

**CITY OF LAREDO
STANDARD TECHNICAL
SPECIFICATION
MANUAL**

Appendix A

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**SECTION A-1
NOTICE TO BIDDERS**

Sealed bids will be received at City Secretary's Office, 1110 Houston Street, Laredo, Texas until _____, _____ P.M., and then publicly opened, read and taken under advisement for the furnishing of all necessary materials, machinery, equipment, labor, superintendence, and all other services and appurtenances required for (Project Name). Said bid shall be marked,

"Project Name"

Each proposal and the proposal guaranty must be originals and must be sealed in an envelope plainly marked with the name of the project as shown above, and the name and address of the Bidder. When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in this Notice to Bidders.

Only proposals and proposal guaranties actually in the hands of the designated official at the time set in this Notice to Bidders shall be considered. Proposals submitted by telephone, telegraph, or fax, will not be considered.

Bidders are expressly advised to review Section C-3.10 of the General Conditions of the proposed Contract as to the causes which may lead to the disqualification of a bidder and/or the rejection of a bid proposal. Unless all bids rejected, Owner agrees to give Notice of Award of Contract to the successful bidder within sixty (60) days from the date of the bid opening.

Bidders are expected to inspect the site of the work and inform themselves regarding all local conditions.

Copies of the plans and specifications may be reviewed free of charge at the office of the City Engineer, 1110 Houston Street, Laredo, Texas, or copies may be obtained upon deposit of \$ _____ for each set of documents. The entire amount of deposit will be refunded to bona fide bidders if the plans and specifications are returned in good order within fifteen (15) days after the bid opening. The full amount of deposit will also be refunded to bona-fide subcontractors, manufacturers of materials, and suppliers whose names are identified in the contractor's (bidder's) Proposal - Information from Bidders.

Signed

Gustavo Guevara, Jr.
City Secretary

Publication Dates:

**SECTION A-2
INFORMATION TO BIDDERS**

Sealed bids will be received at City Secretary's Office, 1110 Houston Street, Laredo, Texas until ____ p.m. on _____, and then publicly opened, read and taken under advisement for the furnishing of all necessary materials, machinery, equipment, labor, superintendence, and all other services and appurtenances required for construction of (Project Name). Said bids shall be marked,

(Project Name)

and shall include acknowledgment of addenda submitted, and all other documents included in said bid call.

Bids shall be based on a per unit of work basis and shall include dollar amounts for each specific unit in improvements listed including those items listed as alternatives as per the proposal sheet included in the specifications of this project.

Each proposal and the proposal guaranty must be originals and must be sealed in an envelope plainly marked with the name of the project as shown above, and the name and address of the Bidder. When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in this Notice to Bidders.

Only proposals and proposal guaranties actually in the hands of the designated official at the time set in this Notice to Bidders shall be considered. Proposals submitted by telephone, telegraph, or fax, will not be considered.

The City reserves the right to award the contract on the basis of the alternative which appears most advantageous to the City, to reject any or all bids, to waive objections based on failure to comply with formalities and to allow the correction of obvious or patent errors. Bidders are expressly advised to review Section C-3 of the General Conditions of the proposed contract as to the causes which may lead to the disqualification of a bidder and/or the rejection of a bid proposal. Unless all bids are rejected, Owner agrees to give Notice of Award of contract to the successful bidder within sixty (60) days from the date of the bid opening.

Bidders for the construction work must submit a satisfactory cashier's or certified check, or bidder's bond, payable without recourse to the order of the City of Laredo, Texas, in an amount not less than five percent (5%) of the total bid based on the bid which check or bond shall be submitted as a guarantee that the bidder will enter into a contract and executed performance and payment bonds within ten (10) days after Notice of Award of contract to him for contracts in excess of \$25,000.00. Bids without the required check or bond will NOT be considered.

Successful bidder for the construction of the improvements must furnish a satisfactory Performance Bond in the amount of 100% of the total contract price, and a satisfactory Payment Bond in such amount, both duly executed by such bidder as principal and by a corporate surety duly authorized so to act under the laws of the State of Texas. The successful bidder will be required to provide Performance and Payment Bonds issued by an insurance company which meets the minimum State requirements and is licensed in the State of Texas, and has a Best's Key Rating as follows:

<u>Construction Contract</u>	<u>Rating</u>
25,001 - 250,000	None
250,000 - 1,000,000	B
Over 1,000,000	A

All lump sum and unit prices must be stated in both script and figures.

Bidders are expected to inspect the site of the work and to inform themselves regarding all local conditions.

The Instructions to Bidders, Forms of Bid, Form of Contract, Plans, Specifications, Form of Bid Bond, Performance and Payment Bonds and other contractual documents may be examined free of charge at the City of Laredo Engineering Department, 1110 Houston Street, Laredo, Texas 78040.

Copies of the plans and specifications may be reviewed free of charge at the office of the City Engineer, 1110 Houston Street, Laredo, Texas, or copies may be obtained upon deposit of _____ for each set of documents. The entire amount of deposit will be refunded to bona fide bidders if the plans and specifications are returned in good order within fifteen (15) days after the bid opening. The full amount of deposit will also be refunded to bona fide subcontractors, manufacturers of materials, and suppliers whose names are identified in the contractor's (bidder's) Proposal-Information from Bidders.

In the event the base bid amount is LESS than \$25,000.00, a Payment Bond and Performance Bond will NOT BE REQUIRED. A Bid Guarantee in the form of a Cashier's or Certified Check or Bid Bond and the Certificate of Insurance however, WILL BE REQUIRED. Under this conditions, the successful bidder for the (*Project Name*) is hereby advised that the total contract price will be paid in ONE PAYMENT upon completion and acceptance of the project by the City of Laredo.

Any other division or section of this project's specifications having reference to Bid Guarantee, Cashier's or Certified Check, Bid Bond, Payment Bond, or Performance Bond, or having mention at all, to the requirements of bonds, is hereby amended to concur with the above conditions ONLY when the base bid is LESS THAN \$25,000.00.

Bidders are advised to contact the City Engineering Department at 1110 Houston Street, Laredo, Texas, 78040, telephone number (956) 791-7346, for any additional information required on the project.

Contractor's attention is directed to Special Provision 000-6233, "Important Notice to Contractors" and "Statement of Materials and Other Charges" which will be included in all projects, beginning with the September 1991 letting. These establish the procedures whereby the Contractor will be permitted to obtain an exemption from the sales tax on certain materials. See Comptroller's Rule 2.291 and Texas Tax Code Chapter 151, as amended by House Bill Number 11, Acts 1991, 72nd Legislature, First called Session. The Contractor will be required to separate the charges for materials from all other charges and will be furnished an Exemption Certificate of each contract the Department. Also, the Contractor must issue resale certificates to suppliers. Sales tax permit applications and information regarding resale certificates may also be obtained by calling the State Comptroller's toll free number 1-800-252-5555.

A Pre-bid meeting is scheduled for _____ at _____ p.m.
at _____.

SECTION A-3 ADVICE TO BIDDERS

PROJECT: (Project Name)

The Contractor's attention is directed to the State of Texas Comptroller of Public Accounts Limited Sales Excise and Use Tax Rules and Regulations, Paragraph 3 of Ruling No. 9. Repairmen and Contractors (amended April 3, 1972). Reference Article 20.01 (T). Upon compliance with certain conditions, this ruling provides for exemption from this tax of materials incorporated into work done for an exempt agency under a Contract. The City is an exempt agency.

Any Bidder may elect to exclude this sales tax from his bid. If the Bidder submitting the lowest acceptable bid for performing the work on this project elects to comply with the above ruling on any bid item included in this Contract by obtaining any necessary permit or permits from the State Comptroller allowing the purchase of material for incorporation into this project without having to pay the Limited Sales, Excise and Use Tax at the time of purchase, he shall upon Award of Contract submit a statement in satisfactory form in which his bid prices to the City for materials are listed separately from all other charges, either by bid item or by total as required by the comptroller. This statement shall be included in and made part of the Contract.

The City will furnish the Contractor with its exemption certificate for those materials incorporated in the project for which the above required statement is submitted.

The City will make no further allowance for and will make no price adjustment above or below the originally bid unit price on account of this tax. It shall be the Contractor's sole responsibility, if he elects to exclude the sales tax from his bid, to comply with the aforementioned Ruling No. 9 and with any other applicable rules, regulation, or laws pertaining to the Texas Limited Sales, Excise and Use Tax which may now or at any time during the performance of this Contract be in effect, and the City shall have no responsibility for any sales or use tax which the Contractor may be required to pass as a result of his failure or the City's failure to comply with said rules, regulations or laws, or as the result of the performance of the Contract or any part thereof by the Contractor.

Bidders are cautioned that materials which are not permanently incorporated into the work are not eligible for exemption and are not to be included in the statements as "Materials" (example: fuel, lubricants, tools, forming materials, etc.).

SECTION A-4
INFORMATION TO CONTRACTORS

PROJECT: (Project Name)

The Contractor's attention is directed to Special Provision 000-6233, "Important Notice to Contractors", and "Statement of Materials and Other Charges" which will be included in all projects, beginning with the September, 1991 letting. These establish the procedures whereby the Contractor will be permitted to obtain an exemption from the sales tax on certain materials. See Comptroller's Rule 3.291 and Texas Tax Code, Chapter 151, as amended by House Bill Number 11, acts 1991, 72nd Legislature, First Called Session. The Contractor will be required to separate the charges for materials from all other charges and will be furnished an Exemption Certificate for each contract by the Department. Also the Contractor must issue resale certificates to suppliers. Sales tax permit applications and information regarding resale certificates may be obtained by calling the State Comptrollers' toll free number 1-800-252-5555.

SPECIAL PROVISION

No. 000-6233

IMPORTANT NOTICE TO CONTRACTORS

The Contractor's attention is directed to Rule 3.291, paragraphs (a) (1), defining separated contracts, subsection (b) (3) discussing separated contracts, and subsection (c) discussing exempt contracts. Reference: Texas Tax Code, Chapter 151.

Contractors should note those organizations in subsection (c) that the rule shows as being exempt no longer qualify for the exemption. The rule states that contractors improving realty for organizations listed in Texas Tax Code 151.309 and 151.310 are exempt from tax. THIS IS NO LONGER TRUE EFFECTIVE WITH CONTRACTS SIGNED ON OR AFTER AUGUST 15, 1991.

Only those contracts with school districts and nonprofit hospitals qualify for the exemption discussed in subsection (c) of Rule 3.291.

The Comptroller is amending the rule to reflect this change.

If the low bidder elects to operate under a separated contract as defined by Rule 3.291, by obtaining the necessary permits from the State Comptroller's office allowing the purchase of materials for incorporation in this project without having to pay the Limited Sales and Use Tax at the time of purchase, the low bidder shall identify separately from all other charges the total agreed contract price for materials incorporated into the project. This form shall be filled out by the low bidder in each of the two bound copies of the contract. Total materials shall only include materials physically incorporated into the realty.

If the Contractor operates under a "separated contract", the Department will furnish the Contractor with an exemption certificate for the applicable materials.

In order to comply with the requirements of Rule 3.291, as mentioned above, it will be necessary for the Contractor to obtain a sales tax permit.

It will also be necessary that the contractor issue resale certificates to his suppliers.

Sales tax application for a sales tax permit and information regarding resale certificates may be obtained by writing to:

Comptroller of Public Accounts
Capital Station
Austin, Texas 78774

The Contractor may also receive information or request sales tax permit applications by calling the State Comptrollers' toll free number 1-800-252-5555.

Subcontractors are eligible for sales tax exemption if the subcontract is made in such manner that the charges for materials is separated from all other charges. The procedure described above will effect a satisfactory separation. When subcontractors are handled in this manner, the Contractor must issue a resale certificate to the subcontractor and the subcontractor, in turn, must issue a resale certificate to his supplier.

STATEMENT OF MATERIALS AND OTHER CHARGES

PROJECT: (Project Name)

MATERIALS INCORPORATED INTO THE PROJECT: \$ _____

ALL OTHER CHARGES: \$ _____

*TOTAL: \$ _____

*This total must agree with the total figure shown in the Item and Quantity Sheets in the bound contract.

For purposes of complying with the Texas Tax Code, the Contractor agrees that the charges for any material incorporated into the project in excess of the estimated quantity provided for herein will be no less than the invoice price for such material to the Contractor.

NOTE: ONLY THE COPY OF THIS FORM IN THE BOUND CONTRACTS IS TO BE FILLED OUT.

**SECTION A-5
PROPOSAL**

To: The City of Laredo, Texas

From: _____
Contractor

Address: _____

PROJECT: (Project Name)

Attn: Honorable Elizabeth "Betty" G. Flores

Pursuant to Notice to Bidders, the undersigned bidder hereby proposes to furnish the labor, materials, and equipment in accordance with the plans and specifications, general conditions of the agreement, special provisions of the Agreement, and Addenda, if any. The bidder binds himself upon acceptance of his proposal to execute a contract and bonds accompanying form of performing and completing the said work within the time stated as required by the detailed specifications at the following unit prices. The quantities shown below are based on the Engineer's estimate of quantities and it is agreed that the quantities may be increased or diminished, and may be considered necessary in the opinion of the City of Laredo, Texas to complete the work fully as planned and contemplated, and that all quantities of work, either increased or decreased, are to be performed at the unit prices set forth below (except as provided in the General Conditions of the Agreement or the specifications, the contract documents).

Acknowledgment of Addenda: (Please initial and date):

Addendum No. 1: _____

Addendum No. 2: _____

Addendum No. 3: _____

Addendum No. 4: _____

Addendum No. 5: _____

Acknowledgment of other documents: (Please initial and date):

Wage Determination: _____

Labor Provisions: _____

Affirmative Action Program: _____

AFFIDAVIT

PROJECT: *(Project Name)*

Form of Non-Collusive Affidavit

STATE OF TEXAS {}

COUNTY OF WEBB {}

_____ being first duly sworn, deposes and says

That he is _____
(a Partner or Officer of the firm of, etc.)

the party making the foregoing proposal or bid, that such proposal or bid is genuine and not collusive or sham; that said Bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any Bidder or Person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, or communication or conference, with any person, to fix the bid price or affiant or of any other Bidder or to fix any overhead, profit or cost element of said bid price, or of that of any other Bidder, or to secure any advantage against the City of Laredo or any person interested in the proposed Contract; and that all statements in said proposal or bid are true.

Signature of

Bidder, if the Bidder is an individual
Partner, if the Bidder is a Partnership
Officer, if the Bidder is a Corporation

Subscribed and sworn before me this _____ day of _____, 19____.

Notary Public

My Commission expires

CITY OF LAREDO
ENGINEERING DEPARTMENT
BID SCHEDULE

ATTACHMENT 1

PROJECT: *(Project Name)*

Item No.	Estimated Qty.	Unit	Description of item with Unit Price Written in Words	Unit Price (in numbers & words)	Amount
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
				<u>TOTAL</u>	

ALTERNATES:

--	--	--	--	--	--

TOTAL BASE BID
WRITTEN IN
WORDS: _____

Contractor

Signature

Title

Address

City/State

Zip Code

Telephone Number: () _____

Fax Number: () _____

Date: _____

**NOTE: ALL BID ITEMS WILL BE PAID FOR WHEN COMPLETE IN PLACE,
TESTED, AND ACCEPTED BY THE OWNER.**

INFORMATION FROM BIDDERS

PROJECT: (*Project Name*)

Statement of Qualifications: (Similar Projects Completed by Bidder)

- 1. Name of Project: _____
Value of Contract: _____
Date Completed: _____
- 2. Name of Project: _____
Value of Contract: _____
Date Completed: _____
- 3. Name of Project: _____
Value of Contract: _____
Date Completed: _____

Experience Data: (Include name and experience record of the Superintendent)

Financial Status: A confidential financial statement will be submitted by the apparent successful low Bidder only if the Owner deems it necessary.

PROJECT: (*Project Name*)

Proposed Progress Schedules:

Data on Equipment to be used on the Work: (Include the number of machines, the type, capacity, age and conditions and location)

Subcontractors: (Submit a list of proposed Subcontractors. List sources, types and manufacturers of proposed materials)

BID BOND

PROJECT: (*Project Name*)

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned

as Principal, and _____ as
Surety, are hereby held and firmly bound unto

as Owner in the penal sum of _____
for payment of which, well and truly to be made, we hereby jointly and severally bind
ourselves, our heirs, executors, administrators, successors and assigns.

Signed, this _____ day of _____, 19__.

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

NOW, THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate,
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said Contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the Agreement created by the acceptance of said Bid,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

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

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

(L.S.)

Principal

Surety

By: _____

SECTION A-6
CHECKLIST FOR BIDDERS

All information required by the terms of the Bid Documents must be furnished.

MISTAKES OR OMISSIONS CAN BE COSTLY AND CAN RESULT IN THE REJECTION OF YOUR BID. Important items for you to check are included in but not limited to, those listed below. This checklist is furnished only to assist you in submitting a proper bid. Check as you read. **DO NOT INCLUDE THIS CHECKLIST WITH YOUR BID.**

- Have you acknowledged receipt of all addenda to the plans and specifications?
- Is your bid properly signed? (Refer to Bid Documents)
- If a bid guarantee is required, is it included in your bid? (A late bid guarantee is treated the same as a late bid)
- Is your bid guarantee in the proper amount? (5% of total bid price)
- Your bid guarantee must be in the form of a Bidder's Bond, a Certified Check or Cashier's Check.
- If your bid guarantee is in the form of a Bidder's Bond, is the bond properly signed by both the bidder and surety and are all required seals affixed?
- Is the surety company qualified and licensed by the State of Texas as required by the provisions of the bid documents?
- Is the name in which you submitted the bid the same on your bid proposal as on the Bidder's Bond?
- If required have you entered a unit price for each bid item?
- If required have you entered the unit price or lump sum price in both words and figures? (Unit Price or Lump Sum price in words govern)
- Are decimals in unit prices in the proper places? Are your figures legible?
- Are the extensions of your unit prices, and your total bid price correct?
- Proposals are required to be submitted in duplicate. Are they identical? The duplicate proposal may be a reproduced copy.

- [] Are all erasures or corrections initialized by the person signing the bid or by an authorized representative of the person signing the bid.
- [] Do not restrict your bid by altering any provisions of the Bid Document or by attaching any documents to the Proposal that takes exception to the Bid Documents.
- [] Have you included all pages of the Proposal with your bid? Are all blanks in the Proposal properly completed (equipment brands, alternate materials, etc.)?
- [] Is the envelope containing your bid properly identified that it is a sealed bid and does it contain the correct project name and bid opening date?
- [] Will your bid arrive on time? Late bids will not be considered. Bids must be received by the City Secretary, City Hall before the specified bid time on the date specified in the Notice to Bidders, or as modified by addenda issued by the City (Other times or dates will be clearly specified in the Notice).

**SECTION A-7
CONSTRUCTION CONTRACT**

PROJECT: (*Project Name*)

STATE OF TEXAS {}

COUNTY OF WEBB {}

THIS AGREEMENT, made this ____ day of _____ by and between the City of Laredo, Texas, acting by and through its duly authorized City Manager hereinafter termed the Owner, and _____ of the City of _____, County of _____ State of _____, his/their executors, administration, heirs, successors, or assigns, hereinafter termed the Contractor.

WHEREAS, the Owner desired to enter into Contract for (*Project Name*) in accordance with the provisions of the Invitation for Bids, the Specifications and Plans title as above, and published by City of Laredo, Texas, 1110 Houston Street, (mailing address: P.O. Box 579), Laredo, Texas 78040 all of which are a part thereof; and,

WHEREAS, the Contractor has been engaged in and now does such work and represents that he is fully equipped, competent and capable to perform the above desired and outlined work, and is ready and willing to perform the work in accordance with the provisions of the Invitation for Bids, the Specifications and Plans, titled, (*Project Name*)

WITNESS:

THAT for and in consideration of the payments and agreements hereinafter mentioned to be made and performed by the Owner, the Contractor hereby agrees at the unit price set forth in his Bid, made a part thereof totaling the sum of _____ (\$ _____) based on the Engineer's estimate of quantities, payable in the manner set out in Division C, Section 9, General Provisions of the contractual Documents to commence and complete the construction of certain landfill improvements in the City of Laredo, Texas, in accordance with Instruction to Bidders, Special Provisions, General Provisions, Technical Provisions, and all other requirements of the contractual Documents, and in accordance with the Specifications and Plans (including all maps, plats, blueprints, and other drawings and printed or written explanatory matter thereof) prepared by the Owner's Engineer, a part thereof and collectively, together with this Agreement constitute the entire Contract; and the Contractor agrees to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services, and whatever else may be necessary to complete the said construction in accordance with said specifications, plans, and other contractual documents including such proposal.

Said Contractor further agrees to begin the work on or before the tenth day following the date set by the Owner in the written notice to proceed and to complete the work within _____ days.

The Contractor further agrees to pay, as liquidated damages, the sum of \$ _____ for each consecutive working day there-in-after as herein provided in Division B, Section 1.

And the Owner in consideration of the full and true performance of the said work by said Contractor hereby agrees to and binds itself to pay the said Contractor the unit price set forth in the attached Bid, and in the manner provided in the Specifications.

IN WITNESS WHEREOF, the OWNER AND THE CONTRACTOR have hereunto set their hand this _____ day of _____.

WITNESS:

Contractor/Firm (Typed)

Name

Signature

Address

Signature (Typed)

Title

Address

City/State/Zip Code

Telephone Number

Fax Number

ATTEST:

CITY OF LAREDO, TEXAS

GUSTAVO GUEVARA, JR., Secretary

Larry Dovalina, City Manager

APPROVED AS TO FORM:

Jaime Flores, City Attorney

**SECTION A-8
PERFORMANCE BOND**

(To be Used in Texas under V.A.T.S. 5160)

THE STATE OF {}
COUNTY OF {}

KNOW ALL MEN BY THESE PRESENTS: That we (1) _____
_____ a (2) _____
_____ of hereafter called Principal and (3) _____
_____ of _____, State of _____
_____, hereinafter called the Surety, are held and firmly bound unto (4) _____
_____ of _____
hereinafter called Owner, in the penal sum of _____
_____ (\$ _____)
Dollars in lawful money of the United States, to be paid in (5)

WEBB COUNTY, TEXAS

_____ for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain Contract with (6) _____
the Owner, dated the _____ day of _____ a copy of which is hereto attached and made a part hereof for the Construction of:

(hereinafter called the "Work")

These notes refer to the numbers in body of Contract above:

Date of Bond must not be prior to Date of Contract.

(1) Correct name of Contractor.

- (2) A Corporation, or Partnership or an Individual, as case may be.
- (3) Correct name of Surety.
- (4) Correct name of Owner.
- (5) County and State.
- (6) Owner.

NOW THEREFORE, if the Principals shall well, truly and faithfully perform the work in accordance with the Plans, Specifications and Contract Documents during the original term thereof, and any extensions thereof which may be granted by the Owner with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie WEBB County, State of Texas, and that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

IN WITNESS WHEREOF, this Instrument is executed in six counterparts, each one of which shall be deemed an original, this the _____ day of _____.

ATTEST:

(Principal) Secretary

PRINCIPAL

By: _____

(SEAL)

Address (State and Zip Code)

Witness as to Principal

Telephone Number

Address (State and Zip Code)

ATTEST:

Secretary

(SEAL)

(Surety) Secretary

(SEAL)

Witness as to Surety

Address (State and Zip Code)

SURETY: (Surety)

By: _____

Address (State and Zip Code)

Telephone No. (Area Code)

PAYMENT BOND

(To be Used in Texas under V.A.T.S. 5160)

THE STATE OF {}
COUNTY OF {}

KNOW ALL MEN BY THESE PRESENTS: That we (1) _____
_____ (2) _____

of _____ hereinafter called Principal and (3) _____
of _____, State of _____, hereinafter called
the Surety, are held and firmly bound unto (4) _____ of
_____ hereinafter called Owner, and unto all
Persons, Firms, and Corporations who may furnish materials for, or perform labor upon
the building or improvements hereinafter referred to in the penal sum of _____
_____ (\$ _____)

Dollars in lawful money of the United States, to be paid in (5) WEBB COUNTY,
TEXAS for the payment of which sum well and truly to be made, we bind ourselves, our
heirs, executors, administrators and successors, jointly and severally, firmly by these
presents.

THE CONDITIONS OF THIS OBLIGATION is such that Whereas, the Principal entered
into a certain Contract with (6) _____
the Owner, dated the _____ day of _____ a copy
of which is hereto attached and made a part hereof for the construction of:

(hereinafter called the "Work")

These footnotes refer to the numbers in body of contract above:

Date of Bond must not be prior to Date of Contract.

- (1) Correct name of Contractor.
- (2) A Corporation, or Partnership or an Individual, as case may be.
- (3) Correct name of Surety.
- (4) Correct name of Owner.
- (5) County and State.
- (6) Owner.

NOW THEREFORE, if the Principals shall well, truly and faithfully perform the work in accordance with the Plans, Specifications and Contract Documents during the original term thereof, and any extensions thereof which may be granted by the Owner with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such Contract, then this obligation shall be null and void; otherwise to remain in full force and effect.

This Bond is made and entered into solely for the prosecution of all claimants supplying labor and material in the prosecution of the work provided for in said Contract, and all such claimants shall have a direct right of action under the Bond as provided in Article 5160, Revised Civil Statues 1925, as amended by House Bill 344, Acts 46 Legislature, Regular Session, 1959.

PROVIDED FURTHER, that if any legal action be filed upon this Bond, venue shall lie WEBB County, State of Texas, and that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any wise affect its obligation on this Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

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

IN WITNESS WHEREOF, this instrument is executed in six counterparts, each one of which shall be deemed an original, this the _____ day of _____.

ATTEST:

(Principal) Secretary

PRINCIPAL

By: _____

(SEAL)

Address (State and Zip Code)

Witness as to Principal

Telephone Number

(SEAL)

Surety

ATTEST:

(Surety Secretary)

By: _____

(SEAL)

Address (State and Zip Code)

Telephone Number

NOTE: If Contractor is Partnership, all Partners should execute Bond.

PERFORMANCE - PAYMENT BOND FORM
M-24, 25, Attach. Sa

ATTEST:

ATTEST:

Individual Principal

By: _____

CERTIFICATE AS TO CORPORATE PRINCIPAL

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

Title

Date: _____

(Affix Corporate Seal)

Telephone No.

The rate of premium on this Bond is _____ per thousand. Total of premium
charge

\$ _____

NOTE: The above must be filled in by Corporate Surety. Power-of-Attorney of person
signed for Surety company must be attached.

SECTION A-9
CONTRACTOR'S AND SUBCONTRACTOR'S INSURANCE

The Contractor shall not commence work under this Contract unit he/she has obtained all the insurance required under this paragraph and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his/her Sub-Contract until the insurance required of the Subcontractor has been so obtained and approved.

- a. **Compensation Insurance:** The Contractor shall procure and shall maintain during the life of this Contract Workmen's Compensation Insurance as required by applicable State or Territorial law for all of his/her employees to be engaged in work at the site of the project under this Contract and, in case of any such work sublet, the Contractor shall require the Subcontractor similarly to provide Workmen's Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Workmen's Compensation Insurance. In the case where any class of employees engaged in hazardous work on the project under this Contract and is not protected under the Workmen's Compensation Statute, the Contractor shall provide and shall cause each Subcontractor to provide adequate employee's liability insurance for the protection of such of his/her employee as are not otherwise protected.
- b. **Contractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance:** The Contractor shall procure and shall maintain during the life of his Contract: Contractor's Public Liability Insurance, Contractor's Property Damage Insurance and Vehicle Liability Insurance in the amount of not less than \$200,000 for bodily injury, including accidental death, to any one person and an amount not less than \$300,000 on account of any one occurrence: Property Damage in the amount not less than \$100,000 per occurrence and \$200,000 aggregate; and Vehicle Liability of \$100,000 for any one person or \$200,000 for each occurrence.
- c. **Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance:** The Contractor shall either (1) require each of his/her Subcontractor to procure and shall maintain during the life of his/her Subcontractor, Subcontractor's Public Liability and Property Damage Insurance and Vehicle Liability Insurance of the type and in the amount specified in Subparagraph b. above or, (2) insure the activities of his/her Subcontractors in his/her policy specified in Subparagraph b. above.
- d. **Scope of Insurance and Special Hazards:** The insurance required under Subparagraph b. and c. above shall provide adequate protection for the Contractor and his/her Subcontractor's, respectively, against damage claims which may arise from operations under this Contract, whether such operations be by the insured or

by any one directly or indirectly employed by him/her and also against any of the special hazard which may be encountered in the performance of this Contract.

- e. **Builder's Risk Insurance (Fire and Extended Coverage):** Unless otherwise provided by the Owner, the Contractor shall procure and shall maintain during the life of this Contract Builder's Risk Insurance (Fire and Extended Coverage on a 100 percent (100%) completed value basis on the insurable portion of the project. The Owner, the Contractor, and Subcontractor (as their interests may appear), shall be named as the Insured.

- f. **Proof of Carriage of Insurance:** The Contractor shall furnish the Owner with certificates showing the type, amount, class of operations covered, effective dates and dates of expiration of policies, including, but not limited to those listed in sections a through e above. Such certificates shall also contain substantially the following statement: "The Insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by the Owner." The insurer of any policy must have a rating of at least B+ and a financial size of Class VI.

CERTIFICATE OF INSURANCE

To: City of Laredo Date: _____
Owner _____

Project: *(Project Name)*

1110 Houston Street, Laredo, Texas _____

This is to certify that _____

Name and Address of Insured and telephone number

is, at the date of this certificate, insured by this Company with respect to the business operations hereinafter described for the types of insurance and in accordance with the provisions of the standard policies used by this company, and further, hereinafter described. Exceptions to standard policies used by this company, and further, hereinafter described. Exceptions to standard policy noted on reverse side hereof.

TYPE OF INSURANCE

Policy No. _____ Effective _____

Expires: _____

Limits of availability: _____

Workman's Compensation: _____

Public Liability: _____ 1 Person: \$ _____

1 Accident: \$ _____

Contingent Liability: _____

Property Damage: _____

Builder's Risk: _____

Automobile: _____

Other: _____

The foregoing policies (do) (do not) cover all subcontractors

Locations covered: _____

Descriptions of Operations covered: _____

The above policies either in the body thereof or by appropriate endorsement provide that they may not be changed or canceled by the insurer in less than five days after the insured has received written notice of such change or cancellation.

WITNESS:

Name

Address

Contractor/Firm (Typed)

Signature

Signature (Typed)

Title:

Address

City/State/Zip Code

Telephone Number

Fax Number

NOTICE:

All persons providing services on this construction project shall abide by new rule 110.110 to the TEXAS LABOR CODE concerning workman's compensation insurance coverage.

This rule is applicable for building or construction contracts advertised for bid by a governmental entity on or after September 1, 1994.

(copy of rule 110.110 is attached)

Rule 110.110 Reporting Requirements for Building or Construction Projects for
Governmental Entities

- (a) The following words and terms, when used in this rule, shall have the following meanings, unless the context clearly indicates otherwise. Terms not defined in this rule shall have the meaning defined in the Texas Labor Code, if so defined.
- (1) Certificate of coverage (“certificate”). A copy of a certificate of insurance, a certificate of authority to self-insure issued by the commission, or a coverage agreement (TWCC-81, TWCC-82, TWCC-83, or TWCC-84), showing statutory workers’ compensation insurance coverage for the person’s or entity’s employees (including those subject to a coverage agreement) providing services on a project, for the duration of the project.
 - (2) Building or construction - Has the meaning defined in the Texas Labor Code, §406.096(e)(1).
 - (3) Contractor - A person bidding for or awarded a building or construction project by a governmental entity.
 - (4) Coverage - Workers’ compensation insurance meeting the statutory requirements of the Texas Labor Code, §401.011(44).
 - (5) Coverage agreement - A written agreement on form TWCC-81, form TWCC-82, form TWCC-83, or form TWCC-84, filed with the Texas Workers’ Compensation Commission which establishes a relationship between the parties for purposes of the Workers’ Compensation Act, pursuant to the Texas Labor Code, Chapter 406, Subchapters F and G as one of employer/employee and establishes who will be responsible for providing workers’ compensation coverage for persons providing services on the project.
 - (6) Duration of the project - Includes the time from the beginning of work on the project until the work on the project has been completed and accepted by the governmental entity.
 - (7) Persons providing services on the project (“subcontractor” in §406.096 of the Act) - Includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes but is not limited to independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity furnishing persons to perform services on the project. “Services includes but is not limited to providing, hauling, or

delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

- (8) Project - Includes the provision of all services related to a building or construction contract for a governmental entity.
- (b) Providing or causing to be provided a certificate of coverage pursuant to this rule is a representation by the insured that all employees of the insured who are providing services on the project are covered by workers' compensation coverage, that the coverage is based on proper reporting of classification codes and payroll amounts, and that all coverage agreements have been filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission's Division of Self-Insurance Regulation. Providing false or misleading certificates of coverage, or failing to provide or maintain required coverage, or failing to report any change that materially affects the provision of coverage may subject the contractor or other person providing services on the project to administrative penalties, criminal penalties, civil penalties, or other civil actions.
- (c) A governmental entity that enters into a building or construction contract on a project shall:
- (1) include in the bid specifications, all the provisions of subsection (d) of this rule, using the language required by paragraph (7) of this subsection;
 - (2) as part of the contract, using the language required by paragraph (7) of this subsection, require the contractor to perform as required in subsection (d) of this rule;
 - (3) obtain from the contractor a certificate of coverage for each person providing services of the project, prior to that person beginning work on the project;
 - (4) obtain from the contractor a new certificate of coverage showing extension of coverage:
 - (A) before the end of the current coverage period, if the contractor's current certificate of coverage shows that the coverage period ends during the duration of the project; and
 - (B) no later than seven days after the expiration of the coverage for each other person providing services on the project whose current certificate shows that the coverage period ends during the duration of the project;

- (5) retain certificates of coverage on file for the duration of the project and for three years thereafter;
- (6) provide a copy of the certificates of coverage to the commission upon request and to any person entitled to them by law; and
- (7) use the following language for bid specifications and contracts, without any additional words or changes, except those required to accommodate the specific document in which they are contained or to impose stricter standards of documentation:

Article _____. Workers' Compensation Insurance Coverage.

A. Definitions:

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

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

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

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

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

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

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

- (1) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
- (2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

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

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

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

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

- (1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;
- (2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;
- (3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

- (4) obtain from each other person with whom it contracts, and provide to the contractor:
 - (a) a certificate of coverage, prior to the other person beginning work on the project; and
 - (b) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
- (5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and
- (7) contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

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

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

- (d) A contractor shall:
 - (1) provide coverage for its employees providing services on a project, for the duration of the project based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements;
 - (2) provide a certificate of coverage showing workers' compensation coverage to the governmental entity prior to beginning work on the project;

- (3) provide the governmental entity, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project;
- (4) obtain from each person providing services on a project, and provide to the governmental entity:
 - (A) a certificate of coverage, prior to that person beginning work on the project, so the governmental entity will have on file certificates of coverage showing coverage for all persons providing services on the project; and
 - (B) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
- (5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (6) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project;
- (7) post a notice on each project site informing all persons providing services on the project that they are required to be covered, and stating how a person may verify current coverage and report failure to provide coverage. This notice does not satisfy other posting requirements imposed by the Act or other commission rules. This notice must be printed with a title in at least 30 point bold type and text in at least 19 point normal type, and shall be in both English and Spanish and any other language common to the worker population. The text for the notices shall be the following text provided by the commission on the sample notice, without any additional words or changes:

REQUIRED WORKERS' COMPENSATION COVERAGE

"The law requires that each person working on this site or providing services related to this construction project must be covered by workers' compensation insurance. This includes persons providing, hauling, or delivering equipment or materials or providing labor or transportation of

other services related to the project, regardless of the identity of their employer or status as an employee.”

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

and

- (8) contractually require each person with whom it contracts to provide services on a project, to:
- (A) provide coverage based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements for all of its employees providing services on the project, for the duration of the project;
 - (B) provide a certificate of coverage to the contractor prior to that person beginning work on the project;
 - (C) include in all contracts to provide services on the project the language in subsection (e)(3) of this rule;
 - (D) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
 - (E) obtain from each other person with whom it contracts, and provide to the contractor:
 - (i) a certificate of coverage, prior to the other person beginning work on the project; and
 - (ii) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
 - (F) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
 - (G) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should

have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

- (H) contractually require each other person with whom it contracts, to perform as required by paragraphs (A) - (H), with the certificate of coverage to be provided to the person for whom they are providing services.
- (e) A person providing services on a project, other than a contractor, shall:
- (1) provide coverage for its employees providing services on a project, for the duration of the project based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements;
 - (2) provide a certificate of coverage as required by its contract to provide services on the project, prior to beginning work on the project;
 - (3) have the following language in its contract to provide services on the project:

“By signing this contract or providing or causing to be provided a certificate of coverage, the person signing this contract is representing to the governmental entity that all employees of the person signing this contract who will provide services on the project will be covered by workers’ compensations coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the commission’s Division of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.”
 - (4) provide the person for whom it is providing services on the project, prior to the end of the coverage period shown on its current certificate of coverage, a new certificate showing extension of coverage, if the coverage period shown on the certificate of coverage ends during the duration of the project;
 - (5) obtain from each person providing services on a project under contract to it, and provide as required by its contract:
 - (A) a certificate of coverage, prior to the other person beginning work on the project; and

- (B) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
- (6) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;
- (7) notify the governmental entity in writing by certified mail or personal delivery, of any change that materially affects the provision of coverage of any person providing services on the project and send the notice within 10 days after the person knew or should have known of the change; and
- (8) contractually require each other person with whom it contracts to:
 - (A) provide coverage based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements for all of its employees providing services on the project, for the duration of the project;
 - (B) provide a certificate of coverage to it prior to that other person beginning work on the project;
 - (C) include in all contracts to provide services on the project the language in subsection (e)(3) of this rule;
 - (D) provide, prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;
 - (E) obtain from each other person under contract to it to provide services on the project, and provide as required by its contract;
 - (i) a certificate of coverage, prior to the other person beginning work on the project; and
 - (ii) prior to the end of the coverage period, a new certificate of coverage showing extension of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the contract;
 - (F) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

- (G) notify the governmental entity in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and
 - (H) contractually require each person with whom it contracts, to perform as required by paragraphs (A) - (H), with the certificate of coverage to be provided to the person for whom they are providing services.
- (f) If any provision of this rule or its application to any person or circumstance is held invalid, the invalidity does not affect other provisions or applications of this rule that can be given effect without the invalid provision or application, and to this end the provisions of this rule are declared to be severable.
- (g) This rule is applicable for building or construction contracts advertised for bid by a governmental entity on or after September 1, 1994.

**SECTION A-10
NOTICE OF AWARD**

To: _____

Project: *(Project Name)*

The City of Laredo has considered the bids submitted for the above described project in response to its advertisement for bids dated _____ and related information to Bidders.

You are hereby notified that your bid in the amount of \$_____, has been favorable considered for the project by the City Council at its regular council meeting on _____. Pursuant to the Information to Bidders you are asked to sign the proposed Contract (in five duplicate originals) and to return the same, along with the required Certificate of Insurance and Payment Bond and Performance Bond within ten (10) days of your receipt of this Notice, for the approval and signature of the City Manager.

For the purpose of effective date of the Performance and Payment Bond, and the required Certificate of Insurance, the date of _____ may be considered the date of the Contract, if the Documents are approved by the City Manager.

If you fail to submit the proposed Contract and the Performance and Payment Bonds and the Certificates of Insurance within ten (10) days from your receipt of this Notice, your bid will be considered as withdrawn and your bid bond will be forfeited.

You are asked to acknowledge receipt of this Notice by signing in the appropriate place below.

Dated this _____ day of _____

CITY OF LAREDO ENGINEERING DEPT.

Rogelio Rivera, P.E.
City Engineer

ACKNOWLEDGMENT:

Receipt of this Notice is hereby acknowledged

Dated this _____ day of _____

Authorized Signature

Title: _____

**SECTION A-11
NOTICE TO PROCEED**

Date: _____

To: _____

Project: *(Project Name)*

In accordance with the construction contract dated _____ you are hereby notified to commence work on _____. Contract time is 45 calendar days including material handling and inventory.

CITY OF LAREDO ENGINEERING DEPT.

Rogelio Rivera, P.E.
City Engineer

The above NOTICE TO PROCEED is hereby acknowledged by

on this the _____ day of _____.

Authorized Signature

Typed Name:

Title: _____

**SECTION A-12
CERTIFICATE OF OWNER'S ATTORNEY**

Project Description: *(Project Name)*

Awarded by the City Council: _____

I, the undersigned, Jaime Flores, City Attorney the duly authorized and acting legal representative of THE CITY OF LAREDO, do hereby certify as follows:

I have examined the attached Contract(s) and Surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid Agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said Agreements on behalf of the respective parties named thereon; and that the foregoing Agreements constitute valid and legally binding obligations upon the parties executing the same in accordance with terms, conditions, and provisions thereof.

Jaime Flores, City Attorney

Date: _____

**SECTION B-1
CONTRACT TIME & LIQUIDATED DAMAGES**

PROJECT: (Project Name)

The Contract Performance for this project shall be (working/calendar) days as defined in the Specifications under General Provisions, Division C, Section 1,

The time set forth in the proposal for the completion of the work is an essential element of the Contract. For each working day under the conditions described in the preceding Paragraph that any work shall remain uncompleted after the expiration of the working days specified in the Contract, together with any additional working days allowed, the amount per day given in the following schedule will be deducted from the money due or to become due the Contractor, not as a penalty but as liquidated damages.

FOR AMOUNT OF CONTRACT		
From More Than	To and Including	Amount of Liquidated Damages Per Working Days
\$0	\$100,000	\$200
100,000	500,000	400
500,000	1,000,000	550
1,000,000	2,000,000	700
2,000,000	5,000,000	850
5,000,000	10,000,000	1,200
10,000,000	15,000,000	1,500
15,000,000	20,000,000	1,700
20,000,000	Over 20,000,000	2,500

SECTION B-2
EQUAL OPPORTUNITY CLAUSE

PROJECT: (Project Name)

1. The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex or natural origin. The Contractor will take Affirmative action to insure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color or national origin. Such action shall include, but not limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection of training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or natural origin.
3. The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or worker's representative of the Contractor's commitments under Section 202 of Executive Order No. 11246, as amended (3CFR 169 (1974) and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The Contractor will comply with all provisions of Executive Order No. 11246, as amended, and of the rules, regulations and relevant orders of the Secretary of Labor.
5. The Contractor will furnish all information and reports required by Executive Order No. 11246, as amended, and by the rules, regulations and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations and orders.
6. In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations or orders, this Contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246, as amended, and such other sanctions may be imposed and remedies invoke as provided in Executive Order No. 11246, as amended or by rule, regulation or order of the Secretary of Labor, or as otherwise provided by law.

7. The Contractor will include the Provisions of Paragraph 1 through 7 in every Subcontract or purchase order unless exempted by rules, regulations or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246, as amended, so that such provisions will be binding upon each Subcontractor or Vendor. The Contractor will take such action with respect to any Subcontract or Purchase Order, as the contracting may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, that in the event the Contractor becomes involved in, or is threatened with, litigation with a Subcontractor or Vendor as a result of such direction by the contracting agency, the Contractor may request the United States to enter into such litigation to protect the interest of the United States.

**SECTION B-4
INSPECTION BY CITY**

PROJECT: *(Project Name)*

The work covered by these Specifications shall at all times be subject to inspection by the City of Laredo authorized inspectors.

The Contractor shall furnish the City Inspector with every reasonable facility for ascertaining whether the work performed is substandard and deviates from the requirements of the plans and specifications. The City Inspector shall have the authority to halt the construction of any portion of the work not meeting requirements until such time as said work has been corrected to the satisfaction of the Inspector and the Engineer.

**SECTION B-3
GENERAL DECISION**

(Insert Latest Wage Scale)

**The latest wage scale can be obtained at the City of Laredo Community
Development Department at**

**DEPARTMENT OF COMMUNITY DEVELOPMENT P.O. BOX 1276 TRANSIT
CENTER EAST WING, 3RD FLOOR 1301 FARRAGUT STREET LAREDO,
TEXAS 78042 For more information you may call 795-2675**

The latest wage scale may also be obtained from the following website:

<http://www.access.gpo.gov./davisbacon/tx.html>

(for Webb County)

State: TEXAS

Construction Type:

HEAVY

HIGHWAY

County(ies):

CAMERON

HIDALGO

NUECES

SAN PATRICIO

VICTORIA

WEBB

END OF GENERAL DECISION

**SECTION B-5
PROJECT SIGN**

Honorable Elizabeth G. Flores
Mayor

Eliseo Valdez, Jr.,	Mayor Pro-Tem	Johnny Amaya	Councilmember
Alfredo Agredano	Councilmember	Joe A. Guerra	Councilmember
Louis H. Bruni	Councilmember	Jose A. Valdez, Jr.	Councilmember
John C. Galo	Councilmember	Juan Ramirez	Councilmember

Larry Dovalina, City Manager
(956) 791-7300

Rogelio Rivera, P.E., City Engineer
(956) 791-7346

A/E's Name
Address
City, State, Zip Code
Telephone Number
Fax Number

Contractor's Name
Address
City, State, Zip Code
Telephone Number
Fax Number

NOTE: Signs are to be installed in ground on 4' x 4' posts
Blue borders
White background
Red letter
Two (2) project signs are required - 4' x 8'

CONTRACTOR TO REMOVE SIGNS UPON COMPLETION OF PROJECT



1993

Blue
White
Blue

White
Red

Blue

**SECTION C-1
DEFINITION OF TERMS**

C-1.01 DEFINITION OF TERMS:

Whenever the terms defined herein occur on the Plans, in any other documents or instrument herein contemplated or to which the Specifications apply, the intent and meaning shall be as follows:

C-1.02 OWNER: (Or Party of the First Party):

The individual, firm corporation or the political subdivision for whom the facilities covered by these Plans and Specifications are to be constructed.

C-1.03 CONTRACTOR: (Or Party of the Second Part):

The individual, firm or corporation with whom the Contract is made by the Owner.

C-1.04 ENGINEER:

City Engineer employed by the Owner, or such other Engineer, or Supervisor authorized by the City Engineer or the Owner to act on their behalf.

C-1.05 CONSULTANT:

Licensed Engineer or Architect employed by the Owner, and authorized by the City Engineer or the Owner to act on their behalf. The decisions by the City Engineer are final.

C-1.06 BIDDER:

An individual, firm or corporation submitting a proposal.

C-1.07 SUPERINTENDENT:

An authorized representative of the Contractor.

C-1.08 INSPECTOR:

An authorized representative of the Owner and Engineer

C-1.09 LABORATORY:

A testing laboratory approved by the Owner and Engineer.

C-1.10 CONTRACT:

The Agreement between the Owner and the Contractor covering the furnishing of all materials and labor necessary to complete the work and consisting of the Plans and Specifications, together with such supplemental agreements as may be made from time to time.

C-1.11 WORKING DAY:

A "Working Day" is defined as any day not including Saturdays, Sundays, or any legal holidays, observed by the City of Laredo, in which weather or other conditions, not under the control of the Contractor, will permit construction of the principal units of work for a continuous period of not less than seven (7) hours. If the contractor opts to work on Saturday, Sunday, or legal holiday requiring construction inspection, said days are considered working days and charged to the contract time.

C-1.12 WORK:

All structures, services, machinery, equipment, or other facilities that are described in the Plans and Specifications together with such additions or modifications as may be ordered by the Owner from time to time.

C-1.13 WORK, ORDER, OR NOTICE TO PROCEED:

A document authorized by the Owner and issued by the Engineer directing the Contractor to proceed on all or part of the work and a specified date.

C-1.14 CHANGE ORDER:

A supplemental agreement adding to or modifying the Contract, including such additional Plans and Specifications as necessary to properly describe the required change.

C-1.15 SURETY:

The corporate body which is bound with the Contractor for the faithful performance of the work covered by the Contract.

C-1.16 PLANS:

The drawings published by the Engineer showing the locations, character, dimensions and details of the work which are part of the Contract.

C-1.17 SPECIFICATIONS:

The directions, provisions and requirements contained herein pertaining to the method and manner of performing the work, or to the quantities, or to the qualities of materials to be furnished under the Contract. The term "Specifications" shall be deemed to include the Contract Documents, the Special Provisions, the General Provision, and the Technical Provisions as contained herein, together with all supplemental agreements and change orders. Specifications are part of the Contract. Plans take precedence over Specifications if in conflict.

C-1.18 CALENDAR DAYS:

A "Calendar Day" is defined as any day of the week inclusive of Saturdays, Sundays, and legal holidays.

SECTION C-2 DEFINITION OF ABBREVIATIONS

C-2.01 DEFINITION OF ABBREVIATIONS:

Whenever the abbreviations defined herein occur on the Plans, in the Specifications, Contract, Bond, advertisement, Proposal, or in any other Instrument herein contemplated or to which the Specifications apply or may apply, the intent and meaning shall be as follows:

A.S.H.O	American Association of State Highways Official
HP	Horsepower
K.W.	Kilowatt
Am. or Amp.	Ampere
KVA	Kilovolt
A.S.T.M.	American Society for Testing Materials
In. or "	Inch or Inches
Lin.	Linear
Asph.	Asphalt
Lb. or #	Pound
Ave.	Avenue
A.W.W.A.	American Waterworks Association
Max.	Maximum
Min.	Minimum
MH	Manhole
I.P.	Iron Pin
B & S.	Bell and Spigot
Mono.	Monolithic
Blvd.	Boulevard
No.	Number
B.T.U.	British Thermal Unit
%	Percent
B.M.	Bench Mark
PL	Property Line
C.I.	Cast Iron
R.	Radius
C.C.C.	Center to Center
Rein.	Reinforced or reinforcing
C/G	Curb & Gutter
C.L.	Center Line
V.G.	Valley Gutter
Con. or Conc.	Concrete
Rem.	Remove
C.S.P.	Concrete Sewer Pipe

Rep.	Replace
C.M.	Circular Mil
R.C.S.D.P.	Reinforced Concrete Storm Drain Pipe
C.F.M.	Cubic Feet per Minute
C.O.	Cleanout
R.P.M.	Revolutions per minute
Cond.	Conduit Minute
Corr.	Corrugated
ROW or R of W	Right of Way
Cu.	Cubic
Vol.	Volume
Culv.	Culvert
S.S.	Sanitary Sewer
Dia.	Diameter
S.D.	Storm Drain
D.S.	Double Strength
Sq.	Square
Dr.	Driveway
Std.	Standard
Elev. or El.	Elevation
T.H.D.	Texas Highway Department
F.	Fahrenheit
V.C.P.	Vitrified Clay Pipe
Ft. or '	Foot or Feet
V	Volt
Gal.	Gallon
Yd.	Yard
S.O.P .	Secretaria de Obras Publicas (Mexican Secretaries of Public Works)
Tex. D.O.T., or TxDOT	Texas Department of Transportation

SECTION C-3 INSTRUCTION TO BIDDERS

C-3.01 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS, AND SITE OF WORK:

Submission of a Proposal shall constitute prima facie evidence that the Bidder has carefully examined the site of the proposed work, the Proposal, Contract Forms, Plans and Specifications, and has satisfied himself as to the character, quality, and quantity of work to be performed, materials to be furnished, and as to the requirements of these Specifications, Special Provisions, and Contract.

Any information on the Plans or in the Specifications as to the soil, or material borings, or tests of existing materials, or location of existing utilities is for the convenience of the Bidder. The accuracy of the information is not guaranteed, and no claims for extra work or damages will be considered if it is found during construction that the actual conditions or locations vary from those indicated on the Plans or in the Specifications.

C-3.02 INTERPRETATION OF ESTIMATES:

Any estimate of quantities of work to be done and materials to be furnished in the proposal or on the Plans is given only as a basis of comparison of Proposals and the Award of the Contract. Such estimate is the result of careful calculation and is believed to be correct, but the Owner does not expressly, or by implication, agree that the actual quantities involved will correspond exactly therewith, nor shall the Bidder plead misunderstanding or deception because of such estimate of quantities, or of the character, location or other conditions pertaining to the work. Payment to the Contractor under unit price contracts will be made only for the actual quantities of work performed or materials furnished in accordance with the Plans and Specifications, and it is understood that the quantities may be increased or diminished as hereinafter provided without in any way invalidating the unit bid prices.

C-3.03 PREPARATION OF PROPOSAL:

The Bidder shall submit his proposal on the forms furnished by the Owner. All blank space in the proposal form shall be filled in for each and every item for which quantity is given, and the Bidder shall state the price (typed, or written in ink, both in words and numerals for which he proposed to do each item of work. In case of conflict between words and numerals, the words will govern.

The Proposal shall be signed in ink by the person or persons making, or authorized to make the bid. If the Proposal is offered by an individual, his name and post office address shall be given. If the proposal is offered by a firm or

partnership, the name and post office address of each member of the firm or partnership shall be given. If the Proposal is offered by a corporation, the name and title of the person signing the Proposal, and the post office address of the corporation shall be given.

Any person signing a Proposal as agent must file with the Owner legal evidence that he has the authority to do so, and that the signature is binding upon the firm or corporation.

C-3.04 REJECTION OF PROPOSAL:

A Proposal showing any alterations or of words or figures, erasures, additions not called for, alternate bids not called for, incomplete bids, condition bids, or proposals not accompanied by proposal guaranty as required, will be considered as an irregular bid and may be rejected. The Owner reserves the right to waive technicalities as to changes, alterations, or reservations, and to make the award to the best interest of the Owner.

C-3.05 PROPOSAL GUARANTY:

Each Proposal shall be accompanied a certified check, cashier's check or bid bond in the amount of five (5%) percent of the total amount bid. Checks shall be made payable unconditionally to the Owner.

C-3.06 DELIVERY OF PROPOSAL:

Each Proposal must be an original and must be sealed, together with the proposal guaranty, in an envelope plainly marked with the name of the project as shown on the Notice to Bidders, and the name and address of the Bidder. When submitted by mail, this envelope shall be placed in another envelope addressed as indicated in the Notice to Bidders.

Only those proposals actually in the hands of the designated official at the time set in the Notice to Bidders shall be considered. Proposals submitted by telephone, telegraph or fax, will **NOT** be considered.

C-3.07 WITHDRAWAL OF PROPOSAL:

A Bidder may withdraw his proposal provided he submits to the official designated to receive bids his request in writing to do so prior to the time set for opening of proposals.

C-3.08 PUBLIC OPENING OF PROPOSALS:

Proposals will be publicly opened and read aloud at the time and place set in the Notice to Bidders.

C-3.09 COMPETENCY OF BIDDERS:

Before any Contract is awarded, the Owner may require the Bidder to furnish a complete statement of his financial resources. His experience in similar work, his equipment available for the work proposed, or any other information necessary to establish his competency and reliability as a Contractor.

C-3.10 DISQUALIFICATION OF BIDDER:

Any of the following causes may be considered as sufficient for the disqualification of the Bidder and the rejection of his Proposal:

More than one proposal for the same work from an individual or corporation under the same or different name.

Evidence of collusion among Bidders.

An unbalanced Proposal.

Failure to submit a unit price for each item of work shown on the Proposal.

Lack of competency as revealed by the financial statement, experience record, or plant and equipment statement furnished.

Lack of responsibility as shown by past work judged from the standpoint of workmanship and progress.

Uncompleted work which, in the judgment of the Owner, might hinder or prevent the prompt completion of additional work if awarded.

Being in arrears on existing Contracts.

Having defaulted on a previous Contract.

C-3.11 MATERIALS GUARANTY:

Before any Contract is awarded, the Owner may require the Bidder to furnish a complete statement of the origin, composition or manufacturer of any and all materials proposed to be used in the work, together with samples, which may be subjected to tests to determine their quality and fitness for the work.

SECTION C-4
AWARD AND EXECUTION OF CONTRACT

C-4.01 CONSIDERATION OF PROPOSALS:

For the purpose of award, after the proposals are opened and read, the bids considered the most advantageous to the Owner will be carefully studied. The bids will then be compared and the results made public. Until the award of the Contract is made, the Owner reserves the right to reject any or all proposals, to waive technicalities, to advertise for new proposals, or to proceed to do the work otherwise when the best interests of the Owner will be thereby promoted.

C-4.02 AWARD TO CONTRACT:

Contract will not be awarded until the necessary investigations as to the competency of the low bidder are made. Award of Contract will be made by the Owner, upon recommendation by the Engineer, to the lowest responsible bidder meeting the requirements of the Owner. Award of Contract will be made within sixty (60) days after the opening of proposals, unless stated otherwise in the Notice to Bidders.

C-4.03 RETURN OF PROPOSAL GUARANTIES:

As soon as the proposal price has been compared the Engineer may, at his discretion, return the proposal guaranties accompanying in those proposals which, in his judgment, will not be considered in making the award. When award is made, the successful bidder's proposal guaranty only will be retained until after Contract and Bond have been executed.

C-4.04 PERFORMANCE AND PAYMENT BOND:

With ten (10) days after Notification of Award of Contract, the successful bidder shall execute and file with the Owner a separate surety and payment bond as required by Chapter 93 of the Acts of the Regular Session of the 56th Legislature of Texas, in the full amount of the contract price as a guarantee of the faithful performance of the Contract and payment of all obligations which may be incurred for material and labor used in the work. Bonds shall be executed by a surety company authorized to do business in the State of Texas on the bond forms provided in these Documents. Any surety shall be subject to the approval of the Owner.

C-4.05 EXECUTION OF CONTRACT:

Within ten (10) days after Notification of Award of contract, the successful bidder shall sign and place in the hands of the Owner the necessary agreement entering into a Contract with the Owner.

C-4.06 NOTICE TO PROCEED:

The Notice to Proceed shall be issued within ten (10) days of the execution of the Agreement by the City provided that the Contractor has properly executed and submitted all Documents required by the City of Laredo within the same period of time. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the City and Contractor. If the Contractor has submitted all Documents required and the Notice to Proceed has not been issued within the ten (10) day period or within the time extension, the Contractor may terminate the Agreement without further liability on the part of either party. Furthermore, should the Contractor fail to execute all the requirements within this same ten (10) days period or within the time extension, the City may terminate the Agreement.

C-4.07

The City of Laredo may make such investigations as he deems necessary to determine the ability of the Bidder to perform the work, and the Bidder shall furnish to the City all such information and data for this purpose as the City may request.

C-4.08 APPROVAL OF CONTRACT:

No Contract shall be binding upon the Owner until it has been signed by the Owner and returned to the Contractor.

C-4.09 FAILURE TO EXECUTE CONTRACT:

Failure to comply with any of the requirements of these Specifications, to execute Contract within ten (10) days after notification of work, or to furnish surety as required, shall be just cause for the annulment of the award. In case of annulment of award, the proposal guaranty shall become the property of the Owner, not as penalty, but as a liquidated damage.

C-4.10

After the Notice to Proceed is issued, the Owner shall provide the Contractor with three (3) complete sets of Plans and Specifications for Contractor's use during construction. In the case that additional sets are required, the Contractor shall make arrangements to obtain the extra sets at his own expense.

C-4.11 RESPONSE TIME DURING THE PROSECUTION OF THE PROJECT:

The contractor shall furnish the owner with three (3) local telephone numbers where contractor or a responsible representative of contractor can be reached at any and all time during the prosecution of this project, and especially during weekends or holidays. Failure of contractor to respond to any such emergency which causes city personnel, equipment and materials to be used in such emergency will result in the contractor being charged an amount which shall be twice the cost incurred by the City in using personnel, equipment and materials to handle such emergency due to failure of the contractor to do so, and, in addition, the contractor will be charged a penalty of \$500.00 for each emergency to which it does not respond. In this connection, "failure to respond" means the failure of the contractor to respond to telephone calls from the relevant staff or owner.

SECTION C-5 SCOPE OF WORK

C-5.01 INTENT OF PLANS AND SPECIFICATIONS:

It is the intent of the Plans and Specifications to describe the complete work to be performed under the Contract. Except as provided on the Plans or in the Specifications, it is also the intent that the Contractor shall furnish all materials, supplies, tools, equipment, labor and incidentals necessary to complete the work.

C-5.02 CHANGES AND INCREASED OR DECREASED QUANTITIES OF WORK:

The Owner has the right to make such changes and alterations in the Plans or in the quantities of work as he may consider necessary or desirable, and such changes and alterations shall not be considered as a waiver of any condition of the Contract, nor shall they invalidate any provision thereof. The Contractor shall perform the work as increased or decreased, and no allowance will be made for anticipated profits.

Payment to the contractor will be made for the actual quantities of work done and materials furnished at the unit prices as set forth in the Contract, except as follows:

When the total cost of work to be done, or of materials to be furnished, is more than one hundred and twenty-five (125) percent of the total contract price for the item stated in the Proposal, then either party to the Contract, upon demand, shall be entitled to a revised consideration on that portion of the work above one hundred and twenty-five (125%) percent of the total contract price stated in the Proposal.

When the total cost of work to be done, or of materials to be furnished, is less than seventy-five (75%) percent on the total contract price for the item stated in the Proposal, then either party to the Contract, upon demand, shall be entitled to a revised consideration on the work actually done.

Revised consideration shall be determined by supplemental agreement between the parties, which supplemental agreement shall be included with, and shall become a party of, the Contract.

C-5.03 OMITTED ITEMS:

The Owner may, in writing, order the omission from the work of any item found unnecessary to the project. Such omission shall be subject to all provisions of Par. C-5.02.

C-5.04 EXTRA WORK:

When the proper completion of the project requires work for which no quantities or prices were shown in the Proposal, such work shall be called "EXTRA WORK" and shall be performed by the Contractor when so directed in writing by the Owner. "EXTRA WORK" shall be performed in accordance with these Specifications and as may be directed by the Engineer.

Prices for extra work shall be itemized and covered by a supplement agreement submitted by the Contractor and approved by the Owner prior to the starting of such work.

Claims for extra work not authorized in writing by the Owner prior to the performance thereof will be rejected.

C-5.05 MAINTENANCE OF TRAFFIC:

When the work requires partial or complete closing of any driveway, alley, street, or roadway, the Contractor shall so schedule and prosecute his work that traffic will be hindered to a minimum.

C-5.06 REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS:

All structures and/or obstructions on the site of the work, which are not to remain in place or which are not to be used in the new construction shall be removed as directed by the Engineer. Such items of removal are not listed in the Proposal will not be paid for as separate items; the cost of doing such work shall be included in the unit price bid for other items.

C-5.07 TOOLS AND ACCESSORIES:

When special wrenches, gauges, or other special tools or accessories are required to properly maintain and operate any machine or equipment furnished under this Contract, the furnishing of such tools and accessories shall be deemed to have been included in the Contract and they shall be furnished by the Contractor without extra cost to the Owner.

C-5.08 GUARANTEES:

All structural, mechanical and electrical equipment or instrument shall be guaranteed against mechanical and physical defects, leakage, breakage, or other damage occurring during normal operation for a period of one (1) year after such equipment or instruments have been accepted by the Owner. The Contractor shall

promptly repair or make good, at his own expense, any defect in such equipment or instruments.

C-5.09 GENERAL GUARANTEE:

All work included in the Contract shall be guaranteed against faulty material or workmanship for a period of one (1) year after the work has been accepted by the Owner.

Neither final acceptance of the work, nor final payment thereof, nor occupancy and use of the work by the Owner shall constitute a waiver of the Owner's right to require the Contractor to repair or make good any such faulty materials or workmanship.

C-5.10 FINAL CLEANING UP:

Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, tools, and materials and shall dispose of all rubbish, temporary structures, and surplus backfill. The site shall be left in a neat and presentable condition throughout. Any land area, driveway, sidewalk, alley, street or road (concrete or asphalt) which has been cut or disturbed during the prosecution of the work shall be repaired at the Contractor's expense to a condition at least as good or better as originally existed.

C-5.11 EXISTING STRUCTURES:

The Plans show the locations of all known surfaces and subsurface structures. However, the exact location of gas mains, water mains, conduits, sewer etc., is unknown and the Owner assumes no responsibility for failure to show any of these structures on the Plans or to show them in their exact location. It is mutually agreed such failure will not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as necessitates, or requires the building of special work, provision for which is not made in the Plans and Proposal, in which case the provisions in these Specifications for extra work shall apply.

SECTION C-6
CONTROL OF WORK AND MATERIALS

C-6.01 AUTHORITY OF ENGINEER:

The work will be observed, tested and inspected by the Engineer, and performed to his satisfaction, in accordance with the Contract, Plans and Specifications. The Engineer will decide all questions which may arise as to the quality and acceptability of materials furnished and work performed, as to the manner of performance and rate of progress of said work, as to the interpretation of the Plans or Specifications relating to the work, as to the fulfillment of the Contract on the part of the Contractor and to the rights of different Contractors on the project.

The decisions of the City Engineer will be final.

C-6.02 CITY ENGINEER AS REFEREE:

The City Engineer will act as referee in all questions, arising under the terms of the Contract between the parties thereto, and his decisions shall be final and binding.

C-6.03 ADEQUACY OF DESIGN:

It is understood that the Owner selected the Engineer named herein to prepare the Plans and Specifications, and all supplements thereto, and it is agreed that the Owner will be responsible for the adequacy of the design, sufficiency of the Plans and Specifications, and safety of structures, 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 fully complied with the Plans and Specifications, all modifications thereof, and all additions and alterations thereof.

C-6.04 PLANS:

Plans will show the lines, grades, cross sections, details and general features of the work. Where shop drawings or working drawings are required, they shall be furnished by the Contractor and approved by the Engineer. Authorized alterations to the Plans will be endorsed on approved copies of the Plans or shown on supplementary sheets.

The approval by the Engineer of the Contractor's shop drawings or working drawings will not relieve the Contractor of any responsibility under the Contract.

The Contractor shall furnish the Engineer with such blue print copies of shop drawings or working drawings as may be required for approval and for the purposes of supervision.

The contract price shall include the cost of furnishing all such prints.

C-6.05 CONFORMITY WITH PLANS:

The finished work shall conform with the lines, grades, cross sections, details and dimensions shown on the Plans. Such deviations from the Plans as may be required will, in all cases, be determined by the Engineer and authorized in writing.

C-6.06 COORDINATION OF PLANS AND SPECIFICATIONS AND SUPPLEMENTAL AGREEMENTS:

The Plans, Specifications, and supplemental agreements are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. In case of disagreement, Plans shall govern over "Technical Provisions," and "Special Provisions" shall govern over "Technical Provisions." The Contractor shall not take advantage of any apparent error or omission on the Plans or Specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately call upon the Engineer for his interpretation and decision, and such decision shall be final.

C-6.07 COOPERATION OF CONTRACTOR:

The Contractor shall give the work the constant attention necessary to facilitate the progress thereof and shall cooperate with the Engineer and with other Contractors in every way possible.

The Contractor shall have on the work at all times, a satisfactory and competent English-speaking Superintendent, authorized to receive order, and act for him as his agent. The Contractor shall designate to the Engineer in writing the name of such Superintendent, and the designated Superintendent may not be removed from the work without the written permission of the Engineer.

C-6.08 CONSTRUCTION STAKES:

The Contractor shall furnish and set at his own expense any and all construction stakes and blue tops as seems necessary for the satisfactory prosecution of the work.

Any missing construction stakes which have been destroyed by the different utility companies, vandals and/or the contractor at the time of construction will be replaced by the contractor at this own expense.

The Engineer may, at his option, make spot or complete checks on all construction alignment and grades to determine the accuracy of the contractor's survey work. These checks, however, will not relieve the Contractor of his responsibility of constructing the work to the lines and grades as shown on the plans or approved change orders. Computations, sketches, and other drawings used in the design and layout of this project will be made available to the Contractor, however these items will not relieve the contractor of his responsibility.

C-6.09 QUANTITIES OF MATERIALS:

It shall be the responsibility of the Contractor to verify all quantities of materials shown on the Plans before ordering such materials. Payment is provided for acceptable materials, and materials rejected due to improper fabrication or excess quantity or other reasons within the control of the Contractor will not be paid for regardless of the quantities or dimension shown on the Plans.

C-6.10 APPROVAL OF MATERIALS:

The sources of supply of materials shall be subject to the approval of the Engineer. Representative samples of materials proposed for use shall be submitted, if required, for examination and testing by an independent testing laboratory selected by the City.

Results obtained from testing such samples may be used for preliminary approval, but will not be used as final acceptance of materials. All materials proposed for use may be inspected or tested at any time during their preparation or use.

If at any time, it is found that sources of supply which have been approved do not furnish a product of uniform quality, or if the product becomes unacceptable at any time, the Contractor shall furnish approved material from another source.

Any material, which after approval has for any reason become unfit for use, shall not be incorporated into the work.

C-6.11 SAMPLES AND TESTS:

Samples and testing procedures shall conform to the requirements of appropriate designations of the American Association of State Highway Officials or the American Society for Testing Materials.

Test for determining the fitness of materials; tests for the purpose of obtaining preliminary approval of materials; tests for determining concrete mixes will be at the expense of the Contractor. Tests for the actual control of the work, such as soil compacting tests and concrete compressive strength test, will be at the expense of the Owner. Any and all retesting because of failure in soil compaction or concrete compressive strength tests shall be done at the expense of the Contractor. Tested and accepted subgrade shall be covered and protected with the flexible base within a maximum of seven (7) days. Tested and accepted flexible base shall be primed and cured a minimum of seventy two (72) hours and shall be cured with asphalt within seven (7) days. Failure to comply with the seven (7) days limitations may result in the need for re-testing at the Contractor's expense depending on weather conditions and at the discretion of the Engineer. The Contractor shall provide such facilities as the Engineer may require for conducting field tests and collecting and forwarding samples. All sampling and testing shall be under the control of the Engineer and shall be done in laboratories approved by him.

C-6.12 STORAGE:

Materials shall be stored as to insure the preservation of the quality and fitness for the work. Material which is not, in the opinion of the Engineer, properly stored and protected will not be included as material in hand in the estimates.

C-6.13 AUTHORITY AND DUTIES OF INSPECTORS:

Inspectors employed by the Owner shall be authorized to inspect all work done in any part of the project and all preparation, fabrication, or manufacturer of the materials to be used.

The Inspector shall be authorized to call to the attention of the Contractor any failure of the work or materials to conform to the Specifications or the Plans. He will in no case act as foreman or perform other duties for the Contractor, nor shall he interfere with the management of the work. In the event the Contractor does not comply with the requirements of the Owner and the Engineer, he may stop all work until the non-compliance is corrected.

If the progress of the work becomes unduly delayed because of negligence on the part of the Contractor, the Inspector shall notify the Owner and the Engineer, who may require the Contractor to give reasons for the delay. If it is found that the Contractor is at fault, then it is the prerogative of the Owner to demand correction.

Inspection as provided herein shall not relieve the Contractor from any obligation to perform the work in conformity with the requirements of the Plan and Specifications. No Inspector shall be authorized to revoke, alter, enlarge or release any requirements of the Plans and Specifications, or to issue instructions

contrary to the Plans and Specifications, or to approve or accept any portion of the work.

The Contractor shall furnish every reasonable facility for ascertaining whether or not the work is performed in accordance with the Plans and Specifications.

No backfill shall be made unless inspected by the Engineer or the City's representative designated in writing and verbal approval of field Engineer is given to such work; if the Contractor should backfill any work without such inspection and approval, the Contractor shall remove or uncover such portions of the finished work as may be directed. After examinations, the Contractor shall restore said portion of the work to the standard required by the Plans and Specifications. Should the work thus exposed and examined prove acceptable or unacceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed shall be done at the Contractor's expense.

C-6.14 SUSPENSION OF WORK:

In case of any dispute arising between the Contractor and the Inspector as to materials furnished or the manner of performing the work, the Inspector shall have authority to reject materials or suspend work until the question at issue can be referred to and decided by the Engineer.

If the Contractor refuses to suspend work on verbal order, the Inspector shall issue a written order to suspend work giving the reason for such suspension. After placing the order in the hands of the Contractor's man in charge, the Inspector shall immediately leave the job. Work done during the absence of the Inspector shall not be paid for.

C-6.15 REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK:

All work which has been rejected or condemned shall be repaired or removed and replaced as the Engineer may direct, at the expense of the Contractor. Materials not conforming to the requirements of the Plans and Specifications shall be removed immediately from the site of the work and replaced with satisfactory material at the expense of the Contractor.

Work done without lines and grades, work done beyond the lines and grade shown on the Plans, work done without inspection, or any extra or unclassified work done without written authority and prior agreement in writing as to the prices will be done at the Contractor's risk and will be considered unauthorized. At the option of the Engineer, such work may not be measured and paid for, or may be ordered removed and replaced at the expense of the Contractor.

Upon the failure of the Contractor to repair satisfactorily or to remove and replace rejected, unauthorized, or condemned work or materials immediately after receiving formal notice from the Engineer, the Owner may at his own option:

- a. Recover for such defective work or materials on the Contractor's bond, or;
- b. Recover from such defective work or materials by action in a court having proper jurisdiction in such matter, or;
- c. Employ labor and equipment and satisfactorily repair, or remove and replace, such defective work or materials and charge the cost of same to the Contractor, which cost will be deducted from any money due him.

C-6.16 DISPUTED CLAIMS FOR EXTRA WORK:

In case the Contractor deems extra compensation is due him for work or materials not clearly covered in the Contract, or not ordered by the Engineer as "EXTRA WORK", the Contractor shall notify the Engineer in writing of his intention to make claim for such extra compensation before he begins the work on which he bases the claim and shall afford the Engineer every facility for keeping actual cost of the work.

Failure on the part of the Contractor to give such notice or to afford the Engineer every facility for keeping account of actual cost of the work shall constitute waiver of the claim for extra compensation. The filing of such notice by the Contractor and the keeping of cost by the Engineer shall not in any way be construed to prove the validity of the claim. Extra work of any kind should only be performed by Contractor upon receipt of an approved Change Order issued by Owner. When the work has been completed, the Contractor shall within ten (10) day file claim for extra compensation with the Engineer, who will present it to the Owner for consideration.

C-6.17 FINAL INSPECTION

Whenever the work provided for under the Contract has been satisfactorily completed and the final cleaning up performed, the Contractor shall notify the Engineer to make the "Final Inspection". Such inspection will be made within ten (10) days of such notification. After such final inspection, if the work is found to be satisfactory, the Contractor will be notified in writing of the acceptance of same. No time charge will be made against the Contractor between the date of notification of the Engineer and the date of the final inspection.

SECTION C-7
LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC

C-7.01 LAWS TO BE OBSERVED:

The Contractor shall make himself familiar with and shall observe and comply with, all Federal, State, and local laws, ordinances and regulations which in any manner affect the conduct of the work, and shall indemnify and save harmless the Owner and the Owner's representative against any claim arising from the violation of any such law, ordinance, or regulation whether by himself or by his employees.

C-7.02 PERMITS AND LICENSES:

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary to the due and lawful prosecution of the work.

C-7.03 PATENTED DEVICES, MATERIALS AND PROCESSES:

If the Contractor is required or desires, to use any design, device, material or process covered by letters, patent, or copyright, he shall provide for such use by suitable legal agreement with the patentee or Owner of such patent. The Contractor and his surety shall indemnify and save harmless the Owner from any and all claims for infringement by reason of the use of any such patented design, device, material, or process, or any trademark or copyright in connection with the work agreed to be performed under this Contract, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay for reasons of any such infringement at any time during the prosecution, or after the completion of the work.

C-7.04 PUBLIC, SAFETY AND CONVENIENCE:

The safety of the public and the convenience of traffic shall be regarded as of prime importance during construction and provisions thereof, made necessary by the work, shall be the direct responsibility of the Contractor, and shall be performed at his own expense.

Where the Contractor is required to construct temporary crossings for streams, culverts, ditches or trenches, his responsibility for accidents shall include the approaches as well as the structures of such crossing.

C-7.05 SANITARY PROVISIONS:

The Contractor shall, at his own expense, provide and maintain in a neat, sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements or the State Department of Health and of other authorities having jurisdiction.

C-7.06 BARRICADES AND WARNING SIGNS:

The Contractor shall furnish and maintain adequate barricades, warning and directing signs, red flags, lights and other traffic control devices as are necessary to comply with the latest edition of the TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREET AND HIGHWAYS.

All provisions of barricades and warning signs shall be considered an incidental and necessary part of the work and no direct payment will be made therefore. All costs of providing such safe guards shall be included in the prices bid for other parts of the work.

C-7.07 USE OF EXPLOSIVES:

When the use of explosives is necessary in the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secured manner and all storage places shall be marked clearly with the words "DANGEROUS EXPLOSIVES". The method of storing and handling explosives and highly inflammable materials shall conform to the requirements of Federal and State laws and regulations. The Contractor shall not use explosives until he has taken the legal precautions necessary to save harmless the Owner from any claims arising from such use of explosives.

C-7.08 PROTECTION AND RESTORATION OF PROPERTY:

The Contractor shall take all measures necessary to protect public or private property which might be injured by any process of construction, and in case of any injury or damage to said property, he shall restore at his own expense the damaged property to a condition similar or equal to the existing before such injury damage was done, or he shall make good such injury or damage in an acceptable manner.

Where the work involves excavation any public or private driveway, alley street or roadway, the Contractor shall do any work necessary to restore such driveway, alley, street or roadway to a condition similar or equal to that existing before such work was done. The Contractor shall be responsible for any subsidence of backfill or pavement failure due to such excavation, and shall promptly repair any such subsidence or failure.

C-7.09 PROTECTION OF EXISTING UTILITIES:

The Contractor shall contact the utility company for exact location prior to doing any work that might interfere with or damage present utilities.

The Contractor shall take all measures necessary to protect existing surface drains, seers, underdrains, conduits, utilities, or similar underground structures, and to provide temporary service when service in any of these is interrupted.

When such facilities are encountered, the Contractor shall notify the Engineer who will arrange for their removal, if necessary. Any utility lines cut or damaged shall be repaired and restored to working conditions as determined by the Engineer.

C-7.10 RESPONSIBILITY FOR DAMAGE CLAIMS:

The Contractor shall save harmless the Owner from all suits, action in or claims brought on account of any injuries or damages sustained by any person or property in consequence of any neglect in safeguarding the work by the Contractor; or on account of any claim or amount recovered for any infringement of patent or reward under the "Workmen's Compensation Laws" or any other laws. He shall be held responsible for all damage or injury to property of any character occurring during the prosecution of the work resulting from any omission, neglect, or misconduct on his part in the manner or method executing the work, or from defective work or materials.

C-7.11 RESPONSIBILITY FOR THE WORK:

Until acceptance of the work by the Engineer, in writing, it shall be under the charges and care of the Contractor. The Contractor shall rebuild and make good at his own expense all injuries and damage to the work occurring before its completion and acceptance. In case of suspension of work for any cause, the Contractor shall be responsible for all the preservation of all materials.

C-7.12 USE OF COMPLETED WORK:

Whenever, in the opinion of the Engineer, any portion of the work is in acceptable conditions, it may be entered upon and used by the Owner upon the written order of the Engineer. Such use shall be held an acceptance of that portion of the work, but not into be considered as a waiver of any of the provisions of these Specifications. Pending final completion and acceptance of the entire work, all necessary repairs and renewal of any part of the work so used, due to defective material or work, to natural causes other than wear and tear, or to the operations of the Contractor, shall be performed by the Contractor at his own expense.

C-7.13 NO WAIVER OF LEGAL RIGHT:

Inspection by the Engineer or by any of his duly representatives, any order, measurement, or certificate by the Engineer; any order by the Owner for the payment of money, any payment for or acceptance of any of work, or extension of time; or any possession taken by the Owner shall not operate as a waiver of any provision of the Contract, or any power therein preserved to the Owner, or of any right to damages therein provided. An waiver of any breach of the Contract shall not be held to be a waiver of any other or subsequent breach.

The Owner reserves the right to correct any error that may be discovered in any estimate that may have been paid, and to adjust that or any subsequent estimate to meet the requirements of the Contract. The Owner reserves the right to claim and recover sums as may be sufficient to correct any error or make good any deficit in the work resulting from error, dishonesty, or collusion in the work after the final payment has been made.

C-7.14 RESPONSIBILITIES OF PARTIES AS TO UTILITY WORK:

It shall be the responsibility of the Contractor to check and coordinate his work with the public and private utility companies which have authority from the City of Laredo to own and operate lines, pipes, conduits, or other means of conveyance within the streets Right-of-Way. The Contractor shall contact the Engineer concerning any and all utility relocation work needed, and it shall be the responsibility of the Contractor to advise the Engineer of any lines or utility poles to be relocated. The Engineer shall assist in coordinating the various utility relocation activities but shall not be responsible for any delays occasioned by this work, although appropriate allowance for additional contract time will be made by the Engineer if warranted. The Owner shall not be responsible for any acts of the Contractor or any damages resulting from work done by the Contractor relating to the removal, alteration, or other activity concerning utilities.

SECTION C-8 PROSECUTION AND PROGRESS

C-8.01 RIGHT-OF-WAY:

The Owner will furnish all and or right-of-way necessary for the performance of the contract and will use due diligence in acquiring land or right-of-way. Should all necessary land or right-of-way not be acquired prior to the beginning of construction, the Contractor shall begin with work upon such land or right-of-way as the Owner may have acquired.

C-8.02 DELAYS DUE TO OWNER:

Should the Owner be prevented or enjoined from proceeding with the work or authorizing its prosecution, either before or after its commencement, by reason of any litigation or by reason of the Owner's inability to acquire necessary land or right-of-way, the Contractor shall not be entitled to make or assert any claim for damage by reason of such delay, or to withdraw from the contract except by consent of Owner.

The time for completion of the work will be extended by such time as determined by the Engineer as will compensate for the time lost by reason of said delay.

C-8.03 SUBLETTING OR ASSIGNING OF CONTRACT:

The "City" does not allow, permit, negotiate, authorize nor approve any assignment of contract proceeds between the "City", the "Contractor", and/or with a bank, lending institution or any type of financial institution either before, during or after a contract award.

The "City" agrees to pay the "Contractor" for specified services as stated in the agreed contract. The "City" does not agree to pay any additional party either jointly or separately for the contract under discussion.

C-8.04 SUBCONTRACTING:

The Owner will not recognize any subcontractor on the work. The Contractor shall be fully responsible to the Owner for the acts and omissions of his subcontractors, and of persons either directly or indirectly employed by them.

C-8.05 PROSECUTION OF WORK:

Prior to beginning of the work, the Contractor shall submit to the Engineer such schedules, charts, or briefs as may be required, outlining the manner of

prosecution of the work. The contractor shall begin the work within ten (10) calendar days after the date set in the "Work Order" or notice to proceed and shall continuously prosecute same with such diligence as will enable him to complete the work within the time specified.

The contractor shall notify the Engineer at least twenty-four (24) hours prior to the beginning at any point. He shall not begin new portions of the work to the detriment of portions already begun.

Owner's normal working hours are Monday through Friday from 8:00 AM to 5:00 PM. The contractor shall notify the owner at least twenty-four (24) hours in advance for any work that is to be scheduled beyond the limits of the owner's working hours, and he shall not begin any such work schedule unless proper inspection by the Contractor has been pre-arranged with the Owner, with the cost for such work beyond the owner's working hours borne by the Contractor.

If at any time the methods, equipment, or sequence of operations used by the Contractor are found to be inadequate to secure the quality of the work or rate of progress required by the contract, the Engineer may in writing order such modifications in the Contractor's methods, equipment, or sequence of operations as he may deem necessary and the contractor shall comply with such order.

C-8.06 WORKMEN AND EQUIPMENT:

All workmen employed by the Contractor shall be skilled and competent. Any person employed by the Contractor who in the opinion of the Engineer does not perform his work in a proper and skillful manner or who is disrespectful, intemperate, disorderly, or otherwise objectionable shall at the written order of the Engineer be immediately removed from the work and shall not be employed again on any part of the work without written consent from the Engineer.

The Contractor shall furnish and use such suitable machinery and equipment as may be required in the opinion of the Engineer to properly prosecute the work. The Contractor shall at the written order of the Engineer remove from the work any equipment found unsuited to properly perform the work.

Upon failure of the Contractor remove the work any person or equipment as ordered by the Engineer, the Engineer may withhold all estimates which have or may become due, or may suspend the work until such orders are complied with.

C-8.07 TEMPORARY SUSPENSION OF WORK:

The Engineer shall have the authority to suspend the work wholly or in part for such period or periods as he may deem necessary due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the

work or for such time as is necessary due to failure on the part of the Contractor to comply with orders given or to perform any or all provisions of the contract.

If work is stopped for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way, and he shall take every precaution to prevent damage or deterioration of the work performed.

The Contractor shall not suspend the work without written authority from the Engineer and shall proceed with the work promptly when notified by the Engineer to resume operations.

C-8.08 COMPUTATION OF CONTRACT TIME:

The Contractor shall complete the work within the number of days stated in the contract. The number of days used shall be the number of days from the first day of actual commencement of operations or the 10th day after the date set in the Work Order or Notice to Proceed whichever comes first, and counting that day as the first elapsed day of contract time.

If the completion of the contract requires unforeseen work, or work and materials in greater quantities than those set forth in the proposal, then additional days or suspension of time charge will be allowed the Contractor equal to the time which in the opinion of the Engineers the work as a whole is delayed.

C-8.09 FAILURE TO COMPLETE THE WORK ON TIME:

The time set forth in the proposal for the completion of the work is an essential element of the contract. If the contractor fails to complete the work in the number of working days specified, a time charge will be made for each day thereafter until the work has been satisfactorily completed.

Unless an amount per day is set forth in the "Special Provisions" to be deducted from the amount due the Contractor for each day charged in excess of the number specified, the time charge shall be based on the monetary loss suffered by the Owner as the result of such delay. Such deductions shall in no way be considered a penalty, but a compensation to the Owner for the added expense to him for engineering supervision and other costs.

C-8.10 ABANDONMENT OF WORK OR DEFAULT OF CONTRACT:

The Engineer may give notice in writing to the Contractor and his surety of delay, neglect, or default stating which if the Contractor:

- Fails to begin work within the time specified, or fails to perform the work with sufficient workmen and equipment;
- Fails to provide materials of sufficient quantity to insure the completion of the work within the contract time; or
- Performs the work unsuitable; or
- Neglects or refuses to remove materials or perform new work such as may have been rejected; or
- Discontinues the work without authority; or
- Refuses to suspend or resume operations when so directed by the Engineer; or
- Becomes insolvent or is declared bankrupt; or
- Commits any act of bankruptcy insolvency; or
- Makes an authorized assignment for the benefit of any creditor; or
- Fails from any other cause whatsoever to carry out the work in an acceptable manner.

The ten (10) days after such notice if given, if a satisfactory effort has not been made by the Contractor or his surety to correct such delay, neglect, or default, the Owner may declare the work abandoned and so notify the Contractor and his surety.

After receiving such notification of abandonment, the Contractor shall not remove from the work any machinery, equipment, tools, materials or supplies then on the site. The Owner shall have the power and authority without violating the contract to take prosecution of the work out of the hands of the contractor and to appropriate or use any or all materials and equipment on the site as may be suitable and acceptable and enter into an agreement for the completion of the contract according to the terms and provisions thereof, or use such other methods as he may elect for the completion of the contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under the contract shall be deducted from any money due or which may become due to the contractor. In the case the cost to the Owner is less than the amount which would have been payable under the contract if it had been completed by the Contractor, then the Contractor shall be entitled to receive the difference. In case the cost to the Owner exceeds the amount which would have

been payable under the contract, if it had been completed by the Contractor, the Contractor and his surety shall be liable and shall pay the Owner the amount of such excess.

SECTION C-9 MEASUREMENT AND PAYMENT

C-9.01 MEASUREMENT OF QUANTITIES:

All work completed under the Contract will be measured in United States standard measures. Linear and surface measurements will be taken horizontally unless otherwise shown on the Plans. Structures will be measured to the neat lines shown on the Plans.

When any material is cubic yards in the vehicle, such measurement will be made at the point of delivery. The capacity of each vehicle shall be plainly marked on said vehicle and the capacity of marking shall not be changed without written permission of the Engineer. The Engineer shall have authority to require all vehicles to have uniform capacity.

C-9.02 SCOPE OF PAYMENT:

The Contractor shall accept the payment as provided in this Contract as full compensation for furnishing all materials, equipment, tools, labor and incidentals necessary to complete the work and for performing all work contemplated and embraced under this contract, as full compensation for loss or damage arising from the nature of the work, or from action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the work; as full compensation for all expenses incurred in consequence of the suspension or discontinuance of the work; as full compensation for all expenses incurred in consequence of the suspension or discontinuance of the work herein specified; as full compensation for expenses incurred in any infringement of patent, trade-mark, or copyright; and as full compensation for completing the work in conformity with the requirements of the Plans and Specifications. Payment will be made only on items which are complete, in place, tested and accepted by the owner. Materials on hand shall be considered for payment ONLY when proper PAID invoices are submitted with Contractor's pay estimates. Materials on hand must be placed in a secured area designed for the project under this contract and be available for inspection by City Engineers at all times. The Contractor must provide an inventory of all materials on a form acceptable to the City Engineer and which must accompany each pay request. The payment of any partial or current estimate shall in no way affect the obligation of the Contractor at his own cost to repair or renew any defective parts of the construction or to replace any defective materials used in the construction and to be responsible for all damages due to such defects. Any items to complete the work indicated on plan shall be considered subsidiary to include positions of work and no further compensation will be made.

No monies payable under this contract, except the estimate for the first month or period, shall become due and payable until the Contractor shall satisfy the Owner that he has fully settled and paid for all materials and equipment used in or upon the work and labor done in connection therewith and the Owner may if he so elects pay and or all bills

wholly or in part, and deduct the amount or amounts paid from any estimate(s) except the first estimate.

In event the surety on any bond given by the Contractor becomes insolvent or is placed in the hands of a receiver or has its right to do business in the State revoked by Law, the Owner may if he so elects withhold payment of any or all estimates until the Contractor shall give a good and sufficient bond in lieu of the bond so executed by said surety.

C-9.03 PAYMENT FOR ALTERED QUANTITIES:

When alterations in the Plans or quantities of work not requiring supplemental agreements are ordered and performed, the Contractor shall accept payment in full at the contract price for the actual quantities of work done. No allowance for anticipated profits will be made. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

C-9.04 PAYMENT FOR OMITTED ITEMS:

When any item ordered omitted from the Contract, the Contractor shall accept payment in full at the contract price for any work actually performed on such item prior to the date of issuance of such order. No allowance will be made for anticipated profits on work ordered omitted. Acceptable materials ordered by the Contractor, or delivered on the work prior to the date of issuance of such order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner. The Contractor shall submit immediately certified statements covering all money expended in the preparation for any item ordered omitted and shall be entitled to reimbursement for any money expended in preparation for any items when such preparation is of no value to the remaining items of the Contract.

C-9.05 PAYMENT FOR EXTRA WORK:

Extra work performed under a supplemental agreement will be paid for according to the terms of such supplemental agreement.

Extra work if performed on a force account basis will be paid for as follows:

For all labor and foreman, the Contractor will receive the wage paid on the project for each hour that said labor and foremen are actually engaged on such work to which shall be added the actual cost of premiums for public liability and workmen's compensation insurance and social security taxes for the actual amount of such payroll.

For all materials used on such work the Contractor will receive the actual cost of such materials including freight charges.

For machinery and equipment used on such work the Contractor will receive an agreed rental price for each hour that such machinery and equipment is actually used on such work. The agreed price shall include the cost of fuel, lubrication and repairs.

To the sum of the foregoing an amount equal to fifteen (15) percent thereof will be added, as compensation for the use of small tools, Superintendent's services, timekeeper's services.

Premium on bond and all other overhead expenses incurred in the prosecution of the extra work including Contractor's profit.

The sum of such payments provided for shall be accepted by the Contractor's as full compensation as provided in C-9.02.

C-9.06 PARTIAL PAYMENTS:

Once a month and within the thirty (30) days after submittal of a correct and complete estimate, the Owner shall make a progress payment to the basis of a duly certified and approved estimate of the work performed during the preceding calendar month under this Contract. To insure the proper performance of the Contract, the Owner shall retain ten (10) percent ** of the amount of each estimate until final completion and acceptance of all work covered by this Contract.

**NOTE Retainage for construction contracts over four hundred thousand (\$400,000) shall be five (5) percent.

In the event that the base bid is less than twenty-five thousand (\$25,000) the total contract price will be paid in one payment upon completion and acceptance of the project.

Should any defective material or work be discovered or should a reasonable doubt arise as to the integrity of any part of the work completed prior to final acceptance and payment, there will be deducted from the first estimate presented after the discovery of such work, an amount equal to the value of the defective or questionable work. Such defective work will be made from all subsequent estimates until the defects have been remedied or the cause for doubt removed.

C-9.07 TERMINATION OF THE CONTRACT BY THE CONTRACTOR:

If the work is stopped for a period of thirty (30) days under an order of any court of other public authority having jurisdiction, or as a result of an act of government, such as declaration of a national emergency making materials unavailable, through no act or fault of the Contractor or subcontractor or their agents or employees or any other persons performing any of the work under a Contract with the Contractor, or if the work should be stopped for a period of thirty (30) days by the Contractor because the Engineer has not issued a Certificate for payment as provided in C-9.06 or because the Owner has not

made payment within the ten(10) days after such stopping of work, then the Contractor may, upon seven (7) additional days written notice to the Owner and the Engineer, terminated the Contract and recover from the Owner payment for all work executed and for any proven loss sustained upon any materials, equipment, tools, construction equipment and machinery, including reasonable profit and damages.

C-9.08 TERMINATION OF THE CONTRACT BY THE OWNER:

If the Contractor is adjudged a bankrupt, or if he makes a general assignment for the benefit of his creditors, or if a receiver is appointed on account of his insolvency, or if he persistently or repeatedly refused or fails, except in cases for which extension of time is provided, to supply enough properly skilled workmen, or proper materials, or if he fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction, or otherwise is guilty of a substantial violation of a provision of the Contracts Documents, then the Owner, upon certification by the Engineer that sufficient cause exists to justify such action, may without prejudice to any right or remedy and after giving the Contractor and his surety, if any, seven (7) days written notice, terminate the employment of the Contractor and take possession of the site and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor and may finish the work by whatever method he may deem expedient. In such case the Contractor shall not be entitled to receive any further payment until the work is finished.

C-9.09

If the unpaid balance of the Contract Sum exceeds the costs of finishing the work, including compensation for the Engineer's additional services made necessary thereby, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or to the Owner, as the case may be, shall be certified by the Engineer, upon application, and this obligation for payment shall survive the termination of the Contract.

C-9.10 ACCEPTANCE OF FINAL PAYMENT:

When the work provided for in the contract has been completed and the final inspection has been made by the Engineer, and all parts of the work have been approved and accepted, the final estimate showing all sums due the Contractor shall be prepared. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. No payment on the final estimate will be made until the Contractor furnishes satisfactory evidence that all claims growing out of lawful demands of laborers, work, men, mechanics, subcontractors, material, men, furnishers of machinery and parts thereof, and suppliers of all kinds have been satisfied. Upon final payment the Contractor shall execute a certificate and release upon the Owner on the form specified.

C-9.11 AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS:

Each and every pay estimate must be accompanied by an "Affidavit of Payment of Debts and Claims and Release of Liens" form (sample of which follows this Section).

C-9.12 MATERIALS ON HAND INVENTORY:

When materials on hand payment is requested, and "Inventory of Materials on Hand" is required and must be included with Contractor's Pay Estimate. Proof of payment for materials on hand is also to be included with the Materials Inventory. A sample form follows this section.

C-9.13 PHOTOGRAPHS

The Contractor shall submit with each monthly progress pay estimate four (4) each 3 ½" x 5" color photographs depicting generally the work done during that month, and each photograph properly identified and dated.

AFFIDAVIT OF PAYMENT OF DEBTS AND CLAIMS AND RELEASE OF LIENS

TO: CITY OF LAREDO
WEBB COUNTY, TEXAS

PROJECT:

By this instrument the undersigned Contractor engaged in the construction of the above project hereby certified that on this date, or any time prior thereto, except listed below, the Contractor has paid the full or has otherwise satisfied all obligations for all materials and equipment furnished, for all work, labor, and services performed and for all known indebtedness and claims against the undersigned for damages arising in any manner on or against the project, its land, improvements and equipment of every kind.

The undersigned hereby certified that he has received all payments currently due under his Contract for work on the above referred (except retainage). Therefore, the undersigned does hereby waive and/or release any and all liens against the property project and as of the _____ day of _____, _____.

Contractor

Authorized Signature

Typed Signature and Title

STATE OF TEXAS
COUNTY OF WEBB

Before me, the undersigned authority, on this day personally appeared _____ known to me to be the person whose name is subscribed to the foregoing instrument, and being first duly sworn, acknowledged to me that he/she executed the same for the purpose and consideration therein expressed and declared to me that the statements contained herein are true.

SWORN AND SUBSCRIBED TO before me this _____ day of _____,

Signature - Notary Public for the State of Texas

Notary Public's Typed Signature

My Commission expires: _____

MATERIALS ON HAND INVENTORY

Project: (*Project Name*)

Contractor: _____

Estimate No. _____ Dates: From _____ to _____

No.	Invoice No.	Vendor	Balance Last Period	Received Current	Placed Current	Balance

SECTION 102 EXCAVATION AND BACKFILL FOR UTILITIES

D-102.01 SCOPE: This section shall govern all excavation and backfill which will be encountered during the work, and supplements those paragraphs pertaining to excavation in Sections entitled "SPECIFICATIONS FOR SDR 26-GRAVITY SEWER PIPING", "WATER LINE CONSTRUCTION", AND "PVC PIPE WATER CONDUITS & INSTALLATION" of these specifications.

D-102.02 CLASSIFICATION: All excavation for this Project shall be considered unclassified. The Contractor is expected to determine the nature of the work and to make his bid prices reflective of the actual conditions which will be encountered. No claim for extra compensation shall be made by the Contractor due to rock, or other unfavorable excavation conditions encountered during the course of the work.

D-102.03 EXISTING UTILITIES: Before commencing excavation, the Contractor shall notify all utility companies with sufficient lead time, and confirm the location of existing underground lines and conduits in the work area.

D-102.04 CLEARING: The Contractor shall do all clearing, grubbing, etc. necessary to complete the work.

D-102.05 DEWATERING: The Contractor shall provide and maintain adequate equipment to remove and dispose of all surface and ground-water entering excavations, trenches, or other parts of the work.

D-102.06 EXCAVATION: Unless otherwise ordered by the Engineer in writing, trench shall be as indicated in the Drawings, and trenching for water lines shall be excavated to a depth of five feet.

D-102.07 SHEETING AND SHORING: Where necessary to protect workmen, the work, or the existing structures, the Contractor shall sheet, brace, and shore the excavation to prevent caving or sliding. This item is further described in Division D, Section 802, entitled "SHEETING AND BRACING".

D-102.08 DISPOSAL OF EXCESS SOIL: Unless otherwise specified, the Contractor shall dispose of all unsuitable or excess excavation spoil. Disposal shall be made at a location and in a manner which is acceptable to the Owner.

D-102.09 PIPE ZONE: The "pipe zone" shall mean that portion of the trench which extends from 24 " above the top of the pipe joints to the bottom of the excavation. "Above the pipe zone" shall mean that portion of the trench which shall extend from 24" above the top of the pipe joints to the top of the finished surface.

D-102.10 BLASTING: Where deemed necessary by the Contractor, and only when authorized in writing by the Engineer, the trench may be blasted. The Contractor shall take all necessary precautions as specified in the General Provisions of these Specifications. The Contractor shall be

solely responsible for any damage incurred due to blasting.

D-102.11 OVER-EXCAVATION: In the event of over-excavation, the over-excavated depth of the trench shall be filled with the appropriate bedding material.

D-102.12 STABILIZATION: Subgrades for pipe work shall be firm, dense, and thoroughly consolidated. The subgrade shall be free of mud, muck, loose material and debris, and shall remain firm and intact under the workmen's feet.

D-102.13 PIPE EMBEDMENT & PIPE ZONE BACKFILL: The first layer of backfill shall be sufficient to provide a compacted depth of one-half the outside diameter of the barrel. This layer shall be placed by hand and tamped with hand or pneumatic tampers. The rest of the pipe zone shall be placed in a similar manner in layers not to exceed 8" loose measure to the top of the pipe zone. Unless otherwise specified, the embedment and material in the pipe zone shall be granular siliceous material free of rocks over 2" in any dimension, which shall contain no more than 25 percent by weight of clay, silt, or organic such as pit run washed sand. Select excavation material may be acceptable; however, the contractor may be required to submit ample sieve analysis results from a reputable independent testing laboratory in order to use such materials for embedment. All backfill material shall be free of trash, debris, and boulders larger than 5" in any dimension. Backfill material containing rock over 3" in any dimension shall not be used in trenches under paved areas. The pipe trench shall be backfilled in a manner so as to prevent future settlement for a period of one year after date of final payment.

LAYING AND INSTALLING PIPE: The Contractor shall provide and install necessary batter boards, wires, or mason's lines to insure installation of the pipe to the lines and grades set by the Engineer. The Contractor's facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench shall be damaged, nor the pipe disturbed that is already laid. The Engineer will inspect all pipe before it is placed in the trench and reject any sections that are damaged by handling or bound to be defective to a degree that would affect the functioning of the pipe. Such pipe so rejected shall be immediately removed from the site of the work. Pipe having breaks or defects not sufficient to cause rejection shall be laid in such a way that the break or defect is at the top.

The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. The bells on bell and spigot pipe shall be laid upgrade. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform.

No pipe shall be laid within ten (10) feet of any point where excavation work is in progress or in trenches containing a perceptible amount of water or on ground that is frozen unless special permission has been furnished by the Engineer.

Before leaving the work at night or any other time, the upper ends of all sewer lines shall be securely closed with a tight fitting plug and provisions shall be made to keep the line from floating out of place should the trench fill with water. Any damage to the sewer lines from failure to follow these provisions shall be repaired at Contractor's expense.

Provisions must be made at all times to keep the interior of the pipe that has been laid free from dirt,

silt, gravel, and any other foreign matter and any such material that is deposited within the pipe from any cause whatsoever must be removed as the work progresses.

D-102.14 BACKFILLING: All trenches and excavations shall be backfilled within 24 hours after pipes are installed therein unless other means of protecting the pipe is directed by the Engineer. At no times, however, shall any backfilling be done until the Engineer has inspected the pipe to be covered. Backfilling requirements:

(1).Timing of backfill: All trenches and excavation shall be backfilled within twenty-four (24) hours after pipes are installed, unless other means of protecting pipe is directed by the Engineer.

At no time, however, shall any backfilling be done until the Engineer has inspected the pipe to be covered.

(2).Backfill placement: After the bedding has been prepared and the pipes installed as required by the pertinent specifications, selected materials from excavation or borrow shall be placed along both sides of the pipe equally in uniform layers not exceeding six (6) inches in depth (loose measurement) in the primary backfill zone and ten (10) inches in depth (loose measurement) in the secondary backfill zone, wetted if required, and thoroughly compacted so that on each side of the pipe there shall be a berm of thoroughly compacted material at least as wide as the external diameter of the pipe, except insofar as undisturbed material obtrudes into this area.

(3).Addition to backfill: Whenever excavation is made for installing pipe culverts or sewers across private property or beyond the limits of the embankment, the top soil removed in excavating the trench shall be kept separate and replaced, as nearly as feasible, in its original position, and the entire area involved in the construction operations shall be restored to a presentable condition.

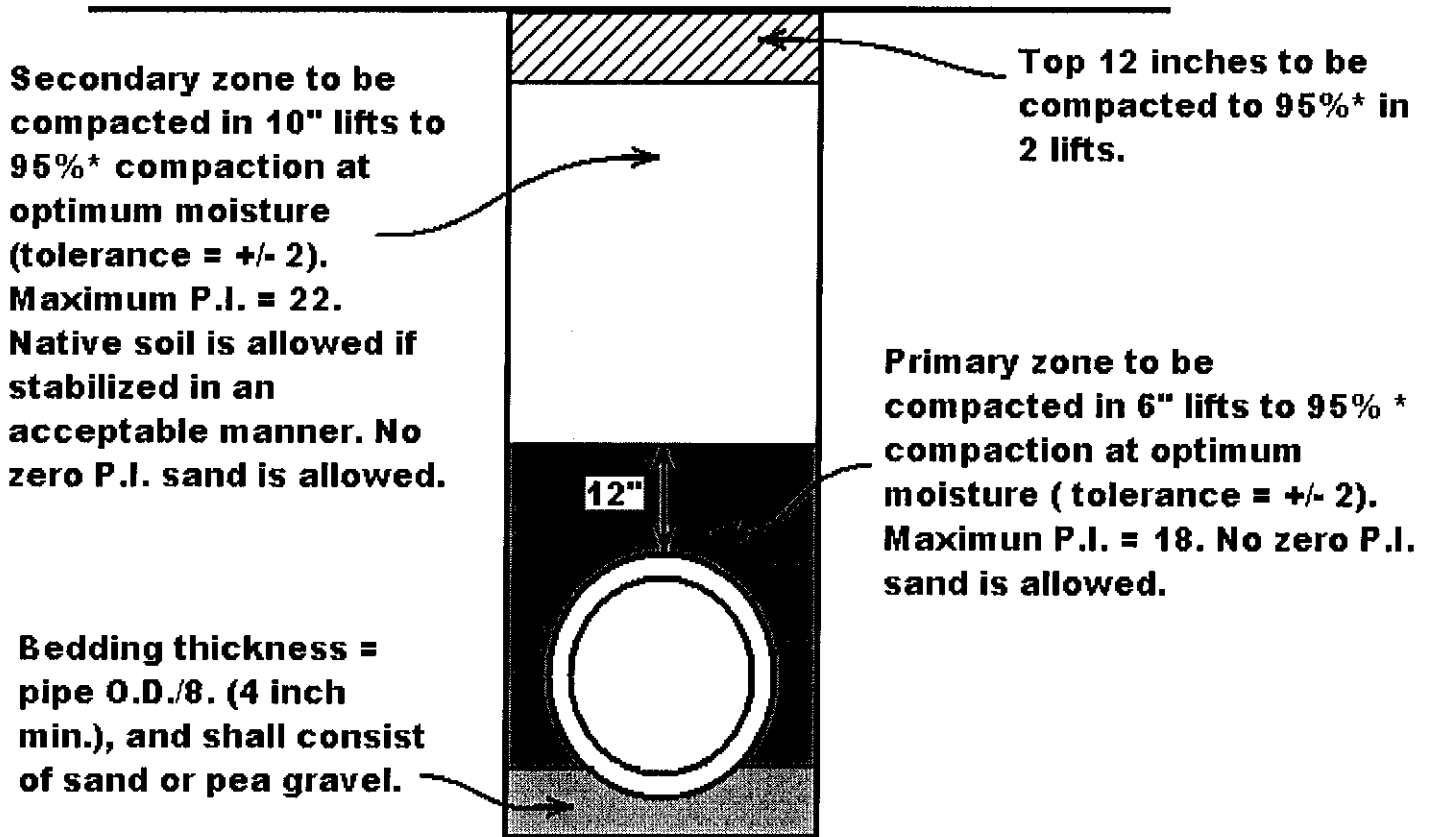
(4).Earth trench: In earth trench, the pipe shall be placed on the natural, undisturbed earth foundation with the trench bottom flat or nearly so. Where rock, shale, or boulders are encountered in the trench, the same shall be removed to a depth of six (6) inches below the grade line and the trench shall be refilled with good, sound earth, gravel, or granular material up to original grade and tamped into place.

(5).Inspection: Prior to the final approval of the utility lines, the Engineer, accompanied by the Contractor's representative, shall make a thorough inspection by appropriate methods of the entire installation. Any indication of defects in material or workmanship or obstruction in the pipe due to the Contractor's negligence shall be corrected by the Contractor without additional compensation and in a manner as directed by the Engineer.

- ① **GENERAL:** There are four (4) different conditions for backfill of proposed pipe. The plans indicate which condition shall prevail in each section or block of the "pipe route". If the plans do not indicate a backfill condition, Condition "A" shall prevail.

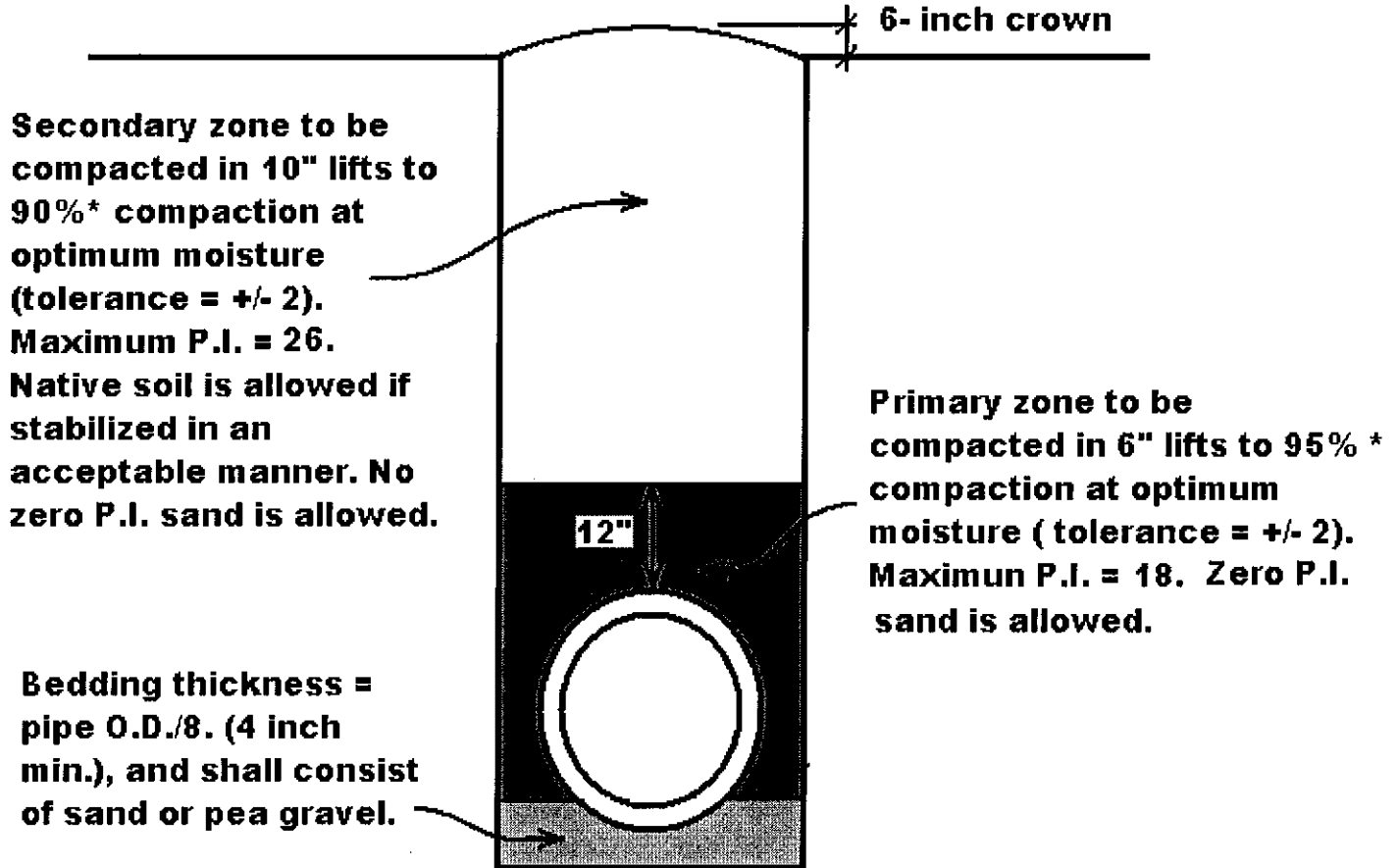
Utility Trench Backfill Methods

Utility Trench Condition "A" Within Paved Areas



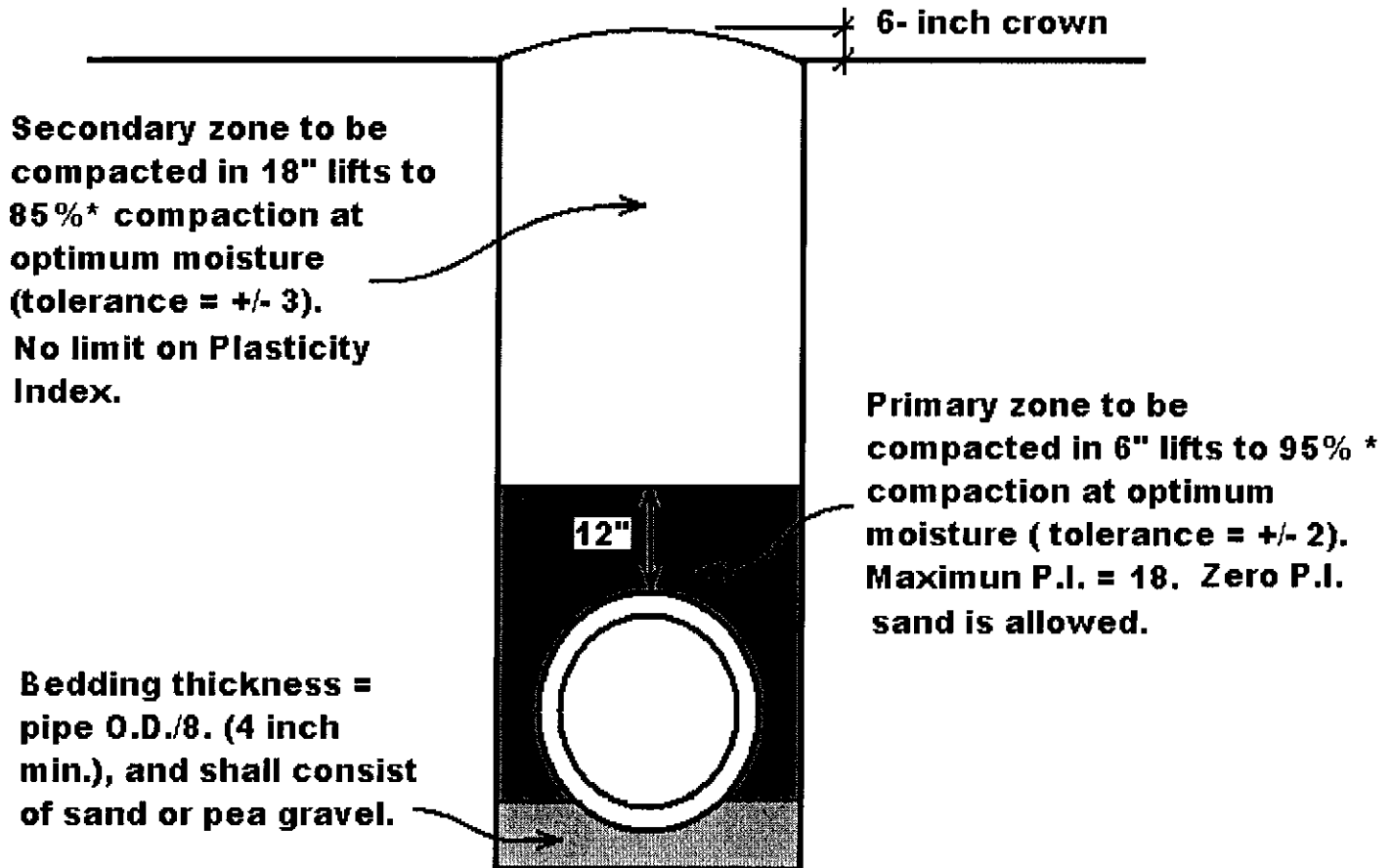
* **Note: All compaction testing shall be performed as per TEX-113-E. All backfill material shall be free of rocks in excess of 3 inches in any direction.**

Utility Trench Condition "B" Within the R.O.W., Outside of Paved Areas



*** Note: All compaction testing shall be performed as per TEX-113-E. All backfill material shall be free of rocks in excess of 3 inches in any direction.**

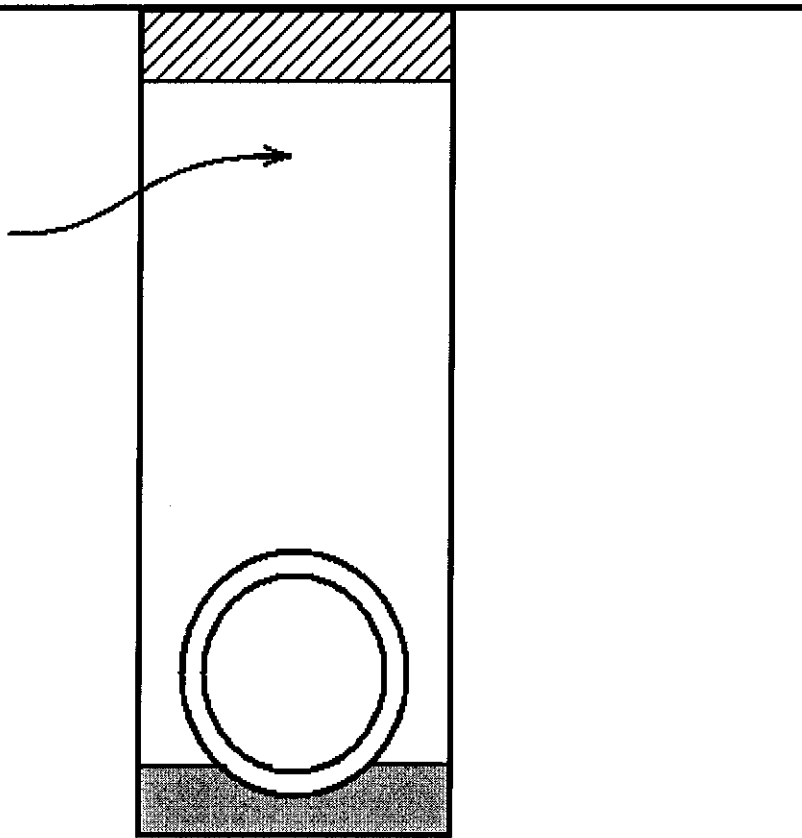
Utility Trench Condition "C" Beyond the R.O.W.



* **Note: All compaction testing shall be performed as per TEX-113-E. All backfill material shall be free of rocks in excess of 3 inches in any direction.**

Utility Trench Condition " D "
Cement Stabilized Sand (Flowable Fill)

**2-sack cement
per 1 cubic yard
of sand, mixed
moist in a
flowable
condition.**



② **OPTION TO ZERO P.I. MATERIAL:** A non-plastic material with the following specification may be used where indicated above. Non-plastic material meeting the specifications below will not be required to be tested for density.

OPTION ZERO P.I.
SIEVE ANALYSIS

Passing 3/8" sieve	95-100%
Passing 1/4" sieve	85-100%
Passing No.40 sieve	75-100%
Passing No.80 sieve	20- 90%
Passing No.200 sieve	00- 20%

D-102.15 WATER JETTING: Only in "Condition C" above, and for pipe 12" or less, and in trenches 8' or less, and only when authority is obtained in writing from the City Engineer, backfill may be compacted with water by use of the jetting method. When using the jetting method, backfill above the pipe zone shall be placed in lifts not to exceed 5 feet. Water jetting shall be delivered under sufficient volume and pressure through an approved jetting hose and pipe nozzle. The jetting hose shall have a minimum inside dimension of two inches (2"). The jetting hose shall be connected to an approved minimum two inches (2") water pump capable of delivering water at the volume and pressure as required by the Engineer. The pipe nozzle shall be of sufficient length to introduce the water at a depth of not less than one foot (1') above the preceding lift. Points of trench jetting shall be staggered along the length of the trench and spaced at not more than three feet (3') on centers. Each five feet (5') lift shall be jetted initially at a depth of not more than one foot (1') above the preceding lift. Sufficient water shall be introduced into the secondary backfill to cause complete subsidence of the backfill and develop free standing water at the surface of each lift. After the final lift has been jetted as approved, twelve (12) hours shall be allowed for the reduction of the materials moisture content. When the backfill moisture content is acceptable for mechanical or pneumatic compaction, the surface shall be compacted to the satisfaction of the Engineer. The surface of the final lift of trenches subject to traffic shall be compacted by ditch tamping equipment.

D-102.16 SITE RESTORATION: The Contractor shall remove and dispose in an acceptable manner of all excess construction material, trash, debris, excess spoil material, etc., from the construction site. All pavement, fences, drainage structures, drainage ditches, and etc., shall be replaced to a condition as good as, or better than, the original structure as existed. The site shall be graded to a smooth well drained condition.

D-102.17 EXISTING GROUND WATER CONDITIONS: Where ground water conditions exist, the following shall apply inclusive of crushed stone backfilling per ASTM Vitriified Clay Pipe C-12.

D-102.18 DISPOSAL OF EXCAVATED MATERIALS: Excavated materials, so far as needed and of a suitable and acceptable character, shall be piled adjacent to the excavations to be used as backfill as required. All excavated material that is unsuitable for backfilling purposes or which is in excess of the amount required or needed to satisfactorily complete the backfill, shall be disposed of as directed by the Engineer. The character and suitability of all backfill material shall meet the approval of the Engineer. Desirable top soil, or sod, etc., shall be carefully piled separately from the

other excavated material so that it can be placed in this original position when required. Excavated material shall be handled at all times in such manner as to cause a minimum of inconvenience to public travel and to permit safe and convenient access to private and public properties adjacent to or along the line of the work. In parkways and easements, where it is necessary to deposit excavated materials on lawns during the progress of the work, care shall be taken to prevent damage to such lawns. Where damage is done to such lawns all expense of replacing the lawn shall be borne by the Contractor.

D-102.19 REMOVAL AND REPLACEMENT OF SOD, SHRUBBERY, PLANTS, ETC.:

Where it is necessary to remove the sod, shrubbery, plants, etc., in order to make any excavation for this work, such areas as are backfilled shall have the same sod, shrubbery, plants, etc. replaced in good condition or if necessary to furnish new sod, shrubbery, or plants of the same kind and in good condition, same shall be furnished by the Contractor at his expense.

The sod, where removal is deemed necessary, shall be removed in squares cut out with a sharp spade or other satisfactory tool; the square shall be of such sizes that they may be conveniently handles without breaking. Such sod shall be removed in layers of not less than four inches (4") depth and shall be stored and given proper attention to protect sod from drying out, pending the time of replacement.

If trees and plants shall be removed, this work shall be done in the approved manner as to require protection of roots, branches, etc.; when backfilling is completed the trees and plants shall be replaced in their original position or as near such position as possible.

D-102.20 PROTECTION OF TREES, PLANTS, SHRUBBERY, ETC.: In developed areas where trees, plants, shrubbery, etc., are adjacent to the line of work, the Contractor shall protect such trees, plants, or shrubbery by wooden boxes, frames, or guards of sufficient strength to prevent any injury from machinery, trucks, or workmen during the prosecution of the work.

**SECTION 104
PVC WATER PIPE**

D-104.01 GENERAL

1. Description

This work shall consist of the construction, complete in place of PVC Water Pipe as specified herein, and in conformity with the lines, grades, dimensions, materials, and design shown on the plans.

D-104.02 PRODUCTS

1. Polyvinyl Chloride Water Pipe

A. GENERAL

All polyvinyl chloride (PVC) water pipe shall be of the rigid (UNPLASTICIZED) type and must bear the National Sanitation Foundation seal of approval for potable water pipe. Each joint of pipe shall consist of single continuous extrusion; bells or other components attached by solvent welding are not acceptable. Pipe shall be pressure rated at 200 psi (DR 14, C-900) as indicated.

Pipe shall have push-on, rubber joints of the bell and spigot type with thickened general bells with rubber gasket joints. The wall thickness of each pipe bell and joint coupling must be greater than the standard pipe barrel thickness. Clearance must be provided in every gasket joint for both lateral pipe deflection and for linear expansion and contraction. Concrete thrust blocking shall be placed behind bends and tees. Concrete support cradles or blocking shall be required for support of all fire hydrants, valves and AWWA C110 fittings; such support shall be provided for AWWA C153 fittings when required by the Engineer.

B. APPLICABLE SPECIFICATIONS

Except as modified or supplemented herein, PVC pipe shall meet the following standards:

- DR 18, C-900, Class 150 PVC Pipe may be used for installation of water mains 8" to 12" not deeper than 8 feet, with the condition that contractor provides to the City of Laredo a written 2 year warranty to begin from the time final inspection and approval has been provided by the Utilities Department. All installation methods, testing procedures and backfilling requirements must be followed as per these specifications applicable to the DR-14, C-900, Class 200, PVC Pipe.
- AWWA C-900, DR 14 for PVC Pressure Pipe, in 2, 6, 8 and 12 inches nominal size, having Cast Iron size outside diameters in trenches greater than or equal to a depth of 10 ft.
- Fittings used with PVC Pressure pipe shall be AWWA C-110 or AWWA C-153 compact ductile iron fittings.
- Any pipe 16" or greater requires a separate specification submittal.

Standard sizes, dimensions and tolerances shall be as follows:

Nominal Size (inches)	Outside Avg. (inches)	Diameter Tolerance (inches)	Wall Min. (inches)	Thickness Tolerance (inches)
6	6.900	+0.011	0.493	+0.046

8	9.050	+0.015	0.646	+0.060
12	13.200	+0.015	0.943	+0.088

All pipe 2" and larger must be approved Underwriter's Laboratories for use in buried water supply and fire protection systems.

C. MATERIAL REQUIREMENTS

All pipe and fittings shall be made from clean, virgin, NSF approved, Class 12454B PVC. Clean reworked materials generated from the manufacturer's own production may be used within the current limits of the referenced AWWA C-900.

D. MARKING

Permanent marking on each joint piece shall include the following at intervals of not more than 5 feet:

- Nominal pipe size and OD base (e.g., 4 CIPS)
- The type of plastic material (e.g., PVC 12454B)
- The Standard Dimension Ratio and the pressure rating in psi for water at 73 F (e.g., DR 14, 200 psi).
- The AWWA designation with which the pipe complies (e.g., AWWA C-900).
- The manufacturer's name or code and the National Sanitation Foundation (NSF) mark.

E. TRACER TAPE

For all non-metallic pipe 8" and larger, directly above centerline of the pipe and approximately 12" below the road base or 18" below finished grade, whichever is greater, shall be placed Conductive Tracer Detection Tape. The tape shall be encased in a protective, inert, plastic jacket and color coded in accordance with APWA Uniform Code.

D-104.03 EXECUTION

1. Excavation

Trench all shall be straight. The minimum width of trench excavation shall not be less than the internal diameter of the pipe plus twelve (12") inches. The pipe shall have a minimum cover of 36" unless shown otherwise on the plans.

2. Embedment Using Gravel or Granular Material

In earth trench, they shall be placed on the natural undisturbed earth foundation, with the trench bottom flat.

Where rock shale, or boulders are encountered in the trench, the same shall be removed to a depth of 6" below the grade line and the trench shall be refilled with good, sound earth, gravel, or granular material up to the original grade and tamped into place.

3. Laying Pipe

Pipe shall not be laid where the subgrade is in a condition unsatisfactory to the Engineer. If subgrade is soft, spongy, or disintegrated, the material shall be removed until a firm, stable and uniform bearing is reached and the subgrade brought back to grade with suitable materials thoroughly compacted in place. Embedment for the pipe or the pipe itself will NOT be laid in water.

Where pipe is installed beneath railroad tracks, construction clearance to cross under railroad trackage shall be obtained by Contractor from proper railroad authorities. Any expense of bracing or support to tracks during excavation operation beneath trackage shall be considered part of the contractor.

Where pipe shall be installed beneath State Highways, construction clearance and other requirements to cross under State Highways shall be obtained from State Highway District Engineer by Contractor.

Proper barricades and flares shall be paced and maintained to assure maximum traffic and pedestrian safety, or as directed by Local, Railroad, State Highway authorities or other governing agencies.

Owner will obtain all general permits for construction, and will make formal applications rights to cross canals railroads, highways, etc., but Contractor must cooperate fully with all agencies involved while construction in areas controlled by such agencies.

Before pipe is laid, all dirt shall be removed from inside; and all lumps, blisters, excess coal tar, dirt, oil, and grease removed from both inside and outside of pipe.

After pipe is laid, care shall be taken to avoid entrance of dirt, water or small animals by use of tight bulk heads in all openings.

4. Service Saddles

Service saddles shall be of the un-hinged type on PVC Class 900 pipe (size 6" to 12"). The saddle body and bottom is to be of 85-5-5-5 solid brass material as per ASTM B-62, single width with a minimum of two (2) silicone bronze bolts and a cc-thread.

Bronze saddles with bronze bolts must meet the latest revision of AWWA specifications for saddles to be used on Class 900 PVC pipes.

-Saddles 6" to 12" are to be Jones J-996, or approved equal.

-Saddles 14" to 16" are to be Jones J-979, or approved equal

These specifications are not intended to eliminate any material or equipment of equal quality and purpose of that specified, but instead designed to set standards. If the contractor wishes to use equal material or equipment, he shall submit a sample and/or written proof of quality that substitute is of equal or better quality to Engineer and Water Utilities Engineer and shall function as these plans and specifications intend.

5. Pipe Joints

Manufacturer's recommendations shall be followed. Under no circumstances joints will be subject to full hydrostatic pressure until after the joint has cured for 8 hours.

6. Installation

No tapping, or threading of plastic pipe shall be permitted on pipe with a wall thickness less than Schedule 80.

The pipe fittings and couplings shall at the same temperature when joints are made. Before the solvent is applied, the joint shall be tested for dry fit. The dry fit should be snug. If the dry fit

is such because of improperly sized pipe, likewise, if the pipe is out-of-round to the extent that force is required to place the fitting on the pipe, the pipe shall be rejected. Building up the joint for undersized pipe with multiple layers of solvent cement or "shaving" the end of the pipe shall not be permitted.

Tees for service lines or laterals must be assembled so that no strain is placed on the pipe during or after the backfill operation.

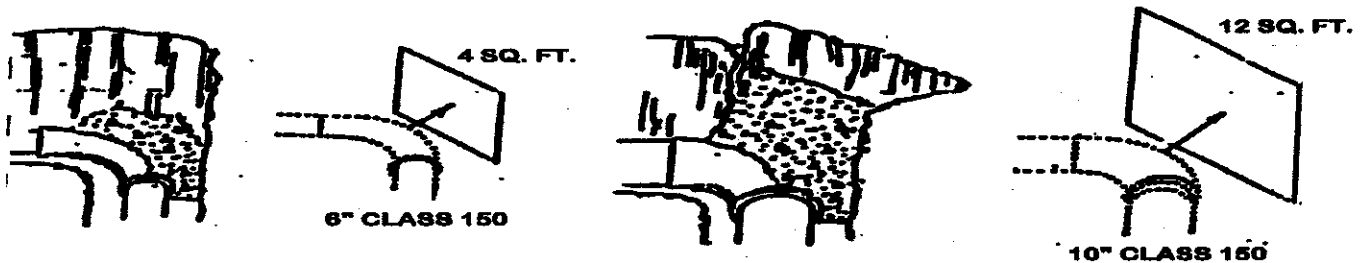
The plastic pipe must be handled with reasonable care so that it is not crimped or damaged when placed in the trench.

All plastic pipes shall be installed in accordance with the recommendations of the pipe manufacturer.

7. Concrete Thrust Blocks

Thrust blocks shall be made of concrete and shall be installed whenever the pipe line changes direction, as at tees and bends; changes size, as at reducers (also some crosses and tees); stops, as at dead end; or is expected to develop thrust at valves. The concrete mix used should be of a minimum strength of 2500 psi and as specified by Engineer.

The size and type of thrust block depends on pressure, pipe size, kind of soil, and the type of fitting. The illustration below shows how the area of a thrust block for resisting horizontal thrusts must increase as the pipe size increases for a given pressure.

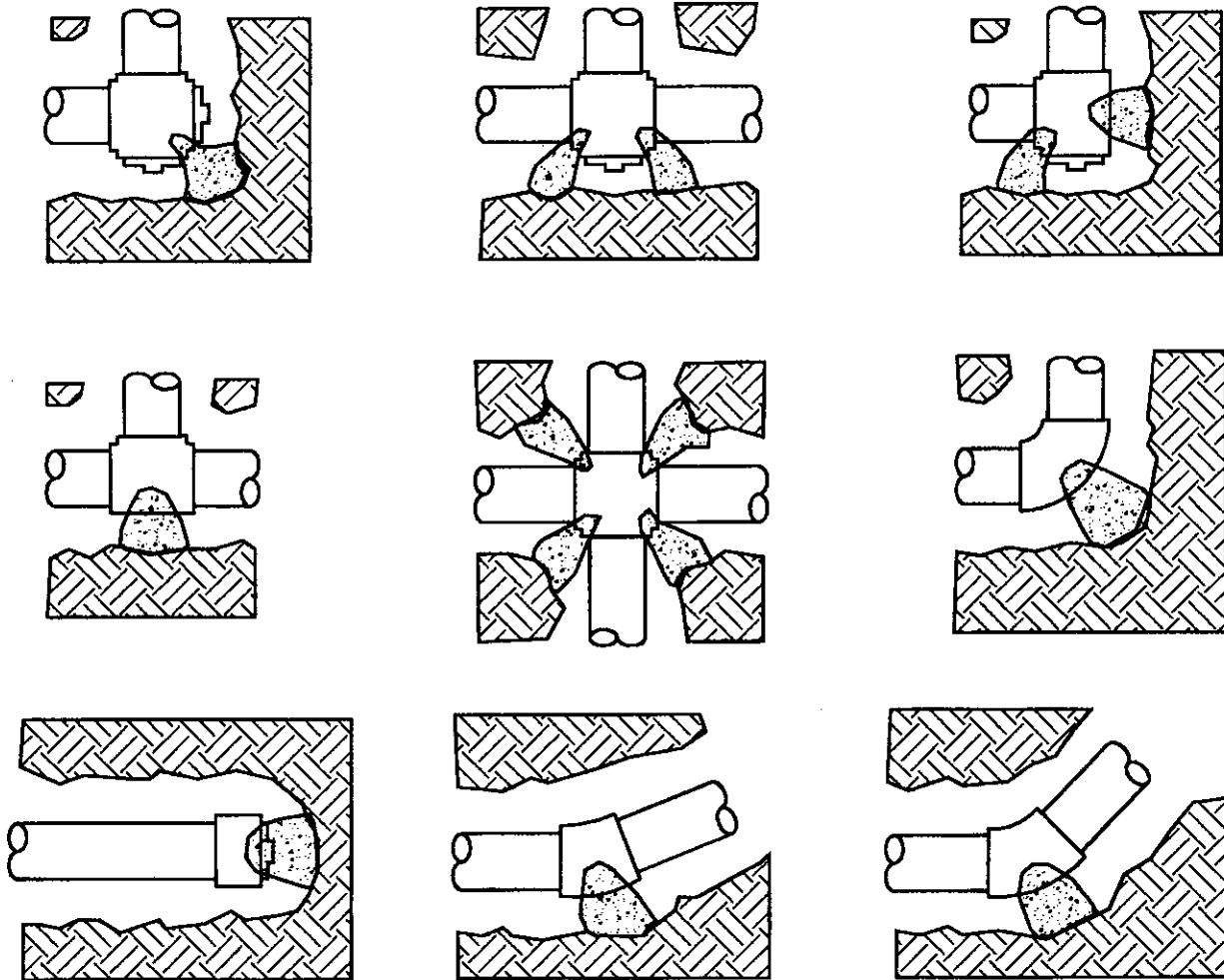


Pipe Size	Thrust (PSF)	TEE		90 BEND		45 BEND		22 1/2 BEND	
		Min. Reqd. Area S.F.	Thrust (PSF)	Min. Reqd. Area S.F.	Thrust (PSF)	Min. Reqd. Area S.F.	Thrust (PSF)	Min. Reqd. Area S.F.	Thrust (PSF)
6"	5700	3	8055	4	4365	2	2205	1	
8"	9870	5	13950	7	7560	4	3825	2	
10"	16125	8	22800	12	12360	6	6255	3	
12"	22965	12	32460	16	17580	9	8910	5	
14"	31155	16	44040	22	23865	12	12090	6	

16"	40320	20	57015	29	30885	16	15645	8
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Thrust based on 150 psi water pressure. Area based on 2,000 psf soil bearing

The location of thrust block depends on direction of thrust and type of fitting as shown below.



If thrusts due to high pressure are expected, anchor valves as shown above.

At vertical bends, anchor resists outward thrust.

8. Storage

Storage of PVC shall be in the shade or shall be covered with a suitable cover. PVC pipe shall not be exposed to the sun longer than 24 hours while being laid.

9. Hydrostatic Tests

All pipe lines constructed under this contract before being accepted shall be tested with a hydraulic test according to *Section 114 "Hydrostatic Tests for Pressure Mains"*.

The contractor will be required to furnish adequate and satisfactory equipment and supplies necessary to make such hydrostatic tests.

If the tests indicate leakage in excess of a rate equal to twenty-five (25) gallons per inch of nominal diameter of pipe line per mile over a twenty-four period, then the Contractor will be required to find the leak and eliminate same. All known leaks shall be stopped regardless of this test requirement.

The cost of testing and finding leaks and repairing the same and re-testing, if necessary, shall be at the expense of the Contractor. The water required to fill the lines shall be furnished by the Contractor.

10. Line Disinfection

The completed water line shall be disinfected according to *Section 116 "Disinfection of Potable Water Mains"*.

The chlorinated water shall then be discharged from the water line and replaced with fresh potable water.

The Contractor will furnish all labor materials and equipment necessary to complete the proper disinfection of the line and the cost of this operation shall be included in the bid price for installation of the distribution system.

11. Measurement

PVC pipe will be measured for payment in linear feet along the center line of the trench. No deduction will be made for valves and fittings.

12. Payment

PVC pipe will be paid for at the unit price per linear foot, complete in place, as provided in the proposal and contract. The contract price per linear foot shall be the total compensation for the furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete work, including excavation, granular embedment material, backfill, and disposal of surplus materials, in accordance with the plans and these specifications.

**SECTION 106
DUCTILE IRON PIPE**

GENERAL

D-106.01 DESCRIPTION:

1. Scope: This section describes the manufacture, construction, and installation of ductile iron pipe and fittings.

D-106.02 QUALITY ASSURANCE: Reference Standards:

- a. AWWA - C105, C110, C111, C115, C151, C153, C600
- b. ASTM - C33, C150

D-106.03 SUBMITTALS:

1. Submit manufacturer's data on pipe furnished, indicating compliance with the Specifications regarding dimensions, thickness, weights, and materials. Where flanged pipe is called for, submit complete piping layout indicating the length of each flanged joint to be furnished.

PRODUCTS

D-106.04 DUCTILE IRON PIPE AND FITTINGS:

1. GENERAL:

- a. Ductile iron pressure pipe six inches (6") in diameter and larger shall conform to the current American National Standard Specifications for Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids, AWWA C151 (A 21.51).
- b. Ductile iron pipe less than six inches (6") in diameter shall be prohibited.

2. DESIGN REQUIREMENTS:

- a. The ductile iron shall conform in all respects to the Current Specification for Ductile Iron Castings, ASTM Designation A536.
- b. Thickness Class: Ductile iron pipe shall be Class 52 minimum.

3. JOINTS:

- a. All ductile iron pressure pipes shall be furnished with one of the following types of joints. Buried pipe shall be furnished with push-on or mechanical joint ends unless otherwise noted. Exposed pipe shall be flanged.

TYPE OF JOINT	REFERENCE STANDARD
Push-on Joint	AWWA C111

Mechanical Joint	AWWA C111
Flanged Ends	AWWA C110 & 115

- b. All screwed flanges shall be ductile iron.
 - c. Provide restrained joint inside encasement.
4. **COATING AND LINING:** All ductile iron pipe and all fittings shall be bituminous coated outside in accordance with AWWA Standards, and polyethylene lined. Provide a nominal 40 mil interior lining of polyethylene. Provide lining of a blend of high-density and low-density polyethylene powders complying with ASTM D1248 compounded with an inert filler and carbon black to resist ultraviolet rays. Preheat pipe in a furnace to insure uniform heat distribution and fusing of the polyethylene powders and proper bonding to the pipe.
 5. **UNDERWRITER'S APPROVAL:** Ductile iron pipe shall be approved by the Underwriter's Laboratory and shall be accepted by the State Fire Insurance Board for use in water distribution systems without penalty. All pipes shall be new.
 6. **BOLTS AND NUTS:** Bolts and nuts for mechanical joints shall be of a high strength corrosion-resistant low alloy steel and conform to AWWA C111. Flange bolts and nuts for above ground installation shall conform to Appendix A of AWWA C115. Flange bolts and nuts for below ground or submerged installations shall be Type 304 or 316 stainless steel.

D-106.05 FLANGE GASKETS: Flange gaskets shall be full faced and conform to Appendix A of AWWA C115.

EXECUTION

D-106.06 EXECUTION: Lay all pipes in accordance with AWWA C600, except as modified herein.

D-106.07 PIPE LAYING AND JOINTING:

1. After the subgrade and embedment materials have been placed and the length of pipe has been placed in the trench, center the spigot in the bell and apply the pipe joint lubricant recommended by the pipe manufacturer. Force the spigot "home" using cables or excavating machinery. Use timbers to protect the bell of the joint from damage during jointing operation, especially when excavating machinery is used to force the pipe home.
2. Lay the pipe in such a fashion that the full length of the barrel of the pipe is resting on the embedment. Excavate bell holes so the bell of the pipe does not touch the bottom of the ditch. Take precautions to prevent dirt and embedment materials from entering the joint space. No blocking up of the pipe or joints will be permitted.

D-106.08 CUTTING OF PIPE: Saw cut pipe for closure pieces in a neat, workmanlike manner without damage to the pipe. Make each cut square to the centerline of the pipe and bevel the outside edge of the pipe at the cut to the same configuration and dimensions as the factory applied spigot

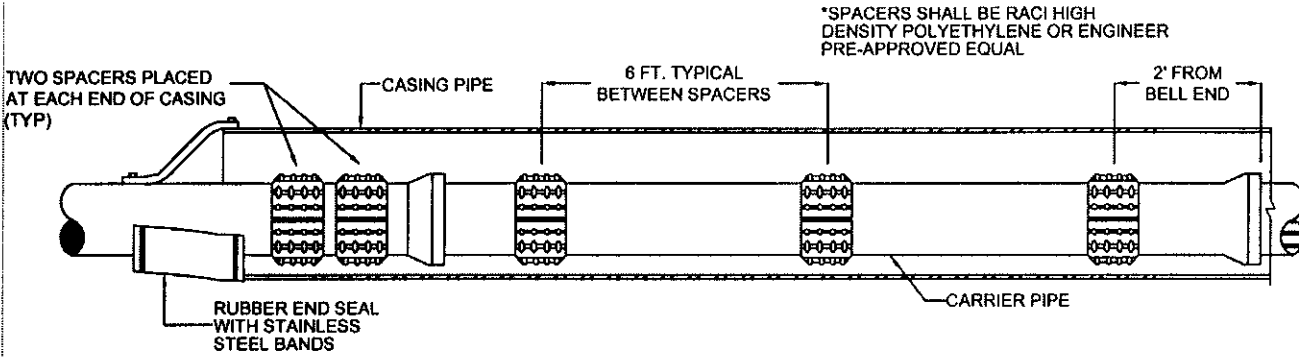
level.

D-106.9 PROTECTION OF PIPE: At all times when pipe laying is not in progress, cover the open ends of the pipeline to prevent water, debris, and animals from entering the pipe. Remove all foreign matter or dirt from the pipe during laying operations. Do not lay pipe in water or when trench conditions are unsuitable for such work.

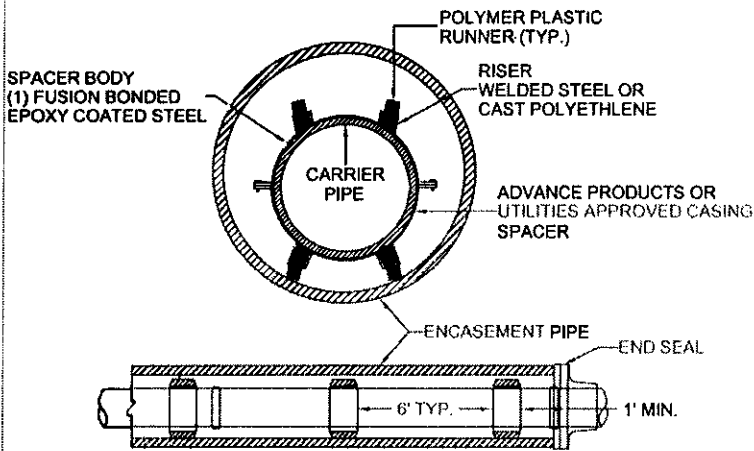
D-106.10 POLYETHYLENE TUBE PROTECTION: All buried cast iron and ductile iron pipe and fitting shall be provided with polyethylene tube protection. Install polyethylene tube according to AWWA C105. Completely cover all fitting and connections with polyethylene film held securely in place with joint tape or strapping.

D-106.11 COATING: Provide a 10 mil thick field coat of bituminous paint on exposed piping.

SECTION 108 STEEL CASINGS

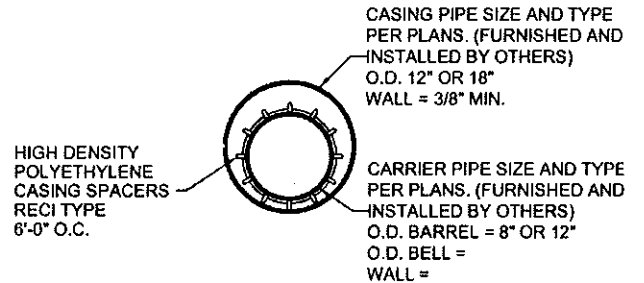


INSULATOR SPACING DETAIL



SPACER SHALL BE LOCATED A MINIMUM OF ONE FOOT FROM EACH SIDE OF PIPE JOINT, END OF CASING, AND ON MAXIMUM TEN FOOT CENTERS

SPACER DETAIL



PIPE INSULATOR DETAIL

SECTION 110 WATER VALVES

D 110.01 GENERAL

1. Description

This item to consist of valves furnished and installed as indicated. Unless otherwise indicated, all valves 4" and larger shall be AWWA type valves suitable design and fully equipped for service buried in earth, without need for further modification and shall be wrapped with 8 mil polyethylene film with all edges and laps securely taped to provide continuous wrap. Where not indicated, the contractor may use valves with any type end-joint allowed for fittings of the pipe class being used. Unless otherwise indicated, all valve stems shall be adjusted to situate the operating nut not less than 30" or more than 36" below the proposed ground or paving surface of the finished project.

D 110.02 PRODUCTS

1. Materials

Contractor shall, as requested by the Utilities Director, submit descriptive information and evidence that materials and equipment Contractor proposes for incorporation into work is of the kind and quality that satisfies the specified functions and quality.

1. Samples, Inspection and Testing Requirements.

All tests and inspections called for by the applicable standards shall be performed by the manufacturer. Upon request, results of these tests shall be made available to the purchaser.

2. Other Requirements:

Each submittal shall be accompanied by:

-Complete data covering the operator, including type and size, model number, etc., the manufacturer's name and address of his nearest service facility, the numbers of turns to fully open and close the valve, detailed instruction for calibrating the limit stops for open and closed positions and any other information which may be necessary to operate and maintain the operator.

- Complete dimensional data and installation instructions for the valve assembly as it is to be installed, including the operator.

- Complete replacement parts lists and drawings, identifying every part from both the valve and operator.

2. Valves

1. Iron-Body Gate Valves

Unless otherwise indicated, Iron Body Gate Valves, 6" to 12", including Tapping Valves, shall conform to AWWA C509, "Resilient Seated Gate Valves for Water Sewage Systems".

Iron Body Gate Valves larger than 12", including Tapping Valves, shall be double disc, parallel seat valves meeting the requirements of AWWA C500.

a. *Stem Seals:* All valves shall be approved O-ring type stem seals. At least two O-rings shall be in contact with the valve stem where it penetrates the valve body.

b. *Operation:* All valves shall be approved O-ring type stem seals. At least two O-rings shall

- be in contact with the valve stem where it penetrates the valve body.
- c. *Gearing*: Double disc gate valves in 16" and larger sizes shall gear and, when necessary for proper bury depth and cover, shall be horizontal bevel-gear type enclosed in a lubricated gear case.
 - d. *Bypass*: Unless otherwise indicated, 16" and larger gate valve shall be equipped with a by pass of the non-rising stem type which meets the same AWWA standard required for the main valve.
 - e. *Valve Ends*: Valve ends shall be push-on, flanged or mechanical joint, as indicted or approved.
Tapping valves shall have inlets flanges conforming to MSS SP-60, with bolt holes drilled per ANSI B16.1 Class 125. Seat rings and body casting shall be over-sized as required to accommodate full size cutters; the outlet end shall be constructed and drilled to allow the drilling machine adapter to be attached directly to the valve.
 - f. *Gear Case*: All geared valves shall have enclosed gear cases of the extended type, attached to the valve bonnet in a manner that makes it possible to replace the stem seal without disassembly and without disturbing the gears, bearing or gear lubricant. Gear cases shall be designed and fabricated with an opening to atmosphere so that water leakage past the stem seal does not enter the gear case.
 - g. *Valve Body*: Double disc gate valves in 16" and larger sizes installed in the horizontal position shall have bronze rollers, tracks, scrapers, etc.

3. Fire Hydrants

- a. Applicable specifications:
 - X AWWA C-502 current: "AWWA Standard for Dry-Barrel Fire Hydrants".
 - X NFPA 1963: "National (American) Standard Fire Hose Coupling Screw Tread".
 - X ANSI A-21.11 current: "American National Standard for Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe Fittings".
- c. Material Requirements
All below ground bolts shall be corrosion resistant. The hydrant valve shall be Neoprene - 90 durometer minimum. The seat ring, drain ring, operating nut and nozzles shall be bronze-AWWA C-502 current.

Coatings shall be durable and applied to clean surfaces. Color specified by City of Laredo. Other expose ferrous metal shall receive asphalt based varnish, or approved equal, applied according to manufacturer's specifications.

D 110.03 EXECUTION

1. Construction Methods

1. *Setting Valves*

Unless otherwise indicated, main valves, blow-off valves and piping shall be set and jointed in the manner described for cleaning, laying, and jointing pipe.

Unless otherwise indicated, valves shall be set at the locations shown on the drawings and such

that their location does not conflict with other appurtenances such as curb ramps. Valves shall be installed so the tops of operating stems will be at the proper elevation required for the piping at the location indicated above **but not exceeding 5ft. in depth**. Valve boxes and valve stem casings shall be firmly supported and maintained, centered and aligned plum over the valve or operating stem, with the top of the box or casing installed flush with the finished ground or pavement in existing streets, and installed with the top of the box or casing approximately 6" below the standard street subgrade in streets which are excavated for paving construction or where such excavation is scheduled or elsewhere as directed by the Engineer.

2. *Dead Ends*

Dead Ends shall be avoided at all times by looping the lines. If this is not possible provide an Eclipse Blow-off Hydrant #78 as manufactured by Kupferle Foundry Company or approved equal. Where stub-outs are placed and/or dead ends not exceeding 30 feet in length a standard plug shall be inserted into the bells of pipes, tees or crosses and spigot ends shall be capped.

3. *Protective Covering*

Unless otherwise indicated, all flanges, nuts, bolts, threaded outlets and all other steel component shall be coal tar coated and shall be wrapped with standard 8 mil (minimum) low density polyethylene film or 4 mil (minimum) cross laminated high-density polyethylene meeting ANSI/AWWA Specification C-105 current, with all edges and laps taped securely to provide a continuous and watertight wrap. Repair all punctures of the polyethylene, including those caused in the placement of bedding aggregates, with duct tape to restore the continuous protective rap before backfilling.

4. *Valve Box, Casing and Cover.*

Stems of all buried valves shall be protected by valve box assemblies. Valve box castings shall conform to ASTM A48, Class 30B. Testing shall be verified by the manufacturer and the country or origin.

2. **Measurement**

All types of valves and blow-off hydrants will be measured per assembly.

3. **Payment**

Payment shall be full compensation in accordance with the pay item seen in the bid, for excavation, furnishing, hauling and placing valves and barrel extensions including anchorage and all incidental and subsidiary material and work; preparing, shaping, dewatering, shoring of trenches, bedding, placing and compacting backfill materials and for all other incidentals necessary to complete the installation, as indicated, complete in place.

1. *Valves:* Valves will be paid for at the unit price bid for the size and type valve installed, including valve stem casing and cover, excavation and backfill, setting, adjusting to grade, anchoring in place, and other appurtenances necessary for proper operation.
2. *Blow-off Hydrant Assemblies:* Blow-off hydrant installation shall be paid for the unit price bid, including fitting between the main line and the blow-off hydrant, setting, adjusting to grade, anchoring in place, and other appurtenances necessary for proper operation; but shall not include pipe and valve between the main line and blow-off hydrant.

SECTION 112 FIRE HYDRANTS

D-112.01 TYPE OF HYDRANT All fire hydrants shall be Dry Barrel, Traffic Model (break away), Post Type having Compression Type Main Valves (5 1/4" opening), closing with line pressure. Hydrants shall be cast-iron, fully bronze mounted, working pressure of 150 psi, test pressure of 300 psi, and shall conform and be in accordance with the latest specifications and revisions of American Water Works Association (AWWA) Standard C-502 for Fire Hydrants for ordinary water works service, except for supplementary requirements contained herein.

D-112.02 DESIGN OF HYDRANT Hydrants shall be Mueller Company 107 with safety crash flange or approved equal.

D-112.08 FUNCTIONAL REQUIREMENTS Design Working Pressure shall be 150 psi (test pressure 300 psi).

Inlet shall be side connection hub end for mechanical joint (ANSI A21.11 - current). Shoe shall be rigidly designed to prevent breakage, with harnessing lugs for joint restraint.

Lower Barrel shall be rigid to assure above ground break at traffic feature. Bury length of hydrant shall be 3 1/2 feet hydrant lead pipe may be elbowed up from main using restrained joints; flanged joints in lead pipes are not allowed. Flange type connections between hydrant shoe, barrel sections and bonnet shall have minimum of 6 corrosion resistant bolts or 4 type 302 or 304 stainless steel bolts.

Hydrant Main Valve shall be 5 1/4 inch I.D. Valve stem design shall meet requirements of AWWA C502, with operating nut turning clockwise to close. Operating nut shall be pentagonal - 1 1/2 inch (point to flat) at base, and 1 7/16" at top - 1 inch minimum height. Seat ring shall be bronze (bronze to bronze threading), and shall be removable with light weight stem wrench. Valve mechanisms shall be flushed with each operation of valve; there shall be a minimum of two (2) drain ports.

Traffic feature shall have replaceable break-away ferrous metal stem coupling-held to stem by readily removable type 302 or 304 stainless steel fastenings. Break-away flange or frangible lugs shall be designed to assure above ground break. Break-away or frangible bolts will not be acceptable.

Outlet nozzles shall be located approximately 18" above ground. Each hydrant shall have two (2) 2 1/2 inch nozzles 180 degrees apart with National (American) Standard Fire Hose Coupling Screw Thread NFPA 1963 and one (1) 4 1/2 inch pumper nozzle with national standard thread. Nozzles shall be threaded or cam-locked, O-ring sealed, and shall have type 302 or 304 stainless steel locking devices. Nozzle caps (without chains) and cap gaskets shall be furnished on the hydrant. The cap nut shall have the same configuration as the operating nut.

Hydrant shall have Dry-Top Construction, factory lubricated oil or grease with the lubricant plug readily accessible.

Hydrant shall have double O-ring seals in a bronze stem sheath housing to assure separation of lubricant for water and shall have a weather seal, to provide complete weather protection.

D-112.03 VALVE FACING The main valve of the hydrant shall be SBR Rubber with a 90 Durometer hardness. The hydrant shall be equipped with a travel stop device located in the top of the hydrant which terminates the downward travel of the main rod. Travel stop devices in the form of a stop in the elbow of the hydrant which could allow the main rod to be put into compression if the hydrant is "over opened" will not be permitted.

D-112.04 LOWER BARREL SECTION The lower barrel section shall be made to conform with the section thickness requirements of AWWA Specification C-502-1973, or the latest revision thereof, and can be furnished in Gray Iron or Ductile Iron. Screwed on flanges are not acceptable.

D-112.05 HYDRANT ADJUSTMENT The hydrant must be capable of accommodating an extension piece at the ground line without shutting down the hydrant or excavating.

D-112.06 OPERATING NUT Hydrant operating nut and cap nuts shall be pentagonal shape 1 1/2" point to flat NST unless otherwise specified. The operating nut shall be a combination weather shield and functional operating device that will protect all operating parts from excessive moisture intrusion by means of an "O" ring seal.

D-112.07 BREAK-AWAY STEMS Break-away stem coupling shall be of ferrous material; its retaining pins, bolts, nuts, etc., of type 302 or 304 stainless steel.

D-112.09 SETTING FIRE HYDRANTS. Fire hydrants shall be located in a manner to provide accessibility and in such a manner that the possibility of damage from vehicles or conflict with pedestrian travel will be minimized. Unless otherwise directed, the setting of any hydrant shall conform to the construction drawings.

All hydrants shall stand plumb; those near curbs shall have the 4" nozzle facing the curb and perpendicular to it. The hydrant bury mark shall be located at ground or other finish grade; nozzles of all new hydrants shall be approximately 18" above grade. Lower barrel length shall not exceed 5 feet. Barrel extensions are not permitted unless approved by the Engineer. Each hydrant shall be connected to the main by 6" ductile iron pipe; a 6" gate valve shall be installed in the line for individual shutoff of each new hydrant.

Fire hydrants on mains under construction shall be painted white. When the mains are accepted and placed in service this hydrants shall be repainted to original color.

D-112.10 SUPPLEMENTAL DETAILS

A. INLET CONNECTION: The inlet shall be six inch (6") Tyton Joint. A Tyton Joint or Lok Tyton Joint Gasket shall be furnished with each hydrant.

B. HYDRANT OUTLET: Each hydrant shall have two (2) 2 1/2" hose nozzles and one (1) 4 1/2" pumper with National Standard Threads.

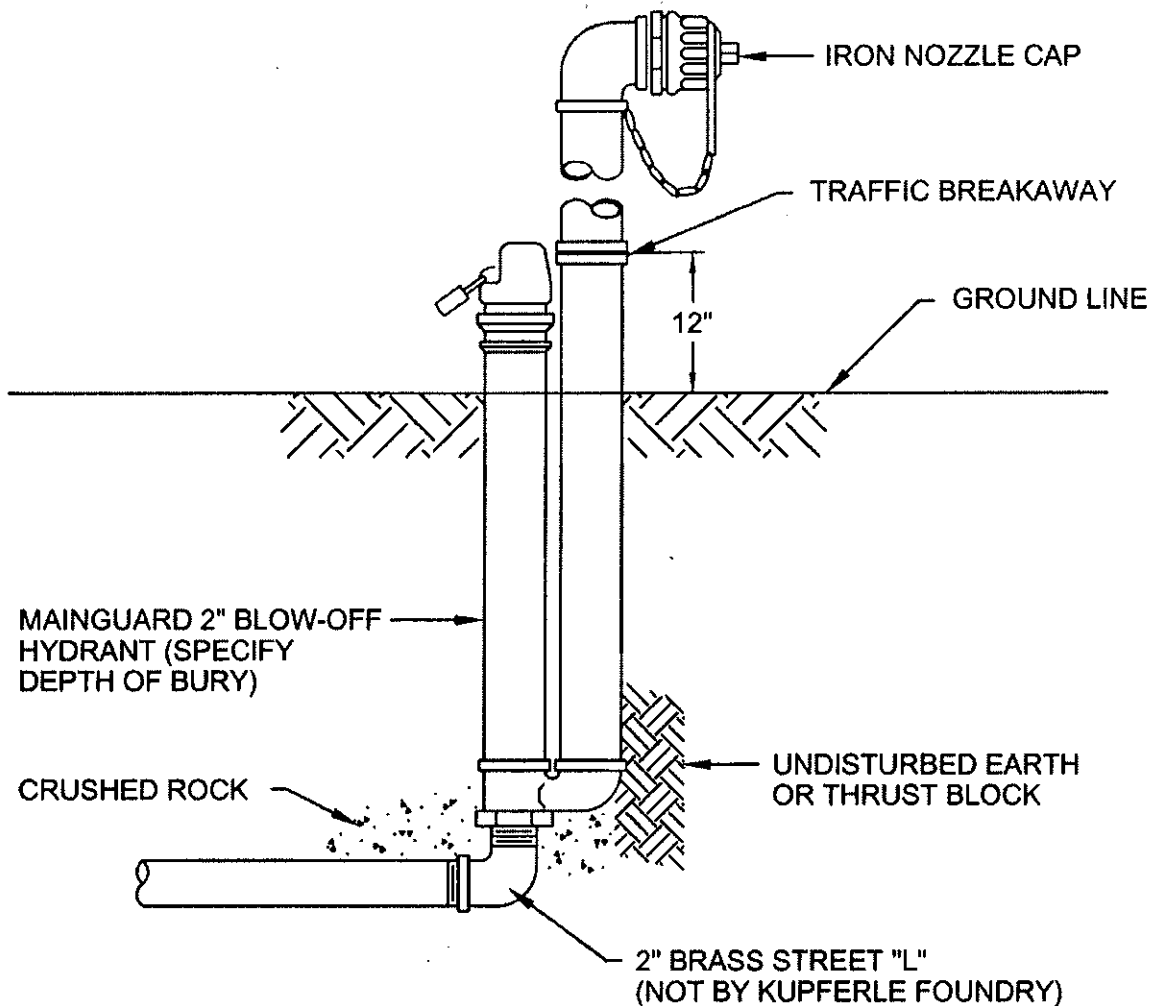
C. DIRECTION OF OPENING: Hydrant shall open by turning to the left (counterclockwise) and shall close by turning to the right (clockwise).

D. DRAIN OPENING: Each hydrant shall have two (2) external drain ports. Drain valve mechanisms that include springs or rods are not acceptable.

D-112.11 MEASUREMENT Fire hydrants will be measured per assembly.

D-112.12 PAYMENT Fire hydrants installation shall be paid for at the unit price bid, including fittings between the main line and the fire hydrant, setting, adjusting to grade, and other appurtenances necessary for proper operation; but shall not include pipe and valve between the main line and fire hydrant.

SECTION 114 FLUSH VALVE



Post Hydrants shall be non-freezing, self draining type with a ___' bury. These hydrants will be furnished with a 2" FIP inlet, a non-turning operating rod, and shall open to the left. All of the working parts shall be of bronze-to-bronze design, and be servicable from above grade with no digging. The outlet shall also be bronze and be 2-1/2" NST. Hydrants shall be lockable to prevent unauthorized use as manufactured by Kupferle Foundry Co., St. Louis, MO, or approved equal.

MAINGUARD BLOW-OFF HYDRANT

SECTION 116 HYDROSTATIC TESTS FOR PRESSURE MAINS

D-116.01 GENERAL

1. Summary

A. Measurement and Payment

1. Separate payment will not be made for hydrostatic testing of water mains. Include costs for testing, repair of defects, and retesting required in this section in appropriate unit prices bid for water line construction.
2. The costs associated with purchase of water to fill proposed lines for flushing, disinfecting, chlorination, dechlorination, and hydrostatic testing shall be paid by the Contractor. Said costs shall be subsidiary to the unit price bid for construction of appropriate size of water line.

2. Quality Assurance

- A. Contractor shall perform hydrostatic tests on water lines in accordance to AWWA C600-93 and these specifications. Hydrostatic test must be performed in the presence of the City of Laredo Utilities Inspector.

3. Submittals

- A. Submit in accordance with the Standard General Conditions and Supplementary Conditions.
- B. Copies of all testing results shall be submitted to the Engineer prior to acceptance of piping system.

D-116.02 PRODUCTS

1. Water

- A. Water used to fill proposed lines, for flushing, for disinfection, and testing of lines shall be potable water from the City of Laredo. Contractor shall coordinate and contract with the City for a temporary construction meter to be located off an existing fire hydrant, if available; otherwise a temporary fire hydrant shall be furnished to the Contractor.

D-116.03 EXECUTION

1. General

- A. Conduct pressure and leakage tests in accordance with Section 3 of AWWA C600 of these specifications. Contractor must notify City of Laredo Utilities Engineer 48 hours prior to pressure and leakage testing.
- B. Commence test procedures when following conditions met.
 1. Pipe section to be tested is clean and free of dirt, sand, or other foreign material.
 2. Pipe outlets plugged with test plugs. Plugs, pipes, fittings, and valves secured to prevent blowouts.
 3. Value of applied test pressure checked at each point in test section to ensure it does not exceed maximum allowable pressure of pipes, valves, fittings, and

appurtenances.

- C. Safety: Perform pressure testing in accordance with OSHA requirements and in manner protecting worker, bystanders, and adjacent property.
- D. Correct leaks defects, and retest until acceptable results obtained.

2. Pressure Tests

- A. Test pressures shall be as follows:
 - 1. Water Main Test Pressure: 150 psi at lowest elevation in test section.
- B. Test Procedure:
 - 1. Add water to expel air.
 - 2. Pressurizing equipment shall include regulator set to avoid over pressurizing and damaging otherwise acceptable line.
 - 3. Make test connection, subject main to normal water pressure, and examine for leaks.
 - 4. Apply test pressure by means of force pump of design and capacity that required pressure can be applied and maintained without interruption for duration of test.
 - 5. Measure test pressure by means of tested and properly calibrated pressure gauge.
 - 6. Maintain initial test pressure for sufficient length of time to permit inspecting piping under test, but not less than 30 min.
 - 7. In case repairs are required, repeat pressure test until pipe installation conforms to specified requirements.
 - 8. Perform final test at required test pressure for 4 hrs.
- C. Water main considered to have failed pressure test if applied pressure drops 1 psi.

3. Leakage Test

- A. Conduct pressure test and initial leakage test concurrently. Final leakage test may be waived by Engineer if found unnecessary to add water during duration of final pressure test.
- B. Leakage defined as quantity of water to be supplied into newly laid pipe, or section thereof, necessary to maintain specified leakage test pressure after main has been filled with water and entrapped air expelled.
 - 1. Leakage shall not exceed number of gph as determined by following formula for rubber-sealed joints.

$$L = \frac{ND(P)^{1/2}}{7,400}$$

Where:

- L= allowable leakage in gallons per hour
- N= number of joints under test
- D= nominal diameter of main in inches
- P= average pressure in lbs./sq. in. gauge during leakage test

2. If section under test contains joints of various diameter allowable leakage will be sum of computed leakage for each size of joint.

C. Test Procedure:

1. Submit test section to approximately 150 psi gauge pressure at highest elevation of water main under test.
2. Conduct final leakage test for 4 hours.
3. Repair defects and retest until acceptable results obtained.

SECTION 118 DISINFECTION OF POTABLE WATER MAINS

D 118.01 GENERAL

1. Summary

A. Section Includes:

1. Requirements for disinfection of new water mains and existing water mains which has been relocated or contaminated by construction operations.

B. Measurement and Payment:

1. Include cost of work specified in this section in unit prices bid for construction of appropriate water line.
2. Costs associated with purchasing of water to fill proposed line, for flushing, disinfecting, chlorination, dechlorination, and hydrostatic testing shall be paid for by the Contractor. Said costs are subsidiary to the unit price bid for construction of appropriate size water line.

2. References

A. American Water Works Association (AWWA):

1. AWWA C651-92- Standard for disinfecting water main.

3. Submittals

- A. Prior to starting disinfection work, furnish detailed outline of proposed sequence operation, manner of filling and flushing units, source and quality of water to be used, and disposal of wasted water.
- B. Submit in accordance with the Standard General Conditions and Supplementary Conditions.
- C. Copies of all test results shall be submitted to the Engineer prior to acceptance of piping system.

4. Quality Assurance

A. Regulatory Requirements:

1. Disinfection work shall be acceptable to Engineer, and to the City of Laredo Regulations. All testing must be performed at the presence of the City of Laredo Utilities Inspector.

B. Source Quality Assurance:

1. Perform work in connection with disinfection under direction of experienced supervisor.
2. Use equipment in proper working condition and adequate for specified work.

D 118.02 PRODUCTS

1. Chlorine

- A. Chlorine gas-water solution or direct chlorine feed is preferred for disinfection.
- B. Use of high test calcium hypochlorite or tablet method of disinfection shall be approved by the Engineer.

- C. Tablet form calcium hypochlorite may be used only for water mains up to 12" in dia. and less than 2,500 ft in length.

2. Water

- A. Water used to fill proposed lines, for flushing, and for disinfection and testing of lines shall be potable water from the City of Laredo. Contractor shall coordinate and contract with the City for a temporary construction meter to be located off and existing fire hydrant, if available, otherwise a temporary fire hydrant shall be furnished by the Contractor.

D 118.03 EXECUTION

1. General

- A. Method of disinfection for water containment devices and piping systems shall conform to AWWA C 651. Contractor must notify City of Laredo Utilities Engineer 48 hours prior to disinfecting a pipe.

2. Chlorine Preparation

- A. Liquid Chlorine:
 - 1. Apply chlorine gas-water solution by means of solution feed chlorinating device of, if approved by Engineer, dry gas may be fed directly through proper devices for regulating rate of flow and providing effective diffusion of gas into water within unit being treated.
 - 2. Provide chlorinating devices for feeding solutions of chlorine gas that prevent backflow of water into chlorine cylinder.
- B. Calcium Hypochlorite:
 - 1. Prepare granular calcium hypochlorite as water mixture before introduction into unit. Make dry powder into paste and thin to approximately 1% chlorine solution.
 - 2. To prepare chlorine solution, add 1 lb. of calcium hypochlorite (65% to 70% available to 7 1/2 gal of water.

3. Pipeline Preparation

- A. After pressure and leakage tests complete, flush units thoroughly to remove foreign material.
- B. Release entrapped air at high points and fill units with disinfecting agent and water to allow disinfecting agent to come in contact with interior surfaces.
- C. If complete venting cannot be accomplished through available outlets, provide necessary corporation cocks and vent piping.

4. Application of Disinfectant

- A. Point of Application:
 - 1. Apply chlorinating agent at supply end of unit being disinfected.
 - 2. For pipes, apply disinfectant through corporation cock installed in top of pipe
 - 3. Place tablets in accordance with AWWA C651

B. Rate of Application:

1. Introduce water at controlled rate in order to regulate chlorine dosage.
2. Proportion rate of chlorine mixture flow to rate of water entering unit so chlorine dose applied produces at least 25 mg/l chlorine residual after period of 24 hrs.
3. Method of determining rate of flow of water into unit being disinfected shall be approved by Engineer.

C. Isolating Systems:

1. Keep chlorine gas-water disinfecting solution and contaminated water from flowing into units previously chlorinated and flushed.

D. Quality:

1. Retain chlorinated water in unit long enough to destroy nonspore-forming bacteria.
2. Minimum retention period shall be 24 hrs with chlorine residual at end of this period of not less than 25 mg/l (ppm)

E. Disinfecting Valves:

1. Operate valves and appurtenances while line or unit is being disinfected to ensure surfaces of valves are disinfected.

F. Swabbing:

1. Flush and swap pipe, fittings or valves that must be placed in service immediately with 5% solution of calcium hypochlorite immediately prior assembly.
2. Secure approval from Engineer before using this method of disinfection.

G. Valve Operation:

Valves proposed for construction shall be operated by Contractor. Existing City valve shall be operated by City personnel only. Contractor shall coordinate opening or closing of City valves and the isolation of City water lines with the City of Laredo Water Utilities.

5. Final Flushing and Test

- A. Following chlorination, flush unit or system until replacement water in system is proven to be comparable in quality to water which will enter unit or system.
- B. Laboratory tests shall be performed at the City of Laredo Testing Labs and samples will be taken by the City of Laredo Water Utilities Inspector.
- C. Repetition of Flushing and Testing:
 1. If initial treatment results in unsatisfactory bacterial test, repeat disinfection until satisfactory results obtained.
- D. Prevent entry of contaminated water into previously disinfected units or systems.
- E. Contractor shall discharge water at acceptable chlorine level. Any cost associated with dechlorination shall be paid by Contractor.

SECTION 120
CONCRETE ENCASEMENT, CRADLES, SADDLES, AND COLLARS

D-120.01 DESCRIPTION: This Item shall govern for placing concrete encasement, cradles, saddles, and collars, when called for the Project plans or as directed by the Engineer.

D-120.02 MATERIALS: Concrete: All concrete shall conform to the provisions of TxDOT Specifications, (Item 421), "Concrete" (Class B) or shall be of the class noted on the plans.

D-120.03 CONSTRUCTION METHODS:

1. **Concrete Encasement:** When concrete encasement is show on the plans or when directed by the Engineer, the trench shall be excavated and fine graded to a depth conforming with details and sections shown on the plans. The pipe shall be supported by precast concrete blocks of the same strength as the concrete for encasement and securely tied down to prevent floatation. Encasement shall then be placed to a depth and width conforming with details and sections shown on the plans.
2. **Concrete Cradles:** When concrete cradles are shown on the plans or when called for by the Engineer, the trench shall be prepared and the pipe supported in the same manner as described in this specification and shall be constructed in accordance with details and sections shown on the plans.
3. **Concrete Saddles:** When shown on the plans or when directed by the Engineer, pipe to receive concrete saddle shall be backfilled in accordance with TxDOT (Item No. 402,)"Excavation, Trenching, and Backfill" to the spring line and concrete placed for a depth and width conforming with details and sections shown on the plans.
4. **Concrete Collars:** When shown on the plans or when directed by the Engineer, concrete collars shall be constructed in accordance with details and sections shown on the plans.

D-120.04 MEASUREMENT: "Concrete Encasement, Cradles, Saddles, and Collars", will be measured by the cubic yard of accepted work, complete in place. Reinforcing, if required, shall not be measured for payment.

D-120.05 PAYMENT: "Concrete Encasement, Cradles, Saddles, and Collars", will be paid for at the unit price bid per cubic yard, which price shall be full compensation for furnishing and placing all materials, manipulation, labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 122
ADJUSTING VALVE BOXES TO GRADE

D-122.01 GENERAL: Section includes adjusting elevation of valve boxes to new grades.

D-122.02 UNIT PRICES: Payment for adjusting valve boxes to grade is on a per valve box basis.

D-122.03 REFERENCE:

- A. ASTM C270 - Specification for Mortar for Unit Masonry.

PRODUCTS

D-122.04 CONCRETE MATERIALS:

- A. For cast in place concrete, conform to requirements to Section 504- Concrete and Section 406 - Concrete Structures.
- B. For mortar mix, conform to requirements of ASTM C270, Type S, using Portland Cement.

EXECUTION

D-122.05 EXAMINATION: Examine existing valve box for damage or defects that would affect adjustment to grade and report such damage or defects to City Engineering.

D-122.06 ESTABLISHING GRADE: Coordinate grade related items with existing grade and finished grade or paving.

D-122.07 ADJUSTING VALVE BOXES:

- A. Salvage and reuse valve box and surrounding concrete block.
- B. Remove and replace 6-inch ductile iron riser pipe with suitable length for depth of cover required to establish the adjusted elevation to accommodate actual finish grade.
- C. Reinstall valve box and riser piping plumbed in vertical position. Provide minimum 6 inches telescoping freeboard space between riser pipe top butt end and interior contact flange of valve box for vertical movement damping.

D-122.08 BACKFILL AND GRADING:

- A. Backfill the area of excavation surrounding each adjusted valve box and compact according to requirement of Section 102 - Excavation and Backfill for Utilities.
- B. Grade to ground surface to drain away from each valve box. Place earth fill around the valve box concrete slab.

SECTION 124
RELOCATION OF FIRE HYDRANTS AND ADJUSTMENT OF GATE VALVES

D-124.01 GENERAL: Section includes relocation of fire hydrants and adjustment of gate valves.

D-124.02 MEASUREMENT AND PAYMENT: Payment is on a lump sum basis for each fire hydrant relocated or each gate valve adjusted.

D-124.03 SUBMITTALS: Submit new locations of fire hydrant to City Engineer for approval.

EXECUTION

D-124.04 INSTALLATION:

- A.** Set fire hydrant plumb and brace at locations and grades as shown on plans. When barrel of hydrant passes through concrete slab, place a 1-inch thick piece of standard sidewalk expansion joint material around section of barrel passing through concrete.
- B.** Locate nozzle center line minimum 18 inches above finish grade.
- C.** Place 12 x 12 inch yellow indicator (plastic, sheet metal, plywood, or other material approved by City Engineer) on pumper nozzles of new or relocated fire hydrants installed on new mains not in service. Remove indicator after new main is tested and approved by City Engineer.
- D.** Do not cover drain ports when placing concrete thrust block.
- E.** Obtain City Engineer's approval in writing prior to installation of hydrants which requires changes in bury depth due to obstructions not shown on plans. Unit price adjustments will not be allowed for changes in water main flow line or fire hydrant barrel length caused by such obstructions.
- F.** Plug branch lines to valves and fire hydrants shown on plans to be removed.
- G.** Remove and dispose of unsuitable materials and debris in accordance with requirement of Section 128 - Waste Material Disposal

SECTION 126
JACKING AND/OR BORING PIPE

D- 126.01 DESCRIPTION: This item shall govern for the furnishing and installation of pipe by the methods of jacking and/or boring as shown on the plans in conformity with this specification.

D - 126.02 MATERIALS:

1. **Pipe:** Pipe shall be of the types and sizes shown on the plans and shall conform to the requirements of either "Storm Drainage Pipe" or "Sanitary Sewers".
2. **Liner plate:** As shown on project plans.
3. **Grout:** Grout shall be sand cement slurry containing a minimum of seven (7) sacks of Portland Cement per cubic yard of slurry. All slurry shall be plant batched and transit mixed.

D - 126.03 CONSTRUCTION METHODS:

1. **Jacking:** Suitable pits or trenches shall be excavated for the purpose of jacking operations for placing end joints of the pipe. When trenches are cut in the sides of embankment such work shall be securely sheeted and braced. Jacking operations shall in no way interfere with the operation of railroads, streets, highways or other facilities and shall not weaken or damage such facilities. Barricades and lights shall be furnished as directed by the Engineer to safeguard traffic and pedestrians.

The pipe to be jacked shall be set on guides to support the section of pipe being jacked and to direct it in the proper line and grade. Embankment material shall be excavated just ahead of the pipe and material removed through the pipe, and the pipe forced through the opening thus provided.

The excavation for the underside of the pipe, for at least one-third of the circumference of the pipe, shall conform to the contour and grade of the pipe. A clearance of not more than two inches (2") may be provided for the upper half of the pipe.

The distance that the excavation shall extend beyond the end of the pipe shall depend on the character of the material, but it shall not exceed two feet (2') in any case.

Generally, pipe shall be jacked from downstream end. Permissible lateral or vertical variation in the final position of the pipe from line and grade will be as shown on the plans or as determined by the Engineer.

Any pipe damaged in jacking operations shall be removed and replaced at the Contractor's expense.

Jacking pits shall be backfilled immediately upon completion of jacking operations.

2. **Boring:** Excavation for "Boring" pits and installation of shoring shall be as outlined under

“Jacking”. The boring shall be done using a pilot hole. The pilot hole shall be bored the entire length of the crossing and shall be used as a guide for the larger hole to be bored. Water or drilling fluids may be used to lubricate cuttings.

Variation in line and grade shall apply as specified under “Jacking”.

3. **Joints:** Joints for pipe for “Jacking”, “Boring” shall be as specified in either, “Storm Drainage Pipe” or “Sanitary Sewers” or as shown on the project plans or shop drawings.
4. **Grouting of Bores:** Space between pipe and liner, pipe and limits of excavation, and liner and limits of excavation shall be pressure grouted, unless otherwise specified on the plans.

D - 126.04 MEASUREMENT: Jacking and boring shall be measured by the number of linear feet of pipe in place. Measurement will be made from end to end of the liner plate and shall include the liner plate and installed pipe as shown on the plans.

D - 126.05 PAYMENT: The work performed and material furnished as specified by this item, measured as provided above shall be paid for at the contract bid price per lineal foot for pipe jacked, or bored, which price shall be full compensation for furnishing all pipe of the type shown on the project plans and all materials, labor, tools, equipment, and incidentals necessary to complete the work, including excavation, grouting, backfilling, restoration to original ground conditions, and disposal of surplus material.

SECTION 128
DISPOSAL OF WASTE MATERIAL AND SALVAGEABLE MATERIAL

D-128.01 GENERAL: Section includes disposal of waste material and salvageable material.

D-128.02 UNIT PRICES: No separate payment will be made for waste material disposal under this section. Include payment in unit price for related sections.

D-128.03 SUBMITTALS:

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

EXECUTION

D-128.04 SALVAGEABLE MATERIAL:

Excavated Material: when indicated on plans, load haul, and deposit excavated material at a location or locations shown on plans outside the limits of project.

Base, Surface, and Bedding Material: Local shell, gravel, bituminous, or other base and surfacing material designated for salvage.

Pipe Culvert: Load culverts designated for salvage into designated trucks.

Other Salvageable Materials: Conform to requirements of individual specification section.

Coordinate loading of salvageable material with City Engineer.

D-128.05 EXCESS MATERIAL:

- A. Vegetation, rubble, broken concrete, debris, asphaltic concrete pavement, excess soil, and other materials not designated for salvage, shall become property of the Contractor and shall be removed from the job site and legally disposed of.
- B. Excess soil may be deposited on private property adjacent to the project when written permission is obtained from property owner. See Paragraph 126.03B above.
- C. Waste materials shall be removed from the site on a daily basis, such that the site is maintained in a neat and orderly condition.

**SECTION 202
PVC SEWER PIPE**

D-202.01. GENERAL**1. Submittals:**

- A. Test Results: Include results of tests with shipment of materials. Furnish 2 additional copies of test results to Engineer.
- B. Submit in accordance with the Standard General Conditions and Supplementary Conditions.
- C. Contractor shall submit all final testing reports for deflection testing and for low pressure air testing of sewer pipe in accordance with Section B- Testing Sewer Systems.

D-202.02. PRODUCTS**1. Polyvinyl Chloride (PVC) Sewer Pipe**

- A. All PVC Sewer Pipe and Fittings used in this contract shall be made of plastic, meeting the requirements of: ASTM D3034. All PVC sewer pipe and fittings shall be SDR- 26.
- B. Fittings:
 - 1. Fittings such as saddles, elbows, tees, and wyes shall be of material and construction corresponding to and have joint design compatible with adjacent pipe.
 - 2. Provide approved adapters for transitions to other types of pipe.
- C. Pipe Joints:
 - 1. Rubber Gasket: Bell and spigot joint, sealed by a rubber gasket so assembly will remain watertight under conditions of service including movements resulting from expansion, contraction, settlement, and deformation of pipe. Gaskets shall conform to ASTM C361.
- D. Pipe Markings: Mark at intervals of 5 feet or less with following.
 - 1. Manufacturer's name or trademark.
 - 2. Nominal pipe size.
 - 3. PVC cell classification, for example 12454-B.
 - 4. Legend, "Type PSM SDR-26 PVC Sewer Pipe".
 - 5. ASTM D3034
 - 6. Extrusion date, period of manufactured or lot number.

E. Fitting Markings

1. Manufacturer's name or trademark.
2. Nominal size.
3. Material designation "PVC".
4. PSM type.
5. ASTM D3034

F. Dimensions:

1. Dimensions of pipe shall be in accordance with Table 1, except wall thickness may be not less than 97% of specified minimum.
2. Average wall thickness shall meet minimum wall thickness requirements of Table 1.

TABLE 1 PVC SEWER PIPE DIMENSIONS			
Nominal Size (in.)	Outside Average (in.)	Diameter Tolerance on Average (in.)	Minimum Wall Thickness (in.) SDR-26
6	6.275	± 0.011	0.241
8	8.400	± 0.012	0.323
10	10.500	± 0.015	0.404
12	12.500	± 0.018	0.481
15	15.300	± 0.023	0.588
*18 or greater, submit for approval			

2. Source Quality Control

A. Testing:

1. Tests conducted by approved testing agency shall be performed to determine the following.
 - a. Pipe dimensions:
 - 1) Average outside diameter.
 - 2) Average inside diameter.
 - 3) Minimum and average wall thickness.
 - b. Pipe stiffness at 5% deflection.
 - c. Pipe flattening for PVC sewer pipe: Deflect pipe to 60% deflection. Remove load and examine specimen for evidence of splitting, cracking or breaking.

2. Conduct tests on random sampling basis covering representative extrusion dates making up Project of each individual pipe size.
3. Engineer may waive testing on small projects with not more than 400 ft. of individual pipe size and individual extrusion dates of less than 10 pipe, totaling no more than 400 ft. pipe acceptance subject to visual inspection by utility inspector for defects.
4. Tests reports shall show results of these tests and conformance to ASTM requirements.

D 202.03 EXECUTION

1. Installation

- A. Trench, backfill, and compact in accordance with Section 102, "Excavation and Backfilling for Utilities".
- B. Rubber Gasket Joint:
 1. Immediately before making joint, lubricate outside of gasket and inside of bell of groove of last pipe with approved vegetable lubricant.
 2. Take care gasket and ends of pipe are clean and free of sand and gravel.
 3. Introduce spigot or tongue of pipe being laid, with gasket in place, into bell or groove end of previously laid pipe.
 4. Carefully set pipe to line and grade, and jack or push completely home.
 5. Use jack or "come-along" to ensure joints are tight.

2. Field Quality Control

- A. Pipe shall be subject to rejection for failure to conform to requirements of Specifications or following:
 1. Fractures or cracks passing through pipe wall or socket, except single crack not exceeding 2 in. in length at either end of pipe or single fracture in socket not exceeding 3 in. in width nor 2 in. in length shall not be considered cause for rejection unless these defects exist in more than 5% of entire shipment or delivery.
 2. Chips or fractures on interior of pipe exceeding 2" in length, 1" in width, and depth more than 1/4 barrel thickness.
 3. Cracks sufficient to impair strength, durability, or serviceability of the pipe.
 4. Defects indicating improper proportioning, mixing, and molding.
 5. Variations of more than 1/8 in./lin.ft. in alignment of pipe intended to be straight.
 6. Damage ends, where such damage prevents making satisfactory joint.
 7. Complete discoloration of any side of pipe.
- B. Specially fabricated fittings, stubs, or pipe sections, shall be submitted for approval by Engineer prior to manufacture.

3. Measurement

PVC sewer pipe will be measured for payment in linear feet along the horizontal centerline of the pipe no deduction will be made for manholes or fittings.

4. Payment

Plastic sewer pipe will be paid for at the unit price per linear foot, complete in place, as provided in the proposal and contract. The contract price per linear foot shall be the total compensation for furnishing of all labor, materials, tools, equipment, and incidentals necessary to complete the work, including excavation, granular embedment material, backfill, and disposal of surplus materials, in accordance with plans and specifications.

SECTION 204 CLAY PIPE SEWERS

D-204.01 DESCRIPTION: This Specification shall govern for the furnishing, excavating, laying, or placing, and backfilling, shoring, and other operations necessary to the installing of all clay sewer pipes of 18" or greater may be used.

D-204.02 MATERIALS: Clay sewer pipe shall be vitrified clay pipe and shall meet all of the requirements for "Extra Strength Clay Pipe" as prescribed by ASTM Specifications C-200. All joints shall comply with ASTM Specification No.C-425 for joints using materials having resilient properties.

D-204.03 EXCAVATION: Pipe sewers shall be built in a trench, the width of which at the top of the pipe shall not exceed the external diameter of the bell of the pipe, plus eight (8") inches. A greater width may be permitted by the Engineer when necessary to sheet the trench. The ground shall be excavated in open trench to the width, depth, and in the direction necessary for the proper construction of the pipe sewer according to the plan, except where tunneling is considered necessary or proper by the Engineer.

The width of existing surface structures to be removed, such as pavement, sidewalks, driveways, curb, curb and gutter, etc., shall not be in excess of that specified for trench width at the top of the pipe, except as permitted or authorized by the Engineer to conform to adjacent markings or joints in the structure.

The excavation of the trench shall not advance more than two hundred (200) feet ahead of the completed pipe work, except where, in the opinion of the Engineer, it is necessary.

Where trench has been excavated below grade, selected fill material shall be used to bring the trench to the required grade and shall be thoroughly compacted by means of mechanical tamps.

The Contractor shall do no tunneling except upon written permission from the Engineer. If permitted, the tunnel shall be of such height and width as the Engineer may direct, and shall be excavated in conformity with a cross section approved by him/her in writing.

D-204.04 BRACING AND SHORING: Shall be as per OSHA (Occupational Safety & Health Association).

D-204.05 FOUNDATIONS: If the foundation is good, firm earth, the earth shall be shaped or pared to give a firm support to the lower third of each pipe and, if necessary to secure a proper bearing for the pipe, a layer of gravel or other suitable material shall be placed. The same means of securing a firm foundation shall be adopted in case the excavation has been made deeper than necessary.

If there is not a good natural foundation, the pipes shall be laid in a masonry cradle supported on a foundation carried to a soil of satisfactory bearing power or supported on a structure designed to carry the weight of pipe and its load to a firm bearing.

If the foundation is rock, an equalizing bed of earth or sand well compacted shall be placed upon the rock. The thickness of these beds under the barrel of the pipe shall be not less than four (4) inches. Pipe shall be laid in these beds so that at least the lower third of each pipe is supported its entire

length.

D-204.06 PIPE LAYING: Each pipe shall be laid to the line and grade given by the Engineer and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the flow line. All pipes shall be laid with the bells uphill. Joints shall be made in the manner specified.

The interior of the sewer shall, as the work progresses, be cleared of all dirt and superfluous materials of every description. On small pipe sewers, where cleaning after laying may be difficult, a swab or drag shall be kept in the pipe and pulled forward past each joint immediately after its completion.

"T" or "Y" branches or junctions shall be installed at the places shown on plans or designated by the Engineer.

D-204.07 BACKFILL: All trenches and excavations in this section shall be in accordance with, Section 102.

D-204.08 ORDER OF CONSTRUCTION: The construction of all sewer pipe lines shall begin at the lower or outlet end, or at the low point in the line. When construction involves the building of the main sewer pipe lines having one or more laterals or tributary lines, the construction of the laterals or tributary lines shall not be started until the main sewer has been completed to the point where the lateral or tributary line connects with the main sewer line. Sewer appurtenances shall be constructed as soon as the sewer which they serve is constructed to their locations. The postponing of the construction of appurtenances until the sewer line has been completed, or the construction of appurtenances in advance of the construction of the sewer line, will not be permitted. All connections to existing sewers shall be done in a manner acceptable to the Engineer.

D-204.09 DELIVERY: Sewer pipe and other materials delivered to the job site in advance of their use shall be stored in a manner satisfactory to the Engineer. All defective sewer pipe or material shall be removed from the site of the work. If sewer pipe is placed along side of the line of construction, it shall be done in such manner as to prevent any unnecessary inconvenience to the public or interfere with the adjacent property, and after permission from the Engineer.

Tight fitting stoppers or bulkheads shall be securely placed in or across the end of all sewer lines when construction is stopped temporarily, or at the end of a day's work. Such closures need not be water tight.

D-204.10 REJECTION OF PIPE: Pipe shall be subject to rejection on account of any of the following:

- a. Variations in any dimension exceeding the permissible variations given in Table II, ASTM Designation C-13.
- b. Fractures or cracks passing through the barrel or socket, except that a single crack at the spigot end of the pipe not exceeding 75% of the depth of the socket, or a single fracture in the socket not exceeding 3" around the circumference nor 2" lengthwise may be permitted.

- c. Chips or fractures on the interior of the pipe exceeding 2" in length, 1 inch in width, and of a depth more than one fourth (1/4) the thickness of the shell.
- d. Blisters that are broken or exceed the dimensions specified in Section 26, ASTM Designation C-13.
- e. Fire cracks or hair cracks sufficient to impair the strength, durability, or serviceability of the pipe.
- f. Variation of more than 1/8 inch per linear foot in alignment of a pipe intended to be straight.
- g. Glaze that does not conform to the requirements specified in Section 25, ASTM Designation C-13.
- h. Insecure attachment of spurs on branches.
- i. Failure to give a clear ringing sound when placed on end and dry-tapped with a light hammer.

All rejected pipes shall be replaced by the Contractor with pipes which meet the requirements of these specifications and those set out in ASTM Designation C-13 without additional cost to the Owner.

D-204.11 BORINGS: Where any information pertaining to the character of the subsurface formations to be encountered in the excavation work is needed by the Contractor, contractor shall make such borings at Contractors own expense, and it is expressly understood that the Owner and/or Engineer does not assume any responsibility for any subsurface formations to be encountered along the trenching or other excavations.

D-204.12 PUMPING, BAILING, AND DRAINAGE: The Contractor shall immediately remove any surface or seepage water or waters from the sewer pipe lines, drains, trenches, ditches, or other surfaces which may accumulate during the progress of the work, by providing the necessary ditches, temporary drain lines, or by pumping, bailing, or any other means necessary to attain the desired relief. The Contractor shall have available, at all times during the progress of the work, such pumps, and equipment must be maintained in good working condition during the process of completing the work so bid.

D-204.13 CONCRETE CUSHION, CRADLE, OR PROTECTION: Concrete cradle, cushion, or protection where required, shall be constructed as shown on the plans. Where a condition arises which requires the installing of such concrete cushions or cradle or protection, not shown on the plans, such installation shall be made only on the written instructions of the Engineer; such instruction shall designate the location, shape, type, and manner of construction.

Where concrete cradle or cushion is constructed beneath the sewer pipe, the sub-grade shall be prepared to the dimensions and form as shown on the plans. Concrete cradle, cushion, or protection shall be placed in a dry trench unless, in the opinion of the Engineer, such a method is not

practicable. Where the concrete is placed in a wet trench the work shall be done strictly as directed or approved by the Engineer.

D-204.14 MEASUREMENT: All pipe installed in accordance with the above specifications and accepted by the Engineer shall be measured by the linear foot of the size and at the depth installed. The depth shall be measured from the flow line of the pipe to the ground surface over the centerline of the pipe at the time of construction. Depth measurement shall be made at manholes, at intervals not to exceed fifty feet (50') between manholes and at breaks in the profile of the ground, at the time of construction. The length of sewer mains and laterals will be measured between centers of manholes where the installation involves the connecting of sewer into a manhole at each end of the line being measured.

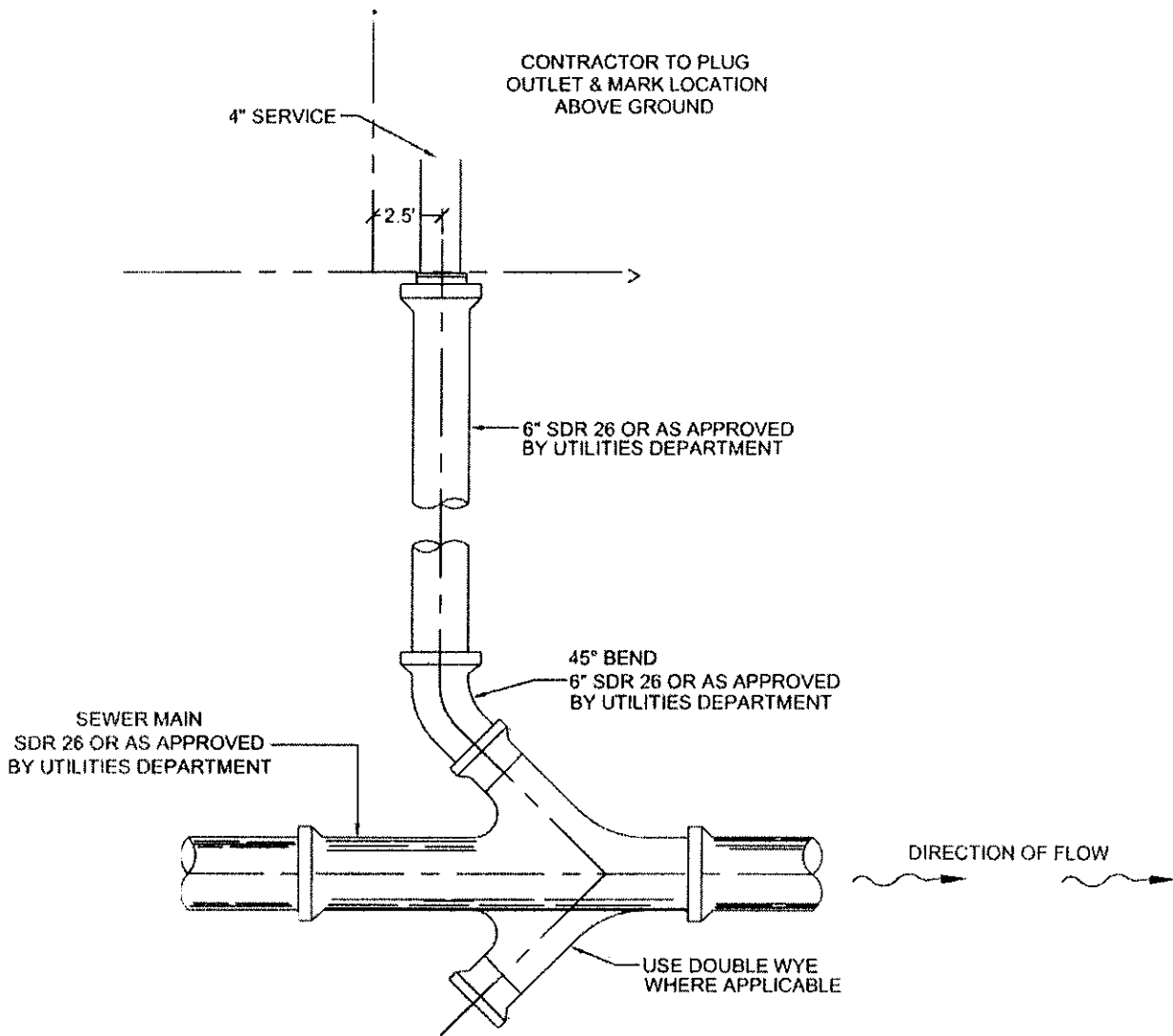
Where the installation involves a connection to an existing stub, the measurement shall be made from the end of the stub to the center of the manhole on the work being measured. Sewer stubs shall be measured from the end of the stub to the center of the manhole to which the stub is connected. Single joints of pipe constructed with a manhole are considered a part of that manhole and no additional payments will be allowed.

Concrete cradle or concrete encasement protection will be measured by the linear foot along the center of the pipe where it has been installed in accordance with the details shown on the plans.

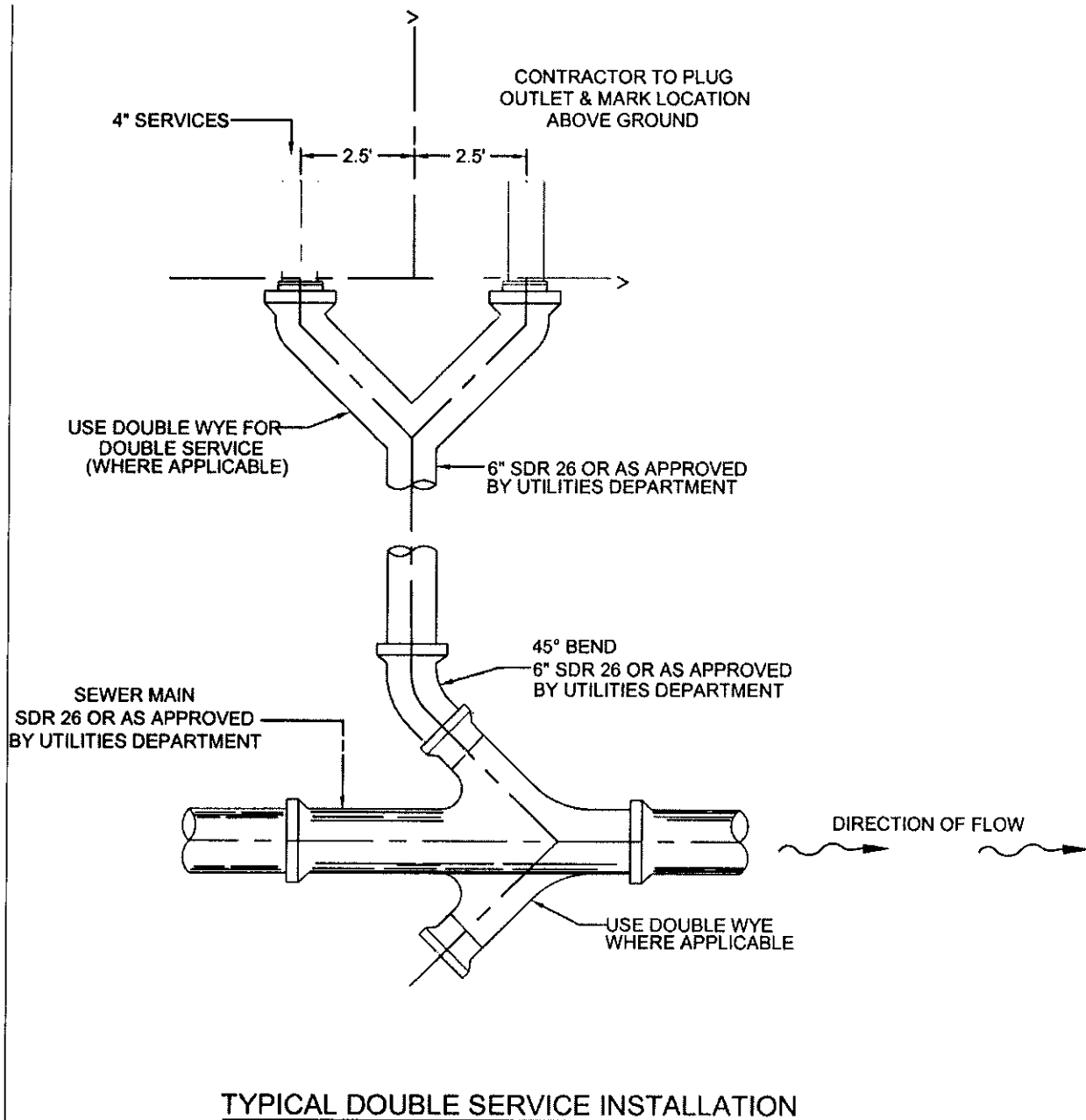
D-204.15 PAYMENT: All sewer mains, laterals, and stubs measured as set out above, shall be paid for at the unit price bid per linear foot complete in place, of the size, type, and depth constructed, which price shall be full compensation for furnishing all labor, material, and equipment, for all hauling, excavation, shaping of trench bottom, bracing, sheeting, and lumber not ordered left in place, for all installation, backfilling, tamping of backfill, and for all clean-up and incidentals necessary to furnish sewer pipe complete in place.

Concrete cradle and concrete encasement will be paid for at the unit price bid per linear foot complete in place.

SECTION 206 SERVICE CONNECTION



TYPICAL SEWER SERVICE INSTALLATION



SECTION 208 FIBERGLASS REINFORCED PLASTIC MANHOLES

D-208.01 MATERIALS

Fiberglass reinforced plastic manholes shall be in accordance with ASTM D3753 "Glass Fiber-Reinforced Polyester Manholes" and the requirements of this specification. The inside diameter of the manhole barrel shall be either 48" or as indicated in the plans. A concentric reducer over the barrel shall have an inside diameter of 24 inches. The minimum wall thickness for all manholes regardless of depth shall be ½" (.480").

D-208.02 GOVERNING STANDARDS

- ① ASTM D3553 - Standard specifications for glass fiber reinforced polyester manholes.
- ② ASTM D2412 - Test method for external loading properties plastic pipe by parallel-plate loading.
- ③ ASTM C581 - Practice for determining chemical resistance of thermosetting resins.
- ④ ASTM D2584 - Test method for ignition loss of cured reinforced resins.
- ⑤ ASTM D695 - Test method for compressive properties of rigid plastics.
- ⑥ ASTM C790 - Test methods for flexural properties of unreinforced and reinforced plastics and electrical insulating materials.
- ⑦ ASTM D2583 - Test methods for indentation hardness of rigid plastics by means of barcol impressor.

The contractor shall furnish the manufacturer's certificate that the material meets the standards set forth herein. All fiberglass manhole sections shall be identified with the manufacturer's name, identification number, and manhole length.

Glass Fiber – Reinforced Polyester Manholes shall be prohibited within street sections on Truck Routes & Industrial Parks.

D-208.03 MANHOLE RINGS AND COVERS

All manhole rings and covers for streets shall have a clear opening of no less than 24" and a height of 5" and a minimum weight for ring and cover of 298 pounds, and shall have the seating surface of ring machined to secure a snug fit. Manholes in street section shall be entered in a concrete slab 6'x6'x8" reinforced with #4 rebar at 8" centers.

The castings for manhole rings and covers shall be as detailed on drawings. They shall be grey iron castings boldly filleted at angles and the arises shall be sharp and perfect. The casting shall be true to pattern, form, and dimensions, free from cracks, sponginess, blow holes, or other pouring faults affecting their strength and value for the service intended. Surfaces of the castings shall be free from burnt on sand and shall be reasonable smooth. Runners, risers, fins, and other cast-on places shall be removed from the surface.

D-208.04 EXCAVATION

The contractor shall be all necessary excavation for the various manholes. Such excavation shall be of sufficient size as to permit the proper installation of the base and wall forms, and allow room for striping of such forms. All such excavation shall conform to the size and dimensions as shown on the drawings, plus a maximum of four (4) feet to permit working room. Care shall be taken to insure that the excavation is not carried to a greater depth that required. If it becomes necessary to shore the walls and also permit the construction of the manhole itself without necessitating the removal of any

shoring until such time as the entire manhole is completed. No shoring shall be left or back filled around, unless authorized by the Engineer. Shoring shall remain in place for at least twenty-four (24) hours after the masonry or concrete work has been completed.

D-208.05 GENERAL CONSTRUCTION METHODS

All manhole work shall be completed and finished in a careful and workmanlike manner, special care being given to sealing the joints around all pipe that extend through the wall of the manhole. Joints for sewer pipe for line and drop connections in sizes 8"-15" shall be made by means of InsertaTee watertight compression connection or approved equal as shown in the plans and details. Install in accordance with the manufacturer's written instructions. Connections for pipe larger than 15" shall be made using a pre-approved connection. Install in accordance with the manufacturer's written instructions after finishing of wall has additional concrete to shape or form on the drawing. Where old manholes are to be adjusted to meet new lines and grades, all old masonry or concrete shall be thoroughly cleaned and wetted before joining any new masonry or concrete to it. All work on manholes shall be done in a workmanlike manner and in conformity with the usual practice used for such work. All materials for adjusting old manholes shall conform to the requirements set out in these specifications for manhole work.

D-208.06 BACKFILLING

The backfilling around the outside of manholes shall commence as soon as the concrete or masonry has been allowed to cure the required time and the forms and shoring have been removed. Such backfill shall be placed in layers of not more than six inches and shall be thoroughly tamped before the next layer is installed. It is anticipated that the backfilling shall be either hand or mechanically tamped. Whichever method is used, care must be exercised to insure that the backfill is thoroughly compacted to the density shown on the drawings. When a density is not shown on the drawings, compaction shall be 90% standard proctor density (ASTM D-690). Unless shown otherwise on the drawings suitable material selected from the excavation shall be used for backfill. Material must be subject to approval by the Engineer.

D-208.07 DROP MANHOLES

Drop manholes shall consist of construction of a standard sanitary sewer manhole with one standard drop connection on one side only, as shown in the detail drawings. All material used in the drop connection shall conform to the requirements of the pertinent specifications.

D-208.08 MEASUREMENT

This item will be measured by each individual structure completed. The depth will measure from the flow line to the top of the rim. The size (for Type "A" manholes) shall be the nominal inside diameter. This item includes but, is not limited to the following:

- ① Structural Excavation;
- ② Loading, hauling, and disposing of all excess material;
- ③ Furnishing all labor and materials;
- ④ Placing and compacting all backfill;
- ⑤ Final Grading.

D-208.09 PAYMENT

This item will be paid for at the Contract unit price bid per each structure for the various sizes, types and various depths of manholes complete and in place as shown in the drawings and specified herein.

SECTION 210 CONCRETE MANHOLES

210.01 DESCRIPTION: This item shall govern construction of manholes complete in place and the materials used therein, including excavation, installation, backfilling and surface restoration. It shall also include furnishing and installing rings, covers, appurtenances and any pumping, and drainage necessary to complete work. Wastewater manholes shall be acceptance tested by the Contractor.

The Contractor shall submit descriptive information and evidence that the materials and equipment the Contractor proposes for incorporation into the Work is of the kind and quality that satisfies the specified functions and quality.

MATERIALS

210.02 MATERIALS and COMPONENTS:

- (1) Concrete and Cement Stabilized Sand: All concrete shall conform to Section 406 "Concrete For Structures", Cast in place concrete shall be Class A, and precast concrete shall be Class I. All interior surfaces of wastewater manholes shall have a coating acceptable to the Engineer or be otherwise acceptably protected from the acidic effects of municipal wastewater. Concrete for backfill or overexcavated areas shall be Class A as indicated. Cement stabilized sand for bedding or backfilling, where indicated or required, shall contain 2 bags of Portland Cement per cubic yard; sand shall be as defined to "Fine Aggregate" in Section 406.
- (2) Mortar: Mortar shall be composed of one part Portland Cement, one part masonry cement (or ¼ part hydrated line), and sand equal to 2-1/2 to 3 times the sum of the volumes of the cement and lime used. The sand shall meet the requirements for "Fine Aggregate" as given in Section 406 "Concrete for Structures".
- (3) Reinforcement: Reinforcing steel shall conform to the requirements of Section 410, "Reinforcing Steel". Secondary, non-structural steel may be replaced by collated fibrillated polypropylene fibers acceptable to the Engineer in cast-in-place wastewater manholes.
- (4) Brick: Brick for ring adjustment courses or for wastewater manholes shall be prohibited.
- (5) Ring and Covers: Rings and covers shall conform to the requirements as described on the Std. Details.

Replacement Rings and Covers, 24" Diameter Lids: This ring and cover shall be used for the replacement of broken rings and covers, Minor Manhole Adjustment, or as otherwise directed by the Engineer.

Rings and Covers, 32" Diameter Lids: This ring and cover shall be used for all new manhole construction, except as otherwise directed by the EngineerA.
- (6) Pipe-to-Manhole: Precast bases and shall have flexible, resilient and non-corrosive boot connector's or ring waterstops acceptable to the Engineer confirming to the requirements of

ASTM C 923 on all wastewater pipe connections.

(7) Precast Grade Ring: Rings shall be reinforced Class A concrete

Precast Grade Rings, 24-1/2" Inside Diameter: This adjustment ring shall be used only for adjusting existing manholes with 24 inch lids and for Wastewater Access Device. Inside to outside diameter dimension of ring shall be 6" with a thickness of 3" to 6".

Precast Grade Rings 35" Inside Diameter: This adjustment ring shall be used for new manhole construction with 32" lids. Inside to outside dimensions of ring shall be 6" with a thickness of 4" to 6".

(8) New manhole Construction and Minor Manhole Adjustment:

New manhole construction and minor manhole adjustments shall be performed as indicated on plans and shall consist of adding precast reinforced concrete rings to adjust the manhole to final grade.

For new manhole construction, the maximum vertical allowable ring adjustment shall be limited to 18 inches (the maximum includes the depth of the ring casting). For existing manhole adjustments that fall within the limits of overlay and street reconstruction projects, the maximum vertical allowable shall be limited to two feet (the maximum includes the depth of the ring casting). All other existing manholes shall have a maximum allowable ring adjustment of one foot (the maximum includes the depth of the ring casting). Any adjustment that will exceed these requirements shall be accomplished as indicated on Std. Detail, and as described below in (9) "Major Manhole Adjustment". All manholes located in flooded areas shall have bolted covers and vents in accordance with TCEQ requirements.

(9) Major Manhole Adjustment:

Any adjustment that exceeds the requirements of (8) Minor Manhole adjustments, shall be accomplished as indicated on plans and shall consist of any combination of removing the concrete rings, and/or the manhole cone section, and/or the straight riser section of the manhole to bring the manhole to final grade. All manholes located in flooded areas shall have bolted covers and vents in accordance with TCEQ requirements.

(10) Waterproofing Joint Materials: O-ring and wedge seals for the joints of all wastewater manholes, when indicated, shall conform to the requirements of ASTM C443. Cold applied preformed plastic gaskets for wastewater manholes shall be as specified by Engineer. Connections between reinforced concrete wastewater manhole structures and pipe shall meet the requirements of ASTM C923.

210.03 CONSTRUCTION: All manholes shall have a minimum inside diameter of 48 inches. Manhole base section shall be appropriately increased to accommodate all converging pipe. A minimum horizontal clearance of 12 inches shall be maintained between adjacent pipes. Pipe ends within the base section shall not be relied upon to support overlying manhole dead and live load

weights. All wastewater branch connections to new or existing main shall be made at manholes with the influent pipe crown installed at the elevation of the effluent pipe crown or above. Where lines enter the manhole up to 24 inches above the flowline of the outlet, the invert shall be sloped upward to receive the flow, thus preventing splashing or solids deposition. 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 system shall require placement of new manholes at locations indicated or directed by the Engineer. Unless otherwise indicated, wastewater manholes shall have concentric cones, except on manholes over large mains where an eccentric cone shall be situated to provide access to an invert ledge.

Manholes shall be founded to the established elevations on uniformly stable subgrade. Unstable subgrade shall be overexcavated a minimum of 12 inches and replaced with a material acceptable to the Engineer. Precast base units shall be founded and leveled on a 6 inch coarse aggregate bedding. The cast-in-place concrete cradle shall be poured against undisturbed trench walls up the pipe's springline.

All adjustments shall be completed prior to the placement of the final surface.

Manhole components to be reused shall be carefully removed and the contact areas shall be cleaned of all mortar, concrete, grease and sealing compounds. Any items broken in the process of removal and cleaning shall be replaced in kind by the Contractor of this expense.

If the adjustment involves raising the elevation of the top of the manhole in accordance with these specifications, the top of the concrete ring shall be cleaned and built up vertically to the new elevation, using new or salvage concrete rings and the ring and cover installed with the top surface conforming to the proposed grade.

Cast-in-place foundations shall have a minimum depth of 12 inches at the invert flowline. The widths of all manhole inverts shall be specifically sized for the connecting pipes. Inverts shall be "U" shaped with a minimum depth of three fourths of the largest pipe diameter. The invert shall have a minimum fall of 0.10 of a foot between the inlet and outlet. 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 shall be measured from the invert flowline to the finish surface elevation.

Wastewater manhole having cast in place foundations may be constructed over existing wastewater pipes, except polyvinyl chloride (PVC), and the top half of the pipe removed to facilitate invert construction. The manhole shall rise from the springline elevation of the pipe, approximately one inch of each 12 inches of run (8%). Wastewater manholes with lines larger than 15 inches shall require precast bases; manholes constructed over in-service mains however, may be built on cast-in-place foundations if the flow cannot be interrupted. Precast and cast-in-place wastewater junctions boxes shall be allowed only where indicated on the plans or acceptable to the Engineer. The floors of the

manholes also, shall rise outwardly from the springline on a slope at 1:12 (8%).

Wastewater lines, except reinforced concrete pipe, set in cast-in-place foundations, shall require a waterstop seal or gasket acceptable to the Engineer around the outside perimeter of the pipe. It shall be

approximately centered under the manhole section wall.

Cast-in-place manholes, junction boxes and flat-slab transitions shall be reinforced Class A concrete. All structural concrete work shall conform to Section 406, "Concrete Structures". Forms will be required for all cast-in-place walls above the foundation. Where the surrounding material can be trimmed to a smooth vertical face, outside forms may be omitted.

Backfilling for manholes shall conform to the density requirements of Section 102. 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 construction of manhole construction shall be backfilled with cement stabilized sand (2 sacks per cubic yard) up to the bottom of Portland Cement pavement slabs or to within two (2) inches of finish elevation of asphalted concrete pavements. The cement-stabilized sand shall be a minimum of 12 inches thick.

When rings and covers are set to grade, the inside and outside of the concrete rings shall be wiped with mortar so placed as to win a durable water-tight joint smooth and even with the manhole cones section. No grouting shall be performed when the atmospheric temperature is at or below 40 degree F, and when necessary, because of a sudden drop in temperature, joints shall be protected against freezing for at least 24 hours.

210.04 ACCEPTANCE TESTING OF WASTEWATER MANHOLES: Manholes shall be tested separately and independently of the wastewater lines.

- (1) Test by the Vacuum Methods: Shall not be acceptable unless recommended by Engineer and authorized by the Utilities Director.
- (2) Test by the Exfiltration Method.

All manhole testing shall be performed by Exfiltration Method of testing described below. This method may only be used when ground water is not present. If ground water is present a Vacuum Test may be used only if directed by the Engineer. All backfilling and compaction shall be completed prior to the commencement of testing.

(a) Procedures:

1. 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. Coating shall be applied after the testing unless coating is applied before field assembly, or at the factory. All lift holes and exterior joints shall be plugged with an acceptable non-shrink grout. No grout shall be placed in horizontal joints.
2. After cleaning the interior surface of the manhole, the Contactor shall place and inflate pneumatic plugs in all of the connecting pips to isolate the manhole; sealing pressure within the plugs shall be as recommended by the plug manufacturer.

3. Concrete manhole shall be filled with water or otherwise thoroughly water for a period of 24 hours prior to testing.
4. At the start of the test, the manhole shall be filled to the top with wetted. The test time shall be 1 hour (60 minutes). The Construction Inspector must be present for observation during the entire time of the test. Permissible loss of water in the 1 hour test time is 0.025 gallons per diameter foot, per foot of manhole depth. For a 4-foot diameter manhole, this quantity converts to a maximum permissible drop in the water lever (from the top of the manhole cone). Of 0.05 inches per foot of manhole depth (0.5 inches for a 10 foot deep manhole).

(3) Failure to Pass the Test (Records of Tests)

If the manhole fails to pass the initial test method as described in (2) Test by the Exfiltration Method and, if allowed, (1) Test by the Vacuum, or if visible groundwater leakage into the manhole is observed, the Contractor shall locate the leak, If necessary by disassembly of the manhole, checking gaskets and replacing if necessary, relubrication, and re-assembly, or Contractor may install an acceptable exterior joint sealing product (recommended by Engineer and approved by Utilities Director) on all joints and then retested. If any manhole fails the vacuum and/or exfiltration tested twice, the Contractor shall consider replacing that manhole. If the Contractor chooses to attempt to repair that manhole, the manhole must be retested until it passes. In no case shall cold applied preformed plastic gasket be used for repair. Records of all manhole testing shall be made available to the Engineer at the close of each working day, or as otherwise directed. Any damaged or visually defective products, or any products out of acceptable tolerance shall be removed from the site.

At a minimum, test Records shall include the following and shall be part of the Project records turned in with the acceptance package:

Name of the manhole manufacturer
 Date tested/date re-tested
 Passed/failed and state what was done to correct the problem
 Location/station of manhole
 Type of Coating
 Any repairs made to the joints.

(4) Inspection:

The Engineer shall make visual inspection of each manhole after it has passed the testing requirements and is considered to be in its final condition. The inspection shall determine the completeness of the manhole; any defects shall be corrected to the Engineer's satisfaction. All

testing shall be performed at the presence of a Utilities Inspector.

210.04 MEASUREMENT: All manholes and the type indicated shall be measured as units complete in place.

New manholes constructed to interim elevations to facilitate stage construction shall be measured as one unit regardless of the number of interim elevation constructed. All labor, materials and other expenses necessary for the stage construction shall be considered subsidiary to the completed unit.

210.05 PAYMENT: Payment for completed manholes of the type indicated shall be made at the unit price bid for each including all labor, equipment, materials, time and incidentals necessary to complete the work.

SECTION 212 PROPOSED WASTEWATER PUMP STATION STANDARDS

212.1 Description:

This item shall govern the design of wastewater pumping stations. The Engineer shall design Wastewater Pump Stations shall to comply with Texas Commission for Environmental Quality (TCEQ) - Design Criteria for Sewerage Systems, 30 TAC 317.3 or any revisions thereto as applicable. The Wastewater Pumping Station design shall also meet the criteria and standards listed within this item of the City of Laredo (COL) Specifications for Water and Sanitary Sewer Construction, if it is to be accepted as part of the COL infrastructure.

The installation of submersible, self-priming type pumping stations is preferred. The engineer shall make an earnest effort to incorporate the design of this pumping station type into projects submitted to the Utilities Department for review. If another type of pumping station (i.e. dry well – wet well, suction lift) is proposed to COL for review and approval, the Engineer shall justify that it is more appropriate for the project than the preferred submersible type.

212.2 Pumping Station General Information:

- a. The pumping station shall be installed in a location, which is readily accessible by maintenance vehicles and is removed from the vehicular traffic lanes of streets and alleys. A minimum 12 foot caliche road shall be constructed along the access easement for operation and maintenance.
- b. The lift station wet well and piping should be designed to avoid operational problems with grit accumulation and provisions for grit removal.
- d. The expected average and peak flow rates produced by all the phases or units of a proposed development that will be served by the pumping station must be presented. Any expected expansions, modifications or replacements of lift stations related to the growth of the development must be presented with the initial submittal of the design report and engineering drawings.
- e. A minimum of two independent pumps shall be provided. Both pumps at stations with only two units shall be the same size. Pumping stations shall be designed so that one unit or the largest capacity unit can be out of service and the remaining unit(s) is (are) able to deliver the expected peak hourly flow rate to the designated point.
- e. Public access will be prevented by installing an 8 foot high fence around the pumping station compound with 3 strands of barbed wire above the fence. Entrance gates will be at least 12 feet in width and shall be located near the wet well to facilitate cleaning with a vacuum truck.

212.3 Pumping Station Valves and Piping

- a. Each pump shall have individual discharge lines. Individual shutoff and check valves will be installed on the discharge line of each pump and shall not be installed within the lift station wet well. A separate valve pit shall be constructed.
- b. Check valves shall be swing arm type and not be installed on the vertical portion of the discharge piping. Individual shut off valves will be gate valves (not plug valves) with a valve pit box. Valve pit box shall be of minimum 4 feet by 6 feet, equipped with a drain, a check valve in the drain pipe and proper ventilation. All valve pits deeper than 4 feet shall include an aluminum ladder.
- c. 45 degree cast iron elbows will be provided for pump discharge piping turns.
- d. Discharge plumbing shall include 4" quick connect with valve and cap.

212.4 Suction Lift Pumping Station Piping

- a. Unless otherwise specified in this section, suction lift pumps shall meet all other applicable requirements in these standards and 30 TAC 317.3.
- b. Suction lift pump stations using dynamic suction lifts exceeding the limits outlined in the following sections may be approved upon submittal of factory certification of pump performance and detailed calculations indicating satisfactory performance under design conditions. Detailed calculations must include static suction lift as measured from the "lead pump off" elevation to the centerline of the pump suction, friction and other dynamic head losses, altitude correction, required net positive suction head and a safety factor of 6 feet.
- c. The pump equipment compartment shall be above grade or offset and shall be physically isolated from the wet well to prevent the humid and corrosive atmosphere from entering the equipment compartment. Wet well access shall be provided through another opening in the wet well cover.
- d. Self-priming pumps shall be capable of priming and repriming at the "lead pump on" elevation. Self-priming and repriming shall be automatically accomplished within 60 seconds under design operating conditions.
- e. Suction piping shall not exceed the size of the pump suction and shall not exceed 25 feet in total length.
- f. Priming lift at "lead pump on" elevation shall include a safety factor of at least 4 feet from the maximum allowable priming lift for the specific equipment at design operating conditions.
- g. The total of the dynamic suction lift at the "pump off elevation" and required net positive suction head at design operating conditions shall not exceed 22 feet.
- h. "T" fitting shall be installed on the individual suction lines in lieu of a 90 degree elbows at the last turn before the pumps to facilitate suction line cleaning.
- i. Dresser couplings with rubber compression rings will be installed on the suction lines to reduce vibrations and facilitate removal.

- j. A ¾ inch bleeder valve and piping will be installed on the pump housing to prime and clean pumps.
- k. Slide type fittings with boot gaskets will be installed on piping at the pumps to facilitate pump removal.
- l. Vacuum gages shall be installed on the suction lines at pump housings
- m. Pulley guards will be provided.

212.5 Pumps

- a. A minimum 5 horsepower unit will be provided (no single phase pumps accepted).
- b. 30 TAC 317.3.c.4 requires submittal of a design report which will include system curves, pump curves and head calculations: Total Suction Lift or Total Suction Head, Net Positive Suction Head available and required Total Discharge Head and Total Dynamic Head including friction losses
- c. The following information will be submitted in the design report for review and approval in addition to the information in the above Section 216.5.b that is required by the TCEQ.
 - 1) Manufacturer(s) of the motor and pump
 - 2) Pump and motor serial numbers
 - 3) Suction pipe, discharge pipe and impeller sizes
 - 4) Pump speed ratio
 - 5) Motor rated horsepower
 - 6) Motor rated speed
 - 7) Motor characteristics: voltage, phase, frequency
 - 8) Rated capacity for site conditions
 - 9) Efficiency
 - 10) Electrical Diagrams
 - 11) Manufacturer's Specifications
- d. Pumps in Submersible Type Pumping Station shall be readily removed and replaced without dewatering the wet well or disconnecting any piping in the wet well.

212.6 Wet Wells

- a. The proposed elevation of all critical components must be presented including: pump intake line inverts, control and alarm levels, top of the wet well, top of the dry well, control and alarm levels, influent line invert(s), invert overflow to emergency storage. Invert flow of pipe to wet well shall not be less than the diameter of inflow pipe.
- b. A lockable aluminum hatch cover with minimum dimensions of 4 feet by 6 feet shall be installed in the wet well cover for access.

- c. The wet well shall be located near the gated Lift Station compound entrance for easy access of maintenance equipment.
- d. The wet well shall be lined with an epoxy coating over all interior surfaces to prevent corrosion of the concrete structure as specified in Division D, Section 210, entitled “**Concrete Manholes**”. Fiber glass wet wells do not require epoxy coating. Fiberglass wall thickness shall be minimum 3/4” thick.
- e. The bottom of the excavated pit for wet or dry well structure must be leveled and native soils, if present, compressed with excavation equipment for the installation of a gravel bed to support the base of the structure.
- f. A minimum of 12 inches of pea gravel shall be installed as bedding material in the finished bottom of dry well and wet well excavations. The pea gravel will also be installed between the wet or dry well and the excavation to an elevation of 1/3 the total depth of the structure as measured from the well bottom. Utilities Inspectors will make a site- specific decision regarding the need or amount of pea gravel placement when the dry well and/or wet well is to be installed within rock.

212.7 Pump Station Controls

- a. Control systems shall be an air bubble, ultrasonic or float type. The electrical equipment shall comply with the National Electrical Code requirements for Class 1, Group C and D, Division 1, locations.
- b. High and low level floats shall also be installed with air bubble and ultrasonic system to operate in case of control system malfunction.
- c. The control system bubbler, transducer, or float controls shall be placed in an area of the wet well which is removed from of the effects of the influent flow(s) being received.
- d. Provisions shall be made to automatically alternate the pumps at the completion of each pumping cycle at all stations. An alternation stop switch shall be provided.
- e. Pump “Lead – Lag” Operation:

One pump will be adequate to deliver all anticipated peak flows. The “lead” pump is turned on at the first *on control elevation* with the “lag” pump started with a rising liquid level at the second *on control elevation*. The “lead” and “lag” pumps will both continue to operate until the pump *off control elevation* is attained. The “lead” and “lag” shall be automatically alternated between the pumps at the completion of each pumping cycle. The “lag” pump shall start if the “lead” pump fails to start at the beginning of a cycle.
- f. Additional support shall be provided for the rear of the communication box cabinet to bear the weight and prevent leaning.

212.8 Pump Instrumentation and Monitoring

- a. The telemetry alarm system shall be of equal brand or compatible to current system used by the City in the area and shall be installed at all lift stations with battery backup and an automatic dialing capacity.

The alarm level elevation shall also be annunciated locally at the lift station with an audible and visual alarm to comply with 30 TAC 317.3.e.5.

- b. All lift stations shall be equipped with hour meters for each pump to record pump motor running time, phase monitor, and lighting arrestor.
- c. Pressure gauges shall be installed on the discharge line of each pump.
- d. Flow measuring devices with instantaneous rate indicators, totalizers and recorders designed specifically for sewage force mains shall be provided at lift stations receiving peak flows of 1,200 gallons per minute or more.

212.9 Force Mains

- a. The force main will be installed at least 3 feet below the finished ground surface, but not at the same elevation as the gravity inlet line(s).
- b. Thrust blocking shall be provided on all buried force main piping in accordance with the most current version of the COL Specifications for Water and Sanitary Sewer Construction.
- c. A gate valve shall be installed on the force main outside pumping stations in a pit box for the following scenarios: (1) if located over and along a creek or the Rio Grande river bed or (2) if the volume held within the force main is greater than the emergency wet well volume above the alarm level when located outside any creek or river bed. The valve will prevent sewage flow from draining back into the wet well during emergencies and equipment repair.
- d. No segment of the force main shall have zero slope to limit the accumulation of gases. Low points should be avoided to prevent solids accumulation.
- e. Force mains shall transition into a gravity line within a manhole in a manner that minimizes agitation of sewage. The crowns of the force main and outlet gravity line will match with bench grouting installed to direct flow into the outlet with a minimal change in the gravity flow angle.

212.10 Ventilation

- a. There shall be no connection between wet well and dry well ventilation systems.
- b. Permanently Mechanical ventilation is required for dry wells located below the ground surface and for wet wells having screens or mechanical equipment requiring regular maintenance or inspection.

Portable ventilation equipment shall be provided for use at submersible pump station and suction lift pump station wet wells when entrance to the wet well for equipment maintenance is required.

- c. Multiple air inlets and outlets are desirable in dry wells over 15 feet deep. Dampers should not be used on exhaust or fresh air ducts. Fine screens or other obstructions within air ducts should be avoided to prevent clogging.
- d. Manual lighting/ventilation switches shall override automatic controls installed for intermittently operated lighting/venting equipment.

212.11 Electrical

- a. Electrical systems and components (i.e. motors, lights, cables, conduits, switchboxes, control circuits etc.) in raw sewage wet wells, and in all enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present, shall comply with National Electrical Code requirements, for Class 1 Group C and D, Division 1 locations. In addition, equipment located in wet wells shall be suitable for use under corrosive conditions. Each flexible cable shall be provided with watertight seal and separate strain relief. A fused disconnect switch located above ground shall be provided for all pumping stations. When such equipment is exposed to the weather, it shall meet the requirements of weatherproof equipment (NEMA 4R).
- b. All electrical junction and control boxes for the motor hook up, electrical connections and cable extensions are to be located outside the wet well.
- c. All underground electrical conduit shall be PVC and have a cover depth of 18 to 24 inches beneath the finished surface.
- d. Wire should be sized for a minimum of 100 amps.
- e. The float control junction box shall be made of PVC.
- f. Special Considerations for Submersible Pumping Stations
 - (1) Submersible pumping stations shall meet the applicable electrical requirements above, except as modified in this section.
 - (2) Electrical supply, control, and alarm circuits shall be designed to provide strain and to allow disconnection outside the wet well. Terminals and connectors shall be protected from corrosion by location outside the wet well in weatherproof enclosure.
 - (3) The motor control center shall be located outside the wet well, be readily accessible and be protected by a conduit seal to meet the requirements of the National Electrical Code to prevent the atmosphere of the wet well to enter the control center. The seal shall be located that the motor may be electrically disconnected without disturbing the seal.

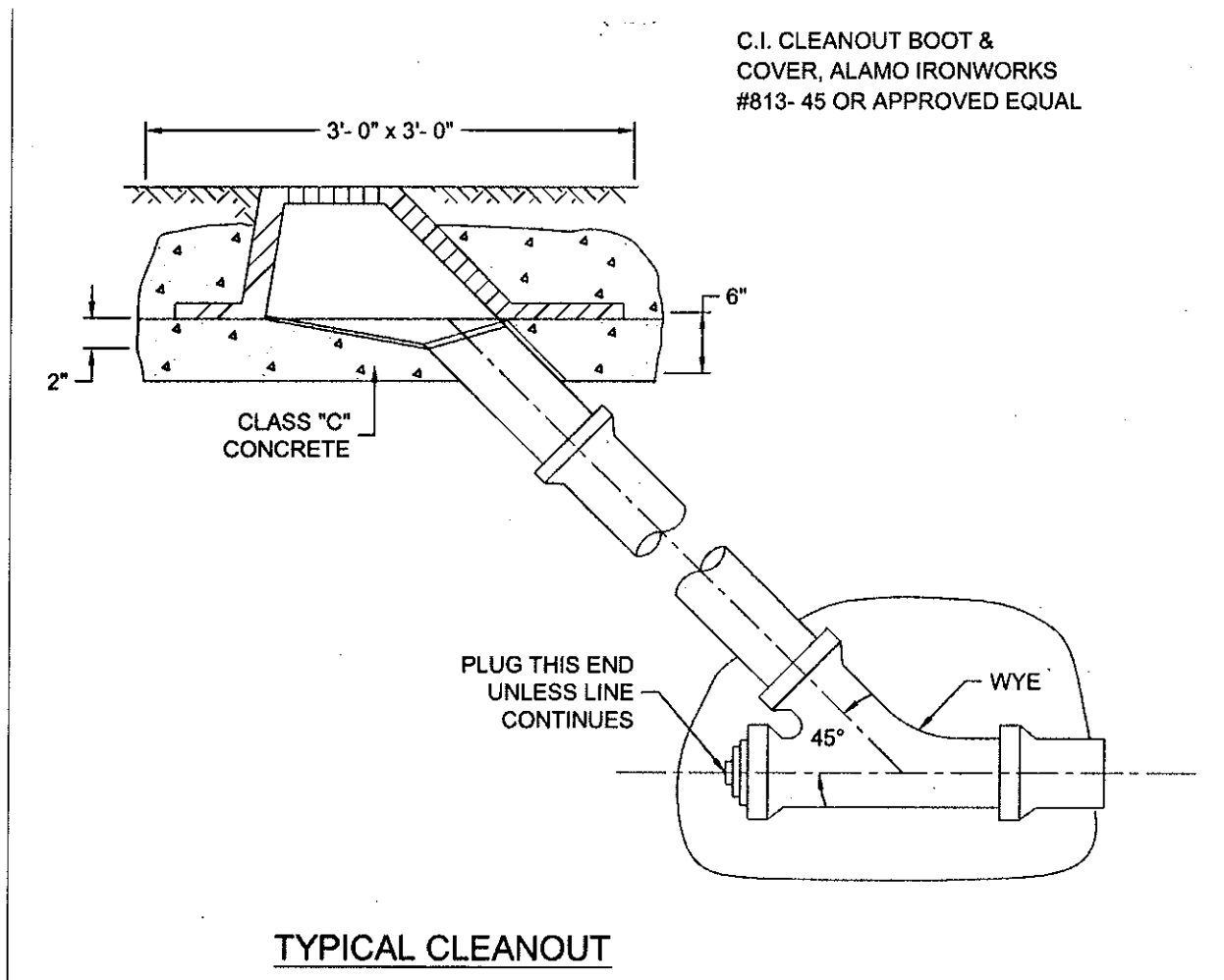
- (4) Pump motor cables shall meet the requirements of the National Electrical Code Standards for flexible cords in wastewater pumping stations. The cable circuit shall be de-energized by ground fault interruption protection in the event of the inability of the cable to conduct electricity. Power cord terminal fittings shall be corrosion-resistant and constructed in a manner to prevent entry of moisture into the cable, shall be provided with relief appurtenances, and shall be designed to facilitate field construction.

212.12 Emergency Operations

- a. An evaluation of the power supply reliability at the lift station location shall be performed in accordance with 30 TAC 317.3.e.1. Wastewater retention capacity within the lift station and collection system shall be calculated at peak flow with volumes above the alarm level.
- b. If the installation of a spill containment structure is required in accordance with 30 TAC 317.3.e.4, it will be designed to completely drain stored wastewater into the lift station wet well as its level is lowered to normal operating levels.
- c. There shall be an electrical connector installed on the above ground power service panel with an approved transfer switch to connect a standby generator if a permanent on-site unit is not required. This electrical connector shall be sized to allow connection of the properly sized generator to operate the pumping station.
- d. All permanently installed engine driven generators shall be protected from operating conditions that would result in damage to the equipment. Protective equipment shall be capable of shutting down the engine and activating an on site alarm. Protective equipment shall monitor for conditions of low oil pressure and overheating.
- e. The generating unit of a permanently installed or portable generator shall be adequate to provide power for pump motor starting current, lighting, proper ventilation and other equipment necessary for safety and proper operation of the lift station.
- f. The engine shall be located above grade with adequate ventilation of fuel vapors and exhaust gases.

212.13 MEASUREMENT AND PAYMENT: Separate measurement or payment will be made for this item and the Contractor shall investigate/ the conditions as they exist in the field and include the unit price bid for the items concerned full reimbursement. Payment shall be made in lump sum.

SECTION 214 SANITARY SEWER CLEANOUTS



SECTION 216 ADJUSTING MANHOLES, CLEANOUTS, AND INLETS

D-216.01 DESCRIPTION: This item shall govern for the furnishing of materials and for adjusting, abandoning, or capping existing sewer manholes, cleanouts, or inlets where required by the plans. Manholes, cleanouts, and inlets shall be adjusted to positions and/or elevations as shown on the plans or as ordered by the Engineer and in accordance with these specifications.

MATERIALS

D-216.02 MATERIALS: Manholes, cleanouts, or inlet rings, plates, grates, covers in good condition removed from the manholes, cleanouts, and inlets in the process of abandonment, capping, or adjustment may be re-used.

CONSTRUCTION METHODS

D-216.03 CONSTRUCTION: Manholes, cleanouts, or inlet rings, covers, plates, and grates shall be removed carefully and the contact areas shall be cleaned of all mortar and grease. Rings, covers, plates, or grates broken in the process of removal and cleaning shall be replaced in kind by the Contractor at his expense.

If the adjustment involves lowering the top of a manhole, cleanout, or inlet, a sufficient depth of concrete shall be removed to permit reconstruction on a batter not exceeding one (1) inch horizontal to two (2) inches vertical. The manhole or inlet ring, cover, plate, or grate shall then be installed with top conforming to the proposed new surface of street or grading as the case may be.

If the adjustment involves raising the elevation of the top of manhole, cleanout, or inlet, the top course shall be cleaned of mortar and built up vertically to the new elevation using new concrete from other manhole, cleanout, or inlet adjustments, or Class "A" Concrete as per section 504, and the ring, cover, plate, or grate installed with top conforming to the proposed new surface of street or grading as the case may be.

If abandonment of an inlet, cleanout, and manhole is required, it shall be removed completely to a depth one foot below the bottom of the trench. In each instance, the bottom of the trench shall be restored to grade by backfilling and compacting by the methods provided herein for backfill.

If capping of a manhole, cleanout, or inlet is required by the plans, capping shall be in accordance with the details shown on the plans.

MEASUREMENT

D-216.04 MEASUREMENT: Manholes, cleanouts, or inlets completely adjusted, abandoned, or capped as prescribed above, will be measured by the unit of each manhole, cleanout, or inlet adjusted. The excavation and backfill involved will not be measured for payment.

PAYMENT

D-216.05 PAYMENT: Each manhole, cleanout, or inlet adjusted, measured as prescribed above, complete in accordance with these specifications, will be paid for at the unit price bid for "Adjusting Manholes", "Adjusting Cleanouts", and "Adjusting Inlets", which price shall be full compensation for furnishing all required materials, including backfill as required, excavation, tools, labor, equipment, and incidentals required to complete the work.

SECTION 218 TESTING SEWER SYSTEM

D-218.01 GENERAL

1. Summary

- A. Section Includes:
 - 1. Deflection testing of sanitary sewer lines.
 - 2. Leakage testing of sanitary sewer lines.
 - 3. Leakage testing of sanitary sewer manholes.
- B. Measurement and Payment:
 - 1. Include costs for testing in appropriate unit prices bid for sewer line construction.

2. Submittals

- A. Submit in accordance with Standard General Conditions and Supplementary Conditions.
- B. Copies of all test results shall be submitted to the Engineer prior to acceptance of piping system.

D-218.02 PRODUCTS (N/A)

D-218.03 EXECUTION

1. GENERAL

- A. Commence test procedures when following condition are met.
 - 1. Pipe section to be tested is clean and free of dirt, sand, water or other foreign material.
 - 2. Pipe section to be tested has backfill placed and compacted
- B. Repair visible leaks in manholes and sewers regardless of results of leakage tests.
- C. Notify Engineer and City of Laredo Utilities Engineer in writing 48 hours before beginning tests.
- D. Contractor shall furnish and pay for all water required for testing.

2. Deflection Testing of Sanitary Sewer Lines

- A. Perform tests on PVC sewer pipe in presence of Engineer and City of Laredo Utilities Inspector.
- B. Provide necessary test mandrel, cable, reeling equipment, and other materials and equipment required to perform tests. Provide cable at each end of test mandrel to allow withdrawal if mandrel becomes stuck.
- C. Deflection Tests shall be performed on all flexible pipes. For pipelines with inside diameters less than 27 inches, a rigid mandrel shall be used to measure deflection.

1. *Mandrel sizing.* The rigid mandrel shall have an outside diameter (OD) equal to 95% of the inside diameter (ID) of the pipe. The inside diameter of the pipe, for the purposes of determining the outside diameter of the mandrel, shall be the average outside diameter minus two minimum wall thicknesses for OD controlled pipe and the average inside diameter for ID controlled pipe, all dimensions shall be per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing.
 2. *Mandrel design.* The rigid mandrel shall be constructed of a metal or a rigid plastic material that can withstand 200 psi without being deformed. The mandrel shall have nine or more "runners" or "legs" as long as the total number of legs is an odd number. The barrel section of the length of at least 75% of the inside diameter of the pipe. A proving ring shall be provided and used for each size mandrel in use.
 3. *Method options.* Adjustable or flexible mandrels are prohibited. A television inspection is not a substitute of the deflection test. Mandrels with removable legs or runners may be accepted on a case-by-case basis.
- D. The test shall be performed without mechanical pulling devices. Sewer is considered to have passed deflection test if mandrel can be drawn through sewer system being tested without aid of mechanical assistance.
- E. If excessive force is required or mandrel fails to pass through, sewer shall have failed deflection test.
- F. The test shall be conducted after the final backfill has been in place at least 30 days. No pipe shall exceed a deflection of 5.0%. If a pipe should fail to pass deflection test, the problem shall be corrected and a second test shall be conducted after the final backfill has been in place and additional 30 days. Correct failed sewers by excavating sewer a point of failure and for distance of 10 ft on either side, allowing sewer to return to its original round cross-section and backfill according to Specifications. Remove and replace sewers failing to return to original round cross-section or failing second deflection test at not cost to Owner. Do not use devices to generate internal pressures or vibrations to correct failed sewers.

3. Leakage of Testing Sanitary Sewer Lines

- A. Tests:
1. Pressure test sanitary sewer pipe 24 inches or smaller in diameter using low pressure air test.
- B. General:
1. Conduct tests in presence of Engineer and City of Laredo Utilities Inspector.
 2. Provide piping connections between section of line being tested and air supply, test pressure equipment, weirs, meters, certified pressure gauge, and other equipment, materials, and facilities necessary to make specified test.
 3. Provide bulkheads, blocking, bracing or other temporary sectionalizing devices that may be required.
 4. Remove temporary sectionalizing devices after test complete.
- C. Low Pressure Air Test
1. General:
 - a. Conduct required low pressure air test as specified herein.

- b. Plug pipe outlets with test plugs. Brace each plug securely to prevent blowouts during air test.
 - c. Add air slowly.
 - d. Pressurizing equipment shall include regulator set to avoid over-pressuring and damaging line.
 - e. Safety pressure test in accordance with OSHA requirements.
2. Air Test Procedures:
- a. The procedure for the low pressure air test shall conform to the procedures described in ASTM C-828, ASTM C-924, ASTM F-1417, or other appropriate procedures, except for testing times.
 - b. The test times shall be as outlined in this section. For sections of pipe less than 36 inch average inside diameter, the pipe shall be pressurized to 3.5 psi greater than the pressure exerted by groundwater above the pipe. Once the pressure is stabilized, the minimum time allowable for the pressure to drop from 3.5 pounds per square inch gauge to 2.5 pounds per square inch gauge shall be computed from the following equation:

$$T = \frac{0.085 \times D \times K}{Q}$$

T= time for pressure to drop 1.0 pound per square inch gauge in seconds;
 K= 0.0049 x D x L, but not less than 1.0;
 D= average inside pipe diameter in inches;
 L= length of line of same pipe size being tested, in feet;
 Q= rate of loss, 0.0015 cubic feet per minute per square feet internal surface shall be used.

Since a K value of less than 1.0 shall not be used, there are minimum testing times for each pipe diameter as follows:

Pipe Diameter (inches)	Minimum Time (seconds)	Length for Minimum Time (feet)	Time for Longer Length (seconds)
6	340	398	0.855 (L)
8	454	298	1.520 (L)
10	567	239	2.374 (L)
12	680	199	3.419 (L)
15	850	159	5.342 (L)
18	1,020	133	7.693 (L)
21	1,190	114	10.471 (L)
24	1,360	100	13.676 (L)

27	1,530	88	17.309 (L)
30	1,700	80	21.369 (L)
33	1,870	72	25.856 (L)

The test may be stopped if no pressure loss has occurred during the first 25% of the calculated testing time. If any pressure loss or leakage has occurred during the first 25% of the test period, then the test shall continue for the entire test duration as outlined in this subparagraph or until failure.

- c. Provide calibrated and certified test gauge at remote test plug.
 1. Gauge air pressure within test section and attach to test plug by sufficient length of hose to place gauge at ground surface. In case of test frames for individual joint testing, gauge to be remote from air supply.
- d. Proceed with test after sewer and lateral installation, including backfilling, is complete and lines cleaned. Proceed as follows:
 1. Flush and clean prior to conducting low pressure air test.
 2. Isolate section of sewer line to be tested by means of inflatable stoppers of other suitable test plugs. One plug shall have inlet tap, or other provision, for connecting hose to portable air control source.
 3. If test section is below groundwater level, determine height of groundwater above spring line of pipe at each end of test section and compute average. For every feet of groundwater above pipe spring line, increase gauge test pressure by 0.43 lb/sq. in.
 4. Connect air hose to inlet ap and portable air control source. Air equipment shall consist of necessary valves and pressure gauges to control rate at which air flows into test section and to enable monitoring of air pressure within test section. Testing apparatus shall also be equipped with pressure relief device to prevent possibility of loading test section with full capacity of compressor.
 5. Add air slowly to test section until pressure inside pipe is raised to 4.0 psig greater than average back pressure that may be over pipe.
 6. After pressure of 4.0 psig obtained, regulate air supply so pressure is maintained between 3.5 and 4.0 psig (above average groundwater back pressure) for period of 2 min. This allows air temperature to stabilize in equilibrium with temperature of pipe walls. Pressure will normally drop slightly until temperature equilibrium is obtained. During this period, check plugs with soap solution to detect plug leakage.
 7. Determine rate of air loss by time pressure drop method. After 2-min air

stabilization period, air supply is disconnected and test pressure allowed to decrease to 3.5 psig. Time required for test pressure to drop from 3.5 to 2.5 psig is determined if rate of air loss is within allowable time limit. If time is equal to or greater than times indicated in tables, pipe line shall be deemed acceptable.

8. Upon completion of test, open bleeder valve and allow air to escape. Plugs shall not be removed until air pressure in test section released. During this time, no one shall be allowed in trench or manhole while pipe is being decompressed.
- e. Repair sewers failing air test by removing and replacing defective pipe sections or by other approved methods at contractors cost.
 1. Retest until acceptable test results obtained to be paid by contractor.

D-218.04. LEAKAGE TESTING OF SANITARY SEWER MANHOLES

- A. After completion of manhole construction, all sealing or rehabilitation, all manholes shall be tested for watertightness and leakage separately and independently of wastewater lines by hydrostatic exfiltration testing.
- B. Plug influent and effluent lines, including services lines, with suitability-sized pneumatic or mechanical plugs. Ensure plugs are properly rated for pressures required for test. Follow manufacturer's safety and installation recommendations. Place plugs a minimum of 6 inches outside of manhole walls. Brace inverts to prevent lines from being dislodged if lines entering manhole have not been backfilled.
- C. Hydrostatic Exfiltration Testing:
 1. Hydrostatic exfiltration testing shall be performed as follows: all wastewater lines coming into the manhole shall be sealed with an internal pipe plug, then the manhole shall be filled with water and maintained full for at least one hour.
 - a. The maximum leakage for hydrostatic testing shall be 0.025 gallons per foot diameter per foot of manhole depth per hour.
 2. If water loss exceeds amount tabulated above, locate leaks, complete repairs necessary to seal manhole and repeat test procedure until satisfactory results are obtained.
 3. For concrete manholes, a wetting period of 24 hours may be used prior to testing in order to allow saturation of the concrete.
- D. Repair sewers failing air test by removing and replacing defective pipe sections or by other approved methods at contractors cost.

SECTION 302 STRUCTURAL EXCAVATION AND BACKFILL

D-302.01 DESCRIPTION: This item shall consist of doing the excavation for the placing of structures; for the disposal of all material obtained from such excavation; for the backfilling around completed structures to the finished grade as called for on the plans. Work to be done shall include all the necessary pumping or bailing, sheeting, drainage, and the construction and removal of any required cofferdams. Unless otherwise provided, the work included herein shall provide for the removal of old structures or portions thereof, trees, and other obstructions necessary to the proposed construction.

D-302.02 DEFINITIONS: "Common Structural Excavation" shall include the removal of all materials regardless of its nature.

D-302.03 USE OF EXPLOSIVES: When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secure manner, and all storage places shall be marked clearly "DANGEROUS EXPLOSIVES". The method of storing and handling explosives and highly flammable materials shall conform to Federal and State laws and regulations. The Contractor shall not use explosives until he has taken the necessary legal precautions to save the Owner against any claims arising from such use of explosives.

CONSTRUCTION METHODS

D-302.04 EQUIPMENT: All equipment necessary and required for the proper construction of structures and appurtenances shall be on project site in first class working condition and shall be approved by the Engineer before construction is permitted to start.

The Contractor shall provide hand tamping devices and pneumatic tampers as may be necessary to obtain the proper compaction for the bed and backfill as specified.

D-302.05 COMMON EXCAVATION: Common excavation shall be done in accordance with the lines and depths indicated on the plans or as established by the Engineer. Unless written permission to the contrary is given by the Engineer, no excavation shall be made outside a vertical plan three feet from the footing lines and parallel thereto.

In order that the Engineer may judge the adequacy of a proposed foundation, the Contractor, if requested, shall make soundings to determine the character of the subgrade materials. The maximum depth of such soundings will not be required to exceed five (5) feet below the proposed footing grade; it is the intent of this provision that soundings shall be made at the time the excavation in each foundation is approximately complete.

The final elevation to which a foundation is to be constructed shall be as shown on the plans or as raised or lowered by written order of the Engineer when such alterations are judged proper to satisfactorily comply with the design requirements for the structure. Should it be found necessary in the judgment of the plans, the necessary alterations in the details of the structure shall be accomplished in a manner as directed by the Engineer.

When a structure is to rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of the excavation and the final removal of the foundation material to grade shall not be performed until just before the footing is placed.

D-302.06 ROCK EXCAVATION: All material encountered, regardless of its nature, shall be included as common structural excavation.

Unless written permission to the contrary is given by the Engineer, no excavation shall be made outside a vertical plane 3 (three) feet from the footing lines and parallel thereto.

Rock foundation material shall be freed from all loose material, cleaned and cut to a firm surface either level, stepped, or serrated as directed by the Engineer. All seams shall be cleaned out and filled out with concrete at the time the footing is placed.

D-302.07 EXCAVATED MATERIAL: Excavated material required to be used for backfill may be deposited by the Contractor in storage piles at points convenient for rehandling. The location of storage piles shall be subjected to the approval of the Engineer who may require that survey points or lines be kept free from any obstruction.

Excavated material not required for backfill shall be disposed of by the Contractor as directed by the Engineer or as specified herein. If, in the opinion of the Engineer, the bottom of the ditch consists of unstable soil, this soil shall be removed from the full width of the trench and replaced with a pit-run gravel. Pit-run gravel shall vary in size from 3/4" to 3 1/2". The material shall be free from large amounts of organic material such as grass, roots, etc. The Engineer shall determine the depth of removal or unstable soil and the amount of backfill necessary. The cost of removing this unstable soil and replacing it with approved material shall be covered by a supplemental agreement. The sides of the trench shall be vertical unless otherwise approved by the Engineer. The Contractor shall install such trench bracing and sheeting as is necessary to protect the excavation also as required for the safety and to conform with governing laws.

Unless otherwise provided, the bracing and sheeting shall be removed by the Contractor after the backfilling has been replaced to a point at least 12 (twelve) inches above the top of the structure. In no case shall any sheeting or bracing be removed until the backfilling conditions have been met. The cost of bracing and sheeting shall be included in the unit price per linear foot for the structures.

The Contractor shall take adequate precautions to prevent damage to all existing utilities. Any utility lines cut or damaged shall be repaired or restored to their former condition.

D-302.08 DEWATERING TRENCH: Removal of water may be accomplished by bailing, pumping, or by a well-point installation as conditions warrant. Pumping or bailing from any excavation shall be done through or alongside any concrete being placed. No pumping or bailing will be permitted during the placing of concrete or for a period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a watertight wall.

D-302.09 BEDDING: The structure shall be bedded as shown on plans on fine granular materials over an earth foundation accurately shaped to fit the lower part of the structure exterior for at least

15% of its overall height. Selected material from excavation or borrow shall then be placed along both sides of the structure equally in layers not more than six (6) inches thick and compacted by mechanical tamps or rammers for the remainder of the lower 30% of the overall height of the structure.

D-302.10 BACKFILLING: As soon as practicable, all portions of excavation not occupied by the permanent structure shall be backfilled. Backfill material shall be free from large or frozen lumps, wood or other extraneous material, placed in successive layers of not more than 6" in depth (loose measurement) for the full width of the cross section. The material and the layers shall have the proper moisture content before tamping or rolling. Wetting or drying of the material and manipulations to secure a uniform moisture content throughout the layer will be required. Should the material be too wet to permit proper compaction or rolling, all work on all positions of the fill thus affected shall be corrected. Unless otherwise provided by the plans or special provisions, hand tamping will not be accepted as an alternate for mechanical compaction.

As a general rule, material used in filling or backfilling the portions described in this paragraph shall be an earth free of any appreciable amount of gravel or stone particles more than 4 (four) inches in greatest dimension and of a gradation that permits thorough compaction. When, in the opinion of the Engineer, such material is not readily available, the use of rock or gravel mixed with earth will be permitted provided no particles larger than 12 (twelve) inches in the greatest and 6 (six) inches in the least dimensions may be used. The percentage of fines shall be sufficient to fill all voids and insure a uniform and thoroughly compacted mass of proper density. No backfill shall be placed adjacent to or over single and multiple boxes until the top slab has attained 500 psi flexural strength.

All backfill as specified above shall be compacted to not less than 95% of the maximum density at optimum moisture content as determined by procedures set out under TEX-113-E. This compaction shall extend to the entire depth of each layer and the backfill, when completed, shall be a homogenous and uniformly compacted mass. Water jetting in backfill operations will not be permitted.

D-302.11 CLEANING AND RESTORATION OF SITE: After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site and shall restore all disturbed areas to their original condition. After all work is completed, the Contractor shall remove all tools and other equipment used by him, leaving the entire site free, clear, and in good condition.

D-302.12 MEASUREMENT AND PAYMENT No separate measurement or payment will be made under this item, but all such work done shall be deemed a subsidiary obligation of the Contractor, and as having been taken into account and included by him in the price bid for the complete job.

SECTION 304 REINFORCED CONCRETE STORM DRAIN PIPE

D-304.01 DESCRIPTION: This item shall consist of reinforced concrete storm drain pipe of types, sizes, and classes shown on the plans furnished and existing in the field. This specification also deals with existing, conflicting pipelines discovered during construction requiring replacement.

MATERIALS

D-304.02 REINFORCED CONCRETE STORM DRAIN PIPE: Reinforced concrete storm drain pipe shall be tongue and groove pipe and shall meet the requirements of ASTM Designation C76-59T, Class 3, with either Type A or Type B Wall, and 24" diameter minimum. Extra strength pipe shall meet the requirements of ASTM Designation C76-59T, Class 4, with either Type A or Type B Wall or latest ASTM Standards. Where pipe is installed under highways, it shall be Class 4 with Type "A" Wall.

D-304.03 JOINTS MATERIAL: Reinforced concrete drain pipe joints shall be constructed to Ram-Nek, rubber O-rings, or approved equal.

D-304.04 CONCRETE: Concrete used for pipe cradles shall meet the requirements of Class "C" concrete, as set out in the section titled "CONCRETE" of these specifications. This concrete shall be furnished by an approved transit mix concrete company and/or mixed on jobsite to specifications herein established.

CONSTRUCTION METHODS

D-304.05 EQUIPMENT: All equipment necessary and required for the proper construction of sewers and appurtenances shall be on project site in first class working condition and shall be approved by the Engineer before construction is permitted to start.

The Contractor shall provide such hand tamping devices and pneumatic tampers as may be necessary to obtain the proper compaction for the pipe and backfill as specified.

D-304.06 EXCAVATION:

(a) Common: Common excavation shall consist of all excavation and shall be carried out to neat lines as specified and shown on the plans. If the excavation is carried out to a point below the required depth, this portion of the trench shall be filled at the Contractor's expense with selected material approved by the Engineer and thoroughly compacted to the specified elevation of the pipe bed.

(b) Rock: Rock excavation shall consist of the removal of boulders and detached rock 1/2 cubic yards in volume or greater, and all rock in ledges or masses which can be removed only by the use of bars, sledges, mechanical hammers, or by blasting.

The sides of the trenches shall be excavated to neat lines of the required width and no rock masses shall be allowed to extend into these lines. The bottom of the trench shall be excavated horizontally

to a depth of at least one-half the diameter of the pipe, or a minimum of 4 (four) inches greater than the finished grade of the pipe bed. After removal of all broken material from the trench, this portion of the trench shall be filled with clean, dry sand, or an equivalent granular material to the elevation of the pipe bed.

When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in a secure manner and all storage places shall be clearly marked "DANGEROUS EXPLOSIVES". The method of storing and handling explosives and highly flammable materials shall conform to Federal, State, and local laws and regulations. The Contractor shall not store or use explosives until he has taken the necessary legal precautions to save the Owner against any claims arising from such possession or use of explosives, with permission secured from the Engineer.

(c) General: Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the Engineer, or as specified herein. If, in the opinion of the Engineer, the bottom of the ditch consists of unstable soil, this soil shall be removed from the full width of the trench and replaced with a pit run gravel or pipe cradles. Pipe cradles shall be constructed in accordance with Division D, Section 304, Paragraph D-304.11, "CRADLES", of these specifications. Pit run gravel shall vary in size from 3/4" to 3-1/2". The material shall be free from large amounts of organic material such as grass, roots, etc. The Engineer shall determine the depth of removal of unstable soil and the amount of backfill necessary. The cost of removing this unstable soil and replacing it with approved material shall be covered by supplemental agreement.

The sides of the trench shall be vertical unless otherwise approved by the Engineer. Spaces for the construction of pipe joints shall be excavated accurately to size so that the barrel supports the entire weight of the pipe and so that no less than 3/4 of the length of the barrel is in continuous contact with the bed. Joint holes shall be large enough to permit easy working under the bottom of the pipe. The bottom of the ditch shall be shaped as shown on the plans.

The Contractor shall install such trench bracing and sheeting as is necessary to protect the excavation, and as required for safety and to conform with governing laws. Such installations shall be governed by the requirements set forth under Division D, Section 802, "SHEETING AND BRACING", and pursuant to the Trench Safety Law of the State of Texas.

Unless otherwise provided, the bracing and sheeting shall be removed by the Contractor after the backfilling has been replaced to a point at least 12 (twelve) inches above the top of the pipe. In no case shall any sheeting or bracing be removed until the backfilling conditions have been met. The cost of bracing and sheeting shall be included in the lump sum price per foot of pipe in the Trench Safety bid item.

The Contractor shall take adequate precautions to prevent damage to all existing utilities. **Any utility lines cut or damaged shall be repaired and restored to their former condition as specified by the respective utility.**

D-304.07 TUNNELING: Pipe shall not be laid in tunnel excavation except as shown on plans or with written permission from the Engineer.

D-304.08 EXCAVATION IN STREETS: Excavation in streets, together with the maintenance of traffic where specified and the restoration of the pavement riding surface shall be in accordance with plan details or as required by other specifications included in the contract.

Pavement shall be restored as per Section 520.

Refer to plans (General Notes) for special instructions.

D-304.09 REMOVING OLD STRUCTURES: When old inlets or manholes are encountered and no plan provision is made for adjustments or connection to the new sewers, such manholes and inlets shall be removed completely to a depth one (1) foot below the bottom of the trench. In each instance, the bottom of the trench shall be restored to grade by backfilling and compacting by the methods provided hereinafter for backfill. Where the trench cuts through storm or sanitary sewers which are known to be abandoned, these sewers shall be cut flush with the side of the trench and blocked with a concrete plug in a manner satisfactory to the Engineer.

D-304.10 DEWATERING TRENCH: Sewers shall not be constructed or laid in a trench in the presence of water. All water shall be removed from the trench sufficiently prior to the sewer placing operation to insure a dry, firm bed on which to place the sewer, and the trench shall be maintained in such unwatered condition until all concrete and mortar is set. Removal of water may be accomplished by bailing, pumping, or by a well-point installation as conditions warrant.

In the event that a trench cannot be dewatered to the point where the pipe subgrade is free from mud, or it is difficult to keep the reinforcing steel clean in cast-in-place monolithic sewers, a seal shall be used in the bottom of the trench. Such seal shall consist of a lean concrete mixture (not less than three (3) sacks of cement per cubic yard), with a minimum depth of three (3) inches.

D-304.11 CRADLES: When, in the opinion of the Engineer, the natural fill material forming the bottom of the trench does not offer a suitable foundation for the pipe, he shall determine the location and dimensions of the necessary supporting cradles which must be added. These design details shall be shown on plans furnished to the Contractor, who will carry out the required work under the Engineer's direction. Payment for any additional work incurred in this operation shall be covered by Supplemental Agreement.

D-304.12 Installation and Backfill: (See Section 102)

D-304.13 BACKFILL-UTILITIES: Refer to **DIVISION D, SECTION 102 "EXCAVATION AND BACKFILL FOR UTILITIES"**.

D-304.14 BACKFILL - STRUCTURAL:

(1).Bedding: The structure shall be bedded as shown on plans on fine granular materials over an earth foundation accurately shaped to fit the lower part of the structure exterior for at least 15% of its overall height. Selected material from excavation or borrow shall then be placed along both sides of the structure equally in layers not more than 6 inches (6") thick and compacted by mechanical tamps

or rammers for the remainder of the lower 30% of the overall height of the structure.

(2).Backfilling: As soon as practicable, all portions of excavation not occupied by the permanent structure shall be backfilled. Backfill material shall be free from large or frozen lumps, wood, or other extraneous material, placed in successive layers of not more than 6 inches (6") in depth (loose measurement) for the full width of the cross section. The material and the layers shall have the proper moisture content before tamping or rolling. Wetting or drying of the material and manipulations to secure a uniform moisture content throughout the layer will be required. Should the material be too wet to permit proper compaction or rolling, all work on all positions of the fill thus affected shall be corrected. Unless otherwise provided by the plans or special provisions, hand tamping will not be accepted as an alternate for mechanical compaction.

As a general rule, material used in filling or backfilling the portions described in this paragraph shall be an earth free of any appreciable amount of gravel or stone particles more than 4 inches (4") in greatest dimension and of a gradation that permits thorough compaction. When, in the opinion of the Engineer, such material is not readily available, the use of rock or gravel mixed with earth will be permitted provided no particles larger than 12 inches (12") in the greatest and 6 inches (6") in the least dimensions will be used. The percentage of fines shall be sufficient to fill all voids and insure a uniform and thoroughly compacted mass of proper density. No backfill shall be placed adjacent to or over single and multiple boxes until the top slab has attained 500 psi flexural strength.

All backfill as specified above shall be compacted to not less than 95% of the maximum density at optimum moisture content as determined by procedures set out under TEX-113-E. This compaction shall extend to the entire depth of each layer and the backfill, when completed, shall be a homogenous and uniformly compacted mass. Water jetting in this backfill operation will not be permitted.

MEASUREMENT AND PAYMENT

D-304.15 PIPE: The footage of pipe shall be paid for on a unit price basis and shall be the number of linear feet of pipe in place measured along the centerline of the pipe from center to center of manholes. The price bid shall be considered to include all labor, materials, and equipment rentals necessary to complete the work as specified, as well as all barricades, lights, and other protective devices necessary to adequately preserve the safety of limb, life, and property.

The several classes and sizes of pipe shall be measured separately. No separate measurement or payment shall be made for "rock excavation".

Causes for Rejection: Pipe shall be subject to rejection for failure to conform to any of the specification requirements. Individual sections of pipe may be rejected because of any of the following:

- (a) Fractures or cracks passing through the shell, except for a single end crack that does not exceed the depth of the joint.
- (b) Defects that indicate imperfect proportioning, mixing and molding.

- (c) Surface defects indicating honeycombed or opened texture.
- (d) Damaged ends, where such damage would prevent making a satisfactory joint.
- (e) Pipe sections not installed in accordance to the lines and grades shown on the plans.

Repairs: Pipe may be repaired if necessary, because of occasional imperfections in manufacture or accidental injury during handling and will be acceptable if, in the opinion of the Engineer, the repairs are sound and properly finished and cured and the repaired pipe conforms to the requirements of the specifications.

Rejections: All rejected pipe shall be plainly marked by the Engineer and shall be replaced by the Contractor with pipe which meets the requirements of these specifications. Such rejected pipe shall be removed immediately from the site of work.

SECTION 306 CORRUGATED STEEL STORM SEWER PIPE

D-306.01 GENERAL: This item shall govern the furnishing of corrugated steel pipe and pipe-arch for culverts and storm sewers for the types, sizes and designations as shown on the plans and further specified in these specifications.

D-306.02 MATERIALS: The pipe shall be fabricated from sheet conforming to the current AASHTO M-274 (ASTM A819) specification for ALUMINIZED STEEL Type 2 material.

Sampling, testing and inspection of metal sheets and coils used for corrugated steel pipe shall be in accordance with Test Method Tex-708-I.

D-306.03 MANUFACTURE: The pipe shall meet the requirements of AASHTO M-36 (ASTM A760) for corrugated steel pipe. All pipe shall be manufactured with a minimum of two re-rolled annular ends.

D-306.04 CLASSIFICATION (TYPE): The pipe shall be manufactured to conform to the current AASHTO M-36 (ASTM A760) specification and shall have an external helical corrugation pattern of $\frac{3}{4}$ " x $\frac{3}{4}$ " x $7\frac{1}{2}$ " as described in AASHTO M-36 (ASTM A760).

All round pipe shall conform to the Type IR pipe classification. All pipe arch shall conform to the Type II R classification.

D-306.05 POST APPLIED COATING: The pipe shall be fully coated both inside and out with a minimum of thickness of 0.05 in. (1.3 mm) measured from the crest of the corrugations, on the top of ribs (as in Type IR pipe), or on the smooth inside surface of the pipe. The coating shall be uniform Class B (bituminous) or Class M (mastic) material as described in AASHTO M-190 (ASTM A849).

D-306.06 GAGE: Unless otherwise shown on the plans or specifications, gages shall be minimum as required by the Texas Department of Transportation, Height of Cover Tables, latest edition.

D-306.07 COUPLING BANDS: Coupling bands shall be of the same base material and coating as the pipe. Coupling bands shall lap evenly on each of the pipes being connected and shall fit securely into at least one full circumferential corrugation to form a tightly closed joint.

All pipe shall be field jointed with corrugated locking bands. Connecting bands shall be drawn together by means of not less than two bolts not less than $\frac{1}{2}$ in. (13 mm) diameter through angles or bar and strap device suitably welded or riveted. Coupling bands shall be no more than three nominal sheet thicknesses lighter than the pipe to be connected and in no case thinner than 0.052 in. (1.32 mm).

D-306.08 INSTALLATION: Corrugated steel pipe shall be installed as outlined in AASHTO Standard Specification for Highway Bridges and ASTM A798.

D-306.09 MEASUREMENT: Corrugated steel pipe will be measured by the linear foot. Such measurements shall be made between the ends of the barrel along its central axis. Where spurs or branches, or connections to existing pipe lines are involved, measurement of the spur or new connecting pipe will be made from the intersection of the its central axis with the outside surface of the pipe into which it connects. Where inlets, headwalls, catch basins, manholes, junction chambers, or other structures are included in lines of pipe, that length of pipe tying into the other structure wall will be included for measurement but not other portion of the structure length or width will be included.

For multiple pipes, the measure length will be the sum of the lengths of the barrels, measured as prescribed above.

In event of a change in design which either increases or decreases the quantity of pipe, the variation in quantity will be measured as prescribed above and the quantity shown on the plans and in the proposal will be increase or decreased as the case may be.

D-306.10 PAYMENT: Payment for corrugated steel pipe, measured as prescribed above will be made at the contract unit price bid per linear foot for various sizes, gages, and types of corrugated steel pipe.

Payment shall be in full compensation for furnishing, transporting, and installing the pipe. This included materials, labor, equipment, tools and incidentals necessary to complete the installation in accordance to the plans and these specifications.

SECTION 308 CORRUGATED POLYETHYLENE PIPE

Pipe materials and installation shall conform to:

ASTM (American Society of Testing and Materials) National Specifications:

- ASTM D1248 Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
- ASTM F810 Smoothwall Polyethylene for Use in Drainage and Waste Disposal Absorption Fields.
- ASTM F405 Standard Specification for Corrugated Polyethylene (PE) Tubing and Fittings.
- ASTM F667 Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.
- ASTM D2321 "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications".

AASHTO (American Association of State Highway and Transportation Officials) National Specifications:

- Section 18 Soil Thermoplastic Pipe Interaction Systems.
- M252 Corrugated Polyethylene pipe, 76 to 254 mm (3 to 10-inch diameters).
- M294 Corrugated Polyethylene Pipe, 305 to 915 mm (12 to 48-inch diameters).
- MP7 Corrugated Polyethylene Pipe 1350 and 1500 mm diameter (54 and 60-inch diameters).

SECTION 310 CONCRETE BOX CULVERTS

D-310.01 DESCRIPTION This Item shall govern for the materials furnished, and for constructing, furnishing, and placing concrete box culverts, at the locations shown, and in accordance with the details on the plans of this Item. Unless otherwise shown on the plans, The Contractor shall have the option of furnishing cast-in-place, pre-cast (formed) or precast (machine made) box culverts.

D-310.02 MATERIALS All materials shall conform to the pertinent requirement of the following items:

Section D-406, "Concrete Structures"
Section D-504, "Concrete"
Section D-410, "Reinforcing Steel"
Section D-304, "Reinforced Concrete Storm Drain Pipe"

Concrete for precast (machine-made) concrete boxes shall conform to ASTM C789 or C850.

When precast (machine-made) boxes are furnished and portland cement is partially replaced, blended, or otherwise modified by pozzolan, the pozzolan shall be fly ash conforming to the Departmental Materials Specification D-9-8900, "Fly Ash". Copies of Departmental Materials Specifications are available from the Texas Department of Transportation, Division of Materials and Tests, 125 East 11th Street, Austin, Texas 78701-2483.

D-310.03 TYPES Cast-in-place concrete boxes shall conform to the details shown on the plans and to the requirements of Section 504 "Concrete" and Section 406 "Concrete Structures".

Precast (formed) concrete boxes shall conform to the details shown of the plans and the requirement of (TxDOT Standard Specification-1993 Edition) Item 424, "Precast Concrete Structures (Fabrication)".

Precast (machine-made) concrete boxes shall conform to the requirements of ASTM C789 or C850, which is applicable.

D-310.04 FABRICATION

(1) General. All fabrication of concrete boxes including forming, casting, and curing shall conform to the following requirements.

- (a) Cast-in-place concrete boxes shall be produced in accordance with Section 406, Concrete Structures".
- (b) Precast (formed) concrete boxes shall be produced in accordance with Item 424, "Precast Concrete Structure (Fabrication)". (TxDOT Standard Specification-1993 Edition)
- (c) Precast (machine-made) concrete boxes shall be produced by a process which will provide for uniform placement of the concrete in the forms and compaction by mechanical devices which will assure dense concrete. Concrete shall be mixed in a central batch plant or other approved batching facility from which the quality and uniformity of the concrete can be assured. Ready-mix concrete will not be acceptable for use in precast (machine-made) concrete boxes. Curing shall be in accordance with ASTM C789 or C850 whichever is

applicable.

(2) Testing. Test specimens for testing of cast-in-place concrete boxes sections shall be in accordance with Section 504, "Concrete". Test specimens for precast (formed) concrete box sections shall be in accordance with Test Method TEX 704-I. Test specimens for precast (machine made) shall be test cylinders made at the same time and in the same manner as the box sections they represent.

For precast concrete boxes (machine-made), a minimum of four (4) test cylinders shall be made for each day's production run of each size and class of box section. Test cylinders for machine-made concrete boxes shall be cured in the same manner and for the same time as the boxes they represent.

Equipment required for testing concrete boxes produced in a precasting plant shall be furnished by the producer.

(3) Marking. Precast concrete boxes produced in a precasting plant shall bear the following markings:

- (a) The name or trademark of the producer.
- (b) The date of manufacture.
- (c) The box size and height of fill.
- (d) When lifting holes are not provided, one end of each box section shall be clearly marked on the inside and outside walls to indicated the top or bottom as it will be installed.
- (e) When required under "Fabricating Tolerances", matchmarks shall be use for proper installation.

Markings shall be indented into the box section or may be painted thereon with waterproof paint.

(4) Fabricating Tolerances. Tolerances for precast sections of either type shall conform to the following.

The inside vertical and horizontal dimensions shall not vary from plan requirement by more than 1/2 inch.

The horizontal or vertical plane at each end of the box section shall not vary from perpendicular by more than 1/2 inch, measured on the inside faces of the section.

The sides of a section at each end shall not vary from being perpendicular to the top and bottom by more than 1/2 inch, measured on the inside faces of the section.

The thickness of walls and slabs shall not be less than that shown on the plans, except than an occasional deficiency not greater than 1/4 inch will be acceptable. If proper jointing is not affected, thicknesses in excess of plan requirements are acceptable.

The straightness of the tongue and groove, at the mating surface shall not vary by more than 1/4 inch.

Deviations from the above tolerances will be acceptable if the sections can be fitted at the plant or job site and it is demonstrated that an acceptable joint can be made. For this condition an acceptable joint is:

When two sections are fitted together on a flat surface, in proper alignment and in the position the sections will be installed, the joint opening at any point shall not exceed one (1) inch. Sections fitted together at the plant and accepted in this manner shall be matchmarked for installation.

(5) Defects and Repair. Fine cracks on the surface of the member which do not extend to the plane of the nearest reinforcement will not be cause for rejection unless the cracks are numerous and extensive. Cracks which extend into the plane of the reinforcing steel shall be repaired in an approved manner.

Small damaged or honeycombed areas which are purely surface in nature shall be repaired to the satisfaction of the Engineer. Excessive damage, honeycomb or cracking will be subject to structural review. When fine cracks on the surface indicate poor curing practices, further production of precast sections shall be discontinued until corrections are made and proper curing provided.

(6) Storage and Shipment. Precast sections shall be stored on level blocking in a manner acceptable to the Engineer. No load shall be placed upon the section until design strength is reached and curing completed. Shipment of sections may be made when the design strength is reached and curing requirements have been met.

D-310.05 CONSTRUCTION METHODS Excavation, bedding and backfill shall be in accordance with the requirements of Section 102, "Excavation and Backfill for Utilities", and Section 6, "Backfilling" except where tunneling or jacking methods are required or permitted by the plans.

Unless otherwise shown on the plans, the Contractor may use any of the jointing material in accordance with the jointing requirements specified in Section 312, "Laying Procedure-Storm Sewer".

When precast box culverts are used to form multiple barrel structures, the box sections shall be placed in conformance with the details shown on the plans.

Connections of precast sections to cast-in-place culverts or to any required headwalls, wingwall, riprap, or other structure shall conform to the details on the plans. Lifting holes shall be filled with mortar or concrete and cured to the satisfaction of the Engineer. Precast concrete or mortar plugs may be used when approved by the Engineer.

D-310.06 MEASUREMENT This Item will be measured by the linear foot. Such measurement will be made between the ends of the culvert or sewer along the flow line. Where spurs or branches, or connections to existing structures are involved, measurement of the intersection of the flow line with the outside surface of the structure into which it connects. Where inlets, headwalls, catch basins, manholes, junction chambers, or other structures are included in lines of culverts or sewers that length of box section tying into the structure wall will be included for measurement but no other portion of the structure length or width will be so included.

For multiple barrel structures, the measured length will be the sum of the lengths of the barrels measured as prescribed above.

This is a plans quantity measurement Item and the quantity to be paid for will be that quantity shown in the proposal and on the "Basis of Estimate" sheet of the contract plans, except as may be modified by the Engineer. If no adjustment of quantities is required, additional measurements or calculations will not be required.

D-310.07 PAYMENT The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Concrete Box Culvert" of the size and type specified. This price shall be full compensation for constructing, furnishing, and transporting sections; for cutting of section of skew or slope; for connections to existing structures; for concrete, reinforcing steel and mall material, labor and equipment, tools, and incidentals necessary to complete the work.

SECTION 312 MANHOLES AND INLETS

D-312.01 DESCRIPTION: This item shall consist of manholes and inlets constructed of required materials in accordance with these specifications and at the locations and on conformity with the lines, grades, and dimensions shown on the plans or as required by the Engineer.

MATERIALS

D-312.02 PRECAST RINGS, THROAT SECTIONS, AND THROAT RINGS: Precast manhole rings shall be four feet in diameter and five inches thick. Throat sections shall be five inches thick and 2.5 feet in length. Throat rings shall be two feet in diameter and five inches thick.

D-312.03 MORTAR: The mortar for precast rings shall be composed of one part of Portland Cement and two parts mortar sand by volume. Portland cement shall conform to the requirements of ASTM Designation C-150, Type I. Sand shall conform to the requirements of AASHTO Specification M-45. The water shall be clean and free from injurious amounts of sewage, oil, acid, strong alkalis and other vegetable matter.

D-312.04 CONCRETE: Reinforced concrete used in manholes shall conform to the requirements of Class "A" Concrete, under the specification contained herein for "CONCRETE". Manholes may be either pre-cast or cast-in-place depending on the contractor, same requiring the approval of the Engineer prior to installation.

D-312.05 BRICK: Bricks shall be of first quality, sound, hard burn, perfectly shaped brick. Shale bricks, if used, shall be homogenous, thoroughly and uniformly burned. Bricks shall not absorb more than 16 percent of water by weight when submerged in water for 24 hours, having been in two completely dry states prior to placing in water. Clay brick shall conform to the requirements of ASTM Designation C-32, Grade NA or equal. Concrete brick meeting the requirements of ASTM Designation C-55, Grade A, shall be acceptable.

D-312.06 CAST IRON FRAMES AND COVERS: All castings shall be true to form and dimensions and shall be free from inclusions of foreign matter, casting faults, injurious blow holes, cracks, sponginess, and other defects rendering them unsuitable.

Finished frames and covers shall have the bearing surfaces machined or ground so that there will be no variation that will permit rocking or rattling and the diameter of the cover will be such as to fit the frame without wedging. The machined sets of frames and covers shall be marked in such a way that they can be properly matched for assembly in the field.

Castings shall conform to AASHTO Designation M 306-89 (2000). Castings shall include labeling of manhole type on manhole covers, such as "STORM DRAIN", "SANITARY SEWER", etc. Manhole covers shall bear the "CITY OF LAREDO" name for all storm drain and sanitary sewer manholes, for proper identification. Casting covers and rings shall be as manufactured by East Jordan Iron Works Nos. 1342 A, or approved equal.

D-312.07 INLET UNITS: Cast iron or steel inlet units shall be installed in conjunction with the

construction or concrete curb and gutter. Prior to placing concrete for curb and gutter, the inlet units shall be set securely in position. Openings for the inlets and recesses in curb and gutter, as indicated on the plans, shall be formed in conjunction with the curb and gutter forms. Concrete for curb and gutter adjacent to the inlet shall be placed using care to secure thoroughly compacted concrete around the inlet castings and formed openings and recesses without displacement of the inlet units in the forms.

CONSTRUCTION METHODS

D-312.08 GENERAL: All concrete work shall be performed in accordance with the requirements of the item, "Concrete Structures", unless otherwise specified. Forms will be required for all concrete walls except where the nature of the surrounding material may be trimmed to a smooth, vertical face (the outside form for concrete bases supporting brick walls may be omitted with the approval of the Engineer). Where brick is used in wall construction, the steps shall be mortared into the joints.

Where concrete is used in wall construction, the steps shall be cast into the wall when the concrete is placed. All brick work shall be laid with one-half of an inch "shoved" joints. Plastered or buttered joints are prohibited. Every fifth course or brick shall be a header course or bond course with long axis of such course laid perpendicular to the long axis of the preceding four courses.

D-312.09 UNCLASSIFIED EXCAVATION:

(a) The Contractor shall do all excavation for structures to the lines, grades, and elevations shown on the plans or staked by the Engineer. The excavation shall be sufficient size to permit the placing of a full width and length of the structure shown, plus such additional sizes to allow for forms.

(b) Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock and other hard formation material shall be cleaned of all loose material and cut to a firm surface, leveled, stepped, or serrated as directed by the Engineer. All seams or crevices shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grades shall not be made until just before the concrete or reinforcing is to be placed.

(c) The Contractor shall do all bracing, sheeting, or shoring necessary to perform and protect the excavation in the structure or as required for safety to conform with governing laws. The cost of bracing, sheeting, and shoring shall be included in the unit price bid for this structure.

(d) Unless otherwise provided, bracing, sheeting, or shoring involved in the construction of this item shall be removed by the Contractor after completion of the structure. The removal shall be performed in such a manner as not to disturb or mar finish or masonry. The cost of removal shall be included in the unit price bid for the structure.

(e) After each excavation is completed, the Contractor shall notify the Engineer to that effect, and concrete and reinforcing steel shall be placed after the Engineer has approved the depth of excavation and the character of the foundation material.

D-312.10 CONCRETE STRUCTURES: The concrete structure shall be constructed of Class "A" reinforced concrete built on prepared foundation material conforming to the dimensions and form indicated on the plans. Construction shall conform to the methods, forms, mixtures, placement, and curing as specified in the specification entitled "CONCRETE STRUCTURES". Any reinforcing required shall be of a kind and type, and shall be furnished, located, spaced, bent, and fastened as indicated on the plans and shall be approved by the Engineer before concrete is placed.

All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flow. The interior floor shall be sloped downward toward the outlet.

D-312.11 INLET AND OUTLET PIPES: Inlet and outlet pipes shall extend through the walls of the structures for sufficient distance beyond the outside of the surface to allow for connections, but shall be cut off flush with the wall on the inside surfaces unless otherwise directed. The concrete shall be placed around the pipe so as to prevent leakage and to form a neat connection.

D-312.12 INVERTS: The inverts passing out or through the manhole or inlet shall be shaped and routed across the floor of the manhole or inlet as shown on the plans. This may be accomplished by adding and shaping mortar or concrete after the base is cast or by placing the required additional material with the base.

D-312.13 The PLACEMENT AND TREATMENT OF CASTING, FRAMES, AND FITTINGS:

All castings, frames, and fittings shall be placed in positions indicated on plans, or as directed by the Engineer and shall be set in true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or anchor bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until all the mortar or concrete is set.

When frames or fittings are to be placed upon previously constructed masonry, the bearing surfaces of the masonry shall be brought true to line and grade and present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds or anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall be set firm and secure.

When concrete structures are so located as to be within the paved areas of the street, the finish top of these structures shall match existing grades.

D-312.14 BACKFILLING:

(a) After a structure has been completed, the area around it shall be filled with approved material in accordance with the specification titled, "STRUCTURAL EXCAVATION AND BACKFILL". Fill shall be made to the elevations shown on the plans or as directed by the Engineer.

(b) No backfill material shall be placed against any structure until permission is given by the Engineer. In the case of the concrete, such permission preferably shall not be given until the concrete has been in place for 14 days and tested in a laboratory conforming to the requirements of ASTM Designation C-42. All water must be removed from excavation before backfilling is done unless otherwise directed by the Engineer.

(c) Fill in place shall be deposited on all sides of the structure at the same time and to approximately

the same elevation. Special care shall be taken to prevent any wedging action against the structure and all slopes, bounding or within the area to be backfilled, will be stepped or serrated to prevent wedge action.

(d) All backfill shall be compacted.

(e) Backfill shall not be measured for direct payment. Performance of this work is not payable directly but shall be considered a subsidiary obligation of the Contractor covered under the contract unit price for the structure involved.

D-312.15 CLEANING AND RESTORATION OF SITE: After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt shall be disposed of as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and other equipment used by him, leaving the entire area free, clear, and in good condition. The performance of the work described in this section is not payable directly, but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for each manhole and inlet.

MEASUREMENT AND PAYMENT

D-312.16 MANHOLES AND INLETS: The number of and types of manholes and inlets shall be counted and listed as the number of units complete in place and accepted by the Engineer.

The number of units of manholes and inlets determined as provided in above paragraph shall be paid at the contract unit price for each of the various types of manholes and inlets as called for on the Bid Schedule, which price and payment shall constitute full compensation for furnishing all materials, for placing and finishing, for all excavation and hauling, for all backfill, for setting and anchoring any frame, cover, or for placing steps, for all labor, equipment, tools, and incidentals necessary to complete the unit, as shown on the plans and as described in the specifications.

SECTION 314
LAYING PROCEDURES - STORM SEWER

D-314.01 LAYING PROCEDURES:

1. Classification: All excavation for this Project shall be considered unclassified. The Contractor is expected to determine the nature of the work and to make his/her bid prices reflective of the actual conditions which will be encountered. No claims for extra compensation shall be made by the Contractor due to rock or other unfavorable excavation conditions encountered during the course of the work.
2. Existing Utilities: Before commencing excavation, the Contractor shall notify all utility companies with sufficient lead time and confirm the location of existing underground lines and conduits in the work area.
3. Dewatering: The Contractor shall provide and maintain adequate equipment to remove and dispose of all surface and ground-water entering excavations, trenches, or other parts of the work.
4. Water-jetting: See Section 102

D-314.02 PREPARATION OF TRENCH: Except in water-bearing earth, mechanical excavation of trenches shall be limited to an elevation four inches (4") above the elevation of the invert of the pipe after placement in its final position. All additional excavation necessary for preparation of the trench bottom shall be made manually. Excess excavation below required level shall be backfilled with gravel which shall be thoroughly tamped. Engineer will determine the depth of removal, and replacement of unstable soil shall be at Contractor's expense. Contractor shall furnish pumps to keep excavation free of water.

Wherever the presence of incipient slides are noted during excavation, the trench walls shall be restrained with adequate sheeting and shoring.

When excavations are made adjacent to existing building or other structure, existing utility lines, or in paved streets, particular care shall be taken to adequately sheet, shore, and brace the sides of the excavation to prevent undermining of or settlement beneath the structures, utility lines, or pavement.

Underpinning of adjacent structures or pavement shall be done by the Contractor at his/her own cost and expense, and in a manner satisfactory to the Engineer. When required by the Engineer, the pavement shall be removed, the void satisfactorily refilled, and the pavement replaced by the Contractor. The entire expense of such removal and subsequent replacement thereof shall be borne by the Contractor.

Should trenches be dry when the trench bottom is prepared, a continuous trough shall be prepared or excavated to receive the bottom quadrant of the pipe barrel. In addition, bell holes shall be excavated so that after placement, only the barrel of the pipe receives bearing pressure from the trench bottom.

Preparation of the trench bottom and placement of the pipe shall be carefully made so that, when in

final position, the pipe is true to line and grade.

When sand, broken stone, or gravel is used to support the pipe, such material shall be placed in the trench bottom in sufficient quantity so that a trough shall be formed to support the bottom quadrant of the pipe barrel.

Trenches in which concrete cradles, cushions, or encasements for pipe are to be placed, may be excavated completely with mechanical equipment. Concrete cradles, cushions, and encasements, where required, shall be constructed as shown on the plans, or, where not shown on the plans, as directed by the Engineer. Where concrete cradles or cushions are constructed beneath the pipe, the subgrade shall be prepared to dimensions and form as shown on the plans. Concrete cushions, cradles, or encasements shall be placed in a dry trench unless, in the opinion of the Engineer, such a method is not practical. Where concrete is placed in wet trench, the work shall be done strictly as directed or approved by the Engineer. The pipe shall be firmly bedded in concrete to the proper grade. Concrete encasements placed over or on the pipe shall be so placed as not to damage or injure joints or displace the pipe. For pipe encasements, sufficient concrete shall be used so that the encasement is at least four inches (4") thick at all points. The concrete shall be wet enough during placement to permit its flow, without excessive prodding, to all required points around the pipe surface. The width of cradle shall be such as to completely fill the trench width. In the case of extremely wide trenches, the concrete cradle may be confined to a narrower width, but in no case shall it be less than twelve inches (12") greater than the diameter of the pipe at the outside of the socket.

D-314.03 PIPE LAYING: Pipe shall be protected during handling against impact shocks and free fall. Pipe shall be kept clean at all times, and no pipe shall be used in the work which does not conform to the appropriate ASTM Standard.

The laying of pipe in finished trenches shall be commenced at the lowest point, with the spigot ends pointing in the direction of the flow.

All pipe shall be laid with ends abutting and true to line and grade. They shall be carefully centered so that they will form a sewer with a uniform invert.

Pipe shall be set firmly according to line and grade, and preparatory to making pipe joints, all surfaces of the portion of the pipe to be joined shall be cleaned.

D-314.04 BACKFILLING TRENCHES: Refer to Section 102.

D-314.05 SHEETING AND SHORING: Whenever timber or other sheeting is driven to a depth below the elevation of the top of the pipe, that portion of the sheeting below the elevation of the top of the pipe shall not be disturbed or removed. Whenever timber or other sheeting is driven for the protection of trench walls in water bearing soil, no portion of such sheeting below a level four feet (4') over the top of pipe shall be removed.

SECTION 316
CONCRETE ENCASEMENT, CRADLES, SADDLES, AND COLLARS

D-316.01 DESCRIPTION: This Item shall govern for placing concrete encasement, cradles, saddles, and collars, when called for the Project plans or as directed by the Engineer.

D-316.02 MATERIALS: Concrete: All concrete shall conform to the provisions of SDHPT Specifications, Item 421, "Concrete" (Class B) or shall be of the class noted on the plans.

D-316.03 CONSTRUCTION METHODS:

- 1. Concrete Encasement:** When concrete encasement is show on the plans or when directed by the Engineer, the trench shall be excavated and fine graded to a depth conforming with details and sections shown on the plans. The pipe shall be supported by precast concrete blocks of the same strength as the concrete for encasement and securely tied down to prevent floatation. Encasement shall then be placed to a depth and width conforming with details and sections shown on the plans.
- 2. Concrete Cradles:** When concrete cradles are shown on the plans or when called for by the Engineer, the trench shall be prepared and the pipe supported in the same manner as described in this specification and shall be constructed in accordance with details and sections shown on the plans.
- 3. Concrete Saddles:** When shown on the plans or when directed by the Engineer, pipe to receive concrete saddle shall be backfilled in accordance with Section 102, "Excavation, Trenching, and Backfill" to the spring line and concrete placed for a depth and width conforming with details and sections shown on the plans.
- 4. Concrete Collars:** When shown on the plans or when directed by the Engineer, concrete collars shall be constructed in accordance with details and sections shown on the plans.

D-316.04 MEASUREMENT: "Concrete Encasement, Cradles, Saddles, and Collars", will be measured by the cubic yard of accepted work, complete in place. Reinforcing, if required, shall not be measured for payment.

D-316.05 PAYMENT: "Concrete Encasement, Cradles, Saddles, and Collars", will be paid for at the unit price bid per cubic yard, which price shall be full compensation for furnishing and placing all materials, manipulation, labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 318 CHANNEL EXCAVATION AND EMBANKMENT

D-318.01 DESCRIPTION Shall consist of required excavation for all channels proposed in the plans; the removal and proper utilization or disposal of all excavated materials; and constructing, shaping and finishing all earthwork involved in conformity with the required lines, grades and typical cross sections and in accordance with specifications requirements herein outlined.

D-318.02 METHODS All suitable materials removed from the excavation shall be used, insofar as practicable, in the formation of embankments as required by the Item, "Embankment", or shall be otherwise utilized or satisfactorily disposed of as indicated on plans, or as directed, and completed work shall conform to the established alignment, grades and cross sections. During construction, the channel shall be kept and drained, insofar practicable, and the work shall be prosecuted in a neat workmanlike manner.

Unsuitable channel excavation in excess of that needed for construction shall be as known as "WASTE" and shall become property of the Contractor to be disposed of by him outside the limits of the right of way.

Payment will not be allowed for excavation of any material which is used for purposes other than those designated, except as provided in the governing specifications under the item "Scope of Work."

D-318.03 MEASUREMENT All channel excavation will be measured in its original position and the volume computed in cubic yards by the method of average in end areas.

D-318.04 PAYMENT All work performed as required herein and in the Item, "Embankment" and measured as provided under "Measurement" will be paid for at the unit price bid under the following method:

Ordinary Compaction (for channel embankment) each layer shall not exceed one (1) foot of loose depth, and shall be compacted as per specifications. Each layer shall be brought to the moisture content ordered by the Engineer, and shall be kept leveled with suitable equipment to insure uniform compaction over the entire layer.

The prices bid shall each be full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to complete the work. Payment for unauthorized work will not be made.

All work required for disposing of waste, including haul, will not be paid for directly, but shall be considered subsidiary work pertaining to the various contract items, and such cost shall be included in the unit prices for these items.

When specified on the plans, and hauling of materials will not be paid directly, but shall be considered as subsidiary work pertaining to the various contract items, and such cost shall be included in the unit prices bid.

SECTION 402 CLEARING AND GRUBBING

D-402.01 DESCRIPTION: "Clearing and Grubbing" shall consist of the removal and disposal of trees, stumps, brush roots, vegetation, logs, rubbish, and other objectionable matter. Full compliance with NPDES permitting & Drainage Standard shall be maintained.

D-402.02 CONSTRUCTION METHODS: The right-of-way shall be cleared of stumps, brush, logs, rubbish, trees, and shrubs, except such trees and shrubs and certain areas designated by the Engineer for preservation. Those trees, shrubs, and other landscape features specifically designed by the Engineer for preservation shall be carefully protected from abuse, marring, or damage during construction operations. Continual parking and/or servicing of equipment under the branches of trees designated for preservation will not be permitted. Trees and shrubs designated for preservation that must be pruned shall be trimmed as directed and all exposed cuts over two (2) inches in diameter shall be treated with an approved material.

Areas required for embankment construction, for roadway, channel and structural excavation, and for borrow sites and material sources shall be cleared and grubbed. On areas required for roadway, channel, or structural excavation, all stumps, roots, etc., (except for designated trees and brush) shall be removed to a depth of at least two (2) feet below the existing ground surface. All holes remaining after clearing and grubbing shall be backfilled and tamped as directed by the Engineer and the entire area bladed to prevent ponding of water and to provide drainage, except, in areas to be immediately excavated, the Engineer may direct that the holes not be backfilled. When permitted by the plans, trees and stumps may be cut off as close to natural ground as practicable on areas which are to be covered by at least three (3) feet of embankment. On areas required for borrow sites and material sources, stumps, roots, etc., (except for designated trees and brush) shall be removed to the complete extent necessary to prevent such objectionable matter becoming mixed with the material to be used in construction.

All cleared and grubbed material shall be disposed of in a manner satisfactory to the Engineer. Unless otherwise provided, all merchantable timber removed as required above shall become the property of the Contractor.

D-402.03 MEASUREMENT AND PAYMENT: Payment will be made for this item as clearing and grubbing and the Contractor shall investigate the conditions as they exist in the field. Price shall be full compensation for furnishings and placing all materials, manipulation, labor, tools, equipment and details necessary to complete the work.

SECTION 404

GENERAL CONSTRUCTION AND PREPARATION OF SITE SPECIFICATIONS

D-404.01 INTENT OF PLANS AND SPECIFICATIONS: The intent of the plans and specifications is to prescribe a complete work or improvement which the Contractor undertakes to do so, in full compliance with the plans, specifications, special provisions, proposal, and contract. The Contractor shall do all work as provided in the plans, specifications, special provisions, proposal, and contract, and shall do such additional work as may be considered necessary to complete the work in a satisfactory and acceptable manner. The Contractor shall furnish all labor, tools, materials, machinery, equipment, and incidentals necessary to the prosecution of the work.

D-404.02 DESCRIPTION OF SITE: This item shall consist of the preparation of site for construction operations by the removal and disposal of all obstructions which are not otherwise provided for in the plans and specifications.

Such obstructions shall be considered to include removal of sections of existing utility lines (water, sewer, & force main), existing fences/gates, and other such materials as shown on the plans including concrete slabs.

This item shall include the removal of obstructions in accordance with the item "Clearing and Grubbing", Section 402. It is the intent of this item to provide for the disposal of all objectionable materials not specifically provided for elsewhere in the plans/specifications. All materials to be salvaged by the Owner shall be properly disposed of by the contractor as directed.

D-404.03 FINAL CLEAN-UP: Upon the completion of the work and before acceptance and final payment will be made, the Contractor shall clean and remove from the site of the work, surplus and discarded materials, temporary structures, and debris of every kind. Contractor shall leave the site of the work in a neat and orderly condition. Surplus and waste materials removed from the site of the work shall be disposed of at locations satisfactory to the Engineer. Grounds around any structures shall be dressed to final grade as shown on plans.

D-404.04 COORDINATION OF PROJECT: The plans, these specifications, the proposal, special provisions, and all supplementary documents are intended to describe a complete work and are essential parts of the contract. A requirement occurring in any of them is binding. In case of discrepancies, figured dimensions shall govern over specifications; and plans and quantities shown on the plans shall govern over those shown in the proposal. The Contractor shall not take advantage of any apparent error or omission in the plans and specifications, and the Engineer shall be permitted to make such corrections or interpretations as may be deemed necessary for the fulfillment of the intent of the plans and specifications. In the event the Contractor discovers an apparent error or discrepancy, Contractor shall immediately call this to the attention of the Engineer.

D-404.05 COOPERATION OF CONTRACTOR: The Contractor shall give to the work the consistent attention necessary to facilitate the progress thereof, and he shall cooperate with the Engineer, his inspectors, and with other contractors in every way possible.

D-404.06 MATERIALS-GENERAL: The materials shall be the best procurable, as required by the plans, specifications, and special provisions. The Contractor shall not start delivery of materials until

the Engineer has approved the source of supply. Only materials conforming to these specifications shall be used in the work, and such materials shall be used only after approval has been given by the Engineer and only so long as the quality of said materials remains equal to the requirements of the specifications. The Contractor shall furnish approved materials from other sources, if for any reason the product from any source at any time before commencement or during the prosecution of the work proves unacceptable. After approval, any material which has become mixed with or coated with dirt or any other foreign substances during its delivery and handling will not be permitted to be used in the work.

D-404.08 MATERIALS-STORAGE: Any and all materials, such as cement, lime, mill work, or other materials or equipment subject to deterioration by exposure to weather or other factors, shall be stored in such a manner to protect them from deterioration or damage preceding the time they become a permanent part of final structure.

D-404.09 "OR EQUAL CLAUSE": Whenever a material or article required is specified or shown on the plans by using the name of the proprietary product, or of a particular manufacturer or vendor, any material or article which will perform adequately the duties imposed by the general design will be considered equal and satisfactory, provided the material or article so proposed is of equal substance and function, and only after written approval by the Engineer.

D-404.10 MEASUREMENT AND PAYMENT: All work performed will NOT be paid directly but shall be included in the unit price bid for other items of construction. Price shall be full compensation for furnishing and placing all materials, manipulation, labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 406 CONCRETE STRUCTURES

D-406.01 GENERAL: This item shall consist of reinforced concrete structures built in accordance with the design requirements and details shown on the plans and in conformity with the requirements herein.

MATERIALS

D-406.02 CONCRETE: Concrete shall conform to the requirements of specifications titled "Concrete". Unless otherwise specified on the plans or in the proposal, all concrete shall be Class "A".

D-406.03 REINFORCING STEEL: Reinforcing steel shall conform to the requirements of ASTM Designation A615, new deformed billet steel having minimum yield strength of 60,000 psi. Wire mesh reinforcement shall conform to the requirements of ASTM Designation A185.

D-406.04 STRUCTURAL STEEL: Structural steel shall conform to the requirements of ASTM Designation A-36.

D-406.05 EXPANSION JOINT MATERIAL:

(a) Pre-molded expansion joint material shall conform to the requirements of Division D, Section 414, titled, EXPANSION JOINT MATERIALS.

(b) Poured joint material shall conform to requirements of Federal Specifications SS-S-156, SS-S-159, or SS-S-164.

D-406.06 FORM MATERIAL:

(a) Form lumber for all exposed concrete surfaces shall be CM concrete form lumber, Southern Yellow Pine or approved equal, S4S, grade marked in accordance with the latest grading rules of the Southern Pine Association. Form lumber not otherwise specified shall be No. 2 Common Southern Yellow Pine, S4S.

(b) Plywood form shall be of Douglas Fir Plywood, 5 ply, and at least 3/4" thick, conforming to the grading rules as required under State Department of Highways and Public Transportation Specifications.

(c) Metal forms are permitted.

CONSTRUCTION METHODS

D-406.07 REINFORCEMENT:

(a) Reinforcing shall be detailed, fabricated, and erected in accordance with Manual of Standard Practice for Detailing Reinforced Concrete Structures (ACT 315-57). Shop drawings shall be submitted in triplicate for engineering approval prior to fabrication. All reinforcement shall be entirely free from rust, scale, grease, or other coating which might destroy or reduce its bond with

concrete.

(b) Spacing: Unless otherwise indicated, the clear distance between parallel bars shall be not less than one and one-half times the diameter of round bars. In no case shall the distance between bars be smaller than the maximum size of the aggregates.

(c) Protective Covering: Reinforcement shall be protected by the thickness of concrete indicated on the plans. Unless otherwise specified, the protective coverings over reinforcement shall not be less than the maximum size of aggregates.

(d) Splicing and Lapping: Unless otherwise indicated, all bars shall be staggered. Adjacent sheets of mesh reinforcement shall be spliced by lapping not less than 12", the lapped ends being securely wired together.

(e) Supports: All reinforcement shall be secured in place true to the lines and grades, indicated by the use of metal supports, spacers, or ties approved by the Engineer. Such supports shall be of sufficient number and strength to maintain the reinforcement in place throughout the concreting operations.

D-406.08 FORMS:

(a) General: Forms shall conform to the shape, lines, and dimensions of the members of structures, as called for on the plans and shall be substantial and sufficiently tight to prevent leakage of mortar. All details of form construction shall be subject to the approval of the Engineer and permission to place concrete will not be given until all such work is complete to his satisfaction.

(b) Braces and Ties: Forms shall be properly braced and tied together so as to maintain position and shape. Metal form of an approved type shall be used to hold forms in place. Such ties shall be of a type especially designed for use in connection with concrete work and shall have provision to permit easy removal of the metal to a depth of at least one-half inch from the surface of the concrete. The use of wire from ties will not be permitted except for minor or special form areas where the use of rigid type metal ties would be impracticable. Where wire ties are used, all wires upon removal of the forms shall be cut back at least one-half inch from the face of the concrete.

(c) Curved Surface: In the case of exterior exposed curved surfaces, the Contractor shall use such forming as may be necessary to provide smooth forms of uniform curvature.

(d) Coating: Plywood forms and plywood form lining shall be mill-oiled according to standard practice recommended by the Douglas Fir Plywood Association. Form lumber for all other exposed surfaces shall be coated with approved non-staining mineral oil which shall be applied shortly before the concrete is deposited. In general, all forms shall be thoroughly wetted before the concrete is placed.

(e) Cleanouts: At the time of placing concrete, the forms shall be clean and entirely free from all chips, dirt, sawdust, and other extraneous matter. For narrow walls and other locations where access to the bottom of the forms is not readily obtainable otherwise, adequate cleanout openings shall be provided.

D-406.09 PLACING CONCRETE-GENERAL:

(a) Supervision: The Contractor shall give the Engineer sufficient notice before starting to place concrete in any unit of the structure to permit the inspection of forms, reinforcing steel, and preparation for placing. Concrete shall not be placed in footings until the character of the foundation has been approved by the Engineer and permission has been given to proceed. When footings can be placed in dry foundation pits, forms may be omitted, if desired by the Contractor and approved by the Engineer, and the entire excavation filled with concrete to the top of the footing. Where this procedure is followed, no measurement for payment will be made for concrete placed outside of the footing dimensions shown on the plans.

(b) Placing: All concrete shall be placed before its initial set has occurred. The operation of depositing and compacting the concrete shall be conducted so as to form a compact, dense, impervious mass of uniform texture which shall show smooth faces on all surfaces. Each part of the forms shall be filled by depositing the concrete directly as near its final position as possible. The coarse aggregate shall be worked back from the face and the concrete forced under and around the reinforcement bars without displacing them. Depositing large quantities at one point in the forms and running or working it along the forms will not be permitted. Concrete in columns shall be placed monolithically unless otherwise provided. An interval of not less than 4 hours shall elapse between the placing of concrete above the tops of the columns or walls to allow shrinkage. Concrete in walls, columns, and deep foundations shall be placed in a manner that will avoid separation of the aggregates or displacement of the reinforcement. Suitable chutes or vertical pipes shall be provided.

(c) Vibrating: All concrete shall be placed with the aid of mechanical vibrating equipment unless otherwise directed. Vibration shall be transmitted directly to the concrete, and in no case shall it be transmitted through the forms of reinforcing steel. The duration of vibration shall at any location be held to the minimum necessary to produce thorough compaction. Vibration shall be supplemented by hand spading to insure the flushing of mortar to the surface of all forms.

(d) Construction Joints: Construction joints shall be formed as shown on the plans. In all cases where they are not shown on the plans, they shall be formed as directed by the Engineer. Where indicated or required dowel rods shall be used. Before placing is resumed, all water and laitance shall be removed and the concrete shall be cut away, if necessary, to insure a strong dense concrete at the joint. In order to secure adequate bond, the surface of all concrete already in place shall be cleaned and roughened and shall then be spread with a 1/2 inch layer of mortar of the same sand-cement ratio as is used in the concrete immediately before the new concrete is deposited.

D-17.10 FINISHING EXPOSED SURFACES: An ordinary surface finish shall be applied to all concrete surfaces either as a final finish or preparatory to a higher grade or class of finish. Higher grades and classes of finish shall be in accordance with the Special THD Specifications, "Surface Finishes for Concrete". Where neither a grade nor class of finish is specified, an ordinary surface finish shall be provided as follows:

After form removal, all porous or honeycombed areas and spalled areas shall be corrected by chipping away all loose or broken material to sound concrete. Holes and spalls caused by removal of metal ties, etc., as required by SHPT. Specifications, Item 420, shall be

cleaned and filled with adhesive grout or epoxy grout. Exposed parts of metal chairs on surfaces to be finished by rubbing shall be chipped out to depth of one-half inch and the surface repaired.

All fins, runs, drips, or mortar shall be removed from surfaces which remain exposed. Form marks and chamfer edges shall be smoothed by grinding and/or rubbing.

Grease, oil, curing compound, etc., shall be removed from surfaces requiring a higher grade of finish. Discolorations resulting from spillage or splashing of asphalt, paint, or other similar material shall be removed. Repairs shall be dense, well bonded, and properly cured, and when made on surfaces which remain exposed and do not require a higher finish, shall be finished to blend with the surrounding concrete. Unless otherwise specified on the plans, ordinary surface finish shall be the final finish for the following exposed surfaces: Inlets, manholes, and sewer appurtenances.

D-406.11 FINISHING VERTICAL SURFACES (General): After tie rods and bolts are removed, the holes shall be filled solid with cement mortar. Honeycomb and minor defects shall not be patched until approval has been given by the Engineer.

D-406.12 REMOVAL OF FORMS:

(a) Finished Concrete: Forms for surfaces required to be finished shall be removed when the concrete has aged not less than 1/2 nor more than 2 curing days after the concrete has been placed.

(b) Unfinished Concrete: Forms and false work may be removed when the concrete has attained a compressive strength of not less than 65 percent of the design strength except that forms for walls, columns, and sides of beams may be removed after 48 hours.

(c) Curing Day: The term "curing day" will be interpreted as any calendar day on which the temperature is above 50 F for at least 19 hours. In continued cold weather, the Engineer will determine when sufficient time has elapsed to permit the removal of forms and false work.

D-406.13 DEFECTIVE WORK: Any defective work discovered after the forms have been removed shall be repaired immediately. If the surface of the concrete is bulging, uneven, or shows excess honeycombing or form marks, which, in the opinion of the Engineer, cannot be repaired satisfactorily, the entire section shall be removed before the repair work is started. No extra compensation will be allowed for extra work or materials involved in repairing or replacing defective concrete.

D-406.14 CURING: Concrete shall be maintained in a moist condition for at least five (5) days after placement. Curing shall be commenced as soon as possible after the concrete has been finished. This shall be either by means of approved curing compound, sprinkling, or by damp curing by means of wet mats, sand, etc. Adequate protection shall be provided to prevent damage from extreme weather conditions shall they be either hot or cold temperatures, wind, or other conditions which would cause evaporation of moisture from the fresh concrete. The ACI recommendations for hot or cold weather shall be followed.

D-406.15 ADDITIONAL CONCRETE FINISH FOR EXPOSED SURFACES: Concrete shall

be finished pursuant to Specification Item #427 or latest revision to the TxDOT standard for surface finishes for concrete utilizing Class A grout with Type II white pigment.

SECTION 408 RIPRAP

D-408.01 GENERAL: This item shall govern the furnishing and placing of concrete riprap.

MATERIALS

D-408.02 MATERIALS: Concrete shall be Class "B". The riprap will consist of a 4 inch slab with a by 6 inch No. 6 wire mesh reinforcement or its equal, and per requirements of specifications entitled, "CONCRETE", Division D, Section 504.

CONSTRUCTION METHODS

D-408.03 GENERAL: If the slopes and bottom of the trench for toe walls are dry and not consolidated properly, the Engineer may require the entire area to be sprinkled, or sprinkled and consolidated before the concrete is placed. All surfaces shall be moist when concrete is placed.

The concrete riprap shall have a toe ditch as specified on plans.

The concrete slab shall be placed, finished, and cured in accordance with the item, "CONCRETE STRUCTURES" Division D, Section 406 of these specifications.

MEASUREMENT AND PAYMENT

D-408.04 RIPRAP: The cubic yards of concrete riprap shall be paid for on a unit price basis. The price bid shall be considered to include furnishing, hauling, and placing all materials and for labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 410 REINFORCING STEEL

D-410.01 DESCRIPTION: This item shall provide for the furnishing and placing of bar reinforcing steel of the size and quantity designated for use in structures and other concrete items that require reinforcing steel as shown on the plans and in accordance with these specifications as per Division D, Section 406, Paragraphs D-406.03-D-406.04.

D-410.02 MATERIALS: Reinforcing steel shall conform to the requirement of Item 440, "Reinforcing Steel" of the TxDOT latest Provisions. Reinforcing steel bars produced outside of the United States are acceptable if such bar reinforcement conforms to the requirements of the ASTM Designations.

D-410.03 PLACING REINFORCEMENT: All steel reinforcing shall be accurately placed in the position shown on the plans and firmly held during the placing and setting of concrete. All reinforcement shall be free from dust, rust, mill scale, paint, oil, or foreign material. Bars shall be tied at all intersections. Distances from forms shall be maintained by means of stays, precast blocks, ties, hangers, metal chairs, or other approved supports. Blocks for holding reinforcement from contact with the form shall be precast concrete blocks of approved shape and dimensions or other equally suitable devices. The use of pebbles, pieces of broken stones or brick, metal pipe and wooden blocks shall not be permitted. Reinforcement in any sections shall be placed and then inspected and approved by the Inspector before the placing of concrete begins.

D-410.04 MEASUREMENT AND PAYMENT: No separate measurement or payment will be made under this item, but all such work done shall be deemed a subsidiary obligation of the Contractor, having been taken into account and included by him in price bid for the complete job.

SECTION 412
WELDED WIRE FABRIC

D-412.01 DESCRIPTION: This item shall govern the furnishing and placing of the various sizes of welded wire fabric as indicated on the plans or as directed by the Engineer.

D-412.02 MATERIAL: All welded wire fabric used in construction shall conform to the requirements of ASTM Designation A-185. It shall be 6 by 6 inches No. 6 or 6 by 6 inches No. 10, plain electric welded reinforcing fabric as indicated on the plans.

D-412.03 CONSTRUCTION METHODS: All splices in the wire fabric shall overlap sufficiently to allow two (2) pairs or transverse wires to be tied together and no splices of less than six (6) inches will be permitted.

At the edge of the construction, the wire fabric shall not be less than one (1) inch nor more than three (3) inches from the edge of the concrete and shall have no wires projecting beyond the last member parallel to the edge of the concrete. The wire fabric shall be straightened to lie flat in place without bulges or excessive vertical displacement and shall be supported properly throughout to insure its proper position in the finished construction.

D-412.04 MEASUREMENT: No measurement of welded wire fabric will be made.

D-412.05 PAYMENT: No direct payment for furnishing and placing welded wire fabric will be made. All materials and labor required will be considered subsidiary to the item in which it is used and shall be included in the unit price bid for said item.

SECTION 414 REINFORCING FIBERGLASS

D-407.1 Description

This item shall govern for the furnishing and placing of concrete reinforced with fibrous mesh in accordance with these specifications and with details as shown on the plans.

D-407.2 Materials

(1) Concrete

All concrete shall conform to the requirements of Item 403, "Concrete for Structures". Unless otherwise shown on the plans or in the bid item, the concrete shall be class A concrete.

(2) Reinforced

Reinforcement shall be 100% virgin polypropylene fibrillated fibers specially manufactured for use as concrete reinforcement and meeting the requirements of ASTM C-1116. The fibrous material shall not contain reprocessed olefin. Each container of fibrous material shall bear the manufacturer's name and/or trademark and the net weight of fibrous material in the package. The specific gravity of the fibrous material shall be 0.91 plus or minus .05. The tensile strength shall be 80 to 110 ksi. The lengths of the fibrous material shall be 1/2, 3/4, 1- 1/2 and 2 inches in the length. Unless otherwise shown on the plans, each cubic yard of concrete shall contain no less than 1- 1/2 pounds of fibrous material. The fibrous material shall be added to the concrete mix at the time the mix is batched.

D-407.3 Excavation, Placing of Concrete, Finishing, Curing and Backfill

All excavation, placing of concrete, finishing, curing and backfilling shall be in accordance with the Item 401, "Structural Excavation and Backfill", and Item 410, "concrete Structures".

D-407.4 Measurement

The quantities of concrete of the various classes which constitute the completed and accepted work in place will be measured by the cubic yard, each, square foot or linear foot as indicated in the Project Manual. Measurement will be as follows:

- (1) Plan Quantity. For those items measured for plan quantity payment, adequate calculations have been made. No additional measurements or calculations will be made.

SECTION 416
EXPANSION JOINT MATERIALS

D-416.01 DESCRIPTION: This item shall govern for furnishing and placing of all expansion joint material as herein specified in the various items of these specifications or as shown on the plans or as directed by the Engineer.

D-416.02 MATERIAL: The material used for expansion joints shall conform to either of the following:

(1) Preformed Bituminous Fiber Material shall be formed from cane or other suitable fibers of a cellular nature securely bound together and uniformly impregnated with a suitable asphaltic binder and shall meet the requirements of the Standard Specifications for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction, ASTM Designation D-1751.

(2) Boards for expansion joints shall be obtained from Redwood or Cypress timber and shall be sound heartwood, free from sapwood, knots, clustered birds-eye, checks, and splits. Occasional sound or hollow birds-eye when not in clusters will be permitted provided the board is free from any other defects that will impair its usefulness as a joint filler.

D-416.03 CONSTRUCTION METHODS: All materials used shall extend the full depth of the concrete and shall be perpendicular to the exposed face. All joints shall be shaped to conform to the contour of the finished section in which they are installed. All material shall be a minimum of one-half (1/2") inch thick.

D-416.04 MEASUREMENT: Expansion Joint Materials will not be measured for payment.

D-416.05 PAYMENT: No direct payment will be made for Expansion Joint Materials. All material supplied and installed as specified herein shall be considered subsidiary work to the various items of these specifications calling for Expansion Joint Materials.

**SECTION 418
MEMBRANE CURING**

D-418.01 DESCRIPTION: This item shall consist of curing by the impervious membrane method of all curbs, sidewalks, drive approaches, concrete riprap, concrete structures, and other concrete as specified in the various items of these specifications or as indicated on the plans.

D-418.02 MATERIALS: The membrane curing compound shall comply with the requirements as set forth under Item 531, "Membrane Curing, Type 2, White Pigmented" of the TxDOT latest provisions.

D-418.03 CONSTRUCTION METHODS: The membrane curing compound shall be applied after the surface finishing has been completed, and immediately after the free surface moisture has disappeared. The surface shall be completely sealed with a uniform coating of the curing compound applied at the rate of coverage recommended by the manufacturer or as directed by the Inspector.

D-418.04 MEASUREMENT: "Membrane Curing" will not be measured for payment.

D-418.05 PAYMENT: The work and materials prescribed herein will not be paid for directly, but shall be included in the unit price bid for the items of construction in which these materials are used.

SECTION 420 CHAIN LINK FENCE

D-420.01 DESCRIPTION: Work includes: providing chain link fence system where shown on the drawings, as specified herein, and as needed for a complete and proper installation.

D-420.02 PRODUCT:

Dimensional Data:

General: Pipe size indicated are commercial pipe sizes.

Galvanizing: On steel framework and appurtenances, provide galvanized finish with not less than the following weight of zinc per square foot.

1. Pipe: 1.8 oz., complying with ASTM A120.
2. Hardware and Accessories: Comply with Table 1 of ASTM A153.
3. Fabric: 1.2 oz, complying with Class I of ASTM A392.

Fabric:

- A. Provide number 9 gauge or 0.148" wires in two (2) mesh with top and bottom knuckled finish.
- B. Place fabric in one piece width.

Posts, Rails, and Associated Items:

- A. End, corner, slope, and pull posts: provide at least the following minimum sizes and weights:

<u>Material and dimensions:</u>	<u>lbs./ft.</u>
Pipe: 2.875" outside dimension	5.79

- B. Line posts: provide minimum sizes and weights.

<u>Material and dimensions:</u>	<u>lbs./ft.</u>
Pipe: 1.900" outside dimension	2.75

- C. Gate posts: provide gate posts for supporting single gate leaf, or one leaf of a double gate installation, for nominal gate widths as follows:

<u>Material and dimensions:</u>	<u>lbs./ft.</u>
Pipe: 2.875" outside dimension	5.79

- D. Top rails:

<u>Material and dimensions:</u>	<u>lbs./ft.</u>
Pipe: 1.660" outside dimension	1.80

1. Provide in manufacturer's longest lengths, with expansion type couplings approximately 6" long for each joint.

2. Provide means for attaching top rail securely to each gate, corner, pull, slope, and end posts.

E. Post brace assemblies: Provide at end and gate posts, at both sides of corner, slope and pull posts, with the horizontal brace located at mid-height of the fabric.

<u>Material and dimensions:</u>	<u>lbs./ft.</u>
Pipe: 1.660" outside dimension	1.80

Use 3/8" diameter rod with turnbuckle for diagonal truss.

F. Tension wire: Provide number 9 gauge galvanized coiled spring wire at bottom of fabric.

G. Post tops:

1. Provide steel, wrought iron or malleable iron, designed as weathertight closure cap.
2. Provide one cap for each post.
3. Provide caps with openings to permit through passage of top rail.

H. Stretcher Bars:

1. Provide one-piece lengths equal to full height of fabric with a minimum crosssection of 3/19" x 3/4".
2. Provide one stretcher bar for each gate and end post, and tow of each corner, slope and pull post, except where fabric is woven integrally into the post.

I. Stretcher Bar Bands:

1. Provide steel, wrought iron or malleable iron, spaced not over 15" on centers, to secure stretcher bars to end, corner, pull, slope, and gate posts.
2. Bands may be used also with special fittings for securing rails to end, corner, pull, slope, and gate posts.

D-420.03 GATES:

A. General:

1. Provide additional horizontal and vertical member to assure proper operation of the gate, and for attachment of fabric hardware and accessories.
2. Space frame members not more than 8 feet apart.

<u>Material and dimensions:</u>	<u>lbs./ft.</u>
Pipe: 1.660" outside dimension	2.27

B. Gate Hardware: Provide the following for each gate:

1. Hinges:
 - a. Pressed or forged steel or malleable iron, to suit the gate size; non-lift-off type, offset

- to permit 180° opening.
- b. Provide 1-11/2 pr. of hinges for each leaf over 6 feet in nominal height.
- 2. Latches:
 - a. Provide forked type or plunger-bar type to permit operation from either side of the gate.
 - b. Provide padlock eye as integral part of latch.
- 3. Keeper: Provide keeper for vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
- 4. Double gates:
 - a. Provide gate stops for double gates consisting of mushroom or flush plate with anchors.
 - b. Set in concrete to engage the center drop rod or plunger bar.
 - c. Provide locking device and padlock eyes as an integral part of the latch, requiring both gate leaves.

D-420.04 MISCELLANEOUS MATERIALS AND ACCESSORIES:

A. Wire ties:

- 1. For tying fabric topline posts, use number 9 gauge wire ties spaced 12" on centers.
- 2. For tying fabric to rails and braces, use number 9 gauge wire ties spaced 24" on centers.
- 3. For tying fabric to tension wire, use number 11 gauge hog rings spaced 24" on centers.
- 4. Manufacturer's standard wire ties will be acceptable if of equal strength and durability.

B. Concrete: Comply with provisions for 2500 psi concrete.

D-420.05 EXECUTION:

Surface Conditions: Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

Installation:

A. General:

- 1. Install posts at a maximum spacing of 10 feet on centers.
- 2. Install corner or slope posts where changes in line or grade exceed a 30° deflection.

B. Excavating:

- 1. Drill holes for post footings in firm, undisturbed or compacted soil, strictly adhering to the dimensions and spacing shown.
- 2. Post hole dimensions.
 - a. Provide 30" deep by 8" diameter foundations for line post for 5 foot fabric height and less.
 - b. Provide 36" deep by 8" diameter foundations for line posts for fabric heights exceeding 5 feet.
 - c. Provide 35" deep by 12" diameter foundations for all other posts.
- 3. Spread soil from excavations uniformly adjacent to the fence line, or an adjacent areas

of the site if so directed.

C. Setting Posts:

1. Remove loose and foreign materials from sides and bottoms of holes, and moisten soil prior to placing concrete.
2. Center and align post in holes.
3. Place concrete around posts in a continuous pour, and vibrate and tamp for consolidation.
4. Check each post for vertical and top alignment and hold in position during placement and finishing operations.
5. Trowel tops of footings, and slope or dome to direct water away from posts.
6. Extend footing for gate posts to the underside of bottom hinge.
7. Set keeps, stops, sleeves, and other accessories into concrete as required.
8. Keep exposed concrete surfaces cured with membrane curing material.

D. Concrete Strength:

1. Allow concrete to attain at least 75% of its minimum 28-day strength before rails, tension wires, and/or fabric is installed.

E. Rails and Bracing:

1. Install fence with top rail and bottom tension wire.
2. Install tip rails continuously through post caps or extension arms bending to radius for curved runs.
3. Provide expansion couplings as recommended by the fencing manufacturer.
4. Provide bracing to the midpoint of the nearest line post or posts at all end corners, slope, pull, and gate posts.
5. Install tension wires parallel to the line of fabric by weaving through the fabric and tying to each post with not less than number 6 gauge galvanized wire, or by securing the wire to the fabric.

F. Installing Fabric:

1. Leave approximately 2" between finish grade and bottom salvage.
2. Excavate high points in the ground to clear the bottom of the fence.
3. Place and compact fill to within 1" of the bottom of the fabric in depressions.
4. Pull fabric taut and tie to post, rails, and tension wires.
5. Install fabric on outward side fencing side of fence and anchor to framework so that the fabric remains in tension after pulling force is removed.
6. Install stretcher bars by threading through or clamping to fabric on 4" centers and secure to posts with metal bands spaced 15" on centers.

G. Installing Gates:

1. Install gates plumb, level, and secure for full opening without interference.
2. Install ground-set items in concrete for anchorage in accordance with the fence manufacturer's recommendations.
3. Lubricate and adjust the hardware for smooth operation.

H. Miscellaneous:

1. Use U-shaped tie wires, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least two full turns.
2. Bend ends of wire to minimize hazards to persons and clothing.
3. Fasteners.
 - a. Install nuts for tension bank and hardware bolts on side of fence opposite fabric side.
 - b. Peen the ends of bolts to prevent the removal of nuts.
4. Repair coatings damaged in the shop or field erection, using a hot-applied repair compound applied in accordance with its manufacturer's recommendations.

D-420.06 Measurement and Payment:

1. **Measurement:** Chain link fence of each height specified will be measured by the linear foot measured including gates. Gates will be measured as linear footage of fence complete in place.
2. **Payment:** The work performed and material furnished as prescribed by this Item, measured as provided under "Measurement" will be paid for at the unit price bid for "Chain Link Fence".

SECTION 422 CONDUITS

D-422.01 DESCRIPTION

This item shall govern for the furnishing and placing of conduit of the types and sizes indicated on the plans, including junction boxes, fittings, expansion joints, attachments, and incidentals.

D-422.02 MATERIALS

All conduit and fittings shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories, and shall be marked in accordance with the applicable requirements of the NEC.

Junction boxes, expansion joints, and conduit fittings shall be fabricated from a material similar to the connection conduit unless indicated otherwise on the Plans and shall be listed by Underwriters Laboratories.

Rigid metal conduit shall be steel, hot dipped galvanized inside and outside. When tested in accordance with ASTM Designation: a 90, zinc coating shall be minimum of 1.5 ounces per square foot. Electronic metallic tubing and intermediate metal conduit shall be steel, hot dipped galvanized on the outside and protected on the inside with a suitable corrosion-resistant materials. Fittings shall be rain-tight. Set screw and pressure cast fittings will not be permitted.

Polyvinyl chloride and high-density polyethylene conduit shall meet the requirements of NEMA Standard TC-2 and UL 651, and the requirements of NEC for Rigid Nonmetallic Conduit. Unless otherwise noted on the Plans, PVC and HDP conduit shall be heavywall (Schedule 40).

Flexible conduit shall liquid-tight metal meeting requirement of NEC and be UL-listed. Where conduit system metallic, all lengths of flexible metal conduit shall be fitted with bonding jumpers.

D-422.03 CONSTRUCTION METHODS

The conduit, junction boxes, fitting, and incidentals shall be placed in accordance with the lines, grades, details, and dimensions shown on the Plans, or as directed by the Engineer. Installation of conduit shall be in accordance with the requirements of NEC. Conduit placed for concrete encasement shall be secured and supported in such a manner that the alignment will not be disturbed during placement of the concrete. No concrete shall be placed until all of the conduit ends have been capped and all box openings closed.

Where conduit is treated in the field, a standard conduit cutting die with a : inch taper per foot shall be used. Conduit placed on structures shall be firmly fastened with three (3) feet of each outlet box, junction box or fitting and at other locations as required by the NEC.

When required by the Engineer, immediately prior to installation of conductors or final acceptance, a spherical template having a diameter of not less than 75 percent of the inside diameter of the conduit shall be drawn through the conduit to insure that the conduit is free from obstruction. Than all conduit ends shall be closed using permanent type caps.

D-422.04 SAMPLING AND TESTING

When tests are required, sampling and testing will be in accordance with the Department's Manual of Testing Procedures.

D-422.05 CURB MARKINGS

The location, size, and purpose of all conduit shall be clearly marked on street curbs.

D-422.6 MEASUREMENT

Conduit of the types and sizes specified on the plans will be measured by the linear foot along the main line of the conduit except that flexible metal conduit will not be paid for directly but will be subsidiary to the various pay items. No measurement will be allowed under this item for conduit used in circuit protector assemblies, service poles, transformer stations, or roadway illumination assembly foundations.

D-422.07 PAYMENT

Conduit, measured as provided under "Measurement", will be paid for at the unit price bid in linear feet for "Conduit", of the types and sizes specified, which prices shall each be full compensation for furnishing and installing all conduit, jacking, boring, excavation, backfilling, replacing pavement, or surface treatment and marking location of conduit; for furnishing and installing all fittings, outlet boxes, bends, expansion devices, junction boxes, attachment devices and incidentals, and for all labor tools, equipment and incidentals as necessary to complete the work.

SECTION 424
RELOCATING WIRE FENCE

D-424.01 DESCRIPTION: This item shall consist of removing and relocating the wire fence(s) at the location(s) designated on the plans, and for furnishing and installing any additional materials required as specified by this item or as indicated on the plans.

D-424.02 MATERIALS: All materials furnished shall be equal to or better than the materials of the existing fence unless specifically designated otherwise on the plans.

D-424.03 CONSTRUCTION METHODS: Construction methods shall be equal to or better than existing type of wire fencing or conform to the Division D, Technical Provisions of Section 418, "Chain Link Fence", for the relocating of existing chain link wire fence.

D-424.04 MEASUREMENT: Accepted work as performed and prescribed by this item will be measured by the linear foot of fence relocated.

D-424.05 PAYMENT: The work performed and the materials furnished as prescribed by this Item will be paid for at the contract unit bid price per linear foot for "Relocating Wire Fence", which price shall be full compensation for removing and reinstalling the existing fence, and for furnishing all additional materials, for all labor, tools, equipment, and incidentals necessary to complete the work.

SECTION 426 RETAINING WALLS

D-426.01 GENERAL: Section includes furnishing the materials and constructing retaining walls as shown on the plans and required by this section. Spread footing retaining walls shall consist of reinforced concrete footings and reinforced concrete stems as shown on the plans.

D-426.02 MEASUREMENT AND PAYMENT:

- A.** Retaining walls will be measured by the square foot of the front surface area of the wall. Unless otherwise shown on the plans, the area will be measured from one (1) foot below finished grade to the top of wall including any coping required.
- B.** The work performed and materials furnished in accordance with this Section and measured as provided under "Measurement" will be paid for at the unit price bid for "Retaining Walls", of the type and/or special surface finish specified. This price shall be full compensation for excavation in back of retaining walls and for footings; furnishing and placing footings, leveling pads, copings and traffic railing foundations, when required; furnishing placing and compacting backfill to finished grade, including cement for stabilization; furnishing and placing concrete, reinforcing steel, waterproofing material, filter material and drain pipe, joint material, water stop, and filter fabric when required; fabricating, curing and finishing all panels; furnishing and placing earth reinforcement, anchorage systems and fasteners; for wall erection; and for all labor, tools, equipment and incidentals necessary for a complete retaining wall.
- C.** No payment will be made for piling or drilled shafts, except when used as foundations for spread footing or MSE walls.
- D.** When piling or drilled shafts are installed beyond limits shown on the drawings at the direction of the Engineer, the additional quantity will be paid for in accordance with the appropriate bid item.

PRODUCTS

D- 426.03 MATERIALS

- A.** All materials shall conform to the pertinent requirements of the following Sections:
 - 1. Section 406 Concrete Structures
 - 2. Section 410 Reinforcing Steel
 - 3. Section 414 Expansion Joint Materials
- B.** Unless otherwise shown on the plans, concrete for retaining wall shall conform to the following:
 - 1. Cast-in-Place, Reinforced Class "C"
 - 2. Cast-in-Place, Nonreinforced Class "A"
- C.** All steel elements in contact with soil shall be galvanized or epoxy coated. Epoxy coating

shall be in accordance with Section 410 - Reinforcing Steel, except that the coating thickness shall be a minimum of 18 mm.

- D.** Joint fillers, pads, waterstops, and other incidental materials shall be as shown on the plans, or approved by the Engineer.

D-426.04 BACKFILL MATERIAL: Backfill for spread footing retaining walls shall consist of suitable earth material such as rock, loam, clay, or other such materials as approved by the Engineer that will form a stable embankment.

EXECUTION

D-426.05 CONSTRUCTION METHODS:

- A.** Construction of retaining walls shall conform to the design and details shown on the plans and to the pertinent requirements of the following Sections:

1. Section 406 Concrete Structures
2. Section 410 Reinforcing Steel
3. Section 414 Expansion Joint Materials

- B.** Any required piling or drilled shafts shall be in accordance with the pertinent Specification.

SECTION 428 CONCRETE DRIVEWAYS

D-428.01 GENERAL: Section includes Portland cement concrete driveways.

D-428.02 MEASUREMENT AND PAYMENT: Payment for concrete driveways is on square yard basis. Refer to Division C, General Provisions, Section 9 Measurement and Payment for unit price procedures.

PRODUCTS

D- 428.03 MATERIALS

- A.** Concrete: Conform to material and proportion requirements for concrete Section 504- Concrete and Section 406- Concrete Structures.
- B.** Reinforcing Steel: Conform to material requirements for welded wire fabric Section 410 - Reinforcing Steel.
- C.** Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 414 - Expansion Joint Material.
- D.** Expansion Joint Filler: Conform to material requirements for expansion joint material of Section 406- Concrete Structures.

EXECUTION

D-428.04 PLACEMENT: Place and finish concrete in accordance with applicable portions of Section 406 - Concrete Structures.

D-428.05 JOINTS: Install joints in concrete driveway in accordance with Section 406- Concrete Structures.

D-428.06 CONCRETE CURING: Cure concrete in accordance with Section 406- Concrete Structures.

D-428.07 PROTECTION: Conform to applicable requirements of Section 406- Concrete Structures.

SECTION 430 CONCRETE SIDEWALKS

D-430.01 GENERAL: Section includes reinforced concrete sidewalks and wheelchair ramps.

D-430.02 MEASUREMENT AND PAYMENT: Payment for concrete sidewalks is on square foot basis. Payment for wheelchair ramps of each type specified is on a per ramp basis. The removal of existing sidewalk and curb or curb and gutter is included in the cost of the ramp. Refer to Division C, General Provisions, Section 9 Measurement and Payment for unit price procedures.

D- 430.03 REFERENCES:

- A.** ASTM C 31-Standard Practice for Making and Curing Concrete Test Specimens in the field.
- B.** ASTM C 39-Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- C.** ASTM C 42- Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- D.** ASTM C 138 -Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
- E.** ASTM C 143 - Standard Method for Slump of Hydraulic Cement Concrete.
- F.** ASTM C 172 - Practice for Sampling Freshly Mixed Concrete.
- G.** ASTM C 698 - Standard Test Methods for Moisture - Density Relations of Soils and Soil Aggregate Mixtures Using 5.5 - Pound Rammer and 12-inch Drop.

D- 430.04 SUBMITTALS: Submit certified testing results and certificates of compliance.

PRODUCTS

D- 430.05 MATERIALS

- A.** Concrete: Conform to material and proportion requirements for concrete Section 406.
- B.** Reinforcing Steel: Conform to material requirements in section 410 & 412.
- C.** Reinforcing Fiberglass: Conform to material and proportion requirements as per Section 414.
- D.** Preformed Expansion Joint Material: Conform to material requirements for preformed expansion joint material of Section 414 - Expansion Joint Material.
- E.** Expansion Joint Filler: Conform to material requirements for expansion joint material of Section 406- Concrete Structures.
- F.** Forms: Use straight, unwrapped wood or metal forms with nominal depth equal to or greater than the proposed sidewalk thickness. The use of 2" by 4" lumber as forms will be allowed.

EXECUTION

D-430.06 REPLACEMENT: Replace sidewalks that are removed or damaged during construction with sidewalk of thickness and width equivalent to those removed or damaged. Provide replace and new sidewalks with wheelchair ramps if sidewalk intersects curb at street or driveway.

D-430.07 PREPARATION:

- A. Identify and protect utilities which are to remain.
- B. Protect living trees, other plant growth, and features designated to remain.
- C. Conduct clearing and grubbing operation in accordance with Section 402 - Clearing and Grubbing.
- D. Excavate subgrade to the line, grade and cross-section shown on plans. Remove soft spots and pumping soils and replace with fill material having a Plasticity Index between 7 and 20.

D-430.08 PLACEMENT:

- A. *Setting Forms:* Securely stake forms to line and grade. Maintain position during concrete placement.
- B. *Reinforcement:* Install 6 x 6, W2.9 x W2.9 welded wire fabric or No. 3 reinforcing steel bars on 18-inch centers longitudinally and transversely. Lay longitudinal bars in walk continuously, except through expansion joints. Support reinforcement in manner to maintain reinforcement in center of slab vertically during placement.
- C. *Expansion Joints:* Install expansion joints in accordance with Section 414 - Expansion Joint Material.
- D. Place concrete in forms to specified depth and tamp thoroughly with "jitterbug" tamp, or other acceptable method. Bring mortar to surface.
- E. Strike off to smooth finish with wood strike board. Finish smoothly with wood hand float. Brush across sidewalk lightly with fine-haired brush.
- F. Unless otherwise indicated on plans, mark off joints ¼ inch deep, at spacing equal to width of walk. Use joint tool equal in width to edging tool.
- G. Finish edges with tool having ¼ inch radius.
- H. After concrete has set sufficiently, refill space along side of sidewalk to top of walk with suitable material. Tamp until firm and solid. Dispose of excess material in accordance with Section 128 - Waste Material Disposal. Repair driveways and parking lots damaged by sidewalk excavation in accordance with Section 428.

D-430.09 CURING: Conform to requirements of Section 406 - Concrete Curing.

D-430.10 FIELD QUALITY CONTROL:

- A.** Testing will be performed under provision of Division C, General Provisions, Section 6 Control of Work and Materials.
- B.** Compressive Strength Test Specimens: Four test specimens for compressive strength test will be made in accordance with ASTM C 31 for each 30 cubic yards or less of sidewalk that is place in one day. Two specimens will be tested at 7 days. The remaining two specimens will be tested at 28 days. Specimens will be tested in accordance with ASTM C 39. Minimum compressive strength shall be 3000 pounds per square inch at 7 days and 3500 pounds per square inch at 28 days.
- C.** Yield test for cement content per cubic yard of concrete will be made in accordance with ASTM C 138. If such cement content is found to be less than that specified per cubic yard, reduce batch weights until amount of cement per cubic yard of concrete conforms to requirements.
- D.** If the Contractor places concrete without notifying the laboratory, the City will have the concrete tested by means of a core test as specified in ASTM C 42. If the concrete does not meet the specification, the cost of the test will be deducted from payment due the Contractor.
- E.** Sampling of fresh concrete shall be in accordance with ASTM C 172.
- F.** Take slump tests when cylinders are made when concrete slump appears excessive.
- G.** Concrete shall be acceptable if the average of the two 28 day compression tests is equal o or greater than the minimum 28-day strength specified.
- H.** If either of the two test is less than the average of the two tests by more than 10 percent, that entire test shall be considered erratic and not indicative of the concrete strength. Core samples will be required of this concrete.
- I.** If any 28-day laboratory test indicates that concrete of low strength has been placed, the concrete in question shall be tested by taking cores as directed by the City Engineer may direct. At least three representative cores shall be taken and tested as specified in ASTM C 42 and the cost deducted from payment due the Contractor.

D-430.11 NONCONFORMING PAVEMENT: Remove and replace areas of sidewalk that fail compressive strength tests, with concrete of thickness shown on plans. Nonconforming sidewalk sections shall be replaced at no additional cost to the City.

D-430.12 PROTECTION: Maintain sidewalks in good condition until completion of work. Replace damaged sidewalks in accordance with Paragraph D-428.06 - Replacement.

SECTION 432 RELOCATION OF MAILBOXES

D-432.01 GENERAL: This item shall govern for the removal, relocation and permanent installation of mailbox assemblies at locations established by the Engineer.

D-432.02 MEASUREMENT AND PAYMENT:

A. This item will be measured as each permanent installation of mailbox assemblies complete in place. Additional permanent mailbox assemblies installed during construction will be measured as each installation complete in place.

B. The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Relocation of Mailboxes." This price shall be full compensation for temporarily relocating mailbox assemblies, providing portable mailbox stands, installing mailboxes in permanent locations; for furnishing all materials and for all manipulations, labor, tools, equipment and incidentals necessary to complete the work. No compensation will be made or temporarily relocating mailboxes more than once.

PRODUCTS

D-432.03 MATERIALS: Materials for mailbox assemblies shall conform to the details shown on the drawings and U.S. Postal Service design criteria.

EXECUTION

D-432.04 CONSTRUCTION METHODS:

A. No mailboxes shall be placed or constructed within the sidewalk unless special provisions are made to ensure complete compliance with A.D.A. & T.D.L.R.

B. The Contractor shall remove and relocate all mailbox assemblies along the existing roadway to a point outside the limits of the proposed construction. The temporary relocation of mailboxes may be accomplished by mounting mailboxes on portable stands furnished by the Contractor and approved by the Engineer.

C. All mailboxes and mailbox assemblies shall be maintained by the Contractor in an upright position and serviceable condition during the construction period. Any existing mailboxes or mailbox assemblies damaged or destroyed as a result of the Contractor's operations shall be replaced by the Contractor at his expense.

D. In the event additional mailbox installations are required after construction has begun, an approved mailbox will be furnished to the Contractor by others and the Contractor shall install either a temporary and/or a permanent supporting assembly.

E. After all construction work in the area has been completed, mailboxes shall be removed from their temporary position and positioned in permanent locations as shown on the drawings or as directed by the Engineer.

SECTION 502 EXCAVATION AND EMBANKMENT OF STREETS

D-502.01 DESCRIPTION: This item shall consist of doing all required excavation within the limits of the roadway (except for excavation otherwise classified such as excavation for drainage structures, etc.): the removal and proper utilization or disposal of all excavated materials; the erection of all embankments; and the constructing, shaping, compacting, and finishing of all earthwork on the entire roadway and approaches thereto in conformity with the lines, grades, and typical sections as shown on the plans and established by the Engineer.

D-502.02 GENERAL: All material encountered of whatever nature within the limits indicated shall be removed and disposed of as directed. The Contractor shall inform and satisfy himself as to the character, quantity, and distribution of all material to be excavated. No payment will be made for any excavated material which is used for purposes other than required in the plans or proposal or as directed by the Engineer.

The rough excavation shall be carried to such depth that sufficient material will be left above the designated grade to allow for compaction. Likewise on embankments, sufficient material shall be placed above the designated grade to allow for compaction and settlement. Should the Contractor excavate below the designated lines, Contractor shall replace such material excavated with approved material in an approved manner and condition at own expense.

The Engineer shall have complete control over the excavation, moving, placing, and disposition of all material, and he shall determine the suitability of material to be placed in embankments.

Stakes set by the Engineer as provided in the "General Provisions" shall include only one set of offset alignment and grade stakes. All slope stakes, bluetops, and additional alignment stakes shall be furnished and set by the Contractor.

EQUIPMENT

D-502.03 GRADING EQUIPMENT: The Contractor may use any type of earth-moving equipment the contractor wishes to use or has available, provided such equipment is in satisfactory condition and of such capacity that the grading schedule as planned by the Contractor and approved by the Engineer can be maintained.

D-502.04 COMPACTING EQUIPMENT:

(a) Tamping rollers shall consist of two metal rollers, drums, or shells or 40 " minimum diameter, each not less than 42 " in length and unit-mounted in a rigid frame in such manner that each roller may oscillate independently of the other; and each roller, drum, or shell shall be surmounted by metal studs with tamping feet projecting not less than seven (7) inches from the surface of the drum and spaced not less than six (6) inches nor more than ten (10) inches measured diagonally from center to center. The area of each tamping foot shall be not less than five (5) feet square inches nor more than eight (8) square inches. Each unit shall be provided with a suitable tamper foot cleaning device.

Where more than one rolling unit is used, the rolling units shall be pivoted on the main frame in a manner which will permit the rolling units to adapt themselves to uneven ground and to rotate

individually. When empty, the weight of the roller shall be such that the unit pressure applied by the tamping foot in contact with the ground is not less than 120 pounds per square inch.

(b) Pneumatic rollers shall consist of not less than nine pneumatic tired wheels running on two axles in such manner that the rear group of tires will not follow in the tracks of the forward group and shall be mounted on a rigid frame provided with platform or body suitable for ballast loading. The front axle shall rotate around the kingpin so located that the roller may be turned within a minimum circle. The pneumatic tire roller under working conditions shall have an effective rolling width of approximately sixty (60) inches and shall give a minimum compression of three hundred and twenty-five (325) pounds per inch of width of tire tread. The roller shall be drawn by either a suitable tractor or a truck of adequate tractive effort.

© Smooth self-propelled rollers shall weigh at least ten tons and may be tandem or three-wheel type. The wheels of the roller shall be equipped with adjustable scrapers.

CONSTRUCTION METHODS

D-502.05 EXCAVATION: The excavation material shall be handled in such a manner as to allow the selected material to be properly placed in embankment and in the capping of the pavement subgrades as determined by the Engineer. Any suitable surplus material shall be stock-piled in approved areas for later use as directed by the Engineer.

The contractor shall make the distribution as indicated on the plans, and the widening or narrowing of the section or raising or lowering of the grade to avoid haul will not be permitted. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept and divert surface water.

In cut areas, the top of the subgrade shall be scarified and compacted to a minimum depth of six (6) inches to not less than the comparable density of the adjoining material. When the required density cannot be obtained, the material shall be undercut and replaced with suitable material as directed. The material placed to refill and undercut portion shall be handled and compacted as specified for embankments.

During compacting operations, water shall be added to the subgrade material. Such watering shall be done by approved methods and using approved equipment. This moisture shall not be more than 2% above or below the optimum.

D-502.06 BORROW: Borrow excavation shall consist of excavation made outside the normal grading limits to obtain material for the completion of embankments and for other purposes. It shall be the Contractor's responsibility to locate and obtain the supply, and the Contractor shall notify the Engineer sufficiently in advance to permit tests and measurements to be made.

All borrow pits shall be opened up immediately to expose the vertical face of various strata of acceptable material to obtain a uniform product. Borrow pits shall be excavated to regular lines to permit accurate measurements, and shall be drained and left in a neat and presentable condition with all slopes dress uniformly.

D-502.07 PREPARATION OF EMBANKMENT AREA: Immediately prior to the placing of material, the entire area upon which the embankment is to be placed shall be striped of all grass, weeds, brush and other organic materials, and shall be scarified and broken to a depth of six (6) inches. All roots, debris, large stones or objectionable material that would interfere with the compaction of fill will be moved and disposed of as directed. A thin layer (approximately three (3) inches) of fill material shall be spread over the scarified foundation, and the whole area compacted as required herein. When embankments are to be placed on natural slopes steeper than 3 to 1, horizontal benches shall be constructed as directed by the Engineer. Material excavated in the construction of such benches will be included in the total yardage of excavation.

D-502.08 CONSTRUCTION OF EMBANKMENTS: Embankments shall be formed of satisfactory materials placed in successive horizontal layers of not more than six inches in loose depth for the full width of the cross section. The material in the layers shall have the proper moisture content before rolling to obtain the required compaction. Wetting or drying of the material and manipulation to secure a uniform moisture throughout the layer shall be required. Should material be too wet to permit proper compaction, corrective work on all portions of the embankment thus affected shall be done with the proper equipment and methods approved by the Engineer.

Each layer placed as specified above shall be compacted to not less than the comparable density of the adjoining material. Compaction shall extend through the entire depth of each layer and the embankment, when complete, shall be homogeneous and uniformly compacted mass. The moisture shall not be more than 2% above or below the optimum.

Under all paved areas and for a depth of six inches below the surface of the subgrade, the embankment shall be compacted to not less than ninety-five percent of the maximum density as determined by procedures set out under TEX-113E. Backfill behind back of curb shall be properly compacted to a depth of 4"; however, any areas inaccessible to a roller shall be consolidated and compacted with approved mechanical tampers. Stones or rock fragments larger than four inches in their greatest dimension will not be permitted in the top six inches of the embankment.

The Contractor shall be responsible for the stability of all embankments made under this contract and shall replace any portion which in the opinion of the Engineer has become displaced due to negligence on the part of the Contractor.

D-502.09 TRUENESS TESTS: In those areas upon which a sub-base or base course is to be placed, the surface of the subgrade shall be of such smoothness that when tested with a sixteen (16) foot straightedge, it shall show no deviation in excess of five-hundredths (0.05) of a foot from true grade as established by grade pins or hubs. In areas not under sub-base or base course, the surface shall not deviate more than one tenth (0.10) of a foot from true grade as established by grade pins or hubs.

MEASUREMENT

D-502.10 ROADWAY EXCAVATION: The number of cubic yards of street excavation to be paid for shall be computed by the method of average end areas. The width of these areas shall be the distance measured from edge of asphalt to edge of asphalt plus two (2.0) feet. The depth shall be

that staked in the field by the Engineer.

D-502.11 BORROW EXCAVATION: The number of cubic yards of "Borrow Excavation" to be paid for shall be computed by the method of average and areas. The width of these areas shall be the distance measured from back of curb to back of curb plus two (2.0) feet. The depth shall be that staked "in the field by the Engineer."

D-502.12 EMBANKMENT: No separate measurement for embankment will be made.

D-502.13 HAUL: No separate measurement of haul will be made other than that specifically approved in the plans.

PAYMENT

D-502.14 STREET EXCAVATION: The cubic yards of street excavation measured as provided in these specifications will be paid for at the contract unit price per cubic yards (dense measurement) for "Street Excavation" which payment shall constitute full compensation for excavation, haul, embankment, watering and compaction; and for furnishing all materials, labor and equipment for doing the work as specified herein and to the liens and grades shown on the plans. Payment for fifty percent (50%) of street excavation will be paid at the time initial excavation (rough grading) is completed. The balance of fifty percent (50%) is to be paid when the street subgrade is tested and approved. Approved subgrade will be covered with asphalt stabilized base within maximum seven (7) days as per Division D, Technical Provisions, Section 512 of these specifications.

SECTION 504 CONCRETE

D-504.01 DESCRIPTION: These specifications shall govern for the materials used, for the storing, measuring, and handling of materials, and for the proportioning and mixing of Portland Cement Concrete.

MATERIALS

D-504.02 CEMENT: Portland Cement shall conform to the requirements of the latest revision of ASTM Designation C150, Type 1, or Type II. Only one brand or kind of cement shall be used in any one structure except as permitted in writing by the Engineer. All cement shall be delivered in bags plainly marked with the brand and name of the manufacturer.

D-504.03 COARSE AGGREGATE: The coarse aggregate shall conform to the requirements of the latest revision of ASTM Designation C-33 and ASTM Designation D-448. Coarse aggregate for the various classes of concrete shall conform to the requirements of the following table:

Table 1 COARSE AGGREGATE GRADATION CHART
Percent Retained on each sieve

Aggregate Grade No.	Nominal Size	2-1/2"	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8
1	2 1/2	0	0-20	15-50	-	60-80	-	-	95-100	-
2 (467)*	1 1/2		0	0-5	-	30-65	-	70-90	95-100	-
3	1		0	0-5	-	10-40	40-75	-	95-100	-
4(57)*	1			0	0-5	-	40-75	-	90-100	95-100
5(67)*	3/4				0	0-10	-	45-80	90-100	95-100
6(7)*	1/2					0	0-10	30-60	85-100	-
7	3/8						0	5-30	75-100	-
8	No.4						0	0-5	35-60	90-100

* Numbers in parenthesis indicate that these gradations conform to corresponding ASTM gradation form ASTM C-33.

The amount of deleterious substances in coarse aggregate shall not exceed the following percentages by weight:

Material removed by decantation	1.0%
Shale, slate and similar materials	1.0%
Clay lumps	0.25%
Soft fragments	3.0%
Other deleterious substances (Including friable, thin, elongated or laminated pieces)	5.0%

The sum of all deleterious materials exclusive of materials removed by decantation shall not exceed 5% by weight.

D-504.04 FINE AGGREGATE: The fine aggregate shall conform to the requirements of the latest revision of ASTM Designation C-33.

Percent Retained on Each Sieve								
AGGREGATE	3/8 in.	No.4	No.8	No.16	No. 30	No. 50	No.100	No.200
GRADE #1	0	0-5	0-20	15-50	35-75	65-90	90-100	97-100

The amount of deleterious substances in fine aggregate shall not exceed the following percentages by weight:

Materials removed by decantation	3.0%
Clay Lumps	0.5%
Other deleterious substances (Such as coal, shale, coated or soft flaky particles) Material finer than No. 200 sieve (a) In concrete subject to surface abrasion	2.5%
(b) All other concrete	3.0%

D-504.05 WATER: Water shall be clean and free from deleterious amounts of acids, alkalis, and organic materials.

EQUIPMENT

D-504.06 GENERAL: All equipment will be inspected by the Engineer and only equipment approved by him may be used. Any equipment disapproved shall be removed from the job site within 24 hours after it has been inspected.

D-504.07 CEMENT STORAGE FACILITIES: All cement shall be stored in well ventilated, weatherproof buildings which will protect the cement from dampness. The floor supporting the cement shall clear the ground a sufficient distance to prevent the absorption of moisture by the cement. Provision for storage shall be ample, and the shipment of cement shall be segregated in such manner as to provide easy access for identification of each shipment.

The Engineer may permit small quantities of cement to be stored in the open for periods not exceeding 48 hours, if a raised platform and adequate waterproof coverings are provided.

D-504.08 AGGREGATE STORAGE FACILITIES: If the aggregates are stored on the ground, the sites for the stockpiles shall be grubbed clear of all weeds and grass, and leveled off. The bottom layer of aggregate shall not be disturbed nor used without cleaning.

When the contract requires the use of two or more sizes of aggregate, the different sizes shall be stored in a manner as to prevent intermixing.

Materials in all stockpiles shall be handled and placed in such manner that segregation of materials

within the stockpile will be avoided.

D-504.09 MEASURING EQUIPMENT: Equipment for measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work, preferably measurement by weight rather than by volume.

D-504.10 MIXING EQUIPMENT: The mixing shall be done in a batch mixer of approved type and size which will insure the uniform distribution of the material throughout the mass so that the mixture will be uniform in color and smooth in appearance. Whenever a concrete mixer is not suitable or adequate for the work, it shall be removed from the site upon written order from the Engineer. Pick-up and throw-over blades in the mixer drum which are worn down more than ten percent (10%) in depth shall be repaired or replaced.

D-504.11 CLASSIFICATION AND MIX DESIGN: It shall be the responsibility of the Contractor to furnish the mix design, using a Coarse Aggregate Factor acceptable to the Engineer, for the class(es) of concrete specified to conform with the requirements contained herein and in accordance with TxDOT Standards. The contractor shall perform, at his own expense, the work required to substantiate the design, except the testing of strength specimens, which will be done by the Department. Complete concrete design data shall be submitted to the Engineer for approval and shall be less than 1 year old.

It shall also be the responsibility of the Contractor to determine and measure the batch quantity of each ingredient including all water, not only for batch designs, but for all concrete produced for the project, so that the mix conforms to these specifications and other requirements shown on the plans.

In lieu of the above mix design responsibility, the Contractor may accept a design furnished by the Engineer, however, this will not relieve him of the responsibility of providing concrete meeting the requirements of these specifications.

Trial batches will be made and tested using all the proposed ingredients prior to placing of concrete, and when the aggregate, and/or type, brand or source of cement, or admixture is changed. When the brand and/or source of cement only is changed, the Engineer may waive trial batches only if a prior record of satisfactory performance of the cement has been established.

Trial batches shall be made in the mixer to be used on the job. When Transit Mix concrete is to be used, the trial designs will be made in a transit mixer representative of the mixers to be used. Batch size shall not be less than fifty percent (50%) of its rated mixing capacity.

Mix designs from previous or concurrent jobs may be used without trial batches if it is shown that no substantial change in any of the proposed ingredients has been made. Mix design shall be current or less than one (1) year old.

The coarse aggregate factor shall not be more than 0.82, but when the voids in the coarse aggregate exceed 48 percent of the total dry loose volume, the coarse aggregate factor shall not exceed 0.85. The coarse aggregate factor shall not be less than 0.68 unless authorized by the Engineer in writing.

Water reducing or retarding agents may be used with all classes of concrete at the option of the Contractor, and will be required for hot weather concreting for cased drilled shafts and for continuous slab placement.

When a retarding admixture is required for hot weather concreting, as specified in TxDOT Item No.437 or latest revision, the amount to be used will be required in the Item, "Concrete Admixtures", subject to change by the Engineer when required. When used in continuous slab placement, the amount to be used will be established by several trial batches with varying retarder content and simulating the placing conditions to be encountered. When water reducing or retarding agents are used at the option of the Contractor, reduced dosage of the admixture will be permitted.

Entrained air will be required in accordance with Tables 4 and 5.

The concrete shall be designed to entrain 5 percent (5%) air when Grade 1 or 2 coarse aggregate is used, 6 percent (6%) when Grade 3 or 5 coarse aggregate is used, and 7 percent (7%) for Grades 5,6 or 7 unless otherwise specified by the Engineer. Concrete as placed in the structure shall contain the proper amount as required herein with a tolerance of plus or minus 1-1/2 percentage points. Occasional variations beyond this tolerance will not be a cause for rejection. When the quantity of entrained air is found to be more than 3 percentage points over those values given herein, additional test beams or cylinders will be made. If these beams or cylinders pass the minimum flexural or compressive requirements, the concrete will not be rejected because of the variation in air content.

D-504.12 QUALITY OF CONCRETE: The concrete shall be uniform, workable, and of a consistency acceptable to the Engineer. The cement content, maximum allowable water/cement ratio, the desired and maximum slump, the proper amount of entrained air and the strength requirements for all classes of concrete shall conform to the requirements of these specifications. It shall be the responsibility of the Contractor to provide concrete meeting these specifications.

During the progress of the work, the Engineer will cast test cylinders or beams, perform slump and entrained air tests, and will make temperature checks, as required, to insure compliance with the specifications.

A strength test shall be defined as the average of the breaking strength of two cylinders or two beams as the case may be. Specimens will be tested in accordance with Test Methods TEX-418- A or TEX-420-A.

If the required strength or consistency of the class of concrete being produced cannot be secured with the minimum cement specified or without exceeding the maximum water/cement ratio, the Contractor will be required to furnish different aggregates, use a water-reducing agent, an air-entraining agent, or increase the cement content in order to provide concrete meeting these specifications.

All test specimens, beams or cylinders, representing tests for removal of forms and/or false work shall be cured using the same methods, and under the same conditions as concrete represented.

"Design Strength" beams and cylinders shall be cured in accordance with TxDOT Bulletin C-11 and

Supplement thereto.

The Contractor shall provide and maintain curing facilities as described in TxDOT Bulletin C-11 and Supplement thereto, for the purpose of curing test specimens. Provision shall be made to maintain the water in the curing tank at temperatures between 70°F and 90°F.

When control of concrete quality is by twenty-eight day compressive tests, job control will be by seven day compressive tests which are shown to provide the required twenty-eight day strength based on results from trial batches. Thereafter, if the required seven day strength is not secured with the quantity of cement specified in Table 4 or 5, changes in the batch design will be made as specified in this article.

TABLE 4- CLASSES OF REGULAR CEMENT

Class of Conc.	Sx. Cem per CY Min.	Min Comp. Strgth (f) 28 day psi	Min. Bm Strgth 7 day psi	Max Water Cement Ratio	Coarse Aggr. No.	General Usage
A	5.0	3000	500	6.5	1-2 3-4	Drilled Shafts, Bridge Substructure, Culverts, (not direct traffic) Inlets, Manholes, Headwalls, Concrete Approach Slab, Curb & Gutter, Concrete Barrier Railing, Concrete Retards, Sidewalks, Driveways
B	4.0	2000	330	8.0	2-3- 4-5- 6-7	Rip-rap, Long Span Structures, Thrust Beams
C	6.0	3600	600	6.0	1-2- 3-4- 5-*8	Drilled Shafts Bridge Railing & Substructure Culverts, Wing Walls Concrete Approach Slab, Concrete Barrier Railing, Machine Laid Curb
S	6.0	3600	600	5.0	2-3- 4-5	Bridge Slab, Top Slab of Direct Traffic Culverts
D	3.0	1500	250	11.0	2-3- 4-5- 6-7	Rip-Rap
H	6.0	As spec. in plans	N/A	5.5	3-4-	Pre-stressed Concrete Beams Boxes & Piling Concrete Barrier Railing

* Grade 8 aggregate for use in machine laid curb.

Entrained air will be required for bridge slabs, top slabs of direct traffic culverts, piers, bents, precast piling (non- prestressed), drilled shafts placed in water, bridge railing, and concrete barrier railing. When Class "H" concrete is used in barrier railing entrained air will not be required.

Grade 1 coarse aggregate will not be permitted in cased drilled shafts.

When Type II cement is used with Classes "C" or "S" concrete, the 7 day beam break requirement will be 550 psi minimum, and with Class "A", 460 psi minimum.

The use of Grade 7 aggregate must have prior approval of the Engineer.

Class of Conc.	Sack Cem per CY Min.	Min Comp. Strgth (f') 28 day psi	Min Comp. Strgth (f') 7 day psi	Max Water Cement Ratio	Coarse Aggr. No.	General Usage
C-C	7	5500 (7-day-4500)	900	4.2	2-3 - 4-5	Bridge Slab, Special High Strength Concrete, when a high-range water reducing agent is used
E	6	3000	500	6	2-3 - 4-5	Seal Concrete
F	6.0 to 8.0	Specified in Plans	$\frac{f_c}{6}$	5.5	2-3 - 4-5	Railroad Structures, occasionally for Bridge Pier Columns or Bents
H-H	6.0 to 8.0	Specified in Plans	N/A	4.5	3-4 - 5-6	Pre-stressed Concrete

Class C-C concrete may be used only when included in the contract, or permitted by Field Change. A high-range water reducing admixture will be required. Class H-H concrete may be used only when properly certified by the Materials and Tests Engineer.

When Class "H-H" concrete is used, entrained air will not be required.

D-504.13 CONSISTENCY: The consistency of the concrete as placed should allow the completion of the finishing operation without the addition of water to the surface. When field conditions are such that additional moisture is needed for the final concrete surface finishing operation, the required water shall be applied to the surface by fog spray only and shall be held to a minimum. The concrete shall be workable, cohesive, possessing satisfactory finishing qualities, and of the stiffest consistency that can be placed and vibrated into a homogeneous mass. Excessive bleeding shall be avoided. Slump requirements will be as specified in Table 3, which follows:

TABLE 3

CONCRETE DESIGNATION	DESIRED SLUMP	MAXIMUM SLUMP
<u>Structural Concrete</u>		
(1) Cased Drilled Shafts	5	6
(2) Slurry Placed Shafts	6	7
(3) Uncased Drilled Shafts Thin-Walled Sections (9" or less)	4	5
(4) Slabs, Caps, Columns, Piers, Wall	3	4

CONCRETE DESIGNATION	DESIRED SLUMP	MAXIMUM SLUMP
Sections over 9", etc.		
(5) Prestressed Concrete Members Class H Class H-H	4 6	5 8
(6) Concrete Traffic Barrier (Cast-in place or Precast) (Slip-form)	4 1 1/2	5 As designated by the Engineer
Concrete Placed Under Water	6	7
Riprap, Curb, Gutter, and other Miscellaneous Concrete	As Specified by the Engineer	

NOTE: No concrete will be permitted with slump in excess of the maximums shown.

- (a) The mortar will cling to the coarse aggregate
- (b) The concrete is not sufficiently fluid to segregate when transported to the place of deposit
- (c) The concrete, when dropped directly from the discharge chute, will flatten out at the center of the pile but the edges of the pile will stand up and not flow
- (d) The mortar will show no free water when removed from the mixer
- (e) The concrete will settle into place when deposited in the forms, and when transported in metal chutes at an angle of 30 degrees horizontal, it will slide and not flow into place
- (f) The surface of the finished concrete will be free from "laitance", or a surface film of free water

Any concrete failing to meet the requirements although meeting the slump requirements will be considered unsatisfactory; and the mix shall be changed to correct such unsatisfactory conditions.

D-504.14 MIXING: The first batch of materials placed in the mixer for each placement shall contain an extra quantity of sand, cement, and water sufficient to coat the inside surface of the drum without diminishing the mortar content or the mix. Upon cessation of mixing for any considerable period of time, the mixer shall be thoroughly cleaned.

The entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch. The concrete shall be mixed in quantities required for immediate use, and any concrete which is not in place within one (1) hour after water is added to the batch will not be used. Retampering of concrete will not be permitted.

After all the ingredients are assembled in the drum the mixing shall continue for a minimum time of one and one-half minute for 14 cubic foot mixers and smaller, and for a minimum time of one minute for 21 cubic foot mixers and larger. During the mixing time the drum shall revolve at a speed of 14 to 20 revolutions per minute. The mixer shall be equipped with a speed regulator to hold the mixer to the required speed of revolution. The absolute volume of the concrete batch shall not exceed 120 percent of the NRMCA-rated capacity of the mixer.

D-504.15 READY MIX CONCRETE: Concrete forms from a central plant of mixed-in-transit mixer trucks may be used if it complies with these specifications. The Engineer shall have free access at all times to the batching and mixing plant for sampling of all materials and inspection of work performed at this project. Concrete shall be delivered in water-tight containers which will not permit segregation of the materials. When delivered, the concrete shall be uniform throughout the mass.

The delivery ticket shall include the date, time, strength, slump, and amount of batch delivered. If an extra charge of water is required at the job site because of too low a slump, the drum shall be turned a minimum of 30 revolutions after addition of such water. Mixer shall be completely emptied before recharging. Trucks shall not be loaded greater than NRMCA-rated capacity. The maximum time interval between the addition of the cement to the batch and the placing of the concrete in the forms shall conform to the requirements set up under TxDOT specifications, Item 420. Overwet mixers shall be rejected and shall not be corrected by the addition of either aggregate or cement to the particular batch in question.

D-504.16 ADVERSE WEATHER: In threatening weather which, in the opinion of the Engineer, may result in conditions which will adversely affect the quality of the concrete to be placed, the Engineer may order postponement of the work. Where work has been started and changes in weather conditions require protective measures to be used, the Contractor shall furnish adequate shelter to protect the concrete against damage from rainfall, wind, or damage due to freezing temperature. In case it is necessary to continue mixing operation during rainfall, the Contractor shall provide protective coverings for the material stockpiles as well as the concrete being placed. The covering for aggregate stockpiles will be required only to the extent as may be necessary to control the moisture conditions in the aggregate so that adequate control of the consistency of the concrete mix may be maintained.

No concrete shall be mixed without the approval of the Engineer when the air temperature is at or below 40 degrees Fahrenheit taken in the shade away from artificial heat and falling. If authorized by the Engineer, concrete may be mixed when the air temperature is 35 degrees Fahrenheit and rising. When permission is given for mixing when the temperature is below 40 degrees Fahrenheit, the Engineer will specify the special precautions which shall be taken.

In case the air temperature is at or above 85 degrees Fahrenheit, concrete may be mixed in accordance with the requirements set up in TxDOT, Specifications, Item 437.

Hand mixing of concrete will be permitted only for small placements or in the case of an emergency and then only when authorized by the Engineer. The Engineer will also specify the proportioning and methods of mixing to be used.

TESTING AND INSPECTION

D-504.17 TESTING AND INSPECTION OF MATERIALS:

- (a) Concrete testing of mix designs shall be made by a commercial testing laboratory approved by the Engineer. One copy of the test reports shall go to the Engineer and one copy of same shall go to the Contractor.
- (b) Selection of the testing laboratory by the Engineer shall be understood as in no way relieving the Contractor's responsibility for the satisfactory performance of the work in full conformance with the requirements of the contract. Excluding written protest by the Contractor, in advance of processing or use of materials, services of the testing laboratory shall be understood as constituting full acceptance by an approval of the Contractor.

- © Tests of concrete and materials shall be made under the direction of the Engineer who shall have access to all places where materials are stored, proportioned, or mixed.
- (d) The Contractor shall submit to the Engineer the mixes he/she intends to use which have been proven by preliminary compression test prior to commencement of work. Proving tests shall consist of at least six 6" x 12" cylinders for each mix specified. Three cylinders shall be tested at 7 days and three at 28 days.
- (e) During the progress of the work one set of 3 each 6" x 12" cylinders for compression tests shall be cast for each 50 c.y. or day's pour. Cylinders shall be tested for compression at seven (7) days and at 28 days, and one cylinder will be reserved as "stand-by".

Samples used for testing must be representative of the batch tested and should be taken from the middle third portion of the batch. Samples shall be mixed with a shovel to insure uniformity throughout the sample and immediately molded into test specimens.

If test cylinders fail to meet specified strength at 28 days by more than 5%, core tests of the structure may be ordered by the Engineer at the Contractor's expense. These tests shall be made by an approved laboratory.

- (f) Slump tests: Slump tests shall be made on each sample taken for compression tests. Additional slump tests shall be as required by the Engineer.

D-504.18 TEST METHODS:

- (a) ASTM Designation C-17 "Standard Method of Sampling Fresh Concrete."
- (b) ASTM Designation C-143 "Standard Method of Slump Test for Consistency of Portland Cement Concrete".
- © ASTM Designation C-31 "Standard Method of Making and Curing Compression and Flexure Test Specimens in the Field".
- (d) ASTM Designation C-39 "Standard Method of Test for Compressive Strength of Molded Concrete Cylinders".
- (e) ASTM Designation C-42 "Standard Methods of Securing, Preparing, and Testing Specimens from Hardened Concrete for Compressive and Flexural Strengths".

All tests shall conform to the requirements of the latest revisions of the applicable ASTM Designations.

D-504.19 PLACING, CURING, AND FINISHING: The placing of concrete including construction of forms and falsework, curing and finishing, shall be in accordance with Division D, Section 406, CONCRETE STRUCTURES.

SECTION 506 CONCRETE CURB AND GUTTER

D-506.01 DESCRIPTION: This item shall consist of curb and gutter composed of Portland Cement concrete, constructed as herein specified on an approved subgrade or base course, in conformity with the lines and grades established by the Engineer and the details and sections shown on the plans.

MATERIALS

D-506.02 CONCRETE: Concrete shall be Class "A" and shall conform to the requirements of Division D, Section 504, titled "CONCRETE" in the specifications.

D-506.03 EXPANSION JOINT MATERIAL: Filler for expansion joints shall be preformed bituminous fiber type and shall conform to the requirements of Division D, Section 414, titled "EXPANSION JOINT Materials".

D-506.04 FORMS: Forms shall be of metal and of a section satisfactory to the Engineer, straight, free from warp and of a depth equal to the depth of the finished work. Forms shall be securely staked to line and grade and maintained in true position during the placing of concrete.

D-506.05 REINFORCING STEEL: Reinforcing steel shall conform to the requirements of Division D, Section 410, titled REINFORCING STEEL.

CONSTRUCTION METHODS

D-506.06 SUBGRADE OR BASE COURSE: The subgrade or base course shall be excavated and shaped to line, grade and cross-section, tamped and sprinkled. The subgrade or base course shall be moist at the time concrete is placed. The specified subgrade materials and specifications for the roadway shall extend 1 foot beyond the back of curb.

D-506.07 PLACING CONCRETE: Where reinforcing is required, it shall be placed and supported upon suitable chairs or concrete spacer blocks before concrete is poured.

D-506.08 FINISHING AND JOINTING: The surface of the concrete shall be struck off to the required line and grade with an appropriately shaped screed and shall be floated smooth while the concrete is still soft. The surface shall be floated with a wood float until a slight excess of sand appears. The outer edges and joints shall be rounded with approved tools to the radii shown on the plans. When the concrete has taken sufficient set, the inside form shall be carefully removed, and the surface thus exposed shall be pointed up where necessary, then wetted and rubbed with a wooden block to remove all form marks and other irregularities, producing a finish similar in appearance to the finished upper surfaces. Mortar finishing will not be permitted. Where the location of expansion joints is not indicated, joints shall be placed at spacing of not more than forty (40) feet. Expansion joint material shall be of the thickness shown on the plans and shall conform to the required section of the curb. Expansion joint material shall be placed between the curb and any abutting structures, and around all obstructions protruding through the curb and gutter as shown on the plans.

Dummy groove contraction joints shall be placed at intervals of approximately ten (10) feet. Joints shall be made so that the joint is perpendicular to the line of the curb.

D-506.09 CURING: When completed, the curb shall be covered with cotton mats of two thicknesses of ten (10) to twelve (12) ounce burlap and kept thoroughly wet for a period of four (4) days at which time the covering may be removed. Other methods of curing if approved by the Engineer may be used at the Contractor's option.

D-506.10 BACKFILLING: The curb shall be backfilled to the full height of the concrete, tamped, and sloped as directed.

MEASUREMENT

D-506.11 CONCRETE CURB AND GUTTER: The footage of concrete curb and gutter to be paid for shall be the number of linear feet, measured along the back of the curb in place, completed, and accepted. The various types and classes of curb and gutter shall be measured separately.

PAYMENT

D-506.12 CONCRETE CURB AND GUTTER: The footage of concrete curb and gutter, measured as provided in Division D, Section 506, Paragraph D-506.11 will be paid for at the contract unit price per linear foot for concrete curb and gutter of the various types and classes.

SECTION 508
MACHINE LAID CONCRETE CURB AND GUTTER

D-508.01 DESCRIPTION: This item shall consist of curb and gutter composed of Portland Cement concrete, constructed as herein specified on prepared subgrade, compacted as specified or shown, with reinforcing steel and in conformity with the lines and grades established by the Engineer and the details and sections shown on the plans.

MATERIALS

D-508.02 MATERIALS: Shall conform to TxDOT Specifications 1993, Item 529 or latest revision, as stated for extruding curb.

CONSTRUCTION METHODS

D-508.03 CONSTRUCTION METHODS: Shall conform to TxDOT Specifications 1993 or latest revision, Item 529, as stated for extruding curb.

MEASUREMENT

D-508.04 MEASUREMENT: The footage of concrete curb and gutter to be paid for shall be the number of linear feet, measured along the back of the curb in place, completed, and accepted. The various types and classes of curb and gutter shall be measured separately.

PAYMENT

D-508.05 PAYMENT: The footage of concrete curb and gutter, the preparation of subgrade, and the placing of flexible base where shown under the curb to dimensions shown on the plans, measured as provided in Division D, Section 508, Paragraph D-508.04 shall be paid for at the contract unit price per linear foot for concrete curb and gutter.

SECTION 510 FLEXIBLE BASE COURSE

D-510.01 GENERAL: Flexible Base shall consist of a foundation course for surfacing, pavement, or other base courses; shall be composed of caliche and stone materials, and shall be constructed as herein specified in conformity with the typical sections shown on the plans and to the lines and grades established by the Engineer.

MATERIALS

D-510.02 MATERIALS: The materials shall consist of argillaceous limestone, calcareous clay particles with or without stone, conglomerate, gravel, sand, or other granular materials. The materials shall be Type F (Pit run caliche), conforming to Item No. 247 of the State Department of Highways and Public Transportation Specifications 1993. The source of the material shall be approved by the Engineer prior to use. The plasticity index of caliche shall have a maximum of 12 and a minimum of 5. The Contractor shall stockpile the material to be used for this particular project. Sampling and testing shall conform to Division C, Section 6, Paragraph C-6.11 of these specifications. Stones greater than 3" in any direction shall be removed from street during construction.

CONSTRUCTION METHODS

D-510.03 CONSTRUCTION METHODS: The flexible base materials shall be placed on the approved subgrade in courses not to exceed eight (8) inches compacted depth. It shall be the responsibility of the Contractor that the required amount of materials be delivered and uniformly spread and shaped. All materials shall be moved from the place where it is dumped by cutting in windrow. After the material has been cut into windrows, it shall be sprinkled, spread, shaped, and rolled in proper sequence to prevent segregation and as necessary for required compaction.

The surface upon completion shall be smooth and in conformity with typical sections and to the established lines and grades. Any deviation in excess of 1/4 inch in cross section and in length of 16 feet measured longitudinally shall be corrected. All irregularities, depressions, or weak spots which develop shall be corrected.

Flexible base shall be compacted to an apparent dry density of not less than 98 percent (98%) of the maximum dry density as determined in accordance with TxDOT Specifications Test Method TEX 113-E. Tests for density will be made within 24 hours after compaction operations are completed. If the material fails to meet the density specified, it shall be reworked as necessary to meet the density required. Just prior to the placing of any succeeding course of flexible base or surfacing on a previously completed course, the density and moisture of the top four (4) inches of the flexible base shall be checked and if tests show the density to be more than 2 percent (2%) below the specified minimum or the moisture content to be more than 3 percent (3%) above or below the optimum, the course shall be reworked as necessary to obtain the specified compaction and moisture content.

Should the base course due to any reason or cause lose the required stability, density, or finish before the surface is completed, it shall be recompacted, refinished, and retested at the sole expense of the Contractor.

The limits of placement for F.B.C. will extend 1 foot beyond the back of curb (whenever curb is specified) in order to provide proper support for concrete curb.

MEASUREMENT

D-510.04 MEASUREMENT: Flexible Base: The number of square yards of flexible base course to be paid for shall be measured as the square yards in place after compaction. Thickness shall be checked by means of depth tests or cores, but no extra yardage for thickness in excess of that shown on the plans will be paid.

PAYMENT

D-510.05 PAYMENT: The yardage of flexible base measured as provided for in Paragraph above will be paid for at the contract unit price for "Flexible Base".

GENERAL

D-510.06 GENERAL: All payment made under this section shall constitute full compensation for excavation for furnishing, loading, hauling, and placing materials; for mixing, blending, sprinkling, shaping and compacting; for reconditioning the underlying course and shoulders, and for furnishing all labor, tools, and equipment as specified herein.

SECTION 512 ASPHALT STABILIZED BASE

D-512.1 DESCRIPTION: This item shall consist of base courses to be composed of a compacted mixture of mineral aggregates and asphaltic materials mixed hot in a mixing plant, and shall conform to Item 345 of the TxDOT's standard specifications for construction of highways, street and Bridges, 1993, or latest edition.

D-512.2 MATERIALS:

1. Asphaltic Materials

a. Mixture. Asphalt for the mixture shall meet the requirements for AC-10 or AC-20 asphalt. The grade of asphalt to be used will be approved by the Engineer after design tests have been made using the mineral aggregate approved for use in the construction of this item.

b. Tack Coat. The asphaltic material for the tack coat shall meet the requirements for emulsified asphalt MS-1 or cut back asphalt RC-2.

2. Mineral Aggregates.

a. Description. The material shall be crushed or uncrushed and screened as necessary to meet the requirements specified and shall consist of durable coarse aggregate particles mixed with approved binding materials.

b. Grades. Unless otherwise specified, the grading of the aggregate shall conform to the limitations as shown below:

SIEVE SIZE	PERCENT RETAINED
1 1/2"	0
1"	0-10
3/8"	30-55
No. 4	45-70
No.40	70-85

Unless otherwise specified, the mineral aggregate shall meet the following physical requirements:

Los Angeles Abrasion	50 Max.
Liquid Limit	30 Max.
Plasticity Index	10 Max.

D-512.3 ASPHALT STABILIZED MIXTURE:

1. Paving Mixture. The mixture shall consist of a uniform mixture of mineral aggregate and asphaltic material. The mineral aggregate will conform to the gradation limits shown above. The asphaltic material shall form from 3.0 to 7.0 percent of the mixture by weight unless otherwise shown on the plans. The exact percentage of asphaltic material shall be based on a mix design approved by the Engineer.

D-512.4 EQUIPMENT:

1. Mixing Plants. All equipment for the handling of materials and the placement of the mixture shall be maintained in good repair and operating condition. Any equipment found to be defective and affecting the quality of the mixture will be replaced.

Mixing plants may be either the weight batching type, the continuous mixing type, or the drum type. All types of plants shall be equipped with satisfactory conveyors, power units, aggregate handling equipment, bins, and dust collectors.

2. Truck Scales. A set of standard platform truck scales, if needed for measurement, shall be placed at a location approved by the Engineer.

3. Asphaltic Material Heating Equipment. Asphaltic material heating equipment shall be adequate to heat the asphaltic material to the required temperature in the quantities needed.

4. Surge Storage System. A surge storage system may be used providing the mixture from the surge storage unit is of equal quality to that coming from the mixer.

5. Spreading and Finishing Machine. The spreading and finishing machine shall be of a type approved by the Engineer, shall be capable of producing a surface that will meet the requirements of the typical cross-section, and shall have adequate power to propel the delivery vehicles in a satisfactory manner.

6. Motor Grader. The motor grader, if used, shall be a self-propelled motor grader and shall be in good operating condition.

7. Rollers. Rollers shall be power driven and of any type capable of obtaining the required compaction.

D-512.5 STORAGE, PROPORTIONING, AND MIXING:

1. Storage and Heating of Asphaltic Materials. The asphaltic material shall be ample to meet the requirements of the plant. Asphalt shall not be heated to a temperature in excess of that recommended by the producer. All equipment used in the handling and storage of asphaltic material shall be kept in a clean condition and be operated in such a manner that there will be no contamination with foreign matter.

2. Feeding and Drying of Aggregate. The feeding of various sizes of aggregate to the dryer shall be done in such a manner that a uniform and constant flow of materials in the required proportions will be maintained. In no case shall the aggregate be introduced into the mixing unit at a temperature of more than 400 F.

3. Proportioning. The proportioning of the various materials entering the asphaltic mixer shall be in accordance with these specifications.

4. Mixing.

a. Batch Type Mixer. In the charging of the weigh box and in the charging of the mixer from the weigh box, such methods or devices shall be used as are necessary to assure a uniform asphaltic mixture.

In introducing the batch to the mixer, all mineral aggregate shall be introduced first, the asphaltic material added, and the materials thoroughly mixed for at least 30 seconds. The mixing time may be increased, if, in the opinion of the Engineer, the mixture is not uniform.

b. Continuous Type Mixer. The amount of aggregate and asphaltic material entering the mixer and the rate of travel through the mixer shall be coordinated so that a uniform mixture of the specified grading and asphaltic content will be produced.

c. Dryer-Drum Mixer. The amount of aggregate and asphaltic material entering the mixer and the rate of travel through the mixer shall be coordinated so that a uniform mixture of the specified grading and asphaltic content will be produced.

d. Tolerances. The Engineer will designate the asphalt content to be used in the mixture after design tests have been made with the aggregate to be used in the project. When tested as determined by the Engineer, samples of the mixture shall not vary from the asphalt content designated by the Engineer by more than 0.5 percent dry weight (based on total mixture).

D-512.6 CONSTRUCTION METHODS:

1. Prime Coat. Before the asphalt stabilized base material is laid, the surface upon which the material will be placed shall be thoroughly cleaned and given a uniform prime coat using MC-30 cutback asphalt. The prime coat should be just sufficient to lightly coat the soil and should not exceed 0.1 gallons per square yard.

2. Transporting Asphalt Stabilized Base. The asphaltic mixture shall be hauled to the project site in vehicles which have been cleaned of all foreign material.

3. Placing. The asphalt stabilized base material shall be dumped and spread on the prepared surface with the specified spreading and finishing machine in such a manner that when properly compacted, the finished surface will be smooth, of uniform density, and will meet the requirements of the typical cross-sections. The limits of placement for A.S.B. will extend 1 foot beyond the back of curb (whenever curb is specified) in order to provide proper support for concrete curb.

4. Compacting. The base shall be compressed thoroughly and uniformly to the densities equivalent to at least 95 percent of the laboratory maximum density.

5. Surface Tests. The surface of the pavement, after compaction, shall be smooth and true to the established line, grade, and cross-section. Density testing of the compacted base and mix extraction and gradation tests may be required by the Engineer.

It is the intent of these specifications to require in-place density and that the materials be placed and compacted from 95 to 98 percent with 96% being the optimum as determined by Test Method Tex-126-E and according to Item 345 "Asphalt Stabilized Base" of the TxDOT Standard Specifications.

D-512.7 MEASUREMENT

Work and materials prescribed by the item shall be measured by the square yard of surface area, complete in place.

Material used in construction methods and testing for asphalt stabilized base not included above shall meet the requirements as set forth in Item 345 "Asphalt Stabilized Base" of the TxDOT Standard Specifications.

Prior to laying any asphalt, Contractor shall submit an Asphalt Stabilized mix design for approval. He shall also submit written assurance that material stockpiles are sufficient to produce a mix consistent with the design for the duration of the project. If material source change occurs prior to completion, **Contractor shall provide a revised mix design at no additional expense to the Owner.**

The Contractor shall provide for quality control at the plant to ensure that paving material delivered to the site conforms to requirement of these specifications and the mix design. Mix design to be current and less than one year old.

Materials will be furnished pre-mixed by the Contractor at the job site. Material will be delivered in trucks by the asphalt plant operator. Material will be installed, in place, by the Contractor, according to specifications, including the required thickness.

Test boring logs, if required, of the project sites can be reviewed at the Engineer's Office.

PAYMENT:

The number of square yards of asphaltic mixture place will be paid for at the contract unit price per square yard.

**SECTION 514
GEOGRID REINFORCEMENT**

D-514.01 DESCRIPTION: This item consists of furnishing and installing geogrid reinforcement in accordance with the lines and grades shown on the plans.

D-514.02 MATERIALS: The geogrid shall be a single layer grid structure formed by a regular network of integrally connected polymeric tensile elements with apertures designed to interlock with the surrounding fill material. The structure shall be capable of maintaining dimensional stability during placement and under normal construction traffic. The geogrid shall be resistant to damage during construction, including ultraviolet degradation, and shall have long-term resistance to chemical and biological degradation caused by the material being reinforced. No multiple layered grids are acceptable.

The geogrid shall also conform to the properties specified below.

STRUCTURAL GEOGRID PROPERTIES
TABLE A

<i>Property</i>	<i>Test Method</i>	<i>Units</i>	<i>Type 1</i>	<i>Type 2</i>
Aperture Stability Modulus at 20 cm-kg	Kinney - 01	cm-kg/deg	3.2	6.5
Rib Shape	Observation	N/A	Rectangular or Square	Rectangular or Square
Rib Thickness	Calipered	in (mm)	0.03 (0.76)	0.05 (1.27)
Aperture Size	I.D. Calipered	in (mm)	0.9 to 1.5 (25 to 33)	0.9 to 1.5 (25 to 33)
Junction Efficiency	GRI-GG2-87	%	90	90
Flexural Rigidity	ASTM D1388- 96	mg-cm	250,000	750,000
Minimum True Initial Modulus in Use	ASTM D6637- 01			
- MD		lb/ft (kN/m)	15,170 (226)	32,980 (360)
- CMD		lb/ft (kN/m)	24,685 (481)	44,725 (652)

Approved products are TENSAR BX1100 for Type 1 geogrid and TENSAR BX1200 for Type 2 geogrid.

Alternate geogrid material will be considered. Such materials must be pre-approved in writing by the Engineer prior to bid date. Alternate material packages must be submitted to the Engineer a minimum of 15 days prior to bid date. Submittal packages must include, as a minimum, the following:

1. Full-scale laboratory testing and in-ground testing of pavement structures reinforced with the specific geogrid which quantifies the structural contribution of the geogrid to the pavement structure. The increase in structural layer coefficient of the base course must meet or exceed that of the design geogrid.
2. Independent certified test results stating that the alternate geogrid has a secant aperture stability modulus at 20 cm-kg, when tested in accordance with the "Grid Aperture Stability by In-Plane-Rotation" test of 3.2 or greater.
3. A list of 5 comparable projects, in terms of size and applications, in the United States, where the results of the specific alternate geogrids used can be verified after a minimum of 1 year of service.
4. A sample of the geogrid and certified specification sheets.

D-514.03 CONSTRUCTION METHODS: Subgrade shall be prepared as indicated on the plans or as directed by the Engineer. The geogrid shall be installed in accordance with the lines and grades shown on the plans. The geogrid shall be oriented such that the roll lengths run parallel to the road. Geogrid sections shall be overlapped a minimum of one foot unless otherwise indicated on the plans or as directed by the Engineer. Care shall be taken to ensure the geogrid sections do not separate during construction, adjacent rolls shall be tied together every 30 feet using suitable plastic ties. Placement of geogrid around corners may require cutting and diagonal lapping. The geogrid shall be pinned, or held in place by other suitable means, at the beginning of the backfill section but will be left free elsewhere to relieve wrinkles or folds in material during fill placement.

Fill material shall be placed in lift thicknesses and compacted as shown on the plans. Tracked construction equipment shall operate on the grid only with a minimum fill cover of four inches. Rubber-tired equipment may operate directly on the grid at speed less than five miles per hour if the underlying material is capable of supporting loads. Sections of geogrid which are damaged by construction activity shall be repaired or replaced at the Contractor's expense.

D-514.04 MEASUREMENT: This item will be measured by the square yard of surface area as shown on the plans. No measurement will be made for lapping material.

D-514.05 PAYMENT: The work performed and materials furnished, as prescribed by this item, measured as provided under "MEASUREMENT", will be paid for the unit price bid for "Geogrid Reinforcement", which price shall be full compensation for furnishing all labor, material, freight, tools, equipment and incidentals, and for doing all the work involved in placement of the geogrid, complete in place.

**SECTION 516
BITUMINOUS PRIME COAT**

GENERAL

D-516.01 DESCRIPTION: This item shall consist of an application of asphaltic material on the completed base course in accordance with these specifications and as directed by the Engineer.

MATERIAL

D-516.02 CUT-BACK ASPHALT: The bituminous material shall conform to the following:

GRADE MC-30

	Min	Max
Kinematic Vis. at 140 F, CST	30	60
Flash Point T.O.C. F	100	

When distilled ASTM Method D-402, the distillate-off volume shall be as follows:

	Min	Max
Off at 437 F%	--	25
Off at 500 F%	40	70
Off at 600 F%	75	93
Residue from 680 F Distillation		
Volume %	50	--

The residue when poured from the flash without cooling immediately upon reaching the maximum temperature specified, shall have the following characteristics:

	Min	Max
Penetration at 77 F, 100gms.,5 sec	120	250
Ductility at 77 F, 5 cm/min., cms.	100	---
Solubility in CCI 4%	99.5	---

The material shall be free from water.

MCC-30 shall be applied uniformly at the rate of 0.25 gallons per square yard. At Contractor's option, appropriate emulsified asphalt, water mixture may be used in lieu of MC-30. Number of applications, mixture rate, and depth of penetration shall be approved by Engineer prior to use of emulsified asphalt. Furnishing and placement of prime coat shall be subsidiary to pavement and flexible base construction.

CONSTRUCTION METHODS

D-516.03 APPLICATION OF ASPHALT: Asphalt shall not be applied when the air temperature

is below 50°F and is falling, and it may be applied when the air temperature is 40°F and rising; the air temperature to be taken in the shade and away from artificial heat. No asphalt shall be placed when general weather conditions in the opinion of the Engineer are not suitable.

All storage tanks, piping, retorts, booster tanks, and distributors used in storing or handling asphalt 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 asphalt with foreign material. Asphalt shall not be heated above 400°F at any time, and when applied, shall be at a temperature of not less than 70°F, and not more than 150°F. The Engineer will select the temperature of application, and the Contractor shall apply the asphalt at a temperature within 15°F of the temperature selected. All asphalt heated above 400°F will be rejected.

Before the application of asphalt, the surface of the base shall be cleaned of dirt, dust, or other deleterious matter by sweeping or other approved methods and, if required by the Engineer, lightly sprinkled with water.

Asphalt shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the asphalt in the quantity specified evenly and smoothly under a pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphalt in all the heating equipment and in the distributor for determining the rate at which it is applied and for insuring uniformity at the junction of two distributor loads. Asphalt shall be applied for the full width of the surface treatment in one application unless the width exceeds twenty-two (22) feet. No traffic or hauling will be permitted over the freshly applied asphalt for five days.

MEASUREMENT AND PAYMENT

D-516.04 QUANTITY-SQUARE YARDS: The quantity of bituminous prime coat to be paid shall be measured in square yards of the area primed, applied at a rate of 0.25 gallons per square yard.

D-516.05 GALLONS: The number of gallons of bituminous prime coat measured as provided in Division D, Section 514, Paragraph D-514.04 will be paid for at the contract unit price per square yard for bituminous prime coat applied.

D-516.06 GENERAL: All payment made under these sections shall constitute full compensation for furnishing (freight included) heating, hauling, and distributing all bituminous material; for cleaning the surface to which it is applied; and for furnishing all labor, tools, and equipment.

**SECTION 518
BITUMINOUS TACK COAT**

D-518.01 DESCRIPTION: This item shall consist of an application of asphaltic material on the completed and prime base course or existing pavement in accordance with these specifications and as directed by the Engineer.

MATERIAL

D-518.02 CUT-BACK ASPHALT: The bituminous material shall conform to the following:

GRADE RC-2	Min	Max
Viscosity (Furol) at 122 F, Sec	200	300
Flash Point T.O.C. F	80	---

The distillate, expressed as percent by volume of total distillate to 600 F, shall be as follows:

Off at 500 F, %	50	75
Off at 600 F, %	70	90
Residue from 680 F, Distillation, Volume %	70	--

The residue, when poured from the flash without cooling, immediately upon reaching the maximum temperature specified, shall have the following characteristics:

	Min	Max
Penetration at 77 F, 100 g., 5 sec.	110	150
Ductility at 77 F, 5 cm/min., cms.	100	---
Solubility in CCI 4%	99.0	---
Spot Test	Neg	

The material shall be free from water.

RC-2 cut-back asphalt used for tack coat may, upon written instructions from the Engineer, be further cut-back by the addition of an approved grade of gasoline not to exceed fifteen (15%) percent by volume.

CONSTRUCTION METHODS

D-518.03 APPLICATION OF ASPHALT: Asphalt shall not be applied when the air temperature is below 50°F and falling, and may be applied when the air temperature is 40°F and rising; the air temperature to be taken in the shade and away from artificial heat. No asphalt shall be placed when general weather conditions in the opinion of the Engineer are not suitable.

All storage tanks, piping, retorts, booster tanks, and distributors used in handling asphalt 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 asphalt with foreign material. Asphalt shall not be heated above 400°F and at the time of application, it shall be at a temperature not less than 100°F, and not more than 175°F. The Engineer will select the temperature of application and the Contractor shall apply the asphalt at a temperature within 15 degrees of the temperature selected. All asphalt heated above 400°F will be rejected.

Before application of asphalt, the surface to receive the coat shall be cleaned of dirt, or other deleterious matter by sweeping or other approved methods. Asphalt shall be applied on the clean surface by an approved type of self-propelled pressure distributor so operated as to distribute the asphalt in the quantity specified evenly and smoothly under the pressure necessary for proper distribution. The Contractor shall provide all necessary facilities for determining the temperature of the asphalt in all the heating equipment and in the distributor for determining the rate at which it is applied, and for insuring uniformity at the junction of two distributor loads. Asphalt shall be applied for the full width of the surface treatment in one application unless the width exceeds twenty-two (22) feet. No traffic or hauling will be permitted on the freshly applied asphalt.

MEASUREMENT

D-518.04 QUANTITY-SQUARE YARDS: The quantity of bituminous tack coat to be paid for shall be measured in square yards of the area tacked, applied at a rate of 0.10 gallons per square yard.

PAYMENT

D-518.05 GALLONS: The number of gallons of bituminous tack coat measured as provided in Division D, Section 516, Paragraph D-516.04 will be paid for at the contract unit price per square yard for bituminous prime coat, applied.

D-518.06 GENERAL: All payment made under these sections shall constitute full compensation for furnishing (freight included), heating, hauling, and distributing all bituminous material; for cleaning the surface to which it is to be applied; and for furnishing all labor, tools, and equipment.

SECTION 520
HOT MIX ASPHALTIC CONCRETE PAVEMENT-TYPE D

D-520.01 DESCRIPTION: This item shall consist of a base course, a leveling up course, a surface course, or any combination of these courses as shown on the plans, each to be composed of a compacted mixture of mineral aggregate and asphaltic material. The mixture, when designed and tested in accordance with these specifications and methods outlined in TxDOT Bulletin C-14, shall have the following:

DENSITY, PERCENT			STABILITY, PERCENT
MIN	MAX	OPTIMUM	
95	99	97	Not less than 35 nor more than 60 unless otherwise shown on plans.

The pavement shall be constructed on the previously completed and approved subgrade, base, existing pavement, bituminous surface, or, in the case of a bridge, on the prepared floor slab, as herein specified and in accordance with the details shown on the plans.

D-520.02 MATERIALS: Materials used in Hot-Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in Item 340 "Hot Mix Asphaltic Concrete Pavement" of the TxDOT Specifications, 1993.

Prior to laying any asphalt, Contractor shall submit a Hot-Mix Asphaltic Concrete mix design (less than one year old) for approval. He shall also submit written assurance that material stockpiles are sufficient to produce a mix consistent with the design for the duration of the project. If material source change occurs prior to completion, Contractor shall provide a revised mix design at no additional expense to Owner.

The Contractor shall provide for quality control at the plant to ensure that paving material delivered to the site conforms to requirements of these specifications and the mix design unless otherwise specified by Engineer.

D-520.03 CONSTRUCTION METHODS: Construction methods used in Hot-Mix Asphaltic Concrete Pavement shall meet the requirements as set forth in Item 340 "Hot Mix Asphaltic Concrete Pavement" of the TxDOT Specifications, 1993, with the following addition:

Application of Hot-Mix Asphaltic Concrete Pavement shall not begin unless the temperature is at least fifty degrees Fahrenheit (50°F) in the shade and rising.

D-520.04 EQUIPMENT: Mixing plants that will not continuously produce a mixture meeting all of requirements of Item 340.4 in the State Department of Highways and Public Transportation Specifications, 1993, shall not be allowed.

D-520.05 MEASUREMENT: The asphaltic mixture shall be measured by square yards as actually used in the completed and accepted work in accordance with the plans and specifications for the

project. No separate measurement will be made for fluxing oil.

D-520.06 PAYMENT: The number of square yards of asphaltic mixture placed will be paid for at the contract unit price per square yard.

SECTION 522 CUTTING AND REPLACING PAVEMENT

D-522.01 DESCRIPTION: This item shall govern for the cutting of pavements, the removal and bases and the replacement of bases and pavements, as herein specified and in conformity with the typical sections shown on the plans and to the lines established by the Engineer.

D-522.02 MATERIALS:

1. **Prime Coat:** All prime coat shall conform to the provisions of Division D, Section 514, "Bituminous Prime Coat".
2. **Tack Coat:** All tack coat shall conform to the provisions of Division D, Section 516, "Bituminous Tack Coat".
3. **Flexible Base Course:** All flexible base shall conform to the provisions of Division D, Section 510, "Flexible Base Course".
4. **Hot-Mix Asphaltic Concrete Pavement:** All hot-mix asphaltic concrete pavement shall conform to the provision of Division D, Section 518, "Hot Mix Asphaltic Concrete Pavement - Type D".
5. **Excavation and Backfilling:** All excavation and backfilling shall conform to the provision of Division D, Section 102, "Excavation and Backfill for Utilities" Backfill under existing pavement.

D-522.03 CONSTRUCTION METHODS:

1. **Cutting of Pavements:**
 - a. **Concrete and asphaltic concrete pavements:** All concrete and asphaltic concrete pavements shall be cut with a concrete saw. The depth of the cut shall be such that upon removal of concrete and/or asphaltic concrete the sides of the cut shall be straight and square. Care shall be taken when cutting concrete pavement, not to cut transverse reinforcing steel.
 - b. **Base Material:** Base material shall be removed by normal trenching operations.
2. **Replacement of Bases:**
 - a. **Base Material:** Base replacement shall be of the type shown on the plans and in the bid proposals.
3. **Replacement of Pavements:** Pavements shall be replaced with hot-mix asphaltic concrete pavement. Replacement will be of the type shown on the plans and in the bid proposals.

When hot-mix asphalt concrete is shown on the plans as replacement of pavement is shall be furnished and placed in accordance with Division D, Section 518, "Hot-Mix Asphaltic Concrete Pavement - Type D. Flexible base shall be in accordance with the primed provisions of Division D, Section 514, "Bituminous Prime Coat", prior to the placement of hot-mix asphaltic concrete. All concrete bases shall be tack coated with RC-2 in accordance with the provisions of Division D, Section 516, "Bituminous Tack Coat", prior to the placement of hot-mix asphaltic concrete.

D-522.04 MEASUREMENT AND PAYMENT:

1. Cutting of pavement and removal of bases: Cutting of pavement and removal of bases will not be measured for payment. All costs in connection therewith shall be included in the applicable contract price for the item to which the work pertains.
2. Replacement of bases with flexible base will be measured and paid for by the square yard as provided for in the plans and in the bid proposal.
3. Prime Coat will be measured and paid for by the square yard as provided for in the plans and in the bid proposals.
4. Tack Coat will be measured and paid for by the square yard as provided for in the plans and in the bid proposals.
5. Hot-Mix Asphaltic Concrete Pavement will be measured and paid for by the square yard as provided for in the plans and in the bid proposals.

SECTION 524
LIME & LIME SLURRY

D-524.01. DESCRIPTION This item establishes the requirements for hydrated lime, quicklime and commercial lime slurry.

CAUTION: Use of quicklime can be dangerous. Users should become informed of the recommended precautions in handling, storage and use of quicklime.

D-524.02. TYPES The various types and grades are defined and identified as follows:

Type A, Hydrated Lime - A dry powdered material consisting of essentially of calcium hydroxide.

Type B, Commercial Lime Slurry: A liquid mixture of essentially hydrated lime and water in slurry form.

Type C, Quicklime: A dry material consisting essentially of calcium oxide. It shall be furnished in either of two grades which differ in sizing.

Grade DS - "pebble" quicklime of a gradation suitable for wither "Dry Placing" or for use in the preparation of a slurry for "Wet Placing".

Grade S - finely-graded quicklime for use in the preparation of a slurry for wet placing. (Note: Due to the possibility of appreciable amount of finely divided, powdered quicklime being present in this product, the use of Type C, Grade S Quicklime is restricted to "Slurry Placing" only. It is considered to be unsuitable for "Dry Placing").

D-524.03. GENERAL Lime shall be applied as provided for in the governing specifications, as a dry material or as a mixture of lime solids and water in the form of lime slurry.

For dry application, Type A, Hydrated Lime or Type C, Quicklime of Grade DS only may be used where specifications permit.

For wet application, lime slurry may be delivered to the job site as Type B, Commercial Lime Slurry or a lime slurry may be prepared at the job site or other location approved by the Engineer, by using Type A Hydrated Lime or Type C Quicklime as specified.

The lime and lime slurry being furnished under the terms of this specification shall, in addition to other requirements, also meet the following chemical and physical requirements.

CHEMICAL

	A	Type B	C
Total "active" lime content, % by wt	90.0 min ¹	87.0 min ²	-
Unhydrated lime content, % by wt CaO:	5.0 max	-	87.0 min
"Free Water" content, % by wt H ₂ O:	5.0 max	-	-

PHYSICAL

	A	Type B	C
Wet sieve requirement, as % by wt. residue:			
Retained on No. 6 (3360 micron) sieve:	0.2 max	0.2 max ²	8.0 max ³
Retained on No. 30 (590 micron) sieve:	4.0 max	4.0 max ²	-
Dry sieve requirement, as % by wt. residue:			
Retained on a 1-inch (25 mm) sieve:	-	-	0.0
Retained on a ¾ inch (19.0mm) sieve:	-	-	10.0 max
Retained on a No. 100 (150 micron) sieve:	-	-	Grade DS- 80% min Grade S- No limits

Note 1: No more than 5.0% by weight CaO (unhydrated lime) will be allowed in determining the total "active" lime content.

Note 2: In "solids content" of the slurry.

Note 3: The amount of total "active" lime content, as CaO, in the material retained on the No. 6 sieve must not exceed 2.0 percent by weight of the original Type C lime.

Type B, Commercial Lime Slurry or a slurry prepared at the job site from Type A Hydrated Lime or Type C Quicklime shall be furnished at a above the minimum "Dry Solids" content as approved by the Engineer and must be consistency that can be handled and uniformly applied without difficulty. The slurry shall be free of liquids other that water and any materials of nature injurious or objectionable for the purpose intended.

D-524.04 SAMPLING AND TESTING The sampling and testing of lime shall be as determined by Test Method Tex-600-J, "Lime Testing Procedure".

D-524.05 MEASUREMENT AND PAYMENT Lime will be measured and paid for in accordance with the governing specifications for the items of construction in which lime is used.

SECTION 526
LIME TREATMENT FOR MATERIALS USED AS SUBGRADE
(ROAD MIXED)

D-526.01. DESCRIPTION This section shall govern for treating the new or existing subgrade, the existing pavement structure or a combination thereof to be used as subgrade by pulverizing, adding lime, mixing, and compacting the mixed material as specified in this section.

D-526.02 MATERIALS

(1) **Lime.** The lime shall meet the requirements of Section 522 “Lime and Lime Slurry”, for the type of lime specified.

The Contractor shall have the option of selecting from the types shown on the plans, the type of lime to be used. The Engineer shall be notified in writing before changing the source or type.

All lime slurries used in “Slurry Placing” shall be furnished at or above the minimum “Dry Solids” content as approved by the Engineer.

(2) **Water.** Water shall meet the material requirements of Item 204 “Sprinkling”.

(3) **Asphalt.** Asphalt shall conform to the requirements of Item 300 “Asphalts, Oils and Emulsions”.

D-526.03 EQUIPMENT

(1) **General.** The machinery, tools and equipment necessary for proper prosecution of the work on this section shall be on the project and approved by the Engineer prior to beginning this item.

All machinery, tools and equipment used shall be maintained in a satisfactory working condition.

(2) **Lime Storage.** Both quicklime and hydrated lime in dry form shall be suitably stored in closed, weatherproof containers until immediately before use. Storage bins, when used, shall be completely enclosed. Hydrated lime in bags shall be store in weatherproof buildings with adequate protection from ground dampness. Type C Quicklime, when permitted by the Engineer, shall be shipped only in bulk; bagged material will not be acceptable.

(3) **Lime Weight Verification.** When lime is furnished in trucks, the weight of lime shall be determined on certified scales or the contractor shall provide a set of standard platform truck scales at a location approved by the Engineer. Scales shall conform to the requirements of Item 520, “Weighing and Measuring Equipment”.

When Type A Hydrated Lime is furnished in bags, each bag shall bear the manufacturer’s certified weight. Bags varying more than five (5) percent from that weight may be rejected and the average weight of bags in any shipment, as shown by weighing 10 bags taken at random, shall not be less than the manufacturer’s certified weight.

(4) **Slurry Equipment.** Type C Quicklime of Grade “DS” or “S”, when used to manufacture slurry on the project, or other location approved by the Engineer shall be slurried in agitated

slurry tanks. The slurring of Type C Quicklime must be handled in such a way as not to generate any dust hazardous to job personnel or to the public or be potentially damaging to any adjacent property.

The distributor truck used for slurry placing need not necessarily be equipped with an agitator; however, the slurry at the time of distribution must meet the consistency requirements specified. For Type B Commercial Lime Slurry, the distributor truck shall be equipped with a sampling device in accordance with Test Method Tex-600-J, Part I.

D- 526.04 CONSTRUCTION METHODS

(1) General. The completed course shall be uniformly treated, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth and shall have a smooth surface.

(2) Preparation of Subgrade or Existing Base. Prior to treating existing material, it shall be sharpened to conform to the typical sections, as shown on the plans or as established by the Engineer. This work shall be done in accordance with the provisions of applicable bid items. When shown on the plans, any existing asphaltic concrete pavement shall be removed and will be paid for in accordance with applicable bid items.

Before pulverizing or scarifying an existing material, when shown on the plans and when directed by the Engineer, the Contractor shall proof roll the roadbed in accordance with Item 216, "Rolling (Proof)". Soft spots shall be corrected as directed by the Engineer.

When the Contractor elects to use a cutting and pulverizing machine that will process the material to the plan depth, the Contractor will not be required to excavate to the secondary grade or windrow the material. This method will be permitted only if a machine is provided which will insure that the material is cut uniformly to the proper depth and which has cutter that will plane the secondary grade to a uniform surface over the entire width of the cut. The machine shall provide a visible indication of the depth of cut at all times.

In lieu of using the cutting and pulverizing machine, the Contractor shall excavate and windrow the material to expose the secondary grade to the typical sections, lines and grades as shown on the plans or as established by the Engineer.

(3) Pulverization. The existing pavements or base material shall be pulverized or scarified so that 100 percent shall pass the two (2) inch sieve.

(4) Application. The percentage by weight or pounds per square yard of lime to be added will be as shown on the plans and may be varied by the Engineer if conditions warrant.

Lime shall be spread only on that area where the mixing operations can be completed during the same working day, except as required for quicklime.

Unless otherwise approved by the Engineer, the lime operation shall not be stated when the air temperature is above 35 F and rising. The temperature will be taken in the shade and away from

artificial heat. Lime shall not be placed when weather conditions in the opinion of the Engineer are unsuitable.

CAUTION: Use of quicklime can be dangerous. Users should be informed of the recommended precautions in handling, storage and use of quicklime.

The application and mixing of lime with the material shall be accomplished by the methods herein described as "Dry Placing" or "Slurry Placing". Type A Hydrated Lime shall be applied by "Slurry Placing" unless otherwise shown on the plans or approved by the Engineer. Type B Commercial Lime Slurry shall be applied by "Slurry Placing". Type C Quicklime shall be applied by "Slurry Placing" or "Dry Placing" as shown on the plans. The method of applying Type C Quicklime may be changed if approved in writing by the Engineer. When Type C Quicklime is used for dry placement, it shall be Grade "DS". When Type C Quicklime is used for slurry placement, it shall be either Grade "DS" or Grade "S". Grade "S" shall be used in slurry placement only.

(a) *Dry Placing.* The lime shall be distributed by a spreader approved by the Engineer or by bag distribution for Type A Hydrated Lime at the rate shown on the plans or as directed by the Engineer.

The lime shall be distributed at a uniform rate and in such a manner as to reduce the scattering of lime by wind. Lime shall not be applied when wind conditions, in the opinion of the Engineer, are such that blowing lime becomes objectionable to adjacent property owners or dangerous to traffic.

A motor grader shall not be used to spread Type A Hydrated Lime but may be used to spread Type C Quicklime, Grade "DS".

The material shall be sprinkled as approved by the Engineer.

(b) *Slurry Placing.* When Type A Hydrated Lime is specified and slurry placement is to be used, Type A Hydrated Lime shall be mixed with water to form a slurry with a solids content approved by the Engineer.

Type B Commercial Lime Slurry shall be delivered to the project in slurry form at or above minimum dry solids content approved by the Engineer. The distribution of lime at the rate(s) shown on the plans or approved by the Engineer shall be attained by successive passes over a measured section of roadway until proper lime content has been secured.

When Type C Quicklime is applied as a slurry, the amount of dry quicklime shall be 80 percent of the amount shown on the plans. The slurry shall contain at least the minimum dry solids content approved by the Engineer. The residue from the slurring procedure shall be spread uniformly over the length of the roadway currently being processed unless otherwise approved by the Engineer. This residue is primarily inert material with little stabilizing value, but may contain a small amount of quicklime particles that slake slowly.

A concentration of these particles could cause the compacted stabilized material to swell during slaking.

Slurry Consistency Requirements:

Slurry shall be of such consistency that it can be applied uniformly without difficulty.

When the distributor truck is not equipped with an agitator, the contractor shall have a standby pump available on the project for agitating the lime and water as required by the Engineer in case of undue delays in dispersing the slurry.

(5) Mixing. The mixing procedure shall be the same for “Dry Placing” or “Slurry Placing” as herein described.

During the interval between application and mixing, hydrated lime that has been exposed to the open air for a period of six (6) hours or more or to excessive loss due to washing or blowing will not be accepted for payment.

The material and lime shall be thoroughly mixed by equipment approved by the Engineer. The material and lime shall be brought to the proper moisture content and may be left to cure one (1) to four (4) days as approved by the Engineer or the mixing continued until a homogeneous friable mixture of material and lime is obtained.

In addition to the above, when Type C Quicklime, Grade “DS”, is used under “Dry Placing”, the material and lime shall be mixed as thoroughly as possible at the time of lime application. Sufficient moisture shall be added during the mixing to hydrate the quicklime. After mixing, and prior compaction, the mixture of material, quicklime and water shall be moist cured for two (2) to seven (7) days, as approved by the Engineer. After curing, mixing shall continue until the pulverization requirements are met.

When shown on the plans or approved by the Engineer, the pulverization requirement may be waived when the material contains a substantial quantity of aggregate.

Following mixing, a sample of the material at roadway moisture will be obtained for pulverization testing. All nonslaking aggregates retained on the ¾-inch sieve will be removed from the sample. The remainder of the material shall meet the following pulverization requirement when tested by Test Method Tex-101-E, Part III:

	Percent
Minimum passing 1¾" sieve	100
Minimum passing ¾" sieve	85

(6) Compaction Methods. Prior to compaction, the material shall be aerated or sprinkled as necessary to provide the optimum moisture. Compaction of the mixture shall immediately after the pulverization requirement is met.

Compaction shall continue until the entire depth of the mixture is uniformly compacted by “Ordinary Compaction” or “Density Control” as shown on the plans. Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical sections, lines and grades as

shown on the plans or as established by the Engineer.

When shown on the plans or approved by the Engineer, multiple lifts will be permitted.

(a) *Ordinary Compaction.* When “Ordinary Compaction” is shown on the plans the following provisions shall apply:

The material shall be sprinkled and rolled as directed by the Engineer. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required, reshaping and recompacting by sprinkling and rolling.

Should the material lose the required stability, compaction or finish before the next course is place or the project is accepted, it shall be reworked in accordance with Subarticle 44.4.(7). However, compaction shall be in accordance with “Ordinary Compaction”.

(b) *Density Control.* When “Density Control” is shown on the plans the following provisions shall apply:

Unless otherwise shown on the plans, each course shall be sprinkled as required and compacted to the extent necessary to provide not less than 95 percent of the optimum density as determined by Test Method Tex-121-E, Part II. Roadway density testing will be as outlined in Test Method Tex-115-E.

When the material fails to meet the density requirements, or should the material lose the required stability, density or finish before the next course is place, or the project is accepted, it shall be reworked.

(7) Reworking a Section. When a section is reworked within 72 hours after completion of compaction, the Contractor shall rework the section to provide the required compaction. When a section is reworked more than 72 hours after completion of compaction, the Contractor shall add 25 percent of the specified rate of lime. Reworking shall include loosening, road mixing as approved by Engineer, compacting, and finishing. When a section is reworked, a new optimum density will be determined from the reworked material in accordance with Test Method Tex-121-E, Part II.

(8) Finishing and Curing. After the final layer or course of the lime treated material has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections.

The completed section shall then be finished by enrolling with a pneumatic tire or other suitable roller as approved by the Engineer. The completed section shall be moist cured and prevented from drying by addition of an asphalt material at the rate of 0.05 to 0.20 gallons per square yard as determined by the Engineer. This material shall be the type shown on the plans. Curing shall continue for seven (7) days before further courses are added or traffic is permitted, unless otherwise approved by the Engineer.

However, the lime treated material may be covered by other courses, the day following finishing, when approved by the Engineer. When the plans provide for the treated material to be covered by other courses of material, the next course shall be applied within 14 calendar days after final compaction is completed, unless otherwise approved by the Engineer.

D-526.05. TOLERANCES

Tolerances shall conform to the following:

(1) Density Tolerances. The Engineer may accept the work providing not more than one (1) out of the most recent five (5) density tests performed is below the specified density, provided the failing test is no more than three (3.0) pounds per cubic foot below the specified density.

(2) Grade Tolerances. Finished grade tolerances shall be in accordance with Subarticle 132.3.(2).

D-526.06. MEASUREMENT

This item will be measured as follows:

(1) Lime.

(a) Type A.

- i. Hydrated Lime (Dry). When Type A Hydrated Lime is used under "Dry Placing", the quantity of lime will be measured by the ton of 2000 pounds, dry weight.
- ii. Hydrated Lime (Slurry). When Type A Hydrated Lime is used under "Slurry Placing", the quantity of lime will be measured by the ton of 2000 pounds, dry weight of the hydrate lime used to prepare the lime slurry at the job site.

(b) Type B.

Commercial Lime Slurry. When Type B Commercial Lime Slurry is used, the quantity of lime will be calculated from the minimum percent "Dry Solids Content" of the slurry previously agreed upon for the project by the Contractor and the Engineer. This figure will be multiplied by the weight of the slurry in tons delivered, which must be at or above the required minimum "Dry Solids Content".

(c) Type C.

- i. Quicklime (Dry). When Type C Quicklime is used under "Dry Placing", the quantity of lime will be measured by the ton of 2000 pounds, dry weight of the quicklime actually delivered on the road.
- ii. Quicklime (Slurry). When Type C Quicklime is used under "Slurry Placing", the quantity will be measured by the ton of 2000 pounds, dry weight of quicklime used to prepare the hydrated lime slurry. The measured tonnage of Type C Quicklime will be multiplied by a conversion factor of 1.28 to give the quantity of equivalent hydrated lime which will be

the basis of payment.

(2) Lime Treatment. Lime treatment will be measured by the square yard of the depth specified to the lines and grades shown on the typical sections.

D-526.07 PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for as follows:

(1) Lime. Lime will be paid for at the unit price bid for "Lime" of one of the following specified types, which price will be full compensation for furnishing all lime.

- (a) *Type A (Dry)*
- (b) *Type A (Slurry)*
- (c) *Type B*
- (d) *Type C (Dry)*
- (e) *Type C (Slurry)*

Lime for reworking a section in accordance with D-524.04 (7) will not be paid for directly but will be subsidiary to this Item.

(2) Lime Treatment. "Lime Treated Subgrade (Ordinary Compaction)" or "Lime Treated Subgrade (Density Control)" of the depth specified will be paid for at the unit price bid per square yard. This price shall be full compensation for shaping existing material, loosening, mixing, pulverizing, spreading, drying, applying lime, water content of the slurry, compacting, curing including curing materials, shaping and maintaining, processing, hauling, reworking if required, preparing secondary subgrade, and for all mixing water, tools, equipment, labor, and incidentals necessary to complete the work.

When proof rolling is shown on the plans and directed by the Engineer, it will be paid for in accordance with Item 216 "Rolling (Proof)".

When "Ordinary Compaction" is shown on the plans, all sprinkling and rolling, except proof rolling, will not be paid for directly but will be considered subsidiary to this Item, unless otherwise shown on the plans.

When "Density Control" is shown on the plans, all sprinkling and rolling, except proof rolling, will not be paid for directly but will be considered subsidiary to this Item.

When subgrade is constructed under this project, correction of soft spots will be at the Contractor's expense.

SECTION 528 ASPHALT WEDGE MILLING

D- 528.01 GENERAL:

Wedge Milling 0" to 3" depth 3' to 5' wide.

1. Description: The item shall consist of milling the existing pavement from the lip of gutter to the depth of 1" and transition it to match the existing pavement at a width of 3' to 5' as instructed by the Engineer. The existing pavement to be milled will either be asphalt, concrete or brick pavement. The removal and disposal of the milled materials shall be as directed by the Engineer. The milled surface shall provide a smooth surface free from gouges, ridges, oil film, and other imperfections of workmanship, and shall have uniform textured appearance. In all situations where the existing HMAC surface contacts the curb face the wedge milling shall include the removal of the existing asphalt covering the gutter up to and along the face of curb. The wedge milling operations for this project will be performed in a continuous manner along both sides of the street. Contractor is required to begin the overlay, within five (5) working days from the date of the wedge milling completion of any one street, on that street. Should the contractor fail to meet this condition, the wedge milling will be shut down and each day that exceed five (5) days that the overlay has not started will be considered a separate working day and charged as such irrespective of any other work that the contractor is performing on the project. The overlay, once begun, on a street, shall continue uninterrupted until complete. Penalties will cease when these operations are no more than five (5) working days apart, the engineer will enforce these conditions.

D- 528.02 PRODUCTS

1. Equipment: The equipment for removing the pavement surface shall be a power operated milling machine or other equal or better mechanical means capable of removing in either one pass or two passes, the necessary pavement thickness in a five-foot minimum width. The equipment shall be self-propelled with sufficient power, traction and stability to maintain accurate depth of cut and slope. The machine shall be equipped with an integral lading and reclaiming means to immediately remove material being cut from the surface of the roadway and discharge the cuttings into a truck, all in one operation. Adequate back up equipment (mechanical street sweepers, loaders, water, truck, etc.) and personnel will also be provided to keep flying dust to a minimum and to insure that all cuttings are removed from street surface daily. Stockpiling of planed material will not be permitted on the project site unless designated by the Engineer. The machine shall be equipped with means to control dust created by the cutting action and shall have a manual system providing for uniformly varying the depth of cut while the machine is in motion thereby making it possible to cut flush to all inlets, manholes, or other obstruction within the paved area. The speed of the machine shall be variable in order to leave the desired grid pattern specified under Surface Texture.

2. Measurement: The price bid per square yard shall be full payment for all items necessary to complete the work.

**SECTION 530
AGGREGATES FOR SURFACE TREATMENTS**

D - 530.01 GENERAL. This item shall govern for aggregates and precoated aggregates used in the construction of surface treatments. Item 302 of TxDOT 1993 Standard Specifications shall be applicable and references made to Item 302 shall pertain to TxDOT standard specifications.

Article 302.4 Grade is supplemented by the following:

	Percent by Weight - Mass
Grade 3 Modified Retained on ¾" sieve.....	0
Retained on _" sieve.....	0 - 5
Retained on ½" sieve.....	55 - 85
Retained on _" sieve.....	95 - 100
Retained on No. 10 sieve	99 - 100
 Grade 4 Modified Retained on _" sieve.....	 0
Retained on ½" sieve.....	0 - 5
Retained on _" sieve.....	60 - 85
Retained on No. 4 sieve	95 - 100
Retained on No. 10 sieve	99 - 100

D - 530.02. AGGREGATE FOR SURFACE TREATMENTS, GRADE 3 & 4, PRE-COATED, TYPE PE: Materials shall be in accordance with Item 302, Type PE of the Texas Department of Transportation 1993 Standard Specifications, or as outlined in the Supplemental Terms and Conditions. Aggregates used for surface treatments may also be evaluated in accordance with the "The Field Manual on Design and Construction of Seal Coats" published by the U.S. Department of Transportation.

Weights will be converted to volume by methods in the Design Manual in order to determine the most economical and advantageous volume to area ratio (CY:SY). Aggregates must meet the following perimeters:

1. Los Angeles Abrasion - Test Method Tex 410-A (Not to exceed 35%)
2. The aggregate will be subjected to 5 cycles of the Soundness Test in accordance with Test Method Tex 411- A. The loss shall not be greater than 25 when magnesium sulfate is used. If the material is a blend then the tests will apply to each individual component making up the whole compound.
3. The polish value of the aggregate shall be tested for in accordance with Standard Test Method Tex 438-A and the following values, established by Texas Department of Transportation, Highway Design Division Operations and Procedures Manual 1 -81, as modified, will be used:

ADT of Highway	Minimum Required Value
0 - 5,000	30
5,000 - and above	32

The County retains the option of accepting aggregates with polish value which do not meet the above rated values if such aggregates meet the requirements of the "polish value exception program" as established by the Texas Department of Transportation.

1. The flakiness index for the aggregate, as determined by Test Method Tex 224 - F shall not exceed 17.
4. In addition to meeting all standards as prescribed above, the material shall be compatible with HFRS - 2P emulsion.
2. Gradation values for grades 3 modified and grade 4 modified aggregates shall be as set forth in Item 302.4 when tested by Test Method Tex -200-F, Part I.

**SECTION 602
SILT FENCE**

D-602.01 DESCRIPTION: This item shall govern for the material of silt fence fabric and related fencing materials used for control of sediment in surface runoff waters.

D-602.02 MATERIAL REQUIREMENTS:

A. Fabric. Fabric may be manufactured from polyester, polypropylene, or polyamide and shall be resistant to ultraviolet degradation, mildew and rot and shall be suitable for use in a wet soil and stagnant water environment. The edges of woven fabric shall be sealed or salvaged to prevent raveling. Fabric shall be at least 36 inches wide with 6 to 8 inches of the width buried in a trench to prevent undercutting, unless specified otherwise on the plans. The fabric shall exhibit the following physical properties when sampled and tested using the specified methods.

Physical Property	Test Method	Silt Fence
1. Tensile Strength, lb	ASTM D 4632	90 Min
2. Elongation @ Yield, %	ASTM D 4632	100 Min
3. Trapezoidal Tear, lb	ASTM D 4533	35 Min
4. Apparent Opening Size	ASTM D 4751	50-80 Min
5. Permittivity, sec ⁻¹	ASTM D 4491	1 Min
6. Ultraviolet Stability original tensile strength retained after 500 hours exposure, %	ASTM D 4355	80 Min

B. Silt Fence: This system consists of fence posts, spaced no more than 8.5 feet apart, and fabric with and attached reinforcing net. Fence posts shall be a minimum of 42 inches long, embedded at least 1 foot, and constructed of either wood or steel. Soft wood posts shall be at least 3 inches in diameter or nominal 2 in. x 4 in. and essentially straight. Hardwood posts shall be a minimum of 1.5 in. x 1.5 in. Net reinforcement shall be a galvanized welded wire mesh of at least 12.5 gauge wire with maximum opening size of 4 in². The fabric shall be attached to the top of the net by crimping or cord at least every 2 feet, or as otherwise specified.

D-602.03 CERTIFICATION AND IDENTIFICATION: Each lot or shipment shall be accompanied by a certification of conformance to this specification. The shipment must be identified by a ticket or labels securely affixed to the fabric rolls. This ticket or label must list the following information:

- a. Name of manufacturer or supplier
- b. Brand name and style
- c. Manufacturer's lot number or control number
- d. Roll width in inches

e. Roll length in yards

D-602.04 MEASUREMENT AND PAYMENT:

- A. Unless indicated in the PROPOSAL FORMS as a pay item, no separate payment for work performed under this Item. Include cost of work performed under this Item in Contract prices bid for items of which this work is a component. When indicated in PROPOSAL FORMS as pay item measure and pay for the filter fabric fence by the linear feet of completed and accepted filter fabric fence between the limits of the beginning and ending of wooden stakes. Filter fabric fence, measured as stated will be paid for at the unit price bid for "**FILTER FABRIC FENCE, COMPLETE IN PLACE**".
- B. Payment for filter fabric fence will include and be full compensation for all labor, equipment, materials, supervision, and all incidental expenses for construction of these items, complete in place, including, but not limited to, protection of trees, maintenance requirements, repair and replacement of damaged sections, removal of sediment deposits, and removal of erosion and sedimentation control systems at the end of construction.

SECTION 604 EROSION CONTROL BLANKETS

D- 604.01 APPLICATION: To protect the side slope of a natural channel and to reduce erosion. The following specification should be met for the erosion control blankets.

The mats should be made of 100% biodegradable agricultural straw/woods netting on top and bottom sides with a minimum thickness of 0.25 inch. Material should not contain any chemical additives. The blanket should be durable and flexible to work with the following information:

- ◆ Flow velocity: greater than 5 fps
- ◆ Permissible shear strength: greater than 1.5 lbs. sq. ft.
- ◆ Weight: greater than 0.5 lbs. sq. yd.
- ◆ Tensile strength/elongation: greater than 30%
- ◆ Should be capable to control side slope of 3:1 to 2:1
- ◆ Netting shall be light photodegradable polypropylene (greater than 1.5 lbs./1000 sq. ft.)

Approved Material Suppliers (to date):

COMPANY NAME	CITY, STATE	MODEL No.	PHONE No.
North American Green	Evansville, Indiana	S150	812-867-6632
BonTerra America	Genesse, Idaho	S1	800-882-9489
American Excelsior Co.	Dallas, Texas	Curlex I	817-640-2161 800-777-2691

CONSTRUCTION SPECIFICATIONS

D-604.02 SITE PREPARATION

- A. Proper site preparation is essential to ensure complete contact of the protection matting with the soil.
- B. Grade and shape area of installation.
- C. Remove all rocks, clods, vegetative or other obstructions so that the installed blankets, or mats will have direct contact with the soil.

SECTION 606 NPDES REQUIREMENTS

D-606.01 GENERAL: This section describes the required documentation to be prepared and signed by the Contractor before conducting construction operations, in accordance with the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) Permit, as stated in the Federal Register Vol. 57 No. 175, issued by the Environmental Protection Agency on September 2, 1992.

The Contractor shall be responsible for implementation, maintenance, and inspection of storm water pollution prevention control measures including, but not limited to, erosion and sediment controls, stormwater management plans, waste collection and disposal, off-site vehicle tracking, and other practices shown on the drawings or specified elsewhere in this or other specifications.

The Contractor shall review implementation of the Storm Water Pollution Prevention Plan (SWPPP) in a meeting with the City Engineer prior to start construction.

D-606.02 UNIT PRICES: Unless indicated in the Unit Price schedule as a pay item, no separate payment will be made for work performed under this section. Include cost of work performed under this section in pay items of which this work is a component.

D-606.03 REFERENCES:

ASTM D3786- Standard Test Method for Hydraulic Bursting Strength for Knitted Goods and Non-woven Fabrics

ASTM D4632- Standard Test Method for Grab Breaking Load and Elongation of Geotextiles

EXECUTION

D-606.04 NOTICE OF INTENT: The Contractor shall fill out, sign, and date the Contractor's Notice of Intent (NOI). The signed copy of the Contractor's NOI shall be returned to the City. The City will complete the Owner's Notice of Intent and will submit both notices to the TCEQ. Submission of the NOI is required by both the City and the Contractor before construction operations start.

D-606.05 CERTIFICATION REQUIREMENTS: Submit name, address, and telephone number of persons or firms responsible for maintenance and inspection of erosion and sediment control measures and all Subcontractors.

D-606.06 RETENTION OF RECORDS:

(a) The Contractor shall keep a copy of the Storm Water Pollution Prevention plan at the construction site or at the Contractor's office from the date it became effective to the date of project completion.

(b) At the project closeout, the Contractor shall submit to the City all NPDES forms and

certifications, as well as a copy of the SWPPP. Stormwater pollution prevention records and data will be retained by City for a period of three (3) years from the date of project completion.

D-606.07 REQUIRED NOTICES:

(a) The following notices shall be posted from the date that this SWPPP goes into effect until the date of final site stabilization:

1. Copies of the Notices of Intent submitted by the City and Contractor and a brief project description shall be posted at the construction site or at Contractor's office in a prominent place for the public viewing.
2. Notice to drivers of equipment and vehicles, instruction them to stop, check, and clean tires of debris and mud before driving onto traffic lanes. Post such notices at every stabilized construction exit area.
3. In an easily visible location on site, post a notice of waste disposal procedures.
4. Notice of hazardous material handling and emergency procedures shall be posted with the NOI on site. Keep copies of Material Safety Data Sheets at a location on site that is know to all personnel.
5. Keep a copy of each signed certification at the construction site or at Contractor's office.

**SECTION 608
HYDRO-MULCH SEEDING**

D-608.01 GENERAL**1.01 SUMMARY**

This Section includes the preparation, application and protection of operations consisting of hydro-mulch seeding within the lines and limits as shown on PLANS and as further directed by the ENGINEER.

1.02 RELATED REQUIREMENTS (NOT USED)**1.03 REFERENCES**

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

TEXAS DEPARTMENT OF AGRICULTURE (TDA)

TDA Chapter 61 1994 Texas Seed Law-Rules and Regulations (March Issue)

**TEXAS DEPARTMENT OF TRANSPORTATION STANDARD
SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS
AND BRIDGES (TxDOT)**

TxDOT Item 164 1995 Seeding for Erosion Control

TxDOT Item 166 1995 Fertilizer

TxDOT Item 168 1995 Vegetative Watering

1.04 - 1.06 (NOT USED)**1.07 QUALITY ASSURANCE**

A sample of each variety of seed to be furnished for analysis and testing when directed by the ENGINEER.

1.08 DELIVERY, STORAGE, AND HANDLING

Each variety of seed to be furnished and delivered in separate bags or containers and protected from moisture until placed.

1.09 - 1.11 (NOT USED)

D-608.02 PRODUCTS**2.01 MANUFACTURER(S)**

The following cellulose fiber mulch manufacturers are approved for providing hydraulic mulches with the exact trade name of mulches accepted. No variation will be accepted unless approved by the ENGINEER.

Trade Name of Approved Product	Name of Manufacturer	Manufacturer Address
American Fiber Mulch	American Fiber Manufacturing, Inc.	1701 Bench Mark Dr., Austin, TX 78728
Conwed Fibers Hydro Mulch	Conwed Fibers	1st Plaza, Suite 350, 1985 Tate Blvd., SE, Hickory, NC 28601
Second Nature Regenerated Wood Fiber	Central Fiber Corporation	4814 Fiber Lane Rd., Wellsville, KS 66092
Pro Mat	Tascon, Inc.	7607 Fairview, Houston, TX 77041

2.02 MATERIALS AND/OR EQUIPMENT**A. Seed**

All seed must meet the requirements of the Texas Seed Law FDA Chapter 61 including the labeling requirements for showing pure live seed (PLS = purity x germination), name and type of seed. Seed furnished to be of the previous season's crop and the date of analysis shown on each bag to be within nine months of the time of use on the project. Buffalograss to be treated with a dormancy method approved by the ENGINEER. The species and varieties of seed to be from among the types specified in Tables 1A and 1B of Item 164 of the Texas Department of Transportation Specifications.

B. Planting Season and Seed Mixes

Planting seasons and seed mixes to conform to the requirements of Item 164 of the Texas Department of Transportation Specifications and/or as modified hereinafter.

C. Cellulose Fiber Mulch

Cellulose Fiber Mulch to be of the type and manufacturer as provided in paragraph 2.01.

The mulch to be designed for use in conventional mechanical planting, hydraulic planting of seed or hydraulic mulching of grass seed, either alone or with fertilizers and other additives. The mulch to be such that, when applied, the material is to form

a strong, moisture-retaining mat without the need of an asphalt binder. It shall be kept in a dry condition until applied and shall not be molded or rotted.

D. Fertilizer

Fertilizer to be in accordance with Texas Department of Transportation Specification Item 166.

E. Water

Water to be in accordance with Texas Department of Transportation Specification Section 168.

2.03 - 2.04 (NOT USED)

D-608.03 EXECUTION

3.01 - 3.02 (NOT USED)

3.03 ERECTION/INSTALLATION/APPLICATION AND/OR CONSTRUCTION

A. Construction Methods

After the designated areas have been completed to the lines, grades and cross sections shown on the PLANS, seeding to be performed in accordance with the requirements hereinafter described. Unless otherwise approved by the ENGINEER, all areas to be seeded to be cultivated to a depth of at least four (4) inches, except where seeding is to be done using a seed drill suitable for seeding into untilled soil. The seedbeds to be cultivated sufficiently to reduce the soil to a state of good tilth when the soil particles on the surface are small enough and lie closely enough together to prevent the seed from being covered too deeply for optimum germination. Cultivation of the seedbed will not be required in loose sand where depth of sand is four (4) inches or more.

B. Planting Season and Seed Mixes

Planting season and the required seed mixes to be in accordance with the required table for location of operation as specified in Texas Department of Transportation Specification Item 164 as modified hereinafter.

Seed Type	Application Rate per Pounds/Acre	Planting Date(s)
Hulled Common Bermuda Grass 98/88	40	Jan 1 to Mar 31
Unhulled Common Bermuda Grass 98/88		
Hulled Common Bermuda Grass 98/88	40	Apr 1 to Sep 30
Hulled Common Bermuda Grass 98/88	40	Oct 1 to Dec 31
Unhulled Common Bermuda Grass 98/88	40	
Annual Rye Grass (Gulf)	30	

C. Water Application

Water application to be in accordance with Texas Department of Transportation Item 168.

3.04 - 3.08 (NOT USED)

D-608-04 PROTECTION

A. Maintenance

The hydro-mulch seeding to be adequately watered until established. Any areas damaged by erosion or areas that do not have an acceptable turfing to be reseeded.

B. Final Acceptance

Final acceptance and payment will be dependent upon hydromulch seeded areas demonstrating a healthy well established growth.

3.10 SCHEDULES (NOT USED)

3.11 MEASUREMENT AND PAYMENT

Measurement to be by lump sum or acre, as indicated in the Contract Bid Documents. Payment for work under this Section will be made at contract price for "Hydro-Mulch Seeding," which price to be full compensation for all fertilizer, seed, equipment, materials, and labor necessary for fertilizing and seeding.

SECTION 610 SEEDING

D-610.01 GENERAL

1.01 SUMMARY

Scope: Seeding and fertilizing of areas not covered by structures, sidewalks, or roads within the project area. Project area is indicated on PLANS or by Special Provision. When shown on PLANS, provide soil retention protection.

1.02 – 1.11 (NOT USED)

D-610.02 PRODUCTS

2.01 MANUFACTURER(S) (NOT USED)

2.02 MATERIALS AND/OR EQUIPMENT

A. Seeds: Conform to requirements of U.S. Department of Agriculture Rules and Regulations as set forth in Federal Seed Act and Texas Seed Law. Use seed which has been treated with an approved fungicide. Container labels to show purity and germination and name and type of seed. Planting date, type, and rate of application as follows:

Type	Rate of Application in Pounds per Acre	Planting Date
1. Unhulled Bermuda Grass	20	January 1 - April 1
2. Hulled Bermuda Grass	12	April 1 - October 1
3. Mix Bermuda and Rye in Following Proportions		October 1 - January 1
Unhulled Bermuda Grass	12	
Rye Grass (Gulf)	200	

B. Fertilizer: Use pellet or granular fertilizer with analysis of 16 percent nitrogen, 20 percent phosphoric acid, and zero percent potash (or 10-10-5), unless otherwise required. Determine percent by methods of Association of Official Agricultural Chemists. Container labels to show analysis. Powdered or caked fertilizer not permitted.

C. Straw Mulch: Use straw of oat or rice stems, prairie grass, bermuda grass, or other approved straw. Do not use straw containing Johnson grass or other noxious weeds and foreign materials.

D. Fiber Mat: Fiber mat to consist of machine-produced mat of wood fibers, with consistent thickness throughout blanket. Use blanket with top side of netted twisted kraft paper having high wet strength or biodegradable extruded plastic mesh. Use blanket of weight from 0.7 Pound per square yard to 1.0 Pound per square yard.

E. Paper Mesh: Use paper mesh consisting of knitted construction of yarn with uniform openings interwoven with strips of biodegradable paper, furnished in rolls with suitable protection for outdoor storage. Use paper mesh of weight from 0.2 pound per square yard to approximately 0.5 pound per square yard.

F. Wire staples: As recommended by fiber mat or paper mesh manufacturer.

2.03 – 2.04 (NOT USED)

D-610.03 EXECUTION

3.01 – 3.02 (NOT USED)

3.03 ERECTION/INSTALLATION/APPLICATION AND/OR CONSTRUCTION

A. General

Fertilizing and Seeding: After area(s) to receive fertilizing and seeding has been completed to lines, grades, and sections shown on PLANS, apply fertilizer at uniform average rate of 500 pounds per acre. Thoroughly mix upper 3 inches of topsoil with fertilizer until a uniform mixture of fertilizer and topsoil is obtained. Sprinkle areas to be seeded with water, using fine spray to avoid washing or erosion of soil. Broadcast seed with sowing equipment at rate specified above, using care to obtain uniform distribution. After broadcasting, lightly rake seeds into soil to a depth not to exceed 1/2 inch. Complete seeding by rolling with roller developing 15 to 25 pounds per inch of tread. Keep seeded areas moist for a period of 10 days immediately following placement. When watering seeded areas, use fine spray to prevent erosion of seeds or soil. Reseed any areas damaged by erosion. Do not apply seeds when weather is too windy or other adverse conditions exist.

B. Straw Mulch Soil Retention Blanket

1. Fertilizing and Seeding: After ditch or slope has been completed to lines, grades, and cross-sections shown on PLANS, apply fertilizer and seed as per A. above. When seed and fertilizer are to be distributed as water slurry, mixture to be applied within 30 minutes after all components are placed in equipment.

2. Mulch Application: Immediately upon completion of planting of seed and fertilizing, spray straw mulch uniformly over the area at the rate of 1.5 to 2 tons of hay or 2.5 tons of straw per acre. Equip mulching machine to inject asphaltic material into straw uniformly as it leaves the equipment at the rate of 0.05 To 0.10 Gallon of asphalt per square yard of mulched area. When watering seeded areas, use fine spray to prevent erosion of seeds or soil. Reseed any areas damaged by erosion for any reason. Mulching operation to follow seeding and fertilizing immediately in continuous operation.

C. Fiber Mat or Paper Mesh Soil Retention Blanket

1. Fertilizing and Seeding: See B.1. above.

2. Fiber Mat or Paper Mesh Installation: Place fiber mat or paper mesh within 24 hours after seeding operations have been completed. Prior to placing, clear area to be covered of all rocks or clods over 1.5-inch diameter and all sticks or other foreign material which will prevent close contact of the blanket with the soil. Area to be smooth and free of ruts or other depressions. If, as a result of a rain, prepared seed bed becomes crusted or eroded, or if eroded places, ruts, or depression exist for any reason, rework soil until smooth and reseed such areas. After area has been properly prepared, lay fiber mat or paper mesh flat, smooth, and loosely, without stretching or crimping material. Apply materials with lengths running parallel to the flow of water. Where more than one width is required, butt or overlap edges as required by manufacturer. Hold material in place by means of wire staple driven into soil at 90 degree angle to surface. Staple material along each edge and in grid pattern with minimum 3-foot centers each way as recommended by manufacturer. In ditches and on slopes, provide additional stapling as recommended by manufacturer.

3.04 – 3.10 (NOT USED)

3.11 MEASUREMENT AND PAYMENT

A. Fertilizing and Seeding: Measure by the acre or lump sum as indicated in PROPOSAL. Payment for work under this Item will be made at Contract price for “Seeding,” which price to be full compensation for all fertilizer, seed, equipment, materials and labor necessary for fertilizing and seeding.

B. Straw Mulch Seeding: Measure by the square yard as indicated in the PROPOSAL. Payment for work under this Item to be made at the Contract price for “Straw Mulch Seeding,” which price to be full compensation for all fertilizer, seed, straw mulch, equipment, materials and labor necessary for fertilizing and seeding.

C. Fiber Mat Seeding: Measure by the square yard as indicated in the PROPOSAL. Payment for work under this Item to be made at the Contract price for “Fiber Mat Seeding,” which price to be full compensation for all fertilizer, seed, fiber mat, equipment, materials, and labor necessary for fertilizing and seeding.

D. Paper Mesh Seeding: Measure by the square yard as indicated in the PROPOSAL. Payment for work under this Item to be made at the Contract price for “Paper Mesh Seeding,” which price to be full compensation for all fertilizer, seed, paper mesh, equipment, materials, and labor necessary for fertilizing and seeding.

SECTION 702 PERMANENT TRAFFIC BARRICADES

D-702.01 GENERAL: This item shall consist of permanent traffic barricades constructed in accordance with the design requirements and details shown on the plans and in conformity with the requirements herein. All sign materials, erection, and usage shall be in strict accordance with the Texas Manual on Uniform Traffic Control Devices for Streets and Highways.

See Figure – 1

MATERIALS

D-702.02 SIGNS:

a. CW1-6 and CW1-7: Signs shall be made from metal out of 12, 14, or 16 gauge steel or 0.80 aluminum with reflective finish and shall conform with the Texas Department of Transportation "Special Specification for Steel Plates for Highway Markers." Signs shall be bolted to posts. Dimension and color of signs shall be as per detail drawing within this provision (Exhibit 1 - CW1-6); (Exhibit 2 - CW1-7).

b. End of Road Barricade: Signs shall be made from pressure treated lumber with dimensions and color as per Exhibit 3.

D-702.03 POSTS:

a. CW1-6 and CW1-7: Posts shall be made from galvanized metal pipe with cap and have the following dimensions:

b. End of Road Barricade: Post shall be made from pressure treated lumber and have the following dimensions:

D-702.04 BOLTS: Steel/metal oval shoulder bottom head bolts shall be used for all barricades and shall include bolt, washer, and nut. Installation shall be as follows:

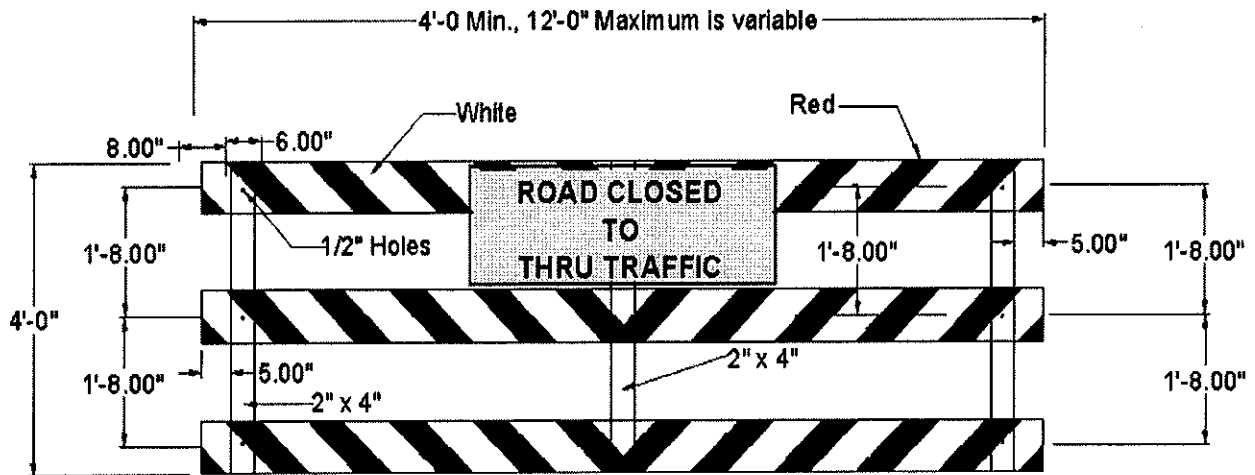
CW1-6 & CW1-7:

END OF ROAD BARRICADE:

PAYMENT

D-702.05: Permanent Barricades signs shall be paid for on a unit price basis. The price bid shall be considered to include materials, labor, equipment and incidentals necessary to complete the work. Payment will be made when installed barricade is approved and accepted by the Owner.

Figure - 1



Use 1/2" x 3 1/2" machine bolts, with two washers each

PANEL FOR
TYPE III BARRICADE
(N.T.S.)

SECTION 704 STREET SIGNS

D-704.01 GENERAL DESCRIPTION This item shall govern for the furnishing, assembling, and installation of street signs. Street Name Signs see Figure – 1 thru Figure – 3.

D-704.02 MATERIALS The sign supports shall be made from new galvanized round steel pipe, 2-3/8 O.D., 0.065 gauge. Pipe must be long enough to provide a 7 feet ground clearance from bottom edge of sign assembly. Length of the pipe will vary depending on the type, size, or signs installed on the pole as an assembly. The type of support, size and specifications for the pipe and sign shall be as shown on the plans.

All traffic signs must comply with the latest edition of the Texas Manual of Uniform Traffic Control Devices. Unless otherwise specified by the Engineer, all signs shall be fabricated from 0.080 gauge aluminum. Engineering Grade reflective sheeting shall be used for all traffic signs except stop signs and school advance crossing signs. All stop signs shall be fabricated with High Intensity reflective sheeting. All school advance crossing signs shall be fabricated from lime green Diamond Grade reflective sheeting.

Street name signs shall be fabricated with green engineering grade reflective sheeting. Aluminum sign blades for street signs shall be 9 inch in height with a minimum length of 30 inches and maximum length of 48 inches. Street name lettering shall be 5 inch white reflective highway gothic font uppercase and lowercase letters. It shall include street abbreviations and designators and block numbers with 3 inch reflective highway gothic font, uppercase and lowercase letters. Street name sign specifications are shown on Street Name Standard Detail included herein.

D-704.04 FOUNDATIONS: Foundations for all pipe supports shall conform to the Street Sign Foundation Detail included herein. Signs shall be installed no less than 2 feet from the back of curve and the edge of sign. It shall not be installed more than five feet from the back of curve with a maximum of 6 feet. When the above requirement cannot be met due to location or width of sidewalk, a minimum of 4 feet sidewalk clearance shall be provided.

No sign shall be attached to the posts until the concrete has aged at least two (2) curing days or until otherwise permitted by the Engineer.

Street Sign Foundation Details are included in the Detail Section.

D-704.05 MEASUREMENT AND PAYMENT Small roadside traffic signs shall be measured by each assembly complete in place. The work performed and material furnished as prescribed by this item, measured as provided for, will be paid for at the unit price bid for Street Signs of the support type as specified, which payment shall be full compensation for furnishing, fabricating, galvanizing and erecting the supports; furnishing concrete foundations, where required; furnishing complete signs; furnishing the sign connections and all hardware; assembling the signs supports; washing and cleaning the signs as specified; and all other details and incidentals necessary to provide the signs complete and installed in place.

Figure - 1:

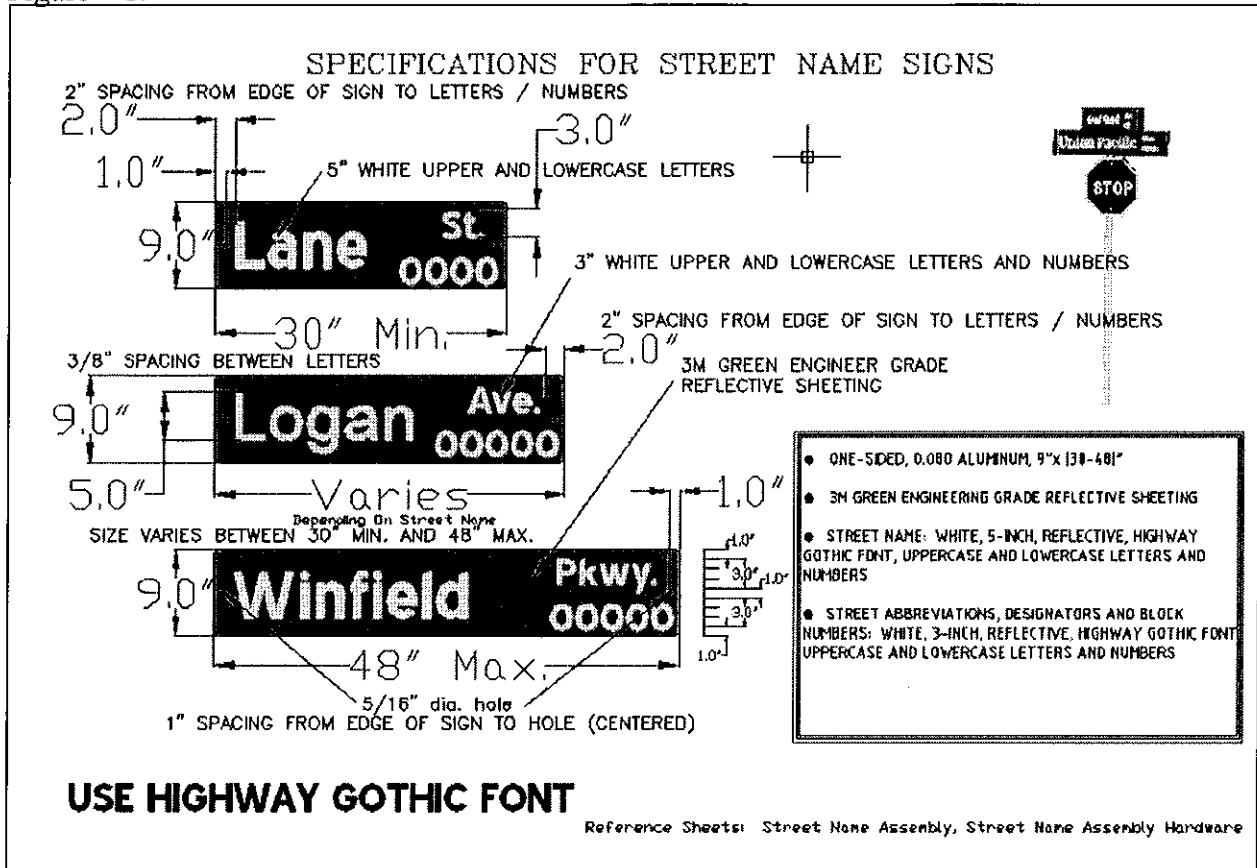


Figure - 2:

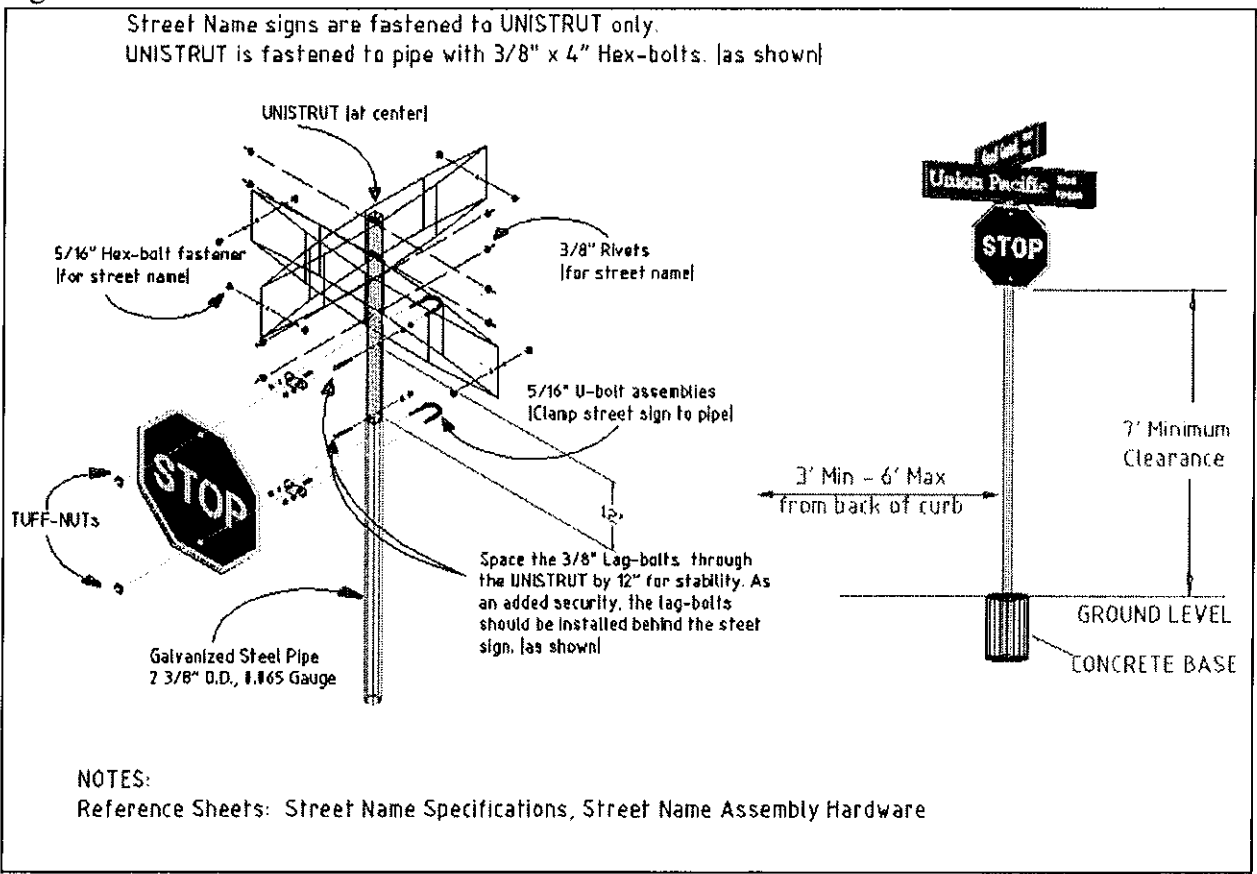
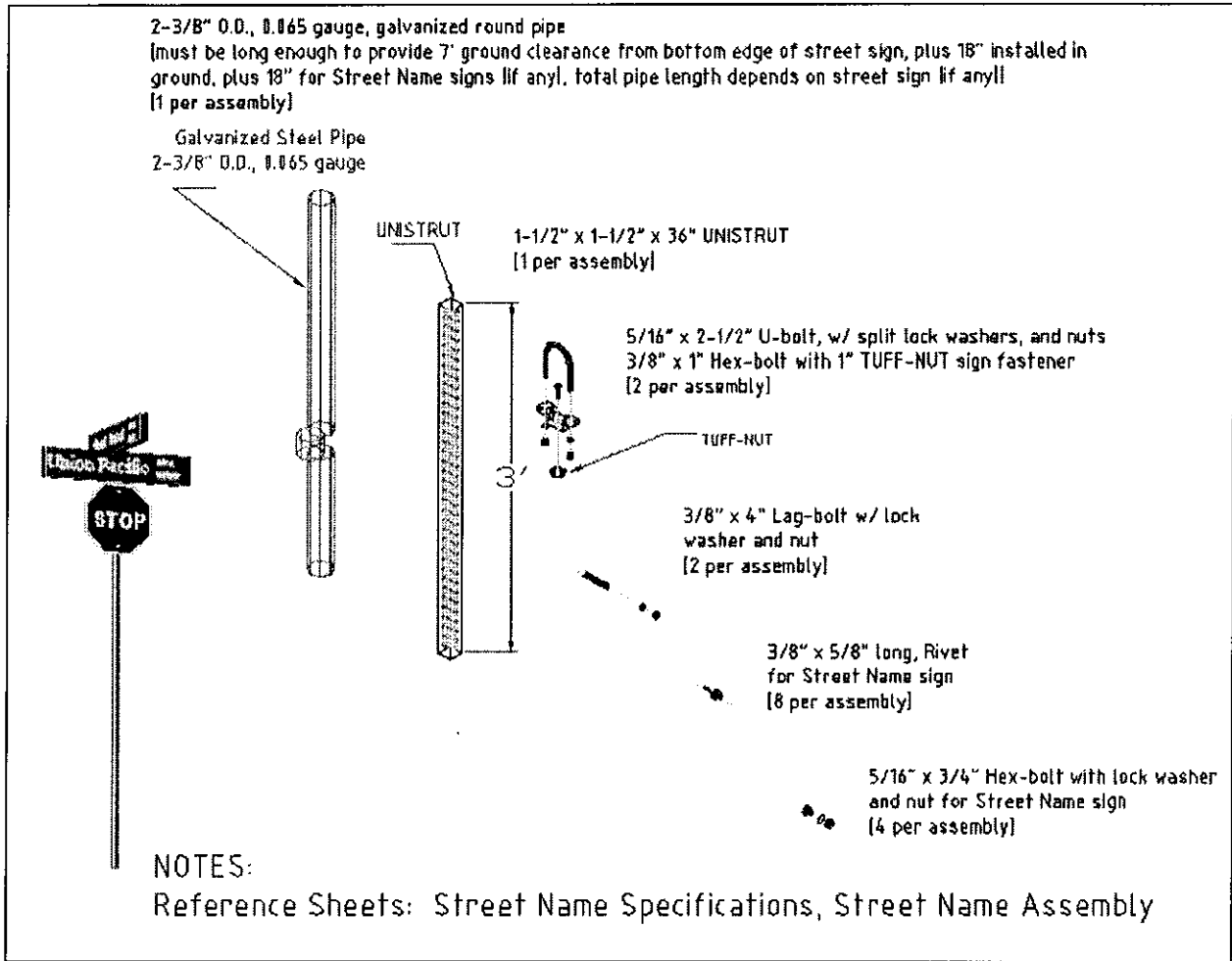


Figure – 3:



SECTION 706 REFLECTORIZED PAVEMENT MARKINGS

D-706.1. DESCRIPTION

This item shall govern for furnishing and placing reflectorized pavement markings and raised reflectorized pavement markers of the types, colors, shapes, sizes, widths, and thickness shown on the plans. Unless otherwise approved by the Engineer, Type II pavement markings shall be used on all roadways within the City of Laredo that are under the City's jurisdiction.

Reflectorized pavement markings supplemented by raised reflectorized pavement markings (traffic buttons) shall be required on all streets with a classification of collector or greater. The installation of these must abide by the latest edition of the Texas Manual of Uniform Control Devices and must comply with the latest TxDOT Traffic Engineer Standard Detail Sheets.

D-706.2. MATERIALS

Type I: Marking Materials. Type I markings are thermoplastic type materials that require heating to elevated temperatures for application. Type I marking materials shall conform to TxDOT Departmental Materials Specifications DMS-8220. Each container of Type I marking material shall be clearly marked to indicate the color, weight, type of material, manufacturer's name and the lot/batch number.

Type II: Marking Materials. Type II markings are paint-type materials that are applied at ambient or slightly elevated temperatures. Type II marking materials shall conform to TxDOT Departmental Materials Specifications DMS-8200, YPT-12 and/or WPT-12, and DMS-8200.

Blue Reflectors for Fire Hydrants. Blue raised reflective markers shall be used on all streets to identify location for all fire hydrants. One marker (Type II-B-B) shall be installed in the center of roadway immediately in front of the location of fire hydrant. The pavement marker shall have two (2) reflectorized faces 180° of each other. The body, other than the reflective faces, shall be blue. Reflectorized raised pavement markers shall abide by latest TxDOT Traffic Engineer Standard Plan Sheets.

D-706.3. EQUIPMENT REQUIREMENTS

Equipment used to place pavement markings shall:

1. Be maintained in satisfactory operating condition.
2. Be considered in satisfactory operating condition if it has an average placement rate of 5,000 linear feet per hour of acceptable four-inch solid or broken lines over any five (5) consecutive working days. Must comply with the latest edition of the Texas Manual of Uniform Traffic Control Revisions.
3. Meet or exceed the material handling at elevated temperatures requirements of the National Fire Underwriters and the Texas Railroad Commission.
4. Be capable of placing a minimum of 40,000 linear feet of four-inch solid or broken markings per working day.

5. Have production capabilities similar to four-inch marking equipment and shall be capable of placing linear markings up to eight (8) inches in width in a single pass when used for placing markings in widths other than four (4) inches.
6. Have production capabilities considered satisfactory by the Engineer when used to place markings other than solid or broken lines.
7. Be capable of placing a centerline and no-passing barrier-line configuration consisting of one (1) broken line with two (2) solid lines at the same time to the alignment and spacing shown on the plans.
8. Be capable of placing broken and/or continuous white line from both sides.
9. Be capable of placing lines with clean edges and of uniform cross-section. All lines shall have a tolerance of plus or minus 1/8 inch per four (4) inch width.
10. Have an automatic cut-off device with manual operating capabilities to provide clean, reasonably square marking ends to the satisfaction of the Engineer, and to provide a method of applying broken line in an approximate stripe-to-gap ration of 10 to 30. The length of any stripe-gap cycle shall not be less than 39.5 feet or more than 40.5 feet.
11. Provide continuous mixing and agitation of the pavement marking material. The use of pans, aprons or similar appliances which the die overruns will not be permitted for longitudinal striping applications.
12. Apply glass beads by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser shall have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment.

When Type I markings are to be placed, the contractor shall have a hand-held thermometer on the project. The thermometer shall be capable of measuring the temperature of the pavement marking material to be placed.

D- 706.4 CONSTRUCTION METHODS

General: When required by the Engineer, the Contractor and the Engineer shall review the sequence of work to be followed and the estimated progress schedule.

Markings may be placed on roadways either free of traffic or open to traffic. On roadways already open to traffic, the markings shall be placed under traffic conditions that exist with a minimum of interference to the operation of the facility. Traffic control shall be as shown on the plans or as approved by the Engineer in writing. All markings placed under open-traffic conditions shall be protected from traffic damage and disfigurement. On roadways open to traffic, with three (3) lanes of travel in one direction, all markings shall be placed from the outside lanes only, unless otherwise approved in writing by the Engineer.

Guides to mark the lateral location of pavement markings shall be established as shown on the plans or as directed by the Engineer. The Contractor shall establish the pavement marking guides and the Engineer will verify the location of the guides.

Markings shall be placed in proper alignment with the guides. The deviation rate in alignment shall not exceed one (1) inch per 200 feet of roadway. The maximum deviation shall not exceed two (2) inches nor shall any deviation be abrupt.

Markings shall essentially have a uniform cross-section. The density and quality of markings shall be uniform throughout their thickness. The applied markings shall have no more than five (5) percent, by area, of holes or voids and shall be free of blisters.

Markings, in place on the roadway, shall be reflectorized both internally and externally. Glass beads shall be applied to the materials at a uniform rate sufficient to achieve uniform and distinctive retroreflective characteristics when observed in accordance with Test Method Tex-828-B Determining Functional Characteristics of Pavement Markings.

The Contractor's personnel shall be sufficiently skilled in the work of installing pavement markings.

Markings placed that are not in alignment or sequence, as shown on the plans or as stated in this specification, shall be removed by the Contractor at the Contractor's expense. Removal shall be in accordance with Item 667, "Eliminating Existing Pavement Markings and Markers," except for measurement and payment. Guides placed on the roadway for alignment purposes shall not establish a permanent marking on the roadway.

Unless otherwise shown on the plans, pavement markings may be applied by any method that will yield markings meeting the requirements of these specifications.

Surface Preparation: New portland-cement-concrete surfaces shall be cleaned in accordance with Item 678, "Pavement Surface Preparation for Markings" to remove curing membrane, dirt, grease, loose and/or flaking existing construction markings and other forms of contamination.

Older portland-cement-concrete surfaces and asphaltic surfaces that exhibit loose and/or flaking existing markings shall be cleaned in accordance with Item 678, "Pavement Surface Preparation for Markings" to remove all loose and flaking markings.

Pavement to which material is to be applied shall be completely dry. Pavements shall be considered dry if, on a sunny day after observation for 15 minutes, no condensation occurs on the underside of a one (1) foot square piece of clear plastic that has been placed on the pavement and weighted on the edges.

Application of Type I Markings: New portland-cement-concrete surfaces shall be further prepared for Type I markings, after cleaning, by placing a Type II marking as a sealer in accordance with this Item. When placing Type I markings in new locations on asphaltic surfaces three (3) years old or older or any portland-cement-concrete surfaces, a Type II marking shall be used as a sealer. Unless otherwise shown on the plans, existing portland-cement-concrete and

asphaltic surfaces to be re-striped will not require Type II markings as a sealer; existing markings may be used as a sealer in lieu of Type II markings. Type II markings shall be placed a minimum of two (2) and a maximum of 30 calendar days in advance of placing Type I markings. Type II markings that become dirty due to inclement weather or road conditions shall be cleaned by washing, brushing, compressed air or other means approved by the Engineer, prior to application of Type I markings. If washing is used, the surface of Type II markings shall become thoroughly dry before placing Type I markings. Color, location and configuration of Type II markings shall be the same as that of Type I markings.

Type I pavement marking material shall be applied within temperature limits recommended by the material manufacturer. Application of Type I pavement markings shall be done only on clean, dry pavement having a surface temperature above 50°F. Pavement temperature shall be measured in accordance with Test Method Tex-829-B Measuring Pavement Temperature.

When Type I pavement marking application is by spray, and operations cease for five (5) minutes or more, the spray head shall be flushed by spraying pavement marking material into a pan or similar container until the pavement marking material being sprayed is at the proper temperature for application.

Unless otherwise directed by the Engineer in writing, Type I pavement marking materials shall not be placed on roadways between during cold inclement weather subject to temperature and moisture limitations specified herein.

Unless otherwise shown on the plans, Type I marking minimum thickness shall be 0.060 inches (60 mil) for edgeline markings and 0.090 inches (90 mil) for stop-bars, legends, symbols, gore and center-line/no-passing barrier-line markings. The maximum thickness of all Type I markings shall be 0.180 inches (180 mil).

The thickness of Type I markings at the time of placement will be measured above the plane formed by the pavement surface. The Engineer will supply a device to measure the thickness of the applied markings. The markings shall be of uniform thickness of the applied markings. The markings shall be of uniform thickness throughout their lengths and widths.

Application of Type II Markings: The application of Type II marking materials shall be done only on surfaces with a minimum surface temperature of 50°F.

The application rate for Type II marking material shall be: between 15 and 20 gallons per mile of solid four (4) inch line and between 30 and 40 gallons per mile for solid eight (8) inch line except that, for new surface treatment projects the application rate shall be between 25 and 30 gallons per mile of solid four (4) inch line and between 40 and 50 gallons per mile for solid eight (8) inch line. Pavement markings for new surface treatment projects shall be applied in two (2) applications each approximately one-half the application rate. The first application shall not contain glass beads. The interval between the first and second applications shall be a minimum of one (1) hour.

When, in the case of impending inclement weather, and the Engineer directs the Contractor to apply water-base traffic paint, the markings are damaged by subsequent rain, sleet, hail, etc., the

Contractor will be paid for the initial placement and the replacement markings. However, if the Contractor places the markings at his option, the Contractor is responsible for all costs associated with the replacement markings.

Reflective raised pavement markers will be required to supplement pavement markings and shall abide by Traffic Engineering Standards Plan Sheets (TxDOT). Temporary flexible reflective roadway marker tabs may be used to mark or delineate roadway prior to applying pavement markings and shall conform to Departmental Materials Specifications DMS 8242 (TxDOT).

D-706.5. PERFORMANCE PERIOD FOR TYPE I MARKINGS

Type I pavement markings shall meet all requirements of this specification for a minimum of 15 calendar days after installation. Pavement markings that fail to meet all requirements of this specification shall be removed and replaced by the Contractor at the Contractor's expense. The Contractor shall replace all pavement markings failing the requirements of this specification within 30 calendar days following notification by the Engineer of such failing. All replacement markings shall also meet all requirements of this specification for a minimum of 15 calendar days after installation.

D-706.6. MEASUREMENT

This item will be measured by the linear foot, by each of the various words, symbols or shapes, or by any other unit as shown on the plans.

Where double stripes are placed, each stripe will be measured separately.

This is a plans quantity measurement item and the quantity to be paid for will be that quantity shown in the proposal and on the "Estimate and Quantity" sheet of the contract plans except as may be modified by approval of Engineer. If no adjustment of quantities is required, additional measurement or calculations will not be required.

Type II pavement markings requiring two (2) applications on new surface treatments will be measured as one (1) marking.

Type II pavement marking materials, when used as a sealer for Type I markings will be measured as Type II markings.

D-706.7. PAYMENT

The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Reflectorized Pavement Markings" of the various types, colors, shapes, sizes, widths, and thickness (Type I markings only) specified. This price shall be full compensation for furnishing all materials; for application of pavement and raised pavement markings and for all other labor, tools, equipment and incidentals necessary to complete the work, except as shown below.

Surface Preparation, when shown on the plans, will be paid for under Item 678 "Pavement Surface Preparation for Markings."

Final work zone pavement markings (paint and beads), which will be used as a sealer for Type I pavement markings will be paid for under this item.

When replacement Type II markings are required due to damage to the original markings from rain, sleet, hail, etc., and the original markings were placed at the direction of the Engineer, the plan quantity requirements under "Measurement" do not apply to the original and replacement markings. The Contractor will be paid for the actual quantity of original and replacement markings at the unit price bid for that item.

SECTION 708 METAL BEAM GUARD FENCE

D-708.1. DESCRIPTION: This item shall govern for furnishing and installing a single line of metal beam rail element supported on timber or steel posts as shown on the plans. Metal beam guard fence (barrier) shall consist of multiple lines of rail element supported on timber or steel posts. Metal beam guard fence and metal beam guard fence (barrier) shall be constructed or materials and workmanship as prescribed by these specifications, at such places as shown on the plans or as designated by the Engineer, and in conformity with the plans and typical details shown.

D-708.2. MATERIALS

Rail Elements: The rail elements shall be of the W-beam type fabricated to develop continuous beam strength and shall consist of metal plate or sheet formed into a beam as shown on the plans. The beam shall be from warp. When tested with a straight edge or string along either edge of a 12-½ foot sectional length of beam, the maximum deviation of the beam edges from the straight edge shall not exceed ½ inch at any point.

The steel for the rail elements shall conform to the requirements of AASHTO M-180. The rail shall be 10 gauge (0.1345 ± 0.008 inch) or 12 gauge (0.1046 ± 0.008 inch) as shown on the plans. Rail elements shall contain not more than 0.04 percent phosphorous nor more than 0.05 percent sulphur.

The rail element for the terminal anchor section shall be of the same materials as the rail element used throughout the project.

Unless otherwise shown on the plans, the rail element shall be galvanized in accordance with the requirements of Item 445, "Galvanizing" TxDOT manual, except that the galvanized coating shall not be less than 1.80 ounces per square foot of double exposed surface (single spot test).

Posts: The posts may be either timber or steel unless otherwise shown on the plans and shall meet one of the following requirements.

A. Timber Posts. All round timber posts shall conform to the American National Standards Institute Specifications and Dimensions for Wood Poles (ANSI) 05.1, except as modified herein.

Species - All timber posts shall be Southern Pine (including minor species) as identified by ASTM D1165.

Dimensions - Posts shall not be less than seven (7) inches in diameter, at any point, as determined by a circumference-diameter tape. The top of the posts shall not exceed eight (8) inches in diameter below the dome or bevel. The diameter at the butt of a post shall not exceed the diameter of the top of that post by more than two (2) inches. The length of the posts shall be as shown on the plans; the length shall not vary more than one (1) inch from the specified length.

Manufacture - Posts may be domed or beveled, as specified. When posts are domed, the dome shall be approximately hemispherical in shape and the radius of the dome of each posts shall be one-half the diameter of the posts at the base of the domed portion. The dome shall be smooth, and the distance from the top of the dome to the base of the dome shall not vary more than one (1) inch at any location.

When posts are beveled, the bevel will be a minimum of 10 degrees and a maximum of 15 degrees for acceptance.

All posts shall be smooth shaved by machine. No "ringing" of the posts as caused by improperly adjusted peeling machine is permitted. All outer and inner bark shall be removed during the shaving process. All knots and knobs shall be trimmed smooth and flush with the surface of the posts.

The groundline, for the purpose of applying those restrictions of ANSI 05.1 that reference the groundline, shall be defined as being located three feet from the butt end of each post.

Holes shall be drilled as shown on the plans for the type of posts being manufactured, with a location tolerance of $\frac{1}{4}$ of an inch in any direction. All manufacturing shall be completed prior to preservative treatment.

Knots - The maximum diameter of any single knot shall not exceed three (3) inches. The sum of diameter of all knots greater than 0.5 inch in any one (1) foot section shall not exceed eight (8) inches.

Scars - Scars are permitted as defined in ANSI 05.1 provided that the depth of the trimmed scar is not more than one (1) inch.

Shape and Straightness - All timber posts shall be nominally round in cross section. A straight line drawn from the center of the top to the center of the butt of any post shall not deviate from the centerline of the posts more than $1\frac{1}{4}$ inches at any point. Post shall be free from reverse bends.

Splits and Shakes - Splits or ring shakes are not permitted in the top. Splits are not permitted in the butt, a single shake is permitted in the butt, provided it is not wider than one-half the butt diameter.

Timber Spacers - When timber spacers are required, the timber species shall be the same as those furnished for the timber posts. The size and hole location shall be shown on the plans, with a tolerance of $\frac{1}{4}$ inch.

Spacers shall be of medium grain, at least four (4) rings per inch on one end, and free from splits, shakes, compression wood or decay in any form. Individual knots, knot clusters or knots in the same cross section of a face are permitted, provided they are sound or firm, and are limited in cumulative width (when measured between lines parallel to the edges) to no more than one-half of the width of the face. Wane or the absence of wood is limited to one-third of the face on no more than 10 percent of the lot. Grain deviation is limited to one (1) inch in six (6) inches. The material may be rough swan or

surfaced, full sized, hit or miss, with a tolerance of ¼ inch for all dimensions.

All manufacturing shall be completed prior to preservative treatment.

Treatment - Timber posts and spacers shall be preservative treated in accordance with Item 492 "Timber Preservative and Treatment, TxDOT manual." In addition to the referenced following provisions shall apply:

Each post treated shall have a minimum sapwood depth of one (1) inch, as determined by examination of the tops and butts of each post. The use of peeler cores is prohibited. Material that has been air dried or kiln dried shall be inspected for moisture content in accordance with AWWPA Standard M2 prior to treatment. Test of representative pieces shall be conducted. The lot shall be considered acceptable when the average moisture content does not exceed 25 percent. Pieces exceeding 29 percent moisture content shall be rejected and removed from the lot.

B. Steel Posts. Steel posts and spacers shall be rolled sections as shown on the plans and conform to the requirements of ASTM A 36. The top of all posts shall be beveled or square as shown on the plans. The posts and spacers shall be drilled or punched for rail attachment as shown on the plans.

Steel posts and spacers shall be galvanized in accordance with the requirements of Item 445 "Galvanizing".

Fittings: Fittings shall consist of bolts, nuts and washers conforming to the details shown on the plans and to the requirements of Item 442 "Metal for Structures." Fittings shall be galvanized in accordance with Item 445 "Galvanizing."

Terminal Connectors: Terminal connectors, where required, shall conform to the details shown on the plans and to the materials and galvanizing requirements specified for rail elements.

Concrete: Unless otherwise shown on the plans, the concrete for terminal anchor posts or for embedment of other posts in concrete, where embedment is required, shall meet the requirements for Class "A" concrete as specified in Item 421, "Portland Cement Concrete."

D-708.3 SAMPLING AND TESTING

When directed by the Engineer, a sample of the rail and terminal section shall be taken for each project or for each shipment to a project. Samples of bolts and nuts may also be required. All samples shall be furnished to the Engineering Department free of charge.

The uniformity of the zinc coating shall be determined by visual inspection. If, in the opinion of the Engineer, visual examination is not conclusive, the uniformity of the coating may be determined by magnetic thickness gauge measurement, in accordance with ASTM E376.

D-708.6. CONSTRUCTION METHODS The posts shall be set plumb and firm to the line and grade shown on the plans. Unless the plans call for setting in concrete, the posts shall be backfilled by thoroughly tamping the materia in four (4) inch layers. Where shown on details the

rail element shall be blocked out from the posts with spacers. The rail elements shall be erected to produce a smooth, continuous rail paralleling the line and grade of the roadway surface or as shown on the plans. The rail elements shall be joined end to end by bolts and lapped in the direction of traffic in the lane adjacent to the guard fence. When shown on the plans, the rail elements shall be curved. Curving of rail elements shall be done during fabrication of the rail elements. Holes for special details may be field-drilled or punched, when approved by the Engineer.

Driving will be an acceptable method of attaining the established line and grade for posts. A structural steel driving head suitable for the type and size of post being driven shall be used. Wood cushion blocks shall be used as necessary to prevent damage to the post. Rope mat, belting or other similar cushioning material may be used in addition to wood cushion blocks. When posts are driven, the driving may be performed with power hammers (steam, compressed air or diesel) or gravity hammers approved by the Engineer. Pilot holes may be required or permitted. The size and depth shall be determined by the Contractor with the approval of the Engineer based on results of trial operations of the first few post driven. Loosened soil around the post shall be thoroughly tamped and any void between the soil and the post resulting from the driving shall be filled with suitable material and thoroughly compacted as directed by the Engineer.

After erection, all parts of galvanized steel posts, spacers, washers, bolts and rail elements on which the galvanizing has become scratched, chipped or otherwise damaged shall be repaired in accordance with Item 445 "Galvanizing."

D-708.5. MEASUREMENT Metal Beam Guard Fence will be measured by the linear foot of fence, complete in place, measurement being made upon the face of the rail in place, from center to center of end posts, from terminal anchor section or in the case of structure to railing connection, from the points shown on the plans, except as follows: Where bids are requested for "Terminal Anchor Sections," measurement will be as each section, complete in place, each section consisting of a terminal anchor post and one 25 foot rail element, as shown on the plans.

D-708.6 PAYMENT The work performed and material furnished in accordance with this item and measured as provided under "Measurement," will be paid for at the unit price bid for "Metal Beam Guard Fence," "Metal Beam Guard Fence (Barrier)," Metal Guard Fence (Barrier) (Blockout)" or "Metal Beam Guard Fence (Blockout)," of the gauge specified. This price shall be full compensation for furnishing all materials, except timber posts furnished by the Department, including necessary boring for preparation, for hauling and erection; for setting posts in concrete when required; for spacers where required and for all labor, tools, equipment and incidentals necessary to complete the work, including driving posts, excavating, backfilling and disposing of surplus material.

When bids are requested for "Terminal Anchor Section" measured as provided under "Measurement," payment will be made at the unit price bid for "Terminal Anchor Section" of the gauge specified. This price shall be full compensation for furnishing the turn-down rail element, anchor assembly, terminal anchor post and foundations; and for all labor, tools, equipment and incidentals necessary to complete the work including excavation, backfilling and disposal of surplus materials.

SECTION 710 RELOCATION OF PERMANENT SIGNS

D-710.01 GENERAL: This item shall govern for removing or relocating existing permanent signs shown on the plans.

D-710.02 MEASUREMENT AND PAYMENT:

- A. This item will be measured as each permanent sign removed or relocated or by any other unit as shown on the plans, complete in place.
- B. The work performed and materials furnished in accordance with this Section and measured as provided under "Measurement" will be paid for at the unit price bid for "Relocation of Permanent Signs". This price shall be full compensation for furnishing and installing new foundations, and/or new sign supports (when required), removing existing signs and related materials; for modifying existing sign supports; for preparing and cleaning; for salvaging; for hauling, excavating, backfilling and surface placement; and for all other materials, labor, tools, equipment and incidentals necessary to complete the work.

PRODUCTS

D-710.03 MATERIALS:

- A. All materials and construction methods shall conform to the details shown on the plans and the requirements of this Section.
- B. Unless otherwise shown on the plans, the Contractor shall furnish all materials. All materials furnished by the Contractor shall be new.

EXECUTION

D-710.04 CONSTRUCTION METHODS:

- A. Removal: Unless otherwise shown on the plans, existing concrete foundations that are to be abandoned shall be removed to a minimum two (2) feet below finish grade. The remaining hole shall be backfilled with material equal in composition and density to the surrounding area, and by replacing any surfacing, such as asphalt pavement or concrete riprap, with like material to equivalent condition.
- B. Relocation: Relocation shall include new foundations. Unless otherwise shown on the Drawings, the existing supports shall be reused and shortened or lengthened as required. Damaged galvanizing shall be repaired. Existing foundations to be abandoned shall be removed in accordance with this section.
- C. Handling and Storage: Existing signs and supports to be relocated or salvaged shall be handled and stored in such a manner that they are not damaged. Care shall be taken to prevent any damage to the various sign assembly components. Any portion of the sign assembly designated for relocation or salvage, including messages, damaged by the Contractor shall be replaced by the Contractor at the Contractor's expense in accordance with the applicable specification.
- D. Any sign components that are removed and are shown on the plans to be reused or salvaged shall become the property of the City and shall be stockpiled at a designated location. All other parts shall become the property of the Contractor and shall be

removed from the right-of-way to a site approved by the engineer.

- E. Cleaning: After the sign has been relocated, the entire sign shall be washed with a biodegradable cleaning solution acceptable to the sheeting and screen ink manufacturers to remove all dirt, grease, oil smears, streaks, finger marks and other foreign sign materials.

SECTION 712 TRAFFIC CONTROL AND REGULATION

D-712.01 GENERAL: Section includes requirements for signs, signals, control devices, flares, lights, and traffic signals, as well as construction parking control, designated haul routes and bridging of trenches and excavation.

D-712.02 MEASUREMENT AND PAYMENT: Measurement is a lump sum basis for traffic control and regulation, including submittal of a traffic control plan if different from the plan shown on the Drawings, provision of traffic control devices and provision of equipment and personnel as necessary to protect the work and the public. The amount invoiced shall be determined based on the schedule of values submitted for traffic control and regulation. Refer to Division C, General Provisions, Section 9 - Measurement and Payment for unit prices procedures.

PRODUCTS

D-712.03 SIGNS, SIGNALS, AND DEVICES: Comply with Texas State Manual on Uniform Traffic Control Devices: Traffic Cones and Drums, Flares and Lights as approved by local jurisdictions.

EXECUTION

D-712.04 PUBLIC ROADS:

(a) Abide by laws and regulations of governing authorities when using public roads. If the Contractor's work requires that public roads be temporarily impeded or closed, approvals shall be obtained from governing authorities and permits paid for before starting any work. Coordinate activities with the City Traffic Engineer.

(b) Contractor shall maintain at all times a 10-foot-wide all-weather lane adjacent to work areas which shall be kept free of construction equipment and debris and shall be for the use of emergency vehicles, or as otherwise provided in traffic control plan.

(c) Contractor shall not obstruct the normal flow of traffic from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on designated major arterials or as directed by the City Engineer.

(d) Contractor shall maintain local driveway access to residential and commercial properties adjacent to work areas at all times.

(e) Surrounding streets used for entering or leaving the job area must be kept free of excavated material, debris, and any foreign material resulting from construction operations.

D-712.05 CONSTRUCTION PARKING CONTROL:

(a) Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles and City's Operations.

(b) Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.

(c) Prevent parking on or adjacent to access roads or in non-designated areas.

D-712.06 FLARES AND LIGHTS:

(a) Provide flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

D-712.07 HAUL ROUTES:

(a) Utilize haul routes designed by authorities or shown on the drawings for construction traffic.

(b) Confine construction traffic to designated haul routes.

(c) Provide traffic control at critical areas of haul routes to regulate traffic minimize interference with public traffic.

D-712.08 TRAFFIC SIGNS AND SIGNALS:

(a) Install traffic control devices at approaches to the site and on site, at cross roads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

(b) Install and operate traffic control signals to direct and maintain orderly flow of traffic in areas under Contractor's control and areas affected by Contractor's operations.

1. Relocate traffic signs and signals as work progresses to maintain effective traffic control.

D-712.09 BRIDGING TRENCHES AND EXCAVATIONS

(a) Whenever necessary, bridge trenches and excavation to permit an unobstructed flow of traffic.

(b) Secure bridging against displacement by using adjustable cleats, angles, bolts or other devices whenever bridge is installed:

1. On a existing bus route;
2. When more than five percent of daily traffic is comprised of commercial or truck traffic;
3. When more than two separate plates are used for the bridge; or
4. When bridge is to be used for more than five consecutive days.

(c) Install bridging to operate with minimum noise.

(d) Adequately shore the trench or excavation to support bridge and traffic.

(e) Extend steel plates used for bridging a minimum one foot beyond edges of trench or

excavation. Use temporary paving materials (premix) to feather edges of plates to minimize wheel impact on secured bridging.

(f) Use steel plates of sufficient thickness to support H-20 loading, truck or lane that produces maximum stress.

D-712.10 REMOVAL

- (a)** Remove equipment and devices when no longer required.
- (b)** Repair damage caused by installation
- (c)** Remove post settings to a depth of 2 feet.

SECTION 802 SHEETING AND BRACING

GENERAL

D-802.01 DESCRIPTION: Unstable soil encountered in trench or foundation excavation which tends to cave in or otherwise, shall be properly sheeted and braced as per OSHA requirements. Sufficient bracing material shall be left in place to guarantee safety to workmen and material where removal of such sheeting and bracing after it has served its purpose would be dangerous to workmen during backfilling or harmful to materials in place.

MATERIALS

D-802.02 MATERIALS: The sheeting material to be placed in contact with the dirt shall be either rough lumber with a minimum thickness of 2" appropriately designed steel sheet piling. Braces shall consist of lumber with a minimum thickness of 4" or metal screw jacks or other mechanical devices approved by the Engineer. All lumber shall be No. 3 common or better.

D-802.03 WHEN TO INSTALL SHEETING AND BRACING: Whenever, in the opinion of the Engineer or the Contractor, the soil at the edge of any excavation is sufficiently unstable as to endanger the safety of life, limb, or property, sheeting and bracing material shall be installed. Such material shall also be installed in all trenches whose sides are steeper than the natural angle of repose of the soil material if it were in loose uncompacted condition and the trenches are in excess of 8 feet deep, but only such portions of the total height of the trench shall be sheeted as appears necessary. Should a layer or pocket of material be encountered anywhere in the trench or other excavation which is of such type as to make possible the failure of adjacent soils, such layer or pocket shall be sheeted and braced in such a manner as to insure its permanency. Whenever a doubt exists as to the necessity of the installation of sheeting and bracing, it shall be installed.

CONSTRUCTION METHODS

D-802.04 GENERAL: Upon discovery of unstable material in any excavation, such sheeting and bracing as may be deemed adequate by the Engineer shall be installed. Stay bracing, piling boards, and box or vertical sheeting methods shall be used depending on the nature of the unstable material encountered. Metal sheeting and steel sheet piling may be used at the option of the Engineer.

D-802.05 MEASUREMENT AND PAYMENT: Separate measurement or payment will be made for this item and the Contractor shall investigate the conditions as they exist in the field and include in the unit price bid per linear foot for the items concerned full reimbursement for any sheeting and bracing that may be required. Payment shall be made in lump sum.

SECTION 804
WORK PERFORMED ON NON-WORKING DAYS

D-804.01 WORKING DAY: A working day is Monday thru Friday, 8:00 a.m. to 5:00 p.m. excluding holidays.

D-804.02 WORK PERFORMED ON A NON-WORKING DAY: Any work which is to be performed on a non-working day must be inspected. The Engineer will decide which work will be requiring the presence of an inspector.

D-804.03 COST OF INSPECTION: The cost for having an inspector present shall be incurred by the Contractor performing the work. Such arrangements will be made in writing and submitted to the Engineer for his approval.

D-804.04 STOP WORK: Any work stoppage by the contractor must be reported in writing to the engineer and owner 24 hours prior to work stoppage.

Section 806
Mailboxes & Cluster Boxes

SECTION 808 DEFINITIONS

Whenever used in these GENERAL CONDITIONS or in the other Contract Documents, the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

Addenda-Written or graphic instruments issued by ENGINEER prior to the receipt of bids which clarify, correct, or change the Bidding Requirements or the Contract Documents.

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

Application for Payment-A request from CONTRACTOR for a progress or final payment on the form accepted by ENGINEER and which is accompanied by such supporting documentation as is required by the Contract Documents.

Asbestos-Any material that contains more than one percent (1%) asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

BID-The offer or proposal of the BIDDER submitted on the prescribed form setting forth the required information, including prices for the Work to be performed.

Bidding Documents-The advertisement or Invitation to Bid, Instructions to Bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

Bidding Requirements-The information requested by and conditions for bidding set forth in the advertisement or Invitation to Bid, Instructions to Bidders, and the Bid form.

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

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

Contract Documents-The Agreement, Addenda (which pertain to the Contract Documents), Contractor's Bid (including documentation accompanying the BID and any post-bid documentation accompanying the BID and any post-bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these GENERAL CONDITIONS, the Supplementary Conditions, the Specifications, and the PLANS, as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and ENGINEERS's written interpretations and clarifications, issued pursuant to Paragraph 3.3, on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to Paragraphs 6.17.4 and 6.17.5 and the reports and drawings referred to in Paragraphs 4.2.1 and

4.2.2 are not Contract Documents.

Contract Price-The amount agreed to by OWNER and CONTRACTOR for completion of the Work, in accordance with the Contract Documents, as stated in Article 4 of the Agreement (subject to the provisions of Paragraph 11.3.1 in the case of Unit Price Work), and as adjusted by any Change Orders.

Contract Times-The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with Paragraph 14.9.1.

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

Defective-An adjective which, when modifying the word Work, refers to Work that is unsatisfactory, faulty, or deficient, in that it does not conform to, or has not been performed in accordance with, the Contract Documents, or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with Paragraph 14.5.1 or 14.6).

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

ENGINEER-The person, firm, or corporation named as such in the Agreement.

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

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

General Requirements-Sections of Division 1 of the Specifications.

Hazardous Waste-The term Hazardous Waste shall mean (i) any hazardous materials, hazardous wastes, hazardous substances, and toxic substances as those or similar terms are defined under any Environmental Laws; (ii) any Asbestos or any material which contains any hydrated mineral silicate, including chrysolite, amosite, crociodolite, tremolite, anthophyllite, and/or actinolite, whether friable or non-friable; (iii) any PCBs or PCB-containing materials, or fluids; (iv) radon; (v) any other hazardous, radioactive, toxic, or noxious substance, material, pollutant, or solid, liquid, or gaseous waste; (vi) any pollutant or contaminant (including petroleum, petroleum hydrocarbon, petroleum products, crude oil, and any factions thereof; any oil or gas exploration

or production waste, and natural gas, synthetic gas, and any mixtures thereof) that in its condition, concentration, or area of release could have a significant effect on human health, the environment, or natural resources; (vii) any substance that, whether by its nature or its use, is subject to regulation under any Environmental Law or, with respect to which any Environmental Law or Governmental Authority, requires environmental investigation, monitoring, or remediation; (viii) any Radioactive Material; and (ix) any underground storage tanks, as defined in 42 U.S.C. Section 699(1)(A)(I) (including those defined by Section 9001[1] of the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation Act, 42 U.S.C. Section 6901 et seq.; the Texas Water Code Annotated Section 26.344; and Title 30 of the Texas Administrative Code Sections 334.3 and 334.4), whether empty, filled, or partially filled with any substance.

Laws and Regulations; Laws or Regulations-Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction over the Work, the Project, and/or the CONTRACTOR's performance of the Work.

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

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

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

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

OWNER-The public body or authority, corporation, association, firm, or person which is a party to the Agreement and for whom the Work is to be provided.

Partial Utilization-Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work in accordance with Paragraph 14.6.

PCBs-Polychlorinated biphenyls.

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

PLANS-The PLANS which show the scope, extent, and character of the Work to

be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

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

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

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

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

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

Specifications-Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

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

Substantial Completion-The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended or, if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with Paragraph 14.9. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

Supplementary Conditions-The part of the Contract Documents which amends or supplements these GENERAL CONDITIONS.

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

Underground Facilities-All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground.

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

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

Work Change Directive-A written directive to CONTRACTOR, issued on or after the Effective date of the Agreement and signed by OWNER and prepared by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed, as provided in Paragraph 4.2 or 4.3, or to emergencies under Paragraph 6.15. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in Paragraph 10.1.2.

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