TOWN OF FAIRVIEW

Sloan Creek Trail Connector

APRIL 2019

372 TOWN PLACE FAIRVIEW, TX. 75069

PREPARED BY: JAMES CHANCELLOR, PE TOWN ENGINEER

DANIELLE GREGORY, EIT

CONTACT INFO: 972-886-4235 jchancellor@fairviewtexas.org

TOWN OF FAIRVIEW

NOTICE TO CONTRACTORS

1. Sealed bids (proposals) addressed to the Town of Fairview (Town), 372 Town Place, Fairview, Texas 75069, will be received at Town Hall until 1:30 p.m. May 2nd 2019 for

2019 SLOAN CREEK CONNECTOR TRAIL

At such time bids will be publicly opened and read aloud.

2. The work consists of furnishing all labor, equipment and materials (except as otherwise specified), and performing all work necessary for a ten foot hike and bike trail and a pedestrian bridge which includes the installation of an estimated 4858 SY of 5" reinforced concrete trail, two low water crossings, and a prefabricated bridge and one abutment.

3. Plans and Specifications for the work may be downloaded at www.fairviewtexas.org

TOWN OF FAIRVIEW, TEXAS

James Chancellor, PE
Town Engineer

INSTRUCTIONS TO BIDDERS

1. Each proposal shall be legibly written or printed in ink, on the proposal form provided in this bound copy of proposed Contract Documents. No alterations in proposal, or in the printed forms thereof, by erasures, interpolations, or otherwise will be acceptable unless each such alteration is signed or initialed by the bidder; if initialed, the Town may require the bidder to identify any alterations so initialed. No alteration in any proposal, or in the proposal form on which it is submitted, shall be made by the person after the proposal has been submitted by the bidder. Any and all addenda to the Contract Documents on which a proposal is based, properly signed by the bidder, shall accompany the proposal when submitted. The bidder may withdraw his proposal any time prior to the bid opening date and time stipulated in the Notice to Contractors.

Each proposal submitted shall be enclosed in a sealed envelope, addressed to the Town of Fairview, 372 Town Place, Fairview, Texas 75069, identified on the outside with the words "Proposal for 2019 Sloan Creek Connector Trail" and identifying the bidder. Proposals shall be delivered to the Town Engineer by 1:30 p.m., May 2nd, 2019 at such time bids will be publicly opened and read aloud. **Facsimile Transmittals Will Not Be Accepted.**

All bids will be tabulated for the Town Council by the Town Engineer. The Town Council will determine the lowest responsible bid, after considering the recommendations of the Town Engineer, determine whether such bid is that of a responsible bidder, and award a contract to the Contractor determined to be the lowest responsible bidder. The Fairview Town Council will authorize the Town Manager to enter into a contract with said Contractor.

2. Each Proposal shall be accompanied by either a cashier's check, a certified check, or an acceptable bid bond in an amount of not less than five percent (5%) of the proposed bid price, made payable without conditions to "Town of Fairview, Texas", and the amount of the said proposal Guarantee may be retained by and forfeited to the Town as liquidated damages if the proposal covered thereby is accepted and a contract based thereon is awarded and the bidder should fail to enter into a contract in the form prescribed, with legally responsible sureties, within the ten (10) days after such award is made by the Town.

The proposal guarantee deposit of the unsuccessful bidders will be returned if and when their proposals are rejected. The proposal guarantee deposit of the bidder to whom a contract is awarded will be returned provided, and when, said successful bidder executes a contract and files satisfactory bonds as hereinafter stipulated. The proposal guarantee deposit of the second and third lowest responsible bidders may be retained for a period of not to exceed sixty (60) days pending the execution of the contract and bonds by the successful bidder.

3. Accompanying his proposal, each bidder shall furnish an experience list of similar work along with such other information as will tend to show the bidder's ability to prosecute the required

work. The Bidder shall have a minimum of three years experience and successful history in the performance of similar work. The Town may make such investigations as they deem necessary to determine the ability of the Bidder to perform the work. The experience list is not required for those bidders who have performed similar work for the Town of Fairview within the past 5 years.

4. Each bidder shall carefully examine the Specifications, and other Contract Documents, shall visit the site and fully inform himself of all conditions affecting the work or the cost thereof, and shall be presumed to have done so and his bid shall be based upon his own conclusions from such examination. Each bidder shall inform himself concerning all Federal, State, and local laws, ordinances or regulations which may in any manner affect his proposed construction operations, or those engaged or employed on the work or the material or equipment. Should a bidder find discrepancies in, or omissions from, the Plans, Specifications or other Contract Documents, he should at once notify the Town Engineer and obtain clarification or interpretation prior to submitting any bid.

Any interpretation of the proposed Contract Documents will be made only by addendum duly issued and a copy of such addendum will be mailed or delivered to each person obtaining a set of such documents from the Town Engineer. The Town will not be responsible for any other explanations or interpretations of the proposed Contract Documents.

5. Each bidder to whom a contract for the work is awarded will be required to furnish surety as follows:

Performance Bond: A contract bond to the Town, in an amount equal to 100 percent (100%) of the not to exceed contract price.

Payment Bond: A payment bond to the Town, in an amount equal to 100 percent (100%) of the not to exceed contract Price.

The bonds shall be executed in three (3) counterparts on the forms bound herein, signed by an acceptable surety company authorized to do business in the State of Texas as required by Article 5160 V.A.T.C.S.

Attorneys-in-fact who sign the bonds must file with each bond a certified and effective dated copy of their power of attorney.

Certificates of Insurance: Satisfactory certificates of insurance shall be filed with the Town in accordance with the GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS in the Contract Documents.

6. The Bidder's attention is directed to Texas House Bill 11 (72nd Legislature, 1st C.S.) which amended the Texas Tax Code Section 151.311. This amendment provides that by the CONTRACTOR entering into a separated contract, The CONTRACTOR will become a seller of materials purchased for the project, which will obviate paying taxes, on materials incorporated into the project.

7. No bidder may submit more that one proposal. Two proposals under different names will not be received from one firm or association.

8. No bidder may withdraw his proposal for a period of sixty (60) days after the date and hour set for the opening herewith. A bidder may modify or withdraw his proposal at any time prior to the expiration of the period during which proposals may be submitted, by written request of the same persons or person who signed the Proposal.

9. The Town reserves the right to accept the bid which, in its judgment is the lowest responsible bid; to reject any or all bids; and to waive irregularities or informalities in any bid submitted. Bids received after the specified time of closing will be returned unopened. Conditional or qualified bids will not be accepted.

10. None of the Instructions to Bidders, Proposal, Performance Bond, Payment Bond, Contract Agreement, General Conditions, Special Conditions or Specifications shall be removed from the bound copy of the Contract Documents prior to filing the proposal contained therein.

11. Each bidder shall sign his proposal, using his usual signature and giving his full business address. Bids by partnerships shall be signed with the partnership name followed by the signature of one of the members of the partnership or by an authorized representative and designation of the person signing. Bids by corporations shall be signed with the name of the corporation, followed by the signature and designation of the president, secretary, or other person authorized to bind it in the matter. The names of all persons signing should also be printed below the signature. a bid by a person who affixes to his signature the word "President", "Secretary", "Agent", or other designation, without disclosing his principal, may be held to be the individual signing. When requested by the Town, satisfactory evidence of the authority of the officer signing in behalf of a corporation shall be furnished.

12. The Notice of Award shall be accompanied by the necessary Contract Agreement and Bond forms. The Bidder to whom the Contract is awarded will be required to execute the Contract Agreement and obtain the Performance and Payment Bonds and Certificates of Insurance within ten (10) calendar days from the date when notice of Award is delivered to the bidder. In case of failure of the bidder to execute the Contract Agreement, the Town may at its option consider the bidder in default, in which case, the bid security accompanying the Proposal shall become the property of the Town.

13. The Town, within ten (10) days of receipt of acceptable Performance Bond, Payment Bond, Certificates of Insurance and Contract Agreement signed by the bidder to whom the contract was awarded, shall sign the Contract Agreement and return to the bidder two (2) executed copies of the Contract Agreement. The Bidder may withdraw his signed Agreement should the Town not execute the Agreement within the stated period by written notice to the Town.

14. The Notice to Proceed shall be issued within ten (10) days of the execution of the Contract Agreement by the Town. The time may be extended by mutual agreement between the Town and Contractor. If the Notice to Proceed has not been issued within the specified time or mutually

agreed upon extension, the Contractor may terminate the Contract Agreement without further liability on the part of either party.

15. Attention is called to the fact that not less than the federally determined prevailing wage rate, as issued by the U.S. Department of Labor, must be paid on this project.

16. The Town intends to award the Contract to a bidder that will be doing a substantial portion of the work rather than through subcontracts. The bidder must complete the item in the Proposal regarding the amount of work to be done by the Prime Contractor. The Town reserves the right to consider this breakdown in awarding the Contract.

17. Each Bidder shall list all subcontractors they propose to use on this project for which the amount of the subcontract is in excess of $10,000. The list shall include the name and address of the subcontractor, the work they will be performing and the amount of the subcontract. The Bidder shall also complete a Statement of Qualifications and Experience for each subcontractor. The Contractor shall not change subcontractors or enter into contract with subcontractors not listed without prior approval by the Town. The Town reserves the right to refuse any or all requests for changes.

TOWN OF FAIRVIEW

Sloan Creek Trail Connector 2019

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2019 SLOAN CREEK CONNECTOR TRAIL
PROPOSAL

THIS BID IS SUBMITTED TO:

Honorable Mayor and Town Council
Town of Fairview
372 Town Place
Fairview, Texas 75069

The Undersigned Bidder proposes to complete the generally described work as shown in these Specifications for the following unit prices and total price. The bidder understands that units may change in the field and that the unit prices shown here will be honored and that the final price will be based on the actual measured or approved field quantities.

DESCRIPTION	QUANTITY ESTIMATE	UNITS	UNIT PRICE	TOTAL
Mobilization	1	LS	_____	_____
Clearing, grubbing and removal of 2" topsoil	1	LS	_____	_____
Import fill material	110.9	CY	_____	_____
Construction entrance	1	LS	_____	_____
Temporary gravel road (3" rock or crushed concrete)	930	CY	_____	_____
Prefab Bridge installation. This includes constructing a bridge abutment, concrete bridge deck, transportation of the bridge 3,500 ft, and other specifications included in the Pedestrian Bridge Drawings. (Note: the bridge has already been purchased and will be delivered to Fairview Pkwy)	1	LS	_____	_____
5" thick, 3,000 psi reinforced concrete trail	4,858	SY	_____	_____
7' X 3' Prefab Box Culvert	20	LF	_____	_____
3 - 36" Concrete Culverts	60	LF	_____	_____
2" Thick Flowable fill for potential X – Section of Trail, Crushed rock or gravel	330	SY	_____	_____
Cedar Split Rail	960	LF	_____	_____
Seed Disturbed Areas (TXDOT Mix)	4,700	SY		

Headwalls for 3 – 36" RCP Culverts	2	EA	_____	_____
Headwalls for 7' X 3' Box Culvert	2	EA	_____	_____
SWPPP	1	LS	_____	_____

TOTAL BASE BID $_____

Proposed Calendar Days to Complete: _____ Days

1. The Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with the Town in the form included in the Contract Documents to complete the 2019 SLOAN CREEK CONNECTOR TRAIL as specified or indicated in the Contract Documents for the Contract Price in this Bid and in accordance with the Contract Documents.

2. Bidder accepts all of the terms and conditions of the notice to Contractors, including without limitation those dealing with the disposition of Bid Security. This Bid will remain open for sixty (60) days after the day of Bid opening. Bidder will sign the Agreement and submit the Contract Security, Certificate of Insurance and other documents required by the Contract Documents within ten (10) days after the date of Town's Notice of Award.

3. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

(a) Bidder has examined, and hereby acknowledges receipt of, copies of all the Contract Documents and the following addenda:

ADDENDUM NO:	DATE
_____	_____
_____	_____
_____	_____

(b) Bidder has examined the site and locality where the Work is to be performed, the legal requirements (Federal, State and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as Bidder deems necessary.

(c) Bidder intends to perform a substantial portion of the work himself in accordance with the following approximate breakdown based on percentage of Base Bid:

Portion of Work by Bidder _____%

Portion to be Sub-Contracted _____%

Subcontractor Information

Name	Type of Work	Amount

5. The following documents are attached to and made a condition of this Bid:

(a) Required Proposal Guarantee (cashier's check, certified check, or bid bond).

(b) Statement of Bidder's Qualifications and Experience.

(c) Statement of Subcontractors' Qualifications and Experience.

6. The terms used in this Bid which are defined in the General Conditions of Agreement included as part of the Contract Documents have the meanings assigned to them in the General Conditions.

Submitted on _____, 20___.

Individual
Partnership
_____Corporation

Firm Name

By:_____

Typed or Printed

SIGNATURE_____

TITLE_____

ADDRESS_____

_____

TELEPHONE_____

TOWN OF FAIRVIEW
2019 SLOAN CREEK CONNECTOR TRAIL

CONTRACTOR _____

STATEMENT OF QUALIFICATIONS AND EXPERIENCE

Note: Demonstrate a minimum of three years experience. Bidders who have performed similar work for the Town of Fairview within the past 5 years are not required to complete this information.

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST: COMPLETION DATE:

DESCRIPTION:

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST COMPLETION DATE:

DESCRIPTION:

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST: COMPLETION DATE:

DESCRIPTION:

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST: COMPLETION DATE:

DESCRIPTION:

DUPLICATE THIS FORM IF THERE IS MORE THAN ONE SUBCONTRACTOR

TOWN OF FAIRVIEW
2019 SLOAN CREEK CONNECTOR TRAIL

SUBCONTRACTOR _____

STATEMENT OF QUALIFICATIONS AND EXPERIENCE

Note: Demonstrate a minimum of three years experience. Subcontractors who have performed similar work for the Town of Fairview within the past 5 years are not required to complete this information.

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST: COMPLETION DATE:

DESCRIPTION:

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST COMPLETION DATE:

DESCRIPTION:

NAME OF PROJECT:

OWNER:

TOTAL CONTRACT COST: COMPLETION DATE:

DESCRIPTION:

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,_____ _____as Principal, and _____ _____ as Surety, are hereby held and firmly bound unto the Town of Fairview, Texas as Owner in the penal sum of_____ . _____(5% of the proposal as submitted) for payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this _____ day of _____, 2019.

The Condition of the above obligation is such that whereas the Principal has submitted to the Town of Fairview, Texas a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing, for the construction of the 2019 SLOAN CREEK CONNECTOR TRAIL in the Town of Fairview.

NOW THEREFORE,

(a) If said Bid shall be rejected, or

(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 Certificates of Insurance 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 Bond 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 forth above.

_____L.S.
Principal

_____
Surety

By: _____

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended and be authorized to transact business in the State of Texas.

TOWN OF FAIRVIEW

2019 SLOAN CREEK CONNECTOR TRAIL

CONTRACT AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 2019, by and between the Town of Fairview, Collin County, Texas, Party of the First Part, hereinafter referred to as the "Town", and _____ Party of the Second Part, hereinafter referred to as the "Contractor" for Construction of 2019 SLOAN CREEK CONNECTOR TRAIL including furnishing all labor, equipment and materials (except as otherwise specified) and performing all work necessary for the construction.

ARTICLE 1. It is hereby mutually agreed that for and in consideration of the payments as provided for herein to the Contractor by the Town, the said Contractor shall furnish all labor, equipment, and material (except as otherwise specified above) and shall perform all work necessary to complete the improvements in a good and substantial manner, ready for use, before the contract time expiration. The work shall be in strict accordance with this Contract, a copy of which is filed pursuant to law in the office of the legal representative of the Town.

ARTICLE 2. It is hereby further agreed that in consideration of the faithful performance of the work by the Contractor, the Town shall pay the Contractor the compensation due him by reason of said faithful performance of the work at stated intervals and in the amount certified by the Town Engineer, in accordance with the provisions of this Contract.

ARTICLE 3. It is hereby further agreed that, at the completion of the work and its acceptance by the Town, all sums due the Contractor by reason of alterations or modifications of the original Contract or by reason of "Extra Work" authorized under this Contract, will be paid the Contractor by the Town after said completion and acceptance.

ARTICLE 4. It is hereby further agreed that any reference herein to the "Contract" shall include all "Contract Documents" as the same are listed and described in Paragraph 1.9 of SECTION: GENERAL CONDITIONS bound herein, and said "Contract Documents" are hereby made a part of this Agreement as fully as if set out at length herein, and that this Contract is limited to the items in the Proposal as signed by the "Contractor" and included in the "Contract Documents".

ARTICLE 5. The Contractor agrees to perform all of the work described in the Contract Documents for the unit prices and total contract price as submitted in the Bid, in the total amount of _____ taking into consideration additions to or deductions from the Total Bid by reason of alterations or modifications of the original quantities or by reason of "Extra Work" authorized under this Agreement in accordance with the provisions of the Contract Documents.

Contractor agrees to a substantial completion time of _____ days and final completion of _____ days from the date of the Notice to Proceed.

ARTICLE 6. The Contractor agrees that the sum of Three Hundred Dollars ($300.00) in Liquidated Damages will be deducted from the Contract price by the Town for each calendar day that the work remains incomplete beyond the Contract time for completion, or within such extra time as may have been allowed by an extension approved by the Town.

ARTICLE 7. The Contractor agrees to submit a Maintenance Bond prior to the release of final retainage for 100% of the value of the Contract Amount for a period of two years from the date of final acceptance.

IN WITNESS WHEREOF, the Party of the First Part and the Party of the Second Part, respectively, have caused this Agreement to be duly executed in day and year first herein written in three (3) copies, all of which to all intents and purposes shall be considered as the original.

ARBITRATION PROVISION:

THIS CONTRACT CONTAINS A BINDING ARBITRATION PROVISION WHICH MAY BE ENFORCED BY THE PARTIES.

CONTRACTOR, PARTY OF THE SECOND PART

By:_____

_____
(Office or Position of Signer)

OWNER, PARTY OF THE FIRST PART
TOWN OF FAIRVIEW, TEXAS

By:_____
Julie Couch, Town Manager

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENT THAT WE, _____ of _____, hereinafter referred to as the "Contractor" and _____ _____, a Corporation organized and existing under the laws of the State of Texas, and duly authorized to transact business in the State of Texas, as "Surety" are held and firmly bound unto the Town of Fairview, Texas (Owner), their successors and assigns, hereinafter called the "Owner", in the penal sum of _____ in lawful money of the United States of America, for the payment of which well and truly to be made to said Owner with the understanding that such designation shall be held and taken to apply to them or to their successors, lessees and assigns, as the circumstances not or to any time in the future under the terms hereof shall require, we, said Contractor and Surety, do hereby bind ourselves and our respective successors, lessees and assignees, jointly and severally, forever firmly by these present.

THE CONDITION OF THE ABOVE OBLIGATION, HOWEVER IS SUCH THAT:

WHEREAS, said Contractor has entered into a certain Contract in writing bearing date of the _____ day of _____, 2019, and designated as construction of the 2019 SLOAN CREEK CONNECTOR TRAIL in Fairview including furnishing all labor, equipment and materials (except as otherwise specified), and performing all work necessary for the construction.

WHEREAS, it is provided in said Contract that said Contractor shall furnish a bond in the sum hereinabove stated condition for the faithful performance of said Contract as well as any supplement or supplements in writing thereto covering additional or other work to be performed by the contractor pursuant to the terms and conditions of said Contract.

NOW, THEREFORE, if said Contractor shall in all respect faithfully and fully perform each and all of the terms, provisions, conditions, and undertakings of said Contract in writing to be by it performed, together with like performance of any an all supplements in writing thereto covering additional or other work to be performed by the Contractor, notice of any such supplement or supplements being hereby waived, then this obligation shall be null and void; otherwise it shall remain in full force, virtue and effect.

PROVIDED FURTHER, that it is expressly understood and agreed that notice of any default in or non-performance of any duty of obligation on the part of the Contractor under the terms of said Contract in writing, or any supplement in writing thereto covering additional or other work to be performed by the Contractor, is hereby expressly waived by the Surety, and that any such default or non-performance of any duty or obligation shall not absolve or release the Surety from its joint and several absolute and unconditional undertaking or indemnity, irrespective of whether Owner shall or shall not call upon the Contractor for compliance therewith or performance thereof, and that these present shall remain in full force, virtue and effect during the existence of said Contractor of any supplement in writing thereto covering additional or other work to be performed by the Contractor, and thereafter for the purpose of adjusting rights and obligations which shall have accrued during

the life of said written Contract, or any supplement in writing thereto covering additional or other work to be performed by the Contractor.

IN TESTIMONY WHEREOF, the Contractor has hereunto set his hand, and said Surety has caused these present to be executed in its name, and its corporate seal to be hereunto affixed, by its attorney-in-fact duly authorized to do so at_____, on this _____ day, of _____,20___.

SURETY COMPANY	CONTRACTOR
_____	_____
Name of Company	Name of Company
By:_____	By:_____
Attorney-in-Fact	
By:_____	_____
Title of Person Signing	Title of Person Signing
(Seal)	(Seal)

(Accompany this bond with attorney-in-fact's authority from the Surety company certified to include the date of the bond.)

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENT, that _____ as "Contractor", and _____ a corporation organized under the laws of the State of _____, with general offices in _____, and authorized to transact business in the State of TEXAS as "Surety", are held and firmly bound unto the Town of Fairview, in the penal sum of _____ for the payment of which sum will and truly to be made, we bind ourselves, and our heirs, executors, administrators, successors, and assigns, jointly and severally, be these presents:

THE CONDITIONS OF THE FOREGOING OBLIGATIONS IS SUCH THAT:

WHEREAS, the Contractor has on the _____ day of _____, 2019, entered into a written contract with the Town for 2019 SLOAN CREEK CONNECTOR TRAIL in Fairview including furnishing all labor, equipment and materials (except as otherwise specified), and performing all work necessary for the construction.

NOW, THEREFORE, if the Contractor and his subcontractors shall pay all indebtedness incurred for supplies, materials, or labor furnished, used or consumed in connection with the prosecution of the work provided for in said contract, this obligation shall be void; otherwise it shall remain in full force and effect.

PROVIDED FURTHER, that the 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 way affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the specifications.

PROVIDED FURTHER, that the surety agrees that any person to whom there is due any sum for supplies, materials, or labor, hereinbefore stated, or his assigns, may bring an action on his bond for the recovery of the indebtedness; **PROVIDED,** that no action shall be brought on the bond after six months from the completion of the public improvements.

SURETY COMPANY:	CONTRACTOR:
_____	_____
Name of Company	Name of Company
By:_____	_____
By:_____	_____
Title of Person Signing	Title of Person Signing
(Seal)	(Seal)

(Accompany this bond with attorney-in-fact's authority from the Surety Company certified to include the date of the bond.)

NOTICE OF AWARD

TO: _____

_____

_____

_____

Project Description: _____

_____

_____

The Fairview Town Council has considered the Proposal submitted by you on _____ for the above described work in response to its Notice to Contractors and Instructions to Bidders and on _____ voted to award you the Contract in the amount of _____. You are required by the Instructions to Bidders to execute the Contract Agreement and furnish the required Performance and Payment Bonds and Certificates of Insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Contract Agreement and to furnish said Bonds and Certificates within ten (10) days from the date of this Notice, the Town of Fairview will be entitled to consider all your rights arising out of the Town's acceptance of your Proposal as abandoned and as a forfeiture of your Bid Security. The Town will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the Town.

Dated this _____ day of _____, 2019.

TOWN OF FAIRVIEW

By_____

James Chancellor, Town Engineer

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____ _____, this the _____ day of _____ _____, 2019.

By _____

Title _____

GENERAL CONDITIONS

1. DEFINITIONS: Wherever used in the Contract Documents, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.1 Acceptance, Final Acceptance: The formal action by the town in accepting the Work as being complete.

1.2 Addenda: Written or graphic supplemental documents issued prior to the opening of bids which modify or interpret the Contract Documents, by additions, deletions, clarifications, or corrections.

1.3 Bid: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the work to be performed.

1.4 Bidder: Any individual, partnership, corporation, or combination thereof submitting a proposal for the Work contemplated, acting directly or through and authorized representative.

1.5 Bonds: Bid, performance, and payment bonds and other instruments or security, furnished by the Contractor and his surety in accordance with the Contract Documents.

1.6 Change Order: A document recommended by the Engineer which is signed by the Contractor and Town and authorizes an addition, deletion, or revision in the Work, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Contract.

1.7 Contract: The written agreement between the town and Contractor covering the work to be performed; other Contract Documents are attached to the Contract and made a part thereof as provided therein.

1.8 Contractor: The individual, partnership, corporation, or combination thereof who has entered into the Contract (or agreement) with the town for the performance of the Work called for in the Contract Documents.

1.9 Contract Documents: The Notice to Contractors, Instructions to Bidders, Proposal, Contract Agreement, Performance Bond, Payment Bond, General Conditions, Supplementary Conditions, Technical Specifications, Plans, Addenda, Notice of Award, and Notice to Proceed are each and all included in this Contract and the Work shall be done in accordance therewith.

1.10 Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.11 Contract Time: The number of calendar days stated in the Proposal for the completion of the Work. The term day as used in the Contract Documents shall mean calendar day unless specifically designated otherwise.

1.12 Effective Date of the Contract: The date indicated in the Notice to Proceed as the date of commencement of the Work, the date from which Contract Time is measured.

1.13 Engineer: The individual or firm designated, appointed, or otherwise employed or delegated by the town for this Work, or their duly authorized agents, such agents acting within the scope of the particular duties entrusted to them in each case. The Engineer on this Project is the town Engineer.

1.14 Field Order: A written order issued by the Engineer which orders minor changes in the Work but which do not involve a change in the Contract Price or the Contract Time.

1.15 Notice of Award: The written notice of the acceptance of the bid from the town to the successful Bidder.

1.16 Notice to Proceed: Written communication issued by the town to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work, also referred to as the Effective Date of the Contract.

1.17 Town: The Town of Fairview, Texas with whom the Contractor has entered into the Contract and for whom the Work is to be provided.

1.18 Plans: The part of the Contract Documents which shows the locations, characteristics, dimensions, and details of the Work to be performed and which have been prepared or approved by the Engineer.

1.19 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.

1.20 Proposal: The offer or proposal of the Bidder submitted on the prescribed form bound herein, setting forth the prices for the Work to be performed.

1.21 Resident Project Representative or Inspector: The authorized representative of the Engineer who is assigned to the site or any part thereof.

1.22 Samples: Physical examples which illustrate materials, equipment or workmanship, and establish standards by which the Work will be judged

1.23 Shop Drawings: All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a Supplier and submitted by the Contractor to illustrate material or equipment for some portion of the Work.

1.24 Specifications: Those portions of the Contract Documents consisting of written technical descriptions of material, equipment, construction systems, standards and workmanship

as applied to the Work and certain administrative details applicable thereto, including these General Conditions and the Supplementary Conditions.

1.25 Subcontractor: An individual, firm or corporation having direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the site.

1.26 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.

1.27 Superintendent: The employee of the Contractor at the project site who shall have sole responsibility an authority for supervision of the Contractor's forces and construction operations.

1.28 Supplementary Conditions: The part of the Contract Documents which amends or supplements these General Conditions.

1.29 Supplier: A manufacturer, fabricator, supplier, distributor, materialman or vendor.

1.30 Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasement containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

1.31 Work: The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, furnishing labor and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

2. TERMS:

2.1 Whenever in these Contract Documents the works "as ordered", "as directed", "as required", "as permitted", "as allowed", or words or phrases of like import are used, it shall be understood that the order, directions, requirement, permission or allowance of the town and Engineer is intended.

2.2 Similarly the works "approved", "reasonable", "suitable" acceptable", "properly", "satisfactory", or words of like effect an import, unless otherwise particularly specified herein, shall mean approved, reasonable, suitable, acceptable, proper or satisfactory in the judgement of the town and Engineer.

2.3 Whenever any statement is made in the Contract Documents containing the expression "it is understood and agreed", or an expression of like import, such expression means the mutual

understanding and agreement of the parties executing the Contract of which these General Conditions are a part.

3. ABBREVIATIONS:

When references are made to the following abbreviations, they refer to the specifications, standards, or methods of the respective national association. All references to the above specifications, standards, or methods shall, in each instance, be understood to refer to the latest issue in effect (including all amendments).

ASSHTO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
AI	The Asphalt Institute
IA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute (Succeeding ASA)
APWA	American Public Works Association, Inc.
AREA	American Railway Engineering Association
ASTM	American Society for Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association, Inc.
CRSI	Concrete Reinforcing Steel Institute
FED SPEC	Federal Specifications
NBFU	National Board of Fire Underwriters
NEC	National Electric Code
NEMA	National Electrical Manufacturers' Association
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Act of 1970
PCA	Portland Cement Association
SSPC	Steel Structures Painting Council
UBC	Uniform Building Code
U/L	Underwriter's Laboratories, Inc.

4. VERBAL STATEMENTS NOT BINDING: It is understood and agreed that the written items and provisions of this Contract shall supersede all prior verbal statements of any and every official and/or other representative of the town, and such statements shall not be effective or be construed as entering into, or forming part of, or altering in any way whatsoever, the written Contract.

5. INTENT OF CONTRACT DOCUMENTS: The intent of the Contract Documents is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the Work in accordance with the Contract Documents are complementary, and what is called for by one shall be as binding as if called for by all.

6. INTENT OF PLANS AND SPECIFICATIONS: Certain Plans prepared by the Engineer on behalf of the town and elsewhere described and named accompany and supplement these Specifications and constitute a part of the Contract Documents. Such Plans are agreed to be constructively attached to these Specifications although convenience may prevent physical attachment.

6.1 Modifications or Additions to Plans: The town shall have the right to modify minor details of these Plans, to provide final or checked plans in lieu of any preliminary or unchecked plans, to supplement these Plans with additional plans or with additional information as the work proceeds, all of which
shall be considered as Plans accompanying these Specifications.

6.2 Organization of Specifications: The organization of the Specifications into divisions, sections, and articles, and the arrangement of Plans shall not control the Contractor in dividing the Work among subcontractors or in establishing the extent of Work to be performed by any trade.

7. PRECEDENCE OF CONTRACT DOCUMENTS: In case of conflict between the Contract Documents, the following order of precedence shall govern:

First:	Supplemental Agreements (Change Orders and Field Orders), the last in time being first in precedence
Second:	Contract
Third:	Notice to Contractors, Instructions to Bidders
Fourth:	Plans and Specifications, the order to precedence in these documents shall be Supplementary Conditions, General Conditions, Technical Specifications and Plans
Fifth:	Contractor Proposal

Figure dimensions of Plans shall govern over scale dimensions, and detailed drawings shall govern over general drawings. In all cases, where a conflict is cited, the Engineer shall be duly informed. The Engineer will notify the Contractor in writing should the above procedure be deviated from in any particular instance.

8. DISCREPANCIES, ERRORS, AND OMISSIONS: Any discrepancies, errors, omissions, or ambiguities found in the contract Documents shall be promptly reported to the Engineer. The Engineer shall clarify such discrepancies or omissions, in writing, within a reasonable amount of time. Work done by the Contractor after his discovery of such discrepancies, inconsistencies, or ambiguities shall be at his own risk in that subsequent corrective measures will be required.

9. REUSE OF DOCUMENTS: Neither the Contractor nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with the town shall have or acquire any title to or ownership rights in any of the Plans, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of the Engineer; and they shall not reuse any of them on extensions of the Project or any other project without written consent of the town.

10. PRECONSTRUCTION CONFERENCE: Before the Contractor starts work at the site, a conference attended by the Contractor, Engineer and others as appropriate will be held to discuss the procedures for handling Shop Drawings and other submittal and for processing Payment Estimates, and to establish a working understanding among the parties as to the Work.

11. SHOP DRAWINGS: Where called for in the Contract Documents, the Contractor shall submit to the Engineer for review, six (6) prints of each Shop Drawing. Shop Drawings shall be understood to include detail calculations, reinforcement bar bending diagrams, fabrication, erection and installation drawings, parts lists, graphs, wiring diagrams, operating instructions, etc. Drawings shall be submitted in sufficient time to allow the Engineer not less than ten (10) working days for review of such drawings, and to accommodate the rate of construction progress required under the Contract.

The review of Shop Drawings by the Engineer will be limited to checking for general agreement with the Contract Documents, and shall in no way relieve the Contractor of responsibility for errors or omissions contained in the Contract Documents. Fabricating dimensions, quantities of material, applicable code requirements, and other Contract requirements shall be the Contractor's responsibility. When the Shop Drawings have been reviewed by the Engineer, four (4) sets of submittals will be returned to the Contractor appropriately stamped. If major changes or corrections are necessary, the Shop Drawings may be rejected and one (1) set will be returned to the Contractor with the required changes or corrections indicated, and the Contractor shall promptly make the required changes or corrections. The Contractor shall make a complete and acceptable second submittal to the Engineer. Revisions to the Shop Drawings shall be limited to changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work. The Contractor shall have no claims for extra work. The Contractor shall have no claims for damages or extension of time due to any delay resulting from the
Contractor's having to make the required revisions.

Portions of the Work requiring a Shop Drawing or sample submission shall not begin until the Shop Drawing or sample has been reviewed.

13. WORK DONE WITHOUT LINES OR GRADES: Any work done without being properly located and work established by base lines, offset stakes, bench marks, or other basic reference points not located, established, or checked by the Engineer, may be ordered removed and replaced at the Contractor's cost and expense.

14. PRESERVATION OF MONUMENTS AND STAKES: The Contractor shall carefully preserve all monuments, bench marks, reference points and stakes, and in case of willful or careless destruction of the same will be charged with the resulting expense of replacement, and shall be responsible for any mistake or loss of time that may be caused by their unnecessary loss or disturbance. In the event that the stakes and marks placed by the Engineer are destroyed through carelessness on the part of the Contractor, and that the destruction of those stakes and marks cause a delay in the Work, the Contractor shall have no claim for damages or extensions of time. In the case of any permanent monuments or bench marks which must of necessity be

removed or disturbed in the construction of the Work, the Contractor shall carefully protect and preserve the same until they can be properly referenced for relocation. The Contractor shall furnish at his own expense such materials and assistance as are necessary for the proper replacement of monuments or bench marks that have been removed or destroyed.

15. UNDERGROUND FACILITIES:

15.1 Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on the information and data furnished to the town by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

(a) The town shall not be responsible for the accuracy or completeness of any such information or data; and,

(b) The Contractor shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof and repairing any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price. This shall include any utilities owned by the town.

15.2 Not Shown or Indicated: If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which the Contractor could not reasonably have been expected to be aware of, the Contractor shall, promptly after becoming aware thereof and before performing any work affected thereby (except in an emergency) identify the owner of such Underground Facility and give written notice thereof to that owner and to the Engineer. The Engineer will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, the Contractor shall be responsible for the safety and protection of such Underground Facility. The Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and of which the Contractor could not reasonably have been expected to be aware. If the parties are unable to agree as to the amount of length thereof, the Contractor may make a claim therefor.

16. TOWN'S RESPONSIBILITIES:

16.1 Communications: The town shall issue all communications to the Contractor through the Engineer.

16.2 Information and Payments: The town shall promptly furnish the data required of the town under the Contract Documents and shall make payments to the Contractor promptly after they are due.

16.3 Land and Rights-of-Way: Prior to issuance of Notice to Proceed, the town will obtain all land and rights-of-way necessary for carrying out and for the completion of the work to be performed pursuant to the Contract Documents, unless otherwise mutually agreed. Nothing contained in the Plans or Specifications shall be interpreted as giving the Contractor exclusive occupancy of the land or rights-of-way provided. Land owned and rights-of-way acquired by the town are as shown on the Plans.

16.4 Encroachments: The town will secure, from the agencies having jurisdiction, the necessary permits to create obstructions, to make excavations if required under the Contract, and to otherwise encroach upon rights-of-way.

16.5 Town's Right to Retain Imperfect Work: If any part or porion of the Work done or material furnished under this contract shall prove defective and not in accordance with the Contract Documents, and if the imperfection in the same, in the opinion of the Engineer, shall not be of sufficient magnitude or importanceas to make the Work dangerous or undesirable, the town shall have the right and authority to retain such Work but shall make such deductions in the final payment therefor as may be just and reasonable.

16.6 Temporary Suspension of Work: The town may suspend the Work or any portion thereof by written notice to the Contractor for a period of not more than sixty (60) days or such further time as agreed upon by the Contractor due to financing delays, unsuitable weather and/or other unfavorable conditions for prosecution of the Work, delay in delivery of Town-furnished equipment or materials, or failure of the Contractor to carry out provisions of the Contract or to provide materials and workmanship meeting the requirements of the Specifications. Suspended work shall be resumed by the Contractor within ten (10) days of receipt of written notice from the town to resume the Work.

16.6.1 The Contractor shall have no claim for damages alleged to have been suffered by reason of any suspension of the Work without termination of the Contract, and he shall receive no additional compensation because of any such suspension.

16.6.2 If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of a failure of the town to act within the time specified above, an adjustment in the Contract Price or an extension of the Contract Time, or both, shall be made by Change Order to compensate the Contractor for the costs and delays necessarily caused by the failure of the town to notify the Contractor to resume Work.

16.7 Termination of Contract (Contractor Not at Fault) : The town may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the

Contract provided that such termination is in the best interest of the town. Any such termination shall be effected by delivery to the Contractor of a Notice of Termination specifying the extent to which termination becomes effective.

16.8 Termination of Contract (Contractor at Fault: The town may, without prejudice to any other right or remedy, terminate the Contract after ten (10) days from delivery of a written notice to the Contractor and his surety in the event of breach of theContract or of any default by the Contractor. It shall be considered a default by the Contractor whenever he shall:

(a) declare bankruptcy, become insolvent, or assign his assets for the benefit of his creditors, or if a trustee or receiver is appointed for the Contractor or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws;

(b) repeatedly fail to provide a qualified superintendent, sufficient skilled workmen, suitable materials or equipment;

(c) repeatedly fail to make prompt payments to Subcontractors or for labor, materials, or equipment delivered;

(d) disregard laws, ordinances rules, regulations, or orders of any public body having jurisdiction over the Work or if he disregards the authority of the Engineer;

(e) violates any important provisions of the Contract Documents; or

(f) repeatedly fail to prosecute work according to the approved progress schedule.

16.8.1 In the event the Contract is terminated due to defaults described above, the town may take possession of the Project and of all materials, equipment, tools, construction equipment and machinery thereon owned by the Contractor, and 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.

16.8.2 If the unpaid balance of the Contract Price exceeds the direct and indirect cost of completing the Project, including compensation for additional professional services, such excess will be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor shall pay the difference to the town. Such costs incurred by the town will be determined by the Engineer and incorporated in a Change Order.

16.8.3 Where the Contractor's services have been so terminated by the town, said termination shall not affect any right of the town against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the town due the Contractor will not release the Contractor from compliance with the Contract Documents.

17. ENGINEER'S AUTHORITY: The Engineer will be the town's representative during the construction period. The duties and responsibilities and the limitations of authority of the Engineer as the town's representative during construction are set forth herein and shall not be extended without written consent of the town Council.

17.1 Project Representation: The town, at its option, may furnish a Resident Project Representative and Inspector to assist the Engineer in observing the performance of the Work. The duties, responsibilities and limitations of authority of any such Resident Project Representative and Inspectors will be as provided in the Supplementary Conditions.

17.2 Clarifications and Interpretations: The Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) as the Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If the Contractor believes that a written clarification or interpretation justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree to the amount or extent thereof, the Contractor may make a claim therefor.

17.3 Authorized Variations in Work: The Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on the town, and also on the Contractor who shall perform the Work involved promptly. If the Contractor believes that a Field Order justifies and increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, the Contractor may make a claim therefor.

17.4 Rejecting Defective Work: The Engineer will have authority to disapprove or reject Work which the Engineer believes to be defective, and will also have the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed or completed.

17.5 Determinations for Payment: The Engineer will determine the actual quantities and classifications of Work performed by the Contractor. The Engineer will review with the Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of a Payment Estimate or otherwise). The Engineer's written decisions thereon will be final and binding upon the town and Contractor, unless, within ten (10) days after the date of any such decision, the Contractor delivers to the town written notice of intention to appeal from such a decision. The Engineer will not be responsible for the Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and program incident hereto, and the Engineer will not be responsible for the Contractor's failure to perform or furnish the Work in accordance with the Contract Documents. The Engineer will not be responsible for the acts or omissions of the Contractor, of any Subcontractor, of any Supplier, or of any other person or organization performing or furnishing any of the Work.

18. CONTRACTOR'S RESPONSIBILITY: By executing the Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents.

18.1 Insurance Requirements: Before any work at the site is started, the Contractor shall deliver to the town certificates of insurance which the Contractor is required to purchase and maintain in accordance with the Contract Documents.

18.2 Supervision: The contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of Construction, but the Contractor shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence or procedure of construction which is indicated in and required by the Contract Documents. The Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.

18.3 Superintendence of Work: The Contractor shall provide and maintain, continually on the site of the Work during its progress, adequate and competent superintendence of all operations for and in connection with the Work being performed under this Contract, either personal or by a duly authorized superintendent or representative.

18.3.1 The superintendent or other representative of the Contractor on the Work, and who has charge thereof, shall be fully authorized to act for the Contractor and to receive whatever orders as may be given by the Engineer for the proper prosecution of the Work, or notices in connection therewith.

18.3.2 The superintendent shall be a person having considerable experience on similar projects. The Contractor shall submit the name of the proposed superintendent to the town together with a list of projects on which the proposed individual has served as superintendent. Such list shall detail the size and complexity of projects and shall include references for each engagement. The Engineer shall review the submitted qualifications. No person shall serve as superintendent without approval of the town.

18.4 Labor, Materials and Equipment: The Contractor shall provide competent, suitably qualified personnel to lay out the Work and perform construction as required by the Contract Documents. The Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work, or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours, and the Contractor will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without the town's prior written consent.

18.4.1 The Contractor shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

18.4.2 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by the Engineer, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used cleaned and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective to assign to the Engineer, or any of the town's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work.

18.5 Sunday, Holiday and Night Work: Except in connection with the care, maintenance or protection of equipment, or of work already done, no work shall be done between the hours of 7 P.M. and 7 A.M., or on Sundays or legal holidays, without the written consent of the town.

18.6 Prosecution and Progress: The Contractor shall, within ten (10) days after being instructed to do so in a written notice from the town, commence the Work to be done under this Contract; and the rate of progress shall be such that the Work shall have been completed in accordance with the terms of the Contract on or before the termination of the Contract Time stated in the Proposal, subject to any extension or extensions of such time made as hereinafter provided.

18.6.1 Promptly after the award of the Contract, the Contractor shall submit to the Engineer for approval an estimated progress schedule and a written program of construction outlining the proposed operations and the order of completion of the various parts in sufficient detail to demonstrate to the Engineer the adequacy of the progress to complete the construction within the time provided. No payment shall be made to the Contractor on any Payment Estimate until such progress schedule and program have been submitted and approved.

18.6.2 Should it become evident at any time during construction that construction operations will or may fall behind the schedule of this first program of construction the Contractor shall, upon request, promptly submit revised written schedules setting out operations, methods and equipment, added amount labor, or of working shifts, night work, etc., by which lost time shall be made up and shall confer with the Engineer until an approved modification of the original program and schedule have been provided by the Contractor. Execution of the Work according to the accepted program of construction, or approved modifications thereof, shall be an obligation of the Contract.

18.6.3 Should the Contractor fail to complete the Work within the Contract Time as stipulated in the Proposal or within such extra time as may have been allowed by extension, the town will deduct from any moneys due or coming due to the Contractor, the amount indicated in

the Proposal for each calendar day the Work shall remain uncompleted. This sum shall be considered and treated not as a penalty but as fixed, agreed and liquidated damages due the town from the Contractor by reason of interference with business, inconvenience to the public, added cost of engineering, administration, inspection, maintenance of detours and temporary facilities, and other items which have caused an expenditure of funds resulting from his failure to complete the Work within the Contract Time.

18.6.4 Permitting the Contractor to continue and finish the Work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, shall in no way operate as a waiver on the part of the town of any of its rights under the Contract.

18.6.5 Neither by the act of taking over the Work nor by the annulment of the Contract nor by requiring the surety to complete the Contract shall the town forfeit the right to recover liquidated damages from the Contractor or his surety for failure to complete the Contract within the specified Contract Time.

18.7 Extensions of Time: The Contractor shall place orders for all principal materials to be needed in the Work within ten (10) days after award of the Contract and delivery dates shall be obtained, in writing, from the suppliers of each of these materials. One copy of each order for the primary materials in the Contract together with one copy of the suppliers reply stating the date of delivery shall be furnished to the Engineer prior to the payment of the first partial monthly Payment Estimate. Payment of partial monthly Payment Estimates shall not be commenced until these provisions have been complied with to the full satisfaction of the Engineer.

18.7.1 Should special conditions arise from war, strikes or other national emergencies wherein restrictions may prevent or delay the acquirement, delivery or use of materials and be the direct cause of specific delays, extensions of time will be granted. In such event, the Contractor shall file with the Engineer, copies of documentary evidence to substantiate the causes and extent of resultant delays at the time they are in occurrence. This evidence together with the original orders and written delivery dates will be used by the Engineer to determine the amount of extension of time to be made on account of such delays. In determining extensions of time, revised delivery dates for primary materials will be computed by extending the original Contract Time by the actual number of days which elapses during any emergency.

18.7.2 The Contractor is requested to bring to the attention of the Engineer, by letter, during the progress of the Work, the occurrence of events which the Contractor considers may warrant extensions of time under the conditions of the Contract. If the Contract is not completed within the Contract Time, the Contractor shall, at the conclusion of the Work, present to the Engineer a written statement presenting his view upon all matters of time extensions.

18.7.3 The amount of all extensions of time, for whatever reason granted, shall be determined by the Engineer with due consideration given to working seasons and working conditions.

In general, only actual and not constructive or hypothetical days of delay will be considered. The town shall have the authority to grant additional extensions of time as the town may deem advisable and justifiable.

18.8 Substitutes or "Or-Equal" Items: Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function and quality required. Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by the Engineer to determine that the material or equipment proposed is equivalent or equal to that named. Requests for review of substitute items of material and equipment will not be accepted by the Contractor. If the Contractor wishes to furnish or use a substitute item of material or equipment, the Contractor shall make written application to the Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application will state that the evaluation and acceptance of the proposed substitute will not be prejudice the Contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with the town for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the Engineer in evaluating the proposed substitute. The Engineer may require the Contractor to furnish, at the Contractor's expense, additional data about the proposed substitute.

18.8.1 If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Engineer, if the Contractor submits sufficient information to allow the Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents.

18.8.2 The Engineer will be allowed a reasonable time within which to evaluate each proposed substitute. The Engineer will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without the Engineer's prior written acceptance, which will be evidenced by a Change Order or an approved Shop Drawing. The town may require the Contractor to furnish , at the Contractor's expense, a special performance guarantee or other surety with respect to any substitute.

18.9 Subcontractors and Suppliers: The Contractor shall not employ any Subcontractor, Supplier or other person or organization, whether initially or as a substitute, against whom the town may have reasonable objection. The Contractor shall not be required to employ any

Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom the Contractor has reasonable objection.

18.9.1 If the Supplementary Conditions require and identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials and equipment) to be submitted to the town for acceptance by the town and if the Contractor has submitted a list thereof in accordance with the Supplementary Conditions, the town's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case the Contractor shall submit an acceptable substitute. The Contract Price will be increased by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued. No acceptance by the town of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of the town to reject defective Work.

18.9.2 The Contractor shall be fully responsible to the town for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with the Contractor just as the Contractor is responsible for the Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between the town and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of the town to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

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

18.9.4 All Work performed for the Contractor by a Subcontractor will be pursuant to an appropriate agreement between the Contractor and the Subcontractor, which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the town. The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor on account of losses under policies issued.

18.10 Patent Fees and Royalties: The Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and, if to the actual knowledge of the town its use in subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by the town in the Contract Documents. The Contractor shall indemnify and hold harmless the town and anyone directly or indirectly employed by the town from and against all claims, damages, losses and expenses (including attorney's fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or

resulting from the incorporation in the Work of any invention, design, process, produce or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

18.11 Permits: Unless otherwise provided in the Supplementary Conditions, the Contractor shall obtain and pay for all construction permits and licenses. The town shall assist the Contractor, when necessary, in obtaining such permits and licenses. The Contractor shall pay all charges of utility owners for connections to the Work, and the town shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

18.12 Laws and Regulations: The Contractor shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, the town shall not be responsible for monitoring the Contractor's compliance with any Laws or regulations. If the Contractor observes that the Plans and Specifications are at variance with any Laws or Regulations, the Contractor shall give the Engineer prompt written notice thereof, and nay necessary changes will be authorized. If the Contractor performs any Work knowing or having reason to know that it is contrary to such Laws or Regulations, and without such notice to the Engineer, the Contractor shall bear all costs arising therefrom; however, it shall not be the Contractor's primary responsibility to make certain that the Plans and Specifications are in accordance with such Laws and Regulations.

18.13 Use of Premises: The Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project site and land and areas identified in and permitted by Laws and Regulations, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. The Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas Contiguous thereto, resulting from the performance of the Work. Should any claim be made against the town by any such owner or occupant because of the performance of the Work, the Contractor shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at law. The Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold the town harmless from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against the town to the extent based on a claim arising out of the Contractor's performance of the Work.

18.13.1 Where the space within the project site, right-of-way or easements is not available for construction plant, the Contractor shall provide at his own expense any work area he requires, shall construct and maintain any roadway or other facilities required for this purpose and the cost thereof shall be included in the prices bid for the various items scheduled in the Proposal.

18.13.2 During the progress of the Work, the Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. at the

completion of the Work, the Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the site clean and ready for occupancy by the town. The Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

18.13.3 The Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

18.14 Record Documents: The Contractor shall maintain in a safe place at the site one record copy of all Plans, Specifications, Addenda, Written Amendments, Change Orders, Work Directive Changes, Field Orders and written interpretations and clarifications in good order annotated to show all changes made during construction. These record documents together with all approved samples and a counterpart of all approved Shop Drawings will be available to the Engineer for reference. Upon completion of the Work, these record documents, samples and Shop Drawings will be delivered to the town.

18.15 Safety and Protection: The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

18.15.1 The Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. The Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in these paragraphs caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor. The Contractor's duties and responsibilities for the safety and protection of the Work shall continue until such time as all the Work is completed and the Engineer has issued a notice to the Contractor that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

18.15.2 The Contractor shall designate a responsible representative at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the town.

18.16 Emergencies: In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the Engineer prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the Engineer determines that a change in the Contract Documents is required because

of the action taken in response to an emergency, a Change Order will be issued to document the consequences of the changes or variations.

18.17 Loses From Natural Causes: All loss or damage arising out of the nature of the Work, to be done, or from the action of the elements, or from floods or overflows, or from groundwater, or from any unusual obstruction or difficulty, or any other natural or existing circumstances either known or unforeseen, which may be encountered in the prosecution of the Work shall be sustained and borne by the Contractor at his own cost and expense.

18.18 Continuing the Work: The Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with the town. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as the Contractor and Town may otherwise agree in writing.

18.19 Indemnification: To the fullest extent permitted by Laws and Regulations, the Contractor shall indemnify and hold harmless the town and its consultants, agents and employees from and against all claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expenses:

(a) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting therefrom, and

(b) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Law and Regulations regardless of the negligence of any such party.

18.19.1 In any and all claims against the town or any of its consultants, agents or employees by any employee of the Contractor, any Subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the contractor or any such Subcontractor or other person or organization under workers or workmen's compensation or benefits payable by or for the contractor or any such Subcontractor or other person or organization under workers or workmen's compensation acts, disability benefit acts or other employee benefit acts.

18.20 Contractor's Responsibility in Case of Termination: After receipt of a Notice of Termination, and except as otherwise directed by the town, the Contractor shall:

(a) stop work under the Contract on the date and to the extent specified in the Notice of Termination,

(b) place no further orders or subcontractors for materials, services or facilities, except as may be necessary for completion of such portion of the Work under the Contract that is not terminated;

(c) terminate all orders and subcontracts to the extent that they relate to the performance of the Work terminated by the Notice of Termination;

(d) assign to the town, in the manner, at the times, and to the extent directed by the town, all of the right, title, and interest of the Contractor under the orders and subcontracts;

(e) settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the town, to the extent he may require, which approval or ratification shall be final for all the purposes of this clause;

(f) transfer title and deliver to the town, in the manner, at the times, and to the extent, if any, directed by the town, the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a performance of, and the work terminated by the Notice of Termination; and the completed or partially completed plans, drawings information, and other property which, if the Contract had been completed, would have been required to be furnished to the town.

(g) complete performance of such part of the Work as shall not have been terminated by the Notice of Termination; and

(h) take such actions as may be necessary, or as the town may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Contractor and in which the town has or may acquire an interest.

18.20.1 After receipt of a Notice of Termination, the Contractor shall submit to the town his termination claim, in the form and with certification prescribed by the town. Such claim shall be submitted promptly but in no event later than one year from the effective date of termination, unless extensions in writing are granted by the town, upon request of the Contractor made in writing within such one year period or authorized extension thereof. However, if the town determines that the facts justify such actions, he may receive and act upon any such termination claim at any time after such one year period or any extension thereof. Upon failure of the Contractor to submit his termination claim within the time allowed the town may determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall thereupon pay to the Contractor the amount so determined.

18.20.2 Upon termination of the Contract, the Contractor shall have no claims against the town except for:

(a) the value of work performed plus profit up to the date the Contract is terminated; and

(b) the cost of materials and equipment on hand, in transit, or on definite commitment, as of the date the Contract is terminated, which would be needed in the Work and which meets the requirements of the Contract Documents.

18.20.3 The value of work performed and the cost of materials and equipment delivered to the site, as mentioned above, shall be determined in accordance with the procedure prescribed for the making of the final estimate and payment.

19. OTHER WORK: The town may perform other work related to the Project at the site by the town's own forces, have other work performed by utility owners or let other direct contracts therefor which shall contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents, written notice thereof will be given to the Contractor prior to starting any such other work; and, if the Contractor believes that such performance will involve additional expense to the Contractor or requires additional time and the parties are unable to agree as to the extent thereof, the Contractor may make a claim therefor.

19.1 The Contractor shall afford each utility owner and other contractor who is a party to such a direct contract (or the town, if the town is performing the additional work with the town's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work, and shall properly connect and coordinate the Work with theirs. The Contractor shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. The Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of the Engineer and the others whose work will be affected. The duties and responsibilities of the Contractor under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of the Contractor in said direct contracts between the town and such utility owners and other contractors.

19.2 If any part of the Contractor's Work depends for proper execution or results upon the work of any such other contractor or utility owner (or the town), the Contractor shall inspect and promptly report to the Engineer, in writing, any delays, defects or deficiencies in such work that render it unavailable or unsuitable for such proper execution and results. The Contractor's failure so to report will constitute and acceptance of the other work as fit and proper for integration with the Contractor's Work except for latent or nonapparent defects or deficiencies in the other work.

19.3 Coordination: If the town contracts with others for the performance of other work on the Project at the site, the person or organization who will have authority and responsibility for coordination of he activities among the various prime contractors will be identified in the

Supplementary Conditions, and the specific matters to be covered by such authority and responsibility will be itemized, and the extent of such authority and responsibilities will be provided, in the Supplementary Conditions. unless otherwise provided in the Supplementary Conditions, the town shall have no authority or responsibility in respect of such coordination.

20. MISCELLANEOUS PROVISIONS:

20.1 Legal Address: The business address of the Contractor given in the Proposal upon which this Contract is founded is hereby designated as the place to which all notices, letters and other communications to the Contractor may be mailed or delivered. The business address of the town appearing in the Contract, is hereby designated as the place to which all notices, letters and other communications to the town may be mailed or delivered. The delivery by one party to the other party at an address so designated, or the depositing in any mail box regularly maintained by the post office, of any notice, letter or other communication addressed to such address, postage prepaid, registered or certified mail, with return receipt requested, shall be deemed sufficient service thereof, and the date of said service shall be the date of such delivery of mailing. Either party may change the said address or addresses at any time by an instrument in writing delivered to the other party. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or communication upon either party personally.

20.2 Independent Contractor: The right of general supervision by the town shall not make the Contractor an agent of the town, and the liability of the Contractor for all damages to persons, firms and corporations, arising from the Contractor's execution of the work, shall not be lessened because of such general supervision; but as to all such persons, firms and corporations and the damages, if any, to them or their property, the contractor herein is an independent contractor in respect to the Work.

20.3 Suggestions to Contractor Adopted at his Own Risk: Any plan or method of work suggested by the town, the Engineer, or their representatives, to the Contractor, but not specified, or required, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor, and the town will assume no responsibility therefor.

20.4 Hindrances and Delays: In executing the Contract, the Contractor expressly covenants and agrees that, in undertaking to complete the Work within the time therein fixed, he has taken into consideration and made allowances for all hindrances and delays incident to such work, whether growing out of delays in securing materials or workmen or otherwise. No charge shall be made by the Contractor for hindrances or delays from any cause during the progress of the work, or any portion thereof, embraced in this Contract, except as provided by the town's right to suspend the Work.

20.5 Provision for Emergencies: Whenever, in the opinion of the Engineer, the Contractor has not taken sufficient precaution for the safety of the public or the protection of the Work to be constructed under this Contract or of adjacent structures or property which may be injured by processes of construction on account of such neglect, and whenever, in the opinion of

the Engineer, an emergency shall arise and immediate action shall be considered necessary in order to protect public or private personal property interests, then the Engineer, with or without notice to the Contractor, may provide (but does not have the duty to do so) suitable protection to the said interests by causing such work to be done and material to be furnished and placed as the Engineer may consider necessary and adequate. The cost and expense of such work and material so furnished shall be borne by the Contractor, and , if the same shall not be paid on presentation of the bills therefor, such costs shall be deducted from any amounts due or to become due the Contractor. The performance of such emergency work under the direction of the Engineer shall in no way relieve the Contractor of responsibility for damages which may occur during or after such precaution has been duly taken by the Engineer.

20.6 Assignment of Contract: The Contractor shall not assign the work, or any part thereof, without the previous written consent of the town, nor shall he assign, by power of attorney or otherwise, any of the money payable under this Contract unless by and with the like consent of the town to be signified in like manner. No right under this Contract, nor to any money due or to become due hereunder, shall be asserted in any manner against said Town, or persons acting for the town, by reason of any so-called assignment of this Contract or any part thereof, unless such assignment shall have been authorized by the written consent of the town. In case the Contractor assigns all, or any part of, any moneys due or to become due under this Contract, the instrument of assignment shall contain a right of the assignee in and to any moneys due or to become due or to become due under this Contract, the instrument of assignment shall contain a right of the assignee in and to any moneys due or to become due to the Contractor shall be subject to all prior liens of all persons, firms and corporations for services rendered or materials supplied for the performance of the Work called for in this Contract.

20.7 Protests: If the Contractor considers any work demanded of him to be outside the requirements of the Contract, or if he considers any order, instruction, or decision of the Engineer or of any Inspector to be unfair, he shall, immediately upon receipt of such order, instruction, or decision, ask for a written confirmation of the same, whereupon he shall proceed without delay to perform the Work or to conform to the order, instruction, or decision; but if the Contractor finds such written order, instruction, or decision unsatisfactory, he shall, within ten (10) calendar days after receipt of same, file a written protest with the town, stating clearly and in detail his objections and the reasons therefor. Except for such protests or objections to the orders, instructions, or decisions of the Engineer and hereby agrees that as to all matters not included in such protest, the orders, instructions, and decisions of the Engineer shall be considered final and binding. All orders, instructions, and decisions of the Engineer will be limited to matters properly falling within the Engineer's authority.

20.8 Arbitration; All claims, disputes, or other questions that may arise between the town and the Contractor concerning any provision or provisions of this Contract which cannot otherwise be settled and which have not been waived by the making and acceptance of final payment or any progress payment may be submitted to and be determined and settled by arbitration in the manner set forth in this paragraph if both parties agree to arbitration prior to entering into arbitration. Either party, by written notice to the other received before litigation is commenced, may demand arbitration and may appoint an arbitrator. If litigation has been commenced prior to receipt of a demand to arbitrate, arbitration shall not be held. Within five

(5) days after receipt of such notice, the other party shall, by written notice to the former, appoint another arbitrator, and in default of said second appointment, the arbitrator first appointed shall be sole arbitrator and shall proceed in the same manner as hereinafter provided for three (3) arbitrators. When two (2) arbitrators have been appointed as aforesaid, they shall, if possible, agree upon a third arbitrator and shall appoint him by notice in writing, signed by both of them given to the town and the Contractor. If fifteen (15) days shall elapse after the appointment of the second arbitrator without notice of appointment of the third arbitrator being given as aforesaid, then either party may, in writing, request that the American Arbitration Association appoint the third arbitrator. Upon appointment of the third arbitrator, the three (3) arbitrators shall meet without delay and shall proceed with determination of the dispute in accordance with the Construction Industry Rules of the American Arbitration Association. If the award sustains the position of the contractor or if the award does not sustain the position of either party, the fees and expenses of the arbitration proceedings shall be assessed equally against both parties and shall be paid one-half by the town and one-half by the Contractor. The decision of the arbitrators shall be final. The Contractor shall carry on the Work and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed upon in writing.

21. BONDS AND INSURANCE

21.1 Insurance: The Contractor shall secure, and maintain throughout the duration of this Contract, insurance of such types and in such amounts as may be necessary to protect himself against all hazards or risks of loss as hereinafter designated and specified. The form and limits of such insurance, together with the underwriter thereof in each case, shall be the responsibility of the Contractor to maintain such coverage shall not relieve him of any contractual responsibility or obligation. If a part of the Contract is to be sublet, the Contractor shall:

(a) Cover any and all Subcontractors in his insurance policies, or

(b) Require each Subcontractor not so covered to secure insurance which will protect said Subcontractor against all applicable hazards or risks or loss designated herein.

21.2.1 Workmen's Compensation and Employer's Liability Insurance: This insurance shall protect the Contractor against any and all claims brought under the Workmen's Compensation law for the State of Texas. It shall also protect the Contractor against claims for injury to, disease or death of workmen engaged in the Work under this Contract which, for any reason, may not fall within the provisions of the Workmen's Compensation Act. Liability limits for this insurance on this Project shall be as specified in the SECTION: SUPPLEMENTARY CONDITIONS.

21.2.3 Comprehensive General Liability Insurance: This insurance, to be on the comprehensive form, shall protect the Contractor against any and all claims arising from injuries to members of the public or damage to property or others arising out of any act or omission of the Contractor, his agents, employees, or subcontractors, in connection with the operation or performance of the Work for and in connections with this Contract.

In addition, this general liability insurance policy shall specifically insure the contractual liability of the Contractor assumed under the provisions for indemnifying the town.

21.2.4 Bodily Injury and Property Damage Insurance: The property damage liability coverage under the comprehensive general liability policy shall contain no exclusion relative to blasting, explosion, collapse of buildings, or damage to underground property. Liability limits for general liability insurance coverage under this policy on this Project shall be as specified in SECTION: SUPPLEMENTARY CONDITIONS.

21.2.5 Comprehensive Automobile Liability Insurance: This insurance, to be on the comprehensive form, shall protect the Contractor against any and all claims or injuries to members of the public and damage to property of others arising from the use of automobiles and trucks in connection with the performance of the Work under this Contract, and shall cover operation on or off the site of the Work of all motor vehicles licensed for highway use, whether they are owned, non-owned, or hired by the Contractor. The policy shall include an "all states" endorsement. Liability limits for automobile liability insurance coverage on this Project shall be as specified in the SECTION: SUPPLEMENTARY CONDITIONS.

21.2.6 Property Insurance: The Contractor shall effect and maintain Builder's Risk Insurance to the full insurable value of the Work, with extended coverage for fire, vandalism, hail, wind, storm, etc., naming the town as co-insured. The Contractor shall provide insurance certificates to the town attesting to the coverage. insurance shall not be modified or cancelled without written notification to the town of such change or cancellation at least fifteen (15) days in advance of such change or cancellation.

22. TESTS AND INSPECTIONS; DEFECTIVE WORK:

22.1 Warranty and Guarantee: The Contractor warrants and guarantees to the town that all work will be in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to the Contractor. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article.

22.2 Access to Work: The Engineer or other representatives of the town, testing agencies and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. The Contractor shall provide proper and safe conditions for such access.

22.3 Tests and Inspections: The Contractor shall give the Engineer timely notice of readiness of the Work for all required inspections, tests or approvals. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved, the Contractor shall assume full responsibility therefor, pay all costs in connection therewith and furnish the Engineer the required certificates of inspection, testing or approval, the Contractor shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with the town's acceptance of a Supplier of materials or equipment proposed to be incorporated in the Work, or of materials or

equipment submitted for approval prior to the Contractor's purchase thereof for incorporation in the Work. The cost of all inspections, tests and approvals in addition to the above which are required by the Contract Documents shall be paid by the town (unless otherwise specified).

22.3.1 All inspections, tests or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to the town.

22.3.2 If any Work (including the work of others) that is to be inspected, tested or approved is covered without written concurrence of the Engineer, it must, if requested by the Engineer, be uncovered for observation. Such uncovering shall be at the Contractor's expense unless the Contractor has given the Engineer timely notice of the Contractor's intention to cover the same, and the Engineer has not acted with reasonable promptness in response to such notice.

22.3.3 Neither observations by the Engineer nor inspections, tests or approvals by others shall relieve the Contractor form the Contractor's obligations to perform the Work in accordance with the Contract Documents.

22.4 Uncovering Work: If any portion of the Work is covered contrary to the written request of the Engineer, it must, if requested by the Engineer, be covered for the Engineer's observation and replaced at the Contractor's expense. if the Engineer considers it necessary or advisable that covered Work not contrary to Engineer's request or previously approved must be observed by the Engineer or inspected or tested by others, the Contractor, at the Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the Engineer may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, the Contractor shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals), and the town shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, they amy make a claim therefor. If, however, such Work is not found to be defective, the Contractor shall be allowed and increase in the Contract price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, the Contractor may make a claim therefor.

22.5 Town May Stop the Work: If the Work is defective, or the Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the town to stop the Work shall not give rise to any duty on the part of the town to exercise this right for the benefit of the Contractor or any other party.

22.6 Correction or Removal of Defective Work: If required by the Engineer, the Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by the Engineer, remove it from the site and replace it with nondefective Work. The Contractor shall bear all direct, indirect and

consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

22.7 One Year Correction Period: If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, the Contractor shall promptly, without cost to the town and in accordance with the town's written instructions, either correct such defective Work, or, if it has been rejected by the town, remove it form the site and replace it with nondefective Work. If the Contractor does not promptly comply with the terms of such instructions, or in any emergency where delay could cause serious risk of loss or damage, the town may have the defective Work (such costs to include, but not be limited to, fees and charges of engineers, architects, attorneys and other professionals). If any such acceptance occurs prior to the Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the town shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, the town may make a claim therefor. If the acceptance occurs after such recommendation, an appropriate amount will be paid by the Contractor to the town.

22.9 Town May Correct Defective Work: If the contractor fails within a reasonable time, after written notice of the Engineer, to correct defective Work or to remove and replace rejected Work as required by the Engineer, or if the Contractor fails to perform the Work in accordance with the Contract Documents, or if the Contractor fails to comply with any other provisions of the Contract Documents, the town may, after seven (7) days written notice to the Contractor, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph, the town shall proceed expeditiously. To the extent necessary to complete corrective and remedial action, the town may exclude the Contractor from all or part of the site, take possession of all or part of the Work, and suspend the Contractor's services related thereto, take possession of the Contractor's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which the town has paid the Contractor but which are stored elsewhere. The Contractor shall allow the town, the town's representatives, agents and employees such access to the site as may be necessary to enable the town to exercise the rights and remedies under this paragraph. All direct, indirect and consequential cost to the town in exercising such rights and remedies will be charged against the Contractor in an amount determined by the engineer, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and the town shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, the town may make a claim therefor. Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all costs of repair and replacement of work destroyed or damaged by correction, removal or replacement of the Contractor's defective Work. The Contractor shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by the town of the town's rights and remedies hereunder.

23. CHANGES IN THE WORK:

23.1 Modifications and Alterations: The Contractor agrees that the town shall have the right to make modifications, changes and alterations in the arrangement or extent of the work, without affecting the validity of the Contract and the Bonds thereunder.

23.1.1 If the modification or alteration increases the amount of work to be done, and the added work or any part thereof is of a type and character which can be properly and fairly classified under one or more unit price items of the Proposal, then such added work or part thereof shall be paid for according to the amount actually done and at the applicable unit price or prices therefor. Otherwise, such work shall be paid for as herein provided under "Extra Work".

23.1.2 If the modification or alteration decreases the amount of work to be done, such decrease shall not constitute the basis for a claim for damages or anticipated profits on work affected by such decrease. Where the value of omitted work is not covered by applicable unit prices, the Engineer shall determine, on an equitable basis, the amount of :

(a) credit due the town for contract work not done as a result of an authorized change;

(b) allowance to the Contractor for any actual loss incurred in connection with the purchase, delivery and subsequent disposal of materials or equipment required for use on the Work as planned and which could not be used in any part of the work as actually built; and

(c) any other adjustment of the contract Price where the method to be used in making such adjustment is not clearly defined in the Contract Documents.

23.1.3 Except for minor changes or adjustments which involve no adjustment in the Contract Price or other monetary consideration, and with the exception of adjustments of estimated quantities for unit price work or materials to conform to actual pay quantities therefor as hereinafter provided under "Estimated Quantities", all changes and alterations in the terms or scope of the Contract shall be made under the authority of duly executed Change Orders issued and signed by the town and accepted and signed by the contractor.

23.2 Extra Work: The term "Extra Work", as used in this Contract, shall be understood to mean and include all work that may be required by the town to be done by the Contractor to accomplish any change or alteration in or addition to the Work shown by the Plans or reasonably implied by the Specifications and not covered by items, and which is not otherwise provided under "Modifications and Alterations".

23.2.1 It is agreed that the Contractor shall perform all extra work under the direction of the Engineer when and as so ordered in writing by the town. It is further agreed that the compensation to be paid the Contractor for performing extra work shall be determined by one or more of the following methods:

Method A: By agreed unit prices; or

Method B: By agreed lump sum; or

Method C: If neither Method A nor Method B can be agreed upon before the extra work is started, the Contractor shall be paid his actual field cost of the work plus fifteen percent (15%) for the work which he performs with his own forces and/or the Contractor shall be paid the subcontractor's actual field cost of the work plus twenty percent (20%) for work which is performed by his subcontractor or subcontractors.

23.2.2 Where extra work is performed under Method C, the actual field cost of such extra work is hereby defined to be and shall include:

(a) the payroll cost for all workmen, such as foremen, mechanics, craftsmen, laborers;

(b) the cost of all materials and supplies not furnished by the town;

(c) rental for all power-driven equipment at agreed-upon rates for the time actually employed or used in the performance of extra work;

(d) transportation charges necessarily incurred in connection with any equipment authorized by the Engineer for use on said extra work and which is not already on the job;

(e) all power, fuel, lubricants, water, and similar operating expenses;

(f) all incidental expenses incurred as a direct result of such extra work, including sales or use taxes on materials, payroll taxes, and the additional premiums for construction bonds, workmen's compensation, public liability and property damages, and other insurance required by the Contract where the premiums therefor are based on payroll and materials costs.

23.2.3 The Engineer may direct the form in which the actual field cost shall be kept, and may also specify in writing before the work commences, the method of doing the work and the type and kind of machinery and equipment, if required, which shall be used in the performance of extra work under Method C. If machinery or heavy construction equipment is required for extra work, the authorization and basis for the use thereof shall be stipulated in the written extra work order. The applicable "plus" percentage (15% or 20%) of the actual field cost to be allowed and paid to the Contractor shall constitute full compensation for profit, overhead, superintendence, field office expense, and all other elements of cost not embraced within the actual field cost as herein defined.

23.2.4 No claim for extra work of any kind will be allowed unless ordered in writing by the town prior to commencement of said extra work. In case any orders or instructions, either oral

or written, appear to the Contractor to involve extra work for which he should receive compensation, he shall make a written request to the town for a written order authorizing such extra work. Should a difference of opinion arise as to what does or does not constitute extra work, or concerning the payment thereof, and the Engineer insists on its performance, the Contractor shall proceed with the Work after making a written request for a written extra work order and shall keep an accurate account of the actual field cost thereof as provided for Method C in the foregoing paragraph.

23.3 Extra Work a Part of Contract: If extra work is performed in accordance with the provisions of this Contract, such extra work shall be considered a part hereof and subject to each and all terms and conditions of said Contract.

24. PAYMENTS TO CONTRACTOR AND COMPLETION:

24.1 Estimated Quantities: Any and all estimated quantities stipulated in the Proposal under unit price items are approximate and are to be used only:

(a) as a basis for estimating the probable cost of the Work, and

(b) for the purpose of comparing the proposals submitted for the Work.

It is understood and agreed that the actual amounts of work done and materials furnished under unit price items may differ from such estimated quantities and that the basis of payment for such work and materials shall be the actual amount of work done and materials furnished in each case. The Contractor agrees that he will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amounts of work actually performed and materials actually furnished and the amounts estimated therefor in the Proposal or other Contract Documents.

24.2 Monthly Estimates and Payments: On or about the first day of each month, the Contractor will make an approximate estimate of the value of work done in conformity with the Plans and Specifications during the previous calendar month and of unused materials delivered for, and stored on the site of, the Work. The Contractor shall submit the estimate to the Engineer and furnish such detailed information as he may request to aid him in the review and recommendation for approval of monthly estimates. After each such estimate has been approved by the town (and any Federal or State funding agency), the town shall pay to the Contractor ninety percent (90%) of the amount of such estimated sum. For Contract amounts equal to or greater than $400,000, the town will either place the entire retainage in an interest bearing account, or reduce the amount of retainage to five percent (5%).

24.2.1 It shall be understood that payments made by the town for materials stored on the site shall be based only upon the actual cost of materials to the Contractor, and shall not include any overhead or profit to the Contractor.

24.2.2 Partial payment shall in general include only completed units or lump sum items. If the Contractor desires payment for partially completed lump sum items, he shall submit an

appropriate cost breakdown of such items prior to commencing Work on the Project. The Engineer will review the itemized breakdown and if he agrees with the breakdown, partial payments will be made accordingly. If the Engineer does not agree with the breakdown for any reason whatsoever, no partial payment will be make for such lump sum items.

24.3 Placing Work in Service: If desired by the town, portions of the Work may be placed in service when completed and the Contractor shall give proper access to the Work for this purpose; but such use and operation shall not constitute an acceptance of the Work, and the Contractor shall be liable for defects due to faulty construction until the entire Work under this Contract is finally accepted and for one year thereafter as stipulated under the Paragraphs hereinbefore which address defective work.

24.4 Completion and Acceptance of Work: On completion of the Work, the Engineer shall:

(a) satisfy himself, by examination and tests, that the Work has been fully and finally completed in accordance with the Plans, Specifications and Contract, and

(b) report such completion to the town Council.

24.4.1 Before final acceptance by the town of the Work, the Contractor shall submit to the town a notarized affidavit, in duplicate, stating under oath that all subcontractors, vendors and other persons or firms who have furnished or performed labor or furnished or performed labor or furnished materials for the Work have been fully paid or satisfactorily secured. Such affidavit shall bear or be accompanied by a statement, signed by the surety company who provided the Performance and Payment bonds for the Work, to the effect that said surety company consents to final payment to the Contractor being made by the town.

24.5 No Waiver of Rights: Neither the inspection by any of the town's officials, employees, or agents, nor any order by the town for payment of money, or any payment for, or acceptance of, the whole or any part of the Work by the town, nor any extension of time, nor any possession taken by the town or its employees, shall operate as a waiver of any provisions of this Contract, or of any power herein reserved to the town or any right to damages herein provided, nor shall any waiver of any breach in this Contract be held to be a waiver of any other or subsequent breach.

24.6 Final Estimate and Payment: After official approval and acceptance of the Work by the town the Contractor shall prepare a final estimate of the Work done under this Contract and the value thereof. Such final estimate shall be submitted to the town after its preparation has been approved and authorized as aforesaid; and the town shall, after said final estimate is made and certified, pay the entire sum so found to be due hereunder, after deducting all amounts to be kept and retained under any provision of this Contract. All prior estimates and payments shall be subject to correction in the final estimate and payment; but in the absence of error or manifest mistake, it is agreed that all estimates, when approved by the town, shall be conclusive evidence of the work done and materials furnished.

24.7 Release of Liability: The acceptance by the Contractor of the last payment shall operate as, and shall be, a release to the town and every officer and agent thereof, from all claims and liability hereunder for anything done or furnished for, or relating to the Work, or for any act or neglect of the town or of any person relating to or affecting the Work.

SUPPLEMENTARY CONDITIONS OF AGREEMENT

1. GENERAL DESCRIPTION OF WORK: The work to be performed under this Contract includes the furnishing of all supplies and appurtenances; providing all construction plant, equipment and tools; performing all work necessary for construction of various drainage improvements in Fairview.

2. CONTRACT SPECIFICATIONS: The Specifications which are bound herewith and which shall govern the materials furnished and the work to be performed in the construction of the work under this Contract and based thereon, are identified and indexed in the Table of Contents at the beginning of this volume of the Contract Documents.

3. COPIES OF SPECIFICATIONS: The Contractor will be furnished, without cost to him, five (5) copies of all Specifications enumerated in the foregoing paragraphs 2 and 3, together with any and all addenda thereto. The Contractor shall keep one copy of all such Specifications constantly accessible on the work site.

4. LIQUIDATED DAMAGES: Should the Contractor fail to complete the work within the required annual contract time, or within such extra time as may have been allowed by extension, the Town will deduct from any moneys due or coming due the Contractor, the sum of One Hundred Dollars ($300.00) for each calendar day that the work shall remain uncompleted. This sum shall be considered and treated not as a penalty but as fixed, agreed and liquidated damages due the Town from the Contractor for reasons of inconvenience to the public, added cost of engineering, administration, supervision, inspection and other items which have caused an expenditure of public funds resulting from his failure to complete the work within the time specified in the Contract.

6. INSURANCE: The Contractor shall provide Certificates of Insurance in accordance with Paragraph 21.2 of the GENERAL CONDITIONS. Insurance coverage shall be in the amounts specified below:

6.1 Workmen's Compensation

A. Definitions:

Certificate of cover ("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 Town.

Persons providing services on the project ("subcontractor" in Texas Labor Code § 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 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 included activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

B. The Contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011 (44) for 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 Town 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 Town showing that coverage has been extended.

E. The contractor shall obtain from each person providing a service on a project, and provide to the Town:

(1) a certificate of coverage, prior to that person beginning work on the project, so the Town 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 Town in writing by certified mail or personal delivery, within 10 days after the Contractor knew or should have known, of any changes that materially affects the provision of coverage of any person providing services on the project.

H. The Contractor shall post on each project site a notice, in the text form and manner prescribed by the Texas 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 Town 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 certificate 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 Town 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 agreement 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 Town to declare the contract void if the Contractor does not remedy the breach within ten days after receipt of notice of breach from the Town.

L. 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 Town prior to beginning work on the project;

(3) provide the Town, 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 Town:

(a) a certificate of coverage, prior to that person beginning work on the project, so the Town will have on file certificates of coverage showing coverage for all person 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 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 Town 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 serviced 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 in Figure 2 provided by the commission on the sample notice, without any additional works 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 or other service 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"

(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 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.

6.2 Employer's Liability Insurance: Liability limits for this insurance shall be not less than the following:

Employer's Liability	$1,000,000 each person

6.3 Bodily Injury and Property Damage Insurance: Liability limits for general liability insurance coverage under this policy shall be not less than the following:

Bodily	$1,000,000 each person $1,000,000 each accident
Property Damage	$1,000,000 each accident $1,000,000 aggregate

6.4 Comprehensive Automobile Liability Insurance: Liability limits for automobile liability insurance coverage under this policy shall be not less than the following:

Bodily	$1,000,000 each person $1,000,000 each person
Property Damage	$1,000,000 each accident

7. LICENSES, PERMITS AND CERTIFICATES: All licenses, permits, certificates, etc., required for and in connection with the work to be performed under the provisions of these Contract Documents shall be secured by the Contractor entirely at his own expense except for any permits required for work to be performed within State Rights-of-Way. These permits will be obtained by the Town from the Texas Department of Transportation.

8. WATER: All water required for and in connection with the work to be performed may be obtained from the Town at no expense. The Town will provide a meter for measuring any water obtained from the Town for execution of the work. Upon completion of the work, the Contractor shall remove all of his temporary service installations. The Contractor shall inform the Utility Superintendent prior to taking water.

9. POWER: All power for lighting, operation of Contractor's plant or equipment, or for any other use as may be required in the execution of the work to be performed under the provision of these Contract Documents shall be provided by the Contractor at his expense.

10. RIGHT-OF-WAY: The Contractor shall confine his construction operations to the street right-of-way as shown on the Plans, and shall use due care in placing construction tools, equipment, excavated materials, pipe materials and supplies, so as to cause the least possible damage to property and interference with traffic. The placing of such tools, equipment and materials shall be subject to the approval of the Engineer.

Where space within the right-of-way is not available for construction plant, the Contractor shall provide, at his own expense, any working area he requires, shall construct and maintain any roadway or other facilities required for this purpose and the cost thereof shall be included in the prices bid for the various items in the Proposal.

11. DAMAGE TO EXISTING STRUCTURES, MATERIALS OR EQUIPMENT: The Contractor will be held responsible for any damage to existing structures, work, materials or equipment because of his operations and shall repair or replace any such damaged structures, work, materials or equipment to the satisfaction of the Town Engineer at no additional cost to the Town.

12. PROTECTION AND MAINTENANCE OF PUBLIC AND PRIVATE PROPERTY: The Contractor shall protect, shore, brace, support and maintain all underground construction uncovered or otherwise affected by the construction work performed by him. All surfacing, driveways, curbs, walks, buildings, utility poles, guy wires, and other surface structures affected by construction operations in connection with the performance of the Contract, together with all sod and shrubs in areas crossed by or adjacent to the right-of-way, shall be maintained and, if removed or otherwise damaged, shall be restored to the original condition thereof as determined and approved by the Town Engineer. All replacements of such underground construction and surface structures or parts thereof shall be made with new materials conforming to the requirements of these Specifications or, if not specified, as approved by the Engineer. The Contractor shall be responsible for all damage to roads, railroads, shoulders, ditches, embankments, culverts, bridges, or other public or private property or facilities, regardless of location or character, which may be caused by moving, hauling, or otherwise transporting equipment, materials or men to or from the work or any part of site thereof, whether by him or his subcontractor or subcontractors. The Contractor shall make satisfactory and acceptable

arrangements with the Town, or with the agency or authority having jurisdiction over, the damaged property or facility concerning its repair or replacement or payment of costs incurred in connection with said damage.

13. RESPONSIBILITY OF CONTRACTOR FOR EMBANKMENT AND BACKFILL SETTLEMENT: The Contractor shall be responsible, financially and otherwise, for (a) any and all settlement of trench and other backfill and embankment which may occur from the time of original placement until the expiration of a period of one year from and after the date of final acceptance of the entire Contract under which the backfilling or embankment work was performed, (b) the refilling and repair of all backfill settlement and the repair or replacement to the original or a better condition of all tracks, pavement, top surfacings, driveways, walks, surface structures, utilities, drainage facilities, sod and shrubbery which have been damaged as a result of said settlement or which have been removed or destroyed in connection with replacement operations, and (c) any and all damage claims filed with or court actions brought against the Town for and on account of any damage or damages directly or indirectly caused by said settlement. The Contractor shall make or cause to be made, all necessary backfill or embankment replacements, and repairs or replacements appurtenant thereto, within thirty (30) days from and after due notification by the Town of settlement and resulting damage at any designated locations.

14. GUARANTY: The Contractor shall insure and guarantee the satisfactory operation of all the installation, the workmanship and restoration of the project area, including backfilll settlement. The project shall be guaranteed to be complete and to function correctly for a period of one year from the date of its acceptance and the Contractor hereby agrees to repair or replace any defective items occurring within that year, free of expense to the Town.

15. BARRICADES AND LIGHTS: All open trench and other excavations shall be provided with suitable barriers, signs, and lights to the extent that adequate protection is provided to the public against accident by reason of such open construction. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.

16. DIVISION OF WORK: Items for this contract shall be bid as either lump sum or unit price as shown on the summary of quantities in the Proposal. Whenever two or more items abut each other, the division of work shall be as defined in the Specifications and as shown on the Plans. If the Specifications do not define the division of work, the Contractor shall make such divisions at his own discretion. It is the intent of these Specifications that the completion of all bid items shall result in the completion of all work shown on the Plans.

17. MANUFACTURER'S RECOMMENDATION: When an item of work is stated to be in accordance with or conform to manufacturer's recommendations, that item shall be submitted to the Engineer in writing for approval and shall be done in accordance with the approved method.

18. QUALITY ASSURANCE: When manufacturer's names are specified herein, they are used to establish a specific minimum requirement for materials used in construction, performance, and dimensional compatibility. The naming of one manufacture is not intended to show preference, eliminate competition or prohibit other manufacturers from offering equipment conforming to the

requirements of the Contract Documents. The use of "or equal" items shall be done in accordance with Paragraph 18.8 of the GENERAL CONDITIONS.

19. PRE-CONSTRUCTION CONFERENCE: As stated in Paragraph 10 of the GENERAL CONDITIONS, a pre-construction conference will be set to discuss scheduling and coordination of the work under this Contract.

20. EXISTING UTILITIES: Certain pipe lines, sewers, culverts, drains, cables, and other existing subsurface structures in the vicinity of the work to be done are indicated on the Plans according to the best information available to the Town. However, the town does not guarantee the accuracy of the information. Any delay to the Contractor due to encountering pipe lines or structures shall not constitute a claim for payment or an extension of time. The Contractor shall be responsible for contacting the utility companies and arranging for an on-site inspection so that the company representatives may locate all facilities endangered by construction:

The Contractor shall be responsible for protecting such existing utilities and for repairs to such facilities in case of damage to same. Should there be relocations or adjustments of utilities necessary to accommodate construction activities, the Contractor shall cooperate with the Company(s) involved and will coordinate such relocations with the schedule of work herein.

21. PARTIAL USE OF IMPROVEMENTS: The Town, at its election, may give notice to the Contractor and place in use those sections of the improvements which have been completed, inspected and can be accepted as complying with the Technical Specifications, and if in its opinion, each such section is reasonably safe, fit and convenient, for the use and accommodation for which it was intended, provided:

a. The use of such sections of the Improvements shall in no way impede the completion of the remainder of the work by the Contractor.

b. The Contractor shall not be responsible for any damages or maintenance costs due directly to the use of such sections.

c. The use of such sections shall in no way relieve the Contractor of his liability due to having used defective materials or poor workmanship.

d. The period of guarantee stipulated in the Paragraph "Guaranty" of this Section, shall not begin to run until the date of the final acceptance of all work which the Contractor is required to construct under this Contract.

22. PROTECTION OF TREES AND SHRUBBERY: No trees shall be removed on the right-of-way except where their removal is authorized in writing by the Engineer.

Main tree roots shall not be cut except where they fall within the area to be occupied by the improvements. Excavation shall be done by and where necessary to prevent injury to roots or protected from permanent damage by reason of construction operations. Trimming of standing trees where required shall be as directed by the Engineer. All shrubbery outside of the right-of-way

which is damaged or removed by the Contractor shall be replaced under the directions of and to the satisfaction of the Town Engineer and property owner, by and at the expense of the Contractor.

23. REMOVAL AND REINSTALLATION OF ITEMS: Street signs, street stop signs, mail boxes and other existing items found within construction limits shall without damage be removed, stored and reinstalled in a condition comparable to pre-existing condition. Unless approved by the town, no extra pay shall be given if existing items are damaged by the Contractor and have to be replaced.

24. MAINTENANCE OF LOCAL TRAFFIC: The Contractor shall notify the Town Engineer at least 72 hours in advance of closure to provide ample time for notifying the public and providing detours. When notice of intended closure is given, the Contractor shall give the Town Engineer an estimate of the period of time that closure of the street will be necessary. Detour signs shall be installed at the locations shown on the Plans.

25. DUST CONTROL: Adequate precaution should be taken to insure excessive dust does not become airborne during construction. No separate payment will be made for performing dust control or for the water used for this purpose. The cost of these items shall be subsidiary to other items.

26. JOB SITE CONDITION: During the construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris, and rubbish as is practicable and shall remove same from any portion of the site, if in the opinion of the Town Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need thereof develops.

27. DISPOSAL OF WASTE: All trees, stumps, existing surface, waste concrete and reinforcing and other debris, which result from the Contractor's excavation and operations, shall be removed from the property. All waste or excess earth shall be either removed from the site or neatly spread on the job site in a manner satisfactory to the Town Engineer. The disposal site for all such waste shall be the responsibility of the Contractor unless otherwise instructed by the Town Engineer.

28. FAILURE OF MATERIALS TO MEET TESTING REQUIREMENTS: Should any materials test specified herein fail to meet the minimum requirements specified, the Contractor shall furnish additional testing, by an independent laboratory approved by the Town Engineer, as necessary to satisfy the Town Engineer that the failed condition or material has been corrected.

29. CONSTRUCTION SEQUENCE: The Contractor shall submit to the Engineer for approval his proposed sequence of construction. The Construction Sequence shall be approved by the Engineer prior to starting the work, and shall be in accordance with the above sequence for placement of new facilities into service.

30. RESIDENT PROJECT REPRESENTATIVE: The Town intends to have a Project Inspector to inspect the Work. All pipe bedding will be inspected prior to backfilling, and any

backfill over pipe not inspected shall be removed for inspection. The Project Inspector will observe the construction activities and note its conformance with the Plans and Specifications as well as the progress of the Work. The Inspector will notify the Contractor and Engineer of any discrepancies. He shall not authorize any deviations from the Contract Documents or interrupt the Contractor's progression of the Work without specific instructions from the Engineer.

31. STATE AND TOWN SALES TAX: The CONTRACTOR'S attention is directed to Texas House Bill 11 (72nd Legislature, 1st C.S.) which amended the Texas Tax Code Section 151.311 This amendment provides that by the CONTRACTOR entering into a separated contract, the CONTRACTOR will become a seller of materials purchased for the project, which will obviate paying taxes on materials incorporated into the project.
As a seller, the CONTRACTOR purchases materials and issues a resale certificate in lieu of paying the sales tax at the time of purchase. The Town, as an exempt entity, will at the time of the "sale" of the materials to the Town, thereby preclude the Town, and CONTRACTOR, from paying the sales tax on the materials. Execution of the Contract Agreement by the Town shall serve as the CONTRACTOR'S authorization to issue a resale certificate.
Services are not tax exempt. The CONTRACTOR will be required to pay all appropriate taxes for all services as set forth herein.

For purposes of these Contract Documents, the following definitions are provided for Materials and Services:

> Materials: Materials are those items which are tax exempt and are items physically incorporated into the facility constructed for the Town. Materials include, but are not limited to, purchased items such as pipe, embedment, the storage tank, concrete, manhole rings and covers and barrel sections, riprap, asphalt, roadbase and subbase, etc.
>
> Services: Services are those items that are not tax exempt and are items used by the CONTRACTOR but which are not physically incorporated into the Town's facility and/or are items which are consumed by construction. Services include, but are not limited to, items such as supplies, tools, concrete forms, scaffolding, temporary storage buildings, the purchase or rental or lease of equipment, skill and labor, etc.

For further information concerning taxes as they relate to materials and services, the CONTRACTOR shall refer to House Bill 11 and/or contact the Texas Comptroller of Public Accounts, Austin, Texas at (800) 252-5555.

32. WAGE RATES: The Contractor and any subcontractors shall pay not less than the current prevailing wage rates for the Fairview area to all laborers, workmen and mechanics employed by them in the execution of this Contract. The Town will not provide wage rates for this project and will not require submission of documentation of wages.

33. CONSTRUCTION STAKING: The Engineer has established a base line on the project, which is shown on the plans. Immediately prior to beginning of construction, the Town's Surveyor shall traverse the project with the Contractor to determine location of control points and bench marks. The Surveyor shall replace any of these controls and bench marks which may have been

disturbed. By using these control points and bench marks the Contractor shall provide all additional construction staking to establish proper line and grade for this project. It shall be the Contractor's responsibility to set any offset control points and bench marks deemed desirable such that, when construction activities disturb the base line, there will remain adequate horizontal and vertical control.

During this offset control staking procedure, the Contractor shall keep the Engineer informed regarding the controls being set. The Engineer may require additional control points if, in his opinion, those being set by the Contractor are not adequate to properly establish line and grade.

ITEM 303. PORTLAND CEMENT CONCRETE PAVEMENT

303.1. DESCRIPTION

This item shall consist of finished pavement constructed of Portland cement concrete on the prepared subgrade or other base course, in conformity with the plans, as herein specified and as supplemented and/or amended by special provisions and to the lines and grades as established by the OWNER. Concrete shall be considered of satisfactory quality, provided it is:

(1) Made of materials acceptable to the job and meeting the requirements of Item 303.2. Portland Cement Concrete Materials and special provisions and amendments thereto;
(2) In the proportions approved by the OWNER; and
(3) Mixed, placed, finished and cured in accordance with the requirements of these specifications and any special provisions.

303.2. PORTLAND CEMENT CONCRETE PAVEMENT MATERIALS

303.2.1. Aggregates for Portland Cement Concrete Pavement.

303.2.1.1. General Requirements. Aggregates for Portland cement concrete shall conform to the requirements contained in this Item and shall be approved by the OWNER prior to use. Aggregates shall be of such character that it shall be possible to produce workable concrete within the limits contained in this specification.

303.2.1.1.1. Storage. The manner of handling and storage of aggregates shall be such as to prevent intrusion of foreign materials and segregation of sizes. If materials are stored on the ground, the stockpile sites shall be grubbed, cleaned of all vegetation and leveled. In this case, the bottom six-in. layer of aggregate shall not be disturbed and shall not be used in the work.

Where two or more sizes or types of aggregates are delivered to the job, each size or type shall be stored separately.

Aggregates shall be stockpiled on the job or at a central batching plant for a minimum of 24-hours prior to use in the project. At the plant, the aggregate shall be wetted to a uniform moisture content of not less than three-percent below saturated surface dry condition before or while being loaded for shipment. Care shall be exercised to maintain this uniformity of moisture until the aggregates are used in the mix. Wetting of stockpiles to maintain the required percent moisture shall be performed at least 12-hours prior to use.

At the time of use, the aggregates shall be free from frozen material and foreign matter. All grass, wood, sticks, burlap, paper or other material which may have become mixed with the aggregates while stockpiled or in handling must be removed.

303.2.1.1.2. Aggregate Measuring. The fine and coarse aggregates shall be measured loose and separately.

By Weight. Aggregate weighing equipment shall conform to the requirements of ASTM C94 Standard Specification for Ready-Mixed Concrete and shall be approved by the OWNER prior to use.

By Volume. The volume measuring equipment shall consist of approved boxes, pans or mechanical devices, which, while in operation, shall give the required volumes of the different kinds of aggregates required for the several classes of concrete. Equipment shall also be so marked and designed that the OWNER can accurately and conveniently check the quantities of each aggregate being used.

Concrete made by continuous mixing shall conform to ASTM C685 Concrete Made by Volumetric Batching and Continuous Mixing.

303.2.1.1.3. Tests. Test of aggregates shall be made in accordance with the applicable current ASTM standards, listed in Table 303.2.1.1.3.(a) Aggregate Tests.

Table 303.2.1.1.3.(a) Aggregate Tests

ASTM Designation	Standard Specification or Standard Test Method (Title)
C29	Bulk Density ("Unit Weight") and Voids in Aggregate
C33	Concrete Aggregates
C40	Organic Impurities in Fine Aggregates for Concrete
C88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C123	Lightweight Particles in Aggregate
C125	Terminology Relating to Concrete and Concrete Aggregates
C127	Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
C128	Density, Relative Density (Specific Gravity) and Absorption of Fine Aggregate
C131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C136	Sieve Analysis of Fine and Coarse Aggregates
C142	Clay Lumps and Friable Particles in Aggregates
C330	Lightweight Aggregates for Structural Concrete
C535	Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
C641	Staining Materials in Lightweight Concrete Aggregates
D8	Terminology Relating to Materials for Roads and Pavements
D75	Sampling Aggregates
D422	Particle-Size Analysis of Soils
D4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
D2217	Wet Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants

303.2.1.2. Fine Aggregates. Fine aggregate shall consist of natural sand, manufactured sand or a combination of the two, with or without mineral filler. The sand, or mixture of sand, comprising a single fine aggregate, shall consist of clean, hard, durable, uncoated grains and shall be essentially free from clay lumps.

303.2.1.2.1. Foreign Material and Deleterious Substances. The maximum permissible percentage, by weight, of deleterious substances shall not exceed the amounts in Table 303.2.1.2.1.(a) Deleterious Substances in Fine Aggregates.

The fine aggregate shall be free from an excess amount of salt or alkali and at the time of use shall be free from frozen and/or all foreign material.

Table 303.2.1.2.1.(a) Deleterious Substances in Fine Aggregates

Substance	Maximum % by Weight
Material removed by decantation	3.0%[1]
Other deleterious substances such as coal, shale, coated grains and soft flaky particles	3.0%

1. An additional loss of two-percent by decantation may be allowed, provided this new additional loss is material of the same quality as specified for fine aggregate or mineral filler.

303.2.1.2.2. Gradation. The fine aggregate shall be well graded from fine to coarse and when tested by standard laboratory sieves shall meet the requirements of Table 303.2.1.2.2.(a) Grading Requirements for Fine Aggregates.

Table 303.2.1.2.2.(a) Grading Requirements for Fine Aggregates

Sieve	Percent Passing by Weight
⅜-in. sieve (9.5mm)	100%
No. 4 sieve (4.75mm)	95 to 100%
No. 8 sieve (2.36mm)	80 to 100%
No. 16 sieve (1.18mm)	50 to 85%
No. 30 sieve (600um)	25 to 65%
No. 50 sieve (300um)	10 to 30%
No. 100 sieve (150um)	0 to 10%
No. 200 sieve (75um)	0 to 3%

303.2.1.2.3. Mineral Filler. Stone dust or crushed sand may be added as a mineral filler, if so directed by the OWNER. Amounts of mineral filler shall not exceed 5-percent of the fine aggregate to improve the workability or quality specified for fine or coarse aggregates. When tested by standard laboratory sieves shall meet the requirements of Table 303.2.1.2.3.(a) Fine Aggregate Mineral Filler.

Table 303.2.1.2.3.(a) Fine Aggregate Mineral Filler

Sieve	Percent Passing
No. 30 sieve (600um)	95 to 100%
No. 100 sieve (150 um)	70 to 100%

303.2.1.2.4. Rejection. Fine aggregates which fail to meet the requirements of these specifications may be rejected by the OWNER. Such rejection shall incur no cost to the OWNER.

Fine aggregates sources, from which materials with properties not meeting these specifications are delivered, may be rejected as further supply sources to the project by the OWNER. Such rejection shall incur no cost to the OWNER.

303.2.1.3. Coarse Aggregates. Coarse aggregates shall consist of durable particles of crushed gravel, crushed stone, crushed blast furnace slag meeting the requirements of ASTM C989 (Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars) Grade 100 or 120, recycled crushed Portland cement concrete, or a combination of these.

303.2.1.3.1. Foreign Material and Deleterious Substances. The maximum permissible percentage, by weight, of deleterious substances shall not exceed the amounts in Table 303.2.1.3.1.(a) Deleterious Substances in Coarse Aggregates.

Aggregates shall be free from injurious amounts of salt, alkali, vegetable matter, or other objectionable material either free or as an adherent coating. At the time of their use, aggregates shall be free from frozen and/or all foreign material that may have become mixed with them in the stockpile.

Table 303.2.1.3.1.(a) Deleterious Substances in Coarse Aggregates

Substance	Maximum % by Weight
Material removed by decantation	1.0%
Shale, slate or other similar material	1.0%
Clay lumps	0.25%
Soft fragments	3.0%
Other deleterious substances, including friable, thin, elongated or laminated pieces	3.0%
The sum of all deleterious substances, exclusive of material removed by decantation	5.0%

303.2.1.3.2. Gradation. Coarse aggregates shall be well graded in size from coarse to fine. When tested by standard laboratory methods, coarse aggregates shall meet the requirements in Table 303.2.1.3.2.(a) Grading Requirements for Coarse Aggregates for percentage passing each sieve by weight.

Coarse aggregates of different characteristics, though tested and approved, shall not be mixed with other aggregates; but shall be stored, batched and weighed separately.

The difference in percent passing between two adjacent sieve sizes shall not exceed 20%.

Maximum Size Aggregate. The maximum size aggregate is defined as the clear space between the sides of the smallest square openings through which 95-percent of the weight of the aggregate can be passed. The maximum size of aggregates for paving concrete shall not exceed 1½-inches, and shall be reduced in size to meet the following conditions:

(1) one-fifth of the least dimension between forms of that part of the structure in which concrete is to be placed;
(2) three-fourths of the clear space between reinforcement; and
(3) one-third the depth of the slab.

Table 303.2.1.3.2.(a) Grading Requirements for Coarse Aggregates

Size No.	Nominal Size (Sieve with Square Openings)	Amounts Finer than Each Laboratory Sieve (Square-Opening), Mass Percent													
		100 mm (4 in)	90 mm (3½ in.)	75 mm (3 in.)	63 mm (2½ in.)	50 mm (2 in.)	37.5 mm (1½ in.)	25.0 mm (1 in.)	19.0 mm (¾ in.)	12.5 mm (½ in.)	9.5 mm (⅜ in)	4.75 mm (No. 4)	2.36 mm (No. 8)	1.18 mm (No. 16)	0.30 mm (No. 50)
1	90 to 37.5 mm (3½ to 1½ in.)	100	90 to 100	–	25 to 60	–	0 to 15	-	0 to 5	-	-	-	-	-	-
2	63 to 37.5 mm (2½ to 1½ in.)	-	-	100	90 to 100	35 to 70	0 to 15	-	0 to 5	-	-	-	-	-	-
3	50 to 25.0 mm (2 to 1 in.)	-	-	-	100	90 to 100	35 to 70	0 to 15	-	0 to 5	-	-	-	-	-
357	50 to 4.75 mm (2 in to No. 4)	-	-	-	100	95 to 100	-	35 to 70	-	10 to 30	--	0 to 5	-	-	-
4	37.5 to 19.00 mm (1½ to ¾ in.)	-	-	-	-	100	90 to 100	20 to 55	0 to 15	-	0 to 5	-	-	-	-
467	37.5 to 4.75 mm (1½ in to No. 4)	-	-	-	-	100	95 to 100	-	35 to 70	-	10 to 30	0 to 5	-	-	-
5	25.0 to 12.5 mm (1 to ½ mm)	-	-	-	-	-	100	90 to 100	20 to 55	0 to 10	0 to 5	-	-	-	-
56	25.0 to 9.5 mm (1 to ⅜ in.)	-	-	-	-	-	100	90 to 100	40 to 85	10 to 40	0 to 15	0 to 5	-	-	-
57	25.0 to 4.75 (1 to No. 4)	-	-	-	-	-	100	95 to 100	-	25 to 50	-	1 to 10	0 to 5	-	-
6	19.0 to 9.5 mm (¾ to ⅜ in.)		-	-	-	-	-	100	90 to 100	20 to 55	0 to 15	0 to 5	-	-	-
67	19.0 to 4.75 mm (¾ in to No. 4)	-	-	-	-	-	-	100	90 to 100	-	20 to 55	0 to 10	0 to 5	-	-
7	12.5 to 4.75mm (½ in to No. 4)	-	-	-	-	-	-	-	100	90 to 100	40 to 70	0 to 15	0 to 5	-	-
8	9.5 to 2.36 mm (⅜ in to No. 8)	-	-	-	-	-	-	-	-	100	85 to 100	10 to 30	0 to 10	0 to 5	–
89	9.5 to 1.18 mm (⅜ in to No. 16)	-	-	-	-	-	-	-	-	100	90 to 100	20 to 55	5 to 30	0 to 10	0 to 5
9[1]	4.75 to 1.18 mm (No. 4 to No. 16)	-	-	-	-	-	-	-	-	-	100	85 to 100	10 to 40	0 to 10	0 to 5

1. Although size 9 aggregate is defined in ASTM C125 Standard Terminology Relating to Concrete and Concrete Aggregates as a fine aggregate, it is included as a course aggregate when it is combined with a size 8 material to create a size 89, which is a course aggregate as defined by ASTM C125.

303.2.1.3.3. Tests. Results of tests performed according to the applicable standard test methods listed in Table 303.2.1.1.3.(a) Aggregate Tests shall meet the criteria specified by the OWNER. Coarse Aggregates shall have a percent wear of not more than 45 when tested by abrasion and impact in the Los Angeles machine, ASTM C131 and C535.

303.2.1.3.4. Rejection. Coarse aggregates which fail to meet the requirements of these specifications may be rejected by the OWNER. Such rejection shall incur no cost to the OWNER.

Coarse aggregate sources, from which materials with properties not meeting these specifications are delivered, may be rejected as further supply sources to the project by the OWNER. Such rejection shall incur no cost to the OWNER.

303.2.2. Portland Cement. Cement shall be either Type I, II, III or Type IP (ASTM C595 Blended Hydraulic Cements), of a standard brand of Portland cement which shall conform to the requirements of ASTM C150 Portland Cement, or other applicable test methods of the ASTM.

303.2.2.1. Delivery. Cement delivered in bags shall be legibly marked on the bag with brand and name of the manufacturer, shall be in good condition at the time of delivery, and shall contain 94-pounds (43kg) net. Bags of cement varying more than 5-percent from the specified weight may be rejected, and if the average net weight in any shipment, as determined by weighing 50 bags taken at random, is less than 94-pounds (43kg), the entire shipment may be rejected. Cement salvaged from discarded or used bags shall not be used.

Cement delivered in bulk may be used, provided the manner and method of handling is approved by the OWNER. When delivered in bulk, the brand name of the manufacturer contained in the shipping information

accompanying the shipment shall be furnished to the OWNER prior to the use of the cement. Bulk cement shall be weighed on approved scales.

Cement from different manufacturers, although tested and approved, shall not be mixed, except as approved by the OWNER.

The CONTRACTOR, when required, shall furnish to the OWNER, with each shipment of cement, a statement as the specific surface of the cement expressed in square-centimeters-per-gram.

303.2.2.2. Cement Weighing Equipment. Bulk cement shall be batched by weight. The scales shall be either the beam or springless dial type, of substantial construction with a maximum allowable error of 0.5-percent of the net load and with minimum gradations of not greater than 5-pounds (2.5kg). Provisions shall be made for indicating to the operator that the required load in the weight box or container is being approached, which device shall indicate at least the last 50-pounds (23kg) of the load. Dial type scales shall be provided with a pointer to the dial.

When a closed-type cement box is used, the cement-weighing scales shall be provided with a springless dial indicator or tare beam to indicate when the weigh box is empty. This indicator for the empty condition of the weigh box shall be in continuous operation. The weigh box shall be fitted with an approved vent and a tightly covered inspection opening of not less than 12-sq.in. (77-cm^2). The weigh box and scales shall be maintained in a satisfactory condition to meet the requirements for accuracy for weight.

303.2.2.3. Volume and Weight of Bag of Cement. A bag of cement as packed by the manufacturer and weighing 94-pounds (43kg) shall be considered 1-cubic-foot (0.28m^3).

303.2.2.4. Storage. Cement shall be stored in a suitable weathertight building which shall protect the cement from dampness, and placed in such manner that shall permit easy access for proper inspection and identification of each shipment.

303.2.2.5. Rejection. Cement may be rejected for failure to meet any of the requirements of this specification and shall be rejected under the following specific conditions:

(1) any bag of cement which has partially set or which contains any lumps or cakes;
(2) all cement salvaged from torn, discarded or used bags; or
(3) bulk cement which has partially set or which contains any lumps or cakes.

303.2.3. Chemical Admixtures. Unless otherwise provided in the plans or special provisions, approved types of chemical admixtures to minimize segregation, to improve workability or to reduce the amount of mixing water may be used in the rate of dosage specified by the OWNER and in accordance with the manufacturer's recommendations.

Admixtures shall be dispensed in a form by an accurate mechanical dispenser designed for convenient confirmation of the accuracy of measurement. Dispensers shall have sufficient capacity to measure at one time the full quantity required for each batch. Two or more admixtures of different types, such as a water-reducing and air-entraining admixture, may not be compatible when mixed together. Where different admixtures are used, they should be added to the batch separately unless it is known that they can be mixed together satisfactorily. Dosage of admixtures shall not vary from the dosage order by the OWNER by more than 5-percent. In addition:

(1) Chemical admixtures shall conform to ASTM C494 Chemical Admixtures for Concrete, Types "A", "D," "F" and "G" for concrete dosages in accordance with manufacturer's recommendations as specified by the OWNER.

Water-reducing admixtures conforming to ASTM C494, Types "A" and "F", shall be used to improve quality of concrete by obtaining specified strength at lower cement content and to increase slump without increasing water-cement ratio and may also be utilized in improving properties of concrete containing aggregates that are harsh or poorly graded.

Water-reducing, set retarding admixtures, conforming to ASTM C494, Type "D" and "G", may be used during hot weather concrete placement, so as to keep concrete workable during the entire placing period, in order that succeeding placements may be made without development of cold joints or discontinuities in the structural unit.

(2) OWNER'S option: High range water-reducing admixtures, super-plasticizers conforming to ASTM C494, Type "F" and "G", may be used to greatly reduce water content to obtain dense concrete with higher early strengths and maintain high slump or flowing concrete while maintaining low water-cement ratio for concrete that must be placed under difficult conditions such as pump or tremie methods, etc.

(3) Air-entraining admixtures shall conform to ASTM C260 Air-Entraining Admixtures for Concrete.

Dosage shall conform to recommendations of manufacturer, as specified by OWNER, and determined by field testing of concrete mixture by qualified testing personnel in accordance with ASTM C94 Ready-Mixed Concrete.

The CONTRACTOR shall secure the approval of the OWNER for the particular admixture which it proposes to incorporate into the concrete prior to actual use of the admixture. The CONTRACTOR shall furnish such information

and evidence that the OWNER may require in its determination of the acceptability of the proposed admixture. When the CONTRACTOR proposes to use an air-entraining admixture which has been previously approved by the OWNER, it shall submit a certification stating that the admixture is the same as that previously approved.

Either prior to or at any time during construction, the OWNER may require that the air-entraining admixture selected by the CONTRACTOR be tested to determine its effect upon the strength of the concrete. When so tested, a 7-day compressive strength of concrete, made with cement and aggregates in proportions to be used in the work and containing the admixture in an amount sufficient to produce from 3- to 6-percent entrained air in the plastic concrete, shall be no less than 85-percent of the strength of concrete, made with the same materials and with the same cement content and consistency but without the admixture.

Any other admixtures for whatever purpose shall have the approval of the OWNER prior to incorporation into the concrete mix.

303.2.4. Mineral Admixtures. Fly ash shall conform to the requirements of ASTM C618 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete, with the exception that the "Loss on Ignition" requirements shall be a maximum of 3-percent. Fly ash shall be sampled and tested at a frequency schedule in accordance with the requirements of ASTM C311 Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete. All sources of fly ash for use in Portland cement concrete shall conform to the requirements of Texas Department of Transportation (TxDOT) Material Specification DMS-8900 Fly Ash.

With the approval of the OWNER, fly ash may be used in all classes of concrete to replace a portion of the Portland cement in a mix design. Unless otherwise approved by the OWNER, the maximum cement reduction shall not exceed 25-percent by weight per cubic-yard of concrete. If historical data and general practice in locality of usage substantiates fly ash concrete using higher percentages, CONTRACTOR may submit written request to OWNER for review. Fly ash replacement shall be on a weight basis. The minimum replacement ratio shall be 1.0-pounds of fly ash per 1.0-pounds (1kg-per-1kg) of cement replaced.

The water-cement ratio of the concrete mix shall be based on total cementitious (cement plus fly ash) materials. Proposed concrete mix designs with materials certification data and laboratory or field mix test results on the properties of the fresh or hardened concrete shall be submitted to the OWNER for approval.

303.2.5. Mineral Filler. Mineral filler shall consist of stone dust, crushed sand or other inert material approved by the OWNER. Mineral filler may be added in amounts not to exceed 10-percent of the weight of the sand or mixture of sands to improve the workability or plasticity of the concrete mix. Such mineral filler shall be of the quality specified for fine or coarse aggregate, and when tested by laboratory methods shall meet the requirements of Table 303.2.5(a) Mineral Filler.

Where mineral filler is used, it shall be measured by volume or weighed and batched separately.

Table 303.2.5.(a) Mineral Filler

Sieve	Percent Retained on Sieve
No. 30 sieve (600um)	0%
No. 200 (75 um)	0% to 35%

303.2.6. Fibrous Reinforcement. At the OWNER'S option, fibrous reinforcement in concrete may be used unless otherwise shown on the plans or in the contract documents. Fibrous reinforcement shall not be used as a replacement for any reinforcement required for structural purposes.

303.2.6.1. Material. Fibers for reinforcement of concrete shall be in accordance with materials specified in ASTM C1116 Fiber-Reinforced Concrete and Shotcrete.

303.2.6.2. Length and Size. The fibers shall be length and size as specified in ASTM C1116.

303.2.6.3. Testing. Test methods ASTM C995 Time of Flow of Fiber-Reinforced Concrete Through Inverted Slump Cone, and ASTM C1018 Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam With Third-Point Loading) in addition to applicable ASTM methods for the testing of concrete shall be used to test the fiber-reinforced concrete. Performance of fiber-reinforced concrete shall meet all requirements as specified in Section 21 of ASTM C1116.

303.2.6.4. Rejection. Fibrous reinforcement or fiber-reinforced concrete may be rejected for failure to meet any of the requirements of this specification or ASTM C1116.

303.2.7. Water. Water for use in concrete shall be reasonably clean and free of oil, acid, alkali, organic matter or other deleterious substances. Water which is suitable for drinking or ordinary household uses may be accepted for use without being tested.

303.2.7.1. Source. Water shall be obtained preferably from a domestic water supply. Where other source of supply is proposed, the approval of the OWNER must be obtained prior to using the water.

303.2.7.2. Measuring Devices. The device for measuring the quantity of water shall indicate the quantity in gallons or pounds and fractions thereof. The operating mechanism shall regulate the quantity required for any given batch within one(1)-percent. The supply inlet shall be cut off automatically when the water is discharged into the mixer.

Upon approval of the OWNER, the water for any one batch in the mixer may be measured in approved cans, buckets or other containers, and no more than the required amount of water shall be introduced into the mixer. The measuring devices shall be checked at the beginning of each job.

303.2.7.3. Tests. If the water is of questionable quality, it shall be tested in accordance with the standard Method of Test of Quality of Water to be used in concrete, AASHTO T26.

303.2.7.4. Rejection. Water for use with cement may be rejected for failure to meet any of the requirements of this specification.

303.2.8. Dowel Bars. Dowel and tie bars shall be either straight or bent, smooth or deformed, as shown on the plans and shall conform to the requirements of Item 303.2.9. Steel Reinforcement. The dowel bars shall be coated with either hot asphalt or an alternate coating, as designated on the plans, to the extent shown on the plans.

303.2.8.1. Dowel Caps. Caps for slip dowel bars shall be of the length shown on the plans and shall have an internal diameter sufficient to permit the cap to freely slip over the bar. In no case shall the internal diameter exceed the bar diameter by more than ⅛-in. (0.3cm), and one end of the cap shall be rightly closed. The cap shall be installed to allow the bar to move not less than 1¼-in. (3cm) in either direction.

303.2.9. Steel Reinforcement. Concrete reinforcement is the metal (rods or fabric) imbedded in concrete in such a manner that the reinforcement and concrete act together in resisting forces.

303.2.9.1. Material. Unless otherwise specified or designated on the plans, the metal for all bar reinforcement shall be one of the following:

303.2.9.1.1. New billet steel. New billet steel shall meet the requirements of ASTM A615/A615M Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

303.2.9.1.2. Axle steel. Axle steel shall meet the requirements of ASTM A996/A996M Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

303.2.9.1.3. Rail steel. Axle steel shall meet the requirements of ASTM A996/A996M Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

The use of rail steel or axle steel shall not be permitted where bending of the bar is required.

Unless otherwise designated on the plans, all reinforcement steel bars shall be deformed in accordance with the requirements of ASTM A615/A615M or A996/A996M, as appropriate. Twisted bars are not considered deformed and shall not be used. The deformed bars shall provide a net sectional area at all points equivalent to that of plain square or round bars of equal nominal size.

Bars for spiral reinforcement shall be plain bars rolled from billets directly reduced from ingots and shall conform to the requirements of ASTM A615/A615M.

303.2.9.2. Sizes and Weights. The size and weight of reinforcing bars shall conform to the requirements of ASTM A615/A615M.

303.2.9.3. Bending. Reinforcement bars shall be bent cold to the shapes indicated on the plans. All bending of hard grade new billet steel shall be done in the shop. Bends shall be true to the shapes indicated, and irregularities shall be cause for rejection. Unless otherwise shown on the plans, bends for stirrups and ties shall be made around a pin having a diameter not less than two times the minimum thickness of the bar. Other bends shall be made according to the latest code of Standard Practice of the Reinforcing Steel Institute.

303.2.9.4. Storage. Reinforcement shall be stored above the ground surface upon skids, platforms or other supports, and shall be protected from mechanical injury and surface deterioration caused by exposure to the conditions producing rust. When placed in the work, the reinforcement shall be free from dirt, loose rust, scale, painting, oil or other foreign material.

303.2.9.5. Rejection. Reinforcement may be rejected for failure to meet any of the requirements of this specification, and specifically for the following:

(4) reinforcement exceeding the allowable variations,
(5) reinforcement not bent in accordance with the details,
(6) reinforcement with a coating of dirt, loose scale, paint, oil or other foreign substances which shall prevent bonding of the concrete and reinforcement, or
(7) twisted bars.

303.2.10. Steel Wire Reinforcement. At the OWNER'S option the use of welded wire fabric may be used in lieu of deformed reinforcement bars unless otherwise shown on the plans or in the contract specifications.

Welded wire fabric shall be delivered to the job site in sheets. Rolls of wire fabric shall not be permitted.

The size of welded wire fabric shall be 12 x 12- W 4 x W 4 with a nominal diameter in inches of 0.225 and a nominal weight 0.136 lbs/linear foot.

303.2.10.1. Material. Wire for fabric reinforcement shall be cold-drawn from rods hot-rolled from billets and shall conform to the requirements of ASTM A82 Steel Wire, Plain, for Concrete Reinforcement. Welded wire fabric shall conform to the requirements of ASTM A185 Steel Welded Wire Reinforcement, Plain, for Concrete.

303.2.10.2. Sizes and Weights. The properties of wire fabric shall conform to the requirements of ASTM A82 or ASTM A185, as appropriate.

303.2.10.3. Storage. Reinforcement shall be stored above the ground surface upon skids, platforms or other supports, and shall be protected from mechanical injury and surface deterioration caused by exposure to the conditions producing rust. When placed in the work, the reinforcement shall be free from dirt, loose rust, scale, paint, oil or other foreign materials.

303.2.10.4. Rejection. Reinforcement may be rejected for failure to meet any of the requirements of this specification, and specifically for the following:

(1) reinforcement exceeding the allowable variations,
(2) reinforcement not bent in accordance with the details,
(3) reinforcement with a coating of dirt, loose scale, paint, oil or other foreign substances which shall prevent bonding of the concrete and reinforcement, or
(4) twisted bars.

303.2.11. Reinforcement Bar Chairs. Reinforcement bar chairs or supports shall be of adequate strength (if specified) to support the reinforcement bars and shall not bend or break under the weight of the reinforcement bars or CONTRACTOR'S personnel walking on the reinforcing bars.

Bar chairs may be made of metal (free of rust), precast mortar or concrete blocks or plastic. Pre-cast mortar or concrete blocks must be approved by the OWNER; and the CONTRACTOR shall supply test data showing the strength of the mortar or concrete blocks.

For approval of plastic chairs, representative samples of the plastic shall show no visible indications of deterioration after immersion in a 5-percent solution of sodium hydroxide for 120-hours.

303.2.11.1. Rejection. Bar chairs may be rejected for failure to meet any of the requirements of this specification.

303.2.12. Joint Filler. Joint filler is the material placed in concrete pavement and concrete structures to allow for the expansion and contraction of the concrete.

303.2.12.1. Material. Expansion joint materials shall consist of boards or a premolded asphalt board tested in accordance with ASTM D545 Test Methods for Preformed Expansion Joint Fillers for Concrete Construction (Nonextruding and Resilient Types).

Boards for expansion joint filler shall be of the required size, shape and type indicated on the plans or required in the specifications. Boards shall be of selected stock of redwood, cypress, gum, southern yellow pine, or Douglas fir timber. The boards shall be sound heartwood and shall be free from sapwood, knots, clustered birdseyes, checks and splits. Occasional sound or hollow birdseyes, when not in clusters, shall be permitted, provided the board is free from any other effects that shall impair its usefulness as a joint filler. With the exception of redwood and cypress, all boards shall be preservative treated according to American Wood-Preservers' Association (AWPA) Standards.

Asphalt boards for expansion joint filler shall be of the required size and uniform thickness and, when used in transverse joints, they shall conform approximately to the shape of the pavement crown shown on the plans and details. Asphalt boards shall consist of two liners of 0.016 asphalt impregnated kraft paper filled with a mastic mixture of asphalt and vegetable fiber and/or mineral filler. Boards shall be smooth, flat and straight throughout, and shall be sufficiently rigid to permit ease of installation. Boards shall be furnished in lengths equal to the width between longitudinal joints, and may be furnished in strips or scored sheet of the required shape.

Asphalt boards, when tested in accordance with the following described methods, shall not deflect from the horizontal more than ¾-inches in 3½-inches (2cm in 9cm). A sample of the board, 2-in. (5cm) wide and 6-in. (15cm) long, flat, straight and cut with its length parallel to the lay of the fiber, shall be clamped between two blocks in the direction of its thickness in such manner that 3½-in. (9cm) length of the sample shall extend unsupported and at right angles from the common plane of the block faces. The samples and clamp so assembled shall be maintained at a temperature of 180°F (82°C) for 2-hours, with the length and width of the clamped portion of the sample horizontal after which the deflection from the horizontal of the unclamped portion shall be immediately measured.

303.2.12.2. Dimensions. The thickness of the expansion joint filler shall be shown on the plans; the width shall be not less than that shown on the plans, providing for the top seal space.

303.2.12.3. Rejection. Expansion joint filler may be rejected for failure to meet any of the requirements of this specification.

303.2.13. Curing Materials. This specification shall govern the materials to be used in the curing of concrete. The materials when applied as elsewhere specified shall retain the moisture, present in the concrete at the time of application of curing material, within specified limits for the curing period.

303.2.13.1. Material. Materials for the curing of concrete shall conform to the following requirements:

303.2.13.1.1. Membrane-Forming Compounds. The membrane curing compound shall conform to the requirements of ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete, Type 2, white pigmented compound, unless otherwise specified or indicated. It shall be of such nature that it shall not produce permanent discoloration of concrete surfaces nor react deleteriously with the concrete.

The compound shall produce a firm, continuous uniform moisture-impermeable film free from pinholes and shall adhere satisfactorily to the surfaces of damp concrete. It shall, when applied to the damp concrete surface at the specified rate of coverage, dry to touch in one(1)-hour and dry through in not more than 4-hours under normal conditions suitable for concrete operations. It shall adhere in a tenacious film without running off or appreciably sagging. It shall not disintegrate, check, peel or crack during the required curing period.

The compound shall not peel or pick up under traffic and shall disappear from the surface of the concrete by gradual disintegration.

The compound shall be delivered to the job site in the manufacturer's original containers only, which shall be clearly labeled with the manufacturer's name, the trade name of the material and a batch number or symbol with which test samples may be correlated.

When tested in accordance with ASTM C156 Water Retention by Concrete Curing Materials, the liquid membrane-forming compound shall restrict the loss of water present in the test specimen at the time of application of the curing compound to not more than 0.55-grams-per-square-centimeter (0.01-oz.-per-in^2) of surface.

303.2.13.1.2. Cotton Mats. The cotton mats used for curing shall meet the following requirements:

Each mat shall have a finished width of approximately 5-ft. 6-in. (1.7m); and after shrinkage shall be at least 6-in. (15cm) longer than the width of the concrete to be cured.

The mats shall be composed of a single layer of cotton filler, completely enclosed in a cover of cotton cloth. The cotton filler shall be of low-grade cotton, cotton linters of such shall contain not less than ¾-pound (0.34kg) of cotton filler per square-yard of mat, uniformly distributed. The cotton cloth used for covering material shall be Osnaburg, weighing not less than $6^3/_{10}$-ounces-per-square-yard (0.21-kg-per-sq.-m).

All mats shall be stitched longitudinally with continuous parallel rows of stitching at intervals of not more than 4-in. (10cm) or shall be tufted both transversely and longitudinally at intervals of not more than 3-in. (7.6cm). The sewing or tufting shall not be done so tightly that the mat shall not contact the surface of the concrete at all points when saturated with water.

To insure the complete covering of the concrete where the mats fit together, there shall be a flap extending all along one side of each mat. This flap shall be composed of two thicknesses of the cover material and shall be at least 6-in. (15cm) in width.

303.2.13.1.3. Waterproof Paper. Waterproof paper shall consist of two sheets of plain kraft paper cemented together with a bituminous material in which are imbedded cords or strands of fiber running in both directions of the paper, not more than 1¼-in. (3cm) apart. The paper shall be light in color; shall be free of visible defects; and shall have a uniform appearance. It shall be sufficiently strong and tough to permit its use under the conditions existing on streets and structural work without tearing or otherwise becoming unfit for the use for which it is intended. The paper shall conform to specifications for ASTM C171 Sheet Materials for Curing Concrete.

When tested in accordance with ASTM C156 Water Retention by Concrete Curing Materials, the paper shall restrict the loss of water present in the test specimen at the time of application of the waterproof paper to not more than 0.055-grams-per-square-centimeter of surface.

303.2.13.1.4. Polyethylene Film. Polyethylene film shall be opaque pigmented white in color; and shall be manufactured from virgin resin without additives or scrap. The film shall have a minimum thickness of 4-mils (0.004-in.). The permissible moisture loss from the concrete, when tested in accordance with ASTM C156 Water Retention by Concrete Curing Materials, shall not exceed 0.055-grams-per-square-centimeter of surface. The film shall be sufficiently strong and tough to permit its use under the conditions existing on paving or structural projects without being torn or otherwise rendered unfit for the use intended during the curing period. It shall be of uniform thickness throughout, free of pinholes and other blemishes.

303.2.13.2. Rejection. Concrete curing materials may be rejected for failure to meet any of the requirements of this specification.

303.2.14. Joint Sealant. Joint sealing compound shall consist of hot poured polymer or ready-mixed cold-applied sealant, or other material approved by the OWNER. It shall not crack or break when exposed to low temperatures. The cured sealant must not pick up or "track" at elevated road temperature.

303.2.14.1. Materials.

303.2.14.1.1. Hot Poured Polymer. The joint sealing compound shall melt to the proper consistency for pouring and shall solidify on cooling to atmospheric temperatures. At no time shall the material be heated to temperature exceeding 450°F (232°C); any material heated above 450°F shall be rejected.

Hot poured polymer shall be tested in accordance with TxDOT Test Method Tex-525-C Tests for Asphalt and Concrete Joint Sealers and shall meet the requirements in Table 303.2.14.1.1.(a) Hot Poured Polymer Sealant Requirements.

Table 303.2.14.1.1.(a) Hot Poured Polymer Sealant Requirements

Property	Test Parameters	Required Result
Penetration	32°F (0°C), 7-oz. (200-grams), 60-sec.	Minimum 0.1-in. (0.25-cm)
	77°F (25°C), 5-oz. (150-grams), 5-sec.	0.45- to 0.3-in. (1.1- to 0.75-cm)
Flow	5-hours, 140°F (60°C), 75° incline	Maximum 0.2-in. (0.5-cm)
Bond extension	15°F (-9°C), 5-cycles	no cracking of the joint sealing material or break in the bond between the joint sealer material and the mortar pieces

303.2.14.1.2. Ready-Mixed Cold-Applied. This sealant shall be a single component and shall consist of a homogeneous blend of asphalt emulsion, polymer, and inert filler. The material shall be a resilient, adhesive compound capable of effectively sealing properly cleaned joints and cracks in concrete and asphalt pavements against infiltration of moisture throughout repeated cycles of contraction and expansion and which shall not be picked up by vehicle tires, particularly at summer temperatures.

This Item covers an emulsion composed principally of a semi-solid asphalt base, water and emulsifying agent suitable for sealing cracks at ambient temperatures of 40°F (4°C) and higher. The emulsion shall be modified with a polymer and shall be smooth and homogeneous, with no evidence of polymer separation.

The cold-applied crack sealant shall meet the requirements in Table 303.2.14.1.2.(a) Cold-Applied Sealant Requirements. Material shall be free-flowing down to 40°F (4°C), such that routine pavement joints and cracks are filled to a depth of 1½-in. (3.8cm) without the addition of heat.

The material shall be furnished in 55-gallon drums.

Table 303.2.14.1.2.(a) Cold-Applied Sealant Requirements

Property	Test Method	Required Result	
		Minimum	Maximum
Viscosity[1], Brookfield, 77°F	ASTM D2196 Rheological Properties of Non-Newtonian Materials by Rotational (Brookfield type) Viscometer; Method A	6,000 Centipoise	25,000 Centipoise
Storage Stability Test, One-Day	AASHTO T59	-	1-Percent
Sieve Test	AASHTO T59	-	0.10-Percent
Evaporations[2] and Tests on Residue			
Residue	See Note 2.	65-Percent	-
Penetration test on Residue, 77°F, 100g, 5-seconds	AASHTO T49	35 (0.1-mm)	75 (0.1-mm)
Softening Point test on Residue, R.&B.	AASHTO T53	140°F (60°C)	-
Ductility test on Residue, 39.2°F, 5 cm/Min	AASHTO T51	100-cm	-

1. OWNER may require Viscosity Profile in lieu of single-spindle viscosity test, in which case the apparent viscosity shall be 10,000.
2. Residue may be obtained by the following evaporation procedure: Mass 200g of sealant into a 1000-ml beaker or a 1-quart can and place in a heating mantle designed for a 1000-ml beaker. During the evaporation the sealant should be stirred frequently to prevent foam-over or local overheating. The temperature shall be maintained between 260°F and 300°F (125°C and 150°C) for 3- to 5-minutes after the material is water free. Pour required specimen.

303.2.14.1.3. Thermoplastic Cold-Applied. If approved by the OWNER, thermoplastic cold-applied jointing material may be used according to manufacturer's recommendations.

303.2.14.2. Rejection. Materials may be rejected for failure to meet any of the requirements of this specification.

303.2.15. Elastomeric Materials. This material shall conform to the requirements of the TxDOT Item 435 Elastomeric Materials. This item shall govern for the materials, testing and fabrication of elastomeric materials, except as otherwise covered in other specifications or on the plans.

303.2.15.1. Rejection. Elastomeric materials may be rejected for failure to meet any of the requirements of this specification.

303.3. MIX DESIGN AND MIXING CONCRETE FOR PAVEMENT

303.3.1. Description. This section shall govern for the concrete in pavements.

303.3.2. Equipment. All machinery and equipment necessary for the prosecution of the work specified herein shall be on the project and shall be approved by the OWNER as to condition before the CONTRACTOR shall be permitted to begin operations on which the machinery or equipment is to be used. All machinery and equipment shall be maintained in good condition to insure the completion of the work without excessive delays for repairs and replacements.

303.3.3. Concrete Mix Design and Control. At least 10-days prior to the start of concrete paving operations, the CONTRACTOR shall submit to the OWNER a design of the concrete mix it proposes to use together with samples, if requested, of all materials to be incorporated into the mix and a full description of the source of supply of each material component. The proposed batch designs must be submitted to the Engineer on the approved form.

The design of the concrete mix shall produce a quality concrete complying with these specifications and meet the requirements of ACI 318 (1992) - PART 3 Construction Requirements, CHAPTER 5, Concrete Quality, except as amended by these provisions. The concrete mix design shall include the following information:

(1) Design Requirements and Design Summary
(2) Material source
(3) Dry weight of cement/cu. yd. and type
(4) Dry weight of fly ash/cu. yd. and type, if used
(5) Saturated surface dry weight of fine and coarse aggregates/cu. yd.
(6) Design water/cu. yd.
(7) Quantities, type, and name of admixtures with manufacturer's data sheets
(8) Current strength tests or strength tests in accordance with ACI 318
(9) Current Sieve Analysis and -200 Decantation of fine and coarse aggregates and date of tests
(10) Fineness modulus of fine aggregate
(11) Specific Gravity and Absorption Values of fine and coarse aggregates
(12) L.A. Abrasion of coarse aggregates

All material samples submitted to the OWNER shall be sufficiently large to permit laboratory batching for the construction of test specimens to check the adequacy of the design. When the OWNER has approved the design mix, there shall be no change or deviation from the proportions thereof or sources of supply except as hereinafter provided. No concrete may be placed on the job site until the mix design has been approved by the OWNER in writing to the CONTRACTOR.

303.3.4. Quality of Concrete.

303.3.4.1. Consistency. In general, the consistency of concrete mixtures shall be such that:

(1) the mortar shall cling to the coarse aggregate,
(2) the aggregate shall not segregate in concrete when it is transported to the place of deposit,
(3) the concrete, when dropped directly from the discharge chute of the mixer, shall flatten out at the center of the pile, but the edges of the pile shall stand and not flow,
(4) the concrete and mortar shall show no free water when removed from the mixer,
(5) the concrete shall slide and not flow into place when transported in metal chutes at an angle of 30° with the horizontal, and
(6) the surface of the finished concrete shall be free from a surface film or laitance.
(7) The concrete shall be uniform and workable.

The consistency of the concrete as placed should allow the completion of all finishing operations 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 amount. The concrete shall be workable, cohesive, possess satisfactory finishing qualities

and be of the stiffest consistency that can be placed and vibrated into a homogeneous mass. Excessive bleeding shall be avoided.

If the strength or consistency required for the class of concrete being produced is not secured with the minimum cement specified or without exceeding the maximum water/cement ratio, the CONTRACTOR may use, or the OWNER may require, an approved cement dispersing agent (water reducer); or the CONTRACTOR shall furnish additional aggregates, or aggregates with different characteristics, or the CONTRACTOR may use additional cement in order to produce the required results. The additional cement may be permitted as a temporary measure, until aggregates are changed and designs checked with the different aggregates or cement dispersing agent.

The CONTRACTOR is solely responsible for the quality of the concrete produced. The OWNER reserves the right to independently verify the quality of the concrete through inspection of the batch plant, testing of the various materials used in the concrete and by casting and testing concrete cylinders or beams on the concrete actually incorporated in the pavement.

303.3.4.2. Standard Classes. Unless otherwise shown on the plans or detailed specifications, the Standard Classes of Pavement Concrete shown in Table 303.3.4.2.(a) shall be used.

Streets, alleys, driveways, and inlets shall be constructed in accordance with these specifications using the classes of concrete, machine or hand finished, whichever is appropriate. Mass pour medians, noses, and islands shall use hand-finished concrete.

The testing does not in any way change the penalties imposed on the CONTRACTOR for deficient strength outlined elsewhere in these specifications.

Table 303.3.4.2.(a) Standard Classes of Pavement Concrete.

Class of Concrete[1]	Minimum Cementitious Lb./CY	28 Day Min. Compressive Strength[2] psi	28 Day Min. Beam Strength[2,3] psi	Maximum Water/ Cementitious Ratio	Coarse Aggregate Maximum Size[4]
A[5]	470	3000	500	0.58	1½"
C	564	3600	600	0.53	1½"
P1[6]	517	4000	N/A	0.49	1½"
P2[7]	564	4500	N/A	0.45	1½"
M	As directed by the OWNER or as shown on the plans				

1. All exposed horizontal concrete shall have entrained – air.
2. Minimum Strength Required by OWNER [Compressive or Flexural]
3. ASTM C78 (Third-Point); Reduce by 10% when Type II Cement is Used
4. Smaller nominal maximum size aggregate may be used if strength requirement is satisfied
5. Sidewalks, separate curb and gutter, and 4-inch thick median pavement
6. Machine Finished
7. Hand Finished

303.3.4.3. Performance Classes. Performance Classes of structural concrete shall meet the requirements in Table 303.3.4.3.(a) Performance Classes of Pavement Concrete.

Table 303.3.4.3.(a) Performance Classes of Pavement Concrete

Class of Concrete[1]	Minimum Cementitious Lb./CY	28-Day Compressive Strength psi	28-Day Flexural Strength[2,3] psi	Maximum Water/ Cementitious Ratio[4]	Coarse Aggregate Maximum Size[5]
PA	423	3000[6]	425	0.58	1½"
PC	517	3600[6]	510	0.53	1½"
PP1[7]	517	4000	N/A	0.48	1½"
PP2[8]	564	4500	N/A	0.44	1½"
PM	As directed by the OWNER or as shown on the plans				

1. All exposed horizontal concrete shall have entrained – air.
2. ASTM C78 (Third-Point); Reduce by 10% when Type II Cement is used
3. For early form removal
4. Consistent with ACI 211.1 Table 6.3.4(a) Relationship between water-cementitious materials ratio and compressive strength of concrete
5. Smaller nominal maximum size aggregate may be used if Strength requirement is satisfied
6. Calculated Average Required Compressive Strength Considering ACI 318 - Sec. 5.3.2.1 shall be strength shown times 1.15
7. Machine Finish
8. Hand Finish

303.3.4.4. Slump. Slump requirements for pavement and related concrete shall be as specified in Table 303.3.4.4.(a) Pavement Concrete Slump Requirements. No concrete shall be permitted with slump in excess of the maximums shown. Any concrete mix failing to meet the above consistency requirements, although meeting the slump requirements, shall be considered unsatisfactory, and the mix shall be changed to correct such unsatisfactory conditions.

Table 303.3.4.4.(a) Structural Concrete Slump Requirements.

Concrete Use	Avg. Slump (in.)	Max. Slump (in.)
Slip Form Paving	3	4
Hand formed paving	4	5
Sidewalk, Separate Curb and Gutter, and Other Miscellaneous Concrete	As specified by OWNER	

303.3.5. Mixing and Delivery. The concrete shall be produced in an approved method conforming to the requirements of this specification and ASTM C94/C94M Standard Specification for Ready-Mixed Concrete or National Ready-mixed Concrete Association (NRMCA). Ready-mix concrete shall be permitted in lieu of the paver-mixer. When ready-mix concrete is used, sampling provisions of ASTM C94 Alternate Procedure 2 shall govern. If fiber-reinforced concrete is used, mixing shall be in accordance with ASTM C1116 Fiber-Reinforced Concrete and Shotcrete. All materials for concrete placed in pavements shall conform to the requirements of the governing item of this specification.

303.3.5.1. Batch Mixing. The concrete shall be mixed in a batch mixer and only in such quantities as are required for immediate use. The mixing of each batch, after all materials are in the drum, shall continue until it produces a thoroughly mixed concrete of uniform mass as determined by established mixer performance ratings and inspection, or appropriate uniformity tests as described in ASTM C94. The entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch. Retempering or remixing shall not be permitted.

303.3.5.1.1. Mixer. The mixer shall produce concrete of uniform consistency and appearance.

303.3.5.1.2. Cleaning. The mixer shall be cleaned thoroughly each time when out of operation for more than 30 minutes.

303.3.5.2. Transit Mixing. When transit mixing is used, the transit mixer shall be of an approved revolving drum or revolving blade type so constructed as to produce a thoroughly mixed concrete with a uniform

distribution of the materials throughout the mass and shall be equipped with a discharge mechanism which shall insure the discharging of the mixed concrete without segregation.

303.3.5.2.1. Prevention of Leaking. The mixer drum shall be watertight when closed and shall be equipped with a locking device that shall automatically prevent the discharging of the mixer prior to receiving the required number of revolutions.

303.3.5.2.2. Mixing. The entire quantity of mixing water shall be accurately measured by a visible calibrated mechanism. Leaking water valves shall be considered as ample reason for condemnation of the mixer unit and removal from the job by the OWNER. Each batch shall be mixed not less than 70 nor more than 100 revolutions at the rate of rotation specified by the manufacturer as mixing speed. Any additional mixing shall be done at a slower speed specified by the manufacturer for agitation and shall be continuous until the batch is discharged.

303.3.5.2.3. Counters. Truck mixers shall be equipped with actuated counters by which the numbers of revolutions of the drum may be readily verified. The counters shall be actuated at the time of starting mixing at mixing speeds.

303.3.5.2.4. Delivery. The rate of delivery of the mixed concrete shall be such that the interval between loads shall not exceed 10-minutes. The concrete shall be delivered to the site of the work and discharged from the mixer before the drum has been revolved 300 revolutions, after the introduction of the mixing water with the dry materials.

303.3.5.3. Central Mixing Plant. A central mixing plant shall be allowed, provided the method of mixing and handling has first been approved by the OWNER.

303.3.5.4. Commercial Concrete Plants. In the event the CONTRACTOR elects to use concrete produced by a commercial concrete plant, an agreement shall be drawn and executed by the responsible executive management of said plant granting the OWNER ingress and egress to all parts of the plant with full authority to make any and all required tests of aggregates and to regulate and control all batching plant and/or central mixing plant operations. This regulatory control shall be applicable only to the concrete produced by the commercial plant for the payment herein specified.

303.3.5.5. Delivery Tickets. For transit mix operations, the manufacturer of the concrete shall, before unloading, furnish to the purchaser with each batch of concrete at the site a delivery ticket on which is printed, stamped, or written, the following information to determine that the concrete was proportioned in accordance with the approved mix design:

(1) Name of concrete supplier
(2) Serial number of ticket
(3) Date
(4) Truck number
(5) Name of purchaser
(6) Specific designation of job (name and location)
(7) Specific class, design identification and designation of the concrete in conformance with that employed in job specifications
(8) Amount of concrete in cubic yards (or cubic meters)
(9) Time loaded or of first mixing of cement and aggregates
(10) Water added by receiver of concrete and his/her initials
(11) Weight of cement
(12) Weight of fly ash
(13) Type and amount of admixtures
(14) Information necessary to calculate the total mixing water added by the producer (total mixing water includes free water on the aggregates, water and ice batched at the plant, and water added by the truck operator from the mixer tank);
(15) Maximum size of aggregate
(16) Weights of fine and coarse aggregate

For on-site concrete plant operations, the CONTRACTOR shall supply to the OWNER a batch ticket with the following information and for each continuous paving operation, provide receipts and invoices to substantiate the amounts of cement and fly ash used in the placement.

(1) At the beginning of each day's placement, a list of the actual batch weights to be used shall be given to the OWNER.
(2) When any changes are made, a new list of weights shall be given to the OWNER.

303.4. EQUIPMENT

303.4.1. General. All equipment necessary for the construction of this item shall be on the project and shall be approved by the OWNER as to condition before the CONTRACTOR shall be permitted to begin construction operations on which the equipment is to be used.

303.4.2. Field Laboratory. A field laboratory structure shall be required only when specifically required and provided for in the special provisions.

303.4.3. Slip Form Paver. Slip form paving equipment shall be provided with traveling side forms of sufficient dimensions, shape and strength so as to support the concrete laterally for a sufficient length of time during placement to produce pavement of the required cross section. The equipment shall spread, consolidate, screed and float-finish the freshly placed concrete in such a manner as to provide a dense and homogeneous pavement.

303.4.4. Forms. The side forms shall be metal, of approved cross section and bracing, of a height not less than the prescribed edge thickness of the concrete section, and a minimum of 10-ft. (3m) in length for each individual form. Forms shall be of ample strength and shall be provided with adequate devices for secure setting so that when in place they shall withstand the impact and vibration of equipment imposed thereupon without appreciable springing or settlement. In no case shall the base width be less than 8-in. (20cm) for a form 8-in. (20cm) or more in height. The forms shall be free from warps, bends or kinks and shall show no variation from the true plane for face or top. Each 10-ft. (3m) length of forms shall be provided with at least 3 pins for securely staking in position. Sufficient forms shall be provided for satisfactory prosecution of the work. 10-ft. (3m) metal form sections shall be used in forming curves with a 250-ft. (75m), and larger radius. For curves with a radius of less than 250-ft. (75m), acceptable flexible metal forms or wood forms may be used upon approval by the OWNER.

303.4.5. Mechanical Vibratory Equipment. All concrete placed for pavement shall be consolidated by approved mechanical vibrators operated ahead of the transverse finishing machine and designed to vibrate the concrete internally and/or from the surface. Unless otherwise shown on the plans, vibrators of the surface-pan type shall be used for full-depth placement. Both types of vibrators shall be furnished and may be used concurrently at the discretion of the OWNER. Vibratory members shall extend across the pavement practically to, but shall not come in contact with, the side forms. Mechanically-operated vibrators shall be mounted in such a manner as not to interfere with the transverse or longitudinal joints.

The internal-type vibrators shall be spaced at not more than 24-in. (61cm) and shall be equipped with synchronized vibratory units. Separate Vibratory units shall be spaced at sufficiently close intervals to provide uniform vibration and consolidation to the entire width of the pavement. The frequency in air of the internal spud-type Vibratory units shall be not less than 8,000-cycles-per-minute and not less than 5,000-cycles-per-minute for tube types. The method of operation shall be as directed by the OWNER. The CONTRACTOR shall have a satisfactory tachometer available for checking the vibratory elements.

The pavement vibrators shall not be used to level or spread the concrete but shall be used only for purposes of consolidation. The vibrators shall not be operated where the surface of the concrete, as spread, is below the elevation of the finished surface of the pavement, except for the first lift of concrete where the double strike-off method of placement is employed. The vibrators shall not be operated for more than 15-seconds while the machine upon which they are installed is still.

The pan-type vibrator units shall apply the vibrating impulses directly to the surface of the concrete. The operating frequency shall not be less than 3,500-cycles- nor more than 4,200-cycles-per-minute in air. The CONTRACTOR shall have a satisfactory tachometer available for checking the speed of the vibratory elements.

Approved hand manipulated mechanical vibrators shall be furnished in the number required for provision of proper consolidation of the concrete along the forms, at joints and in areas not covered by mechanically controlled vibrators. These vibrators shall be sufficiently rigid to insure control of the operating position of the vibrating head.

Complete and satisfactory consolidation of the concrete pavement is a most important requirement of this specification. Cores taken as required by Item 303.8. Pavement Testing and Evaluation shall be carefully examined for voids, honeycombing or other evidence of incomplete consolidation. If such evidence is present, changes in the consolidation procedures and/or equipment shall be made to insure satisfactory consolidation.

303.4.6. Vibrating Screed. The mechanically vibrated screed shall be provided with a template adjusted to the crown of the concrete section. The template shall be power vibrated, adjustable in height and mounted to ride on the forms. The mechanical vibration of one of the screeds on the transverse finishing machine specified in Item 303.4.7. Transverse Finishing Machine shall be acceptable.

303.4.7. Transverse Finishing Machine. The transverse finishing machine shall be provided with two screeds accurately adjusted to the crown of the pavement, shall be power driven and mounted in a substantial frame equipped to ride on the forms. The machine shall be so designed and operated as to strike off and consolidate the concrete.

Finishing machines shall be maintained in a tight and good operating condition, accurately adjusted to the required crown or profile and free from deflection, wobble or vibration tending to affect the surface finish. Machines failing to meet these requirements shall be rejected by the OWNER, and the CONTRACTOR shall provide approved equipment.

303.4.8. Miscellaneous Finishing Equipment. The CONTRACTOR shall furnish a broom of the push broom type not less than 18-in. (45cm) in width with stiff bristles for the final surface finish of concrete base or as the OWNER directs.

The CONTRACTOR shall furnish a sufficient number of bridges equipped to ride on the forms and span the pavement for finishing operations and for the installation and finishing of joints. The CONTRACTOR shall furnish, operate and maintain at least two standard 10-ft. (3m) steel straightedges and all necessary finishing and edging tools as may be required to complete the pavement in accordance with the plans and specifications.

303.5. CONSTRUCTION METHODS

303.5.1. Subgrade. When manipulation or treatment of subgrade is required on the plans, the work shall be performed in proper sequence with the preparation of the subgrade for pavement.

The roadbed shall be excavated and shaped in conformity with the typical sections and to the lines and grades shown on the plans or established by the OWNER. Material excavated in the preparation of the roadbed in excess of that needed to properly construct the subgrade, shoulders, slopes or parkway shall be wasted. If additional material is required, it shall be secured from sources indicated on the plans or designated by the OWNER. All holes, ruts and depressions shall be filled with suitable material and, if required, the subgrade shall be thoroughly wetted and reshaped. Irregularities of more than ½-in. (13-mm), as shown by straightedge or template, shall be corrected. The subgrade shall be uniformly compacted to at least 95-percent of the maximum density as determined by ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)). Moisture content shall be within minus-2%- to plus-4%-of-optimum. The prepared subgrade shall be wetted down sufficiently in advance of placing the pavement to insure its being in a firm and moist condition for at least 2-in. (5cm) below the surface. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of the work. No hauling or equipment shall be permitted on the finished subgrade.

The CONTRACTOR shall notify the OWNER at least three working days in advance of its intention to place concrete pavement.

Density tests must be taken no more than 72-hours prior to placement of concrete. After the specified moisture and density are achieved, the CONTRACTOR shall maintain the subgrade moisture and density in accordance with Item 301. Subgrade, Subbase, and Base Preparation until the pavement is placed. In the event that rain or other conditions may have adversely affected the condition of the subgrade or base, additional tests may be required as dierected by the OWNER.

303.5.2. Placing and Removing Forms. Forms shall be set to line and grade at least 200-ft. (60m), where practicable, in advance of the paving operations. Forms shall be adequately staked with at least three pins per 10-ft. (3m) section and capable of resisting the pressure of concrete placed against them and the thrust and the vibration of the construction equipment operating upon them without appreciable springing or settlement. Forms shall be jointed neatly and tightly and set with exactness to the established grade and alignment. Forms must be in firm contact with the subgrade throughout their length and base width. If the subgrade becomes unstable, forms shall be reset, using heavy stakes, or other additional supports may be necessary to provide the required stability.

303.5.2.1. Settling. When forms settle over ⅛-in. (3mm) under finishing operations, paving operations shall be stopped, the forms reset to line and grade and the pavement then brought to the required section and thickness.

303.5.2.2. Cleaning and Oiling. Forms shall be thoroughly cleaned after each use and well oiled before reuse.

303.5.2.3. Removal. Forms shall remain in place until the concrete has taken its final set. At the time the forms are removed, earth shall be banked against the sides of the slab and immediately and thoroughly wetted.

303.5.2.4. Curb. Superimposed or monolithic curb shall be formed from the flowline of the gutter to the top of the curb. All expansion joints in the curbs shall conform to the joint locations in the slab.

303.5.3. Placing Reinforcing Steel, Tie, and Dowel Bars. When reinforcing steel, welded wire mesh, tie bars, dowels, etc., are required, they shall be placed as shown on the plans. All reinforcing shall be clean, free from rust in the form of loose or objectionable scale, and of the type, size and dimensions shown on the plans. Reinforcing bars shall be securely wired together at the alternate intersections and all splices and shall be

securely wired to each intersection dowel and load-transmission unit intersected. All bars shall be installed in their required position as shown on the plans.

The storing of reinforcing or structural steel on completed roadway slabs generally shall be avoided and, where permitted, such storage shall be limited to quantities and distribution that shall not induce excessive stresses.

303.5.3.1. Installation. All reinforcing bars and bar mats shall be installed in the slab at the required depth below the finished surface and supported by and securely attached to bar chairs installed on prescribed longitudinal and transverse centers as shown by sectional and detailed drawings on the plans. After the reinforcing steel is securely installed above the subgrade, as specifically required by plans and as herein prescribed, there shall be no loading imposed upon (or walking upon) the bar mats or individual bars before or during the placing or finishing of the concrete.

303.5.3.2. Welded Wire Mats. Where welded wire fabric reinforcement mats are required by the plans, or permitted as an alternate by the OWNER, the concrete shall be placed and struck off by means of a template to the depth below the finished surface as specified for the location of the mesh. Welded wire mats, conforming to the specified side lap and end splice requirements as detailed on the plans, shall be placed upon the struck surface. The remainder of the concrete shall be placed thereupon with finishing operations proceeding immediately. There shall be no loading imposed upon the mesh mats after installation in the slab concrete.

303.5.3.3. Assembly. Expansion joints or dummy joints which may require an assembly of parts supported by special devices shall be completely assembled and rigidly supported in the correct position well in advance of the placing of concrete.

303.5.4. Joints.

303.5.4.1. Joint Dimensions. The width of the joint shall be shown on the plans, creating the joint sealant reservoir. The depth of the joint shall be shown on the plans. Dimensions of the sealant reservoir shall be in accordance with manufacturer's recommendations. Normal width/depth ratios are 1 to 1, not to exceed 1 to 1½. After curing, the joint sealant shall be ⅛-in. (3mm) to ¼-in. (6mm) below the pavement surface at the center of the joint.

303.5.4.2. Expansion Joints. Expansion joints shall be installed perpendicularly to the surface and to the centerline of the pavement at the locations shown on the plans.

303.5.4.2.1. Joint Filler. Joint filler shall be as specified in Item 303.2.12. Joint Filler, as approved by OWNER, of the size and shape shown on the plans.

Board joint material with less than 25-percent of moisture at the time of installation shall be thoroughly wetted on the job. Green lumber of much higher moisture content is desirable and acceptable.

The joint filler shall be appropriately drilled to admit the dowel bars when required. The bottom edge of the filler shall extend to or slightly below the bottom of the slab. The top edge shall be held approximately ½-in. (13mm) below the finished surface of the pavement in order to allow the finishing operations to be continuous. Where the joint filler is of a premolded asphaltic type, the top edge shall be protected, while the concrete is being placed and finished, by a metal cap of at least 10 gauge material having flanges not less than 1½-in. (38mm) in depth. The channel cap may remain in place during the joint finishing operations to serve as a guide for tooling the edges of the joint. After the removal of the side forms, the ends of the joints at the edges of the slab shall be carefully opened for the entire depth of the slab.

303.5.4.2.2. Curb. Where a superimposed curb or a separate curb and gutter may be used, the expansion joints therein shall coincide and be continuous with the pavement joint and of the same size and type.

303.5.4.2.3. Proximity to Existing Structures. When the pavement is adjacent to or around existing structures, expansion joints shall be constructed in accordance with the details shown on the plans.

303.5.4.2.4. Dowel Bars. Dowel bars, where required on the plans, shall be installed through the predrilled joint filler and rigidly supported in true horizontal and vertical positions by an assembly of bar chairs and dowel holders welded to transverse bars extending across the slab and placed on each side of the joint. The chair assembly shall be similar and equal to that shown on the plans and shall be approved by the OWNER prior to extensive fabrication.

303.5.4.3. Contraction Joints. Contraction or dummy joints shall be installed at the locations and at the intervals shown on the plans in accordance with this section and Item 402.3. Sawing. The joints shall be constructed by sawing to a ¼-in. (6mm) width and to a depth of ¼ of the pavement thickness, or deeper if so indicated on the plans. Unless otherwise specified on the plans, joints shall be sawed into the completed pavement surface as soon after initial concrete set as possible so that some raveling of the green concrete is observed in order for the sawing process to prevent uncontrolled shrinkage cracking. If sharp edge joints are being obtained, the sawing process shall be sped up to the point where some raveling is observed. Damage by blade action to the slab surface and to the concrete immediately adjacent to the joint shall be minimized. Any

portion of the curing membrane which has been disturbed by sawing operations shall be restored by spraying the areas with additional curing compound. The sawed groove shall immediately be thoroughly cleaned for the full depth and width of the joint and filled. The type of equipment and method for performing this work shall be approved by the OWNER.

303.5.4.4. Construction Joints. Construction joints formed at the close of each day's work or when the placing of concrete has been stopped for 30-minutes or longer shall be constructed by use of metal or wooden bulkheads cut true to the section of the finished pavement and cleaned and oiled. Wooden bulkheads shall have a thickness of not less than 1½-in. (38mm). Longitudinal bars shall be held securely in place in a plane perpendicular to the surface and at right angles to the centerline of the pavement. Edges shall be rounded to ¼-in. (6mm) radius. Any surplus concrete on the subgrade shall be removed upon the resumption of the work.

In no case shall an emergency construction joint be placed within 8-ft. (2.4m) following a regular installation of expansion or contraction joint. If the emergency construction joint should fall within this limitation, the concrete shall be removed back to the previously installed joint.

303.5.4.5. Longitudinal Parting Strips. Longitudinal parting strips or planes of weakness, when required, shall be accurately placed as shown on the plans.

303.5.4.6. Longitudinal Construction Joints. Longitudinal construction joints shall be of the type shown on the plans. Longitudinal joints shall be constructed accurately to required lines in order to coincide with traffic lane lines. No width between longitudinal construction joints shall exceed 24-ft. (7.2m), unless specifically authorized or directed by the OWNER in writing.

303.5.4.7. Joint Sealing. Routine pavement joints shall be filled to a depth of 1½-in. (3.8cm). Materials shall generally be handled and applied according to the manufacturer's recommendations, with additional requirements as stated herein.

303.5.4.7.1. Hot Poured Polymer. The sealing filler shall be melted in an approved oil-batch kettle with continuous mechanical agitation. The kettle shall be equipped with temperature indicators. The OWNER shall determine the optimum temperature for proper pouring fluidity, and the CONTRACTOR shall maintain the material within close range of optimum temperature. At no time shall the temperature exceed 450°F (232°C). Joint sealing compound shall not be poured at atmospheric temperatures below 32°F (0°C).

303.5.4.7.2. Ready-Mixed Cold-Applied. Permeation of joints shall principally be achieved without the task of squeegeeing. However, squeegeeing is recommended to assist permeation and to allow sealant to become rapidly tack-free. Sealant shall "set" in a fixed position within 40-minutes after application, to where traffic may be restored to the pavement without the effects of "tracking." "Tracking" shall be averted without the use of topping materials such as sand.

303.5.5. Placing Concrete. Unless otherwise shown on the plans, the concrete shall be placed using either forms or slipform paver. The concrete shall be rapidly deposited on the subgrade in successive batches and shall be distributed to the required depth and for the entire width of the pavement by shoveling or other approved methods. Any concrete not placed as herein prescribed within the time limits specified in Table 303.5.5.(a) Concrete Placement will be rejected.

Table 303.5.5.(a) Concrete Placement
Temperature –Time Requirements

Concrete Temp (at point of placement)	Max Time - minutes (no retarding agent)	Max Time – minutes (with retarding agent)[1]
Non-Agitated Concrete		
All temperatures	30	45
Agitated Concrete		
Above 90°F	45	75
Above 75 F thru 90°F	60	90
75°F and Below	90	120

1. Normal dosage of retarder

Where bar mats or wire mesh reinforcing is specified, method of concrete placement shall be in accordance with Item 303.5.3. Placing Reinforcing Steel, Tie, and Dowel Bars. Rakes shall not be used in handling concrete. The placing operation shall be continuous. At the end of the day, or in case of unavoidable interruption or delay of more than 30-minutes, a transverse construction joint shall be placed in accordance with Item 303.5.4.4. Construction Joints.

303.5.5.1. Honeycombing. Special care shall be taken in placing and spading the concrete against the forms and at all joints and assemblies so as to prevent honeycombing. Excessive voids and honeycombing in the edge of the pavement, revealed by the removal of the side forms, may be cause for rejection of the section of slab in which the defect occurs.

303.5.5.2. Weather Conditions. Except by specific written authorization of the OWNER, no concrete shall be placed when the air temperature is less than 40°F (4°C) and falling but may be placed when the air temperature is above 35°F (2°C) and rising, the temperature being taken in the shade away from artificial heat. When and if such permission is granted, the CONTRACTOR shall furnish sufficient protective material and devices to enclose and protect the fresh concrete in such a way as to maintain the temperature of the air surrounding the fresh concrete at not less than 50°F (10°C) for a period of at least 5-days. It is to be distinctly understood that the CONTRACTOR is responsible for the quality and strength of the concrete placed under any weather conditions. No concrete shall be placed on a frozen subgrade.

303.5.5.3. Time. Concrete shall not be placed before the time of sunrise and shall not be placed later than shall permit the finishing of the pavement during sufficient natural light.

303.5.6. Finishing.

303.5.6.1. Machine. When the concrete has been deposited, it shall be approximately leveled and then struck off to such elevation that, when mechanically screeded and tamped, the concrete shall be thoroughly compacted and finished to the required line, grade and section with all surface voids filled. Where bar mats or wire mesh reinforcing is specified, method shall be in accordance with Item 303.5.3. Placing Reinforcing Steel, Tie, and Dowel Bars.

303.5.6.1.1. Tolerance Limits. While the concrete is still workable, it shall be tested for irregularities with a 10-ft. (3m) straightedge placed parallel to the centerline of the pavement so as to bridge depressions and to touch all high spots. Ordinates measured from the face of the straightedge to the surface of the pavement shall at no place exceed $^{1}/_{16}$ inch-per-foot (1-mm-per-20-cm) from the nearest point of contact. In no case shall the maximum ordinate to a 10-ft. (3m) straightedge be greater than ⅛-in. (3mm). Any surface not within the tolerance limits shall be reworked and refinished.

303.5.6.1.2. Edging. The edges of slabs and all joints requiring edging shall be carefully tooled with an edger of the radius required by the plans at the time the concrete begins to take its "set" and becomes non-workable. All such work shall be left smooth and true to lines.

303.5.6.1.3. Stamp or Die. All concrete including curbs, curb with gutter, sidewalks, alleys, driveways and structures shall be marked by means of a substantial stamp or die so designed to make an impression in the finish of the concrete. The stamp or die shall designate the firm name or CONTRACTOR and the month and year in which the work was done. The design of the stamp or die shall be approved by the Engineer.

303.5.6.2. Hand. Hand finishing shall be permitted only in intersections and areas inaccessible to a finishing machine. The addition of one-sack of cement per cubic-yard shall be required for all hand finish concrete.

When the hand method of striking off and consolidating is permitted, the concrete, as soon as placed, shall be approximately leveled and then struck off and screeded to such elevation above grade that, when consolidated and finished, the surface of the pavement shall be at the grade elevation shown on the plans. The entire surface shall then be tamped and the concrete consolidated so as to insure maximum compaction and a minimum of voids. For the strike off and consolidation, both a strike template and tamping template shall be provided on the work. In operation the strike template shall be moved forward with a combined longitudinal and transverse motion and so manipulated that neither end of the template is raised from the forms during the striking-off process. A slight excess of material shall be kept in front of the cutting edge at all times.

The straightedge and joint finishing shall be as hereinabove prescribed.

303.5.7. Curing. The curing of concrete pavement shall be thorough and continuous throughout the entire curing period. Failure to provide proper curing as herein prescribed shall be considered as sufficient cause for immediate suspension of the paving operations. The curing method as herein specified does not preclude the use of any of the other commonly used methods of curing, and the OWNER may approve another method of curing if so requested by the CONTRACTOR. If any selected method of curing does not afford the desired results, the OWNER shall have the right to order that another method of curing be instituted. Immediately after the finishing of the surface, the pavement shall be covered with a continuous, uniform water-impermeable coating of the type specified in Item 303.2.13. Curing Materials. After removal of the side forms, the sides of the slab shall receive a like coating before earth is banked against them. The solution shall be applied, under pressure with a spray nozzle, in such a manner as to cover the entire surfaces thoroughly and completely with a uniform film.

The rate of application shall be such as to insure complete coverage and shall not exceed 200-square-feet-per-gallon of curing compound. When thoroughly dry, it shall provide a continuous and flexible membrane, free

from cracks or pinholes, and shall not disintegrate, check, peel or crack during the curing period. If for any reason the seal is broken during the curing period, it shall be immediately repaired with additional sealing solution.

When tested in accordance with ASTM C156 Water Retention by Concrete Curing Materials, the curing compound shall provide a film which shall have retained within the test specimen a percentage of the moisture present in the specimen when the curing compound was applied according to Table 303.5.7.(a) Water Retention by Curing Materials.

Table 303.5.7.(a) Water Retention by Curing Materials

Time	Minimum Retained Moisture
After 24-hours	97%
After 3-days	95%
After 7-days	91%

303.5.8. Opening Pavement to Traffic. All traffic shall be excluded from the pavement for a period of not less than 14-days or until field cured test specimens indicate concrete meets at least 75% of design strength, or as otherwise approved by the OWNER. In all cases the pavement shall be cleaned and joints shall be filled and trimmed before being opened to traffic.

303.5.8.1. Traffic Access. When it is necessary to provide for traffic across the pavement, the CONTRACTOR shall, at its own expense, construct suitable and substantial crossings over the concrete which shall be adequate for the traffic using same.

303.5.8.2. Time. Opening pavement to traffic shall not relieve the CONTRACTOR of responsibility for the work and shall not in any way affect the time charge on the entire project. The number of days stated in the contract shall govern for the completion of the entire work covered by the contract.

303.5.9. Monolithic Curb. Concrete for monolithic curb shall be the same as for the pavement and, if carried back from the paving mixer, shall be placed within 20-minutes after being mixed. Concrete may be placed from the separate mixer if desired but in any case must be placed while the pavement concrete is still plastic. After the concrete has been struck off and sufficiently set, the exposed surfaces shall be thoroughly worked with a wooden flat. The exposed edges shall be rounded by the use of an edging tool to the radius indicated on the plans. When the concrete in the curb has been sufficiently set, the inside form shall be carefully removed and the surface may be plastered with a mortar consisting of one part of Portland cement and two parts fine aggregate. The mortar shall be applied with a template or "mule" made to conform to curb dimensions. All exposed surfaces of curb shall be brushed to a smooth and uniform surface.

303.5.10. Superimposed Curb. When sawed joints are used, curbs shall be doweled as shown on the plans and poured after sawing. Doweled curbs which are placed with an extrusion machine shall have a mixture that conforms to Item 303.3. Mix Design And Mixing Concrete For Pavement.

303.5.11. Slip Form Paving. At the option of the CONTRACTOR, and with the approval of the OWNER, concrete pavement may be constructed by the use of slip form paving equipment.

The concrete, for the full paving width, shall be effectively consolidated by internal vibration with transverse vibrating units or with a series of longitudinal vibrating units loaded with the specified thickness of pavement section and at a minimum distance ahead of the screed equal to the pavement thickness.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels offset to run a sufficient distance from the edge of the pavement to avoid breaking or cracking the pavement edge.

Final finishing for slip form pavement construction shall be to the tolerance as specified in Item 303.5.6. Finishing.

303.6. ALLEY PAVING

Alley paving shall be constructed in accordance with the specifications for street paving hereinbefore described, in accordance with the details shown on the plans, and with the following additional provisions:

Alley paving shall be constructed to one of the typical cross sections shown on the plans.

Transverse expansion joints of the type shown on the plans shall be constructed at the property line on each end of the alley with a maximum spacing of 600-ft. (180m). Transverse contraction and dummy joints shall be placed at the spacing shown on the plans. Contraction and dummy joints shall be formed in such a manner that the required joints shall be produced to the satisfaction of the OWNER. All joints shall be filled with top seal in accordance with the requirements of Item 303.5.4. Joints.

303.7. PAVEMENT LEAVEOUTS

Pavement leaveouts as necessary to maintain and provide for local traffic shall be provided at location indicated on the plans or as directed by the OWNER. The extent and location of each leaveout required and a suitable crossover connection to provide for traffic movements shall be determined in the field by the OWNER. Left or right-turn lanes and median openings shall not be considered as pavement leaveouts.

303.8. PAVEMENT TESTING AND EVALUATION

303.8.1. Testing of Materials. Samples of all materials for test shall be made at the expense of the OWNER, unless otherwise specified in the special provisions or in the plans. In the event the initial sampling and testing does not comply with the specifications, all subsequent testing of the material in order to determine if the material is acceptable shall be at the CONTRACTOR'S expense at the same rate charged by the commercial laboratories. All testing shall be in accordance with applicable ASTM Standards and concrete testing technician must be ACI certified or equivalent.

303.8.2. Pavement Thickness Test. Upon completion of the work and before final acceptance and final payment shall be made, pavement thickness test shall be made by the OWNER. The number of tests and location shall be at the discretion of the OWNER, unless otherwise specified in the special provisions or on the plans. The cost for the initial pavement thickness test shall be the expense of the OWNER. In the event a deficiency in the thickness of pavement is revealed during normal testing operations, subsequent tests necessary to isolate the deficiency shall be at the CONTRACTOR'S expense. The cost for additional coring test shall be at the same rate charged by commercial laboratories.

Where the average thickness of pavement in the area found to be deficient in thickness by more than 0.20-in. (5mm), but not more than 0.50-in. (12.5 mm), payment shall be made at an adjusted price as specified in Table 303.8.2.(a) Concrete Pavement Deficiency.

Table 303.8.2.(a) Concrete Pavement Deficiency

Deficiency in Thickness Determined by Cores		Proportional Part of Contract Price
Inches	mm	Allowed
0.00 — 0.20	0.0 — 5.0	100 percent
0.21 — 0.30	5.3 — 7.5	80 percent
0.31 — 0.40	7.8 — 10.0	70 percent
0.41 — 0.50	10.3 — 12.5	60 percent

Any area of pavement found deficient in thickness by more than 0.50-in. (12.5mm) but not more than 0.75-in. (19mm) or $^1/_{10}$ of the plan thickness, whichever is greater, shall be evaluated by the OWNER. If, in the judgment of the OWNER, the area of such deficiency should not be removed and replaced, there shall be no payment for the area retained. If, in the judgment of the OWNER, the area of such deficiency warrants removal, the area shall be removed and replaced, at the CONTRACTOR'S entire expense, with concrete of the thickness shown on the plans. Any area of pavement found deficient in thickness by more than 0.75-in. (19mm) or more than $^1/_{10}$ of the plan thickness, whichever is greater, shall be removed and replaced, at the CONTRACTOR'S entire expense, with concrete of the thickness shown on the plans.

No additional payment over the contract unit price shall be made for any pavement of a thickness exceeding that required by the plans.

303.8.3. Pavement Strength Test.

303.8.3.1. For Standard Classes of Concrete. During the progress of the work, the CONTRACTOR shall cast test cylinders, in accordance with ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field, to maintain a check on the compressive strengths of the concrete being placed.

In accordance with ASTM C31 and ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete, four test cylinders shall be taken from a representative portion of the concrete being placed for every 150-cubic yards of concrete pavement placed, but in no case shall less than 2 sets of cylinders be taken from any one day's placement.

After the cylinders have been cast, they shall remain on the job site and then transported, moist cured, and tested by the OWNER in accordance with ASTM C31 and ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

In each set, one of the cylinders shall be tested at 7-days, two cylinders shall be tested at 28-days, and one cylinder shall be held or tested at 56-days, if necessary.

If the 28-day test results indicate deficient strength, the CONTRACTOR may, at its option and expense, core the pavement in question and have the cores tested by an approved laboratory, in accordance with ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete and ACI 318 protocol, except the average of all cores must meet 100% of the minimum specified strength, with no individual core resulting in less than 90% of design strength, to override the results of the cylinder tests.

The CONTRACTOR shall be responsible for the proper storage, maintenance, and any required curing of concrete test samples made by the OWNER. The CONTRACTOR shall provide and maintain curing facilities for the purpose of curing concrete test specimens on site in accordance with ASTM C31. The cost of all materials used in test specimens and the cost of storing, maintaining and of providing and maintaining curing facilities will not be paid for as a separate contract pay item, and the costs thereof shall be considered incidental to the contract pay items provided.

Cylinders and/or cores must meet minimum specified strength. Pavement not meeting the minimum specified strength shall be subject to the money penalties or removal and replacement at the CONTRACTOR'S expense as shown in Table 303.8.3.1.(a) Standard Class Concrete Deficiency Penalties.

Table 303.8.3.1.(a) Standard Class Concrete Deficiency Penalties.

Percent Deficient	Percent of Contract Price Allowed
Greater Than 0% — Not More Than 5%	95-percent
Greater Than 5% — Not More Than 10%	90-percent
Greater Than 10% — Not More Than 15%	80-percent
Greater Than 15%	60-percent or removed and replaced at the entire cost and expense of CONTRACTOR as directed by OWNER.

The amount of penalty shall be deducted from payment due to CONTRACTOR; such penalty deducted is to defray the cost of extra maintenance.

These requirements are in addition to the requirements of Item 303.9. Measurement and Payment.

The strength requirements for structures and other concrete work are not altered by this special provision.

No additional payment over the contract unit price shall be made for any pavement of strength exceeding that required by plans and/or specifications.

303.8.3.2. For Performance Classes of Concrete. During the progress of the work, the CONTRACTOR shall cast test cylinders, in accordance with ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field, to maintain a check on the compressive strengths of the concrete being placed.

In accordance with ASTM C31 and ASTM C172 Standard Practice for Sampling Freshly Mixed Concrete, four test cylinders shall be taken from a representative portion of the concrete being placed for every 150-cubic yards of concrete pavement placed, but in no case shall less than 2 sets of cylinders be taken from any one day's placement.

After the cylinders have been cast, they shall remain on the job site and then transported, moist cured, and tested by the OWNER in accordance with ASTM C31 and ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

In each set, one of the cylinders shall be tested at 7-days, two cylinders shall be tested at 28-days, and one cylinder shall be held or tested at 56-days, if necessary.

If the 28 day test results indicate deficient strength, the CONTRACTOR may, at its option and expense, core the pavement in question and have the cores tested by an approved laboratory, in accordance with ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete and ACI 318 protocol, to override the results of the cylinder tests.

The CONTRACTOR shall be responsible for the proper storage, maintenance, and any required curing of concrete test samples made by the OWNER. The CONTRACTOR shall provide and maintain curing facilities for the purpose of curing concrete test specimens on site in accordance with ASTM C31. The cost of all materials used in test specimens and the cost of storing, maintaining and of providing and maintaining curing facilities will not be paid for as a separate contract pay item, and the costs thereof shall be considered incidental to the contract pay items provided.

Cylinders and/or cores must meet the specified strength in accordance with ACI 318 protocol. Pavement not meeting the specified strength shall be subject to the money penalties or removal and replacement at the CONTRACTOR'S expense as shown in Table 303.8.3.2.(a) Performance Class Concrete Deficiency Penalties.

Table 303.8.3.2.(a) Standard Class Concrete Deficiency Penalties.

Percent Deficient	Percent of Contract Price Allowed
Greater Than 0% — Not More Than 5%	95-percent
Greater Than 5% — Not More Than 10%	90-percent
Greater Than 10% — Not More Than 15%	80-percent
Greater Than 15%	60-percent or removed and replaced at the entire cost and expense of CONTRACTOR as directed by OWNER.

The amount of penalty shall be deducted from payment due to CONTRACTOR; such penalty deducted is to defray the cost of extra maintenance.

These requirements are in addition to the requirements of Item 303.9. Measurement and Payment.

The strength requirements for structures and other concrete work are not altered by this special provision.

No additional payment over the contract unit price shall be made for any pavement of strength exceeding that required by plans and/or specifications.

303.8.4. Random Drying Shrinkage Cracks and Stress Cracks. Random drying shrinkage cracks or stress cracks of widths greater than 0.025-inches (0.6mm) in recently placed reinforced Portland cement concrete pavement placed on stabilized subbase or slabs on grade are subject to being removed and replaced at the discretion of the OWNER. Random drying shrinkage cracks or stress cracks of any nature in recently placed non-reinforced Portland cement concrete pavement placed on non-stabilized subbase or slabs on grade are subject to being removed and replaced at the discretion of the OWNER. Recently placed concrete pavement or slabs on grade are those for which the one-year maintenance bond has not expired. Routing, by any means, and sealing random cracks will not be permitted. When Portland cement concrete pavement or slabs on grade must be removed and replaced, the area of removal must extend from the nearest contraction or dummy joint or construction joint a minimum distance of 10-feet (3m), measured parallel to the longitudinal axis of the pavement, and include that portion of the concrete pavement or slab on grade containing the random crack. A sawed dummy joint will be required to be sawed across the opposing, non-damaged, slab in line with the saw cut made for the removal of the damaged slab. The area of removal and replacement of slabs containing longitudinal random cracks will be determined by the OWNER or its representative. Randomly cracked Portland cement concrete sidewalks will require removal and replacement of only the five-feet long section or sections containing random cracks.

303.9. MEASUREMENT AND PAYMENT

Portland cement concrete pavement shall be measured by the square-yard (m^2) of completed and accepted pavement. Measurement for reinforced concrete pavement shall be by the square-yard (m^2) measured in its final position.

The work performed and material furnished as prescribed by this item and measured as provided in this item shall be paid for at the unit price bid per square-yard (m^2) for concrete pavement or the adjusted unit price for pavement of deficient thickness as provided under Pavement Thickness Test and Pavement Strength Test, which price shall be full compensation for shaping and fine grading the roadbed, including furnishing and applying all water required; for furnishing, loading and unloading, storing, hauling and handling all concrete ingredients, including all freight and royalty involved; for mixing, placing, finishing and curing all concrete; for furnishing and installing all reinforcing steel; for furnishing all materials and placing longitudinal, warping, expansion, and contraction joints, including all steel dowels, dowel caps and load transmission units required, wire and devices for placing, holding and supporting the steel bar, load transmission units, and joint filler material in the proper position; for coating steel bars where required by the plans; for all manipulations, labor, equipment, appliances, tools, traffic provisions and incidentals necessary to complete the work.

(2) a piece broken out of the bell or spigot or tongue or groove end of such size that the watertightness of the joint should be impaired,
(3) a shattering or flaking of concrete or other conditions indicating an improper concrete mix,
(4) lack of uniformity in placement of steel which might preclude all joints being typical of those tested,
(5) cracks sufficient to impair the strength, durability or serviceability of the pipe,
(6) failure to conform with any of the specifications herein set forth or referenced,
(7) the complete absence of distinct web-like markings, which may be indicative of a deficiency of water in the concrete mix, from the external surface of the pipe made by any process in which the forms are removed immediately after the concrete has been placed, unless specimens submitted for test that do not have such web-like markings shall have passed the physical tests required by these specifications,
(8) failure of pipe to go completely "home" due to binding of spigot against bell or tongue against groove,
(9) failure to pass any of the tests in Item 501.5.9. Tests,
(10) joint sections with spalls, cracks, fractures, or other imperfections that could adversely affect the performance of the joint,
(11) failure to meet the requirements for coatings and linings.

501.6. REINFORCED CONCRETE CULVERT, STORM DRAIN, PIPE AND BOX SECTION

This item shall govern reinforced concrete culvert, storm drain, pipe and precast reinforced concrete box sections. Pipe shall be cured in accordance with the applicable ASTM Designations for each type of pipe as referred to below.

501.6.1. Reinforced Concrete Culvert, Storm Drain, and Pipe.

501.6.1.1. General. Except as applicable to Item 501.6.1.1.1. Alternate Concrete Pipe D-Load Design, circular reinforced concrete pipe shall conform to ASTM C76 (C76M) Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; arch pipe shall conform to ASTM C506 Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe; elliptical pipe shall conform to ASTM C507 Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe, of the class as designed on the plans subject to the following modifications:

(1) all pipe shall be machine-made by a process which shall provide for uniform placement of zero slump concrete in the form and compaction by mechanical devices which shall assure a dense concrete in the finished product.
(2) sizes larger than 60-in. (1524mm) diameter shall be manufactured using two lines of circular reinforcement.
(3) where Class III pipe of sizes larger than 60-in. (1500mm) diameter are specified, the manufacturer may at its option furnish pipe manufactured with either Wall "B" or Wall "C" minimum thicknesses and the applicable minimum steel area as listed for circular cages in Table II of ASTM C76 (C76M), provided tests strength requirements for Class III pipe are satisfactorily met.

501.6.1.1.1. Alternate Concrete Pipe D-Load Design. When bedding is specified in accordance with Item 504.5.2.16. Alternate Embedment for Concrete Pipe, reinforced concrete pipe shall conform to ASTM C1417 (C1417M) Manufacture of Reinforced Concrete Sewer, Storm Drain, and Culvert Pipe for Direct Design. This specification covers the manufacture and acceptance of precast concrete pipe designed to conform to the OWNER's design requirements and to ASCE 15-93, ASTM C655 (C655M) Specification for Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe, or an equivalent design specification. Conditions of 501.6.1.1. modifications (1) and (2) apply to pipe provided under this specification.

501.6.1.2. Sizes and Permissible Variations. Variations in diameter, size, shape, wall thickness, reinforcement, placement of reinforcement, laying length and the permissible underrun of length shall be in accordance with the applicable ASTM specification for each type of pipe as referred to previously.

Where rubber gasket pipe joints are to be used, the design of joints and permissible variations in dimensions shall be in accordance with ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets, Sections 5 and 6.

501.6.1.3. Joints. Pipe to be placed along curves shall consist of whatever pipe joint lengths or beveled end joints of pipe or combination thereof that are required to place the pipe on the designated centerline curve with no more than one-half of the tongue length of the pipe exposed from its normal fully closed joint position. The amount of bevel, "drop" or shortening of the pipe joint length by the bevel shall not exceed the amount shown in Table 501.6.1.3.(a) Maximum Bevel or Drop for the pipe sizes indicated.

Table 501.6.1.3.(a) Maximum Bevel or Drop

Pipe Diameter	Maximum Amount of Bevel or Drop
From 12-in. (305mm) to 27-in. (685mm), inclusive	3.1875-in. (80mm)
From 30-in. (760mm) to 51-in. (1295mm), inclusive	5-in. (125mm)
From 54-in. (1370mm) to 84-in. (2135mm), inclusive	6-in. (150mm)
From 90-in. (2285mm) to 96-in. (2440mm), inclusive	6.5-in. (165mm)

501.6.1.3.1. Gaskets. Unless otherwise specified on the plans or in the special provisions, pipe joints shall be sealed with either of the following types of gaskets; Cold-applied preformed plastic gaskets or Expanded Cellular Rubber Gaskets. Each joint shall require one continuous gasket conforming to the joint shape. Gasket cross-sectional diameters shall be in accordance with the manufacturer's recommendations.

Cold-Applied Preformed Plastic Gaskets. Plastic gasket shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes, or obnoxious odors.

The gasket joint sealer shall not depend on oxidizing, evaporating nor chemical action for its adhesive or cohesive strength and shall be supplied in extruded rope-form of suitable cross section. The size of the plastic gasket joint sealer shall be in accordance with the manufacturer's recommendations and sufficient to obtain the squeeze out as described under construction methods. The gasket joint sealer shall be protected by a suitable removable two-piece wrapper. The two-piece wrapper shall be so designed that one-half may be removed longitudinally without disturbing the other half to facilitate application as noted below.

The chemical composition of the gasket joint sealing compound as shipped shall meet the requirements of Table 501.6.1.3.1.(a) Sealing Compound Chemical Composition when tested in accordance with the test methods shown. The gasket joint sealing compound when immersed for 30-days at ambient room temperature separately in 5-percent solution of caustic potash, a mixture of 5-percent hydrochloric acid, a 5-percent solution of sulfuric acid and a saturated H_2S Solution, shall show no visible deterioration.

Table 501.6.1.3.1.(a) Sealing Compound Chemical Composition

Composition	Test Method	Percent by Weight
Bitumen (petroleum plastic content)	ASTM D4 Bitumen Content	50-70
Ash-Inert Mineral Matter	AASHTO T-111	30-50
Volatile Matter at 325°F (163°C)	ASTM D6 Loss on Heating of Oil and Asphaltic Compounds	2.0 Max.

The physical properties of the gasket joint sealing compound as shipped shall meet the requirements of Table 501.6.1.3.1.(b) Sealing Compound Physical Properties when tested in accordance with the test methods shown.

Table 501.6.1.3.1.(b) Sealing Compound Physical Properties

Property	ASTM Test Method	Typical Analysis
Specific Gravity at 77°F	D71 Relative Density of Solid Pitch and Asphalt (Displacement Method)	1.20 to 1.35
Ductility at 77°F (cm)	D113 Ductility of Bituminous Materials	5.0 min.
Softening Point at 77°F	D36 Softening Point of Bitumen (Ring-and-Ball Apparatus)	320°F min.
Penetration: 32°F. (300-gms) 60-sec.	D217 Cone Penetration of Lubricating Grease	75 min.
77°F (150-gms) 5-sec.		50 to 120
115°F (150-gms) 5-sec.		150 max.
Flash Point C.O.C.	D92 Flash and Fire Points by Cleveland Open Cup Tester	600°F
Fire Point C.O.C.		625°F

Expanded Cellular Rubber Gaskets. Expanded cellular rubber gaskets shall be produced from tubular cross-sections of a blend of nitrile and vinyl polymers meeting the physical requirements of ASTM D1056 Flexible Cellular Materials-Sponge or Expanded Rubber, Class 2C1.

501.6.1.4. Workmanship and Finish. Pipe shall be substantially free from fractures, large or deep cracks and surface roughness. The ends of the pipe shall be normal to the walls and centerline of the pipe within the limits of variations allowed as stated previously.

501.6.1.5. Pipe Marking. Markings shall be indented on the pipe section or painted thereon with waterproof paint. The following information shall be clearly marked on each section of pipe:

(1) the class of pipe,
(2) the date of manufacture,
(3) the name or trademark of the manufacturer,
(4) where elliptical reinforcement is used, one end of each section or joint of pipe shall be clearly marked during the process of manufacture or immediately thereafter on the inside and the outside of opposite walls to show the location of the "top" or "bottom" of the pipe as it should be installed.
(5) "Top" and "bottom" shall be required on pipe, unless pipe has such an external shape that the correct position of the top and bottom is obvious.

501.6.1.6. Tests. The acceptability of the pipe in all diameters, strengths and classes shall be determined by such material tests performed as required in ASTM C76 (C76M), C506 or C507; by the results of the three-edge bearing test for the load to produce a 0.01-in. (0.25mm) crack and ultimate load and by absorption tests on selected samples from the wall of the pipe in accordance with ASTM C497 (C497M) Concrete Pipe, Manhole Sections, or Tile; and by inspection of the finished pipe to determine its conformance with the design prescribed in these specifications and its freedom from defects.

Testing rates shall be as follows, except that in no case fewer than two specimens shall be furnished:

(1) If subjected to three-edge-bearing tests for the 0.01-in. (0.25mm) crack only, testing shall be performed on 0.8-percent of the number of pipe sections of each size included in the order. Pipes that have been tested only to the formation of a 0.01-in. (0.25mm) crack and that meet the 0.01-in. (0.25mm) test load requirements shall be accepted for use.
(2) If subjected to three-edge-bearing tests for both the 0.01-in. (0.25mm) crack and the ultimate load, testing shall be performed on 0.2-percent of the number of pipe sections of each size included in the order.

As an alternate to the three-edge-bearing test, concrete pipe 60-in. (150cm) in diameter and over may be accepted, at the option of the manufacturer, on the basis of material tests and inspection of the completed product. Acceptability of pipe on this basis shall be determined by the results of material tests as required in ASTM C76, C506 or C507; by crushing tests on cores taken from the barrel of the completed and cured pipe; by absorption tests on samples from the wall of the pipe; and by inspection of the finished pipe, including amount and placement of reinforcement, to determine its conformance with the design prescribed in these specifications and its freedom from defects.

The manufacturer shall furnish facilities and personnel for taking the cores from the pipe barrel and for determining the compressive strength of the samples. When the cores cut from a section of pipe successfully meet the strength requirement, the core-holes shall be plugged and sealed by the manufacturer in a manner such that the pipe section shall meet all of the test requirements of ASTM C76, C506 or C507. Pipe sections, so sealed, shall be accepted for use.

Tested pipe accepted for use shall be marked "TEST" or otherwise appropriately identified. Should any of the test specimens fail to meet the test requirements, two consecutive joints in the same mix series shall be tested and results shall be a basis of accepting or rejecting the pipe of the series.

501.6.1.7. Rejection of Pipe. All rejected pipe shall be plainly marked by the Engineer and shall be replaced by the CONTRACTOR with pipe that meets the requirements of these specifications. Such rejected pipe shall be removed immediately from the site of the work.

501.6.2. Precast Reinforced Concrete Box Sections. Precast reinforced concrete box sections shall conform to ASTM C789 (C789M) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers, or ASTM C850 (C850M) Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers With Less Than 2 Feet of Cover Subject to Highway Loadings. Two-piece box culverts, if approved by the OWNER, must meet or exceed the load requirements of ASTM C789 and ASTM C850. Materials and construction methods, unless otherwise specified, shall conform to the requirements of Item 702.8. Precast and Cast-In-Place Concrete Units.

501.7. DUCTILE-IRON PRESSURE PIPE AND FITTINGS

501.7.1. General. Ductile-iron pressure pipe 4-in. through 64-in. shall conform to the American National Standard for Ductile-Iron Pipe Centrifugally Cast for Water or Other Liquids, AWWA C151. Polyethylene encasement for ductile iron pipe systems shall conform to Item 502.8. Polyethylene Wrap for Metal Pipe and Fittings.

ITEM 508. OPEN CUT – STORM WATER CONDUIT INSTALLATION

508.1. DESCRIPTION

This item shall govern and control the furnishing and placing of culvert pipe and/or conduits or drainage lines, including pipe fittings, connecting drain lines to curb inlets, all joints, all connections to new or existing pipe or headwalls, manholes, catch basins etc., to the lines and grades shown on the plans. All pipe and fittings shall be of the types, shapes, classes, sizes and dimensions as shown thereon; and as may be required to complete the work as shown on the plans.

508.2. GENERAL

508.2.1. Excavation, Embedment, and Backfill. All excavation, pipe embedment, and backfill shall conform to the relevant requirements of Item 504. Open Cut – Backfill, with modifications specified herein.

508.2.2. Trenchless Installation. Where tunneling or jacking methods are shown on the plans or permitted by the Engineer, methods shall conform to the requirements of Item 503. Trenchless Installation.

508.3. REINFORCED CONCRETE PIPE FOR STORM WATER

This item shall govern and control the furnishing and placing of reinforced concrete storm water collection system.

508.3.1. Materials. Reinforced concrete pipe and jointing materials shall conform to the requirements of Item 501.6. Reinforced Concrete Culvert, Storm Drain, Pipe and Box Section.

508.3.2. Installation of Pipe. The CONTRACTOR shall furnish, at its own expense, and place in position as directed by the Engineer all necessary batter boards, string lines, plummets, graduated poles, etc., required in establishing and maintaining the lines and grades. The batter boards and all location stakes must be protected from possible damage or change of location.

All pipe and fittings shall be laid and jointed in a dry trench.

Unless otherwise authorized by the Engineer, the laying of the pipe on the prepared foundation shall be started at the outlet or downstream end with the spigot or tongue end of the pipe joint pointing downstream. Laying shall proceed toward the inlet or upstream end with each abutting section of pipe properly matched, true to the established lines and grades. Approved facilities shall be provided for hoisting and lowering the sections of pipe or the sides of the trench. The ends of the pipe shall be carefully cleaned before the pipe is placed in the trench. As each length of the pipe is laid, the open end shall be protected to prevent the entrance of earth or bedding material. The pipe shall be fitted and matched so that when laid in the prepared bedding, it shall form a smooth, uniform conduit. When elliptical pipe with circular reinforcing or circular pipe with elliptical reinforcing is used, the pipe shall be laid in the trench in such a position that the markings "top" or "bottom" shall not be more than 5° from the vertical plane through the longitudinal axis of the pipe.

508.3.3. Jointing. Jointing shall be one of the following types: Cold applied preformed plastic gaskets or Expanded cellular rubber gaskets. Jointing materials shall conform to the requirements of Item 501.6.1.3. Joints. Gasket installation practices shall be in accordance with the manufacturer's recommendations.

508.3.3.1. Cold Applied Preformed Plastic Gaskets. A suitable primer of the type recommended by the manufacturer of the gasket joint sealer shall be brush applied to the tongue-and-groove joint surfaces and the end surfaces and allowed to dry and harden. No primer shall be applied over mud, sand or dirt or sharp cement protrusions. The surface to be primed must be clean and dry when primer is applied. Primer that shows cracking or flaking at time of installation shall not be accepted.

Before laying the pipe in the trench, attach the plastic gasket sealer around the tapered tongue or tapered groove near the shoulder or hub of each pipe joint. Remove the paper wrapper from one side only of the two-piece wrapper on the gasket and press it firmly to the clean, dry pipe-joint surface. The outside wrapper is not to be removed until immediately before pushing the pipe into its final position.

When the tongue is correctly aligned with the flare of the groove, remove the outside wrapper on the basket and pull or push the pipe home with sufficient force and power (backhoe shovel, chain hoist, ratchet hoist or winch) to cause the evidence of squeeze-out of the gasket material on the inside or outside around the complete pipe joint circumference. Remove any joint material that pushed out onto the interior of the pipe that would tend to obstruct the flow. Pipe shall be pulled home in a straight line with all parts of the pipe on line and grade at all times. Pipe damaged by this operation shall be subject to review by the OWNER and, if necessary, a change in the jointing procedure may be required. Backfilling of pipe laid with plastic gasket joints may proceed as soon as the joint has been inspected and approved by the Engineer. Special precautions shall be taken in placing and compacting backfill to avoid damage to the joints.

When the atmospheric temperature is below 60°F, plastic joint seal gaskets shall either be stored in an area warmed to above 70°F, or artificially warmed to this temperature in a manner satisfactory to the Engineer. Gaskets shall then be applied to pipe joints immediately prior to placing the pipe in the trench, followed by connection to previously laid pipe.

508.3.3.2. Expanded cellular rubber gaskets. Joints using expanded cellular rubber gaskets do not need to be primed. If they are primed, be certain the primer is cured and non-tacky before installing gaskets.

The CONTRACTOR shall provide a copy of the manufacturer's installation instructions to the Engineer. Just before laying the pipe in the trench, stretch the gasket around the tapered tongue (or wedge it into the tapered groove) near the shoulder or hub of each pipe joint. Treat these low-tensile gaskets gently when handling. Box culvert gaskets have mitered corners and should be grasped by these corners when handling or stretching over tongues. When the tongue is correctly aligned with the flare of the groove, pull or push home with sufficient force and power (winch, ratchet hoist, chain hoist or backhoe shovel) to compress the gasket to the extent that the joint gap falls within the recommended range around the entire pipe joint circumference.

CAUTION: Do not close the joint flush, or completely flatten the gasket.

Joint gap ranges for each gasket size are shown in Table 508.3.3.2.(a) Joint Gap Ranges.

Table 508.3.3.2.(a) Joint Gap Ranges

Gasket Sizes as Printed on Parts	Joint Gap Range	
	Minimum	Maximum
3/8″ x 3/8″	3/8″	3/4″
1/2″ x 3/8″	3/8″	7/8"
3/4″ x 3/8″	3/8″	1"
1/2″ x 1/2″	1/2″	1-1/8"
3/4″ x 1/2″	1/2″	1-1/4"
7/8″ x 1/2″	1/2″	1-1/4"
1-1/8″ x 1/2″	1/2″	1-3/8"
1/2″ x 3/4″	3/4″	1-1/2"
5/8″ x 3/4″	3/4″	1-1/2"
3/4″ x 3/4″	3/4″	1-5/8"
7/8″ x 3/4″	3/4″	1-5/8"

508.3.4. Fittings.

508.3.4.1. Poured Concrete Pipe Collars. At all changes in pipe sizes in the conduit line, except at manholes, a pipe collar, as shown in detail on the plans, shall be provided. The locations at which such collars are to be provided are shown on the plan-profile sheets, and their costs are to be included in the price bid for furnishing and installing reinforced concrete pipe. No extra payment shall be made for the installation of concrete pipe collars as shown on the plan-profile sheets.

508.3.4.2. Shop and Field Fabricated Wyes, Tees, Crosses and Bends. Shop or field fabricated wyes, tees, crosses or bends shall be furnished and installed where indicated or required by the Engineer. Fittings for pipe, the largest size of which is less than 24-in. (61cm) in diameter, shall be shop fabricated. Fittings for larger pipe, which is 24-in. (61cm) in diameter and increasingly larger, may be field fabricated. Care shall be taken in the fabrication that the concrete walls of the pipe are broken back only enough to provide the required finishing opening. The reinforcing mesh or bars in each pipe shall be joined by bending, twisting or spot welding, which shall provide a rigid connection. Concrete or mortar meeting the requirements of Item 303. Portland Cement Concrete Pavement or Item 702. Concrete Structures shall be wiped over the reinforcing wires connecting the two-pipe joints, compacted by light blows, shaped to the contour of the pipe barrels, lightly brushed for finish and cured under wet burlap.

508.3.4.3. Poured Concrete Pipe Plugs. When conduit lines terminate at locations which do not include connection to drainage structures, the end of the pipe shall be plugged with a field-cast unit as shown on the plan-profile sheets, and the costs thereof are to be included in the price bid to furnish and install reinforced concrete pipe. No extra payment shall be made for the installation of concrete pipe plugs as shown on the plan-profile sheets.

508.4. CORRUGATED METAL PIPE

This item shall govern and control the furnishing and placing of corrugated metal storm water collection system.

508.4.1. Pipe Materials. Unless otherwise specified on the plans or required herein, corrugated metal pipe may be aluminum, galvanized steel, aluminized steel, or precoated galvanized or aluminized steel. Pipe shall be full circle or pipe arch type as shown on the plans. Damage to materials incurred prior to backfilling shall be corrected according to Item 501.11.8. Repairs.

508.4.2. Couplings. Materials shall conform to the requirements of Item 501.11.10. Couplings. Joints shall prevent infiltration of side material during the life of the installation. Connecting bands shall be placed with the clamping angles and bolts at the tops of the pipe. When it is necessary to join a new pipe of helical corrugations to an existing pipe which was installed with no circumferential end corrugations, the two pipes shall be field jointed with helically corrugated bands.

508.4.3. Excavation and Backfilling. In addition to the requirements of Item 508.2.1. Excavation, Embedment, and Backfill, the provisions contained herein apply.

When pipes are laid in a trench, the trench when completed and shaped to receive the pipe shall be of sufficient width to provide free working space for satisfactory bedding and jointing and thorough tamping of the backfill and bedding material under and around the pipe.

Backfilling for the metal pipe structures is a critical phase of the construction and strict adherence of Item 504. Open Cut – Backfill is required. Unless otherwise shown on the plans or permitted in writing by the Engineer, no heavy earth moving equipment will be permitted to haul over the structure until a minimum of 4-ft. (1.2m) of permanent or temporary, compacted fill has been placed thereon. Until a minimum cover over pipe of 12-in. (30cm) is obtained, only hand operated tamping equipment will be allowed within vertical planes 2-ft. (61cm) beyond the horizontal projection of the outside surfaces of the structure. Prior to adding each new layer of loose backfill material, until a minimum of 12-in. (30cm) of cover is obtained, an inspection will be made of the inside periphery of the structure for local or unequal deformation caused by improper construction methods. Evidence of such will be reason for such corrective measures as may be directed by the Engineer. Engineer may require CONTRACTOR to remove and replace pipe damaged by the CONTRACTOR'S backfilling operation at no additional cost to the OWNER.

508.4.4. Laying Corrugated Metal Pipe. Unless otherwise authorized by the Engineer, the laying of pipes on the prepared foundation shall be started at the outlet end, and separate sections firmly joined together, with outside laps of circumferential joints pointing upstream and with longitudinal laps on the sides. Any metal in joints which is not protected by galvanizing or aluminizing shall be coated as approved by the OWNER. Proper facilities shall be provided for hoisting and lowering the sections of pipe in to the trench without damaging the pipe or disturbing the prepared foundation and the sides of the trench. Any pipe which is not in alignment or which shows any undue settlement after laying, or is damaged, shall be taken up and re-laid without extra compensation.

Multiple installations of corrugated metal pipe and pipe arches shall be laid with the center lines of individual barrels parallel. Unless otherwise indicated on the plans, the clear distances between outer surfaces of adjacent pipes listed in Table 508.4.4.(a) Clear Distances shall be maintained.

Table 508.4.4.(a) Clear Distances

Diameter of Pipe	Clear Distance Between Pipes Full Circle and Pipe Arch	Pipe Arch
18-in.	1-ft. 2-in.	21-in. x 15-in.
24-in.	1-ft. 5-in.	28-in. x 20-in.
30-in.	1-ft. 8-in.	35-in. x 24-in.
36-in.	1-ft. 11-in.	42-in. x 29-in.
42-in.	2-ft. 2-in.	49-in. x 33-in.
48-in.	2-ft. 5-in.	57-in. x 38-in.
54-in.	2-ft. 10-in.	64-in. x 43-in.
60-in.	3-ft. 2-in.	71-in. x 47-in.
66-in.	3-ft. 2-in.	77-in x 52-in.
72-in. through 84-in.	3-ft. 2-in.	—
90-in. through 120-in.	3-ft. 5-in.	—

508.4.5. Connections. Where new structures are constructed as extensions to structures in place or are jointed to existing structures, the construction shall include all work necessary to provide a proper connection

between the new structure and the old as indicated on the plans, including coating of the connection when required.

508.4.6. Reuse of Existing Headwalls. When existing headwalls and aprons are specified on the plans for reuse, the portion to be reused shall be severed from the existing pipe and moved to the new position previously prepared, by approved methods.

Connections shall conform to the requirements for joining sections of pipes as indicated herein or as shown on the plans. Any headwalls, aprons or pipe attached to the headwall damaged during moving operations shall be restored to their original condition at the CONTRACTOR'S expense. The CONTRACTOR, if it so desires, may remove and dispose of the existing headwalls and aprons and construct new headwalls at its own expense, in accordance with the pertinent specifications and design indicated on the plans or as furnished by the Engineer.

508.5. STRUCTURAL PLATE CONDUIT

This work shall consist of furnishing and installing structural plate conduit, pipe arches, arches, underpasses, box culverts and special shapes conforming to these specifications of the sizes, out dimensions, the minimum gage or thickness of metal, footing design, if required, and material required by plans, at the places designated on the plans or by the Engineer, in conformity with established lines and grades.

508.5.1. Materials.

508.5.1.1. Structural Plates. The plates used for construction of structural plate conduits shall conform to the specifications in Item 501.12. Structural Plate Structures.

508.5.1.2. Concrete. Concrete, curing and reinforcing steel shall conform to Item 702. Concrete Structures. Unless otherwise shown on the plans, concrete for footings and headwalls shall be Class A or Class PA as specified by the OWNER. Concrete for longitudinal stiffeners (thrust beams), when specified for steel structures, shall be Class B or Class PB as specified by the OWNER and shall be reinforced in accordance with the plans. Concrete used in longitudinal stiffeners (thrust beams) on steel structures shall cure a minimum of 3-days before backfilling against or over the stiffener. Riprap for slope protection and for invert paving, when required, shall be Class B or Class PB concrete as specified by the OWNER, with reinforcement as specified on the plans and shall conform to the requirements of Item 803.3. Riprap.

508.5.2. General Construction Methods. Structural plate conduits shall be constructed from the specified materials in accordance with the plans and this item.

Steel plates will have approximately a 2-in. (5cm) lip beyond each end crest, which results in the actual length of a given structure being approximately 4-in. (10cm) longer than the nominal length, except when skewed or beveled. Footings for arches shall be designed and constructed to accommodate this additional length.

The distance between multiple structures shall be shown on the plans with the minimum distance being that space required to permit adequate compaction of backfill material.

508.5.3. Excavation. Unless otherwise required, all structural excavation shall be in accordance with the requirements of Item 701.2. Structural Excavation, and the additional requirements herein. The excavation will be of sufficient width to provide ample working space for erection and proper compaction of backfill and bedding material. The CONTRACTOR shall provide adequate drainage of the cut and bedding during the construction operation.

If the quality of the native soil is as good or better than the proposed backfill material, excavation shall be to the limits set forth in the Item 701.2. Structural Excavation. If the quality of the native soil is less than that of the proposed backfill material, the excavation shall extend, from each side of the barrel, a minimum horizontal distance of ½-span or $^2/_3$-rise, whichever is greater.

508.5.4. Substructures for Structural Plate Arches. The substructure for structural plate arches shall be as detailed on the plans. Concrete footings, when required, shall be placed entirely on either rock or firm soil. When footing area is partially rock and partially soil, the rock shall be removed below grade and replaced with suitable materials so that a slightly yielding, compacted earth cushion is provided below the footing for a minimum of 12-in. (30cm). When a thin layer of soil is partially covering rock within the bearing area and when practical to do so, the soil may be removed and the footings placed directly on rock in accordance with details shown on the plans.

Footings shall be formed and finished to true lines and grades as established by the Engineer. Anchors or slots shall be set to true line and grade when placing concrete for each substructure unit. No plates for arch structures shall be placed until the substructure has cured for a minimum of 3-days.

Any portion of an aluminum structure that is in contact with a metal other than aluminum or in contact with concrete containing chlorides shall be insulated from this other metal or concrete containing chlorides by a coating of bituminous material or a plastic coating, such as asphalt, mastic or polymeric coating. The coating shall be applied to the aluminum structure to provide insulation between the aluminum and other metal or concrete containing chlorides and shall extend a minimum distance of 1-foot (30cm) beyond the area of contact.

508.5.5. Foundations for Structural Plate Conduits with Metal Inverts. Horizontal ellipses, box culverts, or other structural plate shapes with metal inverts shall be placed on a shaped bed of granular material carefully and accurately shaped to fit the lower part of the structure for at least 10-percent of its overall height, except that the length of bedding arc need not exceed the width of the bottom plate. The granular material shall be at least 3-in. (76mm) in thickness, so as to obtain uniform seating of the corrugations on the structure bed. For culverts, the bedding specified herein shall be the full width of the invert. Where rock, in either ledge or boulder formation, is encountered, it shall be removed below grade and replaced with a compacted earth cushion having a thickness of not less than ½-in.-per-foot (2cm-per-50cm) height of fill over the top of the structure, with the minimum allowable thickness of 12-in. (30cm) and a maximum of 24-in. (61cm) under the structure. Where the soil encountered at the established grade is a quicksand, muck or similar unstable material, it shall be removed and replaced in accordance with the requirements of Item 701.2. Structural Excavation.

508.5.6. Skewed Structures. The end skew shall not exceed 45°. When the skew of arches is more than 15°, the length of the structure shall be such that no portion of the live load will be carried by the cut portion of the arch end. Where right-of-way or other conditions do not permit the required length, the cut end shall be supported by a rigid headwall designed to meet the conditions. When the skew angle of pipes exceeds 20° and the structure has the ends cut to fit a slope, the ends shall be reinforced with concrete riprap or other suitable end treatment as indicated on the plans or as directed by the Engineer. If headwalls are required, the plates shall be anchored to the headwall with not less than ¾-in. (2cm) diameter by 6-in. (15cm) minimum length bolts, at not over 19-in. (48cm) centers. If structures are to have skewed ends, bevels, step-bevels or other special end treatment, this information will be shown on the plans.

508.5.7. Erection and Shape Control. When all plates of a structure are in position, all bolts not already in place shall be inserted and all nuts tightened progressively and uniformly, beginning at one end of the structure. All nuts shall be tightened a second time to a torque of not less than 150-ft.-lbs. nor more than 300-ft.-lbs. for steel structures, and not less than 125-ft.-lbs. nor more than 150-ft.-lbs. for aluminum structures.

It is essential that bolts be well tightened. If an impact wrench is used, a sufficient number of bolts shall be checked with a long-handled, structural or socket wrench or torque wrench to insure that they are properly tightened. All service bolts used in drawing the plates together shall be replaced with standard high strength bolts.

Lateral ties, struts and/or false-work may be required on some structures to maintain proper shape and alignment during erection and backfill operations. Monitoring of the structure shape throughout erection and backfill requires careful observations of the symmetry and uniform curvature of the periphery of the structure. If there is any tendency toward loss of symmetry in shape or loss of curvature in the structure periphery, even though the structure is within the tolerances stated herein, construction involving the structure shall cease until a proper course of action is established.

CONTRACTOR shall furnish acceptable devices for monitoring the horizontal and vertical shape of the structure. For box culverts and structures not requiring longitudinal or transverse stiffeners, the shape shall be kept within 2-percent of design measurements (span or rise, whichever is greater) or 5-in. (13cm), whichever is less, during erection and backfilling. For structures requiring either longitudinal stiffeners or transverse stiffeners (except box culverts), a minimum of 5 monitoring devices shall be furnished at transverse sections, with one at each longitudinal stiffener, one at the top of the structure, and one at each mid span of the top arc. These shall be installed at each end and as a minimum on 24-ft. (7m) increments for the entire structure length.

For the shape factor furnished (shape factor = Rt/Rs, where Rt is the radius of the top arc and Rs is the radius of the side arc), unless otherwise shown on the plans, the allowable sag from design shape during erection, as a percentage of the rise shall not exceed tolerances shown in Table 508.5.7.(a) Allowable Sag.

Table 508.5.7.(a) Allowable Sag

Shape Factor	Allowable Sag (expressed as percentage of the rise)
up to 2.74	4%
2.75 through 3.24	2%
3.25 and greater	1%

Shape shall be checked at least after each two, 1-ft. (30cm) compacted lifts of backfill, with the upward movement of the top of the structure during backfilling, not to exceed 2-percent of the rise, nor more than 50-percent loss of the mid-ordinate of the side plates, nor more than 25-percent deviation of any mid-ordinate of the

top plates, all measured from the design shape. Selective top loading of the structure may sometimes be required to prevent distortion in excess of tolerances given herein.

508.5.8. Backfilling. Backfilling and/or construction of the embankment around and over the structure is a critical phase of the construction, and strict adherence to these construction methods is required. Backfilling and/or embankment construction around the structure shall be performed in accordance with Item 203. Site Preparation and Item 504. Open Cut – Backfill, except as modified herein.

Any damage to plates or structures caused by equipment and/or backfilling operations shall be corrected or removed and replaced to the OWNER'S satisfaction at the entire expense of the CONTRACTOR.

508.5.8.1. Structural Plate Conduits Without Longitudinal or Transverse Stiffeners and Box Culverts. Unless otherwise shown on the plans or permitted in writing by the Engineer, no heavy earth moving equipment will be permitted to haul over the structure until a minimum of 4-ft. (1.2m) of permanent or temporary compacted fill has been placed thereon. Within vertical planes 2-ft. (60cm) beyond the horizontal limits of the structure and until a minimum of 2-ft. (60cm) of cover has been compacted over the structure, only hand operated, mechanical tamping equipment will be permitted.

During the backfilling operations, extreme care shall be taken to avoid unequal pressures and to obtain uniformly compacted backfill material of uniform density throughout the length of the structure and to insure proper backfill under the structure.

The structure shall be backfilled so that when backfill is complete, the inside dimensions shall be within tolerances set forth in Item 508.5.7. Erection and Shape Control. Backfill material will be placed and compacted in maximum 8-in. (20cm) lifts simultaneously along each side of the structure until the height of the backfill has reached the crown of the structure. Backfill shall continue to be placed in maximum 12-in. (30cm) lifts over the crown in layers extending laterally from the crown and compacted using hand operated or light compaction equipment until the design height is obtained.

For multiple structures the same backfill phases will be performed for all structures more or less simultaneously. Backfilling between the barrels will usually require that the material be placed with a crane and bucket or other suitable equipment. Backfill material shall not be dropped from a height or concentrated in such an amount prior to distribution over the top arc that damage to the flexible structure will result. Compaction of this backfill shall be with hand operated tampers or other acceptable equipment.

508.5.8.2. Structural Plate Conduits Requiring Longitudinal or Transverse Stiffeners Except Box Culverts. The plans will designate, when appropriate, the longitudinal stiffener designs for steel structures or a transverse stiffener design for aluminum structures. The backfill material to be used adjacent to and over the structure to the minimum required cover (as shown on the plans) shall be a granular type material such as a well graded sand and gravel (preferably sharp, rough and angular if possible), or a uniform sand or gravel. Plastic soils will not be permitted. The structure backfill material shall conform to one of the following soil classifications as defined in Table 508.5.8.2.(a) Classification of Soils and Soil-Aggregate Mixtures.

(1) For height of fill less than 12-ft. (3.6m): A-1, A-3, A-2-4 and A-2-5 may be used.
(2) For height of fill of 12-ft. (3.6m) or greater: A-1 and A-3 may be used.

Table 508.5.8.2.(a) Classification of Soils and Soil-Aggregate Mixtures

GENERAL CLASSIFICATIONS = GRANULAR MATERIALS (35-Percent or Less Passing No. 200)					
Characteristic	**Group Classification**				
	A-1		**A-3**	**A-2**	
	A-1-a	**A-1-b**		**A-2-4**	**A-2-5**
Sieve Analysis, Percent Passing:					
(No. 10)	50 max.	—	—	—	—
(No. 40)	30 max..	50 max.	51 max.	—	—
(No. 200)	15 max.	25 max.	10 max.	35 max.	35 max.
Characteristics of Fraction Passing 0.425 mm. (No. 40)					
Liquid limit	—		—	40 max.	41 min.
Plasticity index	6 max.		N. P.	10 max.	10 max.
Usual Types of Significant Constituent Materials	Stone Fragments, Gravel and Sand		Fine Sand	Silty or Clayey Gravel and Sand	

The backfill material shall be compacted to at least 95-percent of maximum density as determined by ASTM D698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

Moisture content shall be within minus-2- to plus-4-of-optimum. It may not be possible to develop this compacted density in the first lift of material over the top arc (Phase 2 described below) due to the influence of the flexible structure; therefore, density in at least the first lift over the top arc (Phase 2) will be the highest density attainable using equipment authorized herein.

The backfill pattern and sequence, up to at least the depth of minimum required cover, shall be in three phases. Phase 1 of the backfill operation will be to backfill under the haunches and/or along the side-walls of the structure. Backfill material will be placed in maximum 8-in. (20cm) lifts simultaneously along each side of the structure until the height of backfill has reached the top of the longitudinal stiffeners or that longitudinal seam (edge of structure crown where the top arc plates connect to the side arc plates).

Phase 2 will be to work simultaneously symmetrically from both sides of the structure with light track type equipment pushing material over the crown until three 12-in. (30cm) lifts of backfill have been placed and compacted uniformly over the crown. The light track equipment shall not exceed 20,000-pounds (9070kg) gross weight with a track pressure less than 1700-pounds-per-square-foot (8300-kg/m^2).

After the crown has been uniformly covered, Phase 3 will be to continue to place maximum 12-in. (30cm) lifts of backfill, compacted, which extend laterally from the crown and compact over the crown and at the sides of the structure using hand operated or light tractor drawn compaction equipment working at the same time on each side of the structure at the same longitudinal location, until at least the minimum required depth of cover is attained. Wheel type equipment will not be allowed over the crown of the structure until Phase 3 is complete.

For multiple structures the same backfill phases will be performed for all structures more or less simultaneously. Backfilling between the barrels will usually require that the material be placed with a crane and bucket or other suitable equipment. Backfill material shall not be dropped from a height or concentrated in such an amount prior to distribution over the top arc that damage to the flexible structure will result. Compaction of this backfill shall be with hand operated tampers or other acceptable equipment.

508.6. MEASUREMENT AND PAYMENT FOR STORM WATER CONDUIT INSTALLATION

508.6.1. General. Unless otherwise specified herein, measurement and payment for storm water conduit installation shall be made as follows.

Pipe, including corrosion protection if in place on the pipe unless otherwise covered by a separate bid item, shall be measured for payment in linear feet (m) along the longitudinal centerline of the pipe actually laid. Deductions shall be made for special structures. Pipe that extends only through the wall of the structure shall be measured to the actual end of the pipe. Conduits shall not be classified for payment according to the depth of the cut.

In the event of a change in design that either increases or decreases the quantity of pipe, the variation in quantity will be shown on the plans and the proposal will be increased as the case may be.

Pipe, including corrosion protection in place on the pipe unless otherwise covered by a separate bid item, shall be paid for at the contract unit price per linear foot (m), complete in place, as provided by the proposal and contract. The contract price per linear foot (m) shall be the total compensation for the furnishing of all labor, materials, tools, equipment and incidentals necessary to complete the work including excavations, backfill and disposal of surplus materials, in accordance with the plans and these specifications.

508.6.2. Reinforced Concrete Pipe. Reinforced concrete culvert pipe shall be measured along the centerline of each size pipe specified. Measurement shall begin at the initial beginning point as shown on the plan-profile sheet, continue through the specified pipe fittings, extend only to the inside faces of manhole walls (excluding the inside manhole diameter) and terminate at the extreme end of construction as provided on the plan-profile sheets. Lateral lines shall be measured along the longitudinal centerline thereof from the center of the connected main conduit to the termination of the lateral as shown on the plan-profile sheets. Structure leads, connecting curb inlets, boxes, etc. shall be measured along the longitudinal centerline thereof from the center of the connected main or lateral conduit to the inside face of the structure.

Pipe fittings and appurtenances, as herein specified, shall not be considered as a pay item, the cost of which shall be included in the price bid for furnishing and installing the particular pipe size. Manholes and other drainage structures shall be measured for payment in accordance with the appropriate pay item. Trench excavation, including embedment and backfill, shall be measured for payment in accordance with the requirements of Item 504. Open Cut – Backfill.

Payment for reinforced concrete culvert pipe shall be paid for at the unit price bid per linear foot (m), measured as hereinbefore provided, for the specified pipe size and shall be full compensation for furnishing and installing the specified diameter pipe and appurtenant fittings, for jointing, for connection to all drainage structures, and for all materials, tools, equipment, labor and incidentals necessary to complete the work.

508.6.3. Corrugated Metal Pipe. Corrugated Metal Pipe of the type specified will be measured between the ends of the barrel along its flow line. Where spurs or branches or connections to existing pipelines are involved, measurement of the spur or new connecting pipe will be made from the intersection of its flow line 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 structure wall will be included for measurement but no other portion of the structure length or width will be so included. For multiple pipes, the measured length will be the sum of the lengths of the barrels, measured as prescribed above.

Payment for corrugated metal pipe, measured as prescribed above, will be made at the contract unit price bid per linear foot (m) for the various sizes of corrugated metal pipe or corrugated metal pipe arch of the material and protective coating as indicated on the plans and proposal, and of the gauges shown on the plans. Payment shall be full compensation for furnishing and transporting the pipe; for all required coatings and invert paving, site preparation, the preparation and shaping of beds, hauling, placing and joining of pipe; for all connections to existing structures; for moving and reusing headwalls where required by the plans; and for all other items of materials, labor, equipment, tools and incidentals necessary to complete the pipe installation in accordance with the plans and these specifications, except trench excavation, including embedment and backfill, which shall be measured for payment in accordance with the requirements of Item 504. Open Cut – Backfill. Where pipes are laid on a skew or where pipe ends are cut to the fill slope, full compensation for cutting the ends parallel with the center line of the street/road or the fill slope shall be considered as included in the price bid per linear foot (m) for the designated item of pipe and no additional allowance will be made.

508.6.4. Structural Plate Conduit. Structural plate conduits of each size, gage or minimum thickness and type specified will be measured by the linear foot (m) of each individual structure (each separate structure in case of multiple installations), along the structures flow line between the ends of the structure. Payment for structural plate conduits shall be made at the unit price bid per linear foot (m) for the various sizes, gage or minimum thickness and types required by the plans and complete in place.

Metal Headwalls of each size and type will be measured by the square foot (m^2) of the actual area of the headwall in place. Payment for metal headwalls shall be made at the unit price per square foot (m^2) of metal headwall.

Until otherwise noted on the plans, concrete for any required headwalls will be measured by the cubic yard (m^3) in accordance with Item 702. Concrete Structures. Payment for concrete for headwalls shall be made at the unit price bid per cubic yard (m^3) of the class of concrete specified for headwalls in accordance with Item 702. Concrete Structures. Unless otherwise noted on the plans, reinforcing steel for any required headwalls will be measured and paid for by the pound (kg).

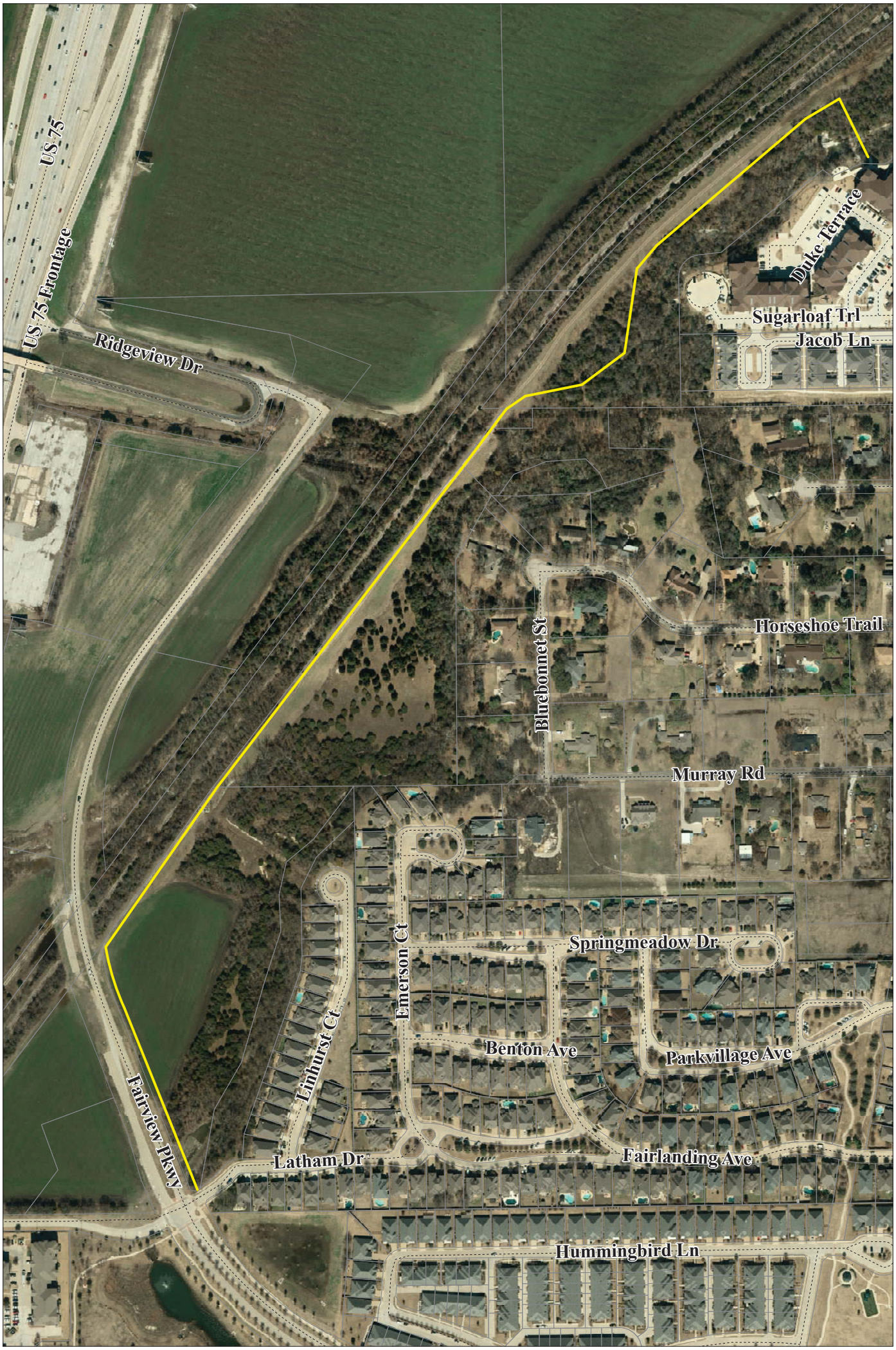
Concrete riprap, including reinforcement, will be measured and paid for in accordance with Item 803.3. Riprap.

Structural excavation will be measured and paid for in accordance with Item 701.2. Structural Excavation.

Concrete and reinforcing steel for longitudinal stiffeners, for foundations and/or for backfill between multiple structures, if required by the plans, will not be measured for payment.

Aluminum alloy inverts, toewalls, footings, closure plates and transverse stiffeners, when required, will be considered a part of the requirements of the structure and will not be measured for payment.

Payment shall be full compensation for furnishing, transporting, and erecting the metal structure; for constructing foundations; for handling, placing and compacting of backfill material; for all bolts, nuts, washers, hooks, bolts, anchor channels and angles; for longitudinal stiffeners, and transverse stiffeners when required; for furnishing alignment control devices; for concrete, reinforcing steel and all other items of material, labor, equipment, tools and incidentals necessary to complete the various installations.


US 75
US 75 Frontage
Ridgeview Dr
Duke Terrace
Sugarloaf Trl
Jacob Ln
Horseshoe Trail
Bluebonnet St
Murray Rd
Springmeadow Dr
Emerson Ct
Linhurst Ct
Benton Ave
Parkvillage Ave
Fairview Pkwy
Latham Dr
Fairlanding Ave
Hummingbird Ln

Sta 0+00
Connect to
existing ramp

Sta 0+00 to Sta 9+00
Construct 5" thick Concrete
Sidewalk A= 1020 S.Y.

Minimum distance to
curb 8'–0" typ.

Meander 10' Sidewalk
adjacent to
Fairview Pkway
See Page 3 for Details

Sta 7+70 to Sta 8+72 Install and compact
select fill to 95% of max density
66.7 cu. yds.

Match Line 9+00

Note:
No longitudinal slopes steeper
than 20:1 and no cross slopes
more than 2% per ADA

0 40 80 Feet

New Sewerline construction to
BEGIN in the summer of 2019

Sta 13+00 INSTALL 1 – 7'X3' Box Culvert
with flared wingwalls at 2% slope. L=20 LF
See low water crossing details on page 4
(Adjust downstream wings to match banks)

Sta 9+00 to Sta 18+00
Construct 5" thick Concrete
Trail A= 1010 S.Y.

CONSTRUCT Cedar split rail fence.
L=180 LF (Each Side)

Sta 12+44 to Sta 14+12 Install and compact
select fill to 95% of max density as needed
44.2 cu. yds.

Match Line 18+00

Contours shown are on 2' intervals
Source: NCTCOG

	Town of Fairview	Drawn By: Danielle Oglesbee, EIT	Scale 1"=80'
	Sloan Creek Connector Trail	Reviewed By: James Chancellor, PE	Sheet 1 of 4

Sta 27+18 INSTALL 3 – 36" RCP Culverts
with flared wingwalls at 3.5% slope. L=20 ft
See low water crossing details on page 4

Match Line 18+00

Sta 18+00 to Sta 29+00
Construct 5" thick Concrete
Trail A= 1240 S.Y.

Start cedar split rail fence
at McElroy property line
End at Town of Fairview Property
line L=300 LF (Each Side)

Sta 26+88 to Sta 27+63
Cut and Fill to 95% of max density.
Max slope = 20:1

Match Line 29+00

Note:
No longitudinal slopes steeper
than 20:1 and no cross slopes
more than 2% per ADA

PERFORM clearing and
limb trimming for 600 LF

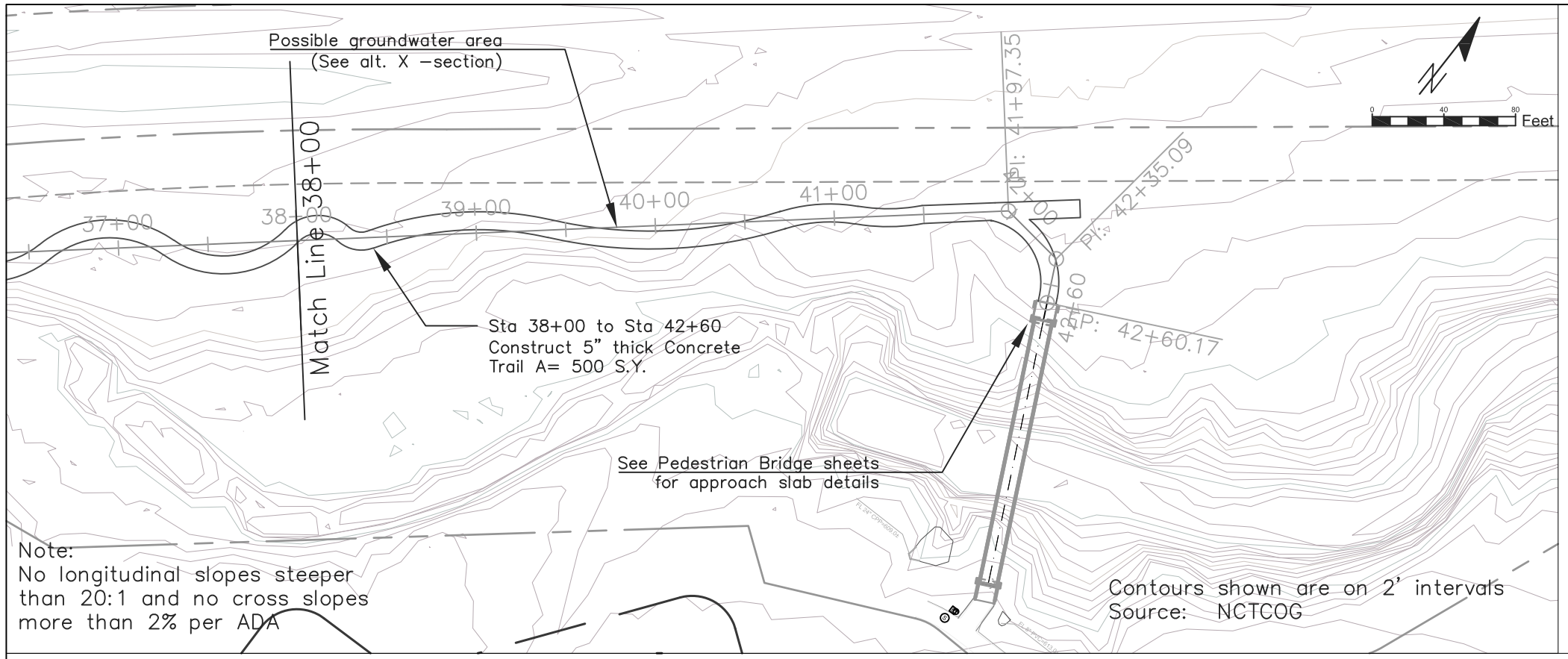
Meander trail adjacent to tree line

Sta 29+00 to Sta 38+00
Construct 5" thick Concrete
Trail A= 1090 S.Y.

Match Line 38+00

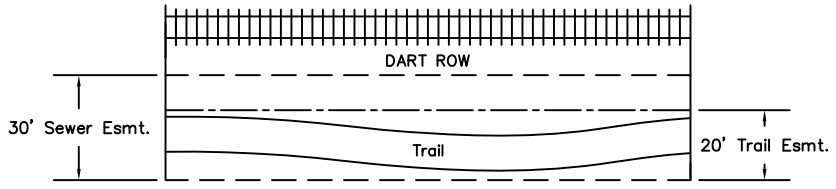
Contours shown are on 2' intervals
Source: NCTCOG

	Town of Fairview	Drawn By: Danielle Oglesbee, EIT	Scale 1"=80'
	Sloan Creek Connector Trail	Reviewed By: James Chancellor, PE	Sheet 2 of 4

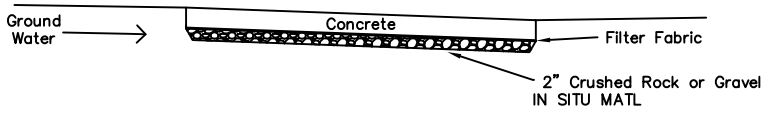


TEMPORARY ROAD FOR BRIDGE INSTALLATION

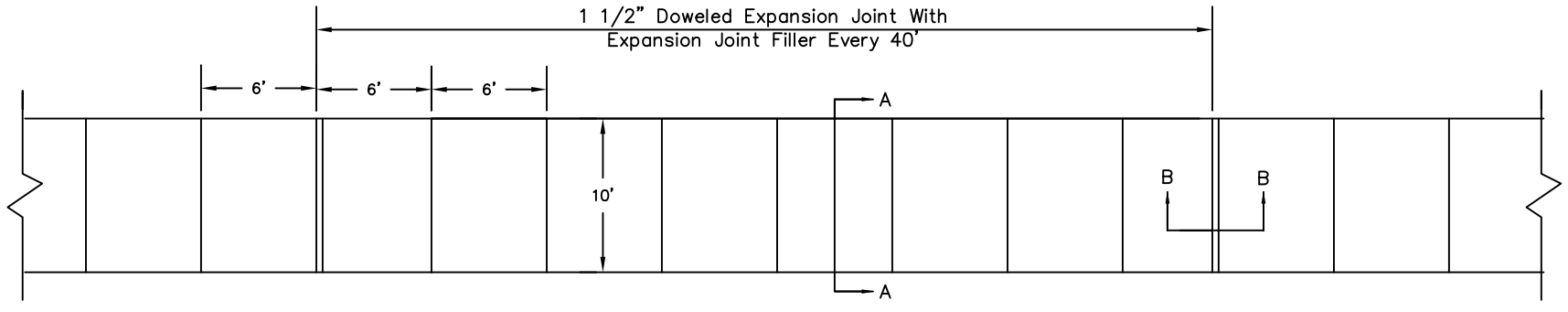
1. AFTER INSTALLING RCP AND SELECT FILL AT WATER CROSSINGS, CONTRACTOR SHALL INSTALL TEMPORARY ROCK ROAD FROM STA. 8+00 TO STA. 42+00 AS NEEDED FOR PEDESTRIAN BRIDGE CONSTRUCTION
2. CONTRACTOR MAY USE ROCK OR CRUSHED CONCRETE 2" TO 3" IN SIZE, 12 FT WIDE, 6" TO 8" DEEP AS NEEDED
3. ROCK INSTALLATION AMOUNT DEPENDENT UPON EQUIPMENT REQUIREMENTS AND GROUND CONDITIONS. CONTRACTOR RESPONSIBLE FOR DETERMINING AMOUNT REQUIRED AND WILL BE PAID BY THE CUBIC YARD INSTALLED.
4. ROCK TO BE REMOVED AFTER PEDESTRIAN BRIDGE IS SET.



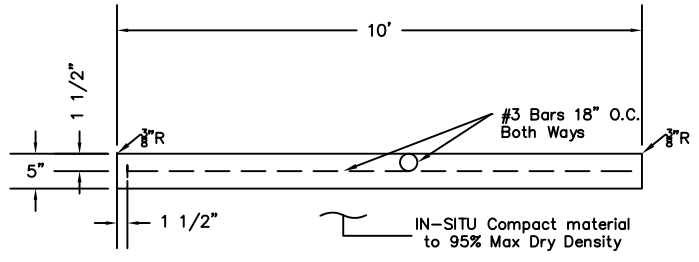
Typical Trail Location
Parallel to the RR Tracks
N.T.S



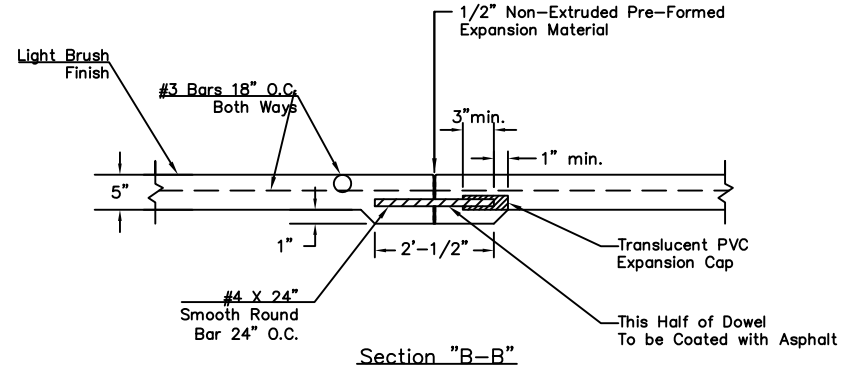
Ground Water X–Section
Alternate
N.T.S



Trail Plan View
N.T.S

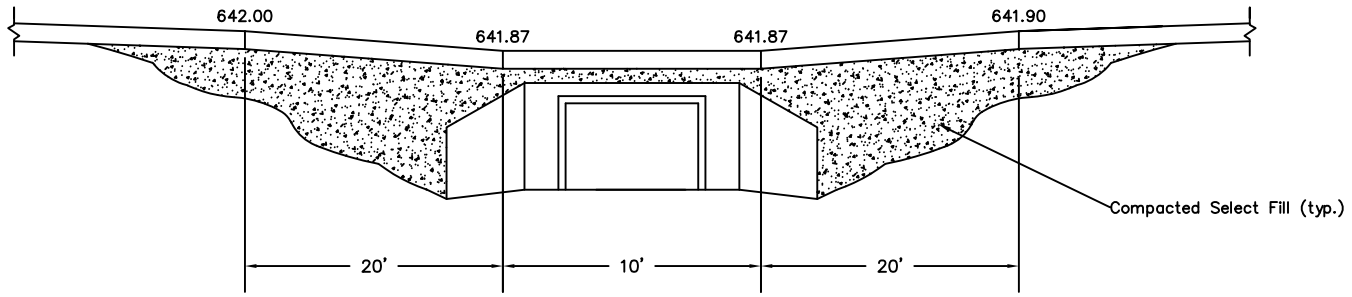


Section "A–A"
N.T.S

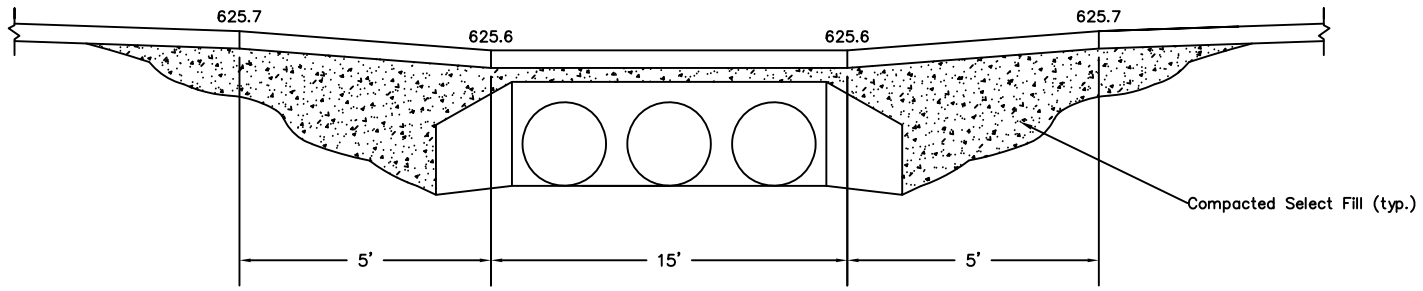


Section "B–B"
N.T.S

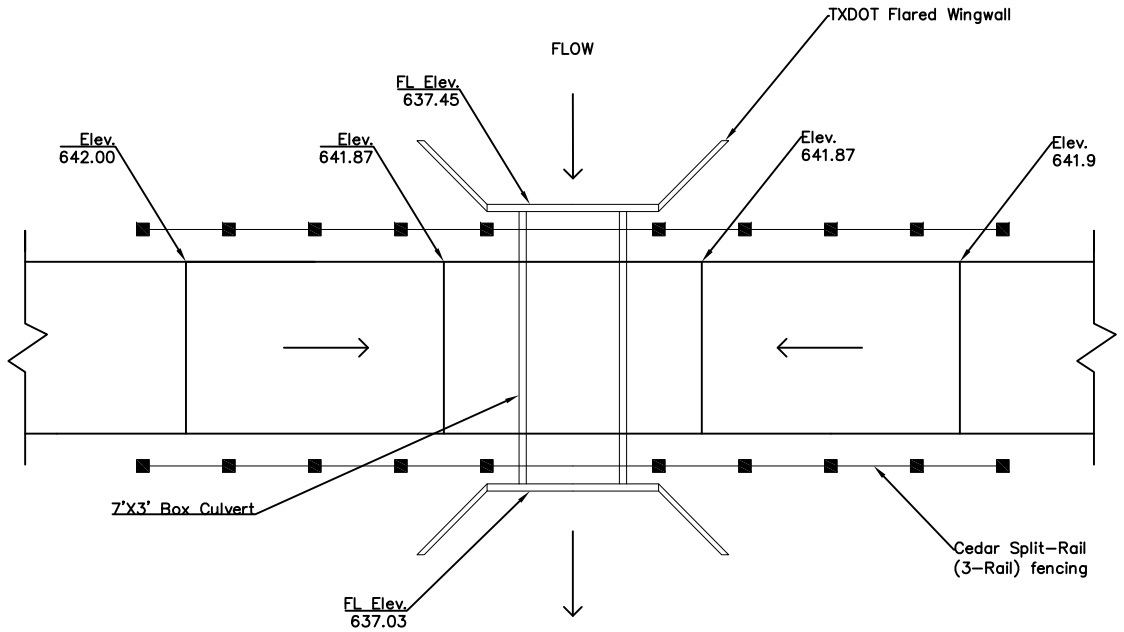
	Town of Fairview	Drawn By: Danielle Oglesbee, EIT	Scale 1"=80'
	Sloan Creek Connector Trail	Reviewed By: James Chancellor, PE	Sheet 3 of 4



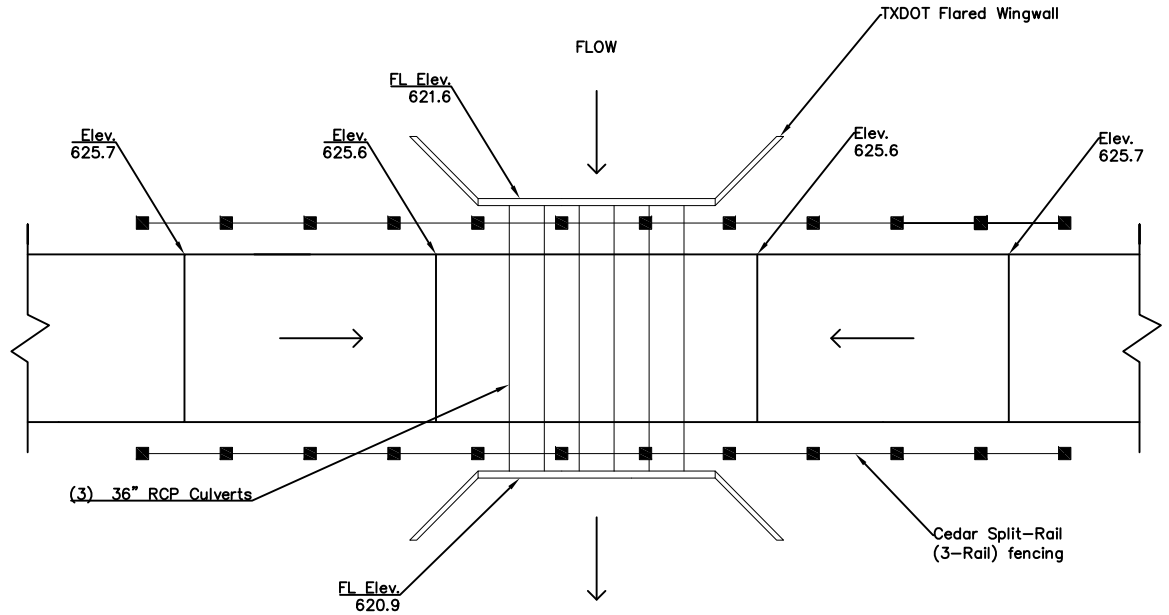
Low Water Crossing 13+00
Profile View
N.T.S



Low Water Crossing 27+18
Profile View
N.T.S



Low Water Crossing 13+00
Plan View
N.T.S



Low Water Crossing 27+18
Plan View
N.T.S

	Town of Fairview	Drawn By: Danielle Oglesbee, EIT	
	Sloan Creek Connector Trail	Reviewed By: James Chancellor, PE	Sheet 4 of 4

TOWN OF FAIRVIEW

CONTRACT PLANS

PEDESTRIAN BRIDGE OVER SLOAN CREEK TRIBUTARY 4
COLLIN COUNTY
FAIRVIEW, TEXAS

SUBSTRUCTURE PLANS FOR PEDESTRIAN
BRIDGE OVER SLOAN CREEK

INDEX OF STRUCTURE PLANS

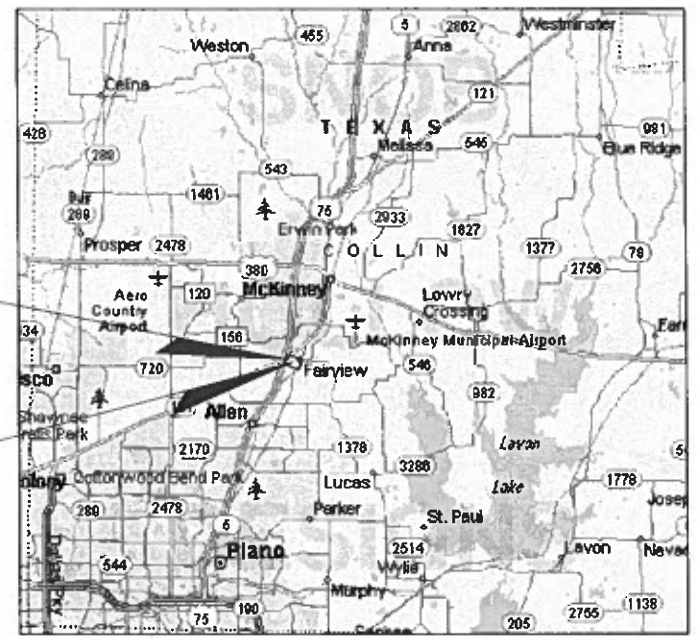
SHEET NO.	SHEET DESCRIPTION
B1-1	KEY SHEET
B1-2 TO B1-3	GENERAL NOTES
B1-4	PLAN AND ELEVATION
B1-5 TO B1-6	TYPICAL SECTIONS
B1-7	FOUNDATION LAYOUT
B1-8 TO B1-11	ABUTMENTS
B1-12	APPROACH SLAB NO. 2

APPENDIX NAME	SHEET DESCRIPTION
TxDOT CS-MD	MISC DETAILS FOR C-I-P CONC SLAB SPANS
TxDOT ODSR	OPTIONAL DRILLED SHAFT REINFORCING

KEY SHEET REVISIONS	
DATE	DESCRIPTION

END BRIDGE
STA. 11+70.17

BEGIN BRIDGE
STA. 10+20.00



VICINITY MAP
N.T.S.

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED DUE TO REPRODUCTION.

SHOP DRAWINGS TO BE SUBMITTED TO:

CHRISTOPHER P. MESZLER, P.E.
1903 CENTRAL DRIVE
BEDFORD, TX 76021
PH. 817-618-3640
TBPE REG. F-15243

ENGINEER OF RECORD:

CHRISTOPHER P. MESZLER, P.E.
1903 CENTRAL DRIVE
BEDFORD, TX 76021
PH. 817-618-3640
TBPE REG. F-15243

PLANS PREPARED FOR:

TOWN OF FAIRVIEW
372 TOWN PLACE
FAIRVIEW, TEXAS 75069
PH. 972-562-0522

PLANS PREPARED BY:

LAKES ENGINEERING, INC.

1903 CENTRAL DRIVE
SUITE #405
BEDFORD, TX 76021
PH. 817-618-3640

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09-13-18

CHRISTOPHER P. MESZLER, P.E.
LIC. NO. 112052

SHEET NO.
B1-1

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\Struct\KEYSRD01.DGN
LAST SAVED: 8:38:49 AM

GENERAL NOTES

1. DESIGN SPECIFICATIONS

A. AASHTO (LRFD) 2017BRIDGE DESIGN SPECIFICATIONS US (STANDARD) VERSION. EIGHT EDITION WITH APPLICABLE INTERIM REVISIONS.
B. BRIDGE DESIGN MANUAL LRFD, TEXAS DEPARTMENT OF TRANSPORTATION.
C. BRIDGE DETAILING MANUAL, TEXAS DEPARTMENT OF TRANSPORTATION.

2. GENERAL CONDITIONS

A. CONTRACTOR SHALL ERECT PRE-FABRICATED SUPERSTRUCTURE PROVIDED BY THE TOWN. CONTRACTOR IS RESPONSIBLE FOR VERIFYING SHOP DRAWINGS PROVIDED FOR SUPERSTRUCTURE, COORDINATING DELIVERY, RECEIVING/UNLOADING SUPERSTRUCTURE DELIVERIES, STORING THE SUPERSTRUCTURE WITHIN THE RIGHT-OF-WAY PRIOR TO ERECTION, ASSEMBLING SUPERSTRUCTURE ACCORDING TO MANUFACTURE'S INSTRUCTIONS, PLACING DECK REINFORCING AND CONCRETE ACCORDING TO MANUFACTURER'S SHOP DRAWINGS, PLANS AND SPECIFICATIONS, AND PREPARING THE SITE FOR DELIVERY, ASSEMBLY, AND ERECTION.

B. ALL ELEMENTS SHALL BE FABRICATED WITH MATERIALS AND PRODUCTS THAT SHALL MEET THE "BUY AMERICAN ACT" REQUIREMENTS.

C. ALL ELEVATIONS SHOWN IN THE STRUCTURAL PLANS ARE REFERENCED TO NAVD 88 DATUM.

D. IF DURING THE COURSE OF CONSTRUCTION, ANY SUBSOIL CONDITION ENCOUNTERED IS DIFFERENT FROM THAT INDICATED BY THE BORINGS AND/OR FROM THAT ASSUMED BY THE ENGINEER, NOTIFY THE ENGINEER BEFORE PROCEEDING WITH THE WORK. REFER TO ADDENDUM NO. 3 FROM GORRONDONA & ASSOCIATES, INC., DATED DECEMBER 3RD., 2014 FOR ADDITIONAL INFORMATION AND REQUIREMENTS. THESE ARE TO BE CONSIDERED PART OF THE CONTRACT.

E. WHEN EXCAVATING IN THE PROXIMITY OF EXISTING FOUNDATIONS, SUPPORTS IN THE FORMS OF TEMPORARY SHORING. TEMPORARY SHEET PILING, GROUTING, ETC. MAY BE REQUIRED TO PREVENT INSTABILITY AND UNDERMINING OF EXISTING FOUNDATIONS. COST ASSOCIATED WITH THESE ACTIVITIES SHALL BE INCLUDED IN THE EXCAVATION OPERATIONS AT NO ADDITIONAL COST.

F. THE GENERAL CONTRACTOR SHALL CHECK, REVIEW AMD VERIFY ALL PLANS DIMENSIONS AND SITE CONDITIONS, SHOULD DISCREPANCIES APPEAR, NOTIFY THE ENGINEER IN WRITING FOR A CLARIFICATION BEFORE COMMENCING WORK.

G. AFTER REMOVAL OF EXISTING FEATURES & OTHER CONSTRUCTION NOTED TO BE REMOVED AND/OR REQUIRED, BACK FILLING OF EXCAVATION SHALL BE IN ACCORDANCE WITH SPECIFICATIONS OR STANDARD PROCEDURES.

H. THE GENERAL CONTRACTOR SHALL RESPONSIBLE FOR THE DISPOSAL OF ALL ACCUMULATED WATER FROM EXCAVATIONS AND DEWATERING OPERATIONS, PREVENTING INCONVENIENCE TO THE WORK AND/OR DAMAGE TO THE STRUCTURAL ELEMENTS. CONTRACTOR SHALL OBTAIN DEWATERING PERMITS AS APPLICABLE PER THE LOCAL CODES AND ORDINANCES.

I. WHEN PERFORMING WORK BELOW GRADE, CARE SHALL BE TAKEN TO AVOID DAMAGING ANY EXISTING UTILITIES. ALL UNKNOWN UTILITIES DISCOVERED DURING CONSTRUCTION SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER. ANY DAMAGE TO EXISTING UTILITIES SHALL BE REPORTED TO THE ARCHITECT/ENGINEER AND ALL AFFECTED PARTIES.

J. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR UPDATING HIS CONSTRUCTION DOCUMENTS WITH ANY REVISED DRAWINGS AND SPECIFICATIONS FIELD ORDERS, CHANGE ORDERS AND CLARIFICATION SKETCHES ISSUED DURING THE COURSE OF CONSTRUCTION.

3. CONCRETE

A. ALL CONCRETE SHALL BE IN CONFORMANCE WITH ACI 318,301,347, LATEST EDITIONS, AND ASTM C94-78A AND PROPORTIONED FOR STRENGTH AND QUALITY REQUIREMENTS IN ACCORDANCE WITH ACI 318, SECTION 4.3 "PROPORTIONING ON THE BASIS OF FIELD EXPERIENCE".

B. ALL CONCRETE SHALL ATTAIN A MINIMUM COMPRESSIVE STRENGTH AT 28-DAYS (STANDARD TEST) OF:

END BENT AND WINGWALL..... 4000 PSI
DRILLED SHAFT..... 4000 PSI
APPROACH SLAB..... 4000 PSI

UNLESS OTHERWISE NOTED ON PLANS, CONCRETE SHALL HAVE A SLUMP OF 4IN ' 1IN. (DRILLED SHAFT 6 IN ' 1IN).

C. STRENGTHS SHALL BE BASED ON LAB-CURED SPECIMENS. ANY ALTERNATIVES TO THE ABOVE MUST HAVE WRITTEN APPROVAL OF THE ENGINEER.

D. CONTRACTOR SHALL EMPLOY A CERTIFIED TESTING LABORATORY FOR CONCRETE SAMPLING AND TESTING IN ACCORDANCE WITH ASTM C31-75 AND ASTM C39-79 AND TEMPERATURE.
ONE SET OF FIVE (6IN X 12IN) CONCRETE CYLINDERS(TEST 1@3, 1@7, 2@28 DAYS) FOR EACH DAY'S PRODUCTION. IF THE TWO 28 DAYS TEST FAIL TO MEET REQ'D STRENGTH,TEST THE 5TH CYLINDER AT 48 DAYS. COST OF CONCRETE TESTING SHALL BE INCLUDED IN CONCRETE POUR OPERATIONS AT NO ADDITIONAL COST.

E. EXACT LOCATION OF CONCRETE PLACED IMMEDIATELY AFTER TEST SAMPLE SHALL BE INDICATED ON REPORT. CONCRETE SHALL BE SAMPLED AT POINT OF DISCHARGE AND INDICATED AS SUCH ON REPORT.

F. ALL CONCRETE SHALL CONTAIN AN A/E/O REVIEWED ASTM C494-79 ADMIXTURE AS FOLLOWS:

FOR F'c EQUAL TO OR LESS THAN 5000 PSI.....TYPE A

CEMENT SHALL CONFORM TO ASTM C150-78A, TYPE I.

G. AGGREGATES SHALL CONFORM TO ASTM C33-79, SIZE NO. 67, UNLESS OTHERWISE NOTED. FOOTINGS MAY CONFORM TO SIZE #57.

H. PLACING AND CURING OF ALL CONCRETE SHALL CONFORM TO ACI 318 AND ACI 301 LATEST EDITIONS. ALL CONCRETE SHALL BE PLACED IN THE DRY UNLESS WRITTEN APPROVAL IS OBTAINED FOR EACH. CASE PRIOR TO PLACING CONCRETE. THE GENERAL CONTRACTOR SHALL TAKE APPROPRIATE MEASURES FOR THOSE INSTANCES WHEN CONCRETE MIGHT EXCEED 90 DEGREES F AT TIME OF PLACEMENT. CONCRETE WITHOUT AN ASTM C494 TYPE "D" ADMIXTURE SHALL NOT BE USED IF THE CONCRETE TEMPERATURE AT TIME OF PLACEMENT EXCEEDS 90 DEGREES F.

I. IN THE EVENT OF CRACKS IN CONCRETE, GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING AND FILLING ALL CRACKS. CONTRACTOR SHALL SUBMIT TO ENGINEER, IN WRITING, LOCATION DESCRIPTION OF ALL CRACKS AND PPOPOSED METHODS FOR REPAIRING SAID CRACKS PRIOR TO REPAIR.
COST OF CRACK REPAIRS SHALL BE INCLUDED IN CONCRETE POUR OPERATIONS AT NO ADDITIONAL COST.

J. SPLICES IN BARS SHALL BE CLASS C IN ACCORDANCE WITH BRIDGE DETAILING MANUAL TEXAS DEPARTMENT OF TRANSPORTATION, EXCEPT WHERE DIMENSIONED OTHERWISE ANYWHERE ELSE IN THE PLANS.

K. ALL REINFORCEMENT REQUIRES INSPECTION BY ENGINEER.

L. WHEN AIR TEMPERATURE IS BETWEEN 85 DEG. F (30 DEG. C) AND 90 DEG F (32 DEG. C), REDUCE MIXING AND DELIVERY TIME FROM 1½"2HOURS TO 75 MINUTES, AND WHEN AIR TEMPERATURE IS ABOVE 90 DEG. F (32 DEG. C), REDUCE MIXING AND DELIVERY TIME TO 60 MINUTES.

M. MIX DESIGNS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO COMMENCEMENT OF ANY CONCRETE WORK.

N. NO ADMIXTURE SHALL BE PERMITTED IN THE CONCRETE MIX WITHOUT WRITTEN APPROVAL BY THE ARCHITECT/ENGINEER.

O. NO WATER SHALL BE ADDED TO THE CONCRETE MIX AT THE JOB SITE.

P. ALL PLUMBING AND ELECTRICAL SLOTS SHALL BE FILLED WITH CONCRETE AFTER PIPES OR CONDUITS ARE INSTALLED.

Q. USE HIGH-RANGE WATER-REDUCING ADMIXTURE (HRWR) IN PUMPED CONCRETE,CONCRETE FOR INDUSTRIAL SLABS,ARCHITECTURAL CONCRETE, PARKING STRUCTURE SLABS, CONCRETE REQUIRED TO BE WATERTIGHT, AND CONCRETE WITH WATER/CEMENT RATIOS BELOW 0.45.

4. CONCRETE SLAB ON FILL

A. ALL TOP ORGANIC SOIL SHALL BE REMOVED AND DISPOSED OF PRIOR TO STARTING FILLING WORK. SELECTED FILL MATERIALS SHALL BE CLEAN CRUSHED LIMEROCK (3" MAXIMUM PARTICLE SIZE) OR CLEAN FINE SAND. THE FILL PLACEMENT SHALL BE IN THE DRY AND IT SHALL BE COMPACTED TO A MINIMUM OF NINETY-EIGHT PERCENT (98%) OF THE MODIFIED PROCTOR ASTM D-1557.

B. SLABS ON GRADE SHALL BE PLACED ON A 10 MIL VISQUEEN VAPOR BARRIER OR APPROVED EQUIVALENT. COST OF VAPOR BARRIER SHALL BE INCLUDED IN THE COST OF THE SLAB ON GRADE AT NO ADDITIONAL COST.

C. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185-85 "STANDARD SPECIFICATIONS FOR WELDED WIRE FABRIC FOR CONCRETE REINFORCEMENT".

D. WELDED WIRE FABRIC SHALL BE SUPPORTED ON SLAB BOLSTERS OR CONCRETE BLOCKS SPACED 3'-0" O.C. OR LESS.

E. SAW-CUT CONTROL JOINTS SHALL BE SAWED AS SOON AS THE CONCRETE IS HARD ENOUGH SUCH THAT IT DOES NOT GET WORN OR DAMAGED BY THE BLADE.

F. COLUMNS, BEAMS, WALLS OR ANY OTHER STRUCTURAL MEMBER PASSING THROUGH SLABS ON GRADE SHALL BE ISOLATED BY ½" IN THICK PREMOLDED JOINT FILLER COMPLYING WITH ASTM D 1751, TYPE 1.

G. JOINTS SHALL BE SEALED WHERE INDICATED BY THE ARCHITECTURAL OR STRUCTURAL DRAWINGS. FILLER AND SEALANT MATERIALS SHALL FOLLOW SPECIFICATIONS.

H. FILL SHALL BE THOROUGHLY MOISTENED IMMEDIATELY BEFORE CONCRETE IS PLACED.

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09-13-18

LAKES ENGINEERING, INC.
TBPE REG. # 15243
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CHRISTOPHER P. MESZLER, P.E.
LICENSE # 112052
1901 CENTRAL DRIVE, SUITE #405
BEDFORD, TX 76021

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

GENERAL NOTES (1 OF 2)

DESIGN: CPM
DRAWN: AS/YF
CHECKED: MR
DATE: 07/03/2018
SHEET
B1-2
File No. 17-111

PLOTTED BY: CMeszler
PLOTTED DATE: 9/13/2018
LOCATION: N:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\struct\B1GeneralNotes03.dgn
LAST SAVED: 8:38:55 AM

GENERAL NOTES (CONTINUED)

5. REINFORCING STEEL

A. REINFORCING STEEL FOR SUPERSTRUCTURE SHALL MEET SUPERSTRUCTURE MANUFACTURER'S SPECIFICATIONS. ALL OTHER REINFORCING STEEL SHALL BE DEFORMED BARS, FREE FROM LOOSE RUST AND SCALE AND CONFORMING TO ASTM A 615, GRADE 60.

B. ALL ACCESSORIES SHALL HAVE UPTURNED LEGS, AND BE PLASTIC DIPPED AFTER FABRICATION.
ACCESSORIES FOR REINFORCING SHALL BE IN ACCORDANCE WITH ACI, CURRENT EDITION.

C. SUPPORT BARS SHALL BE #5 OR GREATER, AND NOT SPACED MORE THAN 4'-0" C/C. SUPPORT BARS AND ENDS OF MAIN REINFORCING SHALL NOT EXTEND MORE THAN 1'-6" PAST OUTERMOST CHAIR OR SUPPORT BAR.

D. A MINIMUM OF 3 SUPPORT BARS AND 3 INDIVIDUAL HIGH CHAIRS FOR EACH SUPPORT BAR SHALL BE PROVIDED FOR TOP REINFORCING.

E. SLAB BOLSTERS SHALL BE PROVIDED FOR VERTICAL COLUMN REINFORCING STEEL, SUCH THAT 2 INCH MINIMUM CLEARANCE IS MAINTAINED.
A SAMPLE SHALL BE SENT TO THE ENGINEER FOR APPROVAL.

F. ALL WINGWALLS AND COLUMNS SHALL BE DOWELED INTO BOTTOM OF FOOTINGS, WALLS OR SLABS WITH BARS OF SAME SIZE AND SPACING AS THE BARS ABOVE.

G. CUTTING BARS WITH THE USE OF A TORCH IS NOT PERMITTED.

H. FIELD-BENDING OF BARS WITH THE USE OF A TORCH IS NOT PERMITTED.

6. REINFORCING STEEL COVER

(MIN. COVER, UNLESS OTHERWISE NOTED)

a. EXTERNAL SURFACE FORMED ..... 3 IN
b. DRILLED SHAFT ..... 3 IN
c. WALLS AND APPROACH SLAB ..... 2 IN

7. FORMING

A. WET THE FORMS, REBARS & BOTTOM OF ALL FOOTINGS EXCAVATIONS IMMEDIATELY BEFORE PLACING FOOTING CONCRETE.

B. SIDE FORMS OF WALLS (NON-RETAINING), COLUMN & BEAMS SHALL BE DESIGNED TO WITHSTAND THE DEAD LOADS OF VIBRATED CONCRETE AND CUMULATIVE LOADS OF SUPPORTING LOAD ABOVE.

C. SIDE FORMS MAY BE REMOVED 8 HOURS AFTER PLACEMENT. NO FORMS SHALL BE ATTACHED TO THE STRIPPED ELEMENTS. NO LOADS SHALL BE PLACED ON STRIPPED ELEMENTS.

8. SHOP DRAWING:

A. CONTRACTOR SHALL SUPPLY SHOP DRAWINGS. INDICATE ISSUE DATE OR LATEST REVISION DATE OF PERSON RESPONSIBLE FOR CHECKING. SHOP DRAWINGS SHALL BEAR CONTRACTOR'S STAMP, INITIALED OR SIGNED CERTIFYING TO REVIEW OF SUBMITTAL, VERIFICATION OF PRODUCT, FIELD MEASUREMENTS, FIELD CONSTRUCTION. CRITERIA, AND COORDINATION OF THE INFORMATION WITHIN THE SUBMITTAL WITH REQUIREMENTS OF THE WORK AND THE CONTRACT DOCUMENTS.

B. CONTRACTOR SHALL SUBMIT TWO SETS OF SHOP DRAWING PLANS TO ENGINEER CHRISTOPHER P. MESZLER, P.E. (1903 CENTRAL DRIVE SUITE #405 BEDFORD, TX 76021 PH. 817.618-3640 TBPE REG. F-15243 LIC. NO. 112052) OR ONE SET ELECTRONICALLY.

C. CONTRACTOR SHALL SUBMIT SHOP DRAWING PLANS FOR: REINFORCING STEEL, CONCRETE MIX DESIGN, ANCHOR BOLTS AND NUTS. ERECTION PLAN/CRANE PLACEMENT, AND SOIL PREPARATION.

STOP!
CALL BEFORE YOU DIG

DIG TESS
1-800-DIG-TESS
(AT LEAST 72 HOURS PRIOR TO DIGGING)

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09/13/18

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LIC. No. 112052
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BEDFORD, TX 76021

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

GENERAL NOTES (2 OF 2)

DESIGN	CPM
DRAWN	AS/YF
CHECKED	MR
DATE	07/03/2018

SHEET
B1-3

File No. 17-111

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\Struct\B1\GeneralNotes04.dgn
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File No. 17-111
SHEET B1-4
DATE: 07/03/2018
CHECKED: MR
DRAWN: AS/YF
DESIGN: CPM

PLAN AND ELEVATION

No.	DATE	REVISION	BY

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

LAKES ENGINEERING, INC.
CHRISTOPHER P. MESZLER, P.E.
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PROFESSIONAL ENGINEER
CHRISTOPHER P. MESZLER
LICENSED
112052
STATE OF TEXAS
09-13-18

ELEVATION

EXISTING TRAIL
EXIST. APPRH. SLAB NO. 1
BEGIN BRIDGE/ FFBW ABUTMENT NO. 1
STA. 10+10.00 ELEV. 617.00
BEGIN BRIDGE/ FFBW ABUTMENT NO. 1
TOP OF CONCRETE DECK
TOP OF PEDESTRIAN RAIL (BY OTHERS)
END BRIDGE/ FFBW ABUTMENT NO. 2
END BRIDGE/ FFBW ABUTMENT NO. 2
STA. 11+70.17 ELEV. 616.25'
APPRH. SLAB (FLUSH W/TOP OF DECK)(TYP.)
TRAIL (BY OTHERS)
APPRH. SLAB NO. 2
10'-0"
150'-2" OVERALL LENGTH OF BRIDGE (MEASURED ALONG ℄ OF BRIDGE)
SLOPE=0.5%
100 YR. FLOOD ELEV. 613.40'
BOTTOM OF CHORD
MATCH EXIST. SLOPE
PROP. GROUND
APPROXIMATE EXISTING GROUND
FILL AS REQUIRED
EXISTING BACKWALL TO REMAIN
12" STONE RIPRAP PROTECTION
3~18" DIA. EXIST. DRILLED SHAFTS
2~24" DIA. DRILLED SHAFTS
12" STONE RIPRAP PROTECTION
1'-6" (TYP.)
1'-6" (TYP.)
2
1
3
580 585 590 595 600 605 610 615 620 625 630
10+00 10+20 10+40 10+60 10+80 11+00 11+20 11+40 11+60 11+80 12+00

PLAN

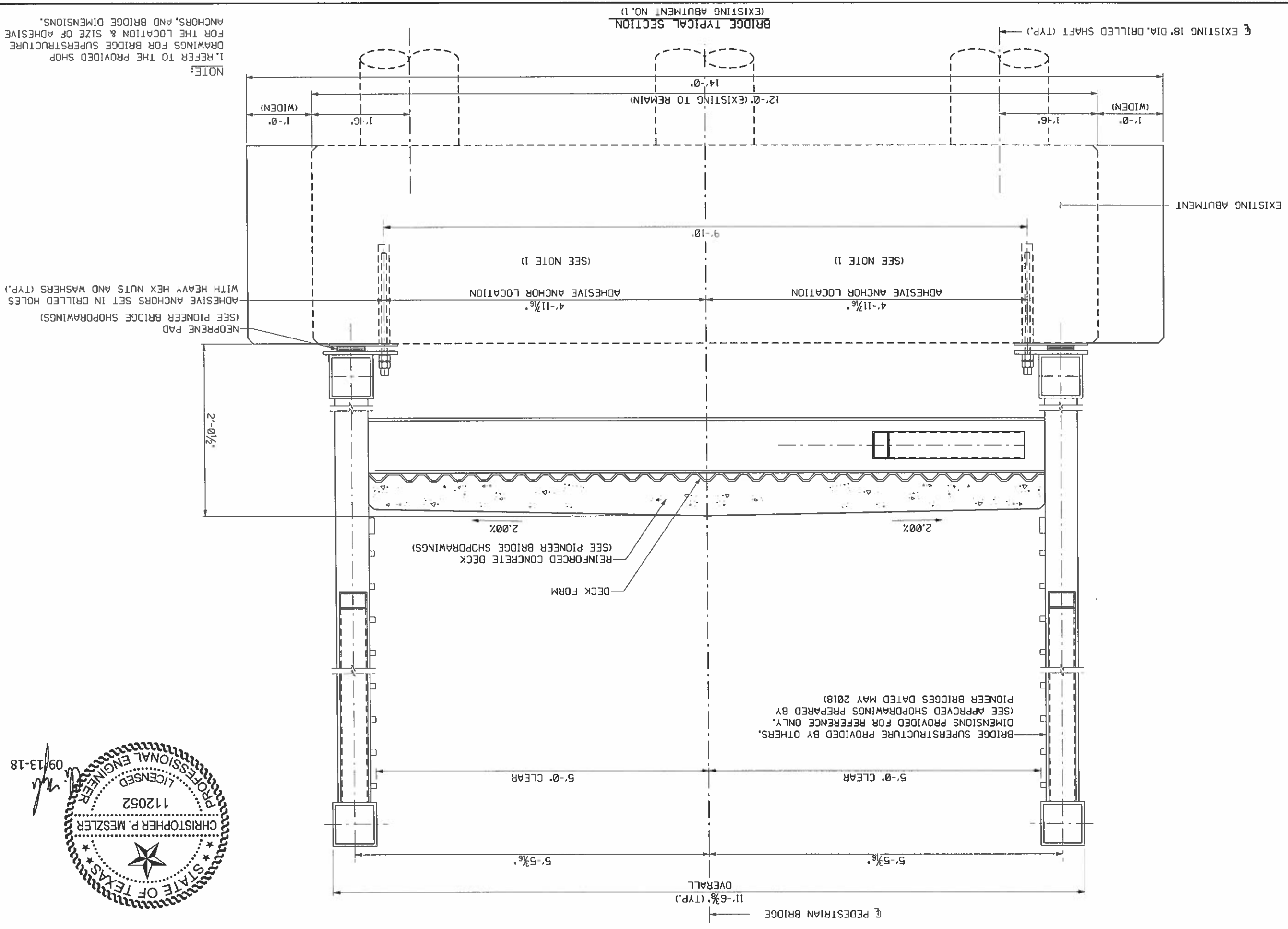
DIRECTION OF STATIONING

1"=15'

24" DIA. DRILLED SHAFT (TYP.)
PEDESTRIAN RAIL (BY OTHERS)(TYP.)
℄ PEDESTRIAN BRIDGE
END BRIDGE
FFBW ABUTMENT NO. 2
BEGIN APPRH. SLAB NO. 2
STA. 11+70.17
END APPROACH SLAB NO. 2
STA. 11+80.17
90°00'00" (TYP.)
90°00'00" (TYP.)
PROP. TRAIL (BY OTHERS)
B-01
B-02
N 26° 13' 34" W
10'-0" CLEAR
11'-4" OVERALL
REMOVE PORTION OF EXISTING PEDESTRIAN RAIL TO ALLOW ACCESS TO BRIDGE
18" DIA. EXIST. DRILLED SHAFTS (TYP.)
EXISTING ABUTMENT
DIRECTION OF FLOW
SLOAN CREEK TRIBUTARY 4
E.J. (SEE NOTE 1)
BEGIN EXISTING APPROACH SLAB NO. 1
STA. 10+10.00
BEGIN BRIDGE FFBW EXISTING ABUTMENT NO. 1
END EXISTING APPRH. SLAB NO. 1
STA. 10+20.00
E.J. (SEE NOTE 1)
605 609 611 613 614 615 617

LEGEND:
INDICATES APPROXIMATE SOIL BORING LOCATIONS

NOTES:
1. FOR EXPANSION JOINT DETAILS, SEE TXDOT STANDARD INDEX "CS-MD". TYPE A JOINT DETAIL.
2. ALL TREES AND VEGETATION REQUIRED TO BE REMOVED IN CONFLICT WITH BRIDGE SHALL BE REMOVED BY HAND TO PRESERVE NATURALLY STABILIZED SLOPE. ANY DISTURBED SLOPE SHALL BE STABILIZED WITH STONE RIP RAP OR APPROVED EQUAL. NOTIFY ENGINEER IMMEDIATELY IF NATURAL SLOPE IS DISTURBED.



NOTE:
1. REFER TO THE PROVIDED SHOP DRAWINGS FOR BRIDGE SUPERSTRUCTURE FOR THE LOCATION & SIZE OF ADHESIVE ANCHORS, AND BRIDGE DIMENSIONS.

TYPICAL SECTION AT EXISTING ABUTMENT NO. 1

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

NO.	DATE	REVISION	BY

DESIGN: CPM
DRAWN: ASVF
CHECKED: WR
DATE: 07/03/2018

SHEET
B1-5

Job No. 17-111

LAKES ENGINEERING, INC.
CHRISTOPHER P. MESZLER, P.E.
LIC No. 112052
1903 CENTRAL DRIVE, SUITE #405
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LICENSED PROFESSIONAL ENGINEER
CHRISTOPHER P. MESZLER
112052
STATE OF TEXAS
09/13-18

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\struct\BITypicalSection03.dgn
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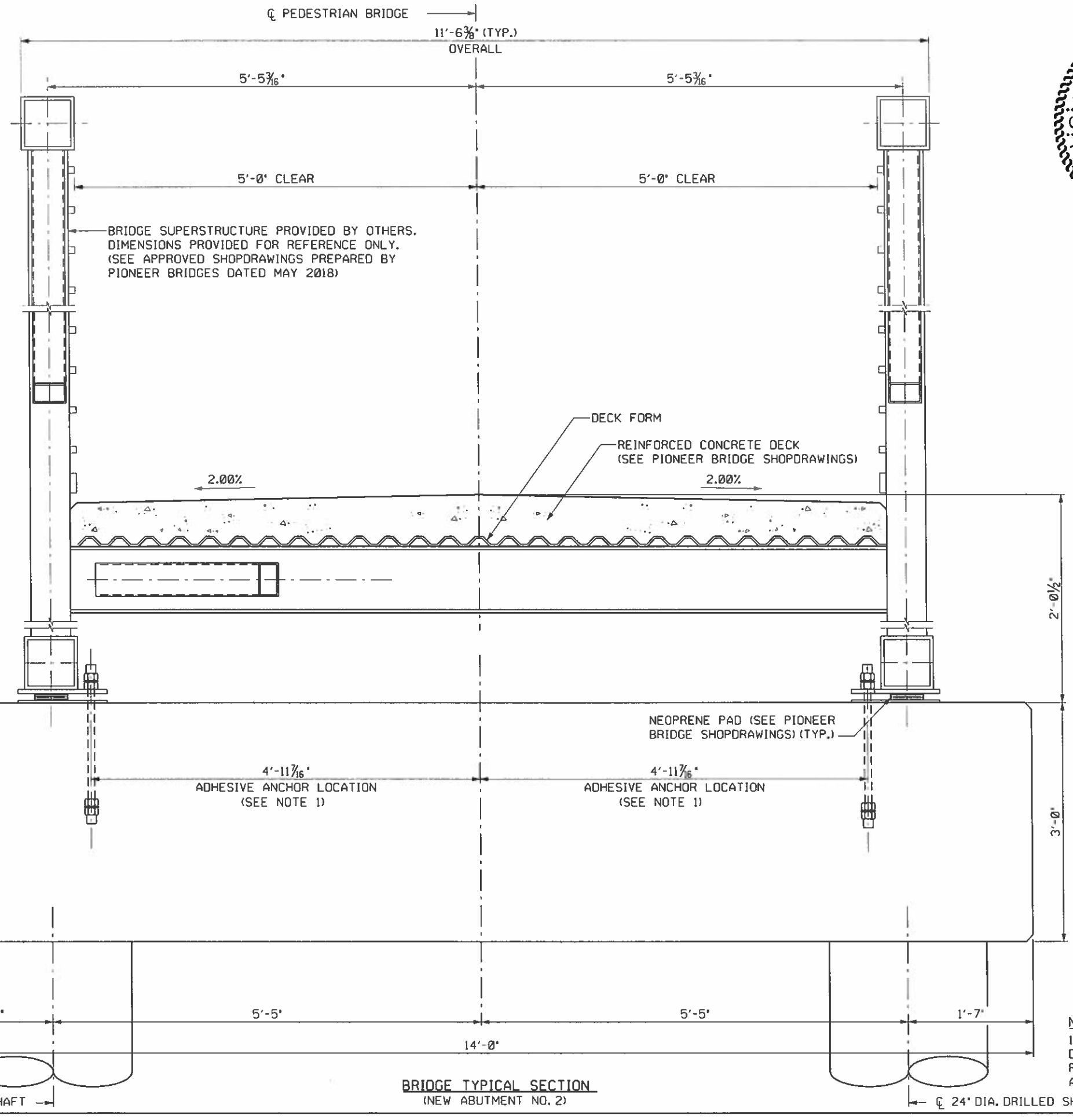

BRIDGE TYPICAL SECTION
(NEW ABUTMENT NO. 2)

NOTE:
1. REFER TO THE PROVIDED SHOP DRAWINGS FOR BRIDGE SUPERSTRUCTURE FOR THE LOCATION & SIZE OF ADHESIVE ANCHORS AND BRIDGE DIMENSIONS.

STATE OF TEXAS
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SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

TYPICAL SECTION AT ABUTMENT NO. 2

DESIGN:	CPM
DRAWN	AS/YF
CHECKED	MR
DATE	07/03/2018

SHEET
B1-6

File No. 17-111

PLOTTED BY: CMeszler
PLOT DATE: 9/12/2018
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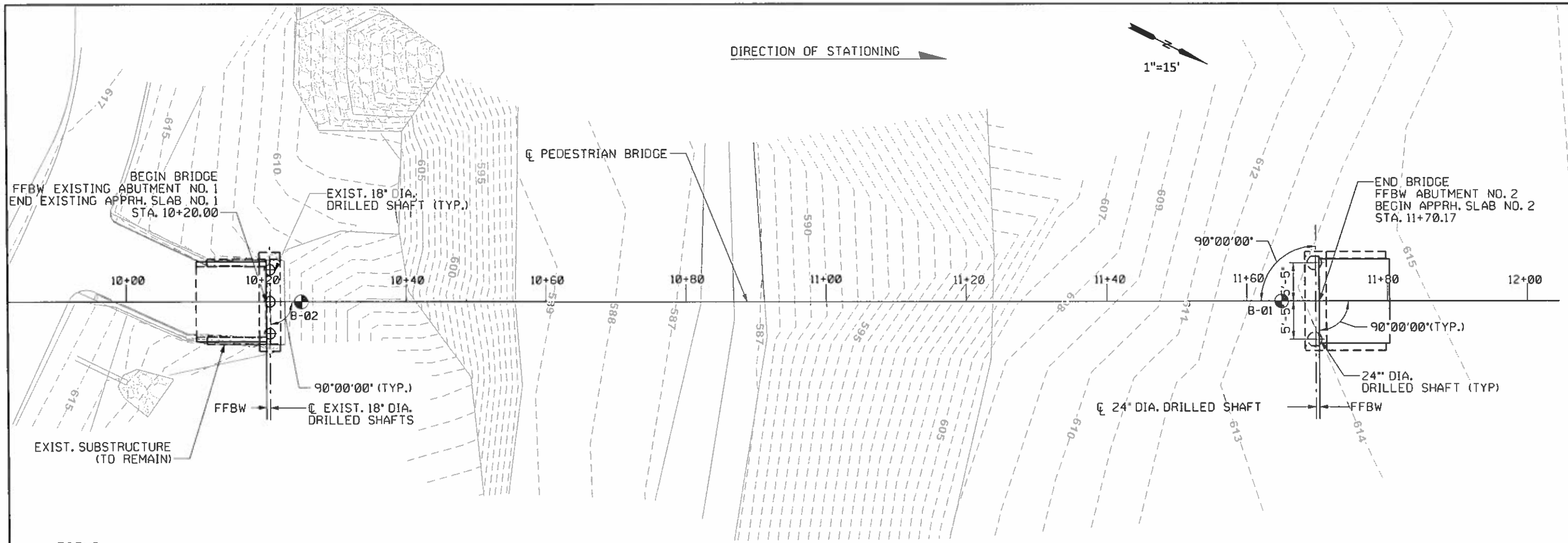

LEGEND:

INDICATES APPROXIMATE SOIL BORING LOCATIONS

PLAN
(RIPRAP NOT SHOWN FOR CLARITY)

DRILLED SHAFT DATA TABLE

INSTALLATION CRITERIA							DESIGN CRITERIA								TOP OF DRILLED SHAFT ELEVATION (FT.)
ABUTMENT NO.	NO. SHAFT	SHAFT SIZE (IN.)	(1) TIP ELEV. (FT.)	(2) MIN. TIP ELEV. (FT.)	MIN.ROCK SOCKET LENGTH (FT.)	(3) MIN.TOP OF ROCK SOCKET ELEVATION (FT.)	FACTORED DESIGN LOAD (TONS)	FACTORED DESIGN UPLIFT LOAD (TONS)	DOWN DRAG (TONS)	LONG TERM SCOUR ELEV. (FT.)	100-YEAR SCOUR ELEV. (FT.)	Ø COMPRESSION	Ø UPLIFT	CONSIDER NONREDUNDANT	
2	2	24	594.5	594.5	5.0	599.5	66	N/A	0	N/A	N/A	0.5	N/A	YES	611.21

(1) THE TIP ELEVATION IS THE HIGHEST ELEVATION THE SHAFT TIP SHALL BE CONSTRUCTED UNLESS LOAD TEST DATA, ROCK CORE TESTS, OR OTHER GEOTECHNICAL TEST DATA OBTAINED DURING PILOT HOLES ALLOWS THE ENGINEER TO AUTHORIZE A DIFFERENT TIP ELEVATION.

(2) THE MIN. TIP ELEVATION IS THE TIP ELEVATION REQUIRED FOR LATERAL STABILITY.

(3) ROCK ENCOUNTERED ABOVE THE MIN. TOP OF ROCK ELEVATION IS CONSIDERED UNSUITABLE FOR INCLUSION IN THE ROCK SOCKET LENGTH. THE ENGINEER MAY REVISE THIS ELEVATION BASED ON PILOT HOLES REQUIRED TO BE PERFORMED.

NOTE:

1. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO PROPOSED FOUNDATION WORK. IF THE CONTRACTOR FINDS CONFLICTS BETWEEN EXISTING UTILITIES AND PROPOSED FOUNDATION CONSTRUCTION, THE ENGINEER SHALL BE NOTIFIED INMEDIATELY, AND PRIOR TO BEGINNING CONSTRUCTION.

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09-13-18

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1900 CENTRAL DRIVE, SUITE #405
BEDFORD, TX. 76021

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

FOUNDATION LAYOUT

DESIGN:	CPM
DRAWN:	AS/YF
CHECKED:	MR
DATE:	07/03/2018

SHEET
B1-7

File No. 17-111

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
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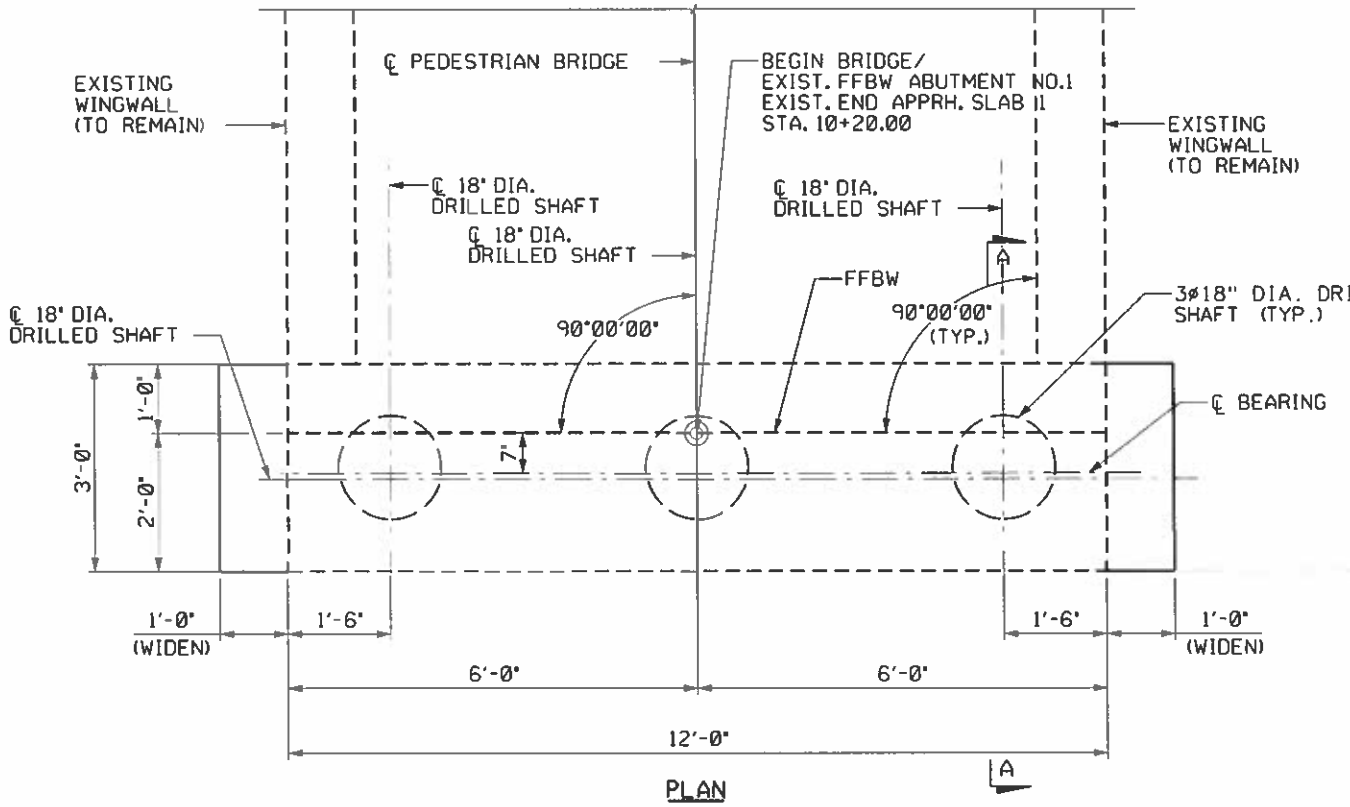
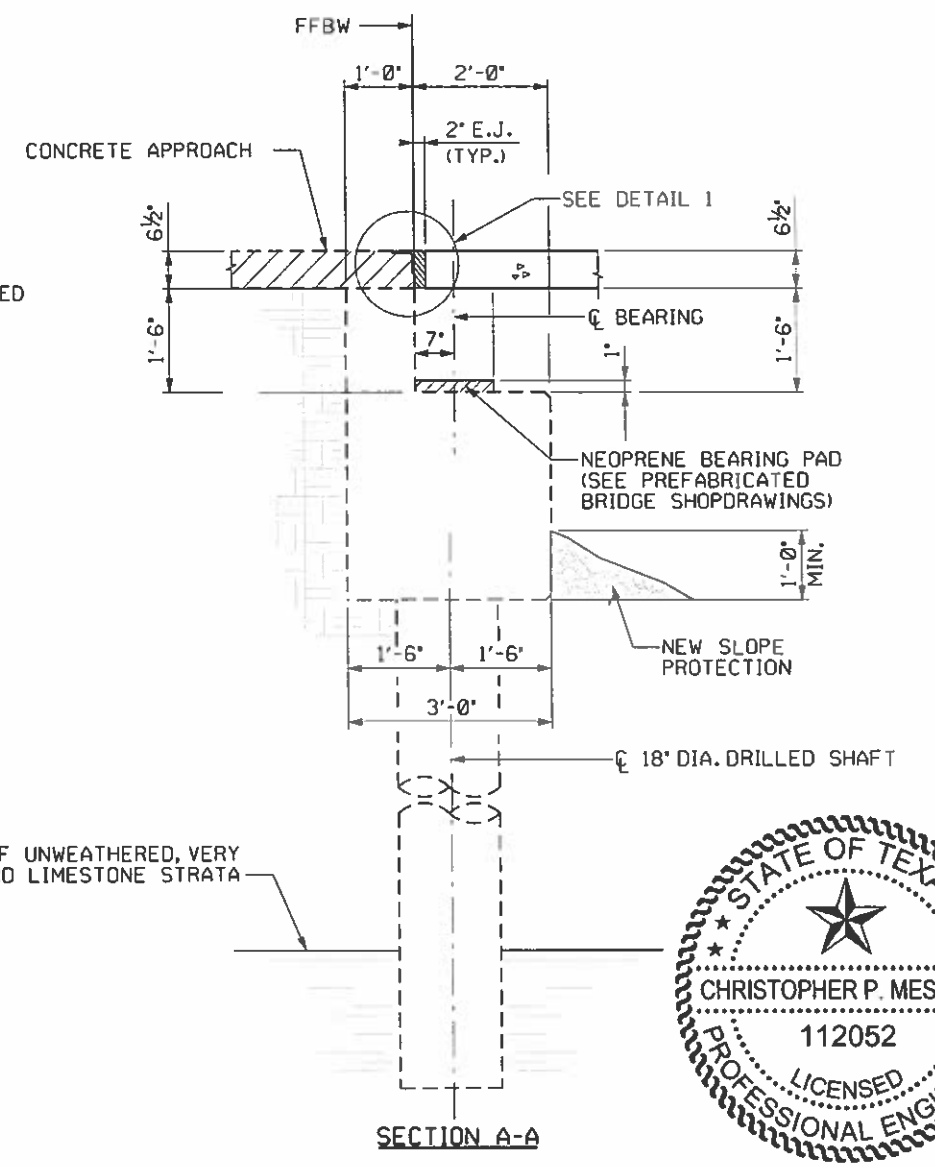
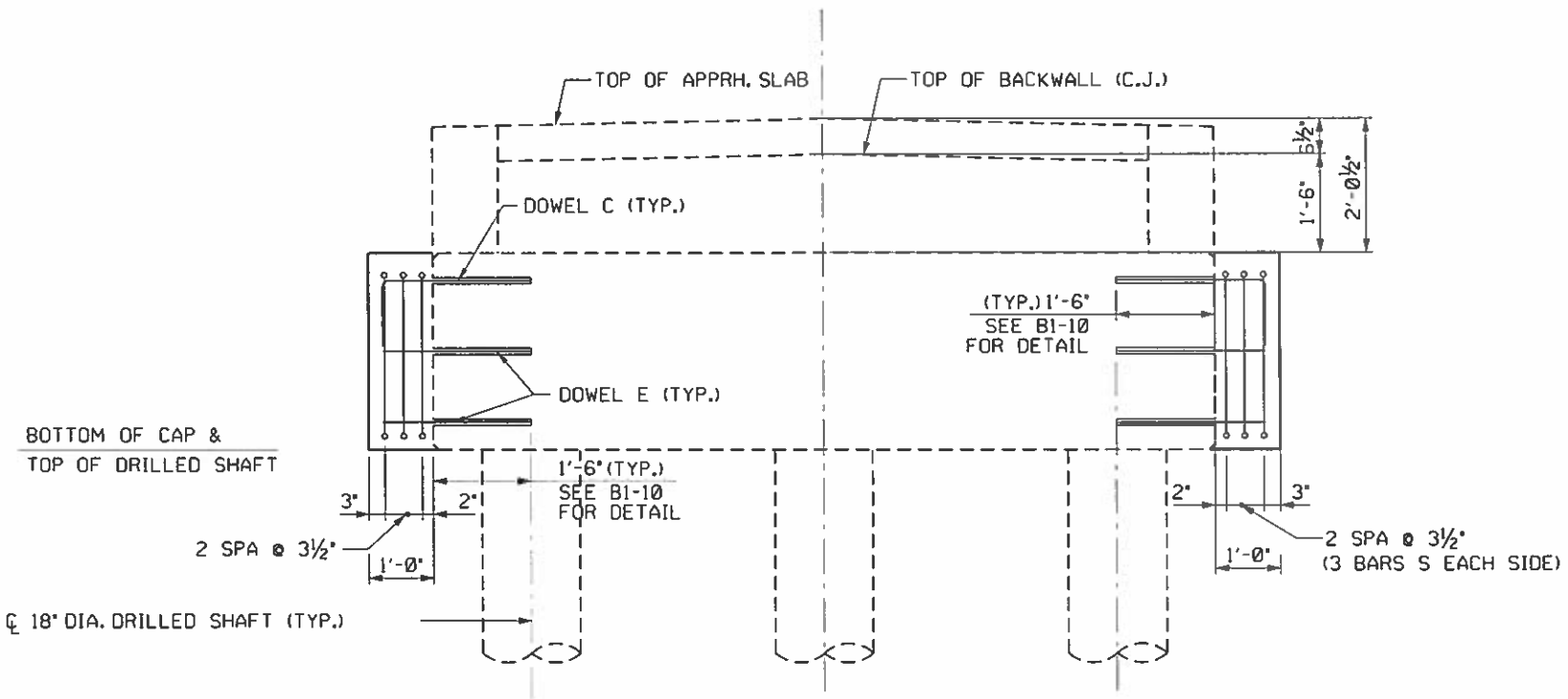
DIRECTION OF STATIONING



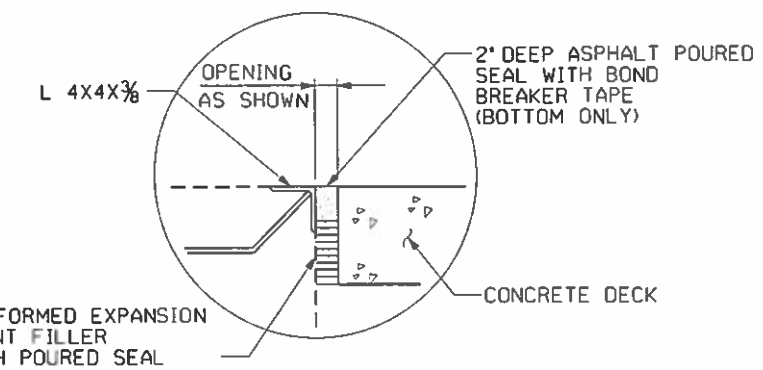
PLAN
(EXISTING ABUTMENT NO. 1)



SECTION A-A



ELEVATION
(EXISTING ABUTMENT NO. 1)



DETAIL 1

LEGEND:

FFBW = FRONT FACE OF BACKWALL

C.J. = CONSTRUCTION JOINT

DIA. = DIAMETER

E.J. = EXPANSION JOINT

NOTES:

1. FOR DOWEL DETAILS SEE SHEET B1-10.
2. ALL LABELS ON THIS SHEET REFERRING TO THE EXISTING ABUTMENT NO.1 'TO REMAIN'
3. SEE PREFABRICATED BRIDGE SHOPDRAWINGS FOR BOLT LOCATION AND ALL OTHER DIMENSIONS.

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09-13-18

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LIC. No. 112052
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BEDFORD, TX 76021

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

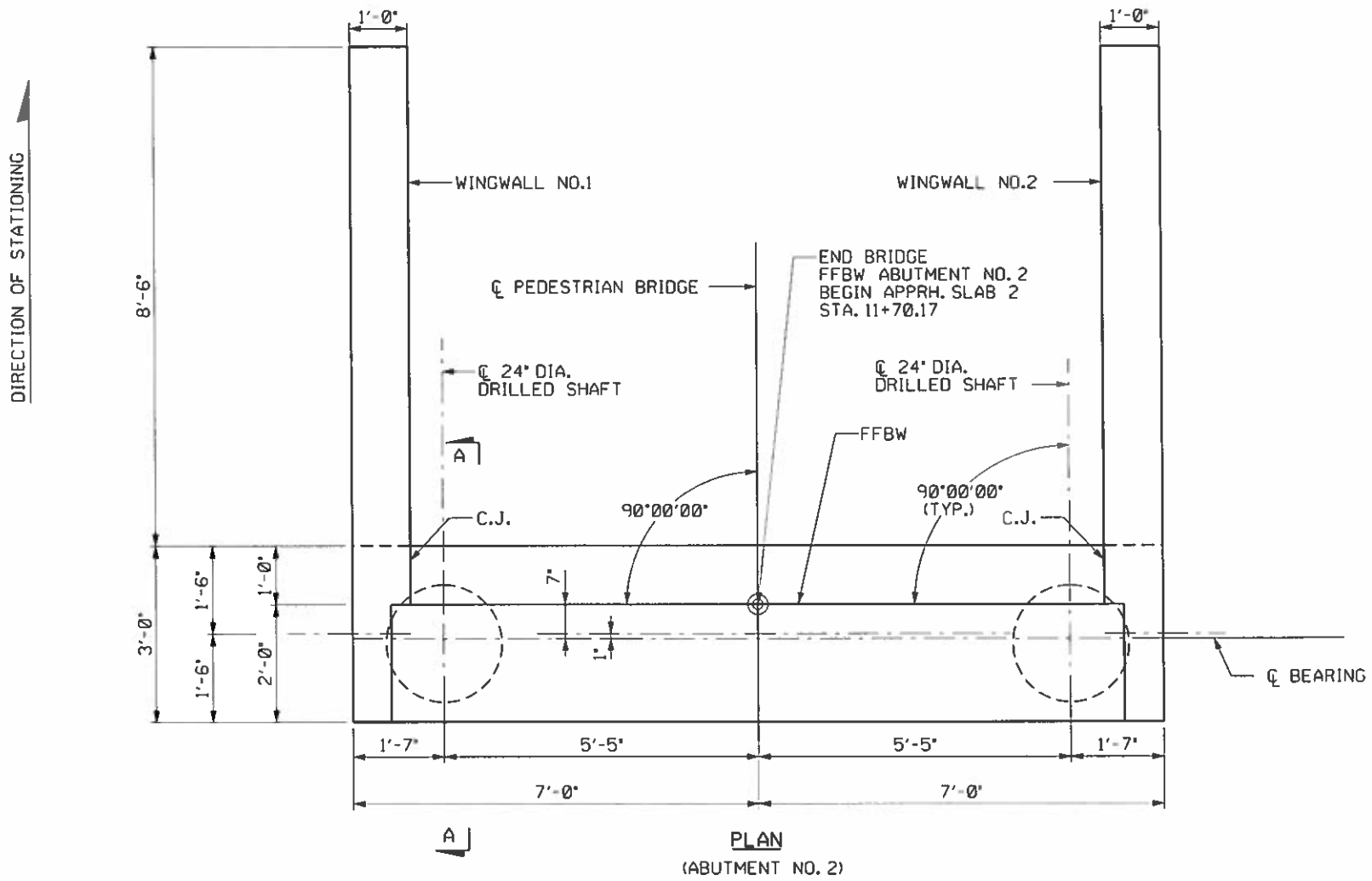
ABUTMENT NO. 1
(EXISTING STRUCTURE)

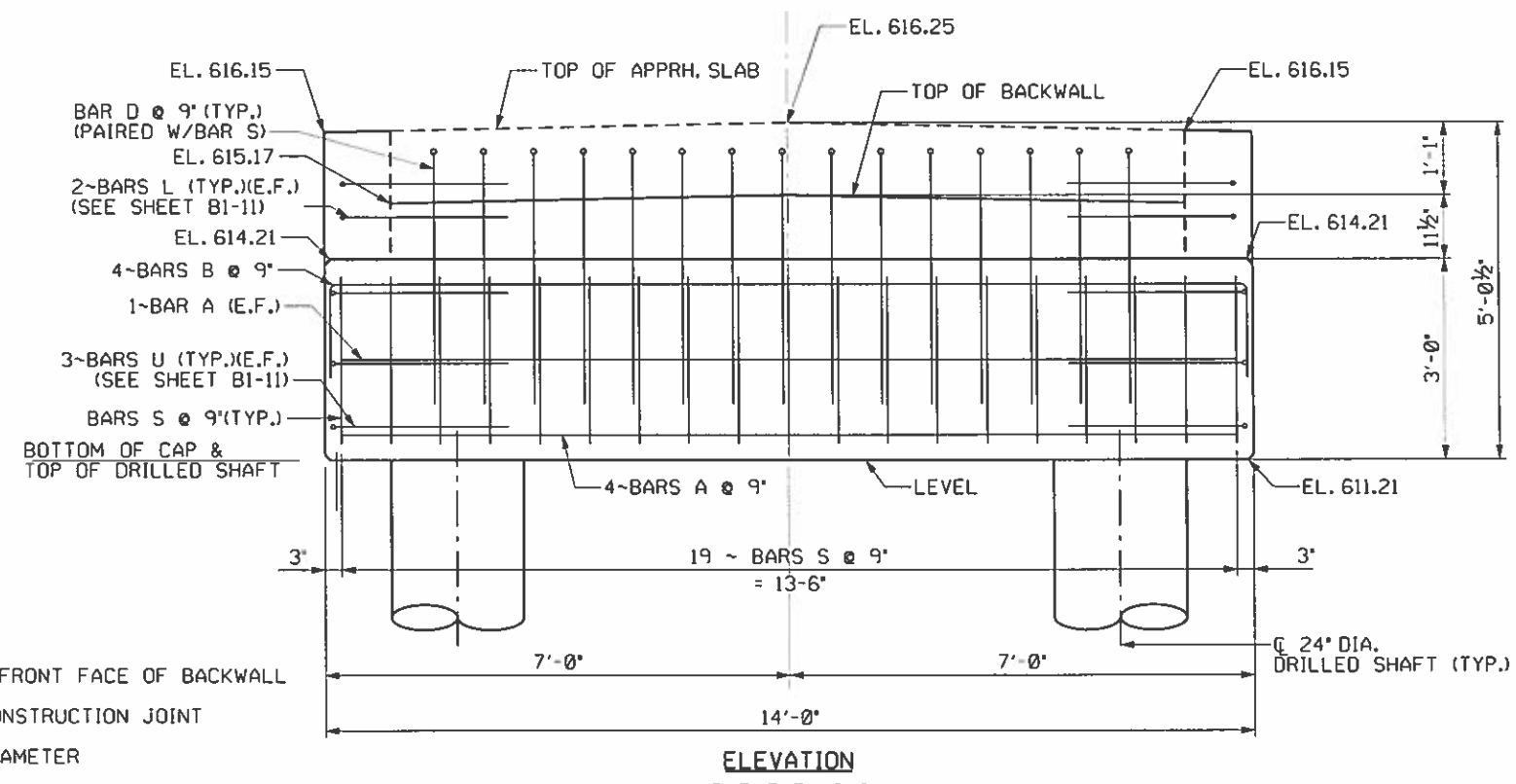
DESIGN:	CPM
DRAWN:	AS/YF
CHECKED:	MR
DATE:	07/03/2018

SHEET
B1-8

File No. 17-111

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\struct\B1EndBent01.dgn
LAST SAVED: 8:39:54 AM



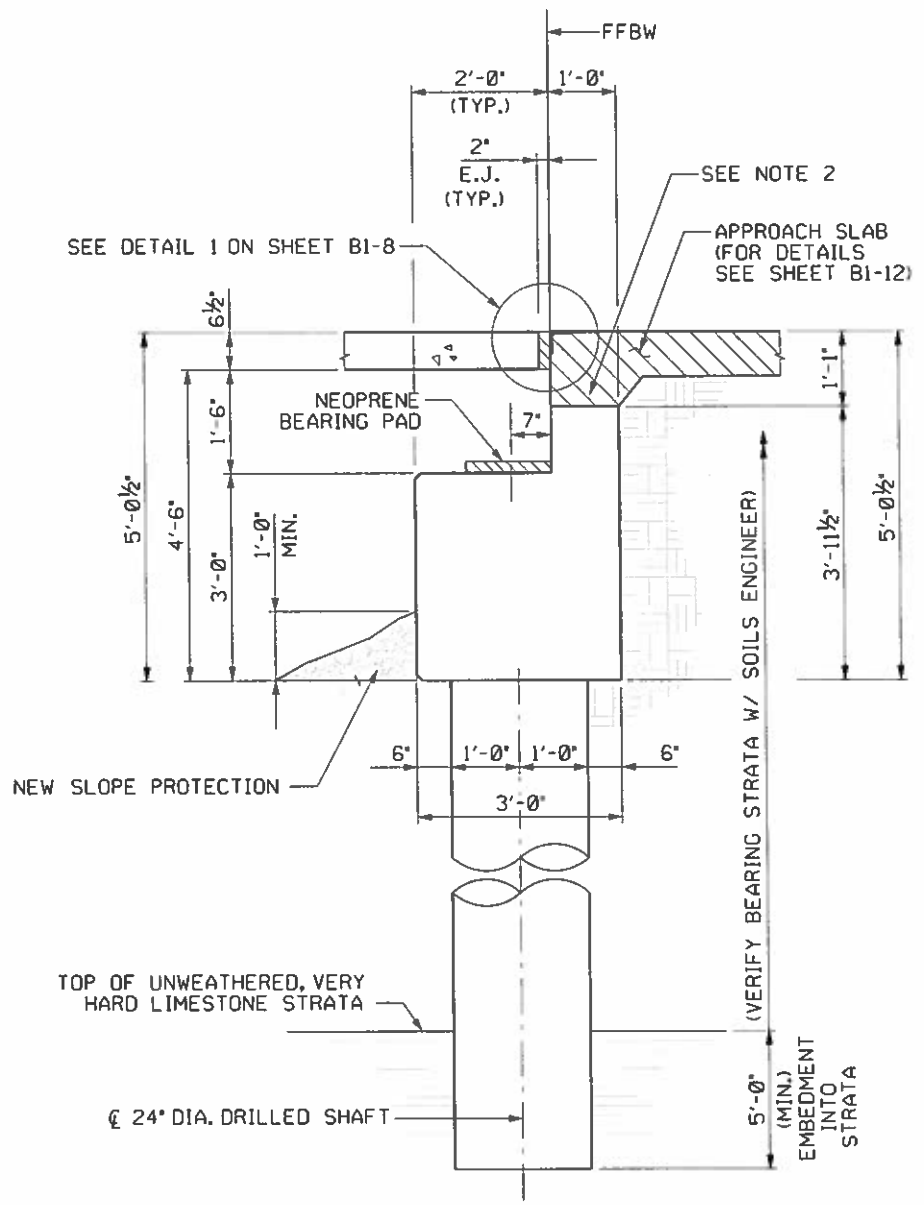


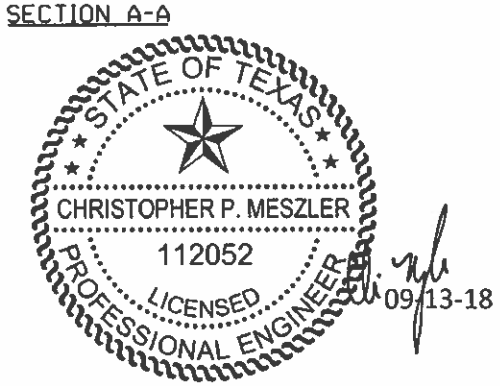
LEGEND:

FFBW = FRONT FACE OF BACKWALL

C.J. = CONSTRUCTION JOINT

DIA. = DIAMETER





NOTES:

1. FOR DRILLED SHAFT DETAILS, SEE B1-10 AND TxDOT INDEX ODSR.
2. PROVIDE A 2% CROSS SLOPE ON TOP OF ABUTMENT CAP (SHORT DIRECTION).
3. PROVIDE TWO LAYERS OF 30 LB SMOOTH ROOFING PAPER BETWEEN BACKWALL AND APPROACH SLAB.
4. FOR APPROACH SLABS DETAILS, SEE SHEET B1-12.
5. SEE PREFABRICATED BRIDGE SHOPDRAWINGS FOR BOLT LOCATIONS AND ALL OTHER DIMENSIONS.

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SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

ABUTMENT NO. 2

DESIGN:	CPM
DRAWN	AS/YT
CHECKED:	MR
DATE	07/03/2018

SHEET
B1-9

File No. 17-111

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\struct\B1EndBent02.dgn
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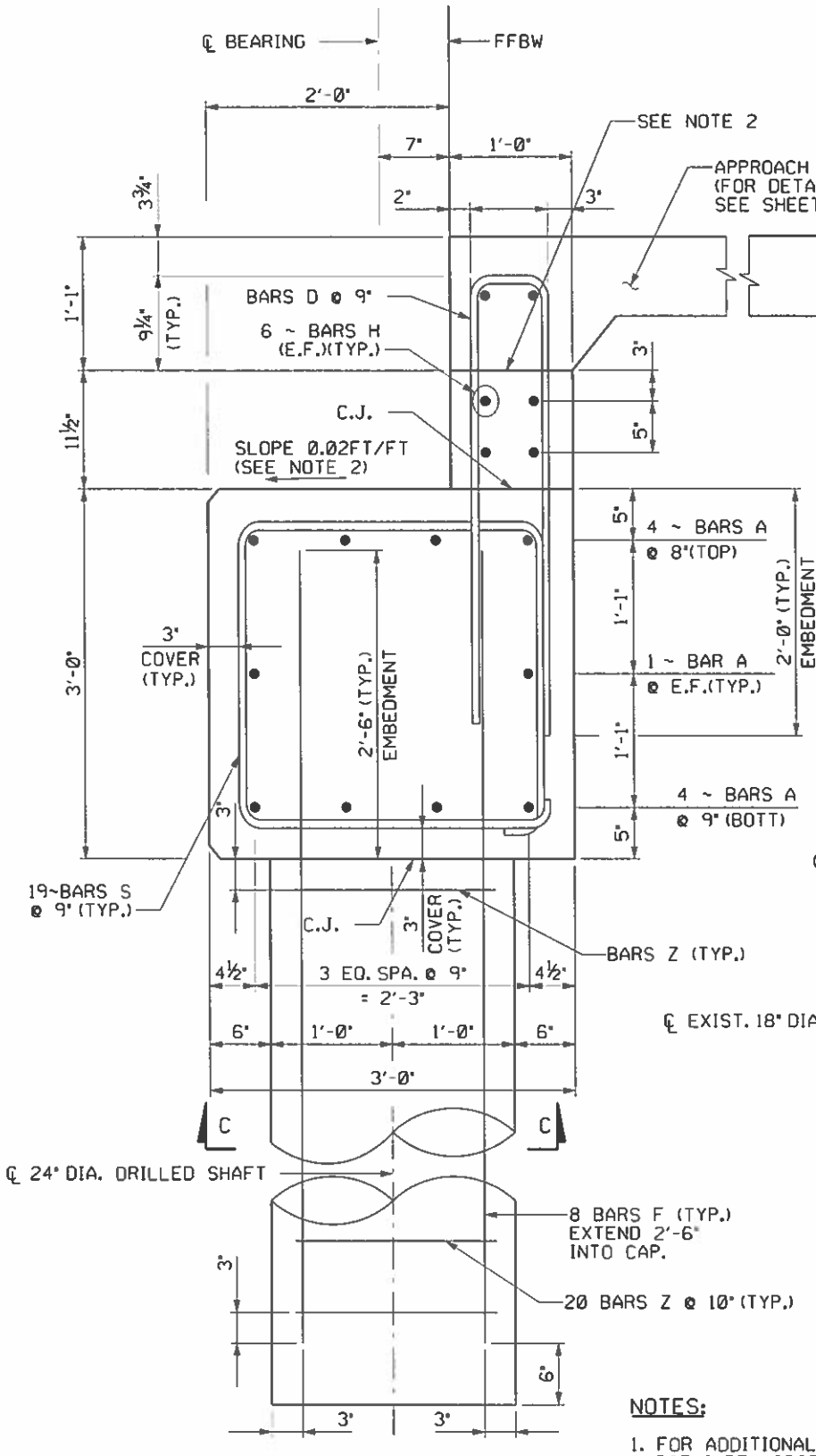
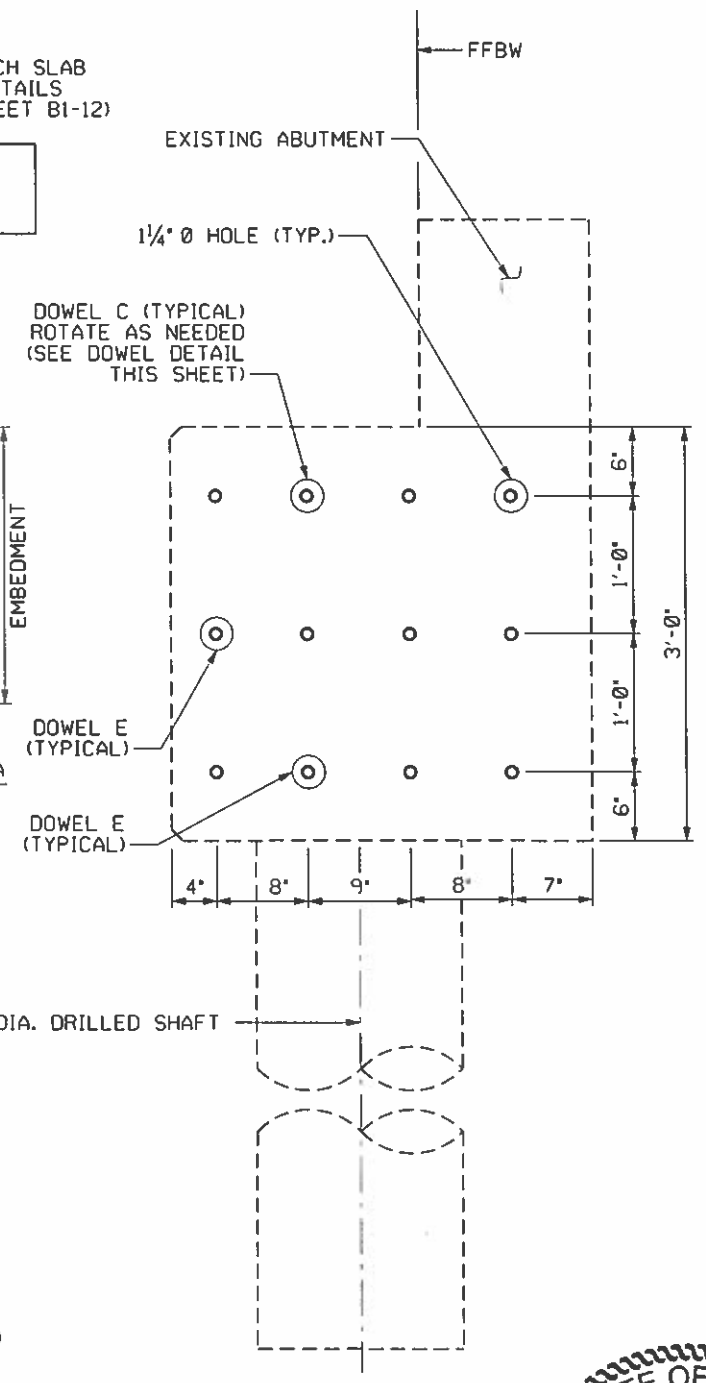


SECTION A-A
(ABUTMENT NO. 2)



EXISTING ABUTMENT NO. 1

TABLE OF ESTIMATED QUANTITIES
ABUTMENT NO.1 AND NO.2 (REQUIRED 1)

ELEMENT		BAR	NO.	SIZE	LENGTH	TOTAL WEIGHT
CAP • DOWELS C & E ABUTMENT NO.1 ONLY		A	6	#8	13'-6"	217
		S	25	#5	11'-1"	289
		B	4	#8	15'-10"	170
		• C	8	#8	3'-9"	81
		• E	16	#8	2'-3"	97
BACKWALL		H	6	#5	11'-8"	74
		D	15	#5	8'-1"	127
		U	6	#6	6'-10"	62
		L	4	#6	6'-0"	37
DRILLED SHAFTS (2 DRILLED SHAFTS)		F	8	#8	13'-9"	293
		Z	14	#3	6'-3"	33
ABUTMENT NO. 1	CAP WIDENING	REINFORCING STEEL			(LB)	178
		CONCRETE			(CY)	0.7
ABUTMENT NO. 2	CAP + BACKWALL	REINFORCING STEEL			(LB)	976
		CONCRETE			(CY)	5.1
	DRILLED SHAFTS	REINFORCING STEEL			(LB)	652
		CONCRETE			(CY)	2.8

TOTAL QUANTITIES		
REINFORCING STEEL	(LB)	1806
CONCRETE	(CY)	8.6

LEGEND:

E.F. = EACH FACE

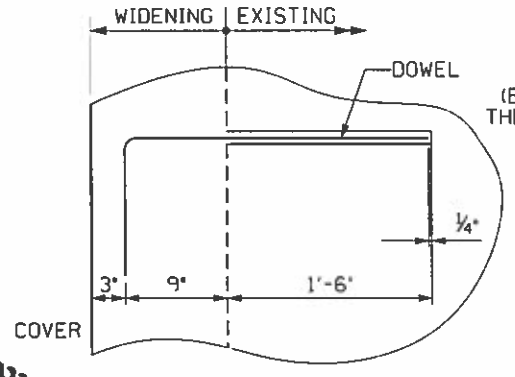
FFBW = FRONT FACE OF BACKWALL

C.J. = CONSTRUCTION JOINT

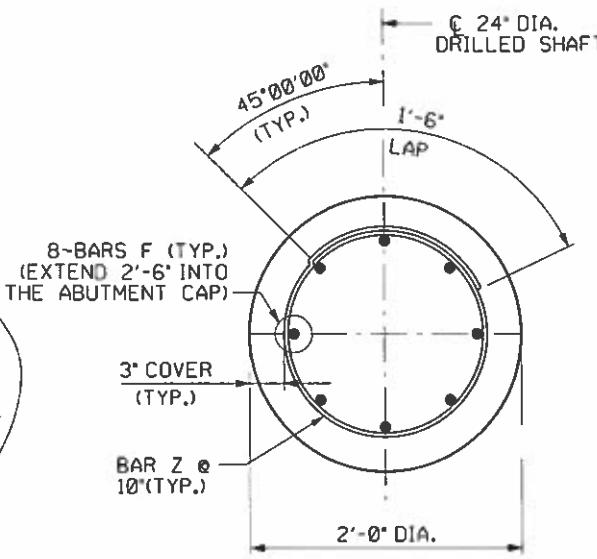
SPA = SPACING

EQ. = EQUAL

SPA. = SPACES



DOWEL DETAIL



SECTION C-C

NOTES:

1. FOR ADDITIONAL DRILLED SHAFT DETAILS, SEE TEXAS DOT INDEX ODSR.
2. PROVIDE TWO LAYERS OF 30 LB SMOOTH ROOFING PAPER BETWEEN BACKWALL AND APPROACH SLAB.
3. WORK THIS SHEET WITH SHEETS B1-9 THRU B1-11.
4. FOR APPROACH SLABS DETAILS, SEE SHEET B1-12.

STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09-13-18

DOWEL NOTES:

DRILL HOLES INTO EXISTING ABUTMENT , IF REINFORCING IS ENCOUNTERED, SHIFT HOLE TO MISS, SET DOWEL IN HOLE FILLED WITH APPROVED EPOXY BONDING COMPOUND. HOLES FOR DOWELS SHALL BE THOROUGHLY CLEANED AND DRIED PRIOR TO PLACING EPOXY AND DOWELS.

BARS C AND E DOWELS FOR EXISTIG ABUTMENT NO.1.

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1901 CENTRAL DRIVE, SUITE #405
BEDFORD, TX 76021

SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

NO.	DATE	REVISION	BY

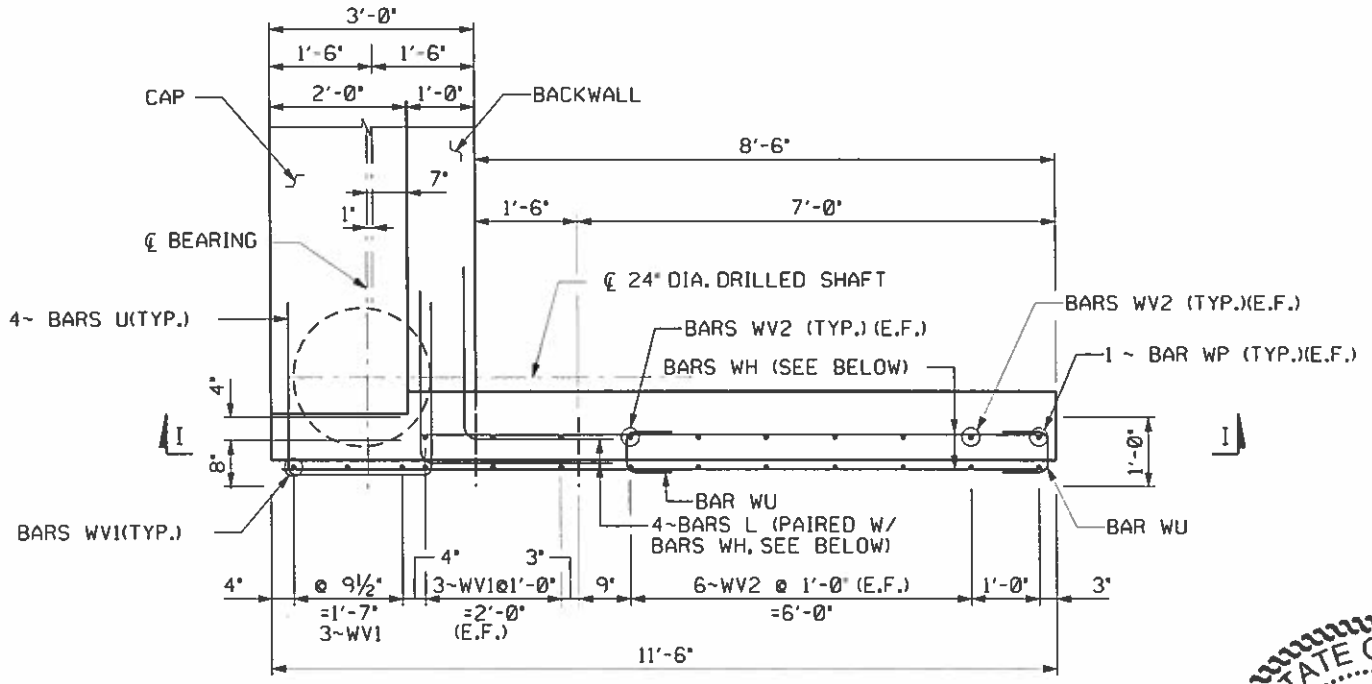
ABUTMENT DETAILS

DESIGN:	CPM
DRAWN:	AS/YF
CHECKED:	MR
DATE:	07/03/2018

SHEET
B1-10

File No. 17-111

PLOTTED BY: CMeszler
PLOT DATE: 9/12/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\struct\B1EndBentDet01.dgn
LAST SAVED: 8:40:01 AM



PLAN

CHEEKWALL & WINGWALL AT ABUTMENT NO.2

(TYPICAL BOTH SIDE)

LEGEND:

E.F. = EACH FACE

N.F. = NEAR FACE

F.F. = FAR FACE

FFBW = FRONT FACE OF BACKWALL

C.J. = CONSTRUCTION JOINT

WW = WINGWALL

CW = CHEEKWALL

DIA. = DIAMETER

EQ. = EQUAL

SPA. = SPACES

AVE. = AVERAGE

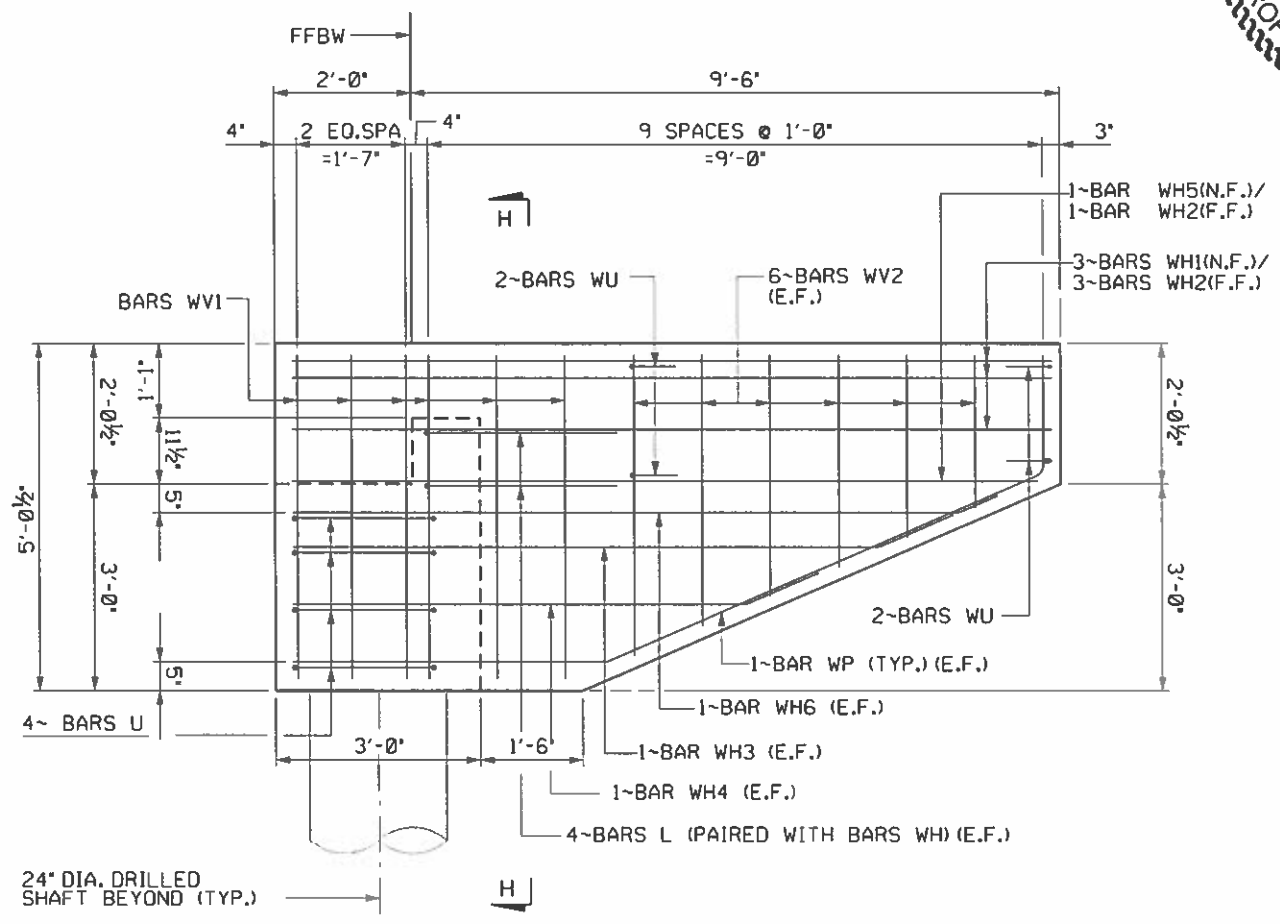
STATE OF TEXAS
CHRISTOPHER P. MESZLER
112052
LICENSED
PROFESSIONAL ENGINEER
09/13/18

TABLE OF ESTIMATED QUANTITIES
WINGWALL + CHEEKWALL (2 REQUIRED)

ELEMENT	BAR	NO.	SIZE	LENGTH	WEIGHT
WINGWALL + CHEEKWALL	WU	2	#4	4'-0"	6
	WV1	9	#5	4'-8"	44
	WV2	12	#5	3'-6" (AVE.)	44
	WP	2	#6	12'-1"	37
	WH1	3	#6	11'-2"	51
	WH2	4	#6	9'-2"	56
	WH3	2	#6	8'-0"	25
	WH4	2	#6	6'-0"	19
	WH5	1	#6	18'-2"	28
	WH6	2	#6	9'-0	28
	U	4	#6	6'-10"	42
	L	4	#6	6'-0"	37
REINFORCING STEEL				LB	417
CONCRETE				CY	1.65

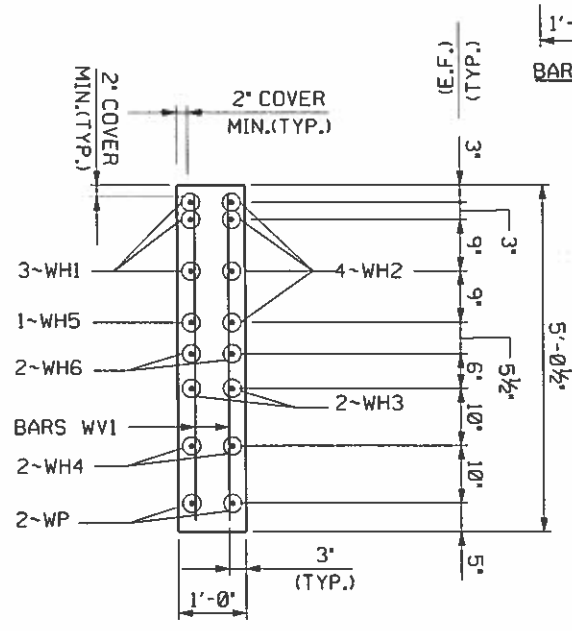
TOTAL ESTIMATED QUANTITIES
WINGWALLS + CHEEKWALLS AT ABUTMENT NO. 2

TOTAL REINFORCING STEEL	LB	834
TOTAL CONCRETE	CY	3.3



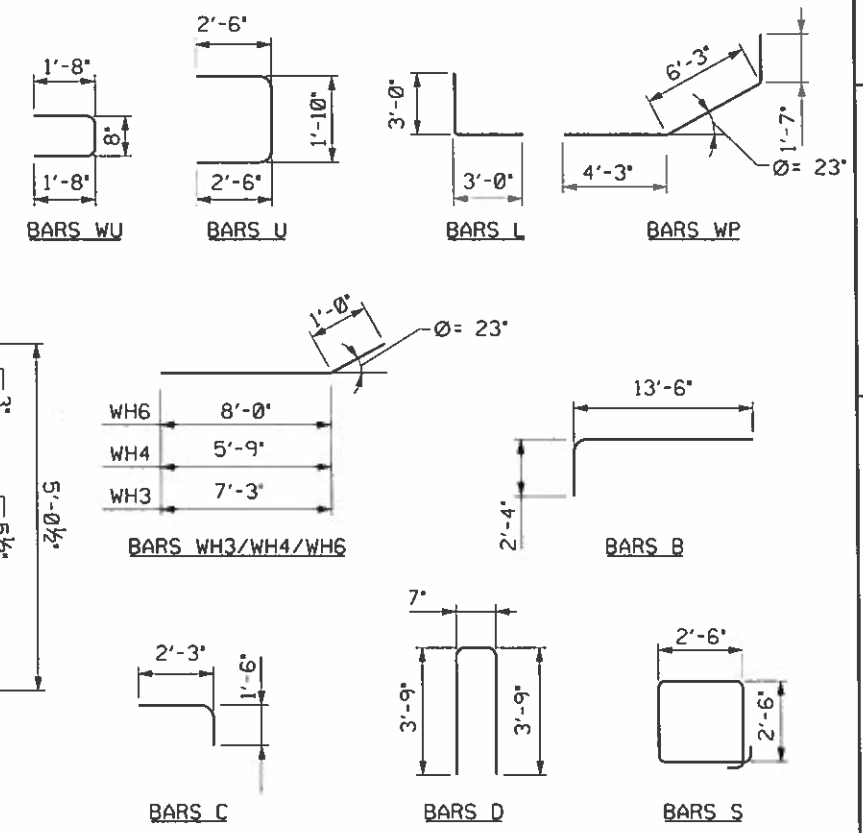
SECTION I-I AT ABUTMENT NO.2

CHEEKWALL & WINGWALL (WINGWALL NO.2 SHOWN)



SECTION H-H

(L BARS NOT SHOWN FOR CLARITY)



BAR BENDING DETAILS

NOTES:

1. WORK THIS SHEET WITH SHEETS B1-9 AND B1-10.
2. ALL DIMENSIONS SHOWN ON BAR BENDING DETAILS ABOVE ARE OUT-TO-OUT.
3. BARS NOT SHOWN ON BAR BENDING DETAILS ABOVE SHALL BE STRAIGHT BARS.

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SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

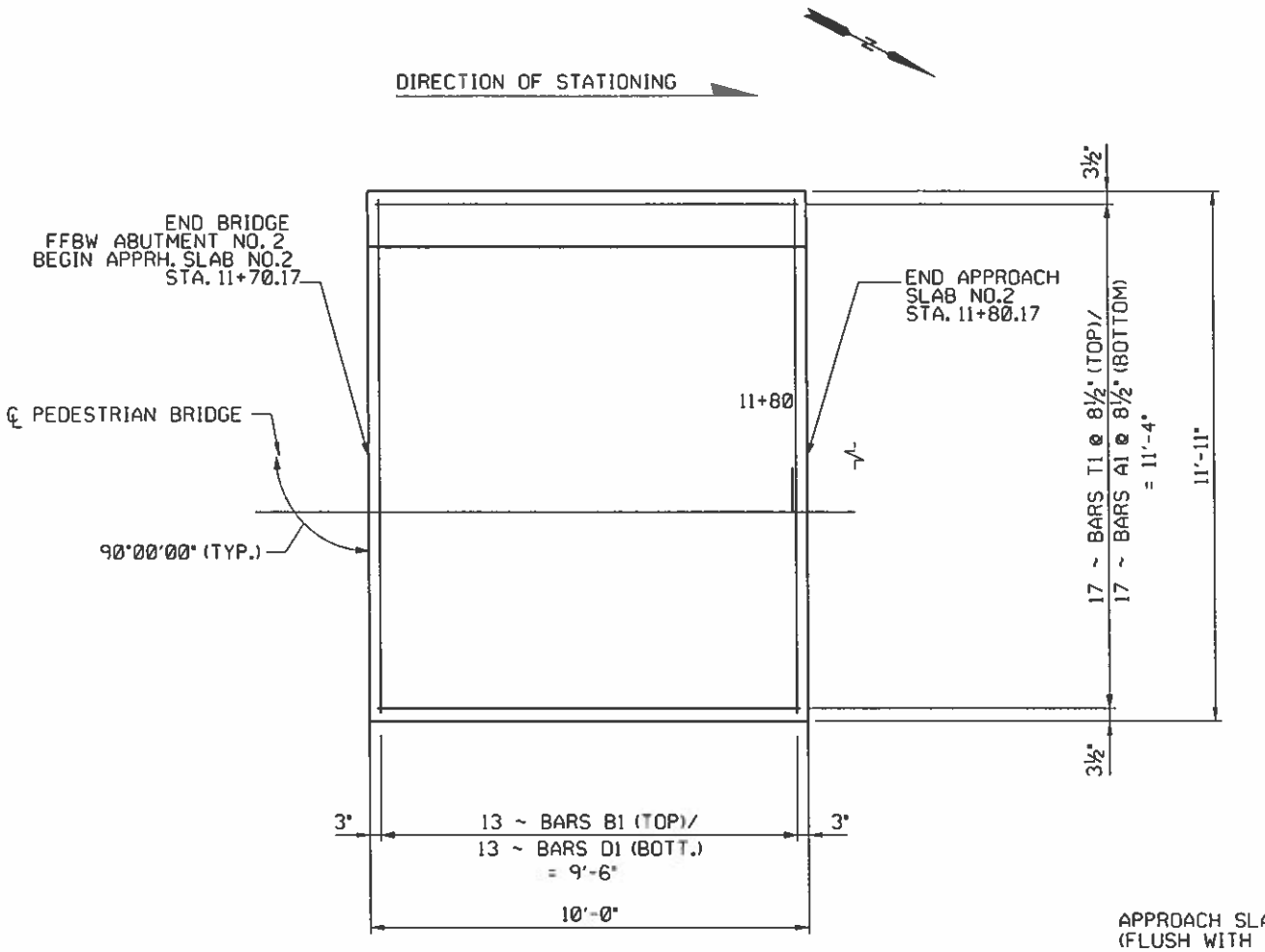
WINGWALL AND CHEEKWALL DETAILS AT ABUTMENT NO. 2

DESIGN:	CPM
DRAWN:	AS/YF
CHECKED:	MR
DATE	07/03/2018

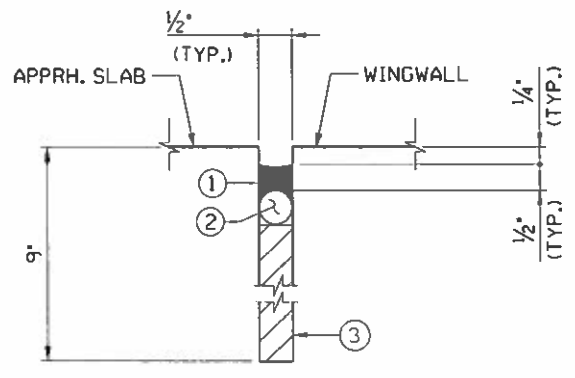
SHEET
B1-11

File No. 17.111

PLOTTED BY: CMesslor
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\Struct\B1EndBent03.dgn
LAST SAVED: 8:40:05 AM



APPROACH SLAB NO. 2

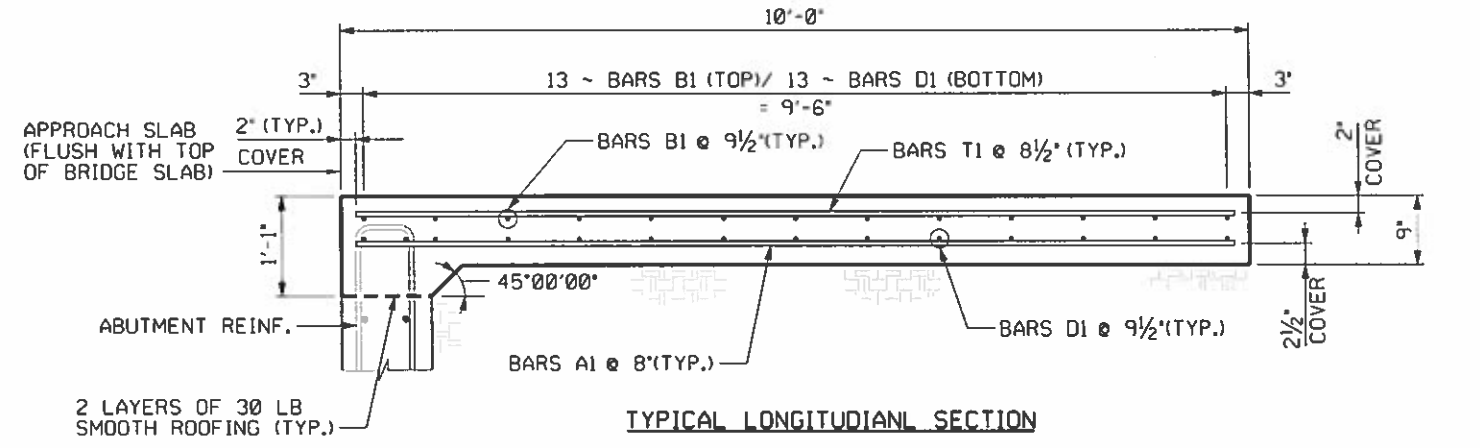


TYPICAL ISOLATION JOINT DETAIL

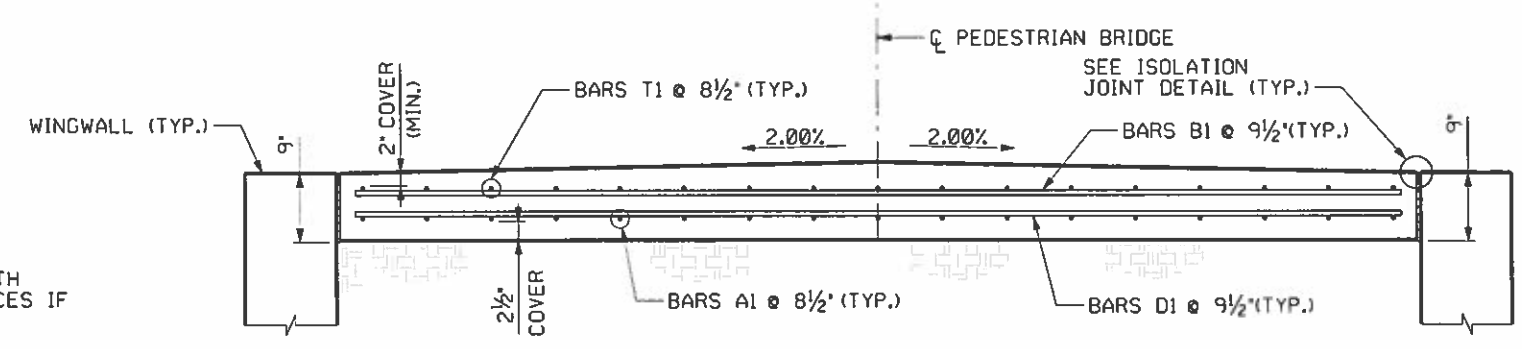
TABLE OF ESTIMATED QUANTITIES APPROACH SLABS (1 REQUIRED)					
ELEMENT	BAR	NO.	SIZE	LENGTH	TOTAL WEIGHT
APPROACH SLAB NO.2	A1	17	6	9'-8"	247
	B1	13	5	11'-6"	157
	D1	14	5	11'-6"	169
	T1	17	5	9'-8"	172
REINFORCING STEEL				LB	745
CONCRETE				CY	3.5

NOTES:

1. WORK THIS SHEET WITH SHEET B1-10.
2. COMPACT AND FINISH THE SUBGRADE OR FOUNDATION FOR THE APPROACH SLAB TO THE TYPICAL CROSS-SECTION AND TO THE LINES AND GRADES SHOWN ON THE PLANS.
3. CURE FOR 4 DAYS USING WATER OR MEMBRANE CURING PER TxDOT ITEM 422.



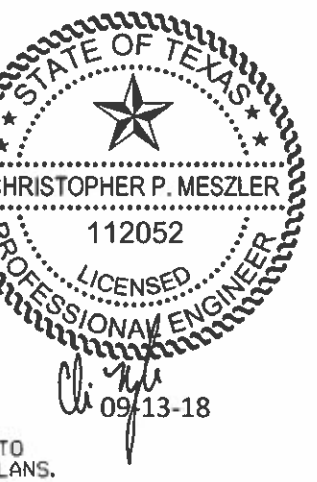
TYPICAL LONGITUDIANL SECTION



TYPICAL TRANSVERSE SECTION
APPROACH SLAB NO. 2
(PEDESTRIAN RAILING NOT SHOWN FOR CLARITY)

LEGEND:

1. CLASS 4.5 OR 7 JOINT SEALANT (LOW MODULUS SILICONE). PREPARE JOINT TO BE DEBRIS, DIRT, DUST, AND OIL FREE. PLACE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED PROCEDURES. TOOL MATERIAL AGAINST JOINT SURFACES IF NOT SELF-LEVELING
2. BACKER ROD SHALL BE 25% LARGER THAN JOINT OPENING AND SHALL BE COMPATIBLE WITH THE SEALANT.
3. PREFORMED BITUMINOUS FIBER MATERIAL.



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SORREL APT TRAIL
PEDESTRIAN BRIDGE
FAIRVIEW, TX

No.	DATE	REVISION	BY

APPROACH SLAB NO. 2

DESIGN:	CPM
DRAWN:	AS/YF
CHECKED:	MR
DATE	07/03/2018
SHEET	B1-12
File No. 17-111	

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\2018\17-111 Ped Bridge - Sorrel Apt Trail\17111\Struct\B1ApproachSlab01.dgn
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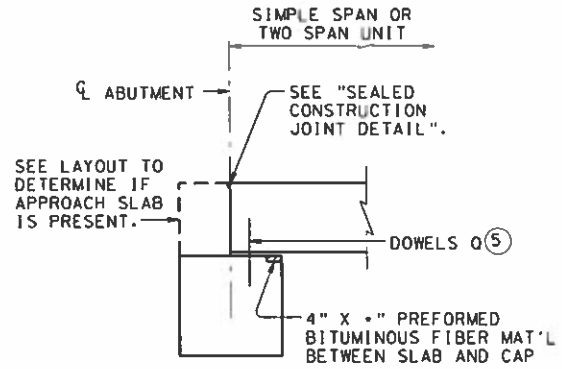
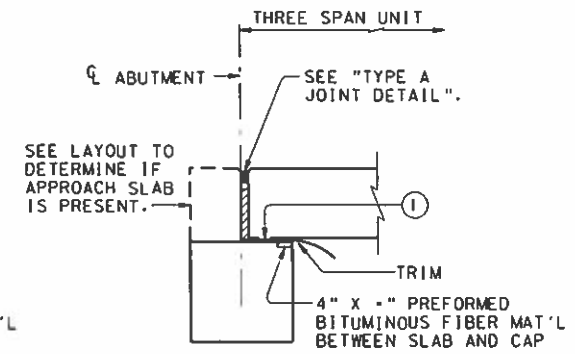
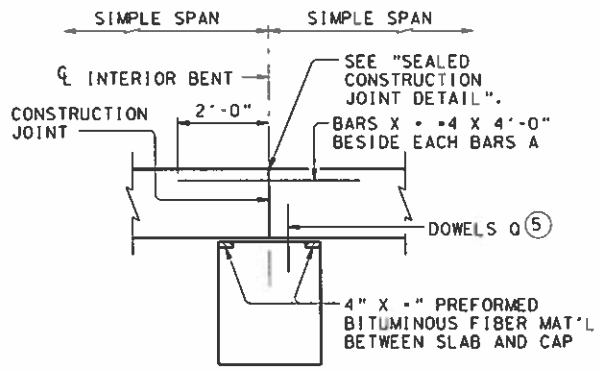


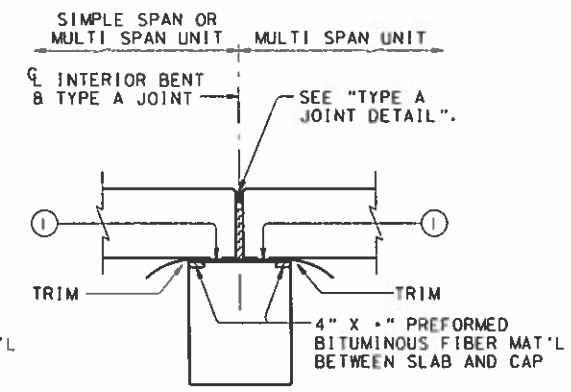
FIXED ABUTMENT



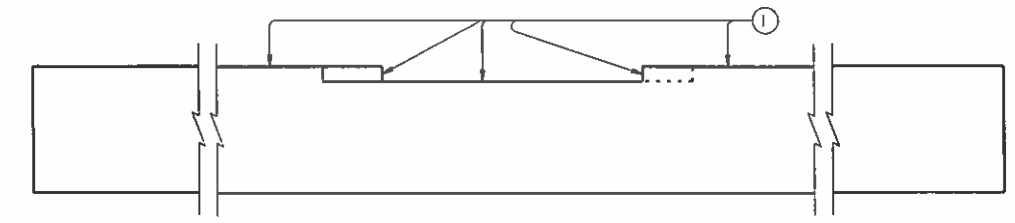
EXPANSION ABUTMENT (9)



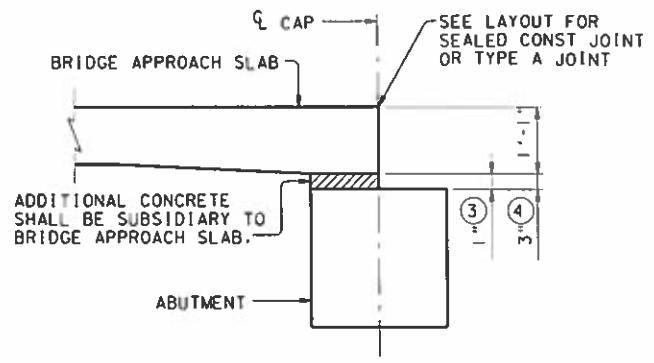
FIXED INTERIOR BENT WITH SIMPLE SPANS (8)



EXPANSION INTERIOR BENT (9)



ELEVATION OF CAP



MODIFIED BRIDGE APPROACH SLAB (2)

ADJUSTMENT IN REINFORCING STEEL QUANTITIES				
RDWY WIDTH	FIXED CONDITION (8)		EXPANSION CONDITION (9)	
	ADD BARS X		DEDUCT DOWEL Q	
	ADD 2.67 LB/BAR		DED 2.25 LB/BAR	
FT	NO.	WEIGHT	NO.	WEIGHT
24	30	•80	5	-11
28	34	•91	5	-11
30	36	•96	5	-11
38	44	•118	5	-11
44	50	•134	5	-11

NOTE: THE ABOVE QUANTITIES ARE FOR THE FIXED OR EXPANSION CONDITION OVER ONE BENT, AND ARE FOR INFORMATION ONLY.

(1) SMOOTH TROWEL FINISH. OIL TOP OF CAP WITH 60 GRADE OIL AND APPLY HEAVY COAT OF POWDERED GRAPHITE. PRESS DOWN ONE LAYER OF 30• ROOFING FELT.

(2) SEE LAYOUT TO DETERMINE IF APPROACH SLAB IS PRESENT.

(3) USE WITH 14" SLAB THICKNESS.

(4) USE WITH 16" SLAB THICKNESS.

(5) SEE ABUTMENT OR BENT DETAILS FOR LOCATION OF DOWELS Q.

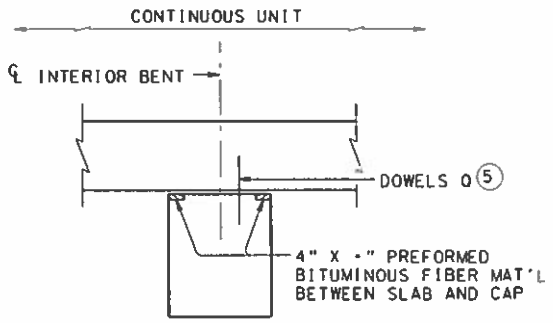
(6) BACKER ROD SHALL BE 25% LARGER THAN JOINT OPENING AND SHALL BE COMPATIBLE WITH THE SEALANT, NO REACTION SHALL OCCUR BETWEEN THE ROD AND THE SEALANT.

(7) SEALANT SHALL BE CLASS 7 SILICONE SEALANT. INSTALL WHEN AMBIENT TEMPERATURE IS BETWEEN 55°F AND 85°F AND RISING. ENGINEER TO DETERMINE ALLOWABLE HOURS FOR SEALANT APPLICATION.

(8) BARS X REQUIRED ONLY WHEN 2 SIMPLE SPANS ARE USED TOGETHER OVER A FIXED INTERIOR BENT. THE USE OF 3 CONSECUTIVE SIMPLE SPANS ARE NOT RECOMMENDED NOR SUPPORTED BY THIS STANDARD.

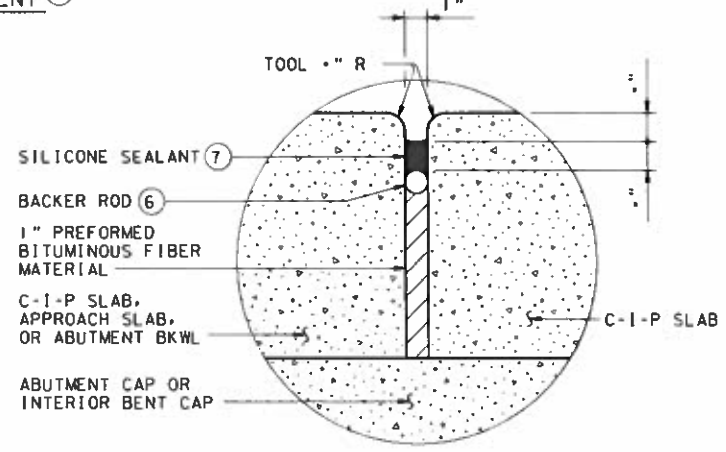
(9) OMIT DOWELS Q FROM EXPANSION BENTS.

(10) RECOMMENDED LOCATION OF TYPE A JOINTS ARE AT THE ENDS OF 3 SPAN UNITS, ENDS OF 2 SPAN UNITS SUPPORTED BY AN INTERIOR BENT, AND NO FARTHER THAN 2 SIMPLE SPANS FROM AN ABUTMENT.

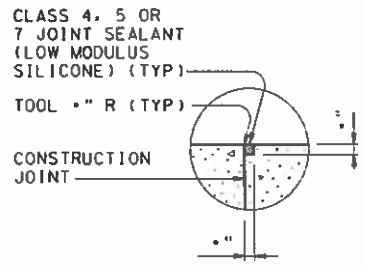


FIXED INTERIOR BENT WITH CONTINUOUS UNIT

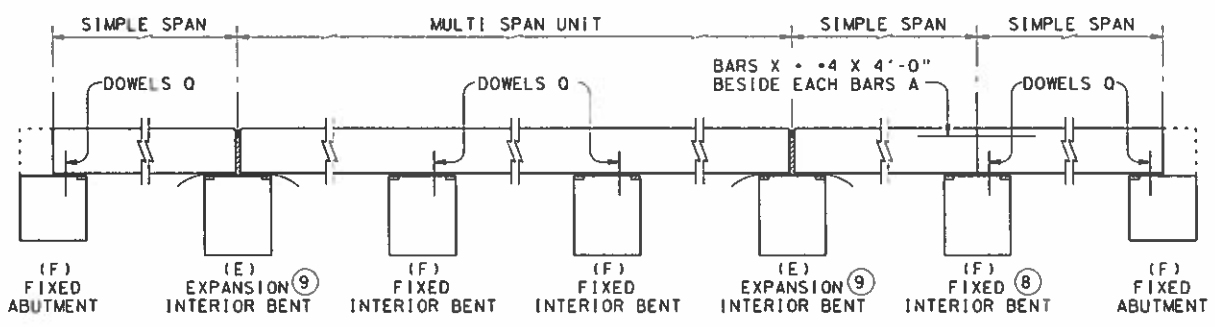
ELEVATION AT FIXED OR EXPANSION BENTS (10)



TYPE A JOINT DETAIL (10)

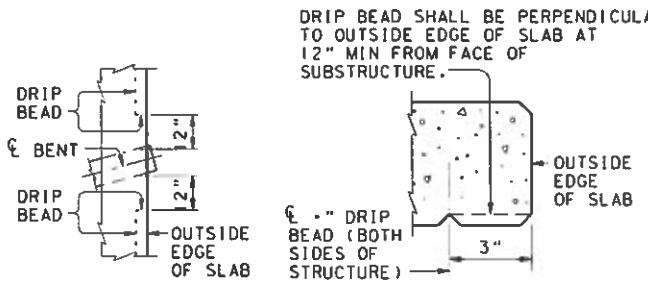


SEALED CONSTRUCTION JOINT DETAIL



EXAMPLE OF FIXED AND EXPANSION BENTS (10)

SHOWING C-I-P SLAB SPAN WITH A 16" SLAB THICKNESS.



PLAN SECTION

DRIP BEAD DETAILS

HL93 LOADING

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MISC DETAILS FOR C-I-P CONC SLAB SPANS

CS-MD

FILE: mcs01ste.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

PLOTTED BY: CMeszler
PLOT DATE: 9/13/2018
LOCATION: M:\Projects\17-111 Ped Bridge - Sorrel Apt Trail\17111\struct\B#ExpJointDet01.DGN
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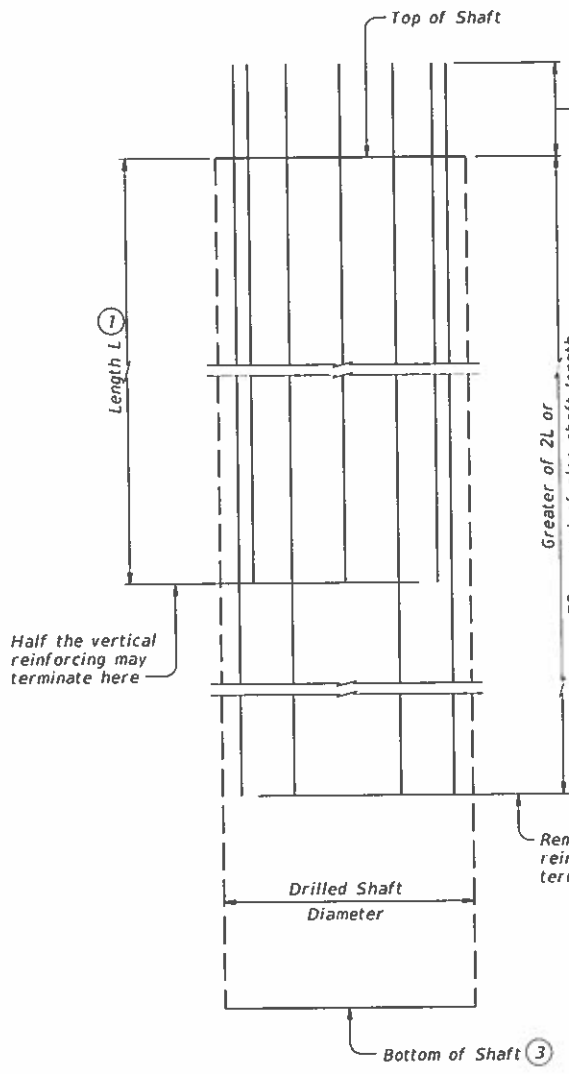
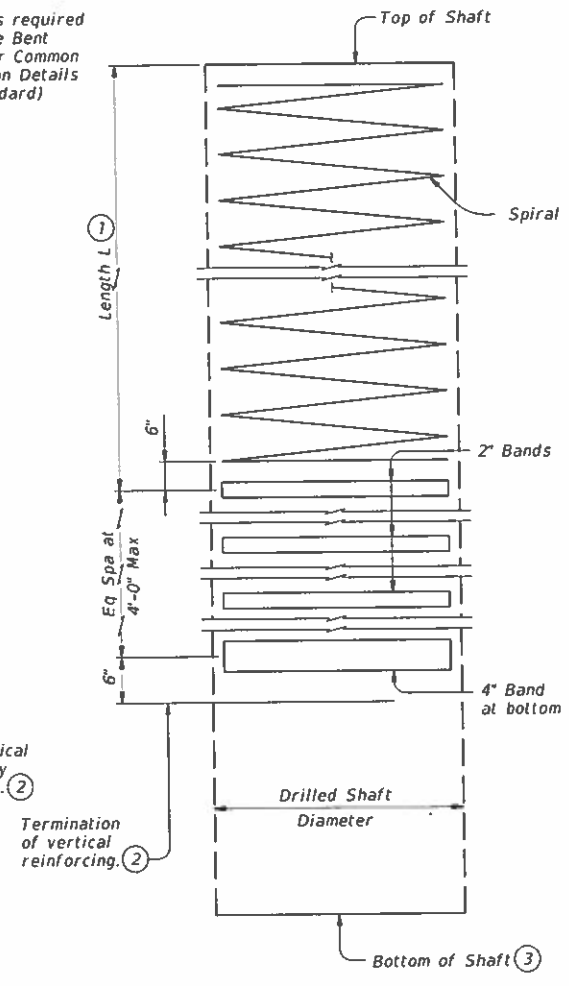
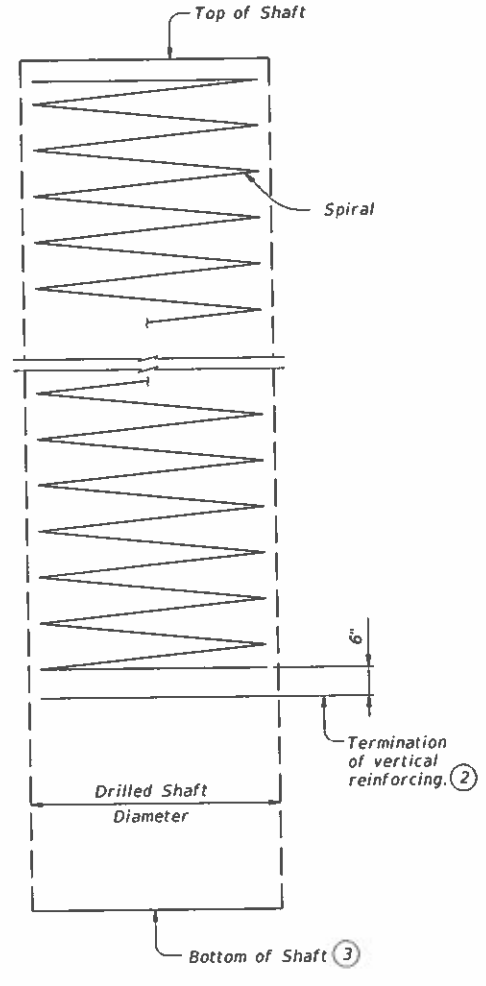


VERTICAL REINFORCING OPTION
(Lateral reinforcing not shown for clarity)



ELEVATIONS



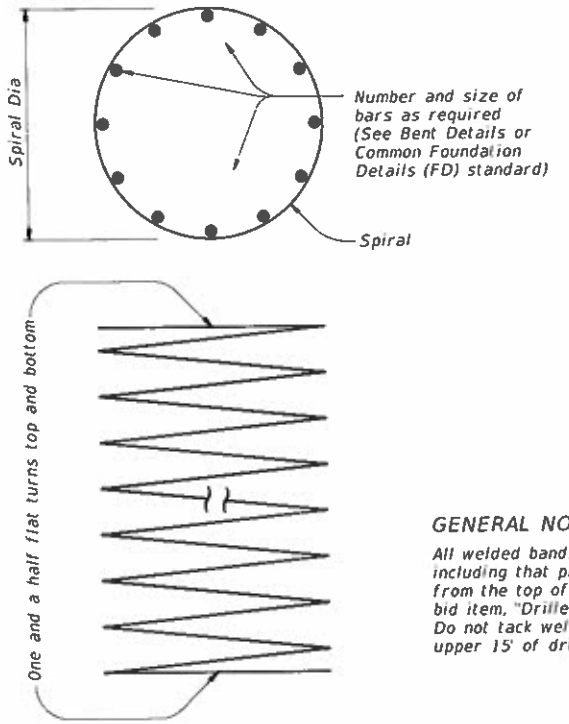
LATERAL REINFORCING OPTIONS
(Vertical reinforcing not shown for clarity)

(1) See Table for length L.

(2) When steel does not extend the full shaft length, the Contractor must demonstrate adequacy of the temporary support procedures to the satisfaction of the Engineer.

(3) Vertical bars may be supported on bottom of drilled hole if material is firm enough to do so when concrete is placed.

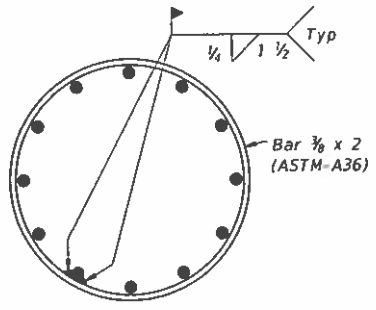
(4) Provide spiral of the pitch and diameter shown elsewhere in the plans.



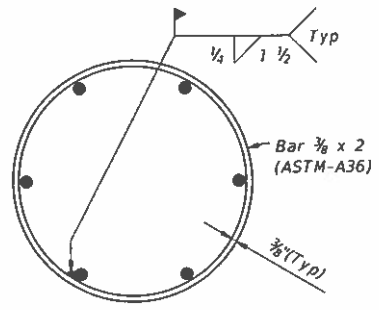
SPIRAL DETAIL (4)

GENERAL NOTES:

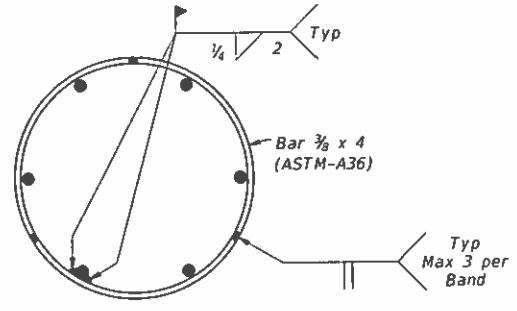
All welded bands and reinforcing steel, including that projecting the required amount from the top of the shaft, are subsidiary to the bid item, "Drilled Shafts".
Do not tack weld spiral to main steel in the upper 15' of drilled shaft.



TOP



INTERIOR



BOTTOM

BAND DETAILS

LENGTH L		
Drilled Shaft Diameter (Inches)	Length L (Feet)	Note
18 & 24	24	The length L is measured from top of shaft, natural ground, or finished ground, whichever results in the longer length of full reinforcement.
30 & 36	30	
42 & larger	10 Shaft Diameters	

These details may only be used for bridge foundations not in or adjacent to waterways. They may only be used for multi-column bents and abutments, excluding abutments supported by drilled shaft retaining walls. Other applications must receive approval of the Engineer.

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OPTIONAL DRILLED SHAFT REINFORCING

ODSR

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