CITY OF KEENE

CONTRACT DOCUMENTS & SPECIFICATIONS

for

CR 317 RECONSTRUCTION

APRIL 2026

CITY COUNCIL MEMBERS

Samantha Gillin – Mayor Pro-Tem
Rob Foster
Troy Smith
Johnny Shaw
Charles Easley
Bob Chapman

JACOB MARTIN

Firm #2448
Project #: 25510

3465 Curry Lane
Abilene, TX 79606
325.695.1070

908 S. Main Street, Suite 100
Boerne, TX 78006
325.695.1070

4920 S. Loop 289, Suite 106
Lubbock, TX 79414
806.368.6375

36 E. Twohig, Suite 101
San Angelo, TX 76903
325.695.1070

1925 Fort Worth Highway
Weatherford, TX 76086
817.594.9880

www.jacobmartin.com | info@jacobmartin.com | TBPE Firm #: 2448 | TBPELS Firm #: 10194493 | TBAE Firm #: BR 2261

CITY OF KEENE

CONTRACT DOCUMENTS & SPECIFICATIONS

for

CR 317 RECONSTRUCTION

MAY 2026

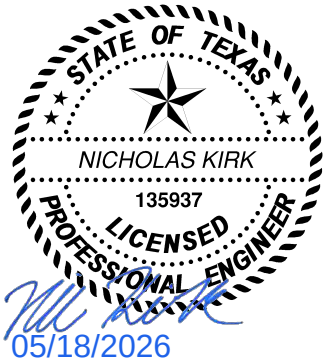
CITY COUNCIL MEMBERS

Samantha Gillin – Mayor Pro-Tem
Rob Foster
Troy Smith
Johnny Shaw
Charles Easley
Bob Chapman

5/18/26

JACOB MARTIN

Firm #2448
Project #: 25510



05/18/2026

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CITY OF KEENE

CR 317 RECONSTRUCTION

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ADVERTISEMENT FOR BIDS
CITY OF KEENE
CR 317 RECONSTRUCTION

Separate sealed bids for the construction of **CR 317 Reconstruction** will be received by the **City of Keene, Texas**, until **2:30 PM**, on **June 10, 2026**, at **1000 N. Old Betsy Rd., Cleburne, TX 76031**, and then at said location publicly opened and read aloud. This project consists of removing approximately 1,740 linear feet of asphalt roadway and replacing with a 30-ft wide concrete roadway with curb and gutter, as well as culvert replacement for the existing (3) 36" cross culverts under CR 317, downstream from the Soil Conservation Service – Site 34 Reservoir. This project also includes shoulder addition for TxDOT turn lanes, repair of driveways along the improved section of CR 317, right-of-way grading for improved drainage, new road striping, and all associated appurtenances.

The Contract Documents, consisting of Advertisement for Bids, Information for Bidders, Bid Proposal, Bid Bond, Agreement, Performance and Payment Bonds, General Conditions, Notice of Award, Notice to Proceed, Plans, and Specifications, may be examined at the following location:

Jacob & Martin, LLC
1925 Fort Worth Highway, Weatherford, Texas 76086

The Owner reserves the right to waive any informalities and to reject any or all bids. Bids may be held by the Owner for a period not to exceed 60 days from the date of bid opening for the purpose of reviewing the bids and investigating the qualifications of Bidders prior to awarding of the contract.

Contractors must obtain a set of CONTRACT DOCUMENTS online at www.jacobmartin.com by digital download or hard copy to be considered a registered plan holder eligible to bid the project. Cost for digital download of CONTRACT DOCUMENTS will be $0.00. Hard copies of the CONTRACT DOCUMENTS will be $100.00 All Copies of the CONTRACT DOCUMENTS must be ordered online and are available for pick up, mail out or digital download via www.jacobmartin.com. Upon verification of online payment, hard copies may be picked up at Jacob & Martin, LLC, located at 1925 Fort Worth Highway, Weatherford, Texas 76086.

Bid Bond: A certified check or bank draft, payable to the order of the City of Keene, negotiable U.S. Government bonds (at par value) or a satisfactory Bid Bond executed by the Bidder and an acceptable surety in an amount equal to five percent (5%) of the total bid shall be submitted with each bid.

City of Keene Samantha Gillin, Mayor Pro-Tem May 20th & 27th, 2026

INFORMATION FOR BIDDERS

Bids will be received by the City of Keene, Texas, herein called the "Owner", at City Hall, 1000 N. Old Betsy Rd., Cleburne, TX 76031, until 2:30 PM on June 10, 2026, and then at said location publicly opened and read aloud.

Each bid must be submitted in a sealed envelope addressed to Samantha Gillin, Mayor Pro-Tem. Each sealed envelope containing a bid must be plainly marked on the outside as "CR 317 RECONSTRUCTION" and the envelope shall bear on the outside the Bidder's name and address. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope and addressed to Samantha Gillin, Mayor Pro-Tem, 1000 N. Old Betsy Rd., Cleburne, TX 76031.

All bids must be made on the required bid form. All blank spaces for bid prices must be filled in, in ink or typewritten, and the bid must be fully completed and executed when submitted. Only one (1) copy of the bid form is required. **Bids will not be received from contractors who are not registered plan holders. Bids shall be submitted on the provided documents. No faxed bids will be accepted.**

All bidders must be able to show they have completed, as a general contractor, at least three completed projects within the last five years for a public entity and of similar size and nature as the project being bid.

The Owner may waive any informalities or minor defects or reject any and all bids. Any bid may be withdrawn prior to the above scheduled time for the opening or authorized postponement thereof. Any bid received after the time and date specified will not be considered. No Bidder may withdraw a bid within 60 days after the actual date of opening thereof. Should there be reasons that the contract cannot be awarded within the specified period, the time may be extended by mutual Agreement between the Owner and the Bidder.

Bidders must satisfy themselves of the accuracy of the estimated quantities in the Bid Schedule by examination of the site and a review of the drawings and specifications including Addenda. The failure or omission of any Bidder to do any of the foregoing shall in no way relieve any Bidder from any obligation in respect to his Bid. After bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the quantities of the work or of the nature of the work to be done. The Contract Documents contain the provisions required for the construction of the project. Information obtained from an officer, agent or employee of the Owner or any other person shall not affect the risks or obligations assumed by the Contractor or relieve him from fulfilling any of the conditions of the Contract.

Each bid must be accompanied by a Bid Bond, certified check, or cashier's check payable to the City of Keene in the amount of five percent (5%) of the greatest amount bid. As soon as bid prices have been compared, the Owner will return the bonds of all except the three (3) lowest responsible bidders. When the Agreement is executed, the bonds of the two (2) remaining unsuccessful bidders will be returned. The Bid Bond of the successful Bidder will be retained until the Performance-Payment Bonds have been executed and approved, after which it will be returned.

Performance-Payment Bonds in the amount of 100% of the contract price, with a corporate surety approved by the Owner, will be required for the faithful performance of the contract. Attorneys-in-fact who sign Payment Bonds or Performance Bonds must file with each bond a certified and effective dated copy of their power of attorney. Bonding will not be required if Bid is less than $25,000; however, no payment will be made until all work is completed and accepted by the Owner.

Award of the contract will be made as a whole to one Bidder. A conditional or qualified bid will not be accepted.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the Performance-Payment Bonds within twenty-one (21) calendar days from the date the Notice of Award is delivered to the Bidder. The Notice of Award shall be accompanied by the necessary Agreement and Bond forms.

The Owner within twenty-one (21) days of receipt of approval of the Contract Documents shall return to the Contractor an executed duplicate of the Contract Documents. Should the Owner not return the executed Contract Documents within such period, The Bidder may, by written notice, withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the Owner.

The Notice to Proceed shall be issued within ten (10) days of the approval of the Contract Documents by the Owner. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual Agreement between the Owner and the Contractor. If the Notice to Proceed has not been issued within the ten (10) day period or within the period mutually agreed upon, the Contractor may terminate the Agreement without further liability on the part of either party.

All applicable laws, ordinances and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

The Engineer is Derek Turner, P.E. with JACOB & MARTIN, LLC; 1925 Fort Worth Highway, Weatherford, Texas 76086 (817-594-9880).

Supplemental Instructions to Bidders (Local Funding)

Title	Must be returned with your bid
Addendums (if applicable)	Yes – Signed and Dated
Cover Page	No
Table of Contents	No
Advertisement for Bids	No
Information for Bidders	No
Statement of Bidder's Qualifications	Yes – Completed and attachments added as applicable
Non-Collusion of Prime Bidders	Yes – Completed, signed, and notarized
Proposer Guarantees	Yes – Completed and signed
Conflict of Interest Questionnaire (Form CIQ)	Yes – Completed and signed
Certificate of Interested Parties (Form 1295)	Must file online as indicated (within 7 business days from notification of pending award)
Bid Proposal with Bid Schedule	Yes – Completed, signed and placed at the front of bid packet
Bid Bond	Yes – Completed and signed by Principal and Surety with additional Bond paperwork as needed
Notice of Award	No – (required after award)
Agreement	No – (required after award)
Payment & Performance Bonds	No – (required after award)
Notice to Proceed	No – (required after award)
General Conditions	No
Specifications and Plans	No

Note: Please do not use staples or bindings on submitted bids.

STATEMENT OF BIDDER'S QUALIFICATIONS

All questions must be answered, and the date given must be clear and comprehensive. **All bidders must be able to show they have completed, as a general contractor, at least three completed projects within the last five years for a public entity and of similar size and nature as the project being bid.** ***If necessary, questions may be answered on separate attached sheets. The Bidder may submit any additional information as desired.***

Name of Bidder: _____ Date Organized: _____
Physical Address: _____ Date Incorporated: _____
_____

Number of Years in contracting business under present name: _____

Contracts on hand:

Contract	Amount	Anticipated Completion Date

Type of work performed by your company: _____
Have you ever failed to complete any work awarded to you? _____
Have you ever defaulted on a contract? _____

List the more important projects recently completed by your firm (be sure to include projects of similar importance):

Project	Amount	Month/Year Completed

Major equipment available for this contract:

Attach resumes for the principal members of your organization, including the officers as well as the proposed superintendent for the project.

Credit Available: _____ Bank Reference: _____

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

Executed this _____day of _____, 20_____.

By:_____

Name: _____

Title: _____

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____}

County of _____} ss.

_____, being first duly sworn,
(Name of Signer)

(1) He/She is _____ of _____, the
(Title of Signer) (Company Name)
Bidder that has submitted the attached Bid;

(2) He/She is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid:

(3) Such Bid is genuine and is not a collusive or sham Bid;

(4) Neither the said Bidder nor any of its officers, partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly with another Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix an overhead, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the **City of Keene** or any person interested in the proposed Contract; and

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance, or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

Signed _____

Name _____

Title _____

Subscribed and sworn to me this _____ day of _____, _____.

By: _____
Notary Public
My Commission Expires:

PROPOSER GUARANTEES

State of _____

County of _____

_____, being first duly sworn disposed and says that:

(1) He/She is the (owner, partner, officer, representative or agent) of _____ _____, the proposer that has submitted the attached proposal.

(2) All responsible parties will comply with Chapter 176 Local Government Code and complete the Conflict of Interest Questionnaire (CIQ).

(3) Proposer will comply with Government Code 2252.908 and provide the **City of Keene, Texas** with the Certificate of Interested Parties, Form 1295, within seven business days from notification of a pending award.

(4) In accordance with Chapter 2271 of the Texas Government Code, the proposer verifies that the company does not boycott Israel and will not boycott Israel during the term of any contract executed in response to this proposal.

(5) In compliance with Chapter 2252 of Texas Government Code, the **City of Keene, Texas** will not enter in a contract with a company that does business with Iran, Sudan, or any known terrorist organization.

(6) The proposer verifies that in compliance with Senate Bill 13 of the Texas 87th Legislative Session it does not and will not during the contract term boycott energy companies. And further certifies that in accordance with Senate Bill 19 of the 87th Legislative Session it does not have a practice, policy, guidance, or directive that discriminates against a firearm entity or firearm trade association and will not discriminate against such an entity or association during the contract term.

(7) The proposer and any subcontractor(s) shall comply with Title VI of the Civil Rights Act of 1964, which prohibits recipients of federal financial assistance from excluding from a program or activity, denying benefits of, or otherwise discriminating against a person on the basis of race, color, or national origin (42 U.S.C.§ 2000d et seq.), as implemented by the Department of the Treasury's Title VI regulations, 31 CFR Part 22, which are herein incorporated by reference and made a part of this contract (or agreement). Title VI also includes protection to persons with "Limited English Proficiency" in any program or activity receiving federal financial assistance, 42 U.S.C. § 2000d et seq., as implemented by the Department of the Treasury's Title VI regulations, 31 CFR Part 22, which are herein incorporated by reference and made a part of this contract or agreement.

SIGNATURE PRINTED NAME DATE

CONFLICT OF INTEREST QUESTIONNAIRE

FORM CIQ

For vendor doing business with local governmental entity

This questionnaire reflects changes made to the law by H.B. 23, 84th Leg., Regular Session.

This questionnaire is being filed in accordance with Chapter 176, Local Government Code, by a vendor who has a business relationship as defined by Section 176.001(1-a) with a local governmental entity and the vendor meets requirements under Section 176.006(a).

By law this questionnaire must be filed with the records administrator of the local governmental entity not later than the 7th business day after the date the vendor becomes aware of facts that require the statement to be filed. *See* Section 176.006(a-1), Local Government Code.

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

OFFICE USE ONLY

Date Received

1 **Name of vendor who has a business relationship with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.** (The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than the 7th business day after the date on which you became aware that the originally filed questionnaire was incomplete or inaccurate.)

3 **Name of local government officer about whom the information is being disclosed.**

_____

Name of Officer

4 **Describe each employment or other business relationship with the local government officer, or a family member of the officer, as described by Section 176.003(a)(2)(A). Also describe any family relationship with the local government officer. Complete subparts A and B for each employment or business relationship described. Attach additional pages to this Form CIQ as necessary.**

A. Is the local government officer or a family member of the officer receiving or likely to receive taxable income, other than investment income, from the vendor?

☐ Yes ☐ No

B. Is the vendor receiving or likely to receive taxable income, other than investment income, from or at the direction of the local government officer or a family member of the officer AND the taxable income is not received from the local governmental entity?

☐ Yes ☐ No

5 **Describe each employment or business relationship that the vendor named in Section 1 maintains with a corporation or other business entity with respect to which the local government officer serves as an officer or director, or holds an ownership interest of one percent or more.**

6 ☐ Check this box if the vendor has given the local government officer or a family member of the officer one or more gifts as described in Section 176.003(a)(2)(B), excluding gifts described in Section 176.003(a-1).

7

_____ _____ _____

Name of signatory Signature Date

CONFLICT OF INTEREST QUESTIONNAIRE
For vendor doing business with local governmental entity

A complete copy of Chapter 176 of the Local Government Code may be found at http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.176.htm. For easy reference, below are some of the sections cited on this form.

Local Government Code § 176.001(1-a): "Business relationship" means a connection between two or more parties based on commercial activity of one of the parties. The term does not include a connection based on:

(A) a transaction that is subject to rate or fee regulation by a federal, state, or local governmental entity or an agency of a federal, state, or local governmental entity;

(B) a transaction conducted at a price and subject to terms available to the public; or

(C) a purchase or lease of goods or services from a person that is chartered by a state or federal agency and that is subject to regular examination by, and reporting to, that agency.

Local Government Code § 176.003(a)(2)(A) and (B):

(a) A local government officer shall file a conflicts disclosure statement with respect to a vendor if:

***

(2) the vendor:

(A) has an employment or other business relationship with the local government officer or a family member of the officer that results in the officer or family member receiving taxable income, other than investment income, that exceeds $2,500 during the 12-month period preceding the date that the officer becomes aware that

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor;

(B) has given to the local government officer or a family member of the officer one or more gifts that have an aggregate value of more than $100 in the 12-month period preceding the date the officer becomes aware that:

(i) a contract between the local governmental entity and vendor has been executed; or

(ii) the local governmental entity is considering entering into a contract with the vendor.

Local Government Code § 176.006(a) and (a-1)

(a) A vendor shall file a completed conflict of interest questionnaire if the vendor has a business relationship with a local governmental entity and:

(1) has an employment or other business relationship with a local government officer of that local governmental entity, or a family member of the officer, described by Section 176.003(a)(2)(A);

(2) has given a local government officer of that local governmental entity, or a family member of the officer, one or more gifts with the aggregate value specified by Section 176.003(a)(2)(B), excluding any gift described by Section 176.003(a-1); or

(3) has a family relationship with a local government officer of that local governmental entity.

(a-1) The completed conflict of interest questionnaire must be filed with the appropriate records administrator not later than the seventh business day after the later of:

(1) the date that the vendor:

(A) begins discussions or negotiations to enter into a contract with the local governmental entity; or

(B) submits to the local governmental entity an application, response to a request for proposals or bids, correspondence, or another writing related to a potential contract with the local governmental entity; or

(2) the date the vendor becomes aware:

(A) of an employment or other business relationship with a local government officer, or a family member of the officer, described by Subsection (a);

(B) that the vendor has given one or more gifts described by Subsection (a); or

(C) of a family relationship with a local government officer.

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.

4 Name of Interested Party	City, State, Country (place of business)	Nature of Interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO Interested Party. ☐

6 UNSWORN DECLARATION

My name is _____, and my date of birth is _____.

My address is _____, _____, _____, _____, _____.
(street) (city) (state) (zip code) (country)

I declare under penalty of perjury that the foregoing is true and correct.

Executed in _____ County, State of _____ , on the _____ day of _____, 20_____.
(month) (year)

_____
Signature of authorized agent of contracting business entity
(Declarant)

ADD ADDITIONAL PAGES AS NECESSARY

Must file online at https://www.ethics.state.tx.us/filinginfo/1295/

BID PROPOSAL

Date: _____

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as a _____* to the City of Keene, (hereinafter called "OWNER").

*Insert "a corporation", "a partnership", or "an individual" as applicable.

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of the CR 317 Reconstruction project in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID each party thereto certifies as to its own organization, that this BID has been arrived at independently, without consultation, communication, or Agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence WORK under this contract on or before a date to be specified in the NOTICE TO PROCEED and to fully complete the PROJECT within **155** consecutive calendar days thereafter, BIDDER further agrees to pay as liquidated damages, the sum of **$500.00** for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

_____

_____

_____

BIDDER agrees to perform all the work described in the CONTRACT DOCUMENTS for the following unit prices or lump sum prices.

Bidder certifies that it does not currently and will not employ undocumented workers. The Bidder further agrees, that if convicted of federal immigration violations under 8 U.S. Code Section 1324a(f), it shall repay the amount paid up to that date under this contract, including any interest paid by Owner to funding agency, if applicable. Such payment shall be made no later than the 120th day after receiving notice of violation from the Owner.

CITY OF KEENE
CR 317 RECONSTRUCTION
BASE BID SCHEDULE A

Show prices in numerals. Round off unit prices to two decimal places only.

These Bid Prices must include all labor, materials, equipment, insurance, overhead, superintendence, transportation, taxes, permits, profits & incidentals to cover the finished Work called for in the Contract Documents.

For all Labor, Materials, Equipment and Incidentals to Furnish and Install the Following:

Bid Item	Description	Est. Qty.	Unit	Unit Price	Extended Amount
1	Mobilization, Bonds, and Insurance	1	LS	$	$
2	Demolish and Remove Existing Excess Pavement/Dirt	1	LS	$	$
3	Excavate R.O.W. (Outside Paved Area) and Haul Off	1	LS	$	$
4	Subgrade Preparation	5,632	SY	$	$
5	Concrete Pavements with Curb and Gutter (31' B-B)	1,635	LF	$	$
6	Demolish and Remove Existing Culverts	3	EA	$	$
7	Install 3'x'4' RCB Culverts	3	EA	$	$
8	Install 30" RCP Lateral Storm Drain	34	LF	$	$
9	Install Sag Curb Inlet	2	EA	$	$
10	Concrete Rip-Rap	1	LS	$	$
11	Rock Rip-Rap (D50 = 18")	1	LS	$	$
12	Install Concrete Driveway Apron and tie-in	5	EA	$	$
13	R.O.W. Grading	1	LS	$	$
14	Striping	1	LS	$	$
15	Traffic Control	1	LS	$	$
16	Hydromulch	1	LS	$	$
17	Erosion Control	1	LS	$	$
TOTAL BASE BID (Items 1 - 17)					**$**

Note: Owner reserves the right to accept any combination of base bid and additive alternate bid items.

CITY OF KEENE
CR 317 RECONSTRUCTION
BASE BID SCHEDULE B

Show prices in numerals. Round off unit prices to two decimal places only.

These Bid Prices must include all labor, materials, equipment, insurance, overhead, superintendence, transportation, taxes, permits, profits & incidentals to cover the finished Work called for in the Contract Documents.

For all Labor, Materials, Equipment and Incidentals to Furnish and Install the Following:

Bid Item	Description	Est. Qty.	Unit	Unit Price	Extended Amount
1	Mobilization, Bonds, and Insurance	1	LS	$	$
2	Install TxDOT Asphalt	899	SY	$	$
3	Install TxDOT Concrete	361	SY	$	$
4	Asphalt Entrance Tie-In	6	EA	$	$
5	Concrete Entrance Tie-In	2	EA	$	$
6	Striping and Pavement Symbols	1	LS	$	$
	TOTAL BASE BID B (Items 1 - 6)				**$**

Note: Owner reserves the right to accept any combination of base bid and additive alternate bid items.

CITY OF KEENE
CR 317 RECONSTRUCTION
ADDITIVE ALTERNATE BID SCHEDULE

Show prices in numerals. Round off unit prices to two decimal places only.

These Bid Prices must include all labor, materials, equipment, insurance, overhead, superintendence, transportation, taxes, permits, profits & incidentals to cover the finished Work called for in the Contract Documents.

For all Labor, Materials, Equipment and Incidentals to Furnish and Install the Following:

Bid Item	Description	Est. Qty.	Unit	Unit Price	Extended Amount
A1	Lime Stabilization of Subgrade (4%)	1	LS	$	$
A2	Cement Stabilization of Subgrade (4%)	1	LS	$	$

Note: Owner reserves the right to accept any combination of base bid and additive/deductible alternate bid items.

BID SCHEDULE CONTRACTOR COMPLIANCE TO TEXAS SALES TAX CODE

The contractor shall make available to the City of Keene all tax advantages available to the City of Keene pursuant to Chapter 151, Subchapter E of the Texas Tax Code.

I, _____, the undersigned, as authorized representative of _____, do hereby agree to complete the installation of material within **155** consecutive calendar days, which time allows for the normal delays associated with inclement weather, etc. as specified in the Specifications.

Respectfully Submitted,

By: _____
(Contractor Signature)

Name: _____

Title: _____

Physical Address: _____

_____

Email Address: _____

Telephone: _____

Employer Federal ID No. _____

ATTEST:

_____

_____

(Seal) if bid by Corporation

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we the undersigned, _____ as Principal, and _____ as Surety, are hereby and firmly bound unto the City of Keene, as Owner in the penal sum of 5% for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

SIGNED, this _____ day of _____, 20___.

The condition of the above obligation is such that whereas the Principal has submitted to the City of Keene, a certain bid, attached hereto, and hereby made a part hereof to enter into a contract in writing for the CR 317 Reconstruction project.

NOW THEREFORE,

(a) If said bid shall be rejected, or in the alternate,

(b) If said bid shall be accepted and the Principal shall execute and deliver a contract in the form of contract attached hereto (properly completed in accordance with said bid,) and shall furnish a bond for this faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the Agreement created by the acceptance of said bid, then this obligation shall be void, otherwise the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that obligations of said Surety and its bond shall be in no way impaired or affected by any extension of 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 Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____	_____
Principal	Surety
By: _____	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 where the project is located.

NOTICE OF AWARD

To: _____ Project Description: City of Keene
CR 317 Reconstruction

_____

_____

The Owner has considered the Bid submitted by you for the above-described work in response to the Advertisement for Bids dated May 20th & 27th, 2026, and the Information for Bidders.

You are hereby notified that your Bid has been accepted for items in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor's Performance Bond, Payment Bond, and Certificate of Insurance within twenty-one (21) days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said bonds within twenty-one (21) days from the date of this Notice, the Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Bid as a forfeiture of your Bid Bond. The Owner 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 Owner.

Dated this _____ day of _____, 20____.

City of Keene
(Owner)

By: _____
Name: Samantha Gillin
Title: Mayor Pro-Tem

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award
is hereby acknowledged by:

_____
(Contractor)

This _____ day of _____, 20____.

By: _____
Name: _____
Title: _____

AGREEMENT

THIS AGREEMENT, made this _____ day of _____, 20____, by and between City of Keene, herein called "Owner", acting through its Mayor, and _____ _____ (a corporation) (a partnership) (an individual), County of _____, State of _____, hereinafter called "Contractor."

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Owner, the Contractor hereby agrees with the Owner to commence and complete the construction described as follows:

CR 317 RECONSTRUCTION

hereinafter called the Project, for the sum of _____ Dollars ($_____) and all extra work in connection therewith, under the terms as stated in the General and Special Conditions of the Contract; and at his (it's or their) own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence, labor, insurance and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal, the General Conditions, Supplemental General Conditions and Special Conditions of the Contract, the Plans, which include all maps, plats, blue prints and other drawings and printed or written explanatory matter thereof, the specifications and contract documents therefore as prepared by JACOB & MARTIN, LLC, herein entitled the Engineer, all of which are made a part hereof and collectively evidence and constitute the contract.

The Contractor hereby agrees to commence work under this contract on or before a date to be specified in a written "Notice to Proceed" of the Owner and to fully complete the project within **155** consecutive calendar days thereafter. The Contractor further agrees to pay as liquidated damages the sum of **$500.00** for each consecutive calendar day thereafter as hereinafter provided in Paragraph 15 of the General Conditions.

The Owner agrees to pay the Contractor in current funds for the performance of the contract, subject to additions and deductions, as provided in the General Conditions of the Contract, and to make payments on account thereof as provided in Paragraph 19 of the General Conditions.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in three (3) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

City of Keene
(Owner)

(SEAL)

ATTEST:

By: _____
Name: _____
Title: _____

By: _____
Name: Samantha Gillin
Title: Mayor Pro-Tem

_____
(Contractor)

(SEAL)

ATTEST:

By: _____
Name: _____
Title: _____

By: _____
Name: _____
Title: _____

Physical Address:

_____
_____

NOTE: The Secretary of the Owner should attest. If Contractor is a corporation, the corporate secretary should attest.

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____

(Name of Contractor)

_____

(Address of Contractor)

a _____ hereinafter called **PRINCIPAL** and
(Corporation, Partnership or Individual)

_____

(Name of Surety)

_____

(Mailing Address of Surety)

_____

(Physical Address of Surety)

_____

(Telephone Number, including area code, of Surety)

hereinafter called **SURETY**, as held, and firmly bound unto

CITY OF KEENE
(Name of Owner)

1000 N. OLD BETSY RD., CLEBURNE, TX 76031
(Address of Owner)

hereinafter called **OWNER** in the total aggregate penal sum of: _____ Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the **PRINCIPAL** entered into a certain Contract with the **OWNER**, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

CR 317 RECONSTRUCTION

_____

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

PROVIDED, FURTHER, that the said **SURETY,** for value received hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the Contract or to **WORK** to be performed thereunder or the **SPECIFICATIONS** accompanying 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 this contract or to the **WORK** or to the **SPECIFICATIONS**.

PROVIDED, FURTHER, that it is expressly agreed that the **BOND** shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 25 percent, so as to bind the **PRINCIPAL** and the **SURETY** to the full and faithful performance of the **CONTRACT** as so amended. The term "Amendment", wherever used in this **BOND,** and whether referring to this **BOND**, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

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

IN WITNESS WHEREOF, this instrument is executed in three (3) counterparts, each one of which shall be deemed an original, this _____ day of _____, 20____.

PRINCIPAL (Contractor):

Name: _____
Address: _____
_____

By: _____
ATTEST: Name: _____
Title: _____

_____ (SEAL)
Name: _____
Title: _____

SURETY:

Name: _____
Address: _____
_____

By: _____
ATTEST: Name: _____
Title: _____

_____ (SEAL)
Name: _____
Title: _____

OWNER APPROVAL:
The OWNER approves the form of this Performance Bond.

Date: _____

Name: City of Keene
Address: 1000 N. Old Betsy Road
Cleburne, TX 76031

ATTEST: By: _____
Name: Samantha Gillin
_____ Title: Mayor Pro-Tem

(SEAL)

NOTES:

1. The date of the Bond must not be prior to the date of the Contract.

2. The amount of the Bond must not be less than the amount of the Contract.

3. If the contractor is a partnership, all partners should execute the Bond.

4. If the contractor is a corporation, the Bond must be executed by an authorized official of the corporation. Authorization should be evidenced by a corporate resolution.

5. The surety must:

    a) be a corporation which is authorized to conduct business in the State of Texas;

    b) be a corporation which is licensed by the State of Texas to execute bonds as a surety; and

    c) must appear on the Treasury Department's most current list (Circular 570 as amended). See the FMI.

6. The Bond must be executed by an authorized representative of the surety. Ordinarily, Bonds are signed by an attorney-in-fact or agent of the surety. The person signing the Bond for the surety should provide a copy of the power of attorney or other evidence of their authority to act on behalf of the surety.

7. (For Public Bodies Only) the Contractor may not be required to obtain a surety bond from any specific insurance or surety company.

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____ hereinafter called **PRINCIPAL** and
(Corporation, Partnership or Individual)

_____
(Name of Surety)

_____
(Mailing Address of Surety)

_____
(Physical Address of Surety)

_____
(Telephone Number, including area code, of Surety)

hereinafter called **SURETY**, as held, and firmly bound unto

CITY OF KEENE
(Name of Owner)

1000 N. OLD BETSY RD., CLEBURNE, TX 76031
(Address of Owner)

hereinafter called **OWNER** and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of: _____
Dollars ($_____) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the **PRINCIPAL** entered into a certain contract with the **OWNER**, dated the _____ day of _____, 20_____, a copy of which is hereto attached and made a part hereof for the construction of:

CR 317 RECONSTRUCTION

_____

NOW, THEREFORE, if the **PRINCIPAL,** shall promptly make payment to all persons, firms, and corporations furnishing materials for or performing labor in the prosecution of the **WORK** provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such **WORK**, and for all labor cost incurred in such **WORK** including that by a **SUBCONTRACTOR,** and to any laborer, mechanic or materialman lienholder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the **SUBCONTRACTORS,** and persons, firms and corporations having a direct contract with the **PRINCIPAL** or its **SUBCONTRACTORS.**

PROVIDED, FURTHER, that the said **SURETY** for value received hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the **WORK** to be performed thereunder of 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 this contract or to the **WORK** or to the **SPECIFICATIONS**.

PROVIDED, **FURTHER**, that no suit or action shall be commenced hereunder by any claimant:

a) Unless claimant shall have given the notice or notices required by applicable state law, in the manner required by applicable state law and within the time limits prescribed by applicable state law; or

b) After the expiration of the minimum period of limitation permitted by applicable state law.

PROVIDED, FURTHER, that it is expressly agreed that this **BOND** shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 25 percent, so as to bind the **PRINCIPAL** and the **SURETY** to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this **BOND** and whether referring to this **BOND,** the contract or the loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

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

IN WITNESS WHEREOF, this instrument is executed in three (3) counterparts, each one of which shall be deemed an original, this ____ day of _____, 20___.

PRINCIPAL (Contractor):

Name: _____
Address: _____
_____

By: _____
ATTEST: Name: _____
Title: _____

_____ (SEAL)
Name: _____
Title: _____

SURETY:

Name: _____
Address: _____
_____

By: _____
ATTEST: Name: _____
Title: _____

_____ (SEAL)
Name: _____
Title: _____

OWNER APPROVAL:
The OWNER approves the form of this Payment Bond.

Date: _____

Name: City of Keene
Address: 1000 N. Old Betsy Road
Cleburne, TX 76031

ATTEST: By: _____
Name: Samantha Gillin
_____ Title: Mayor Pro-Tem

(SEAL)

NOTICE TO PROCEED

To: _____ Project Description: CR 317 Reconstruction
City of Keene

_____

_____

You are hereby notified to commence work in accordance with the Agreement dated _____, _____, on or before _____, _____ and to complete the work within **155** consecutive calendar days thereafter.

The date of completion of all work is therefore, _____, _____.

City of Keene
(Owner)

By: _____
Name: Samantha Gillin
Title: Mayor Pro-Tem

ACCEPTANCE OF NOTICE:

Receipt of the above Notice to Proceed
is hereby acknowledged by:

_____
(Contractor)

This _____ day of _____, 20___.

By: _____
Name: _____
Title: _____

GENERAL CONDITIONS

1. Definitions
2. Additional Instructions and Detail Drawings
3. Schedules, Reports and Records
4. Drawings and Specifications
5. Shop Drawings
6. Materials, Services and Facilities
7. Inspection and Testing
8. Substitutions
9. Patents
10. Surveys, Permits, Regulations
11. Protection of Work, Property, Persons
12. Supervision by Contractor
13. Changes in the Work
14. Changes in Contract Price
15. Time for Completion and Liquidated Damages
16. Correction of Work
17. Subsurface Conditions
18. Suspension of Work, Termination and Delay
19. Payments to Contractor
20. Acceptance of Final Payment as Release
21. Insurance
22. Contract Security
23. Assignments
24. Indemnification
25. Separate Contracts
26. Subcontracting
27. Engineer's Authority
28. Land and Rights-of-Way
29. Guaranty
30. Arbitration
31. Taxes

1. DEFINITIONS

1.1 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:

1.2 ***ADDENDA***- Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the Contract Documents, Drawings and Specifications, by additions, deletions, clarifications, or corrections.

1.3 ***BID***- The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

1.4 ***BIDDER***- Any person, firm or corporation submitting a Bid for the Work.

1.5 ***BONDS***- Bid, Performance, and Payment Bonds and other instruments of security, furnished by the Contractor and his surety in accordance with the Contract Documents.

1.6 ***CHANGE ORDER***- A written order to the Contractor authorizing an addition, deletion or revision in the Work within the general scope of the Contract Documents, or authorizing an adjustment in the Contract Price or Contract Time.

1.7 ***CONTRACT DOCUMENTS***- The contract, including Advertisement for Bids, Information for Bidders, Bid, Bid Bond, Agreement, Payment Bond, Performance Bond, Notice of Award, Notice to Proceed, Change Order, Drawings, Specifications and Addenda.

1.8 ***CONTRACT PRICE***- The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.9 ***CONTRACT TIME***- The number of calendar days stated in the Contract Documents for the completion of the Work.

1.10 ***CONTRACTOR***- The individual firm or corporation with whom the Owner has entered into the Agreement.

1.11 ***DRAWINGS***- That part of the Contract Documents prepared or approved by the Engineer which graphically shows the scope, extent, and character of the Work to be performed by the Contractor.

1.12 ***ENGINEER***- The person, firm or corporation named as such in the Contract Documents.

1.13 ***FIELD ORDER***- A written order issued by the Engineer to the Contractor during construction which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Time.

1.14 ***FINAL COMPLETION-*** The time at which the Work in entirety is complete to the satisfaction of the Engineer and Owner, in accordance with the Contract Documents so that the Work can be utilized for the purposes for which it was intended. The terms finally complete(d), wholly complete(d), and entirely complete(d) as applied to all of the Work refer to final completion thereof.

1.15 ***NOTICE OF AWARD***- The written notice of the acceptance of the Bid from the Owner to the successful Bidder.

1.16 ***NOTICE TO PROCEED***- A written notice given by the Owner to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Work.

1.17 ***OWNER***- The individual or entity with whom the Contractor has entered into the Agreement and for whom the Work is to be performed.

1.18 ***PROJECT***- The total construction of Work to be performed under the Contract Documents.

1.19 ***RESIDENT PROJECT REPRESENTATIVE***- The authorized representative of the Engineer who is assigned to the Project Site or any part thereof.

1.20 ***SHOP DRAWINGS***- All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the Contractor which illustrate how specific portions of the Work shall be fabricated or installed.

1.21 ***SPECIFICATIONS***- That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.

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

1.23 ***SUBSTANTIAL COMPLETION***- The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms substantially complete and substantially completed as applied to all or part of the Work refer to Substantial Completion thereof.

1.24 ***SUCCESSFUL BIDDER***- The Bidder submitting a responsive Bid to whom the Owner makes an award.

1.25 ***SUPPLIER***- A manufacturer, fabricator, supplier, distributor, material man, or vendor having a direct contract with the Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by the Contractor or Subcontractor, including that fabricated to a special design, but who does not perform labor at the site.

1.26 ***UNDERGROUND FACILITIES***- All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic, or other control systems.

1.27 ***UNIT PRICE WORK***- Work to be paid for on the basis of unit prices.

1.28 ***WORK***- The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

1.29 ***WRITTEN NOTICE***- Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the Work.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 The Contractor may be furnished additional instructions and detail drawings, by the Engineer, as necessary to carry out the Work required by the Contract Documents.

2.2 The additional drawings and instruction thus supplied will become a part of the Contract Documents. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

3. SCHEDULES, REPORTS, AND RECORDS

3.1 The Contractor shall submit to the Owner such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records, and other data where applicable as are required by the Contract Documents for the Work to be performed.

3.2 Prior to the first partial payment estimate the Contractor shall submit construction progress schedules showing the order in which he proposes to carry on the Work, including dates at which he will start the various parts of the Work, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of Shop Drawings, the beginning of manufacture, the testing and the installation of materials, supplies and equipment

3.3 The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the Work.

4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the Drawings and Specifications 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 and all incidental Work necessary to complete the project in an acceptable manner, ready for use, occupancy, or operation by the Owner.

4.2 In case of conflict between the Drawings and Specifications, the Specifications shall govern. Figure dimensions on Drawings shall govern over

scale dimensions, and detailed Drawings shall govern over general Drawings.

4.3 Any discrepancies found between the Drawings and Specifications and site conditions or any inconsistencies or ambiguities in the Drawings or Specifications shall be immediately reported to the Engineer, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the Contractor's risk.

5. SHOP DRAWINGS

5.1 The Contractor shall provide Shop Drawings as may be necessary for the prosecution of the Work as required by the Contract Documents. The Engineer shall promptly review all Shop Drawings. The Engineer's approval of any Shop Drawings shall not release the Contractor from responsibility for deviations from the Contract Documents. The approval of any Shop Drawings which substantially deviates from the requirement of the Contract Documents shall be evidenced by a Change Order.

5.2 When submitted for the Engineer's review, Shop Drawings shall bear the Contractor's certification that he has reviewed, checked, and approved the Shop Drawings and that they are in conformance with the requirements of the Contract Documents.

5.3 Portions of the Work requiring a Shop Drawing or sample submission shall not begin until the Shop Drawing or submission has been approved by the Engineer. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

6. MATERIALS, SERVICES, AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the Work within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the Work. Stored materials and equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer.

6.4 Materials, supplies and equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer.

6.5 Materials, supplies or equipment to be incorporated into the Work shall not be purchased by the Contractor or the Subcontractor, subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the Project shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the Contract Documents.

7.2 The Owner shall provide all inspection services.

7.3 The Contractor shall provide at his expense the testing services required by the Contract Documents.

7.4 The Owner shall provide all testing services not required by the Contractor in the Contract Documents.

7.5 All retesting due to failure to meet minimum requirements shall be paid for by the Contractor.

7.6 The Engineer and his representatives will at all times have access to the Work. The Contractor will provide proper facilities for such access and observation of the Work and also for any inspection or testing thereof.

7.7 If any Work is covered contrary to the written instructions of the Engineer it must, if requested by the Engineer, be uncovered for his observation and replaced at the Contractor's expense.

7.8 If the Engineer considers it necessary or advisable that covered Work be inspected or tested by others, the Contractor, at the Engineer's request, will 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, materials, tools, and equipment. If it is found that such Work is defective, the Contractor will bear all the expenses of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction. If, however, such Work is not found to be defective, the Contractor will be allowed an 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 an appropriate Change Order shall be issued.

8. SUBSTITUTIONS

8.1 Whenever a material, article or piece of equipment is identified on the Drawings or Specifications by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The Contractor may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the Contract Documents by reference to brand name or catalogue number, and if, in the opinion of the Engineer, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer may approve its substitution and use by the Contractor. Any cost differential shall be deductible from the Contract Price and the Contract Documents shall be appropriately modified by Change Order. The Contractor warrants that if substitutes are approved, no major changes in the function or general design of the Project will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time.

9. PATENTS

9.1 The Contractor shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the Owner harmless from loss on account thereof, except that the Owner shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Engineer.

10. SURVEYS, PERMITS, REGULATIONS

10.1 The Owner shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the Work together with a suitable number of benchmarks adjacent to the Work as shown in the Contract Documents. From the information provided by the Owner, unless otherwise specified in the Contract Documents, the Contractor shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The Contractor shall carefully preserve benchmarks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be secured and paid for by the Contractor. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the Owner, unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified. If the Contractor observes that the Contract Documents are at variance therewith, he shall promptly notify the Engineer in writing, and any necessary changes shall be adjusted as provided in Section 13, Changes in the Work.

11. PROTECTION OF WORK, PROPERTY, AND PERSONS

11.1 The Contractor will be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The Contractor will comply with all applicable laws, ordinances, rules, regulations, and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection. He will notify Owners of adjacent utilities when prosecution of the Work may affect them. The Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Owner or the Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

11.3 In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer or Owner, shall act to prevent threatened damage, injury, or loss. He

will give the Engineer prompt Written Notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

12.1 The Contractor will supervise and direct the Work. He will be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor will employ and maintain on the Work a qualified supervisor or superintendent who shall have been designated in writing by the Contractor as the Contractor's representative at the site. The supervisor shall have full authority to act on behalf of the Contractor and all communications given to the supervisor shall be as binding as if given to the Contractor. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the Work.

12.2 Labor; Working Hours

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.

B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

1. Regular working hours will be 8:00 AM to 5:00 PM. Owner, Engineer and Contractor may agree to alternative regular working hours at the time of the pre-construction meeting but at no time will work be allowed prior to sunrise or after sunset.

2. Legal holidays are:
   a. January 1st, New Year's Day
   b. Last Monday in May, Memorial Day
   c. July 4th, Independence Day
   d. First Monday in September, Labor Day
   e. Fourth Thursday and Friday of November, Thanksgiving
   f. December 25th, Christmas

13. CHANGES IN THE WORK

13.1 The Owner may at any time, as the need arises, order changes within the scope of the Work without invalidating the Agreement. If such changes increase or decrease the amount due under the Contract Documents, or in the time required for performance of the Work, an equitable adjustment shall be authorized by Change Order.

13.2 The Engineer, also, may at any time, by issuing a Field Order, make changes in the details of the Work. The Contractor shall proceed with the performance of any changes in the Work so ordered by the Engineer unless the Contractor believes that such Field Order entitles him to a change in Contract Price or Time, or both, in which event he shall give the Engineer Written Notice thereof within seven (7) days after the receipt of the ordered change. Thereafter, the Contractor shall document the basis for the change in Contract Price or Time within thirty (30) days. The Contractor shall not execute such changes pending the receipt of an executed Change Order or further instruction from the Owner.

14. CHANGES IN CONTRACT PRICE

14.1 The Contract Price may be changed only by a Change Order. The value of any Work covered by a Change Order or of any claim for increase or decrease in the Contract Price shall be determined by one or more of the following methods in the order of precedence listed below:

(a) Unit prices previously approved.
(b) An agreed lump sum.
(c) The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the Work. In addition, there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the Work to cover the cost of general overhead and profit.

15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the Work are essential conditions of the Contract Documents and the Work embraced shall be

commenced on a date specified in the Notice to Proceed.

15.2 The Contractor will proceed with the Work at such rate of progress to insure full completion within the Contract Time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the Contract Time for completion of the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the Work.

15.3 If the Contractor shall fail to complete the Work within the Contract Time, or extension of time granted by the Owner, then the Contractor will pay to the Owner the amount for liquidated damages as specified in the Bid for each calendar day that the Contractor shall be in default after the time stipulated in the Contract Documents.

15.4 The Contractor shall not be charged with liquidated damages or any excess cost when the delay in completion of the Work is due to the following, and the Contractor has promptly given Written Notice of such delay to the Owner or Engineer.

(a) To any preference, priority or allocation order duly issued by the Owner.
(b) To unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including but not restricted to, acts of God, or of the public enemy, acts of the Owner, acts of another Contractor in the performance of a contract with the Owner, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and
(c) To any delays of Subcontractors occasioned by any of the causes specified in paragraphs (a) and (b) of this article.

16. CORRECTION OF WORK

16.1 The Contractor shall promptly remove from the premises all Work rejected by the Engineer for failure to comply with the Contract Documents, whether incorporated in the construction or not, and the Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to the Owner and shall bear the expense of making good all Work of other Contractors destroyed or damaged by such removal or replacement.

16.2 All removal and replacement Work shall be done at the Contractor's expense. If the Contractor does not take action to remove such rejected Work within ten (10) days after receipt of Written Notice, the Owner may remove such Work and store the materials at the expense of the Contractor.

17. SUBSURFACE CONDITIONS

17.1 The Contractor shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the Owner by Written Notice of:

(a) Subsurface or latent physical conditions at the site differing materially from those indicated in the Contract Documents; or

(b) Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents.

17.2 The Owner shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the Work, an equitable adjustment shall be made and the Contract Documents shall be modified by a Change Order. Any claim of the Contractor for adjustment hereunder shall not be allowed unless he has given the required Written Notice; provided that the Owner may, if he determines the facts so justify, consider, and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION, AND DELAY

18.1 The Owner may suspend the Work or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the Contractor, by Written Notice to the Contractor and the Engineer which notice shall fix the date on which Work shall be resumed. The Contractor will resume that Work on the date so fixed. The Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to any suspension.

18.2 If the Contractor is adjudged a bankrupt or insolvent, or if he makes a general assignment 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, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to Subcontractors or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the Work or if he disregards the authority of the Engineer, or if he otherwise violates any provision of the Contract Documents, then the Owner may, without prejudice to any other right or remedy and after giving the

Contractor and his surety a minimum of ten (10) days from delivery of a Written Notice, terminate the services of the Contractor and 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. If the unpaid balance of the Contract Price exceeds the direct and indirect costs of completing the Project, including compensation for additional professional services, such excess shall be paid to the Contractor. If such costs exceed such unpaid balance, the Contractor will pay the difference to the Owner. Such costs incurred by the Owner will be determined by the Engineer and incorporated in a Change Order.

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

18.4 After ten (10) days from delivery of a Written Notice to the Contractor and the Engineer, the Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Project and terminate the Contract. In such case, the Contractor shall be paid for all Work executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the Contractor, the Work is suspended for a period of more than ninety (90) days by the Owner or under an order of court or other public authority, or the Engineer fails to act on any request for payment within thirty (30) days after it is submitted, or the Owner fails to pay the Contractor substantially the sum approved by the Engineer or awarded by arbitrators within thirty (30) days of its approval and presentation, then the Contractor may, after ten (10) days from delivery of a Written Notice to the Owner and the Engineer, terminate the Contract and recover from the Owner payment for all Work executed and all expenses sustained. In addition, and in lieu of terminating the Contract, if the Engineer has failed to act on a request for payment or if the Owner has failed to make any payment as aforesaid, the Contractor may upon ten (10) days Written Notice to the Owner and the Engineer stop the Work until he has been paid all amounts then due, in which event and upon resumption of the Work, Change Orders shall be issued for adjusting the Contract Price or extending the Contract Time, or both, to compensate for the costs and delays attributable to the stoppage of the Work.

18.6 If the performance of all or any portion of the Work is suspended, delayed, or interrupted as a result of a failure of the Owner or Engineer to act within the time specified in the Contract Documents, or if no time is specified, within a reasonable time, 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 Owner or Engineer.

19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the Contractor will submit to the Engineer a partial payment estimate filled out and signed by the Contractor covering the Work performed during the period covered by the partial payment estimate and supported by such data as the Engineer may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the Owner, as will establish the Owner's title to the material and equipment and protect his interest therein, including applicable insurance. The Engineer will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the Owner, or return the partial payment estimate to the Contractor, indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate. The Owner will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate. The Owner shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all Work covered by the Contract Documents. The Owner at any time however, after fifty (50) percent of the Work has been completed, if he finds that satisfactory progress is being made, shall reduce retainage to five (5) percent on the current and remaining estimates. When the Work is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced below five (5) percent to only that amount necessary to assure completion. On completion and acceptance of a part of the Work on which the price is stated separately in the Contract Documents, payment may be made in full, including retained percentages, less authorized deductions.

19.2 The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

19.3 Prior to Substantial Completion, the Owner, with the approval of the Engineer and with the concurrence of the Contractor, may use any completed or substantially completed portions of the Work. Such use shall not constitute an acceptance of such portions of the Work.

19.4 The Owner shall have the right to enter the premises for the purpose of doing work not covered by the Contract Documents. This provision shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the Work, or the restoration of any damaged Work except such as may be caused by agents or employees of the Owner.

19.5 Upon completion and acceptance of the Work, the Engineer shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the Owner, shall be paid to the Contractor within thirty (30) days of completion and acceptance of the Work.

19.6 The Contractor will indemnify and save the Owner or the Owner's agents harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof equipment, tools, and all supplies, incurred in the furtherance of the performance of the Work. The Contractor shall, at the Owner's request, furnish satisfactory evidence that all obligations of the nature designed above have been paid, discharged, or waived. If the Contractor fails to do so the Owner may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Owner to either the Contractor, his Surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Owner shall be considered as a payment made under the Contract Documents by the Owner to the Contractor and the Owner shall not be liable to the Contractor for any such payments made in good faith.

19.7 If the Owner fails to make payment thirty (30) days after approval by the Engineer, in addition to other remedies available to the Contractor, there shall be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the Contractor.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASED

20.1 The acceptance by the Contractor of final payment shall be and shall operate as a release to the Owner of all claims and all liability to the Contractor other than claims in stated amounts as may be specifically excepted by the Contractor for all things done for furnished in connection with this Work and for every act and neglect of the Owner and others relating to or arising out of this Work. Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the Performance Bond and Payment Bond.

21. INSURANCE

21.1 The Contractor shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the Contractor's execution of the Work, whether such execution be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

(a) Claims under workmen's compensation, disability benefit and other similar employee benefit acts;

(b) Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

(c) Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

(d) Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of any offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person, and;

(e) Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 Certificates of Insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These Certificates shall contain a provision that coverages afforded under the policies will not be cancelled unless at least thirty (30) days prior Written Notice has been given to the Owner.

21.3 The Contractor shall procure and maintain, at his own expense, during the Contract Time, liability insurance as hereinafter specified:

(a) Contractor's General Public Liability and Property Damage Insurance including vehicle coverage issued to the Contractor and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the Contract Documents, whether such operations be by himself or by any Subcontractor under him or anyone directly or indirectly employed by the Contractor or by a Subcontractor under him. Insurance shall be written with a limit of liability of not less than $500,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident; and a limit of liability of not less than $500,000 aggregate for any such damages sustained by two or more persons in any one accident. Insurance shall be written with a limit of liability of not less than $200,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than $200,000 aggregate for any such damage sustained by two or more persons in any one accident.

(b) The Contractor shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the Project to the full insurable value thereof for the benefit of the Owner, the Contractor, and Subcontractors as their interest may appear. This provision shall in no way release the Contractor or Contractor's surety from obligations under the Contract Documents to fully complete the Project.

21.4 The Contractor shall procure and maintain, at his own expense, during the Contract Time, in accordance with the provisions of the laws of the state in which the Work is performed, Workmen's Compensation Insurance, including occupational disease provisions for all of his employees at the site of the Project and in case any Work is sublet, the Contractor shall require such Subcontractor similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the Contractor. In case any class of employees engaged in hazardous Work under this contract at the site of the Project is not protected under Workmen's Compensation statue, the Contractor shall provide, and shall cause each Subcontractor to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The Contractor shall secure, if applicable, "All Risk" type Builder's Risk Insurance for Work to be performed. Unless specifically authorized by the Owner, the amount of such insurance shall not be less than the Contract Price totaled in the Bid. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the Contract Time, and until the Work is accepted by the Owner. The policy shall name as the insured the Contractor, the Engineer, and the Owner.

22. CONTRACT SECURITY

22.1 The Contractor shall within ten (10) days after the receipt of the Notice of Award furnish the Owner with a Performance Bond and a Payment Bond in penal sums equal to the amount of the Contract Price, conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions and agreements of the Contract Documents, and upon the prompt payment by the Contractor to all persons supplying labor and materials in the prosecution of the Work provided by the Contract Documents. Such Bonds shall be executed by the Contractor and a corporate bonding company licensed to transact such business in the state in which the Work is to be performed. The expense of these Bonds shall be borne by the Contractor. If at any time a surety on any such Bond is declared a bankrupt or loses its right to do business in the state in which the Work is to be performed, Contractor shall within ten (10) days after notice from the Owner to do so, substitute an acceptable Bond (or Bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such Bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS

23.1 Neither the Contractor nor the Owner shall sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, or of his right, title or interest therein, or his obligations thereunder, without written consent of the other party.

24. INDEMNIFICATION

24.1 The Contractor will indemnify and hold harmless the Owner and the Engineer and their agents and employees from and against all claims, damages, losses, and expenses including attorney's fees arising out of or resulting from the performance of the Work, provided that any such claims, damage,

loss or expense is attributable to bodily injury, sickness, disease or death, or to injury or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the Contractor, and Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the Owner or the Engineer, or any of their agents or employees, by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, 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 Subcontractor under workmen's compensation acts, disability benefit acts or other employees benefits acts.

24.3 The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer, his agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, Change Orders, designs, or Specifications.

25. SEPARATE CONTRACTS

25.1 The Owner reserves the right to let other contracts in connection with this Project. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their Work, and shall properly connect and coordinate his Work with theirs. If the proper execution or results of any part of the Contractor's Work depends upon the Work of any other Contractor, the Contractor shall inspect and promptly report to the Engineer any defects in such Work that render it unsuitable for such proper execution and results.

25.2 The Owner may perform additional Work related to the Project by himself, or he may let other contracts containing provisions similar to these. The Contractor will afford the other Contractor's who are parties to such Contracts (or the Owner, if he is performing the additional Work himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of Work, and shall properly connect and coordinate his Work with theirs.

25.3 If the performance of additional Work by other Contractors or the Owner is not noted in the Contract Documents prior to the execution of the Contract, Written Notice thereof shall be given to the Contractor prior to starting any such additional Work. If the Contractor believes that the performance of such additional Work by the Owner or others involves him in additional expense or entitles him to an extension of the Contract Time, he may make a claim thereof as provided in Sections 14 and 15.

26. SUBCONTRACTING

26.1 The Contractor may utilize the services of specialty Subcontractors on those parts of the Work which, under normal contracting practices, are performed by specialty Subcontractors.

26.2 The Contractor shall not award Work to Subcontractor (s), in excess of fifty (50) percent of the Contract Price, without prior written approval of the Owner.

26.3 The Contractor shall be fully responsible to the Owner for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the Work of Subcontractors and to give the Contractor the same power as regards terminating any subcontract that the Owner may exercise over the Contractor under any provision of the Contract Documents.

26.5 Nothing contained in this Contract shall create any contractual relation between any Subcontractor and the Owner.

26.6 The Owner may require copies of executed subcontracts.

27. ENGINEER'S AUTHORITY

27.1 The Engineer shall act as the Owner's representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and Work performed. He shall interpret the intent of the Contract Documents in a fair and unbiased manner. The Engineer will make visits to the site and determine if the Work is proceeding in accordance with the Contract Documents.

27.2 The Contractor will be held strictly to the intent of the Contract Documents in regard to the quality of materials, workmanship, and execution of the Work. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The Engineer will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The Engineer shall promptly make decisions relative to interpretation of the Contract Documents.

28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of Notice to Proceed, the Owner shall 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.

28.2 The Owner shall provide to the Contractor information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The Contractor shall provide at his own expense and without liability to the Owner any additional land and access thereto that the Contractor may desire for temporary construction facilities, or for storage of materials.

29. GUARANTY

29.1 The Contractor shall guarantee all materials and equipment furnished and Work performed for a period of one (1) year from the date of Final Completion. The Contractor warrants and guarantees for a period of one (1) year from the date of Final Completion of the system that the complete system is free from all defects due to faulty materials or workmanship and the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the system resulting from such defects. The Owner will give notice of observed defects with reasonable promptness. In the event that the Contractor should fail to make such repairs, adjustments, or other Work that may be made necessary by such defects, the Owner may do so and charge the Contractor the cost thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

30. ARBITRATION

30.1 All claims, disputes, and other matters in question arising out of, or relating to, the Contract Documents or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Section 20, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. This agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the demand for arbitration shall be filed in writing with the other party to the Contract Documents and with the American Arbitration Association, and a copy shall be filed with the Engineer. Demand for arbitration shall in no event be made on any claim, dispute or other matter in question which would be barred by the applicable statute of limitations.

30.3 The Contractor will carry on the Work and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

31.1 The Contractor will pay all sales, consumer, use and other similar taxes required by the law of the place where the Work is performed.

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PART 1 GENERAL

1.1 ABBREVIATIONS

A. Whenever any of the following abbreviations appear in these Specifications and Contract Documents, their meanings shall be as follows:

OWNER	City of Keene
ENGINEER	Jacob & Martin, LLC
ASTM	American Society for Testing Materials
AWWA	American Water Works Association
AASHTO	American Association of State Highway and Transportation Officials
A.C.	Asbestos Cement
C.I.	Cast Iron
C.S.	Commercial Standards
D.I.	Ductile Iron
EPA	Environmental Protection Agency
GPM	Gallons Per Minute
NSF	National Sanitation Foundation
TDA	Texas Department of Agriculture
OSHA	Occupational Safety and Health Administration
PVC	Polyvinyl Chloride
TCDP	Texas Community Development Program
TCF	Texas Capital Fund
TXDOT	Texas Department of Transportation
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
USDA/RD	United States Department of Agriculture - Rural Development

*Latest Revision

1.2 DOCUMENT ORGANIZATION

A. Section GENERAL REQUIREMENTS govern the execution of all sections of the Specifications.

B. Organization of Contract Documents is not intended to control or to lessen the responsibility of the Contractor in dividing work among his subcontractors, or in establishing extent of work to be performed by any trade.

1.3 SPECIFICATION SENTENCE STRUCTURE

A. Specifications are written in modified brief style. Requirements indicated and specified apply to all work of same kind, class, and type even though word "all" is not stated.

B. Simple imperative mood of sentence structure is used in Specification sections which places verb as first word sentence. Where such words as "perform", "provide", "install", "erect", "furnish", "connect", "test", or words similar import are used, it shall be understood that such words include meanings of phrase "The CONTRACTOR shall..." before each word.

C. Standard paragraph titles and other identifications of subject matter in Specifications are intended as aid in locating and recognizing various requirements in the Specifications. Titles do not define, limit, or otherwise restrict Specification text. Capitalizing of words in text does not signify or mean that such words convey special or unique meanings that have precedence over

other parts of the Contract Documents. Specification text shall govern over titling and shall be understood to be interpreted as a whole.

1.4 SPECIFICATION TERMINOLOGY

A. Terms such as "directed", "designated", "requested", "authorized", "approved", "selected", or words of similar value shall mean by the Engineer unless otherwise stated. Use of these terms does not extend the ENGINEERS's responsibility for construction supervision or responsibilities defined in the General conditions.

B. "Required" and words of similar value mean as required to complete the work, unless otherwise stated.

C. "Perform" shall mean CONTRACTOR, at his own expense, shall perform operations necessary to complete work.

D. "Provide" shall mean CONTRACTOR, at his own expense, shall furnish and install work complete in place and ready to use.

E. "Other acceptable manufacturer", "Approved equal", or words of similar meaning shall be understood to be followed by expression "in sole opinion of the ENGINEER" even though such words may not appear in print, unless otherwise stated.

F. "Acceptance", "acceptable", or words of similar meaning shall mean acceptable to ENGINEER or OWNER. OWNER shall have jurisdiction and may override decisions of others.

G. "At no extra cost to Owner", "With no extra compensation to CONTRACTOR", "At CONTRACTOR's own expense", or words of similar meaning shall be understood to mean the CONTRACTOR shall perform or provide specified operation of work at no increase to CONTRACTOR Sum in the executed Contract.

H. "Indicated" refers to graphic representations, notes, or schedules on drawings, or other paragraphs or schedules in specifications, and similar requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled" and "specified" are used, it is to help locate the reference; no limitation on location is intended except as specifically noted.

I. "Accepted" where used in conjunction with ENGINEER's action on CONTRACTORS submittals, and requests, is limited to responsibilities and duties of ENGINEER. Such approval does not release CONTRACTOR from responsibility to fulfill Contract Document requirements.

J. "Regulation" includes Federal, State and Local Laws, statutes, ordinances, and lawful orders issued by authorities have jurisdiction, as well as, rules, conventions, and agreements within construction industry that control performance of work, whether they are lawfully imposed by authorities having jurisdiction or not.

K. "Furnish" is used to mean to supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operation.

L. "Install" is used to describe operations at project site including actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

M. "Installer" is an entity engaged by CONTRACTOR, either as an employee, subcontractor, or sub-subcontractor for performance of particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

N. The term "experienced", when used with the term "installer", means having minimum five (5) previous projects similar in size and scope to this project, and familiar with precautions required, and has complied with requirements of authority having jurisdiction.

O. "Project site" is the space available to the CONTRACTOR for performance of work, either exclusively or in conjunction with others performing construction as part of the project.

P. "Testing Laboratory" is an independent entity engaged to perform specific inspections or test, either at the project site or elsewhere, and to report on, or to interpret results of those inspections or tests as required. Unless otherwise indicated, testing laboratories shall be hired by the CONTRACTOR at no additional cost to the OWNER.

Q. Equipment is "Listed" if of a kind mentioned in a list which:
   1. Is published by a nationally recognized laboratory which makes periodic inspection of production of such equipment.
   2. States that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner.

R. Equipment is "Labeled" if:
   1. It embodies a valid label, symbol, or other identifying mark of a nationally recognized testing laboratory such as Underwriters Laboratories, Inc.
   2. Production is periodically inspected in accordance with nationally recognized standards or tests to determine safe use in a specified manner.

S. Equipment is "Certified" if:
   1. Equipment has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner.
   2. Production is periodically inspected by a nationally recognized testing laboratory.
   3. It bears a label, tag, or other record of certification.

1.5 REFERENCE STANDARDS

A. Applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents regardless of lack of reference within the Contract Documents. Where Contract Documents include more stringent requirements than the reference standards, the Contract Documents shall apply.
   1. Standards referenced directly in the Contract documents take precedence over standards that are not referenced but recognized in the construction industry as applicable.
   2. Except as otherwise limited by the Contract Documents, enforce standards not referenced but recognized in industry as applicable for performance of the work. The ENGINEER shall decide whether code or standard is applicable, or which of several are applicable.

B. Consider a reference standard to be the latest edition with supplements or amendments when standard is referred to in an individual Specification Section but is not listed by the title and date.

C. Maintain copies of reference standards at project site throughout construction period. Make copies of reference standards available as requested by ENGINEER or OWNER.

D. Enforce the most stringent requirements where compliance with two (2) or more standards is specified, and they establish different or conflicting requirements for minimum quantities or quality levels, unless Contract Documents indicate otherwise.
   1. Quantity or quality level shown or indicated shall be minimum to be provided or performed in every instance.
   2. Actual installation may comply exactly with minimum quality indicated,or it may exceed that minimum within reasonable limits.
   3. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for context of requirements.
   4. Refer instances of uncertainty to the Engineer for decision before proceeding.

E. Trade association names and titles of general standards are frequently abbreviated. Where acronyms or abbreviations are used in specifications or other Contract Documents they mean recognized name of trade association, standards generating organization, authority having jurisdiction, or other entity applicable to context of text provision. Refer to "Encyclopedia of Associations", published by Gale Research Company.

PART 2 NOT USED

PART 3 NOT USED

-- END OF SECTION --

SECTION 01 01 01 - SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK INCLUDED

A. Construct work as described in the Contract Documents.
   1. Provide materials, equipment, and incidentals required to make the project completely operable.
   2. Provide the labor, equipment, tools, and consumable supplies required for a complete project.
   3. Provide the civil, architectural, structural, mechanical, electrical, instrumentation and all other work required for a complete and operable project.
   4. Test and place the completed project in operation.
   5. Provide the special tools, spare parts, lubricants, supplies, or other materials as required for the operation and maintenance of the Project.
   6. Drawings and Specifications may not indicate or describe all of the work required to complete the project. Additional details required for the completion of the project are to be provided by the CONTRACTOR and coordinated with the ENGINEER.

1.2 REFERENCE STANDARDS

1.3 JOB CONDITIONS

A. The General Conditions, the Special Conditions, and Division One Specifications apply to each Specification section.
B. Comply with all applicable federal, state and local codes and regulations pertaining to the nature and character of the work being performed.

1.4 DESCRIPTION OF WORK

A. This project consists of removing approximately 1,740 linear feet of asphalt roadway and replacing with a 30-ft wide concrete roadway with curb and gutter, as well as culvert replacement for the existing (3) 36” cross culverts under CR 317, downstream from the Soil Conservation Service – Site 34 Reservoir. This project also includes shoulder addition for TxDOT turn lanes, repair of driveways along the improved section of CR 317, right-of-way grading for improved drainage, new road striping, and all associated appurtenances.

1.5 TIME OF COMPLETION

A. The time to be allowed under this Contract to complete all work is per the Contract Documents. Work time established allows for the normal delays associated with bad weather, etc. and shall begin ten (10) days after the issuance of the Notice to Proceed by the OWNER. Requests for extension to time of completion shall be made by the CONTRACTOR to the ENGINEER, in writing, on a monthly basis corresponding with the submission of a partial payment requests. Requests for time extensions received more than 60 days following a requested date will not be considered.

1.6 SCHEDULE AND SEQUENCE OF CONSTRUCTION

A. Within 10 days prior to submission of the first partial payment request, the CONTRACTOR shall submit to the ENGINEER for approval six copies of the schedule under which the CONTRACTOR proposes to complete the project. Seven days prior to the start of construction, the CONTRACTOR shall submit to the ENGINEER for approval an electronic copy of a schedule under which the CONTRACTOR proposes to complete the project. The CONTRACTOR shall submit an updated schedule with each payment request.
B. If, in the opinion of the ENGINEER, construction progress falls behind the schedule, the CONTRACTOR shall take such action as necessary to improve his progress, and the

CONTRACTOR shall submit to the ENGINEER a revised schedule demonstrating his proposed plan to make up the lag in scheduled progress and complete the project within the contract time.

1.7 WORK BY OWNER

A. The OWNER may perform items of work which are not included in this Contract, but may impact construction scheduling. CONTRACTOR to coordinate construction activities through the ENGINEER.

1.8 CONSTRUCTION OF UTILITIES

A. Coordinate with Utility Companies or their contractors to provide all required utilities for this project. Construction of permanent utilities will be paid for by the OWNER.

B. Power and Electrical Services

1. Pay for temporary construction power, including but not limited to construction cost, meter connection, fees and permits.

1.9 OCCUPANCY

A. As soon as any portion of the Project is ready to use, the OWNER shall have the right to operate the portion upon written notice to the CONTRACTOR.

B. Testing of Controls, including specified test periods, training, and start-up does not constitute acceptance for operation.

C. OWNER may accept the facility for continued use after start-up and testing at the option of the OWNER. If acceptance is delayed at option of the OWNER, shut down facilities per approved Operation and Maintenance procedures.

D. The execution of bonds is understood to indicate the consent of surety.

E. Conduct operations to insure the least inconvenience to the OWNER and general public.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide materials and products per the individual sections of the Specifications.

PART 3 EXECUTION

3.1 NOT USED

-- END OF SECTION --

SECTION 01 02 01 - SPECIAL TECHNICAL SPECIFICATIONS AND CONDITIONS

PART 1 GENERAL

1.1 PRIORITY OF INTERPRETATION

A. The Contract Documents are complementary, and what is called for by one document shall be binding as if called for by all. In case of conflict between any of the Contract Documents, priority of interpretation shall be in the following order:
   1. General Conditions
   2. Agreement
   3. Performance and Payment Bonds
   4. Special Bonds, if any
   5. Bid
   6. Special Technical Specifications and Conditions
   7. Plans
   8. Technical Specifications

1.2 REFERENCE STANDARDS

1.3 SALES TAX EXEMPTION

A. The OWNER qualifies as an exempt agency pursuant to the provisions of the Texas Limited Sales, Excise and Use Tax Act, and is not subject to any State or City sales tax on materials and labor used in the performance for this project. The CONTRACTOR shall issue a resale exemption certificate when purchasing said materials. Said exemption certificate complying with Section 151.155 (Exemption Certificate) and 151.309 (Government Entities) of Texas Limited Sales, Excise and Use Tax Act, as amended. Any sales taxes applicable to equipment purchases, rentals, leases, or consumable supplies or other taxable services not incorporated into the project shall be the responsibility of the CONTRACTOR.

1.4 MINIMUM WAGE SCALE

A. The minimum wage scale shall be according to local prevailing wage rates, if not already listed in the Contract Section.

1.5 METHODS OF OPERATION

A. The CONTRACTOR shall inform the ENGINEER in advance concerning his plans for carrying on each part of the work, but the CONTRACTOR alone shall be responsible for safety, adequacy, and efficiency of his plant, equipment, and methods.

B. The OWNER and ENGINEER will not be responsible for any act or omission of the CONTRACTOR, or any subcontractor, or any of the agents or employees, or any other persons performing any of the work. The OWNER and ENGINEER will not be responsible for any failure of the CONTRACTOR or his subcontractors or any other persons to perform the work in accordance with the requirements of the contract documents.

C. Review by the OWNER or ENGINEER of any plan or method of work proposed by the CONTRACTOR shall not relieve the CONTRACTOR of any responsibility therefore, and such review shall not be considered as an assumption of any risk or liability by the OWNER or ENGINEER, or any officer, agent, or employee thereof.

1.6 SUBCONTRACTORS

A. Subcontractors who may be used by the CONTRACTOR will not be approved by the ENGINEER prior to award of the contract. After award, if approval is given for a subcontractor to perform certain items of the work, the CONTRACTOR will remain completely and totally responsible for all work under this contract. If directed by the ENGINEER, the CONTRACTOR

will also be responsible for correcting any defects and/or removing any defective work completely from the site and satisfactorily replacing the work.

1.7 EVALUATION OF BIDS

A. The bid schedule lists the various divisions of construction contemplated in the Plans and Specifications, together with an estimate of the units of each. With these units as the basis, the Bidder will extend each item using the cost he sets in the unit price column. Any total cost found to be inconsistent with the net cost when the bids are evaluated will be deemed in error and corrected to agree with the unit cost, which shall be considered correct. The written unit price shall be used in case of conflict with the numerical unit price.

1.8 AWARD OF THE CONTRACT

A. The OWNER reserves the right to hold all bids for the number of days specified in the Contract Documents before making an award of the Contract.

1.9 WORKMANSHIP

A. These specifications contain detailed instructions and descriptions covering the major items of construction and workmanship necessary to construct the above mentioned project. The specifications are intended to be so written that only first class workmanship and finish of the best grade and quality will result. The fact that these specifications may fail to be so complete as to cover all details will not relieve the CONTRACTOR of full responsibility for providing a completed project of high quality, first class finish and appearance and satisfactory for operation, all within the apparent intent of the plans and specifications.

1.10 ESTIMATED QUANTITIES

A. The Contract Documents are intended to show clearly all work to be done and materials to be furnished. Where the estimated quantities are shown for the various classes of work to be done and material to be furnished under this contract, they are approximate and are to be used only as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It shall be understood that the actual amount of work to be done and material to be furnished under this contract may differ from these estimates, and where the basis for payment under this contract is the unit price method, payment shall be for the actual amount of such work and material furnished.

B. Where payment is based on the unit price method, the CONTRACTOR agrees that he will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this contract and the estimated quantities contemplated and contained in the proposal. However, in case the actual quantity of any major item becomes as much as 25% more than or 25% less than the estimated or contemplated quantity for such item, then either party to this Agreement, upon demand, shall be entitled to a revised consideration upon the portion of the work above or below 25% of the estimated quantity. The OWNER will not pay for increased material prices for any quantity increase within the 25% allowable. Therefore, the CONTRACTOR should endeavor to have his material quote cover up to 25% more than the bid quantity.

C. A "Major Item" shall be construed to be any individual bid item included in the proposal that has a total cost equal to or greater than25% of the total contract cost, computed on the basis of the proposal quantities and contract unit prices. Any revised consideration is to be determined by Agreement between the parties, otherwise by terms of the Agreement, as provided under Changes in Contract Price in the General Conditions.

1.11 FINAL QUANTITIES INSTALLED

A. Should there be a discrepancy between the CONTRACTOR'S claim for quantity of materials installed and the quantity measured by the ENGINEER, the discrepancy may be resolved as follows:
   1. The plans shall be thoroughly checked by the ENGINEER and CONTRACTOR to assure that all changes in work have been recorded and no errors exist in the material take-off.
   2. Should the quantity discrepancy not be resolved by means of plan sheet examination, then at the CONTRACTOR'S request, segments of lines may be re-measured: however, if the CONTRACTOR'S figures are not proven to be accurate by re-measurement, then the CONTRACTOR shall pay for cost of re-measurement.
   3. Any deviations in straight-line routing of pipeline not approved by the ENGINEER and/or OWNER shall be paid only for the footage of pipe which would have been required for a straight line installation.

1.12 PROTECTION OF LIVES AND PROPERTY

A. In order to protect the lives and health of his employees, the CONTRACTOR shall comply with all pertinent provisions of the "Manual of Accident Prevention in Construction" issued by the Associated General CONTRACTOR of America, Inc. The CONTRACTOR shall maintain an accurate record of all cases of death, occupational disease and injuries requiring medical attention or causing loss of time from work arising out of and in the course of work under this contract. The CONTRACTOR alone shall be responsible for the safety, efficiency and adequacy of his plant, appliances and methods and for any damage which may result from their failure, improper construction, maintenance or operation.

1.13 SANITARY FACILITIES

A. The CONTRACTOR shall provide adequate toilet facilities for use by workmen in accordance with O.S.H.A. provisions, and shall maintain such facilities throughout the construction period.

1.14 EXISTING UTILITIES

A. It shall be the entire responsibility of the CONTRACTOR to locate all existing underground utilities ahead of the work, whether or not shown on the Plans, and to protect and preserve such utilities from any damage from the proposed construction operations. In the event an underground water, oil, gas, telephone line, or other utility is damaged, the respective OWNER of said utility shall be notified immediately by the CONTRACTOR. It shall be the CONTRACTOR'S entire responsibility to see that said utilities are repaired to the satisfaction of the ENGINEER and utility OWNER. If the CONTRACTOR shows a complete disregard for existing utilities, the CONTRACTOR will pay the City of Keene, $500 per occurrence in addition to paying all costs for repairing damage to existing utilities. Continued disregard for existing utilities may result in suspension or termination of the Construction Contract. Where overhead poles or anchors are encountered, or are necessary to be disturbed or moved, the CONTRACTOR shall contact the OWNER of the utility and arrange to have the necessary adjustments made, at no additional cost to the OWNER. When signs are disturbed or damaged, the CONTRACTOR shall restore them to the same or better condition that existed prior to construction.

1.15 SATURDAY AND SUNDAY WORK

A. Construction work on Saturdays or Sundays will not be permitted on the project except to maintain barricades, warning signs and flares. In the event the CONTRACTOR is prevented from working on the project for two or more days in any one calendar week, he may work the following Saturday if approval is given by the ENGINEER and OWNER.

1.16 TPDES GENERAL PERMIT

A. The CONTRACTOR shall fully comply with the Texas Pollutant Discharge Elimination System Permit TXR 150000. All construction activities shall fully comply with all aspects of this permit, and the CONTRACTOR shall certify to the OWNER said compliance before the certificate of construction completion is issued. The CONTRACTOR shall apply for and obtain the permit before construction. The CONTRACTOR shall be responsible for the permit fee and all other costs associated with the referenced permit.

B. At least three (3) days before commencement of construction, the CONTRACTOR shall file a Notice of Intent (NOI) with the TCEQ. The notice shall be sent to the TCEQ, Storm Water & Processing Center: MC-228, P.O. Box 13087, Austin, Texas 78711-3087. One copy of the NOI shall be sent to the ENGINEER and one copy shall be posted at the site. The NOI form and permit requirement may be obtained from the TCEQ or on their website www.tceq.state.tx.us The CONTRACTOR shall prepare a Stormwater Pollution Prevention Plan (SWPPP), obtain, and fully comply with the Texas Pollutant Discharge Elimination System Permit TXR 150000. Questions concerning this permit may be addressed to TCEQ at 512-239-3700.

1.17 CONSTRUCTION SURVEYING

A. The construction surveying described in Paragraph 1 below shall be provided by the OWNER. The surveying work contained in Paragraphs 2, 3, and 4 shall be considered subsidiary to the overall project and no separate payment shall be made for this work. Work contained in Paragraphs 2, 3, and 4 shall be accomplished by the CONTRACTOR.

1. The surveyor shall obtain copies of all private property easements, and public right of way permits. From these easements and permits, the surveyor shall set alignment lathes, stakes, and hubs as needed and benchmarks as needed, plus alignment stakes at every horizontal PI. Also, alignment lathes, stakes, and hubs shall be set at every property line or ROW line crossing. The CONTRACTOR shall notify the ENGINEER at least 24 hours before each segment is to be staked. Each segment to be staked shall be a minimum of 1000 feet in length. Staking will be provided one time only. Stakes that are lost or damaged shall be replaced by the CONTRACTOR at his own cost.
2. Locate and protect control points prior to starting the site work and preserve permanent reference points during construction. The CONTRACTOR shall not change or relocate points without prior approval of the ENGINEER. Notify ENGINEER when the reference point is lost, destroyed, or requires relocation. Replace project control points on the basis of the original survey.
3. Provide complete engineering layout of the work needed for construction.
   a. Provide competent personnel. Provide equipment including accurate surveying instruments, stakes, platforms, tools, and materials.
   b. Record data and measurements per standards.
4. Construction lines and grades, as well as base lines and bench marks provided by the CONTRACTOR, shall be subject to such checks and reviews as the ENGINEER may, from time to time, desire to make.

1.18 WATER USED DURING CONSTRUCTION PERIOD

A. The CONTRACTOR shall pay to the City of Keene,$8.00 per thousand gallons for all water used for filling the lines, flushing, testing, leaks, etc.

B. The OWNER shall furnish water (at the nearest fire hydrant or flush valve) at no cost to the CONTRACTOR for testing, disinfection and flushing as required by these Specifications.

1.19 UTILITIES DURING CONSTRUCTION

A. The CONTRACTOR will be required to make arrangements for and pay for the electrical power and any other utilities required during construction.

1.20 STATE HISTORIC PRESERVATION

A. If cultural materials are encountered during construction, work must cease in the immediate area. Work can continue in the project area where no cultural materials are present. The Secretary of Interior (202-343-4101) must be contacted in accordance with 36 CFR 8007. Also, the State Historic Preservation Officer (512-463-6100) must be notified.

1.21 UNCLASSIFIED EXCAVATION

A. All excavation on this project will be considered to be unclassified, and no extra payment will be made for the removal of any rock, shale, roots and any other material or substance that may be encountered in the construction work as set out on the Drawings and in the Technical Specifications.

1.22 ROCK EXCAVATION

A. In all areas requiring rock excavation, the Contractor shall install the pipe and complete the "rock free" bedding so that the installation may be inspected prior to backfilling. The Owner's inspector shall be notified by the Contractor when the bedding is complete for each particular segment. Any rock excavation areas backfilled without the Owner's prior inspection will require uncovering and checking at the Contractor's expense.

1.23 LOCATION OF PIPELINES

A. In the event pipeline locations required by the Plans should intersect a septic tank drain field or animal pens where extreme pollution might occur, the CONTRACTOR shall notify the ENGINEER and OWNER, and proposed water pipeline shall be re-routed in order to avoid such areas of possible pollution. In the event additional lengths of pipeline are required, the additional lengths will be paid for at the unit price bid per linear foot as set out in the proposal. No unauthorized straight line deviations will be paid for. The CONTRACTOR shall fully comply with TCEQ chapter 290.44(3) and Chapter 317.13 Appendix E for location of water/sewer lines and separation distances. No extra payment will be made to the CONTRACTOR for compliance with TCEQ requirements.

1.24 LOCATION OF VALVES AND METERS

A. Valves, meters, meter boxes and vaults shall be installed at the locations shown on the Plans.
   1. Whenever possible, valves shall be located adjacent to existing fences or edge of the right-of-way especially in cultivated fields. Unless absolutely necessary, valves shall not be located in borrow ditches or wash-out areas. The CONTRACTOR shall install two 4" diameter steel pipes (7'), buried 3 feet with concrete and painted for all valves located in cultivated fields at no additional cost to the OWNER.
   2. The meters shall be centered in the boxes, vaults to allow for reading and ease of removal or maintenance. No boring or taps shall be made for meter installation unless the OWNER has previously designated the exact location for the meter.

1.25 PIPELINE CONSTRUCTION ON PRIVATE PROPERTY EASEMENTS

A. The OWNER has secured necessary easements on private property. The CONTRACTOR shall limit construction operation to a strip 15 feet in width (except as noted), and in the event the CONTRACTOR should damage any property outside the limits of said easements and rights-of-way provided, the CONTRACTOR shall assume all responsibility and pay any damages that may occur at no extra cost to the OWNER. Easements on private property that is used for farmland, the CONTRACTOR shall remove adequate topsoil (not required if the remainder of ditch excavation is essentially the same as topsoil) and place in a windrow so that upon laying and backfilling of pipeline, the work area can be again covered with top soil.

B. Existing fences shall not be cut or otherwise disturbed where practical. Should the CONTRACTOR find it necessary to take loose any fences, corner post bracing shall have been set per Plans to avoid slack in the remainder of the fence. The fence shall be restored to the same or better condition that it was prior to the time it was loosened, at no extra cost to the OWNER. Posts used for fence bracing shall be steel.
C. No extra payment will be made for gravel or asphalt repair.

1.26 CONSTRUCTION ON COUNTY OR CITY RIGHT-OF-WAY

A. The OWNER has received authorization from the County authorizing pipeline construction in County road right-of-way in the locations indicated on the Plans. It shall be the CONTRACTOR'S entire responsibility to notify the appropriate Precinct Commissioner 48 hours prior to any construction work on County right-of-way, and conduct construction operations in full cooperation with Precinct Commissioner.
B. Where necessary to cross a county road or install pipeline within the County road riding surface, all ditch backfilling shall be as noted or required per County Precinct Commissioner, base material replaced as directed by the Precinct Commissioner, and the road left in a condition equal to that prior to crossing. In areas where pavements exists or where new construction is being proposed, and the County Commissioner requires the crossing to be bored, the CONTRACTOR shall bore and encase the pipeline in the same manner required by the Texas Highway Department for highway crossings and payment will be made at the unit price bid for Bore and Encasement as set out in the Bid Schedule. All paved county roads shall be bored. No paved county road shall be open cut unless written approval is obtained from the appropriate Precinct Commissioner.
C. All County road crossings or paralleling in County right-of-way shall have right-of-way markers installed at the entrance and exit points and a detectable metal tape shall be installed in the pipeline ditch while in the County right-of-way.
D. **No extra payment shall be made for special backfill in county roads and no extra payment shall be made for any gravel or asphalt repair. All paved driveways and approaches shall be slick bored for no extra pay as noted on the Plans.**

1.27 WATER LINE PARALLELING OR CROSSING SEWER LINES

A. The Contractor shall fully comply with all Texas Commission on Environmental Quality regulations pertaining to separation distances as described in Table I of this section. No additional payment shall be made for separation distance compliance, but this work shall be considered subsidiary to the overall project.
B. Location of waterlines. The following rules apply to installations of waterlines, wastewater mains or laterals, and other conveyances/appurtenances identified as potential sources of contamination. Furthermore, all ratings specified shall be defined by ASTM or AWWA standards unless stated otherwise. New mains, service lines, or laterals are those that are installed where no main, service line, or lateral previously existed, or where existing mains, service lines, or laterals are replaced with pipes of different size or material.
    1. When new potable water distribution lines are constructed, they shall be installed no closer than nine feet in all directions to wastewater collection facilities. All separation distances shall be measured from the outside surface of each of the respective pieces.
    2. Potable water distribution lines and wastewater mains or laterals that form parallel utility lines shall be installed in separate trenches.
    3. No physical connection shall be made between a drinking water supply and a sewer line. Any appurtenance shall be designed and constructed so as to prevent any possibility of sewage entering the drinking water system.

4. Where the nine-foot separation distance cannot be achieved, the following criteria shall apply.

C. New waterline installation - parallel lines.
   1. Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater main or lateral and the licensed professional engineer licensed in the State of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.
   2. Where a new potable waterline parallels an existing pressure rated wastewater main or lateral and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater main or lateral shall be replaced with at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater main or lateral.
   3. Where a new potable waterline parallels a new wastewater main, the wastewater main or lateral shall be constructed of at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the wastewater main or lateral.

D. New waterline installation - crossing lines.
   1. Where a new potable waterline crosses above a wastewater main or lateral, the segment of the waterline pipe shall be centered over and must be perpendicular to the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. When crossing an existing wastewater main or lateral and it is disturbed or shows signs of leaking, the wastewater main or lateral shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure-rated pipe embedded in cement stabilized sand (see clause (v) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
      a. The potable waterline shall be at least two feet above an existing, non-pressure rated wastewater main or lateral.
      b. The potable waterline shall be at least six inches above an existing, pressure-rated wastewater main or lateral.
   2. Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral, the segment of the waterline pipe shall be centered over and shall be perpendicular to the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (v) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end. The materials and method of installation shall conform to one of the following options:
      a. Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater main or lateral shall be located below the waterline.
      b. All sections of wastewater main or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The encasing pipe shall

be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater main or lateral. The space around the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled to the discrepancies with washed sand. Each end of the casing shall be sealed with watertight non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.

3. When a new waterline crosses under a wastewater main or lateral, the waterline shall be encased as described for wastewater mains or laterals in clause (ii) of this subparagraph or constructed of ductile iron or steel pipe with mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. When a new waterline crosses under a wastewater main, the procedures in §217.53(d) of this title (relating to Pipe Design) must be followed.
4. Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over and shall be perpendicular to the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the center line of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pressure rating of at least 150 psi. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (v) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
5. Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater mains during future construction.

E. Waterline and wastewater main or lateral manhole or cleanout separation. The separation distance from a potable waterline to a wastewater main or lateral manhole or cleanout shall be a minimum of nine feet. Where the nine-foot separation distance cannot be achieved, the potable waterline shall be encased in a joint of at least 150 psi pressure class pipe at least 18 feet long and two nominal sizes larger than the new conveyance. The space around the carrier pipe shall be supported at five-foot intervals with spacers or be filled to the springline with washed sand. The encasement pipe shall be centered on the crossing and both ends sealed with cement grout or manufactured sealant.

F. Location of fire hydrants. Fire hydrants shall not be installed within nine feet vertically or horizontally of any wastewater main, wastewater lateral, or wastewater service line regardless of construction.

G. Location of potable or raw water supply or suction lines. Suction mains to pumping equipment shall not cross wastewater mains, wastewater laterals, or wastewater service lines. Raw water supply lines shall not be installed within five feet of any tile or concrete wastewater main, wastewater lateral, or wastewater service line.

H. Proximity of septic tank drainfields. Waterlines shall not be installed closer than ten feet to septic tank drainfields.

1.28 TRENCH SETTLEMENT

A. The CONTRACTOR shall be responsible for all settlement of backfill, fills, and embankments which may occur within one (1) year after final completion of the contract under which the work was performed.

B. The CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement, within thirty (30) days after notice from the ENGINEER or OWNER.

1.29 RESTORATION OF SURFACES

A. The CONTRACTOR shall replace all surface material (including topsoil in original thickness), and shall restore gravel drives and roadways, fencing, sod and other surfaces disturbed, to a condition equal to that before the work began, furnishing all labor and material incidental thereto.

1.30 SURPLUS EARTH

A. Surplus excavated materials from all trenching, manholes, and structures shall be disposed of by the CONTRACTOR, at no cost to OWNER, as approved by the OWNER and ENGINEER .

1.31 CONCRETE BLOCKING

A. All bends, tees, etc., 2" and larger shall be blocked with concrete per the Plans and Specifications with a minimum soil bearing surface of 1.0 square foot per inch diameter of pipe. The use of rocks, masonry blocks, etc. is not acceptable. Only "Sacrete" which has been thoroughly mixed or Class B concrete shall be used for blocking. No blocking shall be covered up until it has been inspected and approved by the OWNER and/or ENGINEER. If covered prior to inspection, the CONTRACTOR shall uncover the blocking for inspection at his expense.

1.32 FENCES AND SIGNS

A. When necessary for the CONTRACTOR to take down signs, fences or other obstructions, this shall be done at his own expense and replaced in the original condition after construction operations. Fences which are taken loose by the Contactor shall be done in a manner to prevent slacking of the remainder of the wire. The CONTRACTOR, prior to taking down any fence shall have complete approval of the Project Representative as to the width of the fence gap to be made and the manner in which existing posts are to be placed. **No fences shall be cut without authorization in writing from OWNER or ENGINEER.**

1.33 BARRICADES, WARNING SIGNS AND PUBLIC CONVENIENCE

A. The convenience of access of the adjoining property OWNERS on the streets herein scheduled for improvements is of prime importance in the construction operations. In certain locations it may be necessary that property OWNERS use a portion of the roadway being improved to access their property. In such cases, the CONTRACTOR shall schedule his operations to provide such access to the property OWNERS in a safe and convenient manner. The CONTRACTOR shall provide courteous, English speaking and well informed flagmen for directing traffic. Flagmen shall wear a bright red coat and shall use a bright red flag to signal traffic.

B. At each section of street and each cross street intersecting the section of street under construction, the CONTRACTOR shall provide barricades and other warning signs as necessary. Detour signs shall be placed at all intersections where traffic is diverted from the section under construction and at other intersections of the detour to provide complete directions for detouring traffic around the section under construction. CONTRACTOR shall also provide any necessary special signs to signify any hazards or conditions. All barricades, detour

and warning signs that remain in place at night shall be fully lighted by approved methods from sunset to sunrise. All signs shall be kept in a good state of repair and be plainly legible at all times. Upon completion of the project, all signs and evidence thereof shall be completely removed from the site of the work by the CONTRACTOR.

1.34 CLEARING AND CLEAN UP

A. All necessary clearing shall be done by the CONTRACTOR, at no cost to OWNER, as approved by the OWNER and ENGINEER . All tree branches, limbs and roots shall be removed and disposed of by the CONTRACTOR in order that the right-of-way may be left in a neat and presentable condition. Any damage resulting to trees, grass and shrubbery must be paid for, by the CONTRACTOR, and damage claims, if any, settled by the CONTRACTOR.

B. Prior to final acceptance of the project, the CONTRACTOR shall clean and smooth up the site of the work and remove all rock, debris, material, etc., leaving the project site with a neat appearance to the satisfaction of the OWNER. Disposed of debris, rubbish, etc. shall be made in an area which shall meet the approval of the OWNER and ENGINEER. The CONTRACTOR shall comply fully with all applicable EPA and TCEQ regulations.

1.35 FEDERAL AND/OR STATE AGENCY'S APPROVAL AND INSPECTION

A. The written approval of the appropriate state agency having jurisdiction over the facility must be secured prior to payment of the final percentage retained under this contract.

B. The project site and premises as well as any records required shall be available at all reasonable times for inspection by authorized representatives of the State or Federal Agencies having jurisdiction over the project. The CONTRACTOR shall provide all necessary facilities for these inspections.

1.36 "RECORD DRAWING" INFORMATION

A. The CONTRACTOR shall be responsible for recording and providing all information concerning changes from the original plans as to valve, meter, and/or pipeline location for transfer to the "As-Built" or "Record Drawings" Plans. Final payment will not be released until "Record Drawings" are approved by the ENGINEER.

1.37 AFFIDAVIT OF BILLS PAID

A. Prior to final acceptance of the project by the OWNER, the CONTRACTOR shall execute a Release by Claimants and an affidavit which states all bills for labor, materials and incidentals incurred in the construction of the project have been paid in full and that there are no claims pending of which he has been notified.

1.38 LIQUIDATED DAMAGES

A. It is understood and agreed between the parties hereto that time is of the essence under this Contract, and that for each calendar day of delay beyond the stipulated number of calendar days awarded under this Contract, the CONTRACTOR shall pay the OWNER as liquidated damages per the amount specified in the Contract Documents. It is also understood between the parties hereto that such sum shall be treated as liquidated damages and not as a penalty, and the OWNER may withhold from the CONTRACTOR'S final payment such sum as liquidated damages.

1.39 WARRANTY

A. The CONTRACTOR shall guarantee the work performed under this contract against defective materials and workmanship of a period of (1) year year from the date of final acceptance of the work by the OWNER. The CONTRACTOR shall arrange to have his Performance Bond remain

in effect for a period of (1) year year after the date of completion of construction work to cover his guarantee as stipulated under this item and in the General Conditions.

B. If defective materials and/or workmanship are discovered which require repairs made under this guarantee, all such repairs shall be done by the CONTRACTOR at his own expense within ten days after written notice of such defect. Should the CONTRACTOR fail to repair or correct such deficiency within ten days after notification, the OWNER may make the necessary repairs and charge the CONTRACTOR with the applicable costs of all labor and materials required to correct the deficiency.

PART 2 NOT USED

PART 3 NOT USED

-- END OF SECTION --

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SECTION 01 03 01 - MEASUREMENT AND PAYMENT

PART 1 PAYMENT ITEMS

1.1 LUMP SUM PAYMENT ITEMS

A. Payment items for the work of this contract for which contract lump sum payments will be made are listed in the BIDDING SCHEDULE and described below. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved. The lump sum price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for which separate payment is not otherwise provided.

1.2 MOBILIZATION, BONDS, AND INSURANCE

A. PAYMENT
Mobilization, Bonds & Insurance shall be measured and paid for according to the lump sum in the proposal. Payment shall constitute full reimbursement for mobilization of personnel, equipment, and supplies to the project site in preparation for beginning work on contract items to be performed by the CONTRACTOR. Payment shall include, but is not limited to, movement of equipment, personnel, materials, supplies, bonding, insurance fees, application and permit fees (if necessary), and establishment of CONTRACTOR's facilities prior to beginning work. Also included in this item are any de-mobilization costs at project completion. The cost of required insurance and bonding shall also be included in this item. The cost of this item shall not exceed 10% of the total bid amount.

B. Unit of measure: LUMP SUM

1.3 UNIT PRICE PAYMENT ITEMS

A. Payment items for the work of this contract on which the contract unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, environmental protection, meeting safety requirements, tests and reports, and for performing all work required for each of the unit price items.

PART 2 NOT USED

PART 3 NOT USED

-- END OF SECTION --

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SECTION 01 04 01 - SUBMITTALS

PART 1 GENERAL

1.1 SUMMARY

The CONTRACTOR shall submit descriptive information to:

1. Allow the ENGINEER to advise the OWNER whether the materials and equipment proposed for the project are in general conformance with the design concepts and in conformance with the drawings and specifications.
2. Provide a record for the OWNER of the materials and equipment which have been incorporated into the project.
3. Provide a guide for operations and maintenance of equipment.
4. Provide information required for the administration of the Contract for construction of the project.
5. All submittals, shop drawing and other related documents include under this specification section shall be submitted electronically to the Engineer unless directed otherwise by the Engineer. The only exception being the Operation and Maintenance Manuals, which shall be submitted as directed under that item.

1.2 REFERENCE STANDARDS

PART 2 PROCEDURES

2.1 CONTRACTOR'S RESPONSIBILITIES

A. The CONTRACTOR shall be responsible for the accuracy and completeness of the information contained in each submittal and shall insure that the values, material, equipment, or method of work shall be as described in the submittal. All submittals must be stamped by the CONTRACTOR, indicating that they have been checked by the CONTRACTOR for compliance with the Contract Documents and approved by the CONTRACTOR, or contain certifications as required by the Contract Documents. Submittals that do not have the stamp applied or include the required certifications will be returned without processing to the CONTRACTOR.

B. The CONTRACTOR shall ensure that there is no conflict with other submittals and notify the ENGINEER of each case where the proposed change may affect the work of another CONTRACTOR or OWNER. The CONTRACTOR shall ensure coordination of submittals among the related crafts and Subcontractors. Submittals shall not be accepted from Subcontractors or suppliers.

2.2 MARKING OF SUBMITTALS

A. The CONTRACTOR shall assign a number to each submittal provided to the ENGINEER to allow each submittal to be tracked while processing through the review procedures.

B. Assignment of numbers shall be by means of a letter prefix, a sequence number, and letter suffix to indicate resubmittal's.

C. The sequence number shall be issued in chronological order for each submittal in a division. Resubmittal's shall be followed by a letter of the alphabet to indicate the number of times a submittal has been sent to the ENGINEER for processing, As an example, a submittal with the number SD-03-01 indicates that the submittal is the first in Division 3 submitted. Submittal number SD-11-04-AA indicates the submittal is the fourth shop drawing submitted in Division 11 and is being submitted for the second time. Operation and maintenance manuals submitted shall be identified with the same number as its corresponding equipment submittal. For example, OM-11-04 indicates that this is the operation and maintenance manual for the equipment submitted as SD-11-04.

D. Correct assignment of numbers is essential as different submittal types are processed in different ways. Some submittals received do not require that any response be given for the

material. CONTRACTOR and ENGINEER shall both maintain a log of submissions to allow the processing of CONTRACTOR's submittals to be monitored. Logs will be reviewed periodically to determine that all submittals are received and processed.

E. Submittals shall be marked to show clearly the applicable sections of the specification and sheet number of drawings.

F. Submittals shall be accompanied by a Submittal Transmittal Form to be provided by the CONTRACTOR. A separate form shall be used for each specific item, class of material, equipment, and items specified in separate discrete sections, etc. for which a submittal is required. Submittals for various items shall be made with a single form when the items taken together constitute a manufacturer's package or are so functionally related that they should be checked as a unit.

2.3 CONTRACTOR MODIFICATION REQUEST/PROPOSED CONTRACT MODIFICATION

A. Any change in the contract documents that is requested will be initiated by the CONTRACTOR issuing a Contractor's Modification Request or by ENGINEER issuing a Proposed Contract Modification. Proposals will be considered and if found acceptable will be incorporated in a Field Order in accordance with the General Conditions or Change Order in accordance with the General Conditions.

2.4 SHOP DRAWINGS

A. DEFINITION

1. As defined in the General Conditions, shop drawings consist of 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 CONTRACTOR to illustrate material or equipment for some portion of the Work.
2. Shop drawings shall indicate the kind, exact model, size, arrangement, and operation of component materials and devices; materials of construction, external connections, anchorages and supports required; performance characteristics; dimensions, weights, and other information required for installation and correlation with other materials and equipment.

B. SCHEDULE OF SUBMITTAL OF SHOP DRAWINGS

1. The CONTRACTOR shall submit, in accordance with the General Conditions, a schedule indicating the time and sequence in which Shop Drawings are to be submitted. This schedule shall consider the dates for incorporation of the materials or equipment into the project and take into consideration time for delivery and a reasonable time for review of shop drawings. Proposed order and delivery dates shall be incorporated in the Progress Schedule.
2. Shop drawings will generally be reviewed in the order in which they are received. Drawings marked "Priority" will be reviewed ahead of other shop drawing submittals not so marked which have already been received but are not yet being reviewed. CONTRACTOR shall be aware that checking of "Priority" shop drawings may delay the review of other drawings which have already been submitted by the CONTRACTOR and the use of this designation is to be used with discretion.

C. CONTRACTOR'S REVIEW AND CERTIFICATION

The CONTRACTOR shall verify that the material and equipment in each shop drawing conforms to the requirements of the Contract Documents. Shop drawings shall be in strict compliance with the Contract Documents and shall bear an executed statement to that effect by the CONTRACTOR. Shop Drawings without this stamp applied will be returned without review.

D. DEVIATIONS FROM CONTRACT DOCUMENTS

Requests for deviation from the Contract Documents shall be by Contractor's Modification Request as outlined in Paragraph 2.03 of this section of the specifications. The CONTRACTOR'S Modification Request shall fully identify and describe the deviations and state the reason the change is requested. Any savings in cost related to the substitution is to be stated in the request for consideration.

E. REQUIREMENT FOR COMPLETE SHOP DRAWINGS
   1. Material in shop drawings shall be in sufficient detail to demonstrate compliance with all requirements of the Contract Documents. Shop drawings shall address material and/or methods of construction, design criteria, performance characteristics, and special provisions of the Specifications.
   2. Shop drawings for systems and related equipment shall include information for all components required for a complete and operational system, including electrical, mechanical, and any other information required to indicate how the various components of the system function, and shall be included in the same submittal.
   3. Where statements of certification, written guarantees, extended service agreements or extended warranties as defined in Paragraph J are required, they will be provided with the shop drawing. The effective date of the guarantee and service agreements, however, shall not be until the date of acceptance for the project.
   4. Shop drawings shall be clearly marked to show the applicable sections of the specifications and sheet in the drawings. Other identification may also be required on drawings such as layout drawings or schedules to allow the reviewer to determine where a particular item is to be used in the project.
   5. One (1) electronic copy of each shop drawing shall be submitted to the ENGINEER and OWNER.
   6. Shop drawings which do not have all of the information required for evaluation will be returned without benefit of review and comment.

F. CHECKING AND REVIEW OF SHOP DRAWINGS
   1. The ENGINEER will review the data for general conformity to the Contract Documents. Comments will be made on items called to the attention of the ENGINEER for review and verification. Markings will be based on this examination and do not constitute a blanket review of the shop drawing. The ENGINEER's review does not relieve the CONTRACTOR from any responsibility for errors or deviations from the Contract requirements. Shop drawings which contain substantial error or omissions, or which are not clearly legible, will be returned without benefit of review.
   2. Shop drawings will be marked in one of the three following ways:
      a. Approved: Shop drawings are acceptable without correction and may be distributed for construction and/or manufacture.
      b. Approved as Noted: Shop drawings are acceptable with minor corrections as marked and may be used with the corrections noted.
      c. Rejected: Material or equipment described is not acceptable.

G. APPROVAL OF EQUAL SUBSTITUTIONS

Where Contract Documents allow substitution of material or equipment as an approved equal to the specified product, shop drawings shall be provided. Shop drawings shall include supporting data to indicate specifically, on a point-by-point basis for each feature of the design, how the proposed product is equal to or better than the specified product. Deviations from the Contract Documents must be requested and approved as described in Paragraph D.

H. SHOP DRAWINGS REQUIRED

Shop drawings are required for only those items of equipment or materials where submittals are listed in the individual specification section and for the determination of substitutions for approval as described in Paragraph G of this section. Only these shop drawings will be reviewed. Shop drawings which are not required may be returned with the notation "NOT REQUIRED BY THIS CONTRACT."

I. OWNER SELECTED OPTIONS
Where selections are to be made by the OWNER for color, texture or finish and shop drawings are required for that product, shop drawings will be submitted for approval of the materials of construction, composition, etc., prior to the selection of finishes by the OWNER. Items requiring selection of finish for which shop drawings are not required shall be furnished as record data. Selection of finish for materials shall be determined as described in Paragraph 2.13.

J. CERTIFICATIONS, WARRANTIES AND OTHER REQUIREMENTS
Where indicated in the Contract Documents the following items as defined below are to be provided as part of the shop drawing:

1. Certified Test Report - A report prepared by an approved testing agency on the results of tests performed on materials to indicate their compliance with the specifications. Reports are to be numbered consecutively for reference. Retest required to verify compliance with Contract Documents shall be identified with the same number as the original test with a letter to indicate retest, similar to the numbering system used for Shop Drawings.
2. Certification of Local Field Service - A certified letter stating that field service is available from a factory or supplier approved service organization located within a 300-mile radius of the project site.
3. Extended Warranty - A guarantee of performance for the product or system beyond the one-year warranty described in the General Conditions. The Warranty Certificate is to be issued in the name of the OWNER.
4. Extended Service Agreement - A contract to provide operations and maintenance for equipment as specified beyond that required to fulfill requirements for warranty repairs; or to perform routine maintenance at some period beyond the warranty period. The Service Agreement is to be issued in the name of the OWNER.
5. Certification of Adequacy of Design - A certified letter from the manufacturer of the equipment stating that they have designed the equipment offered to account for structural stability to withstand all imposed loads without deformation, failure or adversely affecting the operational requirements of the unit; and operational capability, including mechanical and electrical equipment sizing to be fully operational in accordance with the conditions specified.
6. Certification of Applicator/Subcontractor Qualifications - A certified letter stating that the applicator/subcontractor proposed to perform a specified item of work is duly designated as factory-authorized and trained for the application or installation of the specified product.

2.5 RECORD DATA

A. Record data shall be submitted to provide information as to the general character, style and manufacturer of the equipment to allow the OWNER to adequately identify the materials or equipment incorporated into the project. Record data shall be provided for all equipment and materials of construction. Record data are not required for items for which Shop Drawings and/or operations and maintenance manuals are required.

B. Record data shall be complete to indicate where the material was incorporated into the project, provide schedules of materials and their use, colors, model numbers and other information which would allow this material to be replaced at some future date. Record data will be received by the ENGINEER and logged for transmittal to the OWNER. Record data will not be reviewed for comment and no response will be made to the CONTRACTOR.

2.6 OPERATIONS AND MAINTENANCE MANUALS

A. For each type of equipment to be furnished and installed under this contract, the CONTRACTOR shall prepare an operation and maintenance manual covering:

1. Name, address, and telephone number of nearest competent service organization who can supply parts and service.

2. Equipment function, normal operating characteristics, and limiting conditions, which reflect "as-built" conditions for the equipment furnished.
3. Assembly, installation, alignment, adjustment, and checking instructions, including field modifications made during installation, startup and testing.
4. Operating instructions for startup, routine and normal operation, regulation and control, shutdown, and emergency conditions.
5. Lubrication and maintenance instructions, with lists of acceptable lubricants.
6. Guide to "Troubleshooting".
7. Parts lists, predicted life of parts subject to wear, list of recommended spare parts, and list of maintenance tools furnished with equipment.
8. Outline, cross-section, and assembly drawings; engineering data; control schematics and point-to-point wiring diagrams, and reproductions of all equipment nameplates.
9. A copy of the shop drawing submittal information, description of the equipment, specifications, test data, and performance curves, where applicable.
10. Specified warranties and service agreements.
11. A listing of the manufacturer's identification, including order number, model, and serial number and reproduction of equipment nameplate.

B. The above information, as applicable, shall be provided for the equipment as indicated in individual specification sections.

C. The operation and maintenance manuals shall be in addition to any instructions or parts lists packed with or attached to the equipment when delivered.

D. Manuals shall be furnished in Adobe PDF Format and printed on heavy, first quality paper, 8-1/2x 11-inch size with standard 3-hole punching. Drawings and diagrams shall be reduced to 8-1/2x 11 inches. Where reduction is not practicable, larger drawings shall be folded separately, and placed in envelopes which are bound into the manual. Each envelope shall bear suitable identification on the outside. Indicate applicable specification number and location within plant that equipment will be installed on cover of each manual. Provide "Table of Contents" and "Index Tabs" for each manual.

E. Two preliminary copies of each manual, temporarily bound in heavy paper covers bearing suitable identification, shall be submitted to the ENGINEER at the time of submittal of the shop drawings. CONTRACTOR shall organize all equipment O&Ms, and submit draft covers of all manuals required, in order of process treatment. All volumes shall be numbered sequentially. After review by the ENGINEER, CONTRACTOR shall prepare three (3) hard copies and two (2) electronic copies (on CD) of each operation and maintenance manual and deliver to the ENGINEER not later than 90 days prior to placing the equipment into operation.

2.7 PROJECT INFORMATION REQUEST

A. When it is necessary for the CONTRACTOR to request additional information, interpretation of the Contract Documents, or when the CONTRACTOR believes there is a conflict between the drawings and specifications, he shall identify the conflict and request clarification using the Project Information Request form. Use of this form will allow requests for information to be routed to OWNER, design engineers, design consultants or others through the ENGINEER and allow these requests to be monitored to determine that clarification is provided when needed. Sufficient information shall be attached to permit a written response without further information.

B. The ENGINEER will log each request and will review the request to determine that the information provided is adequate. If information is not adequate, the request will be returned for additional information. When adequate information is provided, the request will be reviewed and a response made. If a change is required, the ENGINEER will initiate a Proposed Contract Modification. If no change is required, the ENGINEER will provide additional information required to help the CONTRACTOR comply with the Contract Documents.

2.8 SCHEDULE OF VALUES AND PAYMENT ESTIMATES

A. For contracts based on lump sum amounts, the CONTRACTOR is to submit to the ENGINEER for approval, a breakdown of cost for the Project. The breakdown is to provide adequate detail to allow easy determination of the percentage of completion for periodic payment review by the ENGINEER. Specification sections and add or deduct items in the proposal are to be used as a guide for preparing the breakdown. This breakdown is to be incorporated onto a form for the submission of payment request provided by the ENGINEER or in a form approved by the ENGINEER.

B. The CONTRACTOR is to submit a schedule showing the anticipated schedule of payments for the CONTRACTOR to assist the OWNER in determining when funds are to be made available for payment of periodic payment requests.

2.9 PROGRESS SCHEDULES

A. As required in the General Conditions, within 10 days prior to the submission of the first periodical estimate for partial payment, the CONTRACTOR shall prepare and submit to the ENGINEER an electronic copy of the schedule in which the CONTRACTOR proposes to carry on the work. The schedule is to include the date on which work will be started on each major activity, including procurement of materials and equipment, and the anticipated date for the completion of each activity. The CONTRACTOR shall be responsible for developing the construction schedule and monitoring progress. The CONTRACTOR shall consider and include the schedules of all subcontractors, material and equipment suppliers to ensure that all necessary information is incorporated into the construction schedule.

1. Give early warning of delays in time for correction.
2. Require that detailed plans for the execution of the work be prepared in the form of future activities and events in sequential relationships.
3. Establish interrelationships of significant planned work activities and provide a logical sequence of interdependence of planned work activities.
4. Provide continuous current status information.
5. Allow analysis of the CONTRACTOR's program for the completion of the Project.
6. Permit preparation of new schedules when an existing schedule is not achievable.
7. Log the progress of the work as it actually occurs.

2.10 SUPPLIERS AND SUBCONTRACTORS

The Contractor is to provide a written list of subcontractors and suppliers prior to the preconstruction conference described in the General Conditions.

2.11 EQUIPMENT INSTALLATION REPORT

A. A written report shall be submitted by the equipment supplier performing the installation check for all major equipment. This report shall certify that 1) The equipment has been properly installed and lubricated, 2) is in accurate alignment, 3) is free from any undue stress imposed by connecting piping, equipment, or anchor bolts, and 4) has been operated under full load conditions and that it is operating satisfactorily.

2.12 NOTIFICATION BY CONTRACTOR

Written notification of the need for testing, observation work by ENGINEER, intent to work outside of regular working hours, or the request to shut down the facilities or make utility connections shall be given to the ENGINEER by issuance of a Notification By Contract or on a form provided by the ENGINEER.

2.13 SELECTION OF FINISH BY OWNER

Items that require that the OWNER select the finish, color, texture, fabric or make other choices related to the appearance of some material or equipment to be provided are to be determined

as soon as possible to allow OWNER adequate time to consider available options for selection. Color chips, samples, etc., for all items are to be assembled and submitted to the OWNER through the ENGINEER for selection of finishes at the same time to allow all options to be considered and allow selections to be coordinated with other items of finish. The ENGINEER will meet with the OWNER who will determine the finish to be used within 2 weeks, unless additional samples are required for selection. Materials for which shop drawings are required are to be submitted for approval of material quality prior to selection of finish. CONTRACTOR's bid shall include costs to match existing colors and furnish non-standard colors at OWNER's selection.

PART 3 NOT USED

-- END OF SECTION --

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SECTION 01 08 01 - GENERAL DEMOLITION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

29 CFR 1910 - Occupational Safety and Health Standards; current edition.

1.2 DEFINITIONS

A. Abandoned: Refers to items that are no longer in use and are to be taken out of service and left in place.
B. Removed: Refers to items that are to be disconnected and removed from project site.
C. Salvaged: Refers to items which are disconnected, taken out of service and turned over to OWNER.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Provide all materials necessary for work.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify field measurements and layouts as shown on drawings, or as existing.
B. Verify that abandoned piping, wiring, equipment, etc. serve only abandoned facilities.
C. Demolition drawings are based on field observations and existing record documents. Report discrepancies to OWNER's Representative before disturbing existing installation. Drawings are for CONTRACTOR's convenience, and accuracy or exactness is not guaranteed.
D. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

A. Coordinate utility service outages with utility company, OWNER's representative, and OWNER's Representative ten (10) days prior to outage.
B. Provide temporary piping, wiring, equipment, etc. as required to maintain existing system in service during construction. When CONTRACTOR elects to perform work on energized equipment or circuits, use personnel experienced in such operations.

3.3 DEMOLITION AND EXTENSION OF EXISTING ITEMS

A. All equipment shown on the Plans to be demolished shall be completely removed along with all associated devices.
B. The CONTRACTOR shall relocate all existing piping, circuitry (conduit and wiring), etc., which impedes the installation of new materials and equipment, unless otherwise specified and/or shown on the Plans.
C. Repair adjacent construction and finishes damaged during demolition and extension work.
D. Maintain access to existing installations which remain active. Modify installation or provide access as appropriate.
E. Remove with care all equipment to be relocated. Repair or replace damaged equipment as required.
F. Provide temporary barricades and other forms of protection as required for safety and security.
G. Provide barriers and appropriate signs meeting requirements of 29 CFR 1910 for size and color where necessary to restrict pedestrians from wandering into construction areas.
H. Completely backfill below-grade areas and voids resulting from demolition work, all backfill must be compacted and stabilized to earthwork specifications. Unless otherwise specified and /or shown on the Plans.

I. Use water as necessary to lay dust when chipping, coring, or sawing concrete, masonry, or similar materials.
J. Demolish and remove existing construction only to extent required, as indicated on the Plans.
K. CONTRACTOR is responsible for disposal of all materials generated as a result of demolition.

-- END OF SECTION --

SECTION 02 01 01 - SITE CLEARING

PART 1 GENERAL

1.1 WORK INCLUDED

All paving and surface debris shall be removed, and the work area shall be cleared of plant life and grass. Trees and shrubs not in conflict with the proposed structure shall not be removed, except as designated by the OWNER.

1.2 REGULATORY REQUIREMENTS

CONTRACTOR shall conform to all applicable codes for the disposal of debris. Clearing work shall be coordinated with the appropriate utility companies.

1.3 REFERENCE STANDARDS

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 PREPARATION

Verify that existing trees, plant life, and features designated to remain are tagged or identified. Provide written notification of intent to begin clearing operation. Document trees that are to be protected.

3.2 PROTECTION

CONTRACTOR shall protect existing trees, plant growth, fences and other features designated to remain during clearing procedures. All benchmarks and structures shall be protected from damage or displacement.

3.3 CLEARING

All areas required for access to the site and execution of the Work, except as indicated in paragraph 3.2, shall be cleared.

Trees and shrubs shall be removed within the limits of excavation required. Stumps, main root balls and the root system to a depth of twelve (12) inches below finished grade shall be removed. CONTRACTOR shall clear undergrowth and deadwood without disturbing the subsoil and shall apply herbicide to any remaining stumps to inhibit growth.

All debris, rocks larger than three inches, and extracted plant life shall be promptly removed from the site by CONTRACTOR, at no cost to OWNER, as approved by the OWNER and ENGINEER.

-- END OF SECTION --

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SECTION 03 01 01 - CONCRETE FORMWORK

PART 1 GENERAL

1.1 REFERENCES STANDARDS

ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
ACI 347R - Guide to Formwork for Concrete; 2014.
COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.
NIST PS 1 (2007) DOC Voluntary Product Standard PS 1-07, Structural Plywood

1.2 WORK INCLUDED

The work performed under this section of the Specifications shall consist of furnishing and installing formwork for cast-in-place concrete, with shoring, bracing, anchorage and all necessary accessories. Openings in the formwork for other work shall be provided. All stripping activities shall be included under this section.

1.3 RELATED WORK AND SPECIFICATIONS

A. Section 03 02 01 - Concrete Reinforcement.
B. Section 03 09 01 - General Concrete.

1.4 DESIGN REQUIREMENTS

CONTRACTOR shall be responsible for the design, engineering and construction of formwork, shoring and bracing to conform to design and code requirements; resultant concrete to conform to required shape, line and dimension. Design and construction of formwork shall take into account live loads, dead loads, weight of moving equipment operating on formwork, concrete mix, height of concrete drop, vibrator frequency, temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to the safety of personnel and structures. CONTRACTOR shall provide shores, struts, and trussed supports as necessary.

1.5 QUALITY ASSURANCE

Work shall be performed in accordance with the standards referenced in Part 1.01 of this specification.

1.6 REGULATORY REQUIREMENTS

Conform to applicable codes for design, fabrication, erection and removal of formwork.

1.7 COORDINATION

Coordinate this section with other sections of the Work which require attachment of components to formwork. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, replace formwork or reset reinforcing to provide minimum specified concrete cover.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

Form Materials: At the discretion of the CONTRACTOR.

2.2 PREFABRICATED FORMS

A. Preformed Steel Forms: Minimum 16-gage (1.5 mm) matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
C. Pan Type: Steel glass fiber of sizes and profile required.
D. Tubular Column Type: Round, spirally wound laminated fiber, wood or glass fiber material, surface treated with release agent, non-reusable, of sizes and profile required.
E. Void Forms: Voids formed under beams and slabs where indicated on the Plans or general notes may be formed through the use of 8-inch thick corrugated fiberboard boxes as manufactured by Voidco, Savway Carton Forms, Jay Void Carton or approved equivalent. Void forms shall be moisture resistant, biodegradable and structurally sufficient to support the weight of wet concrete mix until initial set. For slab, form boxes shall be covered with sheathing of the same material and shall be taped at the joints.

2.3 FORMWORK ACCESSORIES

A. Form Ties:
   1. Metal form ties of the removable or snap-off type, steel, fixed or adjustable length cone type with waterproof washer (for water bearing structures or basements) shall be used to hold forms in place. Such ties shall have provision to permit ease of removal of the metal as hereinafter specified. The use of wire form ties will not be permitted. All metal appliances used inside of the forms to hold them in correct alignment shall be removed to a depth of at least 1/2-inch from the surface of the concrete and shall be so constructed that metal may be removed without undue injury to the surface from chipping or spalling. Such devices, when removed, shall leave a smooth opening in the concrete surface not larger than 7/8-inch in diameter. Burning off of rods, bolts, or ties will not be permitted. Metal ties shall be held in place by devices attached to walls. Each device shall be capable of developing the strength of the tie. Metal and wooden spreaders which are separate from the forms shall be wired to the top of form and shall be entirely removed as the concrete is being placed. The use of metal form ties of a type that are encased in paper or other material to allow the removal of complete tie, leaving a hole through the concrete structure, will not be permitted in the construction of basement or water bearing walls.
      After the tie rods are broken back or removed, the holes shall be thoroughly cleaned to remove all grease and loose particles; then the mortar (non-shrink cement-sand mortar, as dry as practicable) shall be carefully placed into the holes in small quantities. After the holes are completely filled, all excess mortar shall be struck off flush and the surface finished in such a manner as to render the filled hole as inconspicuous as possible, If these patches appear to be darker than the other surface of the concrete, white cement shall be used in the mortar as required.
   2. "Supertie" fiberglass form tie system as manufactured by RJD Industries, Inc., 26945 Cabot Road, Suite 107, Leguna Hill, California, 800/344-4753. Provide spreader rod, ties, gripper and all necessary accessories and installation devices. Provide gray color rod. Install Supertie in accordance with supplier's instructions. After removal of forms, grind Supertie flush to wall.
B. Form Release Agent: Colorless mineral oil which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete.
C. Corners: Chamfered, rigid plastic or wood strip type; 3/4" x 3/4" size; maximum possible lengths. Accurately formed to produce uniformly straight lines and tight edge joints.
D. Nails, Spikes, Lag bolts, Through bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
E. Waterstops:
   1. Plastic water stop

a. Extruded from elastomeric plastic compound of which basic resin shall be prime virgin polyvinyl chloride (PVC). Compound shall not contain scrapped material, reclaimed material, or pigment.
b. Specific Gravity: Approximately 1.37.
c. Shore Durometer Type A Hardness: Approximately 80.
d. Performance Requirements:COE CRD-C 572 .
e. Type: Center bulb with parallel ribs or protrusions on each side of strip center.
f. Corrugated or tapered type water stops are not acceptable.
g. Thickness: Constant from bulb edge to outside stop edge.
h. Minimum Weight per Foot of Water Stop:
    1) 1.60 pounds for 3/8 inch by 6-inch.
    2) 2.30 pounds for 3/8-inch by 9-inch.
i. Factory Fabrications: Use only factory fabrications for intersections,transitions, and changes of direction.
j. Manufacturers and Products:
    1) Vinylex Corp., Knoxville, TN; Catalog No.032504/VIN: No. RB6-38H (6 inches by 3/8 inch) and No. RB9-38H (9 inches by 3/8-inch).
    2) Greenstreak Plastic Products, St. Louis, MO; Catalog No.03150/GRD: Style 732 (6 inches by 3/8-inch) and Style 735 (9 inches by 3/8 inch).

2. Hydrophilic water stop
a. For use at construction joints only, where new concrete is placed against existing concrete and as shown on Drawings.
b. Material shall be a nonbentonite hydrophilic rubber compound.
c. Manufacturers and Products:
    1) Greenstreak Plastic Products, St. Louis, MO; Hydrotite CJ-1020-2K with Leakmaster LV-1 adhesive and sealant.
    2) Adeka Ultra Seal, JLM Associates, Spearfish, SD; MC-2010M with 3M-2141 adhesive and P-201 sealant.

PART 3 EXECUTION

3.1 EXAMINATION

Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Plans.

3.2 EARTH FORMS

Earth forms shall not be used without specific, written approval from ENGINEER. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with the requirements of ACI 301.
B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
D. Align joints and make watertight. Keep form joints to a minimum.
E. Obtain approval from ENGINEER before framing openings in structural members which are not indicated on Plans.
F. Provide chamfer strips on external corners of beams, joists, columns, elevated slabs and walls.
G. Void forms shall be installed in accordance with the manufacturer's recommendations and in such a manner so as to provide tight joints. Void forms shall be anchored to prevent displacement or flotation during concrete placement. Forms shall be protected from moisture or crushing prior to placement. Damaged forms shall be replaced prior to concrete placement.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS AND EMBEDDED PARTS

Provide form openings where required for items to be embedded in or passing through concrete work. Locate and set in place items which will be cast directly into concrete.

3.6 FORM CLEANING

A. Clean and remove foreign matter within forms as erection proceeds.
B. Clean formed cavities of debris prior to placing concrete.
C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts to clean out forms. Use compressed air or other means to remove foreign matter.

3.7 FORMWORK TOLERANCES

Construct formwork so as to maintain tolerances required by ACI 347R, Chapter 3.3, except as otherwise noted.

3.8 FIELD QUALITY CONTROL

Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure. Do not reuse split, frayed, delaminated or otherwise damaged formwork.

3.9 FORM REMOVAL

A. The time for removal of forms shall comply with ACI 318. If curing temperatures are below 50 Degrees F (15 Degrees C), the time for removal shall be increased by fifty percent (50%). In no case shall forms or bracing be removed until concrete has gained sufficient strength to carry its own weight and imposed loads.
B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

-- END OF SECTION --

SECTION 03 02 01 - CONCRETE REINFORCEMENT

PART 1 GENERAL

1.1 REFERENCES STANDARDS

ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
ACI SP-66 - ACI Detailing Manual; 2004.
ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2016.
ASTM A722/A722M - Standard Specification for High-Strength Steel Bars for Prestressed Concrete; 2015.
ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; 2011.
CRSI 10MSP - Manual of Standard Practice; (2009; 28TH Ed)
CRSI 63 - Recommended Practice for Placing Reinforcing Bars
CRSI 65 - Recommended Practice for Placing Bar Supports, Specifications and Nomenclature

1.2 WORK INCLUDED

The work included in this Section of the Specifications shall consist of furnishing and installing reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

1.3 RELATED WORK AND SPECIFICATIONS

A. Section 03 09 01 - General Concrete.
B. Section 03 01 01 - Concrete Formwork.

1.4 SUBMITTALS

A. Submittals shall meet the requirements of Section 01 04 01, CONTRACTOR's Submittals.
B. Record Data: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel, bending and cutting schedules, supporting and spacing devices, and joint and splice locations.
C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
D. Comply with ACI SP-66.
E. Manufacture's specifications and installation instructions for all proprietary products, including sleeves for welded splices.
F. Shop Drawings are required. Provide to scale drawing showing the fabrication and placement requirements for all reinforcing. Include all details required to clearly show placement of bars. Shop Drawings to be sealed by a Texas Licensed P.E.

1.5 QUALITY ASSURANCE

Perform work in accordance with referenced standards. Submit certified copies of mill test report of reinforcement materials analysis.

1.6 COORDINATION

Coordinate work with other trades, placement of formwork, formed openings and other work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

A. Reinforcing Bars: New, deformed billet steel conforming to ASTM A615/A615M, Grade 60 for nonweldable bars and ASTM A706/A706M, Grade 60 for weldable bars.
B. Welded Wire Fabric: ASTM A1064/A1064M for smooth wire andASTM A722/A722M for deformed wire.
C. High Strength Reinforcing Bar (DYWIDAG Thread Bar) Meeting ASTM A722/A722M for Anchoring in Rocks.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16-gage annealed type.
B. Supports for Reinforcement: Conform to CRSI STANDARDS.
C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent settling or vapor barrier puncture.
D. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic coated steel or stainless steel type, size and shape as required.
E. Splices
    1. Mechanical Connections:
        a. Compression: Gateway Building Products "G-Loc" or approved equivalent.
        b. Tension: Lenton Anchor or approved equivalent. Connection device shall develop 125 percent of yield strength of bar.
    2. Welded Splices: "Cadweld," "Thermoweld" or approved equivalent. Size device to develop 125 percent of yield strength of bar.

2.3 FABRICATION

Fabricate concrete reinforcing in accordance with CRSI Manual of Practice. Locate reinforcing splices not indicated on Plans at point of minimum stress. Review location of splices with ENGINEER.

PART 3 EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement by means of accepted spacers, chairs or hangers. Do not deviate from required position.
B. Do not displace or damage vapor barrier.
C. Accommodate placement of formed openings.
D. Conform to ACI 318 code for concrete cover over reinforcement. Concrete surfaces in contact with liquids shall have 2-inch cover.
E. Clean reinforcement to remove loose rust, mill scale, oil, earth, ice, and other materials which might reduce or destroy bond with concrete.

3.2 FIELD QUALITY CONTROL

Concrete shall not be placed until reinforcing steel is inspected by OWNER'S Representative. All concrete placed in violation of this provision will be rejected. The CONTRACTOR shall give OWNER'S Representative a minimum of 24 hours notice after completion of reinforcement placement prior to placement of concrete.

-- END OF SECTION --

SECTION 03 05 01 - GROUT

PART 1 GENERAL

1.1 REFERENCE STANDARDS

ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
ASTM C191 - Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle; Current Edition.
ASTM C1018 - Standard Test Method for Flexural Toughness and First-Crack Strength of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading); Current Edition.
ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete; 2010a (Reapproved 2015).
COE CRD-C-588 - Corps of Engineers Specification for Nonshrink Grout; Current Edition.

1.2 RELATED WORK AND SPECIFICATIONS

A. Section 07 01 01 - Sealants and Caulking.

1.3 SCOPE

Provide grout as shown on the Plans and as specified herein:

A. Grout shall be placed at the following locations:
   1. Column and equipment bases.
   2. Handrails and railings.
   3. Topping in concrete tanks.
   4. Foundation grouting.
   5. Tunnel grouting.
   6. Equipment bases.
   7. Wherever so indicated on the Plans.
B. The types of grout used shall include the following:
   1. Non-shrink, epoxy type.
   2. Non-shrink, non-metallic type.
   3. Ordinary cement-sand.

1.4 QUALITY ASSURANCE

1.5 SUBMITTALS

In addition to all other appropriate requirements of Section 01 04 01, the CONTRACTOR shall submit the following:

A. Record Data:
   1. Submit copies of manufacturer's specifications and installation instructions for all proprietary materials.
B. Reports and Certifications:
   1. For proprietary materials, submit copies of reports on quality control tests.
   2. For nonproprietary materials, submit certification that materials meet specification requirements.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials: Grout materials from manufacturers shall be delivered in unopened containers and shall bear intact manufacturer's labels.
B. Storage of Materials: Grout materials shall be stored in a dry shelter and shall be protected from moisture.

PART 2 PRODUCTS

2.1 MATERIALS

A. Non-metallic, 100 percent solids, high strength epoxy grout.
   1. Use clean, well-graded sand with epoxy resins suitable for use on dry or damp surfaces.
   2. Product and Manufacturer:
      a. Euco High Strength Grout by The Euclid Chemical Company.
      b. Sikadur Hi-Mod Grout by Sike Chemical Company.
      c. Or, Approved Equal.

B. Non-Shrink, Non-Metallic Grout:
   1. Pre-mixed non-staining cementitious grout requiring only the addition of water at the jobsite.
   2. Product and Manufacturer:
      a. Euco N-S by the Euclid Chemical Company.
      b. Masterflow 713 by Master Builders Company.
      c. Or, Approved Equal.

C. Ordinary Cement-Sand Grout:
   1. Except where otherwise specified, use one part cement to three parts sand complying with the following:
      a. Cement: ASTM C150/C150M, Type II.
      b. Sand: ASTM C33/C33M.
   2. Where water repelling and shrinkage reducing requirements are shown or specified, use admixtures.
   3. Product and Manufacturer:
      a. Integral Waterpeller by the Euclid Chemical Company.
      b. Omicron, Type OM by Master Builders Company.
      c. Hydrocide Powder by Sonneborn-Contech.
      d. Or, Approved Equal.
   4. Grout to consist of cement and sand to produce a minimum 28-day strength of 4000 psi with maximum slump of 5 inches. Use 2-inch cube strength test to confirm the design mix strength. Use 2-inch cube strength test on job cured cubes.

D. Water:
   1. Use clean, fresh, potable water free from injurious amounts of oils, acids, alkalis or organic matter.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:
   1. Place grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Specifications, do not proceed until ENGINEER provides clarification.
   2. Drypacking will not be permitted.
   3. It shall be the CONTRACTOR'S responsibility to obtain the services of a qualified, full time employee of the manufacturer to aid in assuring proper use of the product under job conditions.
   4. Placing grout shall conform to temperature and weather limitations as stated in manufacturer's instructions.

B. Equipment Bases:
   1. After shimming equipment to proper grade, securely tighten anchor bolts.
   2. Properly form around the base plates, allowing sufficient room around the edges for placing the grout.
   3. Adequate depth between the bottom of the base plate and the top of concrete base must be provided to assure that the void is completely filled with nonmetallic epoxy grout.

C. Column Bases:
   1. After shimming columns to proper grade, securely tighten anchor bolts.
   2. Properly form around the base plates allowing sufficient room around the edges for placing the grout.
   3. Adequate depth between the bottom of the base plate and the top of concrete base must be provided to assure that the void is completely filled with nonshrink non-metallic grout.

D. Fiber Reinforced Concrete Topping
   1. Cement: Type II.
   2. Components: Screened graded sand, water, water reducer, fiber reinforcing, admixtures, and cement.
   3. Bonding Agent: Cement-water slurry mixture, nonsegregating, thick enough to broom into place just immediately prior to placement of topping to provide approximate 1/4-inch thickness.
   4. Aggregate Gradings: Combine aggregates for grout in proportions providing mixture within grading limits below:

Sieve Sizes	Percent Passing Sand for Grout
No. 4	9 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	10 - 30
No. 100	2 - 10
No. 200	

   5. Fiber Reinforcing:
      a. 100 percent virgin polypropylene fibrillated fibers manufactured for concrete reinforcing to provide greater control of cracking.
      b. ASTM C1116/C1116M, Type III.
      c. Fiber reinforced grout in accordance with ASTM C1018, toughness Index I5.
      d. Polypropylene Fibers:
         1) Specific Gravity: 0.91.
         2) Tensile Strength: 80 to 110 ksi.
         3) Fiber Length: Graded by manufacturer for aggregate size.
         4) Quantities: Minimum 1.5 pounds per cubic yard.
         5) Add fibers at time of batching and mixing grout.
         6) Manufacturer: Fibermesh Co., Chattanooga, TN.
   6. Fiber Reinforced Concrete Topping Mix Design:
      a. Design, select, proportion ingredients and test mix independent testing laboratory.
      b. Prepare trial mixes and cube tests for each design mix.
      c. Design Strength: 5,000 psi at 28 days (cube strength).
      d. Minimum Cement Content: 658 pounds per cubic yard, regardless of strength.
      e. Air Content: 4 to 6 percent.
      f. Use Water-reducing admixture.
      g. Slump as required to maintain homogeneous mix and to allow placement to meet equipment manufacturer's placing tolerance.
      h. Mix fiber-reinforced concrete topping in concrete plant.
      i. Mix fiber-reinforced concrete topping to consistency, easily screened, but not too thin that topping will not stand to required thickness.

-- END OF SECTION --

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SECTION 03 09 01 - GENERAL CONCRETE

PART 1 GENERAL

1.1 REFERENCE STANDARDS

AASHTO M85 - Standard Specification for Portland Cement; Current Edition.
ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
TxDot Item 423, (2004) Hydraulic Cement Concrete
THD Bulletin C-11, Construction Bulletin Procedures for the Design and Control of Portland Cement Concrete Mixtures

1.2 WORK INCLUDED

Concrete shall consist of Portland cement, aggregates, and water which shall conform to the requirements as hereinafter specified. All concrete placed under this contract shall be in conformity with this specification.

1.3 SUBMITTALS

A. Submit complete information for each concrete mix proposed. Include location for mix and proposed finishes.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cement shall be a standard brand of Portland cement, Type I, in conformity with AASHTO M85. Only one brand of cement may be used in any one structure.
B. Coarse Aggregate shall comply fully with the minimum requirements of ASTM C33/C33M, for 1 ½ inch maximum size aggregate.
C. Fine Aggregate shall comply fully with the minimum requirements of ASTM C33/C33M.
D. Reinforcing Steel shall be new deformed reinforcing bars, ASTM A1064/A1064M, of sizes and shapes noted on the Plans.
E. Premolded Expansion Joint Material shall conform with the requirements of ASTM D1751.

2.2 CLASSIFICATIONS & PROPORTIONS

A. Concrete shall be proportioned using methods outlined in the THD Bulletin C-11 for design of a concrete batch to meet the requirements hereinafter set forth. It shall be the entire responsibility of the CONTRACTOR to procure the strength as set out below for the respective class of concrete. All concrete shall be Class C unless otherwise shown on Plans. The concrete shall be uniform and workable. The minimum cement content, maximum allowable water content, and maximum slump shall conform to the following:

Class of Concrete	Minimum Cement (Bags / Cu. Yd.)	Maximum Water (Net Gal / Bag)	Maximum Slump for Hand Tamping	Maximum Slump for Machine Vibration
A	5.00	7.0	4"	3-1/2"
B	4.50	7.5	4"	3-1/2"
C	5.25	6.5	4"	3-1/2"

B. The concrete mix will be designed with the intent of producing concrete which, when cured and tested as outlined in THD Bulletin C-11, will have strength equal to or greater than the following:

Class of Concrete	Compressive Strength (1lb per Sq. In.)		7-Day Flexural Strength (1 lbs psi)
	28 - Day	7 - Day	
A	3,000	2,250	500
B	2,500	1,875	470
C	3,500	2,600	650

C. If the strength required for the concrete being produced is not secured with the minimum cement content specified, additional cement shall be used or other aggregates provided at the CONTRACTOR's expense.

D. Air entrainment shall be used for all exterior concrete.

2.3 CONSTRUCTION JOINTS

Construction joints shall be made only where located on the Plans, unless otherwise approved by the ENGINEER.

2.4 FORMS

All forms shall be of wood or metal and shall be built mortar tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations. Forms shall be constructed and maintained to prevent warping and opening of joints due to shrinkage of the lumber.

2.5 STEEL REINFORCEMENT

A. Reinforcing steel in the sizes, shapes and lengths as shown shall be placed in the positions as indicated on the Plans. Minimum cover of not less than 1" of concrete shall be provided over the surface of all reinforcing steel.

B. Stirrups and hoops shall pass around the main reinforcement members and shall be securely attached thereto. The reinforcing steel shall be spaced and secured in the forms by means of approved galvanized metal spacers or precast motor blocks. Steel shall be wired together at all intersections; and when completed, the reinforcement mat shall present practically a rigid cage of steel which will not be distorted or shifted from position in any way by workmen walking on the mat or by concrete placement operations. Reinforcing steel in horizontal slabs shall be supported by chairs to ensure accurate placement. Do not lift reinforcement during concrete placement.

C. Splicing of bars will be permitted only where shown on the Plans or with the specific approval of the ENGINEER. The bar splice, when so made, shall not be less than 36 bar diameters with the spliced bars securely tied.

D. Steel bars, when placed in the work, shall be completely free of dirt, grease, loose rust, scale or other foreign matter. After placement, care shall be exercised to keep the steel free of mud, dried concrete or other material. No concrete whatsoever shall be deposited in the forms until the ENGINEER has inspected the final placement and condition of the reinforcement and approved the work for placement of concrete.

PART 3 EXECUTION

3.1 MIXING CONCRETE

A. Mixing at Site: Concrete shall be thoroughly mixed in a batch mixer of an approved size and type which will insure a uniform distribution of the materials throughout the mass, equipped with

adequate water storage and a device for accurately measuring and automatically controlling the amount of water used in each batch.

B. Truck Mixing: Truck mixers shall be of the revolving drum type, water tight, and so constructed that the concrete can be mixed to insure uniform distribution of materials throughout the mass.

C. Time of Hauling and Placing Mixed Concrete: Concrete transported in a truck mixer shall be placed in its final position in the forms within 1 ½ hours after the introduction of the mixing water to the cement and aggregate.

D. Delivery Rate of Concrete during concrete operations shall be such as to provide for the proper handling, placing and finishing of the concrete, and the interval between batches shall not exceed 20 minutes. Concrete which has partially hardened shall not be retempered or remixed.

3.2 HANDLING AND PLACING OF CONCRETE

A. During and immediately after depositing, concrete shall be thoroughly compacted by mechanical vibration with satisfactory equipment and in a manner and to the extent as may be approved by the ENGINEER. Concrete shall not be poured in weather below freezing.

B. In preparation for placement of concrete, all sawdust, chips or other construction debris and extraneous matter shall be completely removed from the interior of the forms. When placing concrete on previously placed construction joints, the surface shall be cleaned by compressed air or vacuum methods, if so directed, and the surface of the existing joint shall be completely free of dust, dirt, sawdust or other foreign material. Concrete shall not be placed in any form prior to specific inspection and approval by the ENGINEER.

C. Foundations and footings shall be placed on firm, undisturbed earthen subgrade which is free of mud or excessive moisture. If groundwater is encountered, prior to placement of concrete the area shall be dewatered sufficiently for the subgrade to be firm and stable with the last 6 inches of excavation being removed immediately ahead of the concrete placement. Concrete for footing and/or foundations will not be placed on unstable, soggy or otherwise unsatisfactory earthen subgrade.

D. Concrete shall be placed in a manner to avoid segregation of the materials and the displacement of reinforcement. All chutes, troughs, tremies and pipes shall be kept clean and free from coatings of hardened concrete. When placing operations involving dropping the concrete more than 5 feet, the concrete shall be deposited through approved pipes or tremies. In walls less than 11 feet in height and widths less than 12 inches, tremies will not be required.

E. During and immediately after depositing, the concrete shall be thoroughly compacted by mechanical vibrating equipment and in a manner and to the extent as may be approved by the ENGINEER. Where placed in sidewalks, pavement or driveways, satisfactory hand methods for compaction and consolidation may be used.

F. Concrete shall be placed in horizontal layers not more than 12" thick except as provided herein. When less than a complete layer is placed in one operation, it shall be terminated in a vertical bulk head. Each layer shall be placed and compacted before the preceding batch has taken initial set to avoid surfaces of separation between the batches and to avoid the formation of construction joint with a preceding layer and surfaces of separation between batches.

G. When placement of concrete is unavoidably temporarily discontinued, the concrete, after becoming firm enough to retain its form, shall be cleaned of laitance and other objectionable material to a sufficient depth to expose sound concrete, and the top surface of the concrete adjacent to the forms shall be smoothed with a trowel. Where a "feather" edge might be produced at a construction joint, an inset formwork shall be used to produce an edge thickness of not less than 6" in the succeeding layer. Work shall not be discontinued within 18" of the top of any face, unless provisions have been made for a coping less than 18" thick, in which case,

and if permitted by the ENGINEER, the construction joint may be made at the underside of the coping.

H. CYLINDER OR BEAM TESTS: During work progress, the OWNER, at his discretion, shall have cylinders or beam tests performed as specified herein. The laboratory testing and services shall be provided by the OWNER. The OWNER does hereby reserve the right to collect all cylinder samples himself, if desired, and deliver same to the testing laboratory approved to perform the tests prior to the placement of concrete. The tests will be performed to maintain a check on the compressive or flexural strength of the concrete that is actually placed. The test shall be defined as the average of the breaking of two cylinders or two beams as the case may be. Test beam or cylinder specimens shall be required for each 167.5 cubic yards, or a portion thereof, placed each day. For smaller concrete placements, the OWNER's Representative may vary the test specimen to 25 cubic yard placement, over a several day period. Cylinders or beam specimens shall be field protected per THD Bulletin C-11 until transported to the testing laboratory. The test specimens shall be cured in accordance with THD Bulletin C-11

3.3 CURING & FINISHING

A. Concrete surfaces exposed to conditions causing premature drying shall be protected by covering as soon as possible with approved curing compound, burlap, sand, or other satisfactory material and kept moist. Curing shall continue for a period of not less than 7 days after placing the concrete.

B. Surface finishes shall be classified as follows:
   1. Class I - Ordinary Surface Finish
   2. Class II- Rubbed Finish
   3. Class III - Broom Finish
   4. Class IV - Steel Trowel Surface Finish
   5. Class V - Adhesive Grout Finish
   6. Class VI - Sidewalk Finish

   All concrete shall be given Class I, ordinary surface finish, and in addition, if further finishing is required, such other types of finish as specified. If not otherwise specified, the following surfaces shall be given Class II -Rubbed Finish: exposed faces of structures; outside faces of slabs, brackets, curbs, headwalls, railings. Slab surfaces shall be given Class III - Broom Finish and Class IV - Steel Trowel Surface Finish.

C. Inspector to approve all finishes for slabs prior to their installations. Contractor to acquire from Engineer written instruction of finishing slabs in each specific area of building and exterior slabs.
   1. Class I, Ordinary Surface Finish: Immediately following the removal of forms, all fins and irregular projections shall be removed from all surfaces except from those which are not to be exposed. On ALL surfaces, the cavities produced by form ties and other holes, honey comb spots, broken corners or edges and other defects shall be thoroughly cleaned, carefully pointed and cured with a mortar of cement and fine aggregate. The resulting surface shall be to the satisfaction of the ENGINEER.
   2. Class II, Rubbed Finish: After removal of forms, the rubbing of concrete shall be started as soon as its condition will permit. Immediately before starting this work, the concrete shall be kept thoroughly saturated with water for a minimum period of three hours. Surfaces to be finished shall be rubbed with a medium carborundum stone, using a small amount of mortar on its face. The mortar shall be composed of cement and fine sand mixed in proportions used in the concrete being finished. Rubbing shall be continued until all form marks, projections and irregularities have been removed, all voids filled, and a uniform surface has been obtained. The final finish shall be obtained by rubbing with a

fine carborundum stone and water. This rubbing shall be continued until the entire surface is of a smooth texture and uniform color.

3. Class III, Broom Finish: After the concrete is compacted, the surface shall be carefully rodded and struck off with a strike board to conform to the cross-section and grade shown on the Plans. After striking off and consolidating as specified above, the surfaces shall be made uniform by longitudinal or transverse floating, or both. When the concrete has hardened sufficiently, the surface shall be given a broom finish with a broom of an approved type. The strokes shall be square across the slab, from edge to edge with adjacent strokes slightly overlapped. The surface when finished shall be uniform, free of porous spots, irregularities, depressions and small pockets or rough spots.
4. Class IV, Steel Trowel Finish: The concrete surface shall be struck off and given a float finish as outlined for Class III finish above. After the surface has been tested with a straight edge and irregularities corrected, the entire system shall be finished with an acceptable steel bladed rotary type mechanical finishing machine to a smooth and uniformly finished condition. Hand troweling methods with a steel trowel will be used to finish corners or other areas inaccessible to the finishing machine and to remove all blade marks, burrs and other irregularities left by the machine, and the entire surface completed in a smooth and workmanlike manner, of uniform texture, and to the entire satisfaction of the ENGINEER.
5. Class 5, Adhesive Grout Finish: The surface of the concrete shall be given an Class 1 finish, chamfer lines lightly rubbed, irregularities corrected, and then covered with an adhesive grout textured coating a minimum of 1/16" thickness. Coating shall be composed of one part white cement, one part natural (gray) cement, two parts masonry and, one part (latex) emulsion and enough water to form a viscous slurry of a consistency that may be applied by spray gun, brush or roller with appreciable running or sagging. The proportions of white and gray cement may be varied slightly to obtain the desired color. Gradation of the masonry sand shall be as required to product a texture satisfactory to the ENGINEER. Prepackaged materials meeting these requirements and acceptable to the ENGINEER as to color, texture and appearance will be permitted. The adhesive grout coating shall be applied to the moistened concrete surface in a manner which will provide a uniform texture and color, in the thickness specified, and shall be completely protected from rain and/or freezing for a period of 24 hours minimum.
   The adhesive grout type coating shall meet the test requirements of TxDot Item 423 for Adhesive Grout Type Coatings. If requested, the CONTRACTOR shall furnish the ENGINEER a certificate from the manufacturer stating the product furnished complies with these specifications.
6. Class 6, sidewalk Finish: After the concrete has been deposited in place, it shall be compacted, the surface struck off by means of a strike board, and then finished with a steel trowel. An edging tool shall be used on all edges and at all expansion joints and dummy joints. The surface shall not vary more than 1/8" under a 10 foot straight edge. The surface shall then be given a granular or matted texture by light brushing with a wetted brush or broom to provide a non-skid surface when wet and meeting the entire approval of the ENGINEER.

D. Temperature of Concrete: When placing concrete at a temperature below 45 degrees F., the concrete shall have a temperature not lower than 50 degrees F. and not higher than 95 degrees F. Suitable means shall be provided to maintain the concrete at a temperature not less than 50 degrees F. for the first five days after placement, or until it has hardened sufficiently, or until the first three days if high early strength concrete is used. The method of heating the materials at all times shall be subject to the ENGINEER's approval. No salt, chemical or other foreign matter shall be mixed with the concrete for the purpose of preventing freezing. If warm water is used, the cement shall be put in before other aggregates to prevent a flash set.
   If concrete is placed when weather is such that the temperature of the concrete would exceed 95 degrees F., as determined by the ENGINEER, the CONTRACTOR shall employ effective

means, such as placing early in the day, as necessary to maintain the temperature of the concrete as it is placed below 95 degrees F.

-- END OF SECTION --

SECTION 03 10 01 - CONCRETE CURB AND GUTTER, VALLEY GUTTER AND CHANNELS

PART 1 GENERAL

1.1 DESCRIPTION

Concrete curb and gutter shall be non-reinforced formed or machine laid and built as monolithic curb and gutter and according to the dimensions and designs shown on the plans and shall be composed of Class "A" concrete as specified in Section 03 09 01. All concrete curb and gutter, valley gutter, alley aprons, driveways and sidewalks constructed as part of this project or on any City street or alley shall be constructed with high quality materials and workmanship and shall conform to these material specifications. Concrete valleys, radius fillets and drainage channels shall be reinforced as shown on the Plans.

1.2 REFERENCE STANDARDS

TxDot Item 420, (2004) CONCRETE STRUCTURES
TxDot Item 440, (2004) REINFORCING STEEL

PART 2 PRODUCTS

2.1 MATERIALS

Concrete materials for curb and gutter, valley gutter, driveways and other concrete work shall be in accordance with Section 03 09 01.

A. Forms: Outside forms for this work shall be constructed of wood or metal, shall be of the depth of concrete, straight, free from warp and of sufficient strength when staked to resist the pressure of the concrete without springing. The face of the gutter shall be sloped 1/4" toward the street where a gutter drains into a valley gutter crossing the street. The forms to be used shall be approved by the Project Representative.
B. Expansion Joint Material shall be prepared asphalt filler or Redwood expansion joint filler 1/2 inch or 3/4 inch thick as shown on plans and shall conform with the provisions of TxDot ITEM 420,.2, E. Where new concrete joins old concrete and at the beginning and ending of radius a 1/2 inch expansions joint shall be required.
C. Reinforcing Steel shall conform with the requirements of TxDot Item 440 for new billet or rail street reinforcing.

PART 3 EXECUTION

3.1 CONSTRUCTION METHODS

The subgrade shall be excavated and shaped to line, grade and cross section, and loose material or fill shall be wetted and thoroughly tamped. If dry, the subgrade shall be lightly sprinkled immediately before concrete is deposited thereon. The workability of the concrete and method of placement shall be such that finished concrete work shall be dense and free of honeycombs. All driveway leave-outs shall be constructed with a part of the driveway curb return of 7" radius; and the curb shall be laid down, giving a total width of 2.0 feet on the gutter. Where existing driveway approaches have no radius on the curb return, the new curb and gutter shall be formed the same as for regular driveway leave-outs except a radius of 2 feet minimum shall be constructed on the leave-out. Curb ends at leave-outs shall be ended with a vertical face and not sloped off, where proposed curb and gutter ends without tying to existing, the top of curb shall be sloped 6 to 1 to the flow line. No sharp or abrupt changes in grade will be allowed on any adjustment of any existing structures.

A. Curb and Gutter of either the stand-up or laid-down type shall be formed or machine laid. Expansion joints will be placed at the beginning and end of every curb return at intersections

and alleys. In areas where walks or other concrete improvements join the curb, a 1/2" expansion joint shall be placed at the back of the curb. For hand placed curb expansion joints shall be placed no more than 50 feet apart.

Dummy joints shall be placed 10 feet apart along the length of each section, and the back of the curb shall be scored to promote controlled cracking.

No curb which would allow vehicular traffic across corners shall be laid down at intersections. An island and curb return must be maintained in order to provide pedestrian safety. Corner curb returns may be tear shaped if first approved by the City as to shape.

Before the concrete has reached the stage of initial set the exposed surface may be covered approximately 3/8" to 1/2" thick with cement-sand mortar in the ratio of one part cement to two parts sand, and shaped to the sections indicated on the Plans. Curb and gutter shall not be placed during a sandstorm, and a heavy coating of dust between the concrete and mortar topping will not be permitted. The surface shall receive a hand trowel finish, and the exposed edges rounded by use of an edging tool with the radius as indicated on the Plans. After all edging has been completed, the surface shall be brushed at right angles to the center line of the street.

B. Valley Gutters and Driveway Approaches shall be spaded and tamped until mortar entirely covers and forms the top surface. The surface of the concrete shall be floated smooth and all edges rounded to 1/2" radius. Before the concrete is given final finishing, the surface shall be tested with a 10 foot straight edge and any irregularities of more than 1/4" in 10 feet shall be eliminated.

   Valley gutters and all concrete flatwork shall be reinforced with 6 x 6 x 10 ga. welded wire mesh or No. 4 rebar as shown on the Plans. Curb and gutter radii which is poured monolithic with concrete valley gutters shall be reinforced; however, all other curb and gutter shall be formed or machine laid and shall not be reinforced.

C. Sidewalks - Sidewalk subgrade shall be prepared as described in the first paragraph of 3.01 of this section. A 3" cushion of granular material (blow sand) shall be placed on the subgrade unless otherwise specified. The concrete shall be spaded and tamped until it is consolidated and then screeded off to the finished elevation.

   After sufficient cement mortar has been brought to the surface by approved methods, the concrete shall be darbied and floated by means of hand or mechanical floats to a true even surface. Any low spots shall be filled with fresh concrete and again floated. The concrete shall then be steel troweled at the proper time and a sufficient number of times to produce a smooth hard surface which is free of waves, sandy spots or other defects. Cement or sand-cement mixture will not be dusted on the wet surface unless permission is given by the ENGINEER. After the surface has been worked to a true plane, the section of slab markings shall be made every 4 feet unless otherwise specified by the ENGINEER or by the plans. Each slab marking shall be cut entirely through the slab with a pointing trowel or other suitable tool. The top coat shall be floated to an even surface and the edges rounded on all sides to a radius of 1/2". The surface shall be left with a uniform, lightly brushed finish. Reinforcing steel shall be required only where specified on the Plans. Sidewalk thickness shall be as specified on the plans.

3.2 PROTECTION - CURING

All concrete must be protected from premature drying, and freshly placed concrete shall be protected against rain, washing and marking. The following methods of curing will be permitted.

A. Water Cure - For a water cure, the concrete must be covered with cotton mats or two thicknesses of 10 to 12 oz. burlap and kept thoroughly wet for a period of four days, at which time the covering may be removed; or the finished work shall be wetted and thoroughly covered with at least 2 inches of earth. Earth covering shall be sprinkled twice a day for four days.
B. Membrane curing compound may be used if approved by the ENGINEER.

3.3 PROTECTION FROM TRAFFIC

The work shall be protected from vehicular traffic for at least 7 days. Immediately after the removal of forms, the curb and gutter shall be backfilled. No heavy equipment will be permitted on any concrete work for 7 days after day of placement.

3.4 CLEAN-UP

During construction, all gutters shall be kept open. Material stored on pavement shall be boxed in. Upon completion of the work, all building material and accumulated debris shall be removed and the job site left in a presentable condition.

3.5 WORK TO BE SUPERVISED BY THE CITY

All work shall be performed under the supervision and subject to the direction and approval of the City and the Project Representative, whose decision shall be final.

3.6 LIGHTS AND BARRICADES

During construction the Contactor shall erect barricades where required and place red lanterns or flares to protect pedestrians and vehicular traffic as specified in the Section 01 02 01.

3.7 INSPECTION

All curb and gutter forms shall be inspected by the Project Representative prior to placement of concrete. The CONTRACTOR shall not place concrete into forms which have not been inspected and approved by the Project Representative. The CONTRACTOR shall request inspections by the Project Representative a minimum of 24 hours prior to inspection time.

-- END OF SECTION --

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SECTION 31 01 01 - FLOWABLE FILL

PART 1 GENERAL

1.1 REFERENCE STANDARDS

ACI 229R - Report on Controlled Low-Strength Materials; Latest Edition.
ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2016a.
ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete; 2016a.
ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2016.
ASTM C495/C495M - Standard Test Method for Compressive Strength of Lightweight Insulating Concrete; 2012.

1.2 WORK INCLUDED

A. Scope: This Section governs flowable fill or controlled low strength material for pipe embedment, encasement, and backfill. Flowable fill shall be utilized for all encasement and pipe caps for yard piping.
B. Flowable fill shall be described as a low cement content ready-mix material with high flow properties. Where flowable fill is shown for use on the Plans or described in the Specifications, it is intended that such fill be able to be removed at a later date if so desired with the use of ordinary trenching equipment or by hand excavation, High Air Generators shall be used with flowable fill to reduce shrinkage and/or facilitate pumping and/or limit compressive strength potential for future excavations.

1.3 RELATED SECTIONS

A. Section 01 04 01 - CONTRACTOR's Submittals.
B. Section 03 09 01 - General Concrete.
C. DIVISION 2 - Sitework.

1.4 QUALITY ASSURANCE

Material suppliers shall demonstrate experience in the manufacture of ready-mix concrete and flowable fill. Mix design submittal shall include quality statement on flowable fill performance, documented strengths, and previous applications.

1.5 SUBMITTALS

A. Submit mix designs with proportions of each component; strengths at 7 days and 28 days, materials descriptions with types and classifications, test results, density in-place and of wet mixture, air content, viscosity, setting time, shrinkage, yields, and flowability and pumpability characteristics. Mix design shall include batch proportions with unit weight measurements. Furnish information on methods and procedures proposed for grouting, and blocking and bulkhead designs and locations.
B. Suppliers utilizing materials to reduce shrinkage and/or lower compressive strength potential shall submit manufacturer's data on properties in comparative mixtures.

PART 2 PRODUCTS

2.1 MANUFACTURERS

DaraFill Flowable Fill Performance Additive - Grace Construction Products or approved equivalent.

2.2 MATERIALS

A. Cement - Type I - ASTM C150/C150M or blended cement with flyash meeting the requirements for use in concrete.
B. Aggregate shall be free of organics and shall conform to ASTM C33/C33M.
C. Admixtures: DaraFill as manufactured by Grace Construction Products, or approved equivalent. Material shall be added per manufacturer's recommendations to achieve strength, flowability and pumpability requirements.

2.3 CONCRETE MIXES

A. CONTRACTOR shall develop mix designs of flowable fill for each application required and shall coordinate flowability, pumpability, unit weight, strength, and air content for each application. Air contents shall be between 15 percent and 30 percent. Minimum cementitious content shall be 200 pounds per cubic yard. Concrete mixtures shall provide high flow properties without segregation. Shrinkage shall be less than 1 percent by volume.
B. Unless otherwise noted, flowable fill shall be designed for between 200 psi and 500 psi at 28 days. In absence of test data, provide mixtures with materials described above and having wet unit weight measurements in the range of 95 to 115 lbs/cu ft.
C. Flowable fill may be completely mixed in a concrete truck or manufactured at the job site by mixing cement-sand slurry with a preformed foam.

PART 3 EXECUTION

3.1 GENERAL

A. For annular space grouting, the entire annular space and length of the space shall be filled with grout, produced and placed by experienced personnel, using manufacturer's approved methods and equipment.
B. General procedure shall be to bulkhead both ends of the annular space or piping or trench to be filled. In long closures, provide ventilation taps where necessary. Secure flumes and pipe to prevent floatation during placement of flowable fill. Secure members mechanically, or bed with short lift of stiff flowable fill.
C. Fill for pipe encasement shall be done in lifts unless otherwise approved by the ENGINEER. CONTRACTOR shall coordinate fill locations and grouting pressures with flowable fill design such that specified grouting pressures are not exceeded. Removable internal stiffeners may be installed provided no internal modification or damage is done to the Pipe.
D. The annular volume or pipe volume to be filled shall be calculated and utilized as a verification that the entire space has been filled. The consumed volume shall also be monitored and shall be acceptable if within 10 percent of the calculated volume.
E. For all applications, the CONTRACTOR shall plan deliveries and/or production of flowable fill to ensure continuous grouting operation for the entire segment until completed.
F. For grouting other than annular spaces and for use of flowable fill as trench backfill under paved areas, CONTRACTOR shall block and anchor pipe to grade and alignment to prevent floatation or movement during placement and flowable fill shall be placed in a minimum of 2 lifts, the first one below and to not more than D/4 on the sides of the pipe.

3.2 TESTING

For every flowable fill application, CONTRACTOR shall obtain three (3) samples of each batch and test compressive strength in accordance with ASTM C495/C495M or ASTM C109/C109M for 7-day and 28-day strengths.

-- END OF SECTION --

SECTION 31 02 01 - STRUCTURAL EXCAVATING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.1 REFERENCE STANDARDS

29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates; 2014.
ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.
ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2015.
ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.
TxDot Item 247 (2004) Flexible Base

1.2 WORK INCLUDED

A. Excavation, backfill and compaction around structures.
B. Site excavation and backfilling.
C. Excavation support systems.
D. Fill for over-excavation.
E. Groundwater and surface water control.
F. Excavation for paving and landscaping.

1.3 QUALITY ASSURANCE

Test material to be used as compacted fill, whether excavated onsite or imported as offsite borrow, for compliance with the requirements of Section 31 06 01 prior to placement.

PART 2 PRODUCTS

2.1 MATERIALS

A. Excavation Support System: CONTRACTOR's option, suited for purpose.
B. Fill Materials: In accordance with schedule in Section 31 06 01, and as shown on the Plans. Material Specifications in Section 31 06 01 shall be met.

PART 3 EXECUTION

3.1 PREPARATION AND LAYOUT

A. Establish extent of structural excavation by area and elevation; designate and identify datum elevation.
B. CONTRACTOR shall set required lines and levels.
C. Maintain benchmarks and other reference points.

3.2 PROTECTION

A. Protect, support and/or reroute existing utilities.
B. Protect adjacent work from damage by excavation and backfilling operations.
C. Protect adjacent structures from undermining.
D. Support sides of excavations to prevent soils movement which may diminish the excavation width below width required for working.
E. Support sides of excavation which interfere with normal 45 degree bearing splay of any foundation.

3.3 EXCAVATION SUPPORT SYSTEMS

A. Design, installation and maintenance of temporary excavation support systems is the responsibility of the CONTRACTOR. Provide support systems at no additional expense to OWNER.
B. Design and construct excavation support systems in accordance with OSHA Standards and interpretations 29 CFR 1926.
C. For excavation exceeding 20 feet, it will be required to have side slopes designed by professional ENGINEER licensed in the State of Texas.

3.4 GROUNDWATER AND SURFACE WATER CONTROL

A. CONTRACTOR is responsible for designing, providing and maintaining a system for control of groundwater at no additional expense to OWNER.
B. Provide adequate swales, dams, ditches and grades to prevent surface water from flowing into excavation.
C. Maintain water control until structure is complete and backfill is brought to final grade unless otherwise directed by ENGINEER.
D. Groundwater or water from other sources may be present in excavations regardless of whether shown on boring logs.

3.5 EXCAVATION

A. Excavate to lines and grades shown on the Drawings. Excavations shall be either braced or shored or laid back to a slope no steeper than two horizontal to one vertical unless specifically shown otherwise in CONTRACTOR's Trench Safety Plan.
B. When excavation is essentially complete, verify depths and dimensions as well as soil classification and bearing capacity.
C. Perform additional excavation only as approved by the OWNER.
D. Correct unauthorized excavation as directed at no cost to OWNER.
E. Fill over-excavated areas under structure bearing surfaces with lean concrete, flowable fill, or compacted Class 3 Aggregate Fill as required by the ENGINEER.
F. Excavate to within 1-foot of final grade, making final excavation immediately prior to placement of mud slab. Limit area of final excavation to that which is being prepared for concrete placement. Limit exposure of final excavated surface to eight hours. Keep excavations free of standing water until concrete and backfill operations are complete.
G. Mud slabs shall be used beneath all footings and slabs on grade.

3.6 BACKFILLING

A. Verify fill materials to be reused are acceptable.
B. Verify foundation perimeter drainage installation (if required on plans) has been inspected.
C. Verify underground tanks are anchored to their own foundation to avoid floatation after backfilling.
D. Generally, compact subgrade to density requirements for subsequent backfill materials.
E. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill with Class 3 aggregate fill or compact to density equal to or greater than requirements for subsequent backfill material.
F. Prior to placement of aggregate base course material for paved areas, remove soft or unstable areas and replace with aggregate base course material, then scarify subgrade to a depth of 6 inches and compact to a minimum of 95 percent of ASTM D698 at a moisture content within 3

percent of optimum moisture. Density and moisture content of the compacted subgrade shall be maintained until it has been covered with base course material.

G. Backfill areas to contours and elevations with unfrozen materials.
H. Backfill around structures as soon as possible after approval by the ENGINEER.
I. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
J. Backfill with select fill within two feet of structure unless otherwise indicated on the Drawings.
K. Fill materials shall be as shown on the Plans and included in the Specifications. Materials are specified in Section 31 06 01. Place and compact in continuous layers not exceeding eight inches loose depth. Avoid heavy or intense compaction against and within five feet of structure.
L. Maintain specified moisture content of backfill materials to attain required compaction density.
M. Do not backfill against walls until concrete has been in place at least seven days. Water bearing structures shall not be backfilled until hydrostatic test results are acceptable.
N. Do not backfill against unsupported foundation walls or partially completed structures until after main floor slabs have been in place at least seven days and placement is approved by the ENGINEER. Water bearing structures shall not be backfilled until hydrostatic test results are acceptable.
O. Backfill simultaneously on each side of foundation walls and other structures to equalize soil pressures. Provide temporary bracing as required.
P. Take special care to prevent wedging action against structure. Bench or serrate slopes bounding excavation.
Q. Slope grade away from building minimum 1/4-inch per foot, unless noted otherwise.
R. Make grade changes gradual. Blend slope into level areas.
S. Relocate surplus backfill materials to location indicated on-site as directed by OWNER, at no cost to OWNER.
T. Tolerance for Top Surface of Backfilling: Plus or minus 1 inch from required elevations.

3.7 COMPACTION

A. Remove shoring and sheeting unless otherwise approved by the ENGINEER. The cost of abandoned shoring and sheeting is to be borne by the CONTRACTOR.
B. Compact fill materials in accordance with Section 31 06 01.
C. Remove and replace improperly compacted backfill material at no cost to OWNER.

3.8 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed by OWNER'S Representative.
B. Tests and analysis of fill material will be performed in accordance with ASTM Standards.
C. Compaction testing will be performed in accordance with ASTM D698.
D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to OWNER.
E. Frequency of Field Density Tests:
    1. Sand Fill: One test per 3000 Square Feet, but not less than 3 tests per 6-inch compacted lifts.
    2. Select Fill: One test per 3000 Square Feet, but not less than 3 test per 6-inch compacted lift.
    3. Site Fill: One test per 3000 Square Feet, but not less than 3 test per 6-inch compacted lift.

3.9 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Section 02 01 01.
B. Recompact fills subjected to vehicular traffic.

3.10 CLEAN UP

Remove surplus fill materials to on-site spoil areas as directed by the OWNER at no cost to OWNER.

-- END OF SECTION --

SECTION 31 03 01 - TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.1 WORK INCLUDED

Trenching for buried piping systems as well as subsequent embedment, backfill and compaction operations, necessary to install the pipe as specified.

1.2 QUALITY ASSURANCE

1.3 REFERENCE STANDARDS

TxDOT Specification Item 247
TxDOT Specification 334

1.4 PROTECTION

A. Protect trees, shrubs, and lawn areas to receive planting, and other features remaining as part of final landscaping.
B. Protect benchmarks, existing structures, roads, sidewalks, paving and curbs against damage from vehicular or foot traffic. Install and maintain bridging, planking and cants to provide access to Work.
C. Protect excavations by shoring, bracing, sheet piling, underpinning, or by other methods, as required to prevent cave-ins or loose soil from falling into excavations.
D. Underpin or otherwise support adjacent structures which may be damaged by excavation work. This includes service lines and pipe chases.
E. Notify the ENGINEER of unexpected subsurface conditions.
F. Where damage could result from continuing work, discontinue work in area until resident inspector notifies the CONTRACTOR of the required modifications.
G. Protect bottom of excavations and soil around and beneath foundations from frost, freezing, and excessive moisture changes.
H. Grade around trenches to prevent surface water runoff into excavated areas.
I. Protect above or below grade utilities including lateral lines, sprinkler system lines, and all other lines which are to remain. The cost of replacing damaged lines is to be borne by the CONTRACTOR.

PART 2 PRODUCTS

2.1 BED AND FILL MATERIALS

A. Refer to specifications Section 31 06 01, SITE GRADING AND EARTHWORK, for requirements of Aggregate Fill Classifications and to the Drawings for locations and dimensional requirements.
    1. Embedment and initial backfill for PVC pipe larger than 2 inches, steel pipe, and DIP pipe shall be Class 2 Aggregate Fill. If not shown on the Plans, embedment and initial backfill shall be Class 2 Aggregate fill. Embedment and initial backfill for small plastic pipe shall be sand fill.
    2. Embedment for RCCP and HCP shall be Class 3 Aggregate Fill. Initial backfill shall be non-expansive earthfill.
    3. Flowable fill (foam grout) shall conform to specifications Section 31 01 01, FLOWABLE FILL.
    4. Concrete shall conform to Section 03 09 01, GEENERAL CONCRETE.
    5. Trench backfill under paving and to 5 feet outside of pavement shall be sand to within top 1 foot. Top 1 foot shall be Flowable fill with top 2 inches being cold mix asphalt.

PART 3 EXECUTION

3.1 PREPARATION AND LAYOUT

A. Establish extent of excavation by line and elevation. Designate and identify datum elevations.
B. Set required lines and levels.
C. Maintain benchmarks, monuments and other reference points.

3.2 UTILITIES

A. Known underground utilities are indicated on the Drawings.
B. Before starting excavation, establish the location and extent of underground utilities occurring in the work area.
C. As excavation approaches utilities, hand excavate to uncover utilities.
D. Notify the ENGINEER for direction for removal and/or relocation of utility companies' lines which are in the way of excavation.
E. Maintain, re-route or extend as required, existing utility lines to remain which pass through work area with the approval of the OWNER. Relocations are at the CONTRACTOR's cost.
F. Protect utility services uncovered by excavation.
G. Accurately locate and record abandoned and active lines rerouted or extended on Project Record Documents.

3.3 TRENCHING

A. Ensure trenching does not interfere with normal 45 degree bearing splay of any foundation.
B. Excavate in accordance with lines and grades. Excavated material which meets respective backfill requirements may be used for backfilling, stockpile or remove as applicable.
C. Cut trenches sufficiently wide to enable proper installation of services and to allow for inspection. Minimum trench width shall be 6 inches wider than the pipe outside diameter. Pipe shall be installed in center of trench, with not more than 12-inch clearance nor less than 4-inch clearance between pipe wall and trench wall at any point. Trim and shape trench bottoms and leave free of irregularities, lumps and projections. Over excavated trench depths shall be filled to the proper grade with embedment material at no additional cost to the OWNER.
D. Existing pavement over trenches shall be removed to a width of 6 inches outside the trench on each side by sawing methods and to a neat line. Asphalt pavements shall be sawed for full depth. Concrete pavement shall be sawed to a depth which will allow the section to be removed smoothly without underbreakage. Brick pavement shall be removed by hand methods in a manner that will not damage bricks, and the bricks shall be delivered and hand stacked as designated by the OWNER.
E. Trench width shall be not more than 24 inches wider than outside diameter of pipes. Walls shall be vertical to elevation equal to 12 inches above the top of the pipe. Whenever the prescribed maximum trench width is exceeded, the CONTRACTOR shall use the next higher class of embedment, at no additional cost to the OWNER.
F. Do not disturb soil within branch spread of existing trees or shrubs that are to remain. If it is necessary to excavate through roots, perform work by hand and cut roots with a sharp axe.
G. When complete, request the resident inspector to inspect excavations. Correct unauthorized excavation as directed, at no cost to the OWNER.
H. If, in the opinion of the resident inspector, the undisturbed material at grade depth is unstable, the CONTRACTOR shall be required to remove the unstable material and fill the trench to the proper subgrade with embedment material. Payment will be made to the CONTRACTOR at the unit price per cubic yard set forth in the Bid Schedule.

I. Unsuitable excavated subsoil including perishable, spongy material, large rock, or other material designated by the resident inspector shall not be used in backfilling. Unsuitable material shall be disposed of by the CONTRACTOR, at no cost to the OWNER, in a manner approved by the OWNER.

3.4 SHEETING AND SHORING

A. In caving ground or in wet, saturated or flowing or otherwise unstable materials, the sides of all trenches and excavations shall be adequately sheeted and braced, to maintain the excavation from slides or cave-ins and to provide safety for workmen.

B. Sheeting and shoring shall be designed by professional ENGINEER, licensed in the State of Texas.

C. Sheeting, shoring, and bracing shall be removed unless otherwise approved by the ENGINEER. Removal of sheeting, shoring, and bracing shall be performed in a manner to prevent damage to new or existing structures and to avoid cave-ins or sliding of the banks. All holes and voids from the sheeting shall be immediately and completely filled and compacted with suitable materials. All costs associated with the abandonment of sheeting, shoring and bracing shall be borne by the CONTRACTOR.

3.5 DEWATERING

A. Keep trenches dry. Provide necessary equipment including pumps, piping and temporary drains. Maintain groundwater level a minimum of 3 feet below bottom of excavations during construction.

B. Direct surface drainage away from excavated areas. Provisions shall be made for the satisfactory disposal of water pumped to prevent damage to public or private property.

C. Control the grading in and adjacent to excavations to prevent water running into excavated areas or onto adjacent properties or thoroughfares.

D. Furnish and operate suitable pumps on a 24 hour basis to keep excavations free of water until services have been placed and backfilling is completed.

3.6 BEDDING

The CONTRACTOR shall install the pipe and complete the bedding so that the installation may be inspected prior to backfilling. The OWNER's inspector shall be notified by the CONTRACTOR when the bedding is complete for each particular segment. Any excavation areas backfilled without the OWNER's prior inspection will require uncovering and checking at the CONTRACTOR's expense.

Manually place and compact bedding material in layers not exceeding six inches.

Manually shape bedding material to conform to pipe barrel and bell or flanges such that the entire length of the pipe barrel is supported by the bedding material.

Embedment and initial backfill materials shall be placed as shown on the plans and compacted in six inch layers along sides of pipe and to a minimum depth of 12 inches over the top of the pipe.

3.7 SETTING VALVES, VALVE BOXES AND FITTINGS

Gate valves and pipe fittings shall be set joint to new pipe in the manner specified for cleaning, laying and jointing pipe.

Valve boxes shall be firmly supported and centered plumb over the wrench nut of the gate valve, with box cover flush with the surface of the finished pavement or at such level as directed.

Standard plugs shall be inserted into the bells of all dead ends of pipe, tees or crosses and spigot ends shall be capped. Plugs or caps shall be jointed to the pipe or fitting in the manner specified above.

Concrete blocking will be required at all tees, bends, crosses and fire hydrants as provide herein. Blocking shall be placed between solid ground and the fittings. The bearing on the pipe and ground to be as detailed or as may be directed.

3.8 BACKFILLING

After pipe has been laid on the specified bedding material and all joints have been made, the backfilling of the trench shall begin. All trenches as a minimum shall have the bedding material extended to the top of the pipe and select backfill to a point 6" above top of pipe. Except as specified for backfilling trenches in streets, the remainder of the trench shall be backfilled using material excavated. In areas where the natural terrain provides less than 2 feet of cover for the proposed line, the CONTRACTOR shall construct a backfill mound over the trench. This trench shall be no less than 6 feet wide, not greater than 14 inches tall, and shall provide 24 inches of cover over the proposed line. In areas where the proposed line crosses drainage channels, a 6 inch concrete cap shall be placed over the line to the satisfaction of the ENGINEER.

A. Do not start backfilling until services have been inspected.
B. Ensure trenches are free of building debris, snow, ice, and water and that ground surfaces are not in a frozen condition.
C. Backfill systematically and as early as possible to allow maximum time for natural settlement and compaction.
D. Place and compact backfill materials in continuous layers according to the approved method of compaction. Use a method which will not disturb or damage services. No excessively large rocks or debris of any sort shall be used as backfill.
E. Maintain moisture content and compaction density of fill materials as required.
F. Acceptable backfill shall be placed from eight inches over the pipe to the surface.
G. Excavated unsuitable material and excess material shall be disposed of by the CONTRACTOR, at no cost to the OWNER, in a manner approved by the OWNER.
H. Backfilling Trenches in Outside Paved Areas:
    1. After pipe has been placed to the grade, alignment and bedding to the top of pipe, the trench shall be backfilled with select material to a level 6 inches above the top of pipe. The select backfill shall be place carefully by depositing the backfill material vertically by hand or by machines in such a manner that the pipe will not be displaced laterally and the pipe will not be damaged by contact with the backfill material, tools or equipment. Above this level, backfill may be shoveled or pushed into the ditch by hand or machine, completely filling the trench.
    2. In no event shall the backfill material contain rocks larger than 4 inches.
    3. The backfill material shall be neatly rounded over the trench and smoothed such that the height of the backfill mound over the trench does not exceed 14 inches above the original ground surface. Any excess excavated material that is not required to make the mound over the pipe trench shall be disposed of to the satisfaction of the OWNER.
    4. Any deficiency of backfill material shall be supplied by the CONTRACTOR.
I. Backfilling Trenches in Asphalt Paved Areas:
    1. Where the trench crosses or lies within existing asphalt paved areas, the trench shall be backfilled with sand or granular material to 14 inches below the surface elevation. Compacted crushed base material shall then be added from the top of the backfill material to the surface. The base material for the 14 inch crushed base course shall meet the requirements of TxDOT Specification Item 247, Grade 1, Type A.
    2. In asphalt paved area, the top 2 inches of the base course shall be removed prior to application of the 2 inch asphalt surface layer. Then, the base course shall be primed with

0.25 gallon per square yard with MC-30. After allowing a minimum of 6 hours curing time, the areas shall receive 2 inches of Type "D" Hot Mix asphalt at a compacted density of 140 pounds per square yard and applied in a manner to be smooth and level with existing pavement. Asphalt shall meet the minimum requirements of TxDOT Specification 334.

J. Backfilling Trenches in Concrete Paved Area:
   1. Where the trench crosses or lies within existing concrete paved areas, the trench shall be backfilled with sand or granular material to 19 inches below the suface elevation. Compacted crushed base material shall then be added from the top of the backfill material to the surface. The base material for the 19 inch crushed base course shall meet the requirements fo TxDOT specification Item 247, Grade 1, Type A.
   2. The top 7 inches of the base course shall be removed prior to application of the concrete surface layer and replaced with 7 inches of 4500 psi concrete with reinforcement per the plan details. This concrete shall be doweled into existing surrounding concrete.

3.9 COMPACTION

A. Compact embedment and initial backfill materials per General Requirements.
B. Remove and replace improperly compacted backfill material at no cost to OWNER. Additional trench settlement following completion shall be restored to a level surface. Trench surfaces may be left crowned in open country.
C. Water jetting for consolidation will not be permitted within 25 feet of any structures, unless acceptable to the ENGINEER.

3.10 TRENCH SETTLEMENT

The CONTRACTOR shall be responsible for all settlement of backfills, fills, and embankments which may occur within one (1) year after final completion of the contract under which the work was performed.

The CONTRACTOR shall make, or cause to be made, all repairs or replacements made necessary by settlement, within thirty (30) days after notice from ENGINEER or OWNER at the CONTRACTOR's own expense.

3.11 CLEAN UP

The Contractor shall, at no cost to the OWNER, remove surplus fill materials to on-site spoil areas as directed by the OWNER .

-- END OF SECTION --

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SECTION 31 04 01 - TRENCH EXCAVATION SAFETY PROTECTION SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

A. This item will consist of the basic requirements which the CONTRACTOR must comply with in order to provide for the safety and health of workers in a trench. The CONTRACTOR shall develop, design and implement the trench excavation safety protection system. The CONTRACTOR shall bear the sole responsibility for the adequacy of the trench safety system and providing "a safe place to work" for the workman.

1.2 GENERAL

A. The trench excavation safety protection system shall be used for all trench excavations deeper than five (5) feet. The Excavating and Trenching Operation Manual of the Occupational Safety and Health Administration, U.S. Department of Labor, shall be the minimum governing requirement of this item and is hereby made a part of this Specification. The CONTRACTOR shall, in addition, comply with all other applicable federal, state and local rules, regulations and ordinances. The design of the trench excavation safety protection system shall be performed by or under the supervision of a professional engineer licensed to practice in the State of Texas.

B. If evidence of possible cave-ins or slides is apparent, all work in the trench shall cease until the necessary precautions have been taken by the CONTRACTOR to safeguard personnel entering the trench. It is the sole duty, responsibility and prerogative of the CONTRACTOR, not the OWNER or ENGINEER or resident inspector, to determine the specific applicability of the designed trench safety systems to each field condition encountered on the project. The CONTRACTOR shall maintain a permanent record of daily inspections.

1.3 REFERENCE STANDARDS

1.4 INDEMNIFICATION

A. The CONTRACTOR shall indemnify and hold harmless the OWNER, their employees and agents, from any and all damages, costs, (including without limitation, legal fees, court costs, and the cost of investigation), judgments or claims by anyone for injury or death of persons resulting from the collapse or failure of trenches constructed under this project.

B. The CONTRACTOR acknowledges and agrees that this indemnity provision provides indemnity for the OWNER and ENGINEER in case the OWNER or ENGINEER is negligent either by act of omission in providing for trench safety, including, but not limited to inspections and failure to issue stop work orders.

1.5 MEASUREMENT AND PAYMENT

A. All methods used for a trench excavation safety protection system shall be measured by the linear foot of trench and paid at the unit price in the CONTRACTOR's schedule of values, which shall be total compensation for furnishing design, materials, tools, labor equipment, and incidentals necessary, including removal of the system, Measurement for pipeline trench excavation safety protection system shall be based on the linear feet along the centerline of the pipeline trench. Measurement for structural trench excavation safety protection system shall be based on the linear feet around the outside perimeter of the structure's walls.
Where pipelines intersect structures, measurement for the pipeline shall begin/end at the outside of the structure's wall.

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 NOT USED

-- END OF SECTION --

SECTION 31 06 01 - SITE GRADING AND EARTHWORK

PART 1 GENERAL

1.1 REFERENCE STANDARDS

ASTM C88 - Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate; Latest Edition.
ASTM C131/C131M - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine; Latest Edition.
ASTM C535 - Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine; Latest Edition.
ASTM D448 - Standard Classification for Sizes of Aggregate for Road and Bridge Construction; 2012.
ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.
ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN m/m3)); 2012.
ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2011.
ASTM D4221 - STANDARD TEST METHOD FOR DISPERSIVE CHARACTERISTICS OF CLAY SOIL BY DOUBLE HYDROMETER; Latest Edition.
ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table; Latest Edition.
TXDOT Item 247

1.2 WORK INCLUDED

A. General excavation and fill operations for buildings. Rough grading and contouring of site, and drainage ditches.
B. Aggregate fill and earth fill material classifications and requirements.
C. OWNER is responsible for payment of all soils test. ENGINEER is responsible for determining all tests necessary. CONTRACTOR is responsible for allowing time in the construction schedule for testing any required rework.

1.3 QUALITY ASSURANCE

A. All materials to be used whether excavated on-site or imported as offsite borrow, shall be tested for compliance with the requirements of this section prior to placement.
B. Notify OWNER and ENGINEER when bearing material (bottom of excavation) is reached for observation of founding strata.
C. Prior to furnishing any soils to the site, CONTRACTOR shall furnish a written, notarized certification from the landowner of each proposed offsite soil borrow source stating that to the best of the landowner's knowledge and belief, there has never been contamination at the borrow source site with hazardous toxic materials.

1.4 SUBMITTALS

Submit test reports for all specified parameters for each material classification used prior to placing material and at intervals of 2000 cy during placement. Obtain representative samples from multiple locations from stockpiles for each test.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Stockpile excavated materials and/or borrow in designated areas or in areas as approved by the ENGINEER. Do not stockpile material in the flood plain.

B. Lightly compact and slope top of stockpiles to prevent excessive erosion and ponding of water.

1.6 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as portion of final landscaping.
B. Protect benchmarks, existing structures, fences, roads, sidewalks and paving.
C. Protect above or below grade utilities which are to remain. Do not take existing utilities out of service without specific authorization by the OWNER. Notify OWNER at least five working days prior to taking existing utilities out of service to make connections or for removal of utility.
D. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods, as required to prevent cave-ins or loose soil from falling into excavations.
E. Underpin adjacent structures which may be damaged by excavation work, including service lines and pipe chases.
F. Notify the ENGINEER of unexpected subsurface conditions.
G. Where damage could result from continuing work, discontinue work in area until ENGINEER notifies the CONTRACTOR of the required modifications.
H. Protect bottom of excavations and soil around and beneath foundations from frost, freezing, and excessive moisture changes.
I. Grade around excavations to prevent surface water runoff into excavated areas. During excavation, maintain grades for complete drainage. Install temporary drains or drainage ditches as needed to intercept or divert surface water and prevent interference or delay of the Work. Install groundwater pumping facilities and hoses/piping required to perform the work. The pumping of water shall be included in the appropriate lump sum bid items. No separate payment will be made for drainage control or ground water pumping.
J. Repair damage, promptly, at no cost to OWNER.

PART 2 PRODUCTS

2.1 MATERIALS

A. Class 1 Aggregate Fill: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable materials and have a percentage of wear of not more than 40 percent when tested in accordance with ASTM C131/C131M or ASTM C535. When material is subjected to five (5) cycles of the sodium sulfate soundness test in accordance with ASTM C88, the weighted percentage of loss shall not exceed 12 percent. The source of the material shall be approved by the ENGINEER and shall meet the following gradation in accordance with ASTM D448, size number 57:

SIEVE SIZE SQUARE OPENING	PERCENT PASSING
1-1/2 inches	100
1-inch	95-100
1/2 inch	25-60
No. 4	0-10
No. 8	0-5

B. Class 2 Aggregate Fill: Consist of durable particles of crushed or weathered limestone free of unsuitable, soft, or organic material will be considered. The source of the material shall be approved by the ENGINEER. Bin #10 or chat material complying with the following gradation requirements:

SIEVE SIZE SQUARE OPENING	PERCENT PASSING
3/4-inch	100
1/2-inch	95-100

3/8-inch	90-100
1/4-inch	65-80
No. 4	30-40
No. 20	0-5

C. Class 3 Aggregate Fill: Consist of durable particles of crushed stone free of silt, clay, or other unsuitable material and have a percentage of wear of not more than 40 percent when tested in accordance with ASTM C131/C131M or ASTM C535. When material is subjected to five cycles of the sodium sulfate soundness test in accordance with ASTM C88, the weighted percentage of loss shall not exceed 12 percent. The source of the material shall be approved by the ENGINEER and meet the following gradation:

SIEVE SIZE SQUARE OPENING	PERCENT PASSING
1-3/4-inch	100
7/8-inch	65-90
3/8-inch	50-70
No. 4	35-55
No. 40	15-30
No. 100	0-12 Wet Sieve Method

D. Crushed Limestone Base Material: Shall meet the requirements of 2004 TXDOT Item 247, Type A, Grade 2 or better.

E. Non-Expansive Earth Fill: Consist of soil materials with a liquid limit of 35 or less, a plasticity index between 5 and 15, a minimum of 35 percent passing the No. 200 sieve, a minimum of 85 percent passing the No. 4 sieve, and which are free of organics or other deleterious materials. When compacted to the recommended moisture and density, the material shall have a maximum free swell value of 0.5 percent and a maximum hydraulic conductivity (permeability) of 1 E-05 cm/sec, as determined by laboratory testing of remolded specimens of the actual materials proposed for the non-expansive earth fill.

F. General Earth Fill: Consist of any soil materials which have a minimum plasticity index of 8, a minimum of 20 percent passing the No. 200 sieve, a minimum of 75 percent passing the No. 4 sieve, and which are free of organics or other deleterious material. On-site soils are sometime suitable for use as general earth fill.

G. Select Fill:
   1. Non-organic, sandy clay or clayey sand.
   2. Liquid limit less than 36.
   3. Plasticity index ranging from 5 to 18.
   4. Sieve Analysis: Maximum percent retained on No.4 sieve = 25 to 50 and on No.40 sieve = 50 to 75.
   5. Maximum of 70 percent passing #200 sieve.
   6. Maximum size of aggregate 1-3/4 inches.
   7. On-site soils may be blended and utilized for select fill if approved by the ENGINEER and if the blended material complies with the select fill requirements above.

H. Sand Fill or Sandy Select:
   1. Granular material of uniformly graded crushed rock from 3/4-inch U.S. sieve downward.
   2. Plasticity Index: Maximum of 5.
   3. Sieve Analysis:

SIEVE NO.	MAX. PERCENT PASSING
1-inch	100

No. 10	50
No. 40	30
No. 200	8

I. Low-Permeability Earth Fill: Consist of soil materials classified as CH or CL in accordance with ASTM D2487. The materials also shall have a minimum liquid limit of 40, a minimum plasticity index of 20, a minimum of 50 percent passing the No. 200 sieve, and shall be free of organics or other deleterious materials. The material shall have a Percent Dispersion of less than 20 when tested in accordance with ASTM D4221. When compacted to the recommended moisture and density, the material shall have a maximum hydraulic conductivity of 1 E-07 cm/sec, as determined by laboratory testing of remolded specimens of the actual materials proposed for the low-permeability fill.

J. Unclassified Material: All material excavated from site not meeting the requirements for topsoil, or classified materials.

PART 3 EXECUTION

3.1 PREPARATION AND LAYOUT

A. Establish extent of site grading by area and elevation; designate and identify datum elevation.
B. CONTRACTOR shall set required lines and levels.
C. Maintain benchmarks, monuments and other reference points.

3.2 UTILITIES

A. Approximate locations of known underground utilities are indicated on the Drawings. The CONTRACTOR is responsible for locating all existing utilities prior to construction.
B. Before starting excavation, the CONTRACTOR is to establish location and extent of underground utilities occurring in work area.
C. Notify the ENGINEER for direction for removal and/or relocation of lines which are in the way of excavation.
D. Maintain, reroute or extend as required, existing utility lines to remain which pass through work area with the approval of the OWNER.
E. Support and protect utility services uncovered by excavation.
F. Accurately locate and record abandoned and active lines rerouted or extended, on Project Record Documents.
G. As excavation approaches utilities, hand excavate to uncover utilities.

3.3 EXCAVATION

A. Before starting excavation, clear and grade work area to minimum depth shown on Plans. Strip top soil approximately 6 inches to 12 inches, depending on location and stockpile.
B. Excavate in accordance with lines and levels required for construction of the Work.
C. When excavation is through paved areas, cut pavement to provide a square, uniform edge with minimum disturbance of remaining pavement and replace in accordance with the Drawings.
D. In all areas requiring rock excavation, the CONTRACTOR shall install the pipe and complete the "rock free" bedding so that the installation may be inspected prior to backfilling. The OWNER's inspector shall be notified by the CONTRACTOR when the bedding is complete for each particular segment. Any rock excavation areas backfilled without the OWNER's prior inspection will require uncovering and checking at the CONTRACTOR's expense.
E. Machine slope banks.
F. Hand trim excavations and leave free from loose or organic matter.

G. Provide and maintain surface and groundwater control until backfilling is complete. Keep excavations free from standing water.
H. Do additional excavation only by written authorization of ENGINEER.
I. Correct unauthorized excavation as directed, at no cost to OWNER. Areas that are excavated to elevations below those shown on the Plans shall be backfilled and compacted with crushed rock (Class 3 Aggregate Fill) if area is under aggregate fill, pipe, or structure, and otherwise with non-expansive earth fill.
J. Excavations should not interfere with normal 45 degree bearing splay of any foundation unless sheeting and/or shoring is designed and provided for excavation.
K. Stockpile excavated material in areas designated by ENGINEER according to classifications given under materials portion of this section.
L. Do not disturb soil within branch spread of existing trees or shrubs that are to remain.
M. Coordinate with OWNER's representative prior to reaching founding level for foundations and prior to placing mud slabs to request observation.

3.4 COMPACTED FILL

A. Preparation for Fill Placement:
   1. Do not start backfilling operations until structures have been inspected and backfilling authorized by OWNER's representative or the ENGINEER. Backfill against structures in accordance with Section 31 02 01, STRUCTURAL EXCAVATING, BACKFILLING AND COMPACTING.
   2. Ensure areas to be filled are free from debris, snow, ice and water, and that ground surfaces are not in a frozen condition.
   3. Do not place fill over existing subgrade surfaces which are porous, wet or spongy.
   4. Proofroll subgrade with minimum 25-ton pneumatic roller or loaded dump truck under observation of OWNER's representative. Remove soft or unstable areas and replace with select fill, then scarify subgrade to a depth of 6 inches and compact to a minimum of 95 percent of ASTM D698 at a moisture content within 3 percent of optimum moisture. Density and moisture content of the compacted subgrade shall be maintained until it has been covered with the next course of construction.
   5. Place compacted fill to grades, contours, levels and elevations shown on Drawings. After dumping, spread the material in horizontal layers. Place fill in maximum 6-inch compacted lifts compacted to a minimum of 95 percent Standard Proctor (ASTM D698) at a moisture content within 3 percent of optimum moisture. Density and moisture content of each lift of fill must be maintained until the next lift is placed.
   6. Existing hillsides or slopes which will receive fill should be loosened by scarifying or plowing to a depth of not less than 8 inches. The fill material shall be benched into the existing slope in such a manner as to provide adequate bonding between the fill and slope, as well as to allow the fill to be placed in horizontal lifts.
   7. Fills should extend a minimum of 5 feet outside of building lines and slope to natural grade.
B. Material Placement:
   1. General:
      a. Place fill in maximum 6-inch compacted lifts compacted to a minimum of 95 percent Standard Proctor (ASTM D698) at a moisture content within 3 percent of optimum moisture. Density and moisture content of each lift of fill must be maintained until the next lift is placed. Use a method so as not to disturb or damage completed work constructed in the excavations.
      b. If the surface is too smooth and hard to bond properly with a succeeding layer, the surface shall be roughened and loosened by disking before the succeeding layer is placed.

c. Where fill is to be placed next to existing fill, that fill shall be removed to unweathered, dense material. Each layer shall be benched and disked as adjoining lifts are placed. Material hauling equipment shall be so routed to prevent the formation of ruts.
d. The surface of the fill shall be graded to drain freely and maintained throughout construction. During the dumping and spreading process, all roots, debris and all rocks greater than 3 inches in maximum dimension shall be removed.
e. Following the spreading and mixing of the soil, it shall be processed by disking or pulverizing throughout its thickness to break up and reduce clod size, and provide additional blending of materials.
f. The moisture content of the soil shall be adjusted, if necessary, by either aeration or the addition of water to bring the moisture content within the recommended range. Water required for sprinkling to bring the fill material to the proper moisture content shall be applied evenly through each layer.
g. Any layers which become damaged by weather conditions shall be processed to meet recommended requirements. The compacted surface of a layer of fill shall be lightly loosened by disking before the succeeding layer is placed.

C. Compaction:
1. Compact fill materials listed below to required percentages of maximum dry density.
a. Compact non-expansive earth fill in top 12 inches under paving or building to a minimum of 95 percent of maximum dry density of an ASTM D1557 Modified Proctor at a moisture content with 3 percent of optimum moisture.
b. Compact non-expansive earth fill and general earth fill not under roads or in embankment and more than 1 foot beneath roads to a minimum of 95 percent of ASTM D698 at a moisture content within 3 percent of optimum moisture.
c. Compact non-expansive earth fill against underground walls to between 95 and 100 percent of ASTM D698 at a moisture content within 3 percent of optimum moisture.
d. Place Select Fill in maximum 6-inch compacted lifts compacted to a minimum of 95 percent Standard Proctor (ASTM D698) at a moisture content within 3 percent of optimum moisture.
e. Minimum Frequency of Density Tests:
1) Bearing: 1 test/3000 square feet per list or minimum of 2 tests per lift.
2) Structure Fills: 1 test/3000 square feet per lift, minimum 2 test per lift.
3) Backfill: 1 test/6000 square feet per lift, minimum 2 tests per lift.
4) Trench backfill: 1 test/150 Lf trench per lift, minimum 2 tests per lift.
f. The CONTRACTOR shall be responsible for the actual quality of the fill, in place. Satisfactory test results shall not be considered as the sole factor of the quality of the fill operation.
g. The moisture content and density of all fill shall be maintained at the specified range of moisture and density.
2. Compact aggregate fill material in maximum 6-inch thick lifts.
a. Aggregate fill for pipe bedding shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D4253. The moisture content shall be in a range that will accommodate efficient placement and compaction.
3. Prior to placement of aggregate base course material for paved areas, remove soft or unstable areas and replace with aggregate base course material, then scarify subgrade to a depth of 6 inches and compact to a minimum of 95 percent of ASTM D698 at a moisture content within 3 percent of optimum moisture. Density and moisture content of the compacted subgrade shall be maintained until it has been covered with base course material.

3.5 SUBGRADE

A. The CONTRACTOR shall excavate or fill to the top of proposed subgrade so that the specified thickness of base course material will be obtained across the section. After excavation or fill has been made to the subgrade elevation as shown on the Plans, the CONTRACTOR shall

prepare the subgrade for compaction by scarifying and disking the subgrade a minimum of 6 inches and a maximum of 8 inches. Water shall be added to the soil if necessary, and the soil disked again to obtain a uniform moisture content throughout the depth of the subgrade. Moisture of the compacted subgrade shall be at optimum moisture content or at a tolerance of +/- 3%, which will be determined by soil laboratory analysis. If it is determined the moisture content is not uniform or within the limits specified, water shall be added and the subgrade disked again; or the soil shall be disked to the extent necessary to dry the soil to the specified limits, all at the CONTRACTOR's expense.

B. After the subgrade has been prepared to the specified moisture content, subgrade shall be compacted for the full street section to 95% per ASTM D698 for a depth of 6 inches. Any areas of subgrade failing to meet the specified density shall be re-disked and recompacted until the correct density is obtained, all at the CONTRACTOR's expense. If determined by the ENGINEER or City Representative, a minimum of one density test per 6,000 square feet shall be made by an independent soil testing laboratory for Quality Control of the finished work.

C. Compaction of the subgrade shall be performed with sheep foot rollers, pneumatic rollers and flat steel wheel rollers to the extent necessary to obtain the specified soil density. Final compaction shall be made by flat steel wheel rollers or pneumatic tire rollers to leave a smooth surface on which to install the base course material.

D. The subgrade shall be shaped with a self-propelled grader, and all holes, ruts and depressions filled with an approved material and rolled to the extent directed by the ENGINEER. The surface of the subgrade shall be finished to the required lines and grade; and any deviation in excess of 1/4 inch, when checked with a 16 foot straight edge, shall be corrected by the CONTRACTOR.

3.6 SCHEDULE

A. General Earth Fill:
   1. Use under seeded areas, backfill at depths of more than 5 feet below and 5 feet outside of roads and in embankments (except for clay liner material) unless, otherwise shown on Drawings.
   2. Fill to within 4 inches of finished grade as backfill adjacent to structures.

B. Non-Expansive Earth Fill: Use as backfill for the top 5 feet depth under roads as shown on Drawings. Use to 5 feet outside the limits of roads.

C. Low Permeability Earth Fill: Use for top 2 feet of interior slope of embankments.

D. Select Fill: Use as backfill against structure walls and beneath structures.

E. Class I Aggregate Fill: Use for over excavated areas under structures and as otherwise shown on Drawings.

F. Class 2 Aggregate Fill: Use for pipe embedment and initial backfill per details in the Plans.

G. Sand Fill: Use for small pipe embedment (#2-inch diameter).

H. Topsoil: Use within limits of seeded areas after substantial completion of construction and other fill has been placed.

I. Unclassified Material: Dispose of on-site as directed by the OWNER .

3.7 TOLERANCES

A. Site grading to conform to Plans within the following tolerances:
   1. Drainage ditches: 0.10 feet.
   2. Excavations: plus zero to -0.10 feet.
   3. Compacted fill: 0.10 feet.

3.8 SURPLUS MATERIAL

A. CONTRACTOR shall, at no cost to the OWNER, dispose of unclassified material, surplus fill materials and excess topsoil on-site as directed by the OWNER.
B. Leave stockpile areas and entire jobsite clean and raked, ready to receive seeding.

3.9 WATER INJECTION

General specifications for water injection under the new building are included below. Compliance with this Specification is essential. The injection depth is a minimum of 10 feet below existing grade.

A. Injection process shall be observed on a full-time basis by a qualified inspector under the direction of the OWNER's designated geotechnical ENGINEER.
B. A surfactant (wetting agent) shall be added to the water. The amount of surfactant used should be in accordance with the manufacturer's recommendations.
C. The lower portion of the injection nozzle shall consist of a hole pattern that will uniformly disperse the water throughout the entire depth.
D. Injection pressures should be adjusted to disperse as large a volume of water as possible within a pressure range of 50 to 200 pounds per square inch.
E. Injection pipe shall be forced downward (not jetted or washed) in 12 to 18 inch intervals, injecting to refusal at each interval. For an injection depth of 10 feet a minimum of 7 intervals shall be used and for an injection depth of 5 feet a minimum of 4 intervals shall be used. Refusal will be determined on site by the inspector.
F. Spacing for the injections not to exceed five feet on center each way, and injections shall be carried at least five feet outside building lines. Subsequent injections should be offset from initial locations in a pattern that maximizes distribution of the mixture.
G. After the recommended number of injection passes the moisture content of the soils shall be evaluated by the OWNER's designated geotechnical ENGINEER on the basis of laboratory tests on tube samples (not cuttings) obtained from borings under his supervision following a twenty-four-hour curing period. This ENGINEER shall develop recommendations on the need for any additional injections.
H. In the event that more than three injections passes are required, the surface of the injected area shall be scarified to a depth of at least eight inches and re-compacted prior to the next injection.
I. The surface of the injected area should be sealed or otherwise protected against moisture loss as soon as possible after acceptance of the water injection process.

3.10 MAINTENANCE

Following the final shaping of material, the base course shall be maintained throughout its entire length by the use of a standard road machine or motor grade and rollers until such time as, in the judgment of the ENGINEER, base course meets the required density, is properly bonded and is suitable for priming. The base shall be properly drained at all times. During this maintenance period, any deficiencies in thickness, composition, smoothness or density shall be corrected in a satisfactory manner.

The CONTRACTOR shall be fully responsible for maintaining and preserving the completed base course during the period prior to surface treatment. Upon completion of the base course, if the asphaltic surface cannot be applied, the CONTRACTOR shall apply an emulsion of primer coat to the base surface in order to afford dust control and assist in base maintenance. CONTRACTOR shall return to the project as often as required to fill holes in the base surface and add primer as required or recommended by the ENGINEER.

-- END OF SECTION --

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SECTION 31 08 01 - LIME TREATED SUBGRADE

PART 1 GENERAL

1.1 DESCRIPTION

This item shall consist of constructing one or more courses of a mixture of soil, lime, and water in accordance with this Specification, and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans. Lime-treated subgrade shall fully comply with City of Abilene requirements and shall be applied at _24_ LBS/SY.

1.2 REFERENCE STANDARDS

AASHTO T 26 - Standard Method of Test for Quality of Water to Be Used in Concrete; Latest Edition.
ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)); 2012.
ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2015.
ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 2015.

PART 2 PRODUCTS

2.1 MATERIALS

A. Hydrated Lime shall conform to the requirements of ASTM C207, Type N or pelletized lime will be allowed.

B. Commercial Lime Slurry shall be a pump-able suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity naturally injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids content", shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following requirements as to chemical composition and residue.

1. Chemical Composition: The "solids content" of the lime slurry shall consist of a minimum of 70%, by weight, of calcium and magnesium oxides.
2. Residue: The percent by weight of residue retained in the "solids content" of lime slurry shall conform to the following requirements:
   Residue retained on a No. 6 (3360 micron) sieve Max. 0.0%
   Residue retained on a No. 10 (2000 micron) sieve Max. 1.0%
   Residue retained on a No. 30 (590 micron) sieve Max. 2.5%
3. Commercial lime slurry shall conform to one of the following two grades:
   Grade 1 - The "dry solids content" shall be at least 31% by weight, of the slurry.
   Grade 2 - The "dry solids content" shall be at least 35%, by weight, of the slurry.
4. Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water shall be tested in accordance with and shall meet the suggested requirements of AASHTO T 26. Water known to be or potable quality may be used without test.
5. Soil for this work shall consist of materials on the site or selected materials from other sources and shall be uniform in quality and gradation, and shall be approved by the ENGINEER. The soil shall be free of roots, sod, weeds, and stones larger than 2-1/2 inches (60 mm).

2.2 COMPOSITION

A. Lime shall be applied at the rate specified on the Plans for the depth of subgrade treatment of 6 inches.

B. Tolerances: At final compaction, the lime and water content for each course of subgrade treatment shall conform to the following tolerances:

Material	Tolerance
Lime	+0.5%
Water	+2% / -0%

2.3 WEATHER LIMITATIONS

The lime-treated subgrade shall not be mixed while the atmospheric temperature is below 40 degrees F (4 degrees C) or when conditions indicate that temperatures may fall below 40 degrees F (4 degrees C) within 24 hours, when it is foggy or rainy, or when soil or subgrade is frozen.

2.4 EQUIPMENT

The equipment required shall include all equipment necessary to complete this item such as: grading and scarifying equipment, a spreader for the lime or lime slurry, mixing or pulverizing equipment, sheepsfoot and pneumatic or vibrating rollers, sprinkling equipment, and trucks.

PART 3 EXECUTION

3.1 CONSTRUCTION METHODS

A. General: It is the primary requirement of this Specification to secure a completed subgrade containing a uniform lime mixture, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth, and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the CONTRACTOR to regulate the sequence of his/her work, to use the proper amount of lime, maintain the work, and rework the courses as necessary to meet the above requirements.

Prior to beginning any lime treatment, the subgrade shall be constructed and brought to grade and shall be shaped to conform to the typical sections, lines, and grades as shown on the Plans. The material to be treated shall then be excavated to the secondary grade (proposed bottom of lime treatment) and removed or windrowed to expose the secondary grade. Any wet or unstable materials below the secondary grade shall be corrected, as directed by the ENGINEER, by scarifying, adding lime, and compacting until it is of uniform stability. The excavated material shall then be spread to the desired cross section.

If the CONTRACTOR elects to use a cutting and pulverizing machine that will remove the subgrade material accurately to the secondary grade and pulverize the material at the same time, he will not be required to expose the secondary grade nor windrow the material.

However, the CONTRACTOR shall be required to proof-roll the subgrade, as directed by the ENGINEER and correct any soft areas that this rolling may reveal before using the pulverizing machine. This method will be permitted only where a machine is provided which will ensure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a smooth surface over the entire width of the cut. The machine must give visible indication at all times that it is cutting to the proper depth.

B. Application: Lime shall be spread only on the area where the first mixing operations can be completed during the same working day. The application and mixing of lime with the soil shall be accomplished by the methods hereinafter described as "Dry Placing" or "slurry Placing".

When hydrated lime is specified, the CONTRACTOR may use either method. Pelletized lime will also be allowed.

1. Dry Placing. The lime shall be spread uniformly over the top of the subgrade by an approved screw-type spreader box or other approved spreading equipment. The amount of lime spread shall be the amount required for mixing to the specified depth which will result in the percentage determined in the job mix formula.
   The lime shall be distributed in such a manner that scattering by wind will be minimal. Lime shall not be applied when wind conditions, in the opinion of the ENGINEER, are detrimental to a proper application. A motor grader shall not be used to spread the lime. The material shall be sprinkled, as directed by the ENGINEER, until the proper moisture content has been reached.
2. Slurry Placing. The lime shall be mixed with water in trucks with approved distributors and applied as a thin water suspension of slurry. Commercial lime slurry shall be applied with a lime percentage not less than that applicable for the grade used. The distribution of lime shall be attained by successive passes over a measured section of subgrade until the proper amount of lime has been spread. The amount of lime spread shall be the amount required for mixing to the specified depth which will result in the percentage determined in the job mix formula. The distributor truck shall continually agitate the slurry to keep the mixture uniform.

C. Mixing: The mixing procedure shall be the same for "Dry Placing" or "Slurry Placing" as hereinafter described.

1. First Mixing. The full depth of the treated subgrade shall be mixed with an approved mixing machine. Lime shall not be left exposed for more than 6 hours. The mixing machine shall make two coverage's. Water shall be added to the subgrade during mixing to provide a moisture content above the optimum moisture of the material and to ensure chemical action of the lime and subgrade. After mixing, the subgrade shall be lightly rolled to seal the surface and help prevent evaporation of moisture. The water content of the subgrade mixture shall be maintained at a moisture content above the optimum moisture content for a minimum of 48 hours or until the material becomes friable. During the curing period, the material shall be sprinkled as directed. During the interval of time between application and mixing, lime that has been exposed to the open air for 6 hours or more, or to excessive loss due to washing or blowing will not be accepted for payment.
2. Final Mixing. After the required curing time, the material shall be uniformly mixed by approved methods. If the mixture contains clods, they shall be reduced in size by blading, discing, harrowing, scarifying, or the use of other approved pulverization methods so that the remainder of the clods shall meet the following requirements when tested dry by laboratory sieves:

	Percent Passing
Minimum of clods passing 1-1/2" sieve	100%
Minimum of clods passing No. 4 sieve	60%

D. Compaction of the mixture shall begin immediately after final mixing. The material shall be aerated or sprinkled as necessary to provide optimum moisture. The field density of the compacted mixture shall be at least 93 percent of the maximum density of laboratory specimens prepared from samples taken from the material in place that passed the sieve analysis. The specimens shall be compacted and tested in accordance with ASTM D698. The in-place field density shall be determined in accordance with ASTM D1556/D1556M or ASTM D2167. Any mixture that has not been compacted shall not be left undisturbed for more than 30 minutes. The moisture content of the mixture at the start of compaction shall not be below nor more than 2 percentage points above the optimum moisture content. The optimum moisture content shall be determined in accordance with ASTM D698 and shall be less than that amount which will cause the mixture to become unstable during compaction and finishing.

The material shall be sprinkled and rolled as directed by the ENGINEER. All irregularities, depressions, or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required, and reshaping and recompacting by sprinkling and rolling. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereon or the work is accepted.

In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests will be made by the ENGINEER. If the material fails to meet the density requirements, it shall be reworked to meet these requirements. Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and shall conform with the typical section shown on the plans and to the established lines and grades. Should the material, due to any reason or cause, lose the required stability, density, and finish before the next course is placed or the work is accepted, it shall be recompacted and refinished at the sole expense of the CONTRACTOR.

E. Finishing and Curing: After the final layer or course of lime-treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The completed section shall then be finished by rolling, as directed, with a pneumatic or other suitable roller sufficiently light to prevent hair cracking. The finished surface shall not vary more than 3/8 inch when tested with a 16-foot straightedge applied parallel with and at right angles to the pavement centerline. Any variations in excess of this tolerance shall be corrected by the CONTRACTOR, at his/her own expense, in a manner satisfactory to the ENGINEER.

   The completed section shall be moist-cured for a minimum of 7 days before further courses are added or any traffic is permitted, unless otherwise directed by the ENGINEER. Subsequent courses shall be applied within 14 days after the lime-treated subgrade is cured.

F. Thickness: The thickness of the lime-treated subgrade shall be determined by depth tests or cores taken at intervals so that each test shall represent no more than 600 square yards. When the base deficiency is more than 1/2 inch, the CONTRACTOR shall correct such areas in a manner satisfactory to the ENGINEER. The CONTRACTOR shall replace, at his/her expense, the subgrade material where borings are taken for test purposes.

G. Maintenance: The CONTRACTOR shall maintain, at his/her own expense, the entire lime-treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the ENGINEER.

-- END OF SECTION --

SECTION 31 11 01 - CRUSHED AGGREGATE BASE COURSE

PART 1 GENERAL

1.1 GENERAL

This item consists of a base course composed of crushed aggregate and binder constructed on the prepared subgrade in accordance with these Specifications and in conformity with the dimensions and typical cross section shown on the Plans to the lines and grades established by the Engineer.

1.2 REFERENCE STANDARDS

AASHTO T 11 - Standard Method of Test for Materials Finer Than 75 Micrometer (No.200) Sieve in Mineral Aggregates by Washing; 2005; R 2013.
AASHTO T 27 - Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates; 2014.
TxDOT Item 249
TEX-113-E

PART 2 PRODUCTS

2.1 MATERIALS

A. The aggregate shall be either crushed stone, crushed gravel or crushed slag. The fine aggregate shall be screenings obtained from crushing stone, gravel or slag. Sand or approved binder may be used as filler, but shall not exceed 15 percent by weight of the total combined aggregates.

B. The crushed stone shall consist of hard durable particles or fragments of stone which is free of an excess of flat or disintegrated pieces, dirt or other objectionable matter.

C. The crushed gravel shall consist of hard, durable stones, rock and boulders of acceptable quality and gradation and shall be free of an excess of flat or disintegrated pieces, dirt or other objectionable matter. The methods used in production of the crushed gravel shall be such that the finished product shall be as uniform as practical. The crushing of the gravel shall result in a product of which 100% of the material particles will have at least one fractured face. If necessary to meet this requirement or to eliminate an excess of fine particles, the gravel shall be screened before crushing.

D. The crushed aggregate shall meet the gradation requirements specified in the proposal and given in the following table, using AASHTO T 11 and AASHTO T 27.

TABLE I - REQUIREMENTS FOR GRADATION OF AGGREGATE
TxDOT Item 249, Type A, Grade 1

Sieve Designation	% by Weight Retained
1-3/4 inch	0
7/8 inch	10 - 35
3/8 inch	30 - 50
No. 4 sieve	45 - 65
No. 40 sieve	70 - 85
Maximum P.I.	10
Maximum Liquied Limit	35

E. All material shall be stockpiled as specified prior to sampling. Samples will be taken from the stockpile by approved sampling techniques, and no deliveries shall be made prior to acceptance of the stockpile by the ENGINEER. The processed material shall be stockpiled to a

uniform height. The stockpile shall be a minimum of 15 feet and a maximum of 20 feet in height and is to be formed with at least 10 layers with each layer being leveled before placing the next layer. Each layer shall be no more than 2 feet thick. In loading from the stockpile for delivery to the job site, the material shall be loaded by making successive vertical cuts through the entire depth of the stockpile.

F. The material supplier shall furnish the ENGINEER certification that all materials furnished are from the approved stockpile. The CONTRACTOR shall furnish the ENGINEER certification that no material other than that from the approved stockpile is delivered to the job site and shall also furnish a certified weight ticket for each load of material delivered to the job site.

2.2 ADDITIONAL FINE MATERIAL

A. If additional fine material in excess to that naturally present in the base course material is necessary for correcting the gradation to the limitations of the specified gradation, for satisfactory bonding of the base material or for changing the soil constants of the material passing the No. 40 mesh sieve, it shall be uniformly blended and mixed with the base course material at the crushing plant or by an approved plant. The additional fine material for this purpose shall be obtained primarily from the crushing of stone or gravel; and when used, shall be of a gradation as necessary to accomplish the specified gradation in the final mixed base course material. The additional fine material may be composed of sand, but the amount of sand shall not exceed 10 percent by weight of the combined base material. The sand shall all pass a No. 40 mesh sieve and not more than 5 percent by weight shall pass a No. 200 mesh sieve.

PART 3 EXECUTION

3.1 CONSTRUCTION METHODS

A. Operation at Sources of Supply: All work involved in clearing and stripping of quarries and pits including handling unsuitable material encountered shall be performed by the CONTRACTOR at his own expense. The base material shall be obtained from approved sources. The material shall be handled in such a manner that a uniform and satisfactory product will be secured.

B. Equipment: All equipment necessary for the proper construction of this work shall be on the project site in first class working condition and shall be approved by the ENGINEER before construction is permitted to begin. The flat wheel roller shall be of the three-wheel type, weighing not less than ten tons. The roller shall have a rear wheel compression of not less than 330 pounds per linear inch of tire width and shall be equipped with adjustable scrapers. The pneumatic roller shall consist of pneumatic tired wheels arranged in a manner to provide a satisfactory compacting unit. The roller shall have an effective rolling width of at least 60 inches and shall give a compression of at least 275 pounds per inch of width of tread when fully loaded. Other equipment may be used for compacting and consolidating the base course upon approval by the ENGINEER. Such equipment shall be routed over the area being compacted and shall be operated until the required density is obtained. Equipment for spreading and shaping shall consist of spreader boxes having strike-off templates, screeds or other approved spreading devices which will place the base material in a uniform layer with a minimum of segregation. Provisions shall be made by the CONTRACTOR for furnishing water at the plant or at the site of the work by equipment of ample capacity and of such design as to assure uniform application.

C. Subgrade: Subgrade and existing street surface shall be prepared as specified and checked and accepted by the ENGINEER before placing and spreading operations are begun. Any ruts or soft, yielding places which appear by reason of improper drainage conditions, hauling or from any other cause shall be corrected and roller to the required compaction before the base

course is placed thereon. Grade control between the edges of the gutters shall be by means of grade stakes, steel pins or forms placed in lanes parallel to the center line of the street by the CONTRACTOR and at intervals sufficiently close that string lines or check boards may be placed between the stakes, pins or forms.

D. Plant Mix: The base material shall be uniformly blended during crushing operations in an approved plant. The type of plant may either be a central proportioning and mixing or a traveling mix plant. The plant shall blend and mix the materials to meet these Specifications.

E. Placing and Spreading: The crushed aggregate base material that has been proportioned in a crushing and screening plant or proportioned and processed in a central mixing plant shall be placed on the prepared subgrade and compacted in layers of thickness of not more than 6 inches.

Depositing and spreading of material shall commence where designated and shall progress continuously without breaks. The material shall be deposited and spread in lanes in a uniform layer and without segregation of size to such loose depth that when compacted the layer will have the required thickness. It shall be the charge of the CONTRACTOR that the required amount of approved material be delivered in each 100-foot station. The base material shall be spread by use of spreader boxes or other approved devices or methods that will spread the material in the required amount in a manner to avoid or minimize the need for re-handling material and to prevent the rutting of underlying course. The spreader boxes or other devices shall be equipped with strike-off templates or screeds that can be adjusted or controlled to secure the required thickness of material. Dumping from vehicles in piles on the subgrade so as to require re-handling will be permitted; however, in such event, the material shall be graded into windrows and sample of material taken from windrows shall meet the gradation specified. Use of motor graders for spreading, manipulating or working the base may be used if desired.

METHOD OF PLACING - The base course shall be constructed in a layer of not less than 2-1/2 inches nor more than 6 inches of compacted thickness. The aggregate as spread shall be of uniform gradation with no segregation or pockets of fine or coarse materials. The aggregate, unless other permitted by the ENGINEER, shall not be spread more than 4,000 square yards in advance of the rolling. Any necessary sprinkling shall be kept within these limits. No materials shall be place in snow or on a soft, muddy or frozen subbase or underlying course.

For the second layer, the construction procedure herein described shall apply.

The ENGINEER will make tests to determine the maximum density and the proper moisture content of the base material and this information will be available to the CONTRACTOR. The base material shall be at a uniform moisture content and optimum moisture content with a tolerance of +/-2% when rolling is started. Any minor variations shall be corrected by sprinkling or by aeration until the specified moisture content is obtained. During the placing and spreading caution shall be exercised to prevent the incorporation of subgrade, subbase or shoulder material in the base course mixture.

F. Finishing and Compacting: After spreading, the base material shall be thoroughly compacted by rolling and sprinkling when necessary. Any single roller shall perform the rolling for not more than 25 cubic yards per hour and additional rollers shall be provided when spreading is greater than this rate. Rolling shall progress gradually from the sides to the center of the land under construction or from one side toward previously placed material by lapping uniformly each preceding pass by one-half the width of such pass and shall continue until the entire area of the course has been rolled. Rolling shall continue until the base material has been compacted to not less than 100% per TEX-113-E. In addition to the requirements specified for density, the full depth of the base course shown on the Plans shall be compacted to the extent necessary to

remain firm and stable under construction equipment. Blading and rolling shall be done alternately as required or as directed to obtain a smooth, even and uniformly compacted base. For final rolling, either 10 ton three-wheel or 8 ton tandem rollers may be used. The course shall not be rolled when the underlying course is soft or yielding or when the rolling causes a wavelike motion in the base course. When the rolling develops irregularities, which exceed 3/8 inch when tested with a 16 foot straight edge, the irregular surface shall be loosed, refilled with the same kind of materials as that used in constructing the course, and rolled again as required above. Along places inaccessible to rollers, the base course material shall be thoroughly tamped with mechanical or hand tampers. Each hand tamper shall weight not less than 50 pounds and have a face area or not more than 100 square inches.

3.2 TESTING

A. After the base course is completely compacted, the surface shall be tested for smoothness and accuracy of grade and crown. If any portions are found to lack required smoothness or fail in accuracy of grade or crown, such portions shall be scarified, reshaped, recompacted and otherwise manipulated as the ENGINEER may direct until the required smoothness and accuracy are obtained. The finished surface shall be such that it will not vary more than 3/8 inch from the 16-foot straight edge applied to the surface parallel to the center line and at right angles.

3.3 PROTECTION OF BASE COURSE

A. Work on the base course shall not be performed during freezing temperatures nor when the subgrade is wet. When the base materials contain frozen material or the underlying course is frozen, the construction operations shall be stopped. In general, hauling equipment may be routed over completed portions of the base course provided no excessive damage results and such equipment is routed over the full width of the base course to avoid rutting or uneven compaction. However, the ENGINEER shall have full and specific authority to stop all hauling over completed or partially completed base course when, in his opinion, such hauling is causing damage. Any damage resulting to the base course from routing of equipment over the base course shall be repaired by the CONTRACTOR at his own expense.

3.4 MAINTENANCE

A. Following the final shaping of the material, the base course shall be maintained throughout its entire length by the use of a standard road machine or motor grade and rollers until such time as, in the judgment of the ENGINEER, base course meets the required density, is properly bonded and is suitable for priming. The base shall be properly drained at all times. During this maintenance period, any deficiencies in thickness, composition, smoothness or density shall be corrected in a satisfactory manner.

B. The CONTRACTOR shall be fully responsible for maintaining and preserving the completed base course during the period prior to surface treatment. Upon completion of the base course, if the asphaltic surface cannot be applied, the CONTRACTOR shall apply an emulsion or primer coat to the base surface in order to afford dust control and assist in base maintenance. CONTRACTOR shall return to the project as often as required to fill holes in the base surface and add primer as required.

-- END OF SECTION --

SECTION 33 10 01 - CULVERTS

PART 1 GENERAL

1.1 WORK INCLUDED

This item shall consist of furnishing and installing new culvert crossings in the designated locations. The culvert will receive concrete headwalls, wing walls, sloped end treatment or riprap protection for each culvert as shown on the Plans.

1.2 REFERENCE STANDARDS

PART 2 PRODUCTS

2.1 CULVERT

A. Reinforced Concrete Box (RCB): The box culvert shall be new pre-cast reinforced concrete box which conforms to all TxDOT and local standards. Pre-Cast Box shall be Hanson Precast or approved equal.
B. High Density Polyethylene Pipe (HDPE) Culvert: HDPE pipe shall have smooth interior and annular exterior corrugations. HDPE pipe shall be ADS, or approved equal.
C. Corrugated Metal Pipe (CMP): CMP shall have standard interior and exterior corrugations or smooth interior as directed on Plans. The CMP shall be Contech or approved equal.
D. Reinforced Concrete Pipe (RCP): The pipe culvert shall be new reinforced concrete pipe which conforms to all TxDOT and local standards. RCP shall be Hanson Precast or approved equal.

2.2 CONCRETE AND REINFORCING

A. Concrete: Concrete for this item shall conform to the requirements of Class "A" Concrete, THD Specifications.
B. Reinforcement: Reinforcing steel shall either be wire mesh or bar reinforcement as shown on Plans. If wire mesh is used, it shall be 6" x 6" Number 10 or Number 6 plain electric welded reinforcing fabric or its equal. A minimum lap of 6 inches shall be used at all splices. At the edge of the riprap, the wire mesh shall not be less than 1 inch nor more than 3 inches from the edge of the concrete and shall not have wire projecting beyond the last member parallel to the edge of the concrete. If bar reinforcement is used, the sectional area of steel in each direction shall not be less than the sectional area of the wire mesh described above. The spacing of bar reinforcement shall not exceed 19 inches in each direction, and the distance from the edge of the concrete to the first parallel bar shall not exceed 6 inches.

PART 3 EXECUTION

3.1 GENERAL

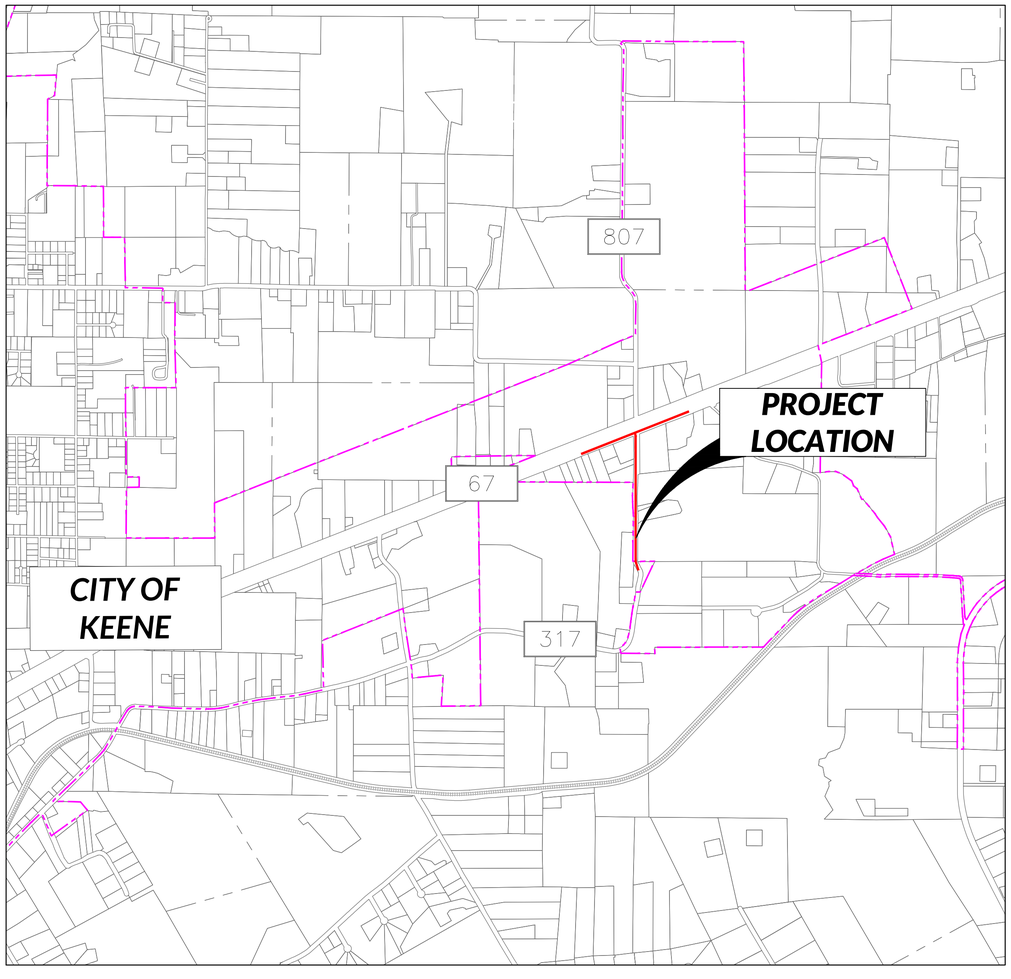
A. The ditch shall be excavated and shaped in order that the culvert may be set to the designated grade. The ditch shall be backfilled with sand, or other granular material, approved by ENGINEER, and compacted to the density of the adjacent compacted base material under the entire roadway. Backfill will be compacted around sides and ends of culvert.
B. Reinforcement shall be properly supported throughout the placement to maintain its position equidistant from the top and bottom surfaces of the slab.
C. The slopes and bottom of the trench for the walls shall be sprinkled and consolidated to the satisfaction of the ENGINEER. All surfaces shall be moist when concrete is placed.
D. After concrete has been placed, compacted, and shaped to conform to the dimensions shown on the Plans, and has set sufficiently to avoid slumping, the surface shall be finished with a wooden float to secure a reasonable smooth surface. Curing of concrete shall conform to Section 03 09 01, GENERAL CONCRETE.

-- END OF SECTION --

PLANS FOR
CR 317 RECONSTRUCTION
MAY 2026

TxDOT NOTES:

1. ALL CONSTRUCTION WITHIN STATE RIGHT-OF-WAY WILL REQUIRE COMPLIANCE TO TxDOT STANDARD SPECIFICATIONS, STANDARD PLANS, AND TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
2. SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024, AND SPECIFICATION ITEMS LISTED AS FOLLOWS GOVERN ON THIS PROJECT FOR ALL WORK WITHIN STATE RIGHT-OF-WAY.
3. DRAINAGE FOR THIS DEVELOPMENT WILL BE DESIGNED SUCH THAT THERE WILL BE NO ADVERSE IMPACTS ON THE CAPACITY, FUNCTION, OR INTEGRITY OF TEXAS DEPARTMENT OF TRANSPORTATION RIGHT OF WAY DRAINAGE FACILITIES.



PROJECT VICINITY MAP
1" = 1000'

NORTH

CITY OF KEENE TEXAS

COUNCIL MEMBERS

SAMANTHA GILLIN. . . . . MAYOR PRO-TEM, PLACE II

ROB FOSTER. . . . . WARD 1

JOHNNY SHAW. . . . . WARD 2

CHARLES EASLEY. . . . . WARD 3

TROY SMITH. . . . . PLACE I

BOB CHAPMAN. . . . . PLACE III

JOHNATHAN SEITZ. . . . . CITY MANAGER

HOLLY RUSSELL. . . . . CITY SECRETARY

REVISIONS:	
DESCRIPTION	DATE

STATE OF TEXAS
DEREK TURNER
84843
LICENSED
PROFESSIONAL ENGINEER
5/18/26

JACOB MARTIN
1925 FORT WORTH HIGHWAY
WEATHERFORD, TEXAS 76086
817.594.9880

TBPE FIRM # 2448 | TBAE FIRM # BR 2261 | TBPELS FIRM # 10194493

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED
PROFESSIONAL ENGINEER
05-18-2026

Plotted by: nic kirk Plot Date: 5/18/2026 3:12 PM
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X:\CL_Keene\25510 – CR 317 Reconstruction – Keene\Drafting_Plans_C_Civil\25510_02_NOTES.dwg

GENERAL CONSTRUCTION NOTES:

1. CONTRACTOR TO FIELD VERIFY SIZE AND LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION. (TEXAS ONE CALL SYSTEM (1-800-545-6005). CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES WHICH ARE TO REMAIN. BURIED UTILITIES SHOWN ON THE PLANS HAVE BEEN ESTABLISHED BY ON GROUND INFORMATION AS WELL AS COORDINATION WITH UTILITY COMPANIES. LOCATIONS MAY NOT BE EXACT AND OTHER UTILITIES MAY EXIST.
2. PRIOR TO COMMENCEMENT OF CONSTRUCTION, ALL PARTIES THAT MEET THE DEFINITION OF OPERATOR AS DEFINED BY THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ) TPDES CONSTRUCTION GENERAL PERMIT TXR150000 SHALL SUBMIT REQUIRED NOTIFICATION WHICH MAY INCLUDE A COPY OF THE NOTICE OF INTENT (NOI) FILED WITH THE TCEQ AND/OR A CONSTRUCTION SITE NOTICE (CSN). A COPY OF THE NOI OR THE CSN SHALL BE PROVIDED TO THE CITY. THE NOI/CSN FORMS AND PERMIT REQUIREMENTS MAY BE OBTAINED FROM TCEQ AT www.TCEQ.state.tx.us/nav/permits/wq_construction.html. A STORM WATER POLLUTION PREVENTION PLAN (SWP3) SHALL BE DEVELOPED AND IMPLEMENTED PRIOR TO COMMENCEMENT OF CONSTRUCTION. QUESTIONS CONCERNING THESE REQUIREMENTS MAY BE ADDRESSED TO TCEQ SMALL BUSINESS LOCAL GOVERNMENT ASSISTANCE PROGRAM AT 800-447-2827.
3. ALL EXCAVATION GREATER THAN 5 FEET DEEP SHALL COMPLY WITH O.S.H.A. TRENCH SAFETY STANDARDS.
4. ALL MATERIAL FOR THIS PROJECT SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
5. CONTRACTOR SHALL CONTACT A REPRESENTATIVE FROM THE GAS COMPANY A MINIMUM OF 48 HOURS BEFORE COMPLETING GAS LINE CROSSINGS.
6. NO CHANGE IN THE WORK PERFORMED SHALL BE AUTHORIZED WITHOUT APPROVAL OF THE ENGINEER.
7. THE CONTRACTOR SHALL CONTROL EROSION AND SEDIMENTATION PER THE APPLICABLE PERMITS, LAWS, AND REGULATIONS.
8. CONTRACTOR SHALL MINIMIZE DAMAGE TO EXISTING LANDSCAPING ON PRIVATE PROPERTY. EXISTING LANDSCAPING SHALL BE REPAIRED TO ITS ORIGINAL CONDITION INCLUDING THE REPLACEMENT OF EXISTING LAWN AREAS WITH THE SAME TYPE OF LAWN AS WAS REMOVED.
9. ALL ABOVE GROUND STRUCTURES SHALL BE PROTECTED BY THE CONTRACTOR FROM DAMAGE DURING THE CONSTRUCTION PROCESS. ANY DAMAGE DONE ON PRIVATE PROPERTY SHALL BE REPLACED OR REPAIRED TO ORIGINAL OR BETTER CONDITIONS.
10. CONTRACTOR SHALL KEEP THE JOB SITE CLEAN AND FREE OF DEBRIS DURING CONSTRUCTION.
11. THE CITY RESERVES THE RIGHT TO WITHHOLD PAYMENT IF THE CONTRACTOR FAILS TO FOLLOW THE ABOVE GENERAL CONSTRUCTION GUIDELINES.

EROSION AND POLLUTION CONTROL NOTES:

1. ALL CONTRACTORS SHALL COMPLY WITH THE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM AS FURTHER DESCRIBED IN THE SPECIAL TECHNICAL SPECIFICATIONS.
2. THE CONTRACTOR SHALL INSTALL EROSION AND POLLUTION CONTROL MEASURES AS FIELD CONDITIONS WARRANT TO PREVENT OFF-SITE MIGRATION OF SOILS OR OTHER POLLUTANTS BY VEHICULAR TRACKING OR IN STORM WATER RUNOFF. PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY, INSTALLATION OF CONTROL MEASURES. REPAIRS OR MODIFICATIONS TO THE MEASURES WILL BE MADE BY THE CONTRACTOR IF THE CONTROL MEASURES PROVE INEFFECTIVE OR IF ADDITIONAL CONTROL MEASURES ARE NECESSARY.
3. ALL STOCKPILED SOILS SHALL BE MAINTAINED IN A MANNER TO PROPERLY CONTROL SEDIMENT RUNOFF.
4. THE CONTRACTOR SHALL CONSTRUCT A BERM OR OTHER SPILL PROTECTION MEASURE FOR ANY TEMPORARY FUEL STORAGE TANK(S) ON SITE.
5. IF SUMP PUMPS ARE USED TO REMOVE WATER FROM EXCAVATED AREAS, THE DISCHARGE SHALL BE CONTAINED, FILTERED OR DISCHARGED TO A SETTLING BASIN TO REMOVE SEDIMENT AND OTHER POLLUTANTS BEFORE THE WATER ENTERS A STORM DRAIN OR LEAVES THE SITE.
6. THE CONTRACTOR SHALL STABILIZE, WITH SOME FORM OF GROUND COVER, ANY AREA WHERE CONSTRUCTION ACTIVITY IS TO BE CEASED (TEMPORARILY OR PERMANENTLY) FOR MORE THAN TWENTY-ONE (21) DAYS. RE-VEGETATION OF ALL DISTURBED SOIL SHALL BE INITIATED WITHIN TWENTY-ONE (21) DAYS OF FINAL CONSTRUCTION OPERATIONS.
7. AT THE CONCLUSION OF THE PROJECT, ALL CHANNELS, DRAINAGE WAYS AND BORROW DITCHES IN THE WORK ZONE SHALL BE CLEARED OF ANY SEDIMENT AND DEBRIS GENERATED BY THE PROJECT OR DEPOSITED AS A RESULT OF THE EROSION AND POLLUTION CONTROL MEASURES.
8. CONTRACTOR SHALL INSTALL EROSION CONTROL DEVICES ON UPSTREAM SIDE OF ALL CULVERTS, INLETS AND AT DOWNSTREAM GUTTER FLOW EXIT POINTS. EROSION CONTROL DEVICES WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS. LOCATIONS FOR EROSION CONTROL DEVICES ARE THE MINIMUM REQUIRED. CONTRACTOR IS RESPONSIBLE FOR PROVIDING A STORM WATER POLLUTION PREVENTION (SW3P) PLAN FOR THE PROJECT FOR APPROVAL AT THE PRE-CONSTRUCTION CONFERENCE.

TXDOT PERMIT NOTE:

CONTRACTORS - YOU'RE TO CAL THE TxDOT INSPECTOR NOTED ON THE APPROVED PERMIT 48-HOURS PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR IS REQUIRED TO CONTACT TxDOT DISTRICT TRAFFIC SIGNAL SHOP AT (817) 370-3661 FOR LINE LOCATES IF BURIED PORTION OF THE WORK IS NEAR TxDOT TRAFFIC SIGNALS.

TRAFFIC CONTROL NOTES:

1. ALL TRAFFIC CONTROL SHALL COMPLY WITH SECTION 12 OF THE GENERAL CONDITIONS.
2. WORK SHALL BE CONDUCTED IN A WAY AS TO MINIMIZE INTERFERENCE WITH TRAFFIC. CONTRACTOR SHALL PROVIDE ADVANCED WARNING CONSTRUCTION SIGNING AND TYPE III BARRICADES WITH "ROAD CLOSED" SIGNS LOCATED AT THE START OF CONSTRUCTION. ALL SIGNING AND BARRICADES PROVIDED SHALL BE IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD).
3. TRAFFIC CONTROL SHALL NOT BE PUT IN PLACE MORE THAN ONE DAY PRIOR TO START OF CONSTRUCTION.
4. TRAFFIC CONTROL SHALL BE PHASED SO THAT ROAD CLOSURES ARE LIMITED TO ONE WEEK UNLESS AUTHORIZED BY THE CITY TO BE LONGER.
5. IF ACCESS TO PRIVATE OR PUBLIC PROPERTY MUST BE DISRUPTED BY AN EXCAVATION, THE EXCAVATION SHALL BE BACKFILLED OR COVERED WITH STEEL PLATES TO RESTORE ACCESS IMMEDIATELY AFTER PIPE INSTALLATION AND NO LATER THAN THE END OF EACH WORKING DAY.
6. CONTRACTOR SHALL MAINTAIN TRAFFIC CONTROL DURING THE CONSTRUCTION.
7. THE CITY RESERVES THE RIGHT TO WITHHOLD PAYMENT IF THE CONTRACTOR FAILS TO FOLLOW THE GUIDELINES FOR TRAFFIC CONTROL.

PAVEMENT REPAIR CONSTRUCTION NOTES:

1. PAVEMENT REPAIR SHALL INCLUDE 6" OF BASE MATERIAL COMPACTED TO 98% SP ± 2% OM AND 2" OF TYPE "D" HMAC.
2. ALL EXISTING ASPHALT AND CONCRETE SURFACES SHALL BE CLEANLY SAW CUT WITH STRAIGHT LINES.
3. COMPACTION TESTING IS REQUIRED ON ALL BACKFILL UNDER EXISTING PAVEMENT. ONE TEST SHALL BE PERFORMED ON EVERY LIFT AT 300FT INTERVALS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING TESTING. INITIAL COMPACTION TESTING WILL BE PAID BY THE OWNER. RE-TESTING OF LOCATIONS WITH FAILED COMPACTION WILL BE PAID BY THE CONTRACTOR.
4. PAYMENT FOR PAVEMENT REPAIR WILL BE RELEASED AFTER THE FOLLOWING ITEMS HAVE BEEN COMPLETED:
   - 4.1. INSTALLATION OF NEW ASPHALT OR CONCRETE
   - 4.2. SWEEPING OF PAVEMENT
   - 4.3. INSTALLATION OF PAVEMENT MARKINGS (STRIPING, REFLECTIVE BUTTONS, ETC.)
   - 4.4. INSPECTION BY OWNER'S REPRESENTATIVE
   - 4.5. PASSING COMPACTION TEST
   - 4.6. IF PAVEMENT REPAIR IS ITEMIZED IN THE BID SCHEDULE (BASE MATERIAL, TYPE B HMAC, TYPE D HMAC, ETC.) THEN CONTRACTOR MAY REQUEST PAYMENT FOR EACH COMPLETED ITEM. HOWEVER, PAYMENT FOR FINAL SURFACE COURSE SHALL NOT BE APPROVED UNTIL ALL OF THE ABOVE REQUIREMENTS ARE MET.
5. THE CITY RESERVES THE RIGHT TO WITHHOLD PAYMENT IF THE CONTRACTOR FAILS TO FOLLOW THE PAVEMENT REPAIR GUIDELINES.

CONSTRUCTION AND GRADING NOTES:

1. PROPOSED GRADE LINES ARE INDICATED ON THE PLANS AND SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. A MINIMUM OF 3:1 SLOPE SHALL BE MAINTAINED IN ALL LOCATIONS.
2. MANHOLES SHALL BE ADJUSTED AS NECESSARY TO MEET PROPOSED GRADES.
3. VALVE BOXES SHALL BE ADJUSTED AS NECESSARY TO MEET PROPOSED GRADES.
4. EXCAVATED BASE MATERIAL FROM THE ROADWAY MAY BE USED TO FILL BELOW PROPOSED PAVEMENT.
5. EXCAVATED MATERIAL (EXCLUDING ASPHALT) FROM THE ROADWAY, AS AVAILABLE, MAY BE USED TO FILL IN THE RIGHT-OF-WAY TO 2" BELOW FINISHED GRADE. REMOVE AND REPLACE AND/OR HAUL IN TOP SOIL TO COMPLETE TO FINISHED GRADE.

CONCRETE PAVING NOTES:

1. PORTLAND CEMENT SHALL BE AS PER NCTCOG ITEM 303.2.2 SPECIFICATIONS.
2. AGGREGATES SHALL BE AS PER NCTCOG ITEM 303.2 SPECIFICATIONS.
3. CONCRETE FOR ALL PAVING SHALL HAVE A MINIMUM STRENGTH OF 3,600 PSI WHEN TESTED AT 28 DAYS.
4. FOR HAND FORMED PAVING, ALLEYS, SIDEWALKS, AND DRIVEWAYS SLUMP SHALL BE AN AVERAGE OF FOUR INCHES WITH A MAXIMUM OF FIVE INCHES. REFER TO NCTCOG ITEM 303.3.4.4 SPECIFICATIONS.
5. THE CONTRACTOR SHALL USE A LIQUID MEMBRANE-FORMING COMPOUND AS PER NCTCOG ITEM 303.2.13.1.1 SPECIFICATIONS.
6. CONCRETE PAVEMENT SHALL BE CLASS C (3,600 PSI MIN.) AS SPECIFICIED IN THE NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG) PUBLIC WORKS CONSTRUCTION STANDARD SPECIFICATIONS ITEM 303. PORTLAND CEMENT CONCRETE PAVEMENT WITH A MAXIMUM WATER/CEMENT RATIO OF 0.53 AND A MAXIMUM COARSE AGGREGATE SIZE OF 1-1/2".
7. SLUMP FOR SLIP FORM PAVING SHALL BE AN AVERAGE OF 3-INCHES WITH A MAXIMUM OF 4-INCHES.
8. ALL REINFORCING STEEL FOR PAVING SHALL BE GRADE 60 BARS PER NCTCOG ITEM 303.2.9 AND SUPPORTED WITH THE APPROPRIATE BAR CHAIRS PER NCTCOG ITEM 303.2.11. WHERE REINFORCING BARS ARE SPLICED, A 30 DIAMETER LAP SHALL BE USED.
9. WITH APPROVAL OF THE OWNER, FLY ASH CONFORMING TO ASTM C618 MAY BE USED IN ALL CLASSES OF CONCRETE TO REPLACE A PORTION OF THE PORTLAND CEMENT IN THE MIX DESIGN UP TO A MAXIMUM OF 25% BY WEIGHT PER CUBIC YARD OF CONCRETE.
10. EXPANSION JOINTS IN PAVEMENT SHALL BE LOCATED AT INTERSECTION P.C.'S AND P.T.'S AND ALL STRUCTURES OR MANHOLES PROTRUDING THROUGH OR ADJACENT TO THE PAVEMENT. EXPANSION JOINTS SHALL BE SPACED AT 500 FEET MAXIMUM.
11. SAWED CONTRACTION JOINTS SHALL BE SPACED BETWEEN 15 AND 20 FEET IN PAVEMENT. JOINTS SHALL 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.
12. ALL JOINTS SHALL BE SEALED WITH HOT POURED POLYMER OR READY-MIXED COLD-APPLIED SEALANT CONFORMING TO NCTCOG ITEM 302.2.14.
13. EXISTING ASPHALT SHALL BE REMOVED AND HAULED OFF AS NECESSARY TO MEET THE FINAL PAVEMENT GRADE. EXISTING EXCAVATED BASE SHALL BE USED AS FILL UNDER CONCRETE PAVEMENT AS NECESSARY.
14. INITIAL DENSITY AND CONCRETE TESTING SHALL BE PROVIDED BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RETESTING AFTER FAILED TESTS.

ASPHALT PAVING NOTES:

1. PULVERIZED (ROAD-MIXED) ASPHALT AND BASE MATERIAL. THIS ITEM SHALL CONFORM TO TxDOT SPECIFICATION ITEM 260. STRENGTH REQUIREMENTS WILL BE STRENGTH O. MICRO-CRACKING WILL BE REQUIRED FOR THIS ITEM. THE LIME STABILIZED BASE MATERIAL SHALL BE MOIST CURED FOR 3 DAYS AFTER COMPACTION. THE UNIT PRICE FOR THIS ITEM SHALL INCLUDE ALL LABOR, EQUIPMENT, LIME, AND MATERIALS NECESSARY TO COMPLETE THE WORK.
2. HOT MIX ASPHALT CONCRETE PAVEMENT. THE HOT-MIX DESIGN FOR THIS PROJECT IS THE RESPONSIBILITY OF THE CONTRACTOR. IF THE WEATHER CONDITIONS ARE FAVORABLE, THE CONTRACTOR MAY STOCKPILE HOT-MIX AND RE-HANDLE IT. CARE SHOULD BE EXERCISED, HOWEVER, TO PREVENT THE MIX FROM COOLING BELOW 200 DEGREES F. ASPHALT PAVEMENT WILL NOT BE PLACED IN STOCKPILES ON ANY OF THE NEWLY PLACED SURFACES. A STOCKPILE AREA INDEPENDENT OF THIS PROJECT WILL BE SELECTED. STOCKPILING WILL NOT BE PERMITTED AND TRUCKS MUST BE COVERED AFTER NOVEMBER 1ST THRU MAY 1ST. THE CONTRACTOR WILL CONTROL THE WORKMAN SO THAT NO WALKING ON THE UNCOMPACTED MIX WILL BE PERMITTED. CLOSE ATTENTION IS CALLED TO THE REQUIREMENTS FOR SPECIFIED EQUIPMENT TO PLACE HOT-MIX. THE CONTRACTOR SHALL ADJUST EQUIPMENT SO THAT EXCESS RAKING WILL NOT BE REQUIRED. LARGE RAKED AREAS WILL NOT BE PERMITTED. TAKE OFF AT JOINTS THAT RISE OR SINK WILL NOT BE RAKED BUT WILL BE PICKED UP AND RE-LAID. NO JOINTS WILL BE PERMITTED IN WHEEL PATHS. CONTRACTOR SHALL CORE ROADWAY AFTER CONSTRUCTION IS COMPLETE AT A RATE OF 1 CORE PER 1000' OF ROADWAY. CORE AND REPAIR COST IS SUBSIDIARY TO BID ITEM FOR HMAC. SEE ALSO THE TESTING REQUIREMENTS. ANY EXCESS ASPHALT MATERIAL WILL REMAIN THE PROPERTY OF THE CONTRACTOR.

TESTING REQUIREMENTS PER TXDOT

TXDOT ITEM # REQUIREMENTS

310 TxDOT PREQUALIFIED SOURCE

340 TEX 207 IN PLACE AIR VOIDS (MAY USE CALIBRATED GAUGE WITH ENGINEERS APPROVAL)
2 PER 500 TON=22
TEX 236 ASPHALT CONTENT & GRADATION 1 PER 500 TON=11
*CONTRACTOR SHALL PROVIDE 1-8 CERTIFIED TECHNICIAN
FOR ALL PAVING OPERATIONS.

360 & 420 TEX 415A SLUMP - 1 TEST PER 60 CY, 3.1
TEX 418A COMPRESSIVE STRENGTH 4 CYLINDERS
PER 60 CY
OR EACH DAY-12.4
TEX 422A TEMPERATURE - 1 TEST PER 60 CY, 3.1

810 TxDOT PRE-QUALIFIED SOURCE

LEGEND

	PROPOSED UTILITY EASEMENT
	PROPOSED STREET R.O.W.
	PROPOSED LOT LINES
	PROPOSED DRAINAGE EASEMENT
	PROPOSED PROPERTY BOUNDARY
ASPHALT / CONCRETE	PROPOSED STREET PAVEMENT
	PROPOSED CURB AND GUTTER
	EXISTING STREET R.O.W.
W W W W W W	EXISTING WATER LINE
S S S S S S	EXISTING SEWER LINE
FM FM FM FM FM	EXISTING SEWER FORCE MAIN
	EXISTING CONTOUR LINE
GAS GAS GAS GAS	EXISTING UNDERGROUND GAS LINE
UFO UFO UFO UFO	EXISTING UNDERGROUND FIBER OPTIC
OE OE OE OE OE	EXISTING OVERHEAD ELECTRIC

ABBREVIATIONS AND SYMBOLS

AE	ACCESS EASEMENT	EOP	EDGE OF PAVING	PVC	POLYVINYL CHLORIDE
BOC	BACK OF CURB	FH	FIRE HYDRANT	R.O.W.	RIGHT-OF-WAY
C&G	CURB & GUTTER	FL	FLOW LINE ELEVATION	S	SLOPE
CO	CLEAN-OUT	FO	FIBER OPTIC LINE	SL	SEWER LINE
CPI	POINT OF INTERSECTION OF CURB	GV	GATE VALVE	SLE	STREET LIGHT EASEMENT
CR	CURB RETURN	MH	SEWER MANHOLE	UE	UTILITY EASEMENT
DE	DRAINAGE EASEMENT	PE	POLYETHYLENE	WL	WATER LINE

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED
PROFESSIONAL ENGINEER
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

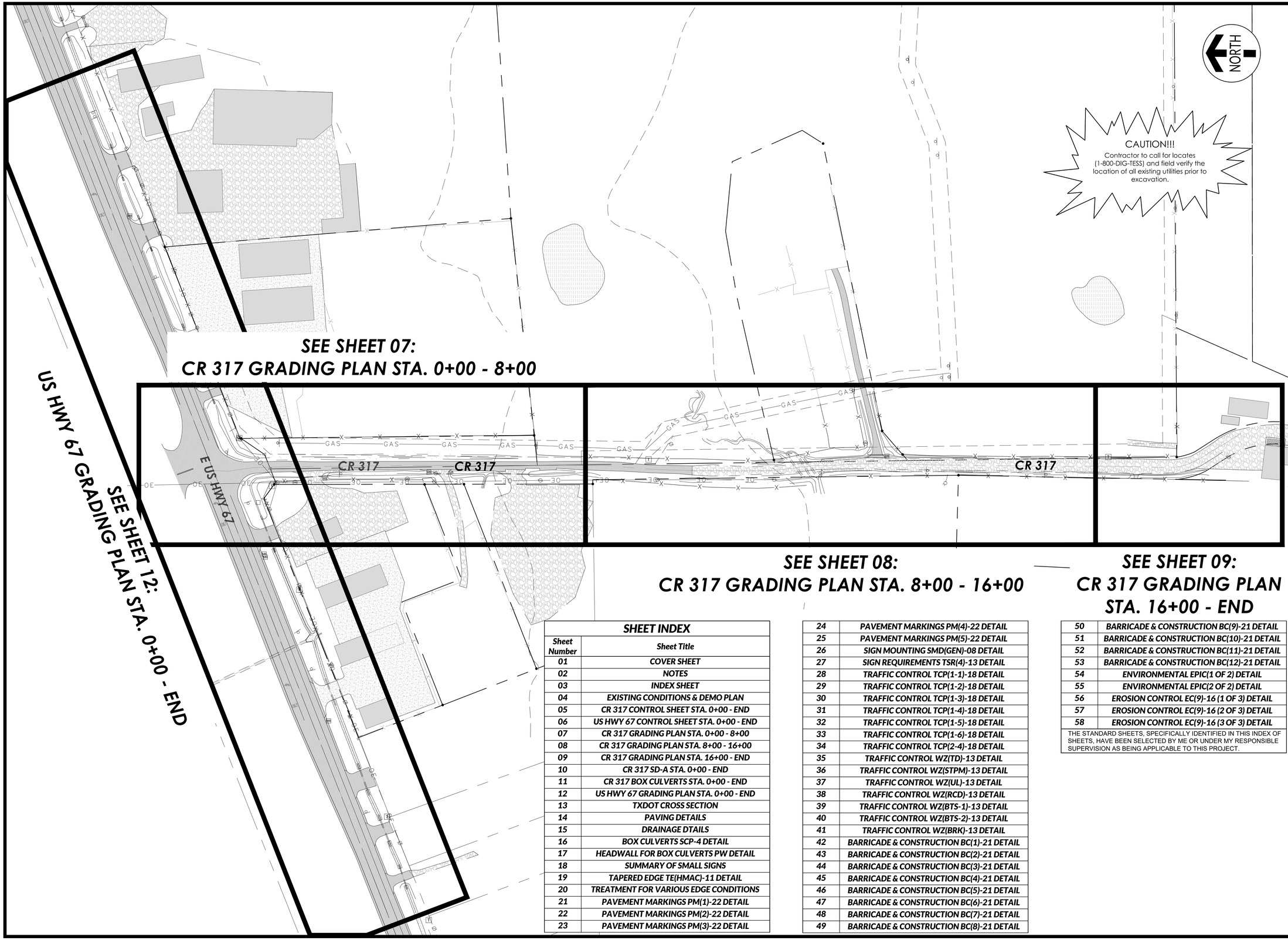
NOTES

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510
SCALE N.T.S.

SEQ. 02 / 58
SHEET 02



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THE STANDARD SHEETS, SPECIFICALLY IDENTIFIED IN THIS INDEX OF SHEETS, HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS

CR 317 RECONSTRUCTION

INDEX SHEET

NO.	REVISION	DATE

PROJECT # 25510 | SCALE 1" = 80'

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 03 / 58 | SHEET 03

Plotted by: nic. kirk Plot Date: 5/18/2026 3:12 PM
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NORTH

CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.

US HIGHWAY 67
POSTED SPEED = 65 MPH

WILLIAM RAY LEE
10.33 Ac
4310 E HWY 67

LEE PRODUCTS, INC.
0.70 Ac
4308 E HWY 67

LEE PRODUCTS, INC.
2.41 Ac
4308 E HWY 67

LEE PRODUCTS, INC.
4.92 Ac
4308 E HWY 67

KEENE ECONOMIC DEVELOPMENT CORP.
57.26 Ac
208 CR 317

KEENE ECONOMIC DEVELOPMENT CORP.
2.34 Ac
4700 CR 317

FLOOD ZONE A
FEMA National Flood Insurance Map No. 48251C0200J
(Effected December 4, 2012)

30' GAS EASEMENT
TEXAS MIDSTREAM GAS SERVICES, LLC
V. 4448, PG. 757
OPR/JCT

30' GAS EASEMENT
TEXAS MIDSTREAM GAS SERVICES, LLC
V. 4448, PG. 768
OPR/JCT

25' UTILITY EASEMENT
CITY OF KEENE
V. 2444, PG. 671
OPR/JCT

85.64' R.O.W. (VARIABLE)

27.12' R.O.W. (VARIABLE)

36' R.O.W. (VARIABLE)

E US HWY 67

CR 317

0.18 MILES TO COUNTY RD 318

0.67 MILES TO COUNTY RD 414

REMOVE APPROX. 25LF OF EXISTING ASPHALT DRIVEWAY
EXISTING 18" RCP
TO REMAIN

REMOVE APPROX. 24LF OF EXISTING ASPHALT DRIVEWAY
EXISTING 18" RCP
TO REMAIN

REMOVE APPROX. 450LF OF EXISTING ASAPHALT SHOULDER

REMOVE APPROX. 20LF OF EXISTING CONCRETE DRIVEWAY
EXISTING 24" CMP
TO REMAIN

REMOVE APPROX. 8LF OF EXISTING ASPHALT DRIVEWAY
EXISTING 18" RCP
TO REMAIN

DESTROY APPROX. 690LF OF EXISTING SOLID WHITE EDGE LINE

REMOVE APPROX. 840LF OF EXISTING ASPHALT ROAD

REMOVE APPROX. 14LF OF EXISTING ASPHALT DRIVEWAY

REMOVE EXISTING 15" DIP

REMOVE EXISTING 18" CMP/12" RCP

REMOVE EXISTING 18" CMP

REMOVE EXISTING 18" PVC/CMP

REPLACE 3-EXISTING 36" CMP

REMOVE EXISTING 12" RCP

REMOVE APPROX. 21LF OF EXISTING ASPHALT DRIVEWAY
EXISTING 18" RCP
TO REMAIN

DESTROY APPROX. 823LF OF EXISTING SOLID WHITE EDGE LINE

REMOVE APPROX. 712LF OF EXISTING ASPHALT SHOULDER

EXISTING 4.5'x4' BOX CULVERT TO REMAIN

REMOVE APPROX. 23LF OF EXISTING CONCRETE DRIVEWAY
EXISTING 24" CMP
TO REMAIN

REMOVE APPROX. 17LF OF EXISTING ASPHALT DRIVEWAY
EXISTING 24" RCP
TO REMAIN

REMOVE APPROX. 21LF OF EXISTING ASPHALT DRIVEWAY
EXISTING 24" RCP
TO REMAIN

BOWER MOBILE HOME PARK

4228 & 4232 E HWY 67
1.50 Ac
4230 E HWY 67

4228 & 4232 E HWY 67
0.75 Ac
4228 E HWY 67

WINSTON L UNITE JR & ANGELA PACITA APUZEN
1.09 Ac
4801 CR 317

TERRANCE L KEENAN
1.24 Ac
4739 CR 317

INSPIRA FINANCIAL TRUST, LLC.
20.82 Ac
4421 CR 317

JOSE CARLOS GARCIA ETUX MARGARITA
1.36 Ac
4216 E HWY 67

JOSE CARLOS GARCIA ETUX MARGARITA
1.00 Ac
4208 E HWY 67

JOSE CARLOS GARCIA ETUX MARGARITA
0.79 Ac
4200 E HWY 67

LARRY HEARN
0.73 Ac
4120 E HWY 67

BUEL BAPTIST CHURCH OF CLEBURNE
BUEL CEMETERY
4.21 Ac
4609 CR 317

NOTES:

1. *EXISTING MAILBOXES TO BE RELOCATED AS NECESSARY.*
2. *EXISTING PAVEMENT STRIPING AND MARKINGS TO BE DESTROYED BY FOG SEALING THE EXISTING PAVEMENT WITHIN THE RESTRIPING ZONE.*

LEGEND

ASPHALT CONCRETE GRAVEL DIRT	EXISTING STREET PAVEMENT
=========	EXISTING DRAINAGE CULVERT

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

EXISTING CONDITIONS & DEMO PLAN

NO.	REVISION	DATE

PROJECT # 25510
SCALE 1" = 80'

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 04 / 58
SHEET 04

Plotted by: nic. kirk Plot Date: 5/18/2026 3:13 PM
Saved By: svanderpool Save Time: 5/14/2026 9:40 AM
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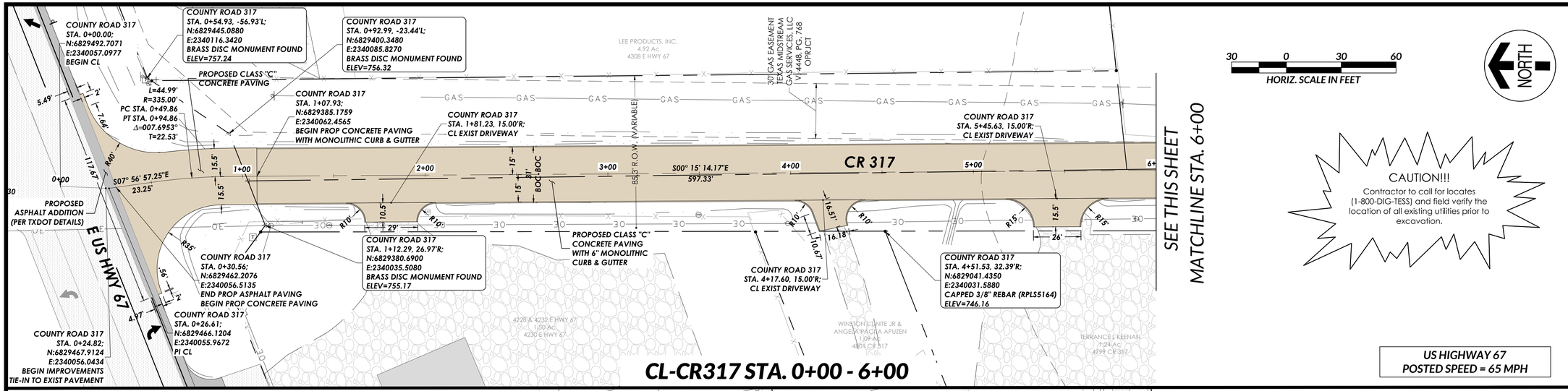
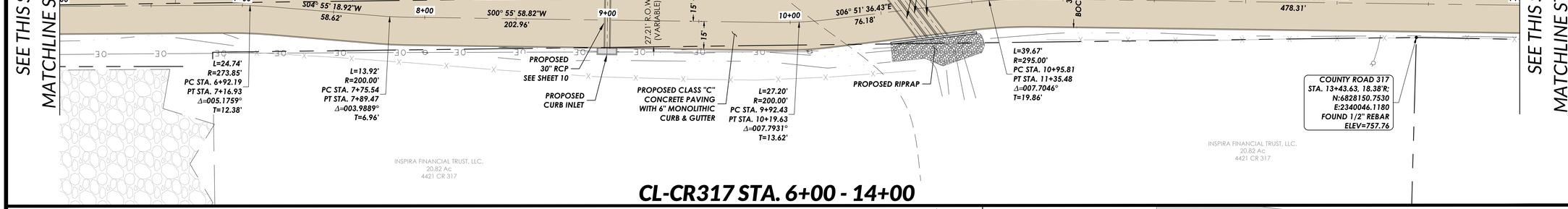
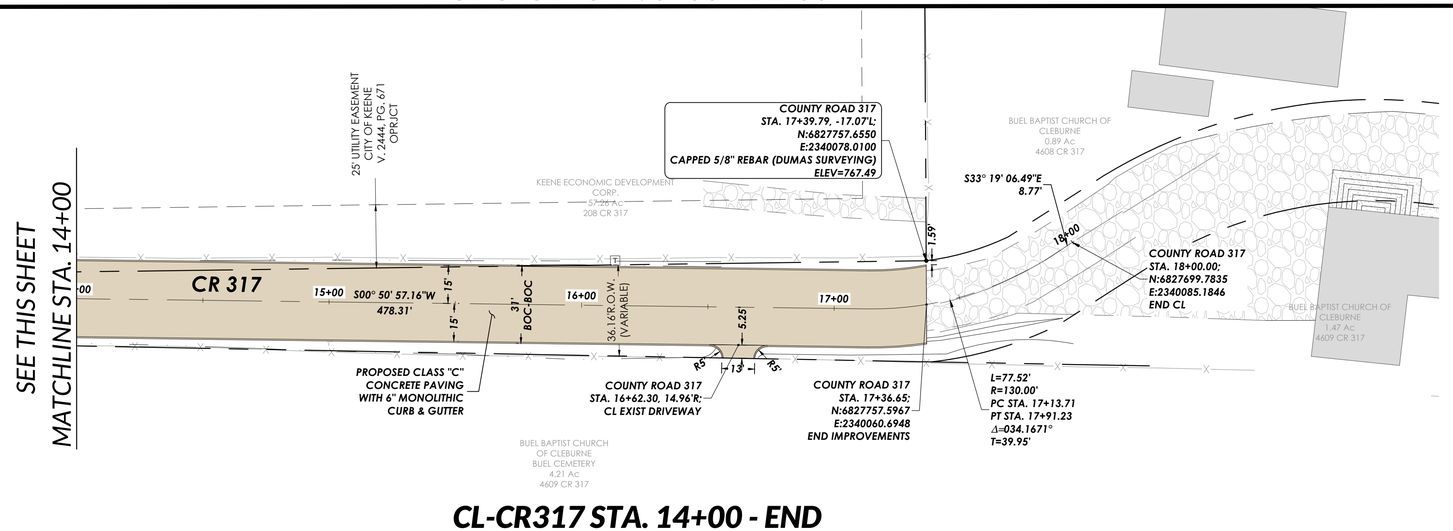






NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW
JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS

CR 317 RECONSTRUCTION

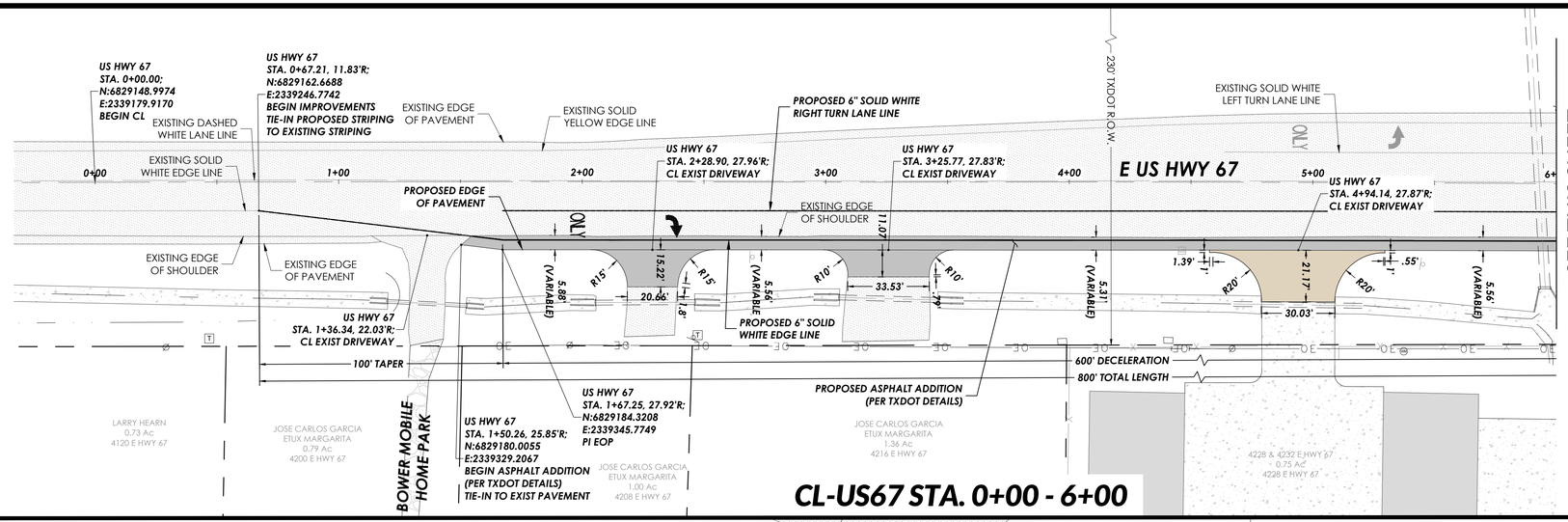
CR 317 CONTROL SHEET STA. 0+00 - END

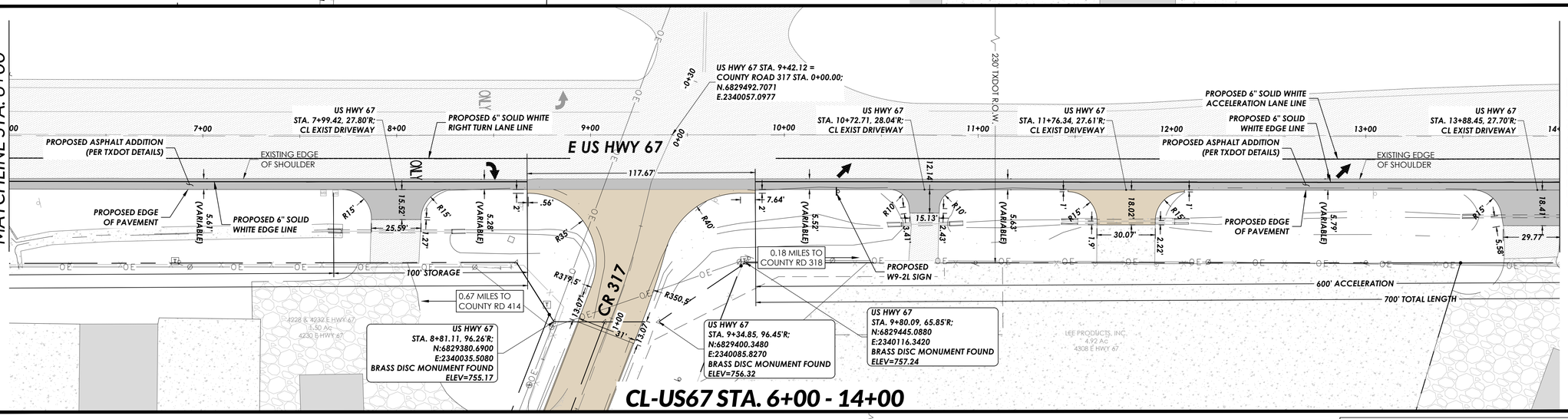
NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

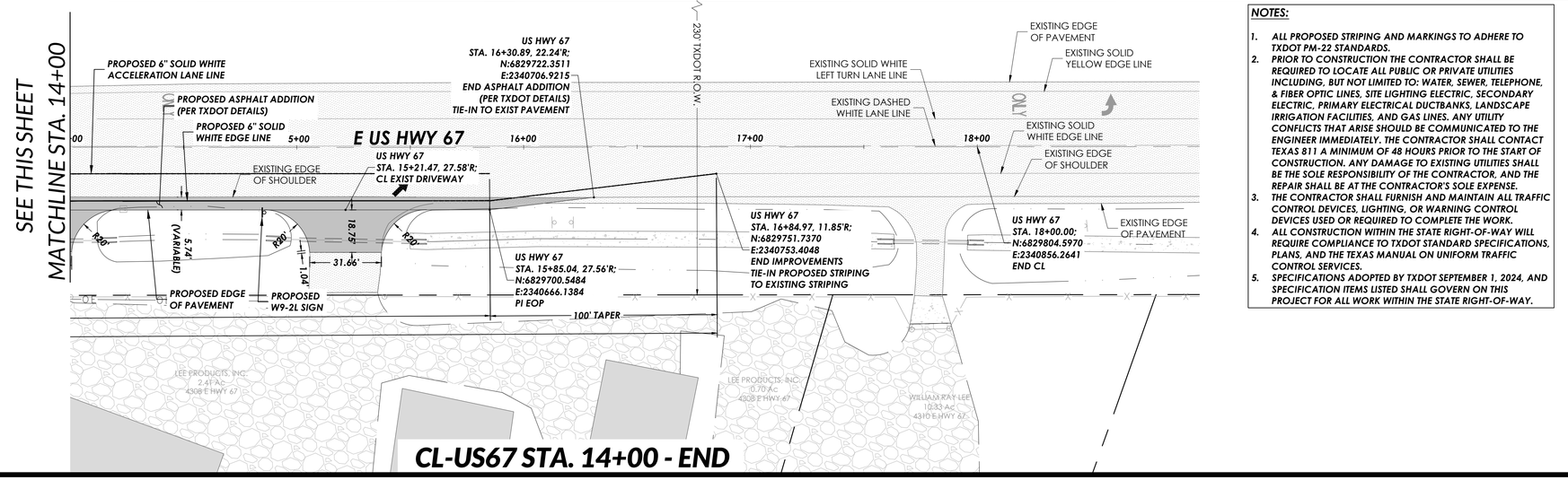
PROJECT # 25510 | SCALE 1" = 30'

SEQ. 05 | SHEET 05 of 58





TMUTCD W9-2L
STANDARD SIGN
N.T.S.



NOTES:

1. ALL PROPOSED STRIPING AND MARKINGS TO ADHERE TO TXDOT PM-22 STANDARDS.
2. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL BE REQUIRED TO LOCATE ALL PUBLIC OR PRIVATE UTILITIES INCLUDING, BUT NOT LIMITED TO: WATER, SEWER, TELEPHONE, & FIBER OPTIC LINES, SITE LIGHTING ELECTRIC, SECONDARY ELECTRIC, PRIMARY ELECTRICAL DUCTBANKS, LANDSCAPE IRRIGATION FACILITIES, AND GAS LINES. ANY UTILITY CONFLICTS THAT ARISE SHOULD BE COMMUNICATED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHALL CONTACT TEXAS 811 A MINIMUM OF 48 HOURS PRIOR TO THE START OF CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR, AND THE REPAIR SHALL BE AT THE CONTRACTOR'S SOLE EXPENSE.
3. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL TRAFFIC CONTROL DEVICES, LIGHTING, OR WARNING CONTROL DEVICES USED OR REQUIRED TO COMPLETE THE WORK.
4. ALL CONSTRUCTION WITHIN THE STATE RIGHT-OF-WAY WILL REQUIRE COMPLIANCE TO TXDOT STANDARD SPECIFICATIONS, PLANS, AND THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL SERVICES.
5. SPECIFICATIONS ADOPTED BY TXDOT SEPTEMBER 1, 2024, AND SPECIFICATION ITEMS LISTED SHALL GOVERN ON THIS PROJECT FOR ALL WORK WITHIN THE STATE RIGHT-OF-WAY.

NORTH

30 0 30 60
HORIZ. SCALE IN FEET

CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.

US HIGHWAY 67
POSTED SPEED = 65 MPH

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED
PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
US HWY 67 CONTROL SHEET STA. 0+00 - END

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE 1" = 30'

SEQ. 06 / 58 | SHEET 06

Plotted by: nic. kirk Plot Date: 5/18/2026 3:13 PM
Saved Time: 5/13/2026 12:47 PM Saved By: svanderpool
X:\CL_Keene\25510 - CR 317 Reconstruction - Keene\Drafting_Plans_C_Civil\25510_06_PLAN_CONTROL_LIS67.dwg

Plotted by: nic. kirk Plot Date: 5/18/2026 3:13 PM
Save Time: 5/18/2026 3:10 PM Saved By: nkirk
X:\CL_Keene\25510 - CR 317 Reconstruction - Keene\Drafting_Plans_C_Civil\25510_07_PNP_CR317 STA. 0+00 - 8+00.dwg

EOP=759.84
MATCH EXIST ELEV
@ STA. 0+03.43; 48.36'L
EOP=759.73
@ STA. 0+08.44; 50.61'L
EOP=759.72
@ STA. 0+10.27; 51.42'L
PI EOP
EOP=759.68
@ STA. 0+13.34; 44.43'L
PC EOP
BEGIN COUNTY RD 317
TP=759.76
MATCH EXIST ELEV
@ STA. 0+24.84;
BEGIN IMPROVEMENTS
BEGIN ASPHALT PAVING
COUNTY RD 317
TP=759.53
@ STA. 0+30.56;
END ASPHALT PAVING
BEGIN CONCRETE PAVING

EOP=757.96
@ STA.0+58.98; 15.50'L
PRC EOP
EOP=756.18
@ STA.0+94.86; 15.50'L
PT EOP
BOC=755.56
@ STA. 1+07.93; 15.50'L
BEGIN CURB

LEE PRODUCTS, INC.
4.92 Ac
4308 E HWY 67

30' GAS EASEMENT
TEXAS MIDSTREAM
GAS SERVICES, LLC
V. 4448, PG. 768
OPRJCT

KEENE ECONOMIC DEVELOPMENT
CORP.
57.26 Ac
208 CR 317

CAUTION!!!
Contractor to call for locates
(1-800-DIG-TESS) and field verify the
location of all existing utilities prior to
excavation.

30 0 30 60
HORIZ. SCALE IN FEET

NORTH

US HIGHWAY 67
POSTED SPEED = 65 MPH

BOC=741.86
@ STA.7+16.93; 15.50'L
PT CURB
BOC=741.99
@ STA. 6+92.18; 15.50'L
PC CURB
BOC=741.48
@ STA.7+89.47; 15.50'L
PT CURB
BOC=741.55
@ STA. 7+75.54; 15.50'L
PC CURB

E US HWY 67

CR 317

BOC=755.56
@ STA. 1+07.93; 15.50'R
BEGIN CURB
EOP=756.18
@ STA.0+94.86; 15.50'R
PT EOP
EOP=756.55
@ STA.0+86.73; 15.50'R
PCC EOP
EOP=759.07
@ STA. 0+47.07; 60.37'R
PC EOP
EOP=759.08
@ STA. 0+47.20; 60.91'R
PI EOP
EOP=759.21
MATCH EXIST ELEV
@ STA. 0+40.43; 62.56'R
EOP=759.09
@ STA. 0+45.26; 61.38'R

BOC=754.14
@ STA. 1+66.73; 25.50'R
PT DRIVEWAY
BOC=754.33
@ STA.1+56.73; 15.50'R
PC DRIVEWAY

BOC=752.90
@ STA. 2+05.73; 15.50'R
PT DRIVEWAY
BOC=753.41
@ STA.1+95.73; 25.50'R
PC DRIVEWAY
TP=753.76
MATCH EXIST ELEV
@ STA.1+81.23; 25.50'R
DRIVEWAY CL

4230 E HWY 67

BOC=747.38
@ STA.4+02.26; 15.50'R
PC DRIVEWAY
BOC=747.45
@ STA. 4+11.66; 22.08'R
PT DRIVEWAY
BOC=747.59
@ STA. 4+15.31; 32.10'R
PI DRIVEWAY
TP=747.42
MATCH EXIST ELEV
@ STA.4+23.24; 30.51'R
DRIVEWAY CL

WINSTON L UNITE JR &
ANGELA PACILA APUZEN
1.09 Ac
4401 CR 317

BOC=746.31
@ STA. 4+40.57; 15.50'R
PT DRIVEWAY
BOC=747.37
@ STA.4+31.18; 28.92'R
PC DRIVEWAY
BOC=744.42
@ STA.5+17.63; 15.50'R
PC DRIVEWAY
BOC=744.59
@ STA. 5+32.63; 30.50'R
PT DRIVEWAY

TERRANCE L KEENAN
1.24 Ac
4799 CR 317

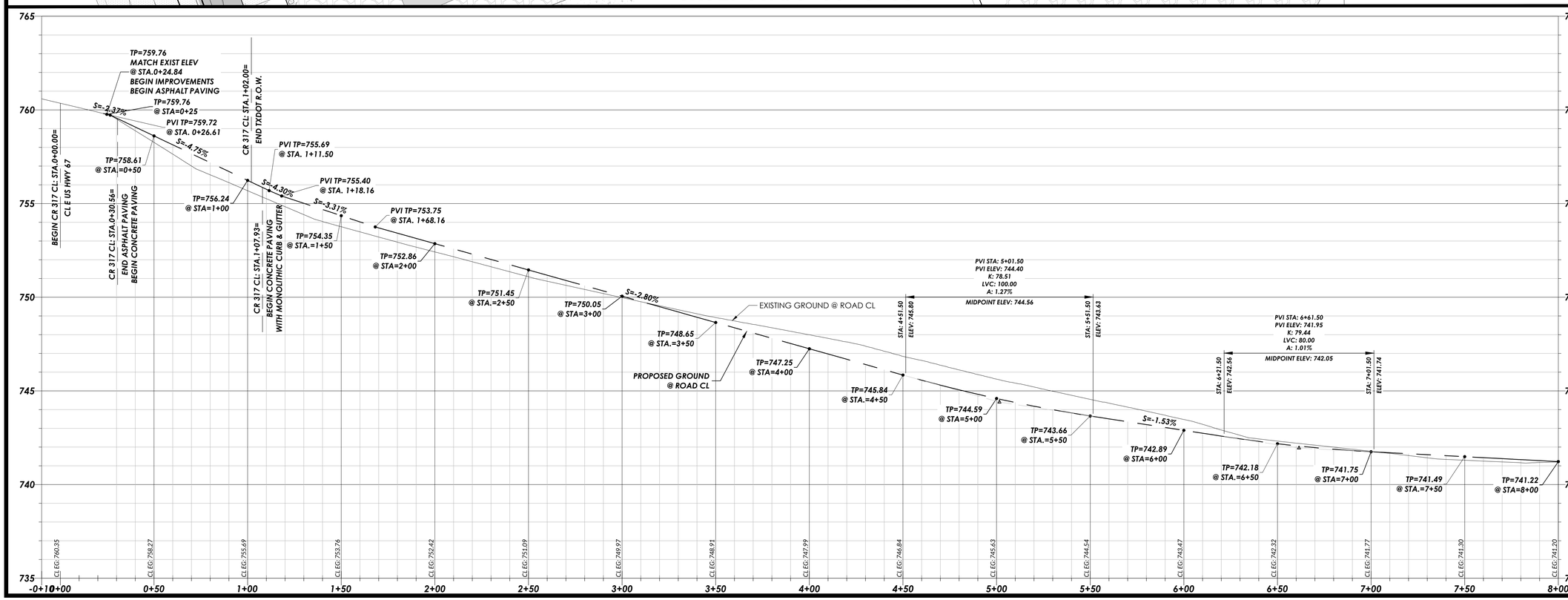
BOC=743.50
@ STA. 5+73.63; 15.50'R
PT DRIVEWAY
BOC=744.35
@ STA.5+58.63; 30.50'R
PC DRIVEWAY
TP=744.43
MATCH EXIST ELEV
@ STA.5+45.63; 30.50'R
DRIVEWAY CL

BOC=741.99
@ STA. 6+92.18; 15.50'R
PC CURB
BOC=741.86
@ STA.7+16.93; 15.50'R
PT CURB
BOC=741.55
@ STA. 7+75.54; 15.50'R
PC CURB
BOC=741.48
@ STA.7+89.47; 15.50'R
PT CURB

INSPIRA FII

SEE SHEET 8
MATCHLINE STA. 8+00

CR317 STA. 0+00 - 8+00



NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

CR 317 GRADING PLAN STA. 0+00 - 8+00

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510
SCALE H: 1" = 30'
V: 1" = 3'

SEQ. 07 / 58
SHEET 07

Plotted by: nic. kirk Plot Date: 5/18/2026 3:13 PM
Save Time: 5/14/2026 9:53 AM Saved By: svanderpool
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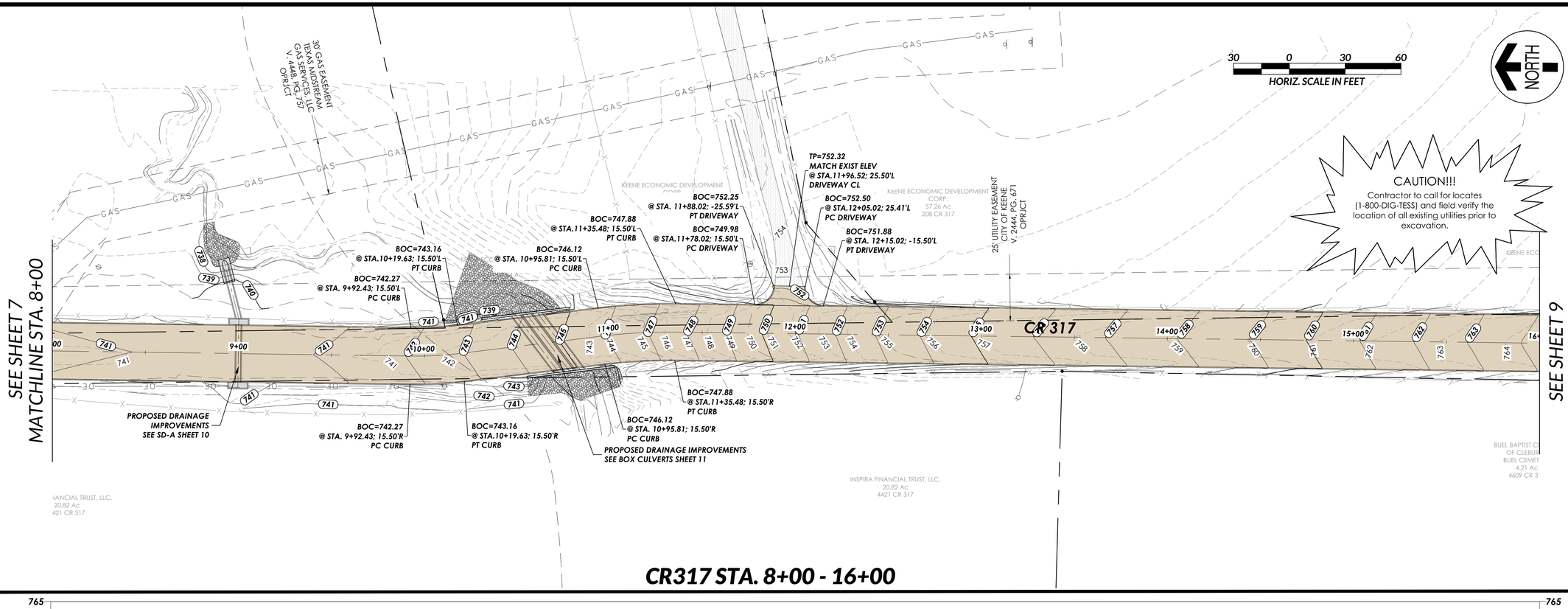
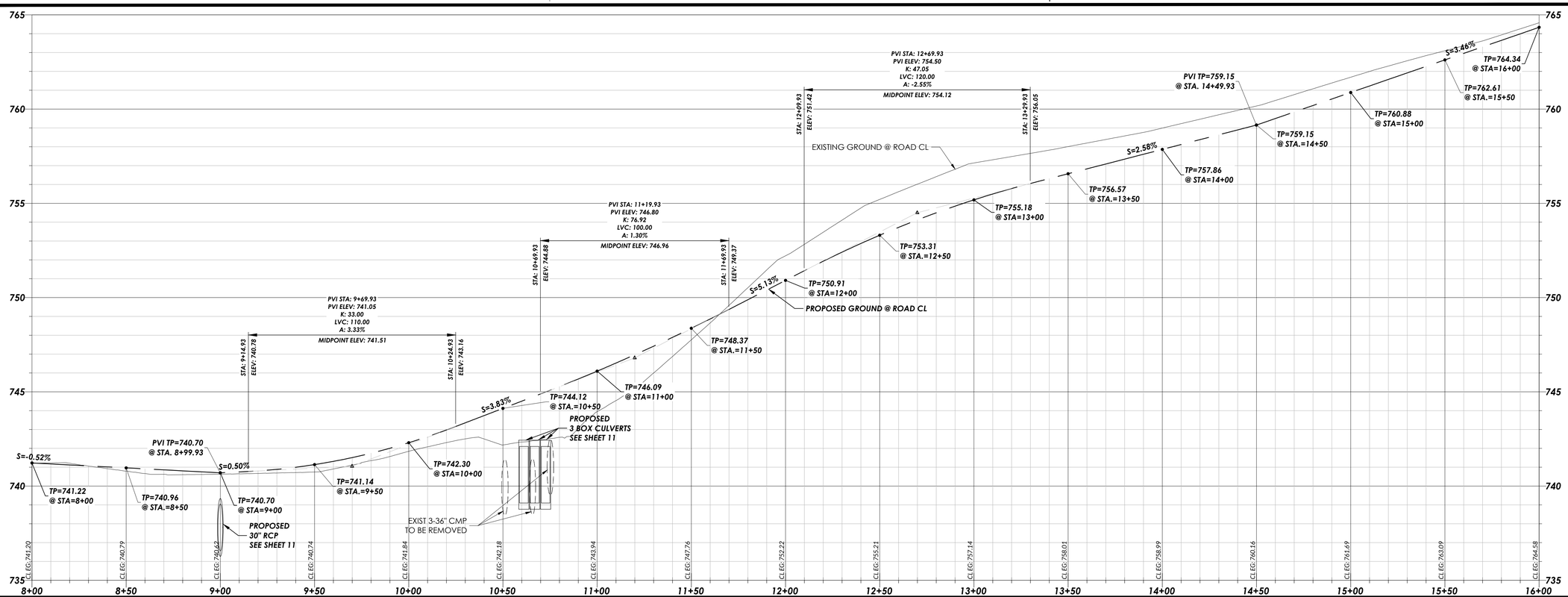


CR317 STA. 8+00 - 16+00



NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

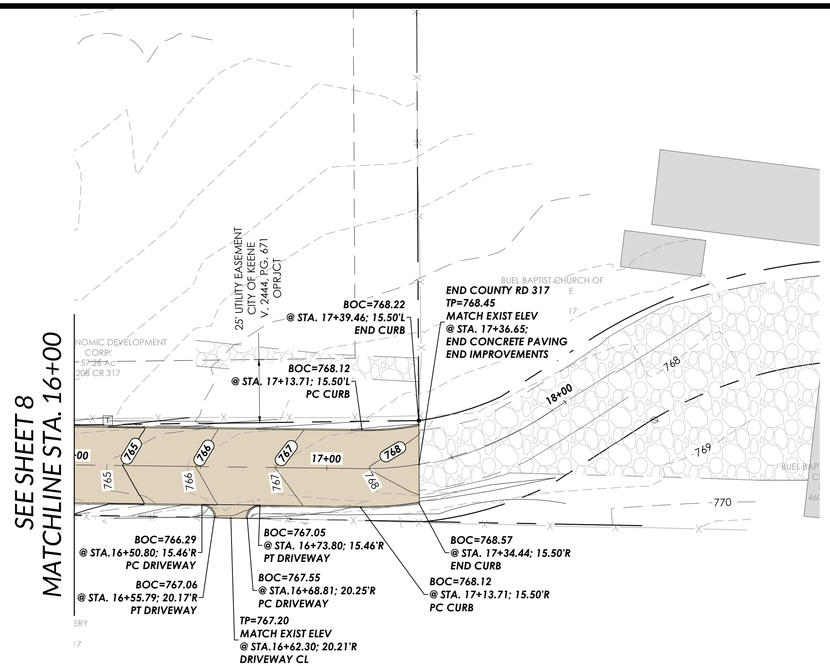
CR 317 GRADING PLAN STA. 8+00 - 16+00

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510
SCALE H: 1" = 30' V: 1" = 3'

SEQ. 08 / 58
SHEET 08



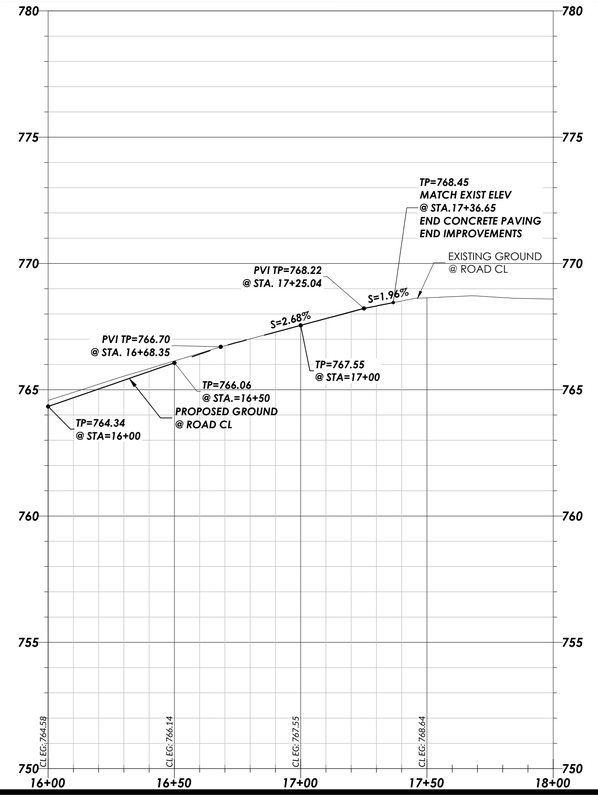
30 0 30 60

HORIZ. SCALE IN FEET

NORTH

CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.

CR317 STA. 16+00 - END



STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

CR 317 GRADING PLAN STA. 16+00 - END

NO.	REVISION	DATE

PROJECT # 25510
SCALE H: 1" = 30' V: 1" = 3'

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 09 / 58
SHEET 09

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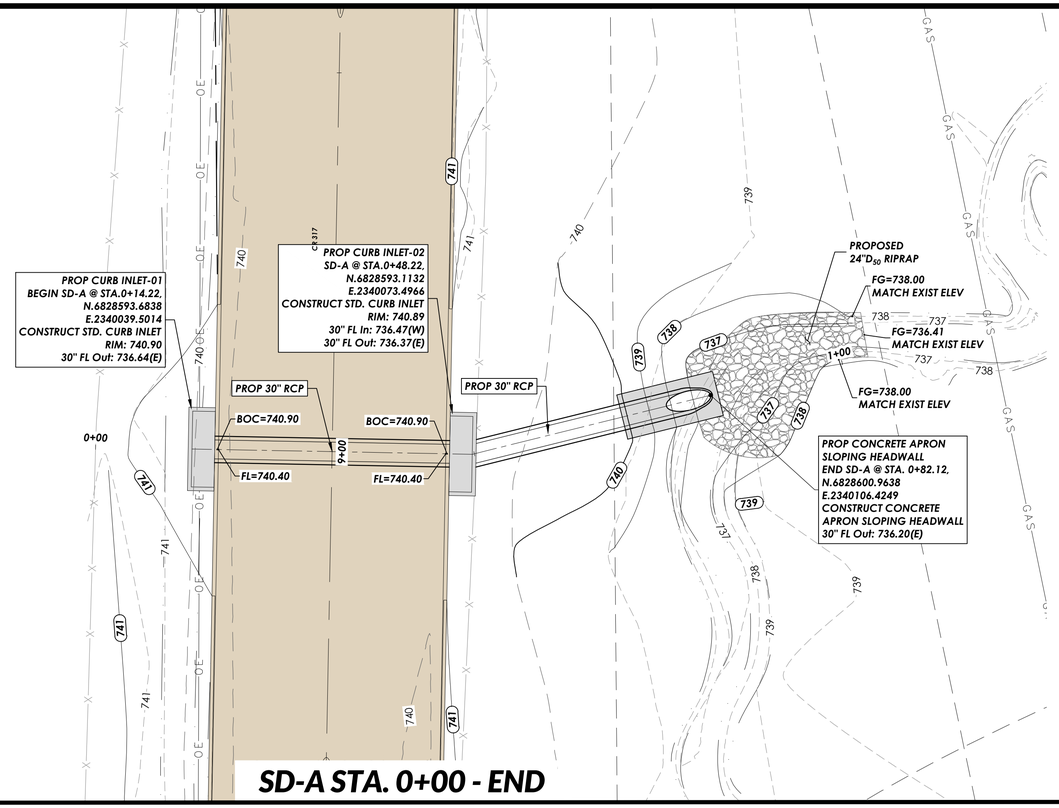

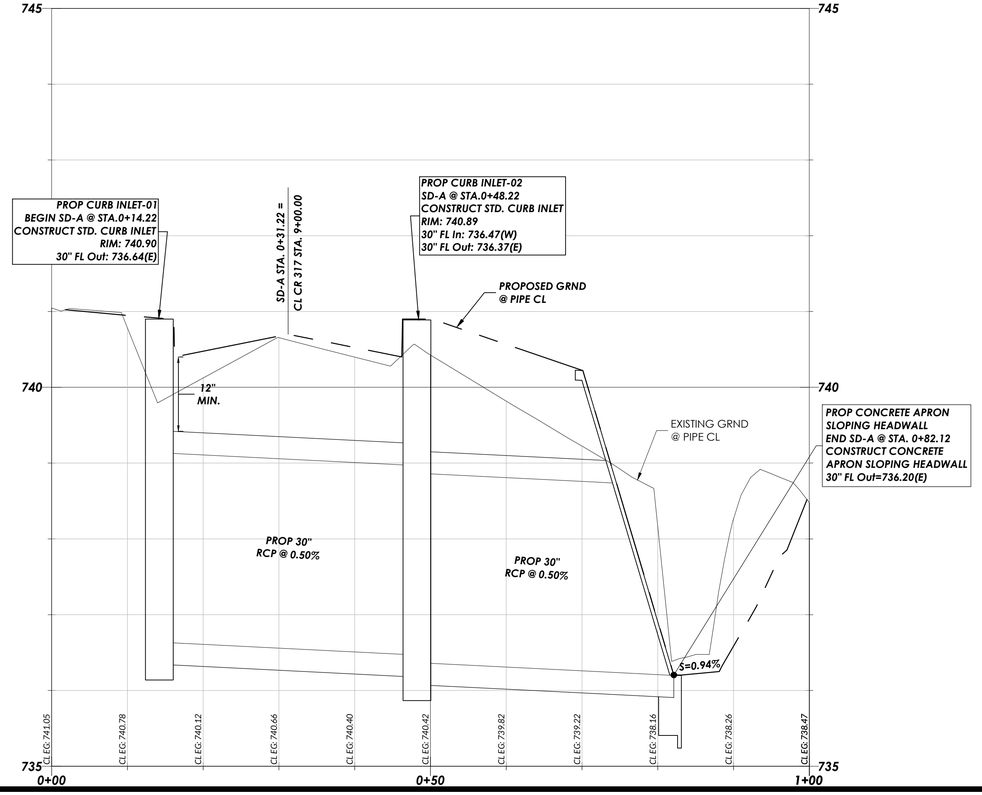

NORTH

10 0 10 20

HORIZ. SCALE IN FEET

CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

CR 317 SD-A STA. 0+00 - END

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510
SCALE H: 1" = 10' V: 1" = 1'

SEQ. 10 / 58
SHEET 10

Plotted by: nic. kirk Plot Date: 5/18/2026 3:14 PM
Save Time: 5/15/2026 11:14 AM Saved By: svanderpool
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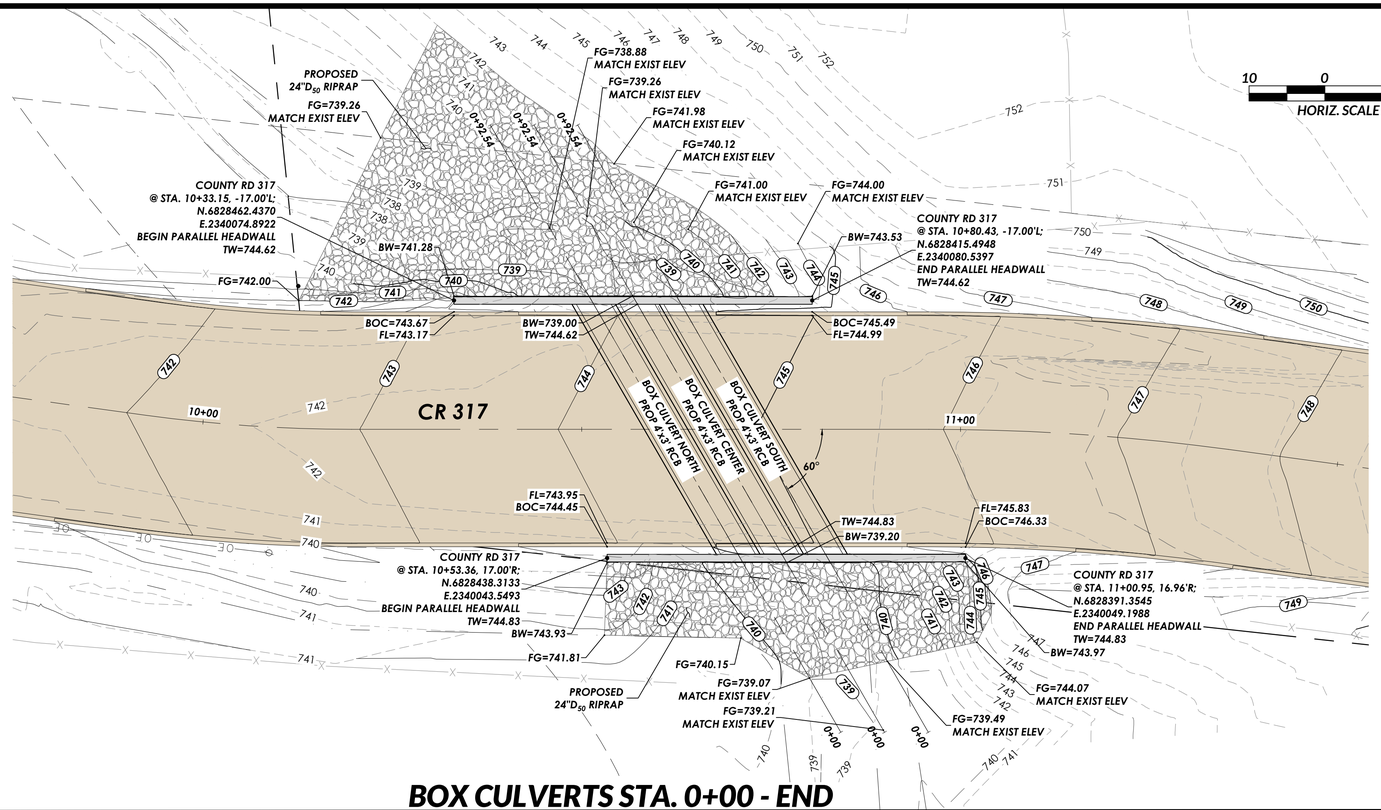
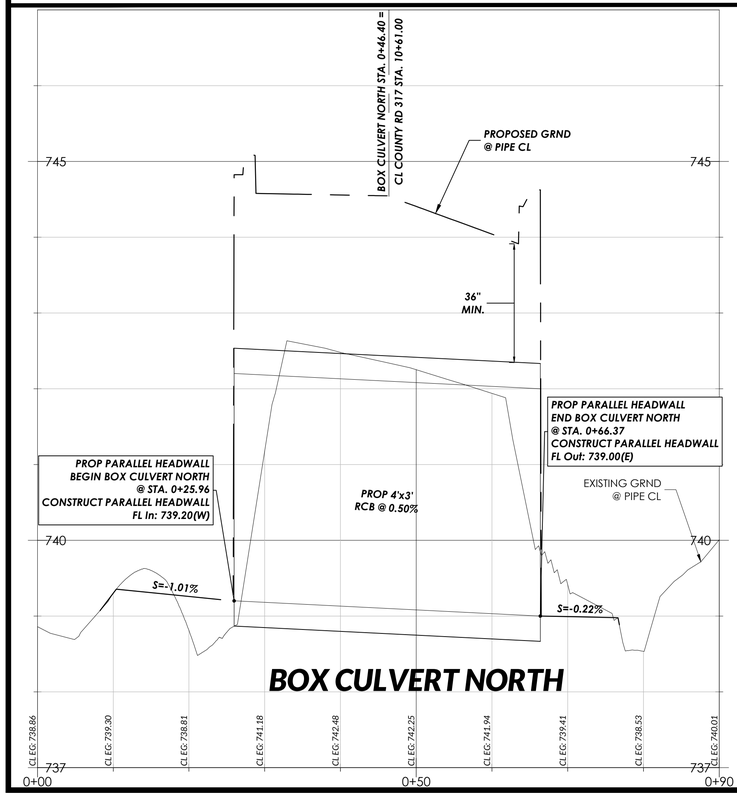
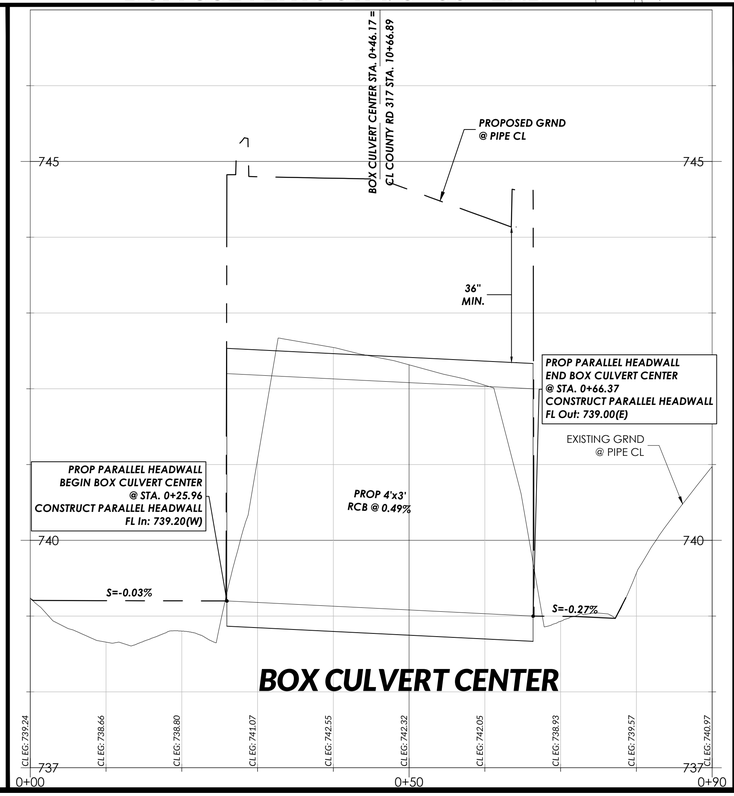


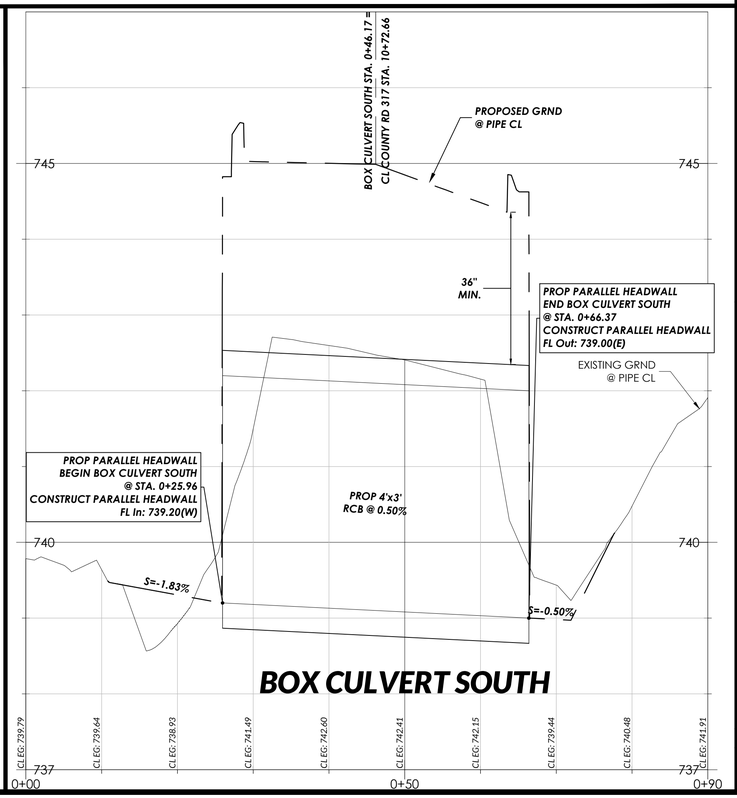
BOX CULVERTS STA. 0+00 - END



BOX CULVERT NORTH



BOX CULVERT CENTER



BOX CULVERT SOUTH

CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

CR 317 BOX CULVERTS STA. 0+00 - END

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510
SCALE H: 1" = 10' V: 1" = 1'

SEQ. 11 / 58
SHEET 11

Plotted by: nic. kirk Plot Date: 5/18/2026 3:14 PM
Saved Time: 5/14/2026 10:08 AM Saved By: svanderpool
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Plotted by: nic. kirk Plot Date: 5/18/2026 3:14 PM
Saved Time: 5/14/2026 8:36 AM Saved By: svanderpool
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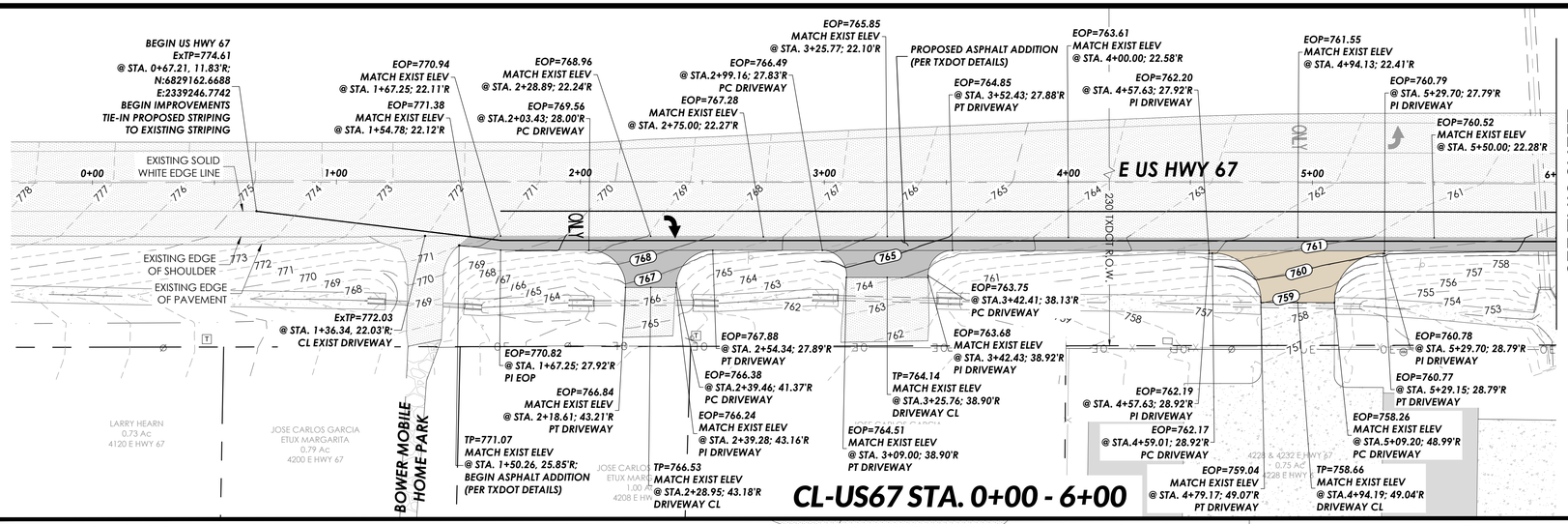
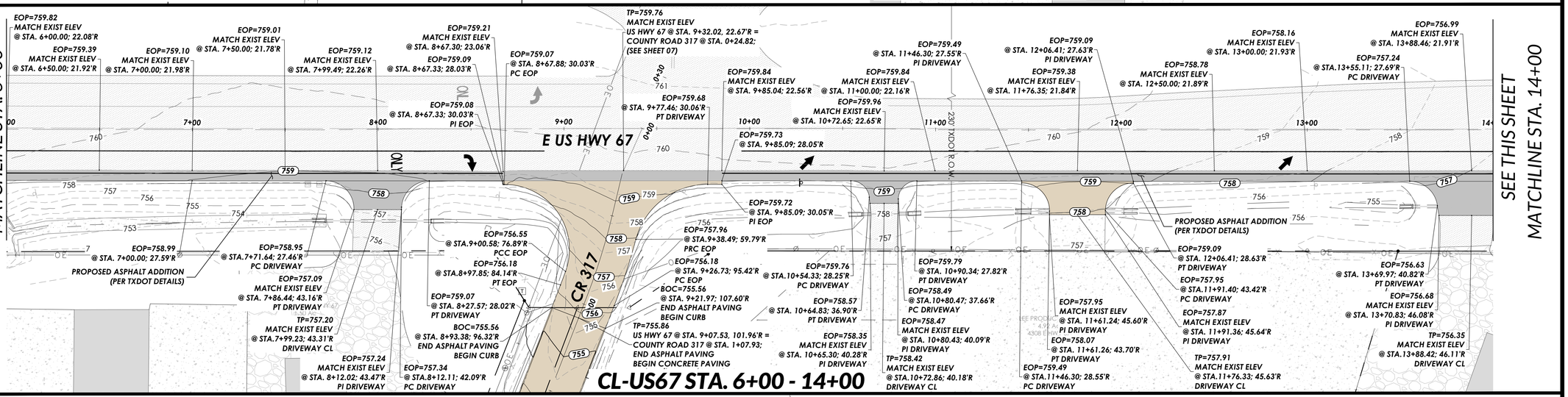
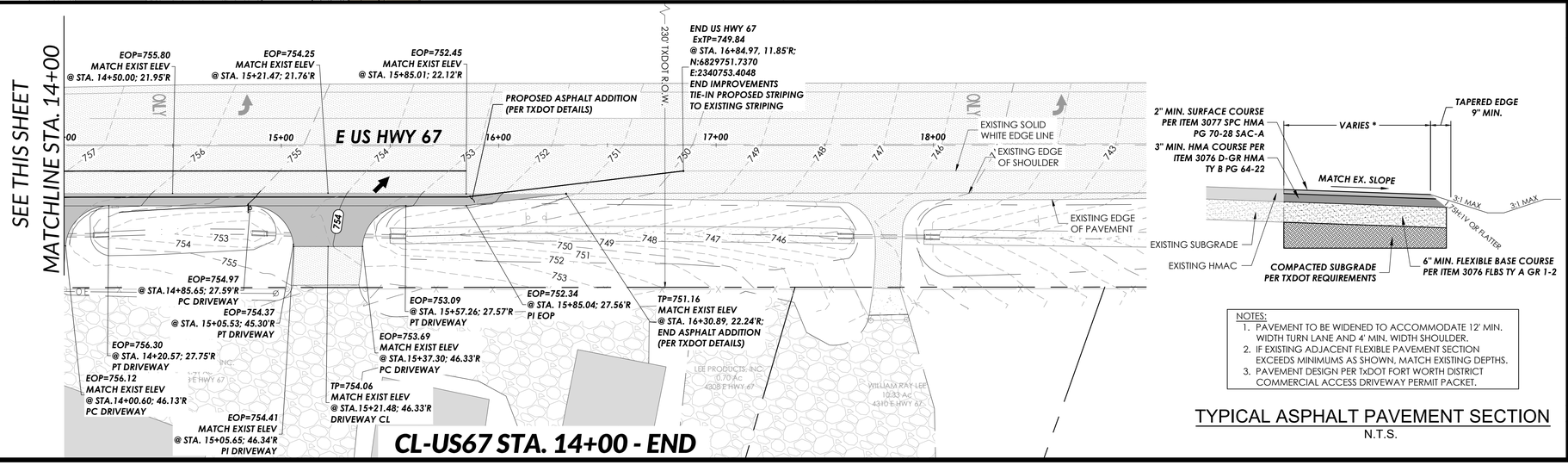


CL-US67 STA. 0+00 - 6+00



CL-US67 STA. 6+00 - 14+00



CL-US67 STA. 14+00 - END

NOTES:
1. PAVEMENT TO BE WIDENED TO ACCOMMODATE 12' MIN. WIDTH TURN LANE AND 4' MIN. WIDTH SHOULDER.
2. IF EXISTING ADJACENT FLEXIBLE PAVEMENT SECTION EXCEEDS MINIMUMS AS SHOWN, MATCH EXISTING DEPTHS.
3. PAVEMENT DESIGN PER TxDOT FORT WORTH DISTRICT COMMERCIAL ACCESS DRIVEWAY PERMIT PACKET.

TYPICAL ASPHALT PAVEMENT SECTION
N.T.S.

NORTH

30 0 30 60
HORIZ. SCALE IN FEET

CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.

US HIGHWAY 67
POSTED SPEED = 65 MPH

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
US HWY 67 GRADING PLAN STA. 0+00 - END

NO.	REVISION	DATE

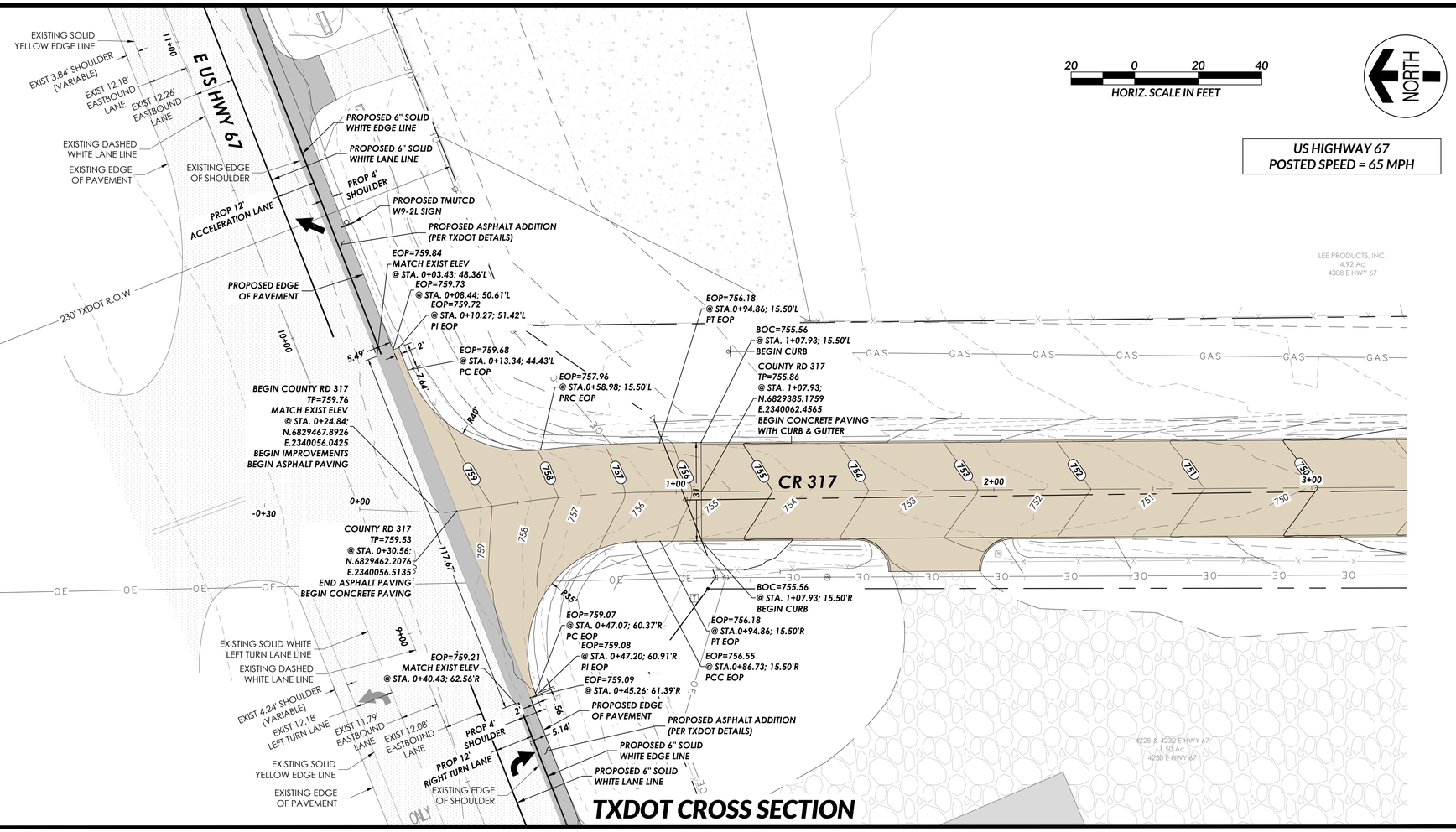
BAR IS ONE INCH LONG ON ORIGINAL DRAWING.
IF NOT ONE INCH, SCALE ACCORDINGLY.

PROJECT # 25510 | SCALE 1" = 30'

SEQ. 12 | SHEET 12
58

Plotted by: nic. kirk Plot Date: 5/18/2026 3:15 PM
Save Time: 5/14/2026 8:49 AM Saved By: svanderpool
X:\CL_Keene\25510 – CR 317 Reconstruction – Keene\Drafting_Plans_C_Civil\25510_13_PNP_CR317 XING US67.dwg

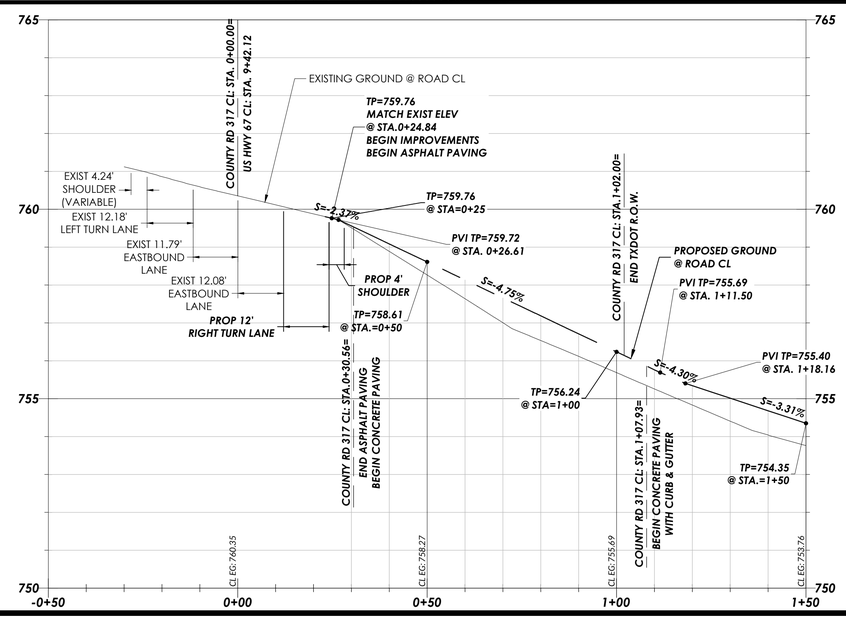
CAUTION!!!
Contractor to call for locates (1-800-DIG-TESS) and field verify the location of all existing utilities prior to excavation.



US HIGHWAY 67
POSTED SPEED = 65 MPH

NOTES:

1. *PROPOSED ASPHALT PAVEMENT TO MATCH EXISTING ASPHALT CROSS SLOPE.*
2. *SLOPES SHALL BE 3:1 MAXIMUM.*
3. *CONTRACTOR TO RESTORE SURFACES TO A CONDITION EQUAL TO OR BETTER THAN EXISTING.*
4. *ALL DISTURBED AREAS SHALL BE STABILIZED WITH VEGETATIVE GROUND COVER WITHIN 21 DAYS AFTER CONSTRUCTION IS COMPLETED.*
5. *AFTER COMPLETION OF CONSTRUCTION, SITE IS TO BE PERMANENTLY SEEDED. SEEDING TO MEET TXDOT ITEM 164.*
6. *PROPOSED ASPHALT ROAD CONSTRUCTION PER TXDOT STANDARD CDD (FTW) - "CONCRETE COMMERCIAL DRIVEWAY". PROPOSED ASPHALT ROAD WILL NOT HAVE CURB, GUTTER, OR SIDEWALK.*
7. *PROPOSED ASPHALT ROAD TO TERMINATE AT EXISTING ASPHALT PER TXDOT STANDARD CPTD (FTW) - "CONCRETE PAVEMENT TERMINUS AT HOT MIX TRANSITIONS OR TEMPORARY PAVEMENT".*
8. *ALL PROPOSED STRIPING AND MARKINGS TO ADHERE TO TxDOT PM-22 STANDARDS.*



TXDOT CROSS SECTION

05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

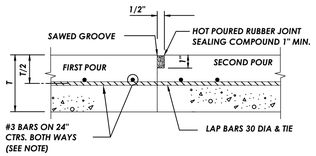
CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TXDOT CROSS SECTION

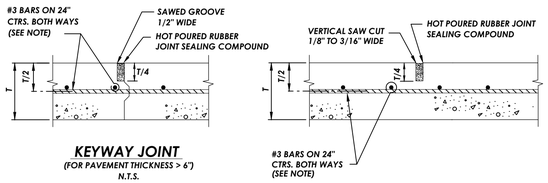
NO.	REVISION	DATE

PROJECT # 25510
SCALE H:1" = 20' V:1" = 2'
BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 13 / 58
SHEET 13



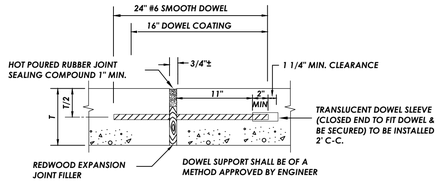
CONSTRUCTION JOINT
N.T.S.



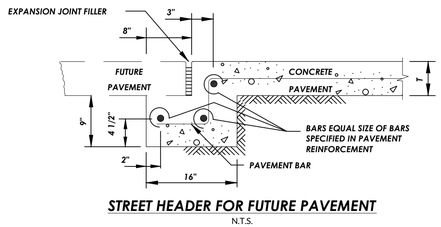
KEYWAY JOINT
(FOR PAVEMENT THICKNESS > 6")
N.T.S.

SAWED CONTRACTION JOINT
N.T.S.

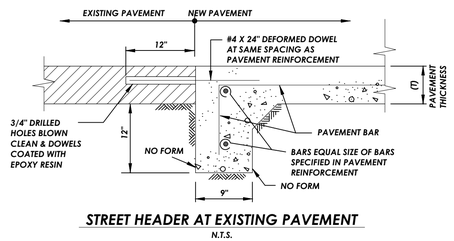
NOTE:
ALTERNATE REINFORCEMENT #4 BARS ON 30" CTRS. BOTH WAYS.



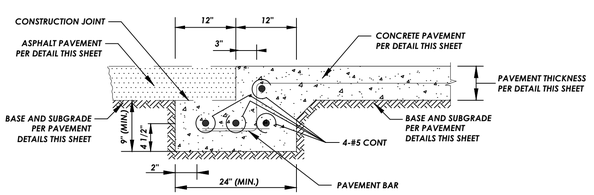
EXPANSION JOINT
(SPACED 600 FT. MAXIMUM: LOCATE AT STRUCTURES AND AT INTERSECTION P.C.'S & P.T.'S)
N.T.S.



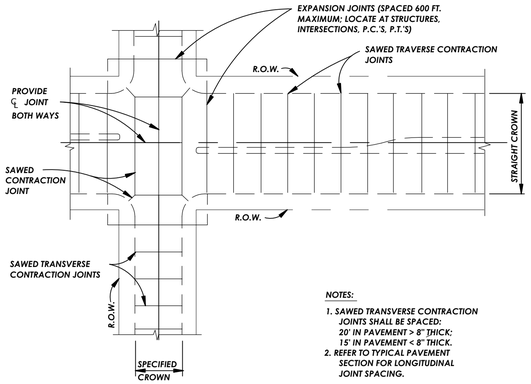
STREET HEADER FOR FUTURE PAVEMENT
N.T.S.



STREET HEADER AT EXISTING PAVEMENT
N.T.S.

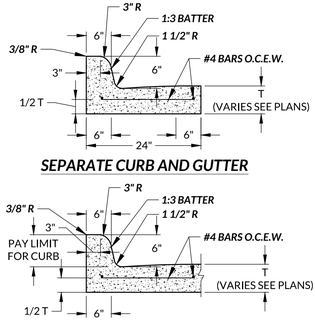


CONCRETE-ASPHALT JOINT DETAIL
N.T.S.



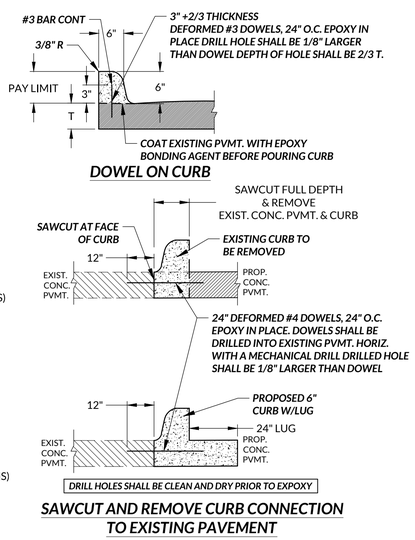
NOTES:
1. SAWED TRANSVERSE CONTRACTION JOINTS SHALL BE SPACED: 20' IN PAVEMENT > 8" THICK; 15' IN PAVEMENT < 8" THICK.
2. REFER TO TYPICAL PAVEMENT SECTION FOR LONGITUDINAL JOINT SPACING.

SPACING DIAGRAM FOR TRANSVERSE JOINTS
N.T.S.



SEPARATE CURB AND GUTTER

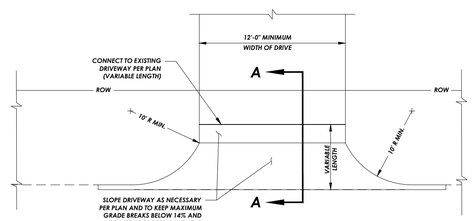
INTEGRAL CURB AND GUTTER



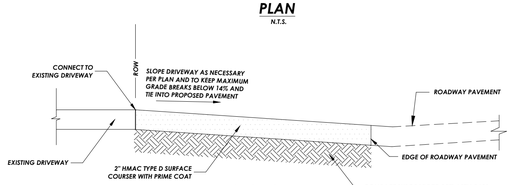
DOWEL ON CURB

SAWCUT AND REMOVE CURB CONNECTION TO EXISTING PAVEMENT

CONCRETE CURB DETAILS
N.T.S.

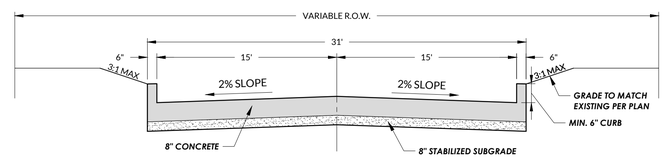


PLAN
N.T.S.



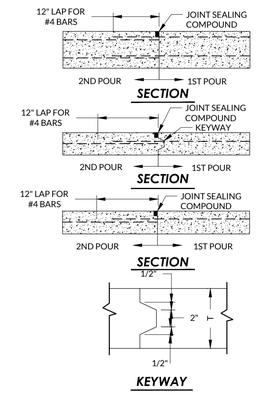
SECTION A-A
N.T.S.

STANDARD ASPHALT DRIVEWAY
N.T.S.



NOTES:
1. ALL REINFORCEMENT SHALL BE #3 BARS ON 24" CENTERS BOTH WAYS
2. ALTERNATE REINFORCEMENT SHALL BE #4 BARS ON 30" CENTERS BOTH WAYS.
3. PAVEMENT STRENGTH SHALL CONFORM TO CLASS "C" CONCRETE.
4. GRINDING AND REUSE OF EXISTING ASPHALT AND BASE WILL BE ACCEPTABLE FOR FILL

REINFORCED CONCRETE PAVEMENT
N.T.S.

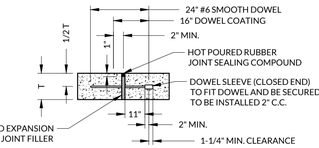


SECTION

SECTION

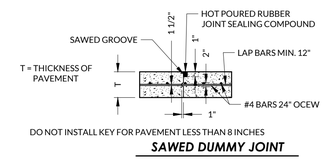
SECTION

KEYWAY



EXPANSION JOINTS TO BE PLACED ON 500' TO 700' INTERVALS AND RADIUS RETURNS, BOTH MEDIAN & INTERSECTION.

TRANSVERSE EXPANSION JOINT

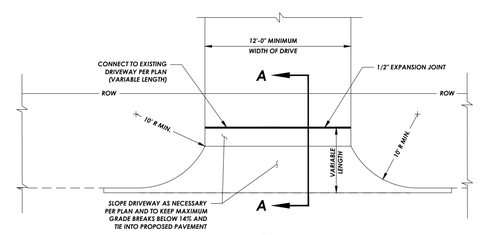


DO NOT INSTALL KEY FOR PAVEMENT LESS THAN 8 INCHES

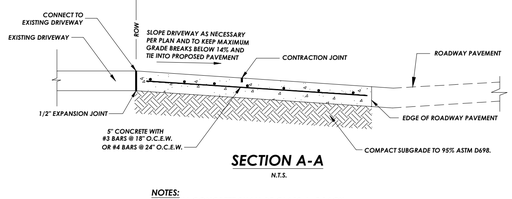
SAWED DUMMY JOINT

CONSTRUCTION JOINTS

STREET JOINT DETAILS
N.T.S.



PLAN
N.T.S.



SECTION A-A
N.T.S.

NOTES:
1. ALL CONCRETE SHALL BE CLASS A, 5 SACK.
2. SAND SHALL NOT BE ACCEPTED AS COMPACTED SUBGRADE. SAND WILL BE ALLOWED FOR LEVEL-UP ONLY.
3. ALL STEEL SHALL HAVE A 2" MINIMUM COVER.

STANDARD CONCRETE DRIVEWAY
N.T.S.

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

PAVING DETAILS

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 14 | SHEET 14 / 58

Plotted by: nic. kirk Plot Date: 5/18/2026 3:15 PM
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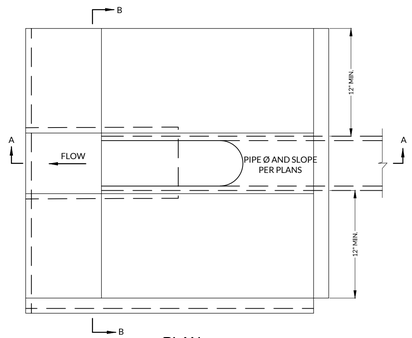
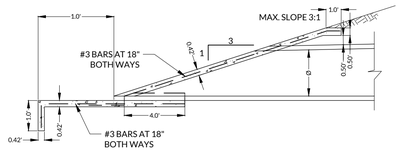
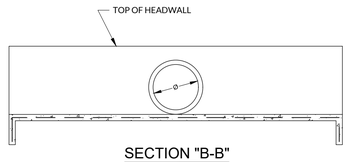


PLAN



SECTION "A-A"

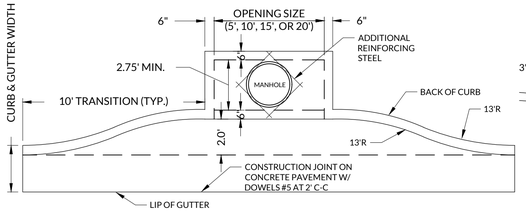


SECTION "B-B"

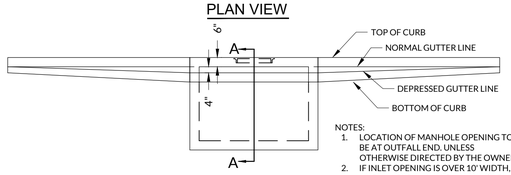
NOTE:
CONCRETE SHALL BE CLASS "A"

CONCRETE APRON SLOPING HEADWALL

N.T.S.



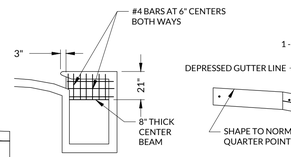
PLAN VIEW



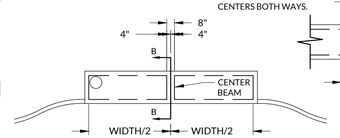
ELEVATION

NOTES:
1. LOCATION OF MANHOLE OPENING TO BE AT OUTFALL END. UNLESS OTHERWISE DIRECTED BY THE OWNER.
2. IF INLET OPENING IS OVER 10' WIDTH, THEN THERE SHALL BE A MANHOLE OPENING AT EACH END OF INLET.

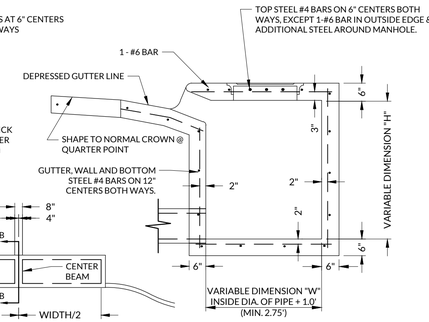
CURB INLET RECESSED 5', 10', 15', OR 20' OPENING



SECTION B-B



CENTER BEAM FOR 15' AND 20' INLETS

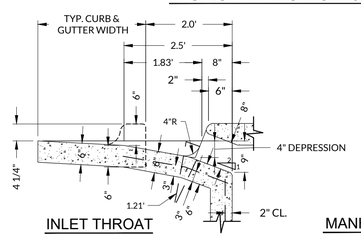


SECTION A-A

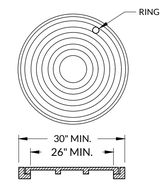
CURB INLET RECESSED CROSS SECTION & CENTER BEAM

STORM DRAIN DETAILS GENERAL NOTES:

1. IN GENERAL, REINFORCING STEEL SHALL BE #4 BARS ON 12" CENTERS BOTH WAYS FOR GUTTER, BOTTOM SLAB ENDS, FRONT AND BACK WALLS, AND #4 BARS ON 6" CENTERS BOTH WAYS FOR TOP SLAB. AN ADDITIONAL #6 BAR SHALL BE PLACED IN THE FRONT EDGE OF THE TOP SLAB IN THE INLETS AND ADDITIONAL REINFORCING STEEL SHALL BE PLACED AROUND MANHOLES AS SHOWN.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. ALL CONCRETE SHALL BE CLASS "A". ALL EXPOSED CORNERS SHALL BE CHAMFERED 3/4".
4. ALL REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2" TO THE CENTERS OF THE BARS.
5. 10'-0" OF EXISTING CURB AND GUTTER UPSTREAM AND 10'-0" OF EXISTING CURB AND GUTTER DOWNSTREAM SHALL BE REMOVED AND REPOURED INTEGRALLY WITH EACH INLET.
6. ALL BACK FILLING SHALL BE PERFORMED BY MECHANICAL TAMPING TO 90% STANDARD PROCTOR DENSITY.



INLET THROAT



MANHOLE FRAME & COVER

CURB INLET RECESSED INLET THROAT & M.H. FRAME & COVER

CURB INLET RECESSED

N.T.S.

Plotted by: nic. kirk Plot Date: 5/18/2026 3:15 PM
Saved By: svanderpool Save Time: 5/14/2026 9:04 AM
X:\CL_Keene\25510 – CR 317 Reconstruction – Keene\Drafting_Plans_C_Civil\25510_15_DTLS_DRAINAGE.dwg

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

DRAINAGE DTAILS

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510
SCALE N.T.S.

SEQ. 15 / 58
SHEET 15

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

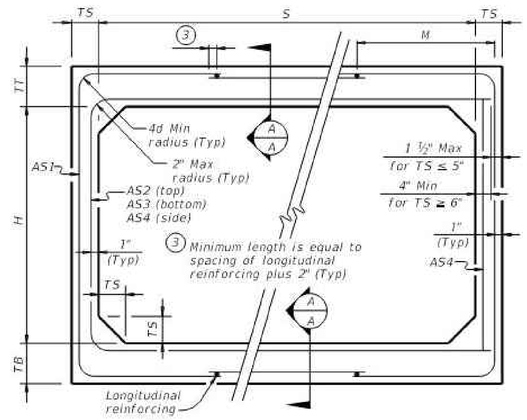
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
4	2	7.5	6	5	< 2	–	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	–	–	–	3.6
4	2	5	5	5	3 - 5	38	0.13	0.13	0.13	0.12	–	–	–	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	–	–	–	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	–	–	–	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	–	–	–	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	–	–	–	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	–	–	–	3.6
4	3	7.5	6	5	< 2	–	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	–	–	–	4.1
4	3	5	5	5	3 - 5	38	0.12	0.16	0.16	0.12	–	–	–	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	–	–	–	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	–	–	–	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	–	–	–	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	–	–	–	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	–	–	–	4.1
4	4	7.5	6	5	< 2	–	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	–	–	–	4.6
4	4	5	5	5	3 - 5	38	0.12	0.18	0.18	0.12	–	–	–	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	–	–	–	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	–	–	–	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	–	–	–	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	–	–	–	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	–	–	–	4.6

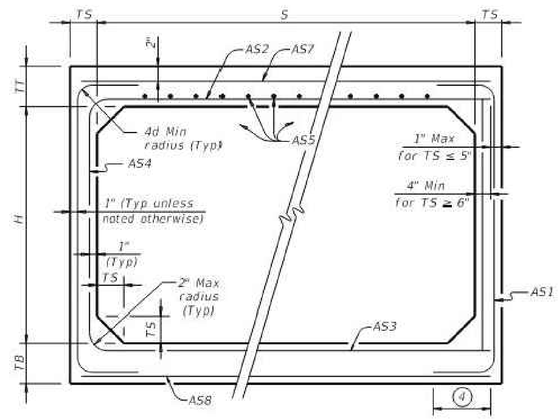
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

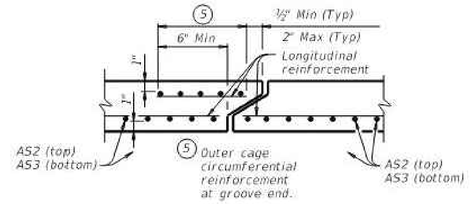
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f'c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)."

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

4'-0" SPAN

SCP-4

FILE: CD-SCP04-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
BOX CULVERTS SCP-4 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 16 | SHEET 16 / 58

X:\CL_Keene\25510 – CR 317 Reconstruction – Keene\Drafting_Plans_C_Civil\25510_16_DTLS_BOX CULVERT.dwg Saved By: svanderpool Save Time: 5/14/2026 2:53 PM Plotted by: nic.kirk Plot Date: 5/18/2026 3:15 PM

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

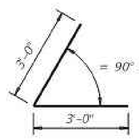
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2-wings) (4)		Estimated Quantities per ft of Toewall (1-toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2-wings)

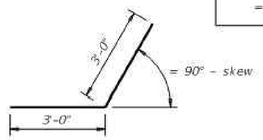
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

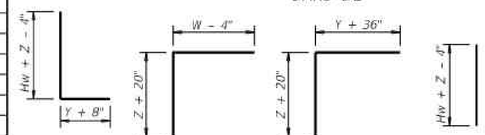
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

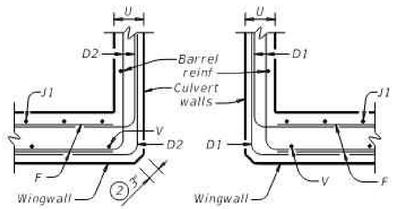
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (5) + (N + 1) (U)] ÷ cosine (θ)

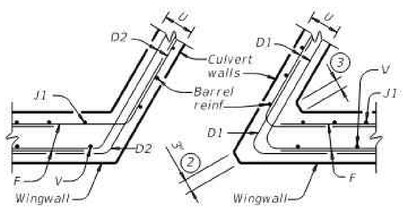
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

See applicable box culvert standard sheet for S, H, T, and U values.



SECTION C-C - PW-1



SECTION C-C - PW-2

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

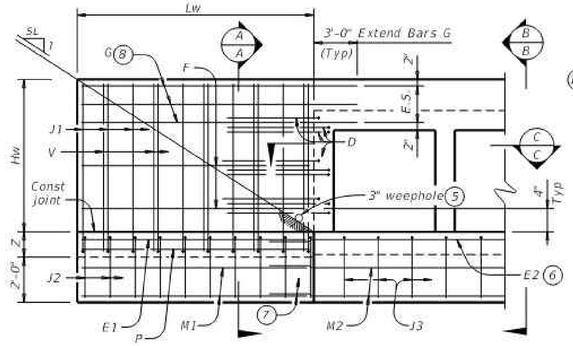
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

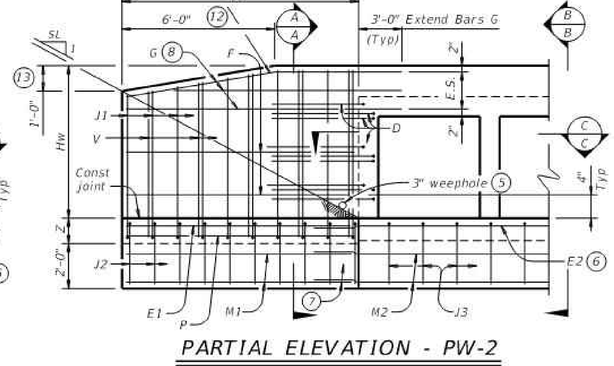
MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

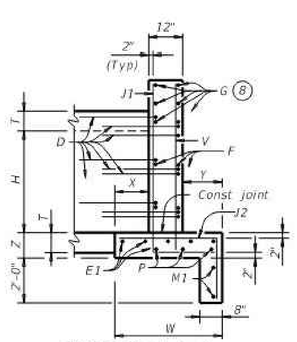
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



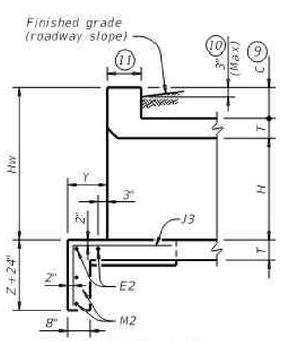
PARTIAL ELEVATION - PW-1



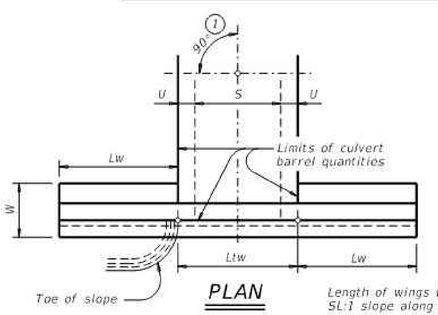
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

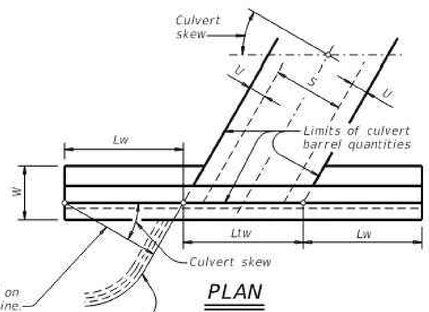


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

Texas Department of Transportation — Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2

PW

FILE: CD-PW-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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	DIST	COUNTY		SHEET NO.

DATE:
FILE:

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN — TBPELS FIRM # 10194493 — TBAE FIRM # BR 2261 — TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
HEADWALL FOR BOX CULVERTS PW DETAIL

NO.	REVISION	DATE

PROJECT # 25510 | SCALE N.T.S.
BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 17 | SHEET 17
58

X:\CL_Keene\25510 - CR 317 Reconstruction - Keene\Drafting_Plans_C_Civil\25510_17_DTLS_WINGWALL.dwg Saved By: svanderpool Save Time: 5/14/2026 2:54 PM Plotted by: nic.kirk Plot Date: 5/18/2026 3:15 PM

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
										PREFABRICATED		
06	1	WR-2L	LANE ENDS MERGE LEFT	36 x 36	X		S80	1	UA	P	BM	N

POST TYPE: FRP = Fiberglass; TWT = Thin-Wall 10BWG = 10 BWG; S80 = Sch 80

POSTS: 1 or 2

ANCHOR TYPE: UA=Universal Conc; UB=Universal Bolt; SA=Slipbase-Conc; SB=Slipbase-Bolt; WS=Wedge Steel; WP=Wedge Plastic

PREFABRICATED: P = "Plain"; T = "T"; U = "U"

MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam; WC = 1.12 #/ft Wing Channel; EXAL= Extruded Alum Sign Panels

BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N; TY S

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DATE:
FILE:

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS					
4-16		DIST	COUNTY		SHEET NO.
8-16					

18

STATE OF TEXAS — NICHOLAS KIRK — 135937 — LICENSED PROFESSIONAL ENGINEER

05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN — TBPELS FIRM # 10194493 — TBAE FIRM # BR 2261 — TBPE FIRM # 2448

CITY OF KEENE, TEXAS

CR 317 RECONSTRUCTION

SUMMARY OF SMALL SIGNS

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 18 | SHEET 18 / 58

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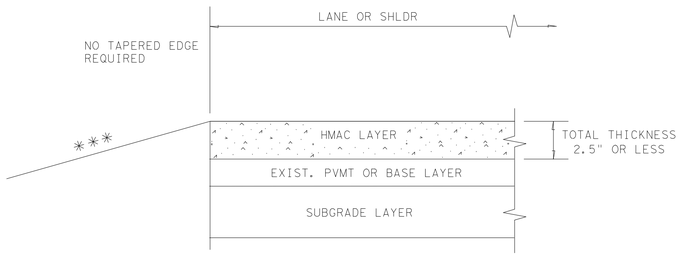
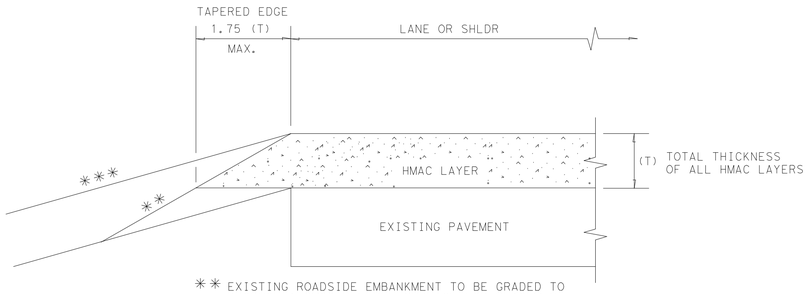


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

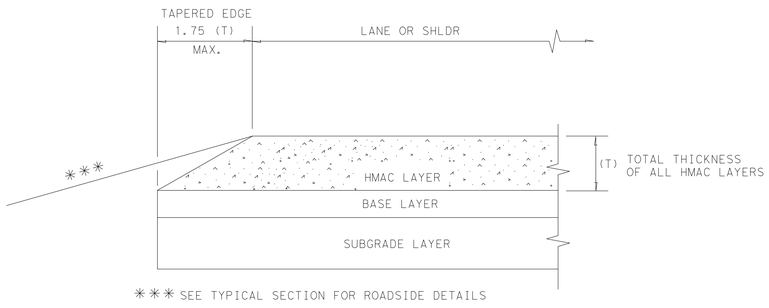
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

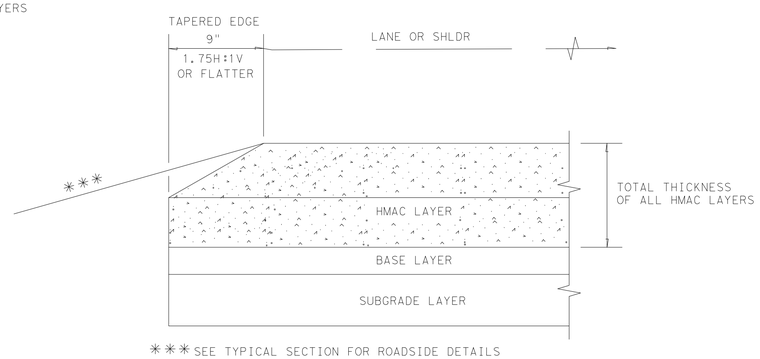
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

(NOT TO SCALE)

DATE:
FILE:

05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TAPERED EDGE TE(HMAC)-11 DETAIL

Texas Department of Transportation — Design Division Standard

TAPERED EDGE DETAILS
HMAC PAVEMENT
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.

NO.	REVISION	DATE

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PROJECT # 25510 | SCALE N.T.S.

SEQ. 19 | SHEET 19 / 58

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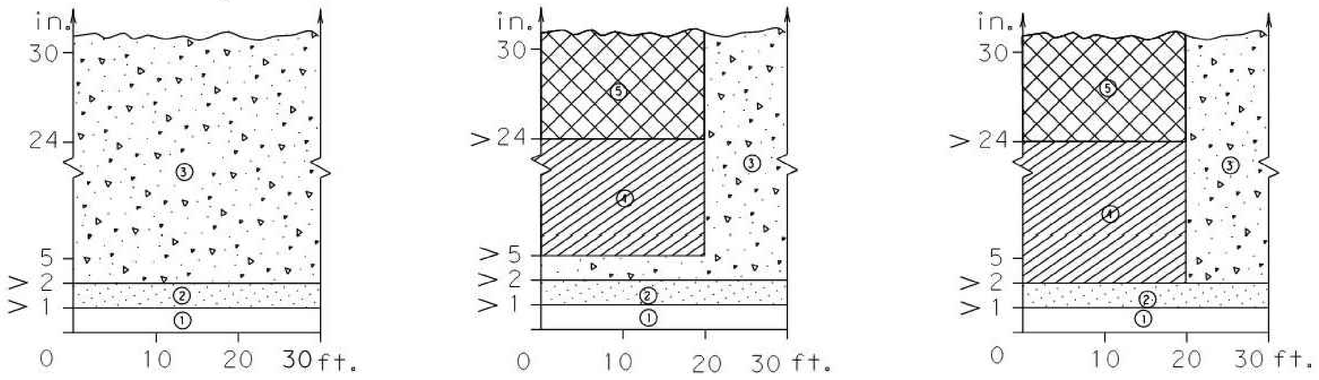
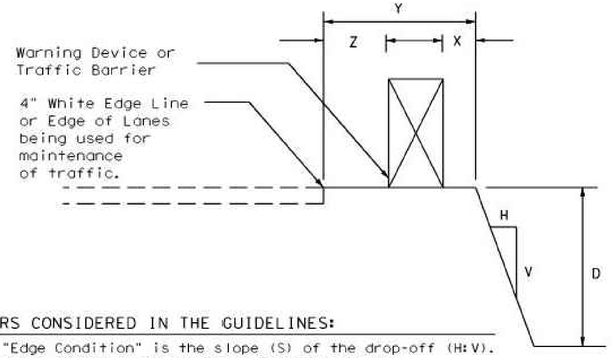
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

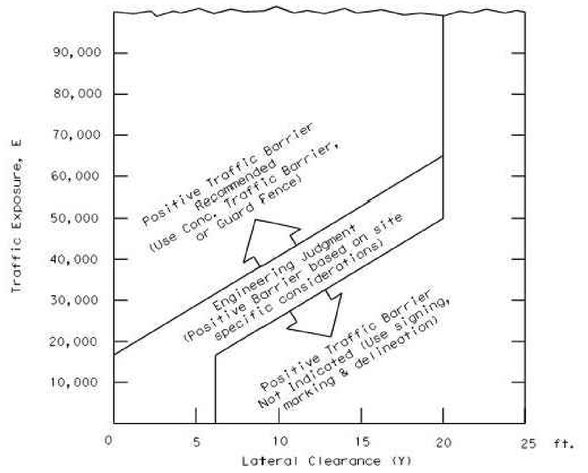
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1. E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED
PROFESSIONAL ENGINEER

Date 05-18-2026

Texas Department of Transportation — Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
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REVISIONS 05-01 08-01 9-21	DIST	COUNTY		SHEET NO.

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED
PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TREATMENT FOR VARIOUS EDGE CONDITIONS

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BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

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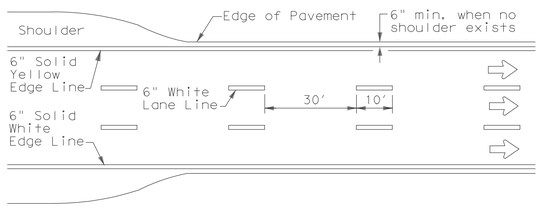
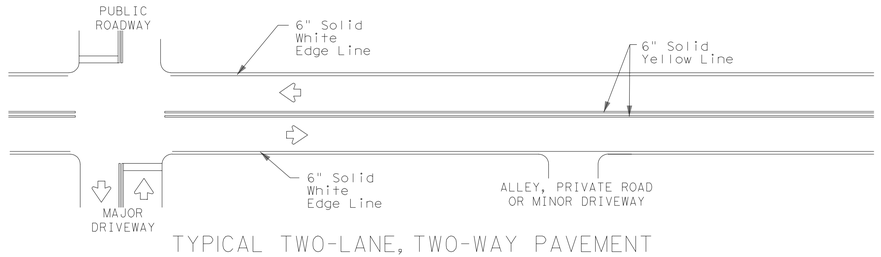
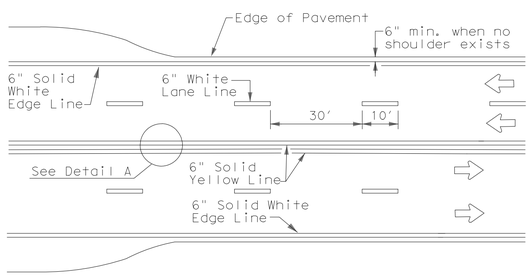


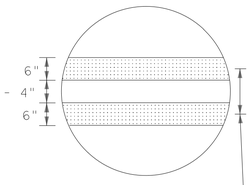
EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

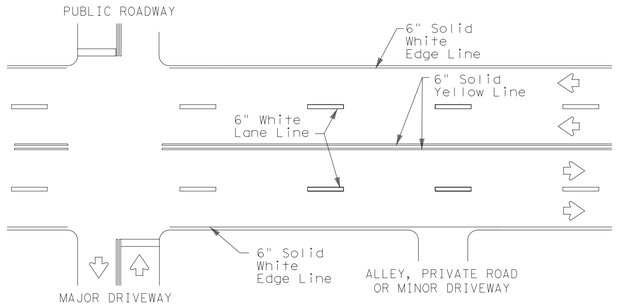


DETAIL "A"

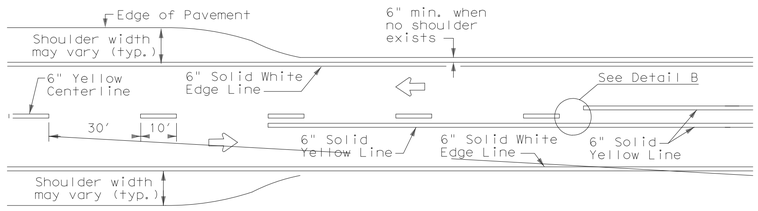
9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

* 2" minimum for restripe projects when approved by the Engineer.

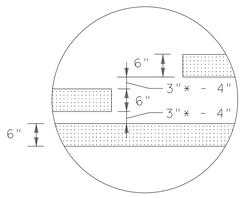
** 8" minimum for restripe projects when approved by the Engineer.



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



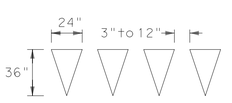
TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

DETAIL "B"

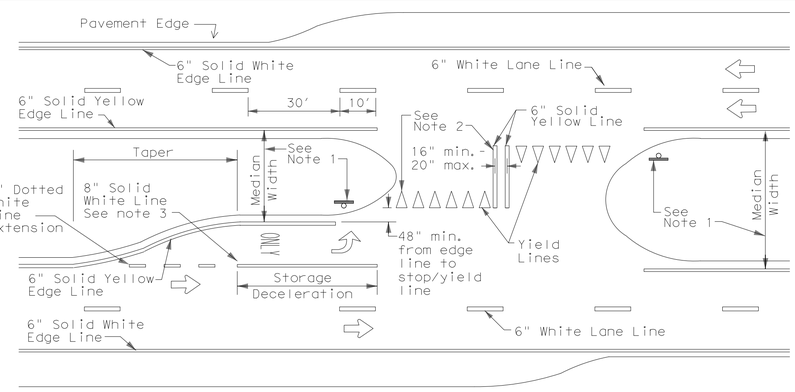
* 2" minimum for restripe projects when approved by the Engineer.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES

For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

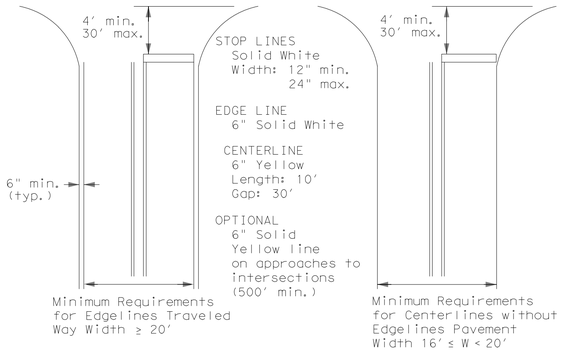
GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths
for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD
PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12 22A	DIST	COUNTY		SHEET NO.

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
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JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

PAVEMENT MARKINGS PM(1)-22 DETAIL

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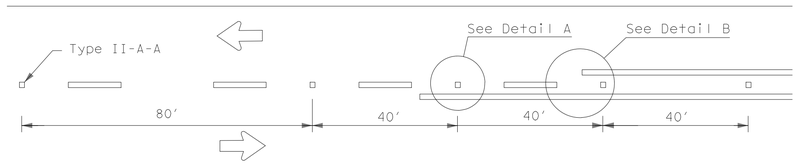
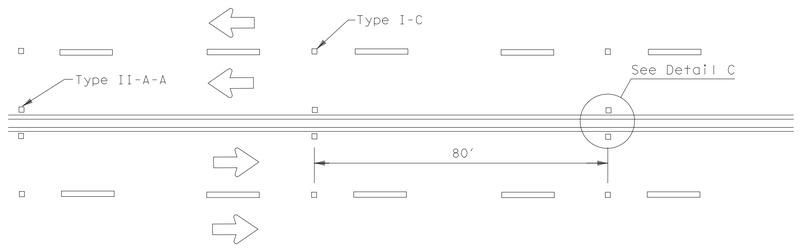
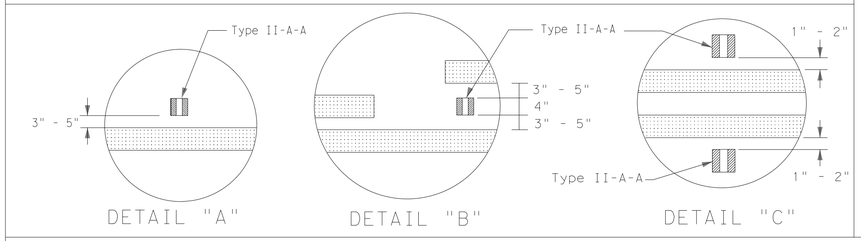
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

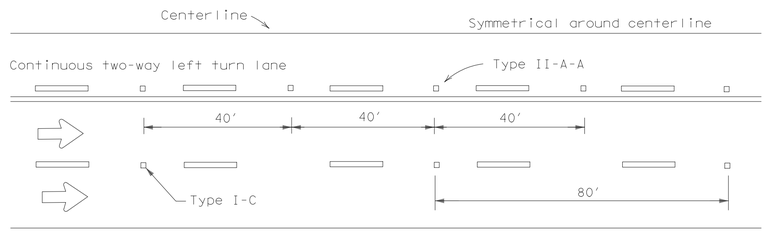


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

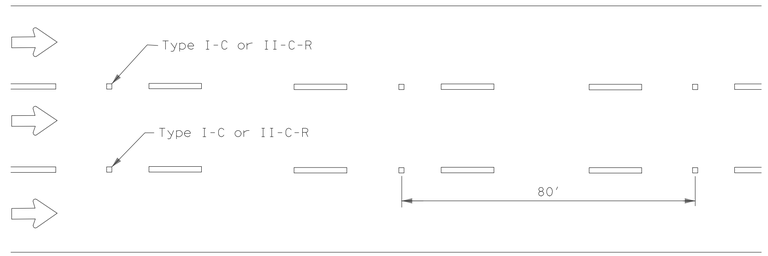


CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS





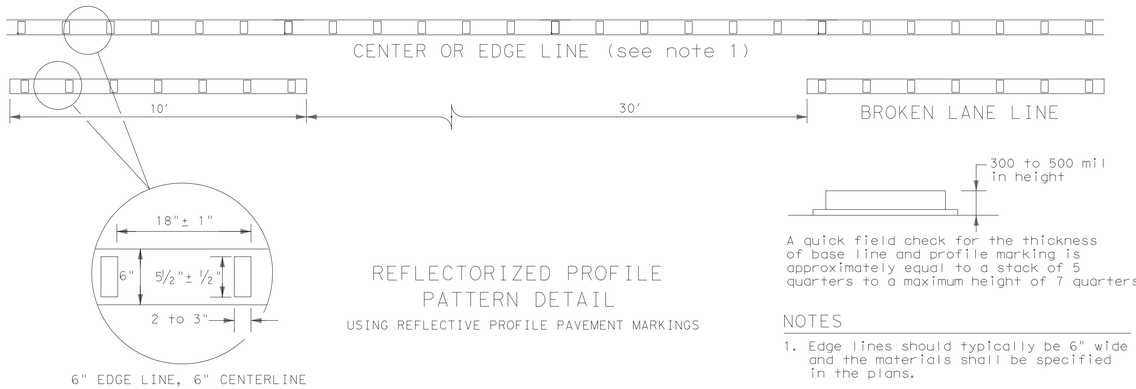
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

See Note 3.



REFLECTORIZED PROFILE
PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

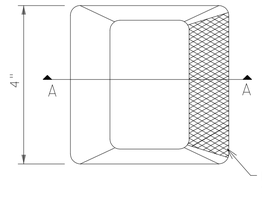
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

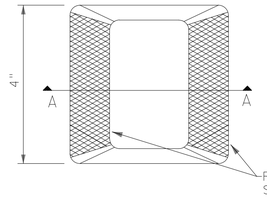
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

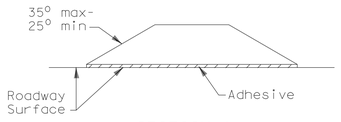
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation | Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
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REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	DIST	COUNTY		SHEET NO.
228				

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FILE:

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STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
PAVEMENT MARKINGS PM(2)-22 DETAIL

NO.	REVISION	DATE

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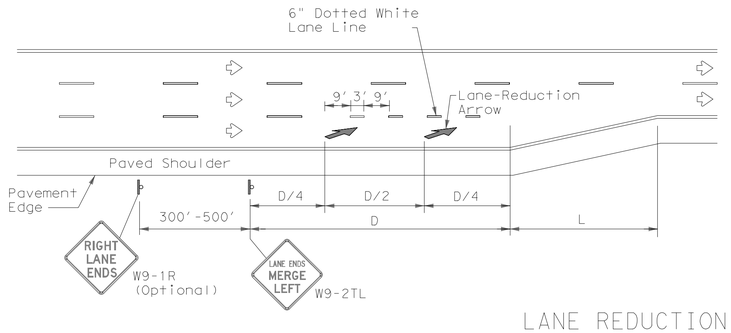
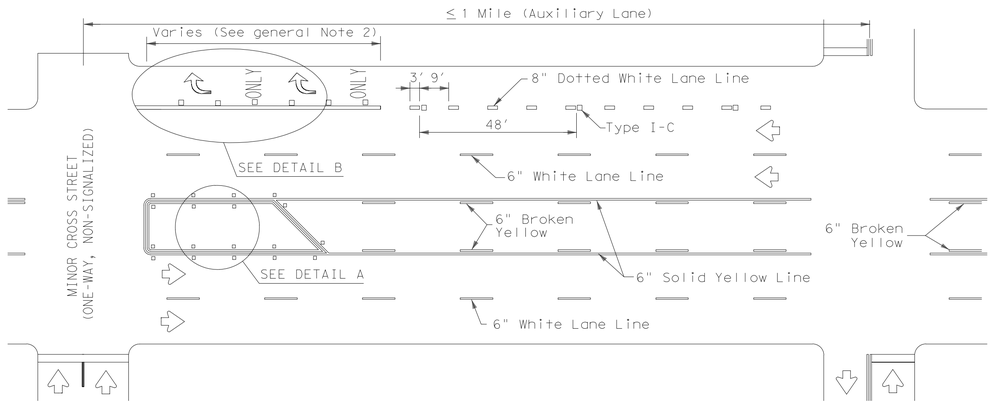


LANE REDUCTION

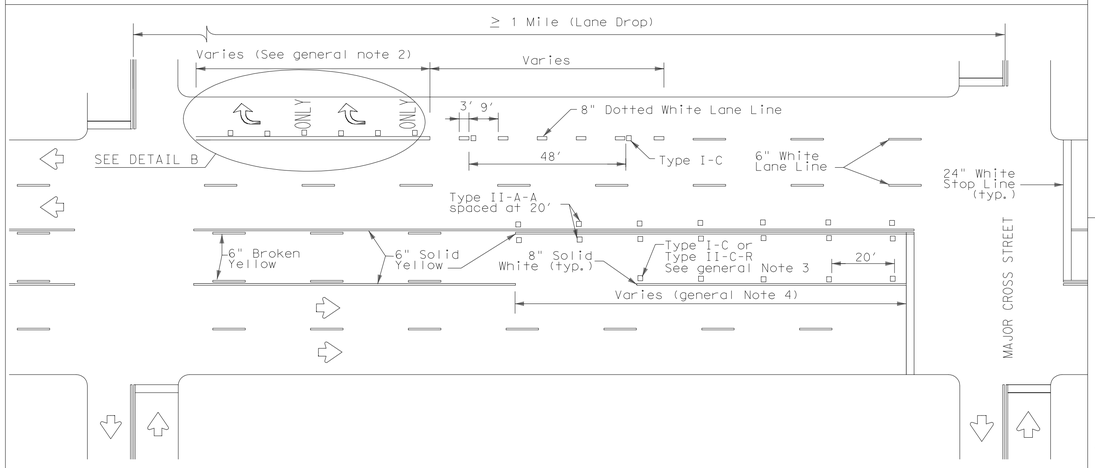
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

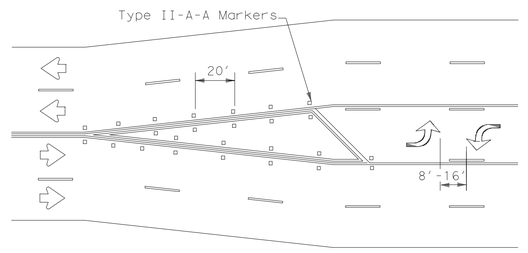
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE

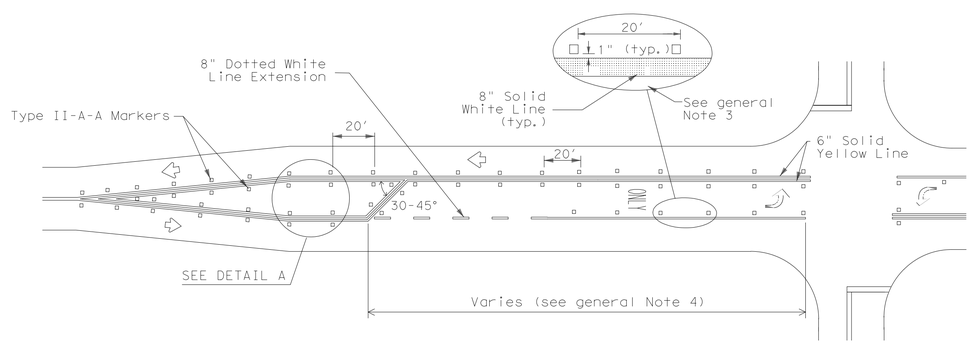


TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP

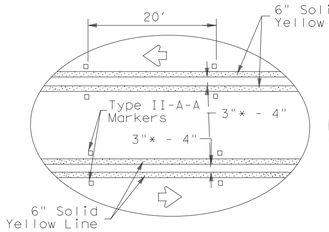


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

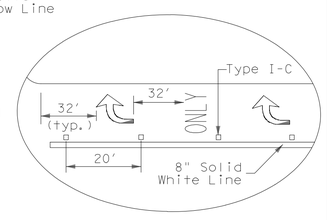
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

* 2" minimum allowed for restripe projects when approved by the Engineer.

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

Texas Department of Transportation — Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12 22C	DIST	COUNTY		SHEET NO.

DATE: FILE:

Nicholas Kirk
STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

PAVEMENT MARKINGS PM(3)-22 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 23 | SHEET 23

58

Plotted by: nic kirk Plot Date: 5/18/2026 3:16 PM
Saved By: svanderpool Save Time: 5/14/2026 3:53 PM
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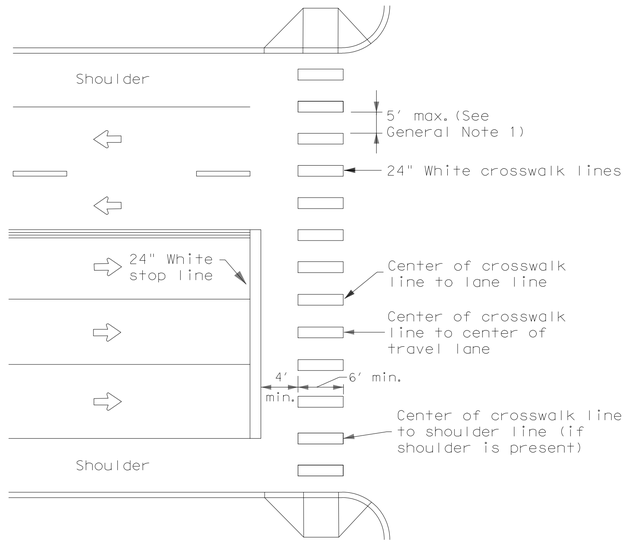


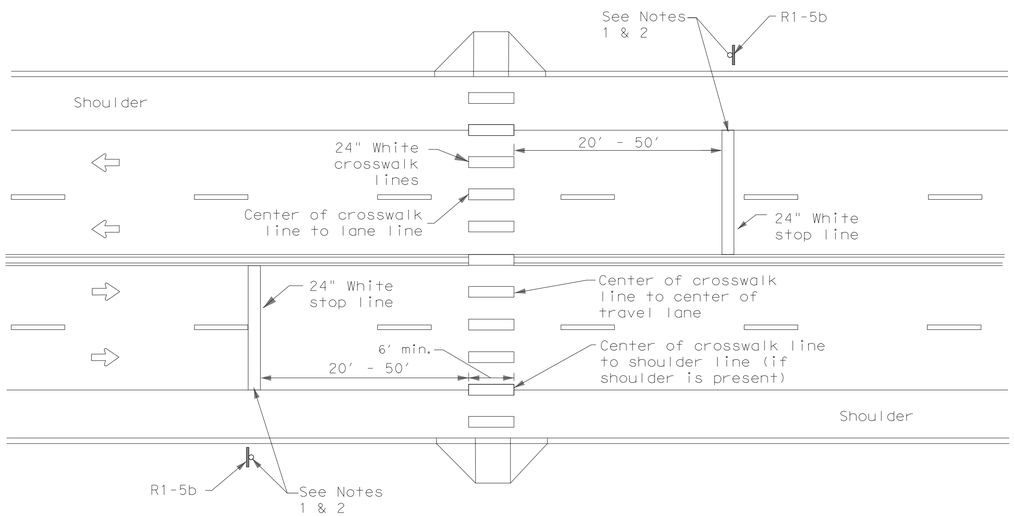
HIGH-VISIBILITY LONGITUDINAL CROSSWALK
AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6′ wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY
LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation — Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO.
6-20				
6-22				
12-22				
22D				

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DATE:
FILE:

Plotted by: nic.kirk Plot Date: 5/18/2026 3:16 PM
Saved By: svanderpool Save Time: 5/14/2026 3:37 PM
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NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

PAVEMENT MARKINGS PM(4)-22 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 24 | SHEET 24 / 58

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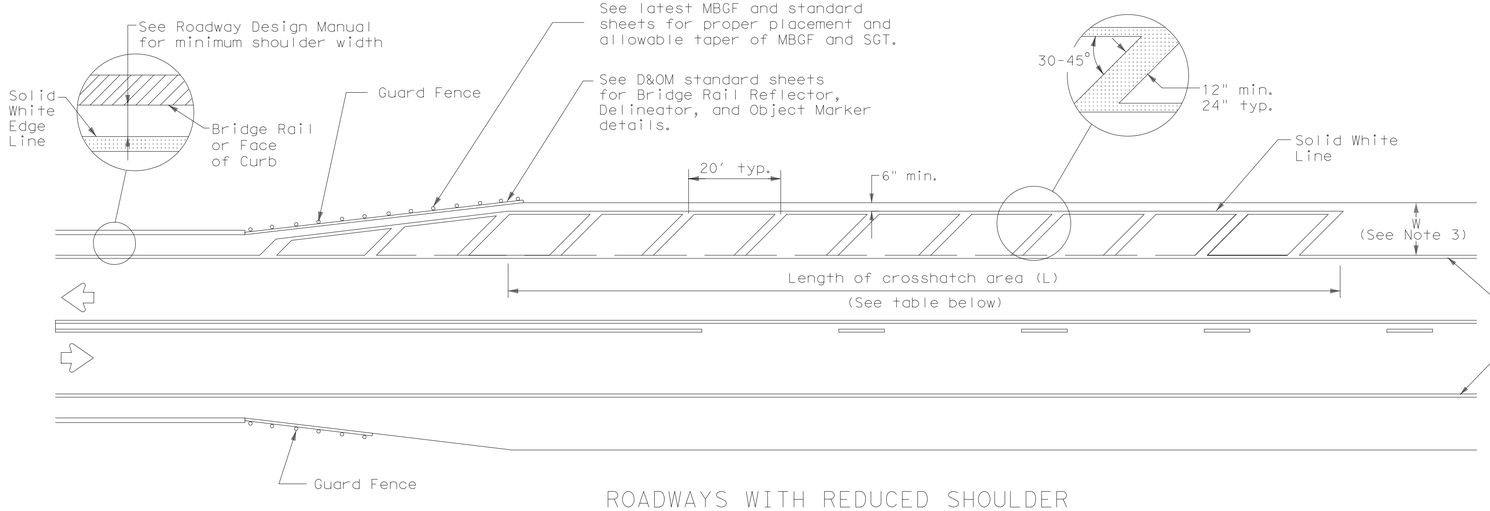
DATE:
FILE:



ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

Texas Department of Transportation — Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

PM(5)-22

FILE: pm5-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.
22E				

STATE OF TEXAS — NICHOLAS KIRK — 135937 — LICENSED PROFESSIONAL ENGINEER

05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN — TBPELS FIRM # 10194493 — TBAE FIRM # BR 2261 — TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

PAVEMENT MARKINGS PM(5)-22 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 — SCALE N.T.S.

SEQ. 25 — SHEET 25 / 58

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DATE:
FILE:

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

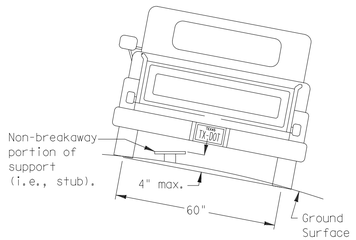
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

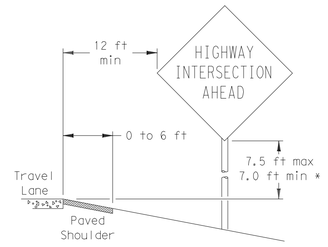
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

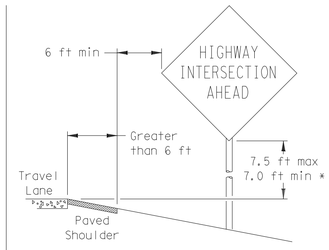
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

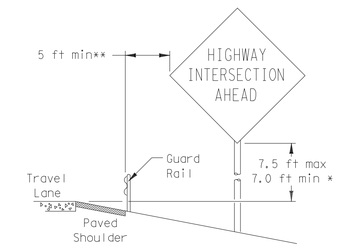
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



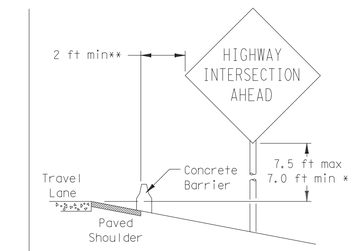
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



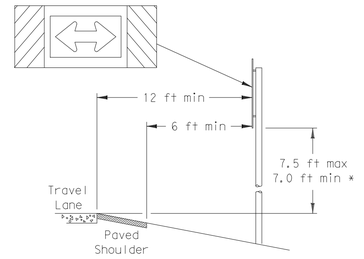
BEHIND GUARDRAIL



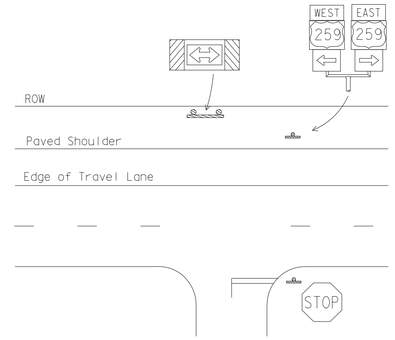
BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

T-INTERSECTION



When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

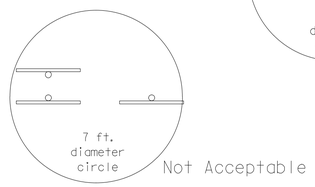
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

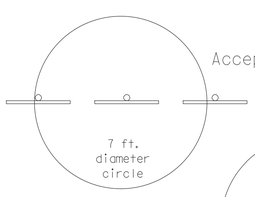
The maximum values may be increased when directed by the Engineer.

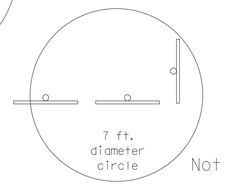
See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

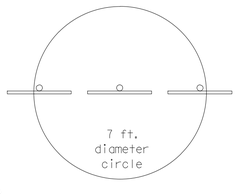
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



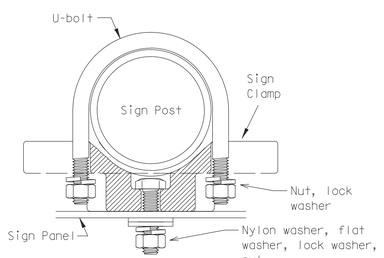






TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

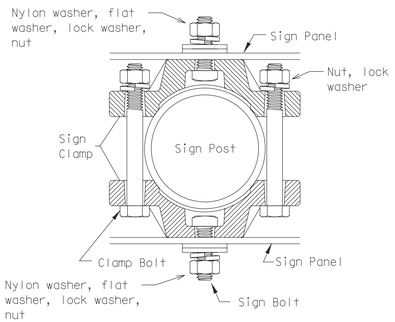


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

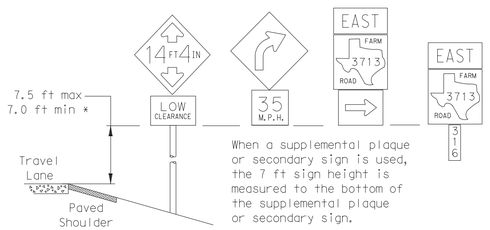
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



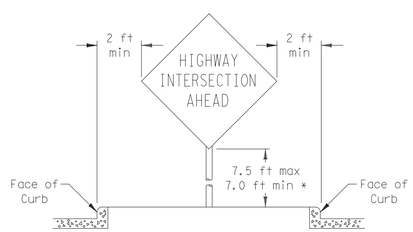
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



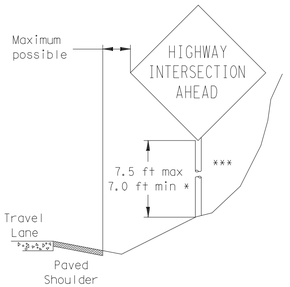
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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9-08 REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.

26A

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

SIGN MOUNTING SMD(GEN)-08 DETAIL

NO.	REVISION	DATE

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PROJECT # 25510
SCALE N.T.S.

SEQ. 26 / 58
SHEET 26

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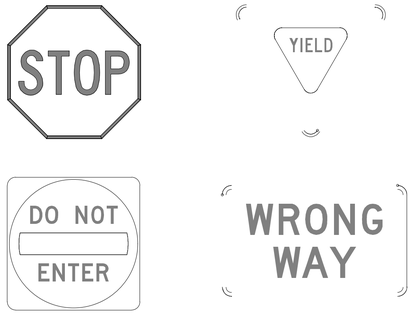
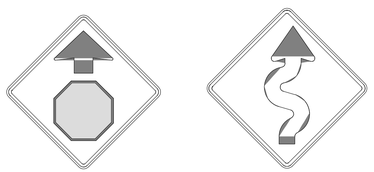
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

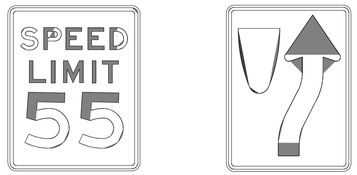
REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

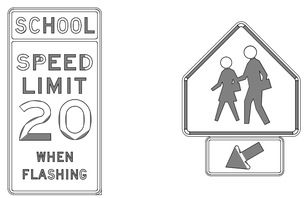
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Texas Department of Transportation | Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
4				

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
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JACOB MARTIN | TBPELS FIRM # 10194493 | TBAE FIRM # BR 2261 | TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
SIGN REQUIREMENTS TSR(4)-13 DETAIL

NO.	REVISION	DATE

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SEQ. 27 | SHEET 27 / 58

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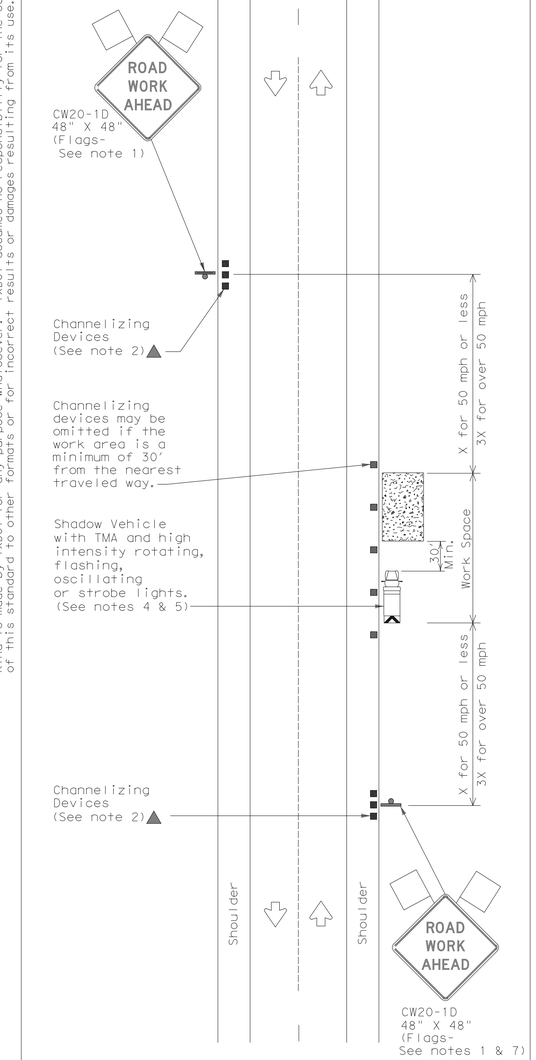
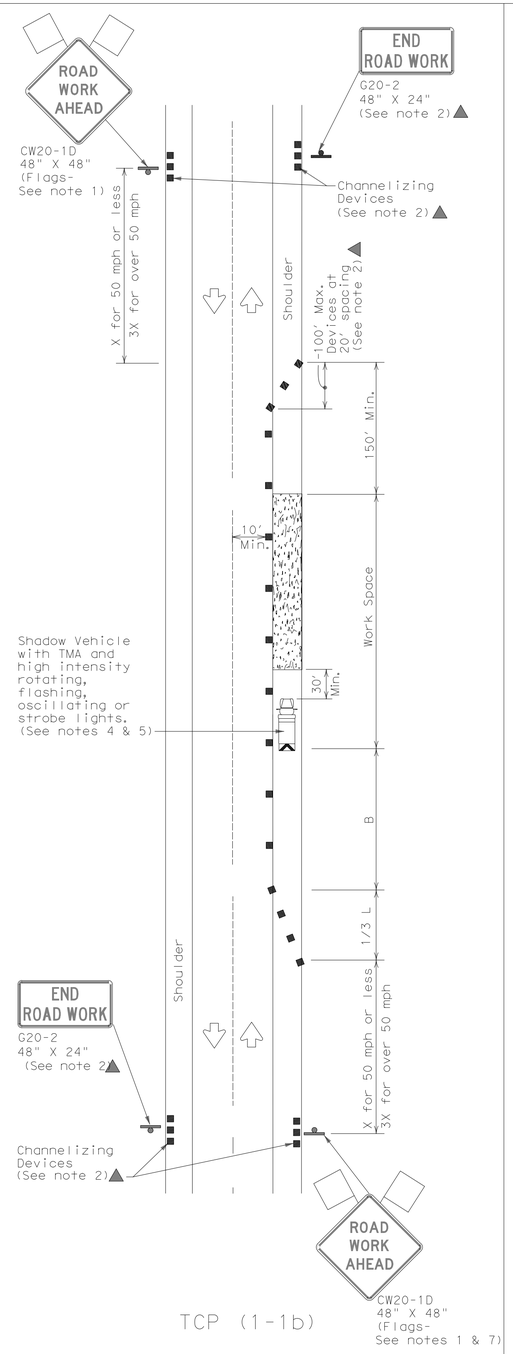


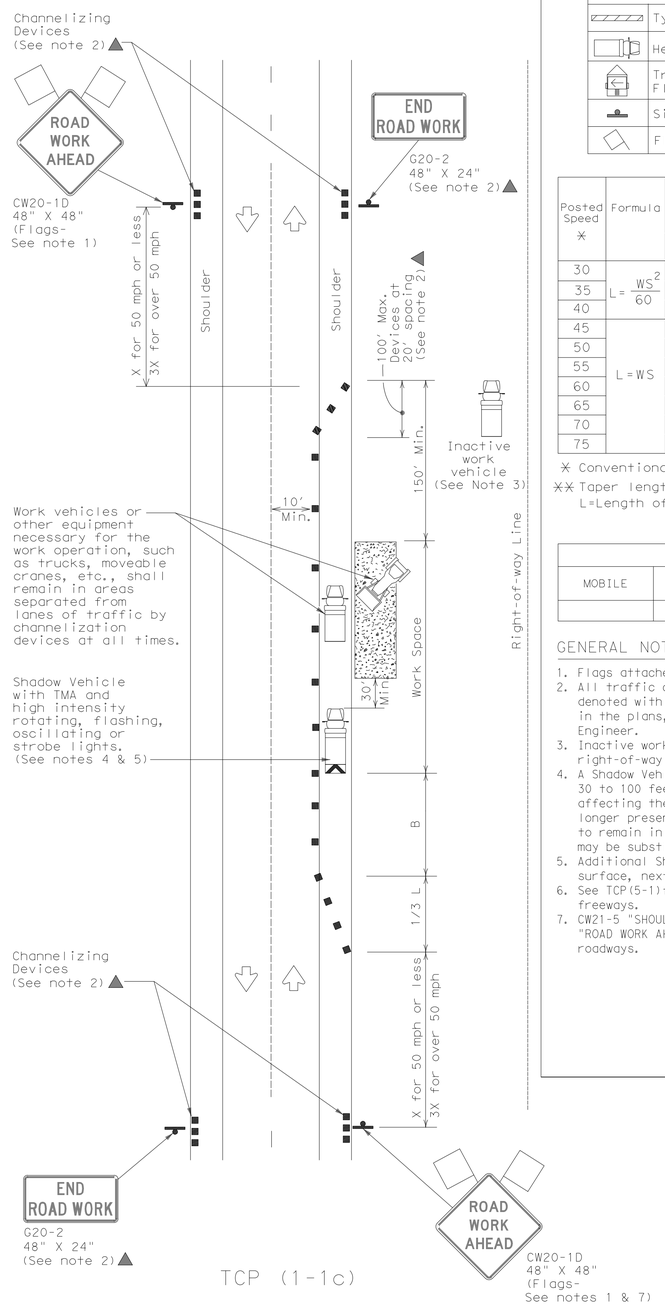
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18				
151				

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL TCP(1-1)-18 DETAIL

NO.	REVISION	DATE

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SEQ. 28 | SHEET 28 / 58

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Save Time: 5/14/2026 3:56 PM Saved By: svanderpool
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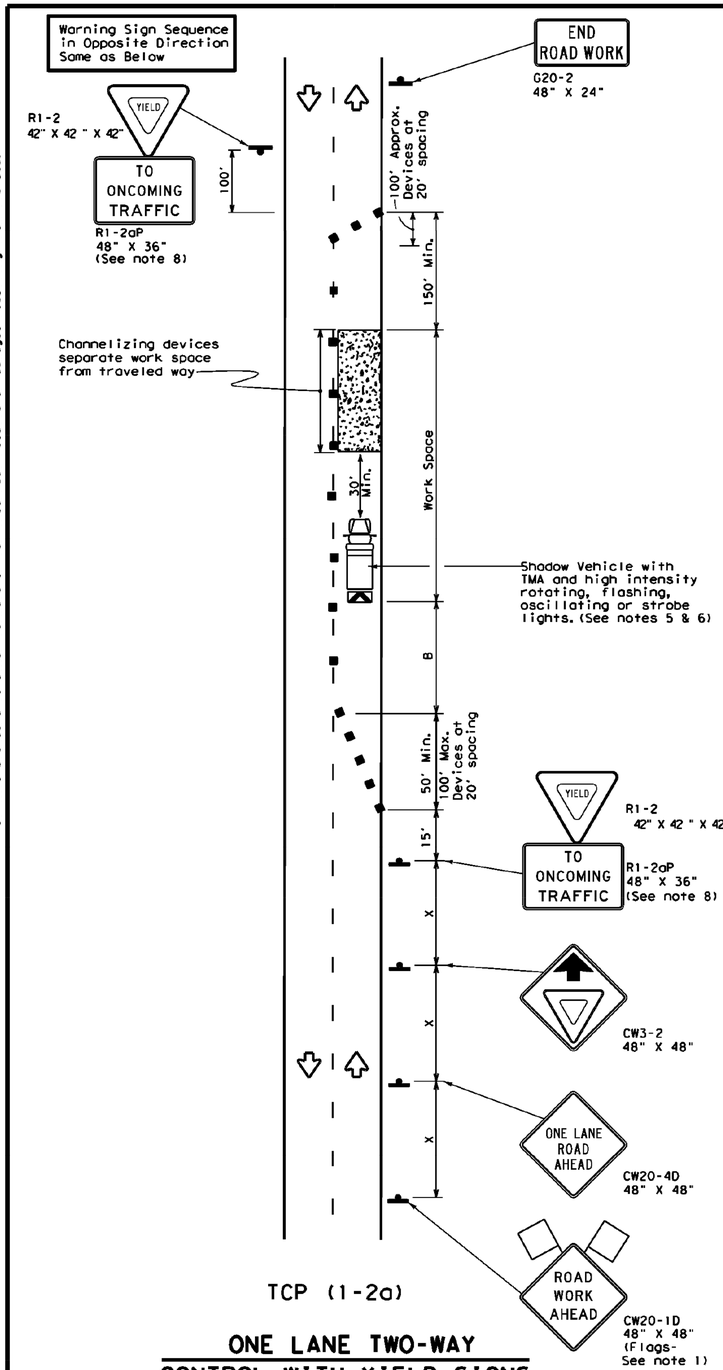
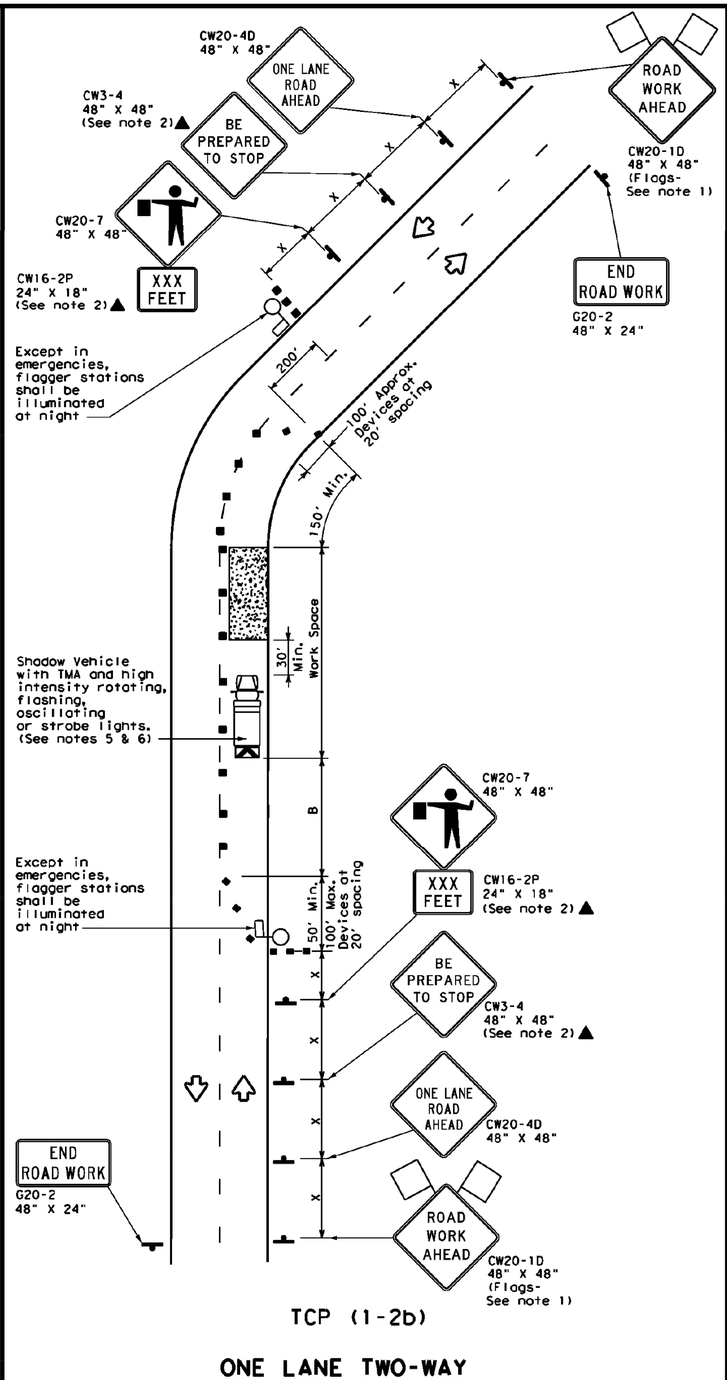
FILE:



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	(M)	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	L= $WS^2/60$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 / 2-94 2-12 / 1-97 2-18	DIST	COUNTY		SHEET NO.
152				

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
TRAFFIC CONTROL TCP(1-2)-18 DETAIL

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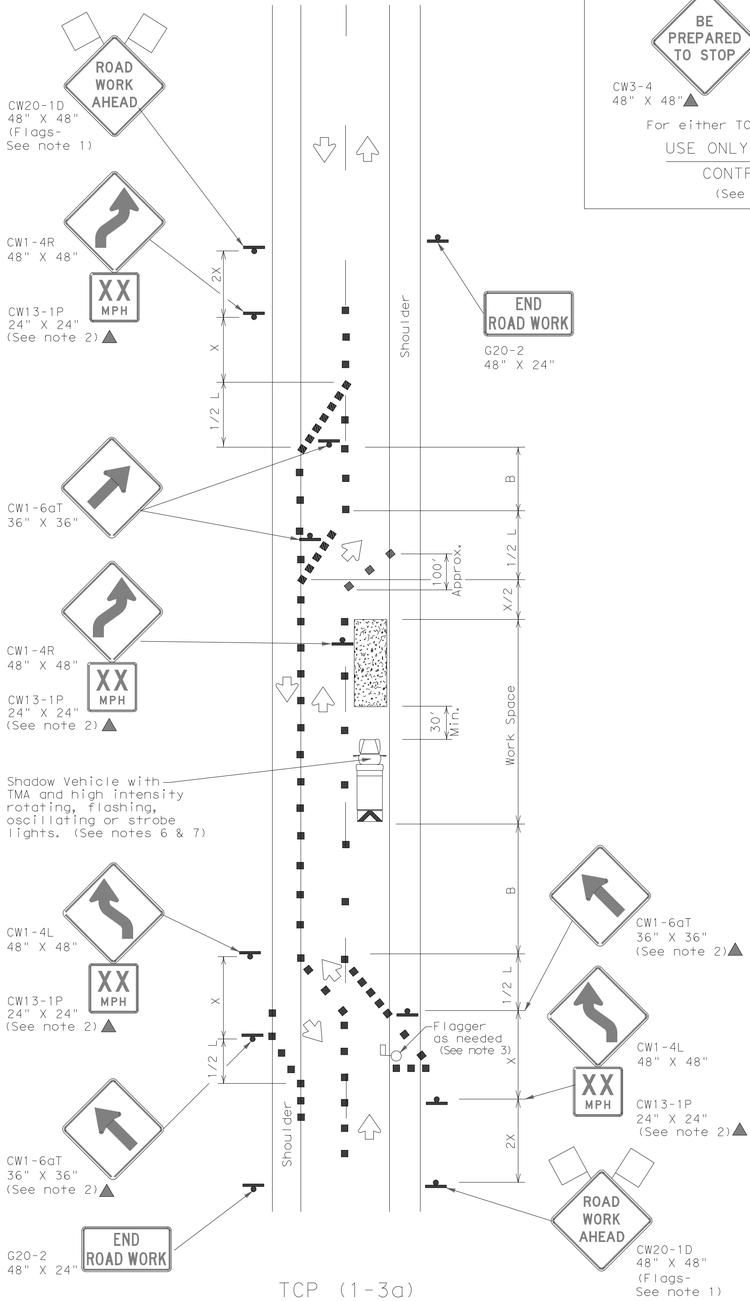
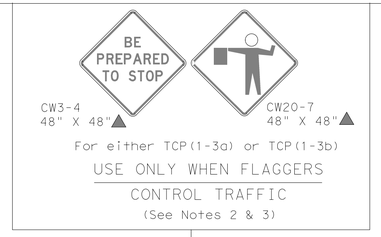
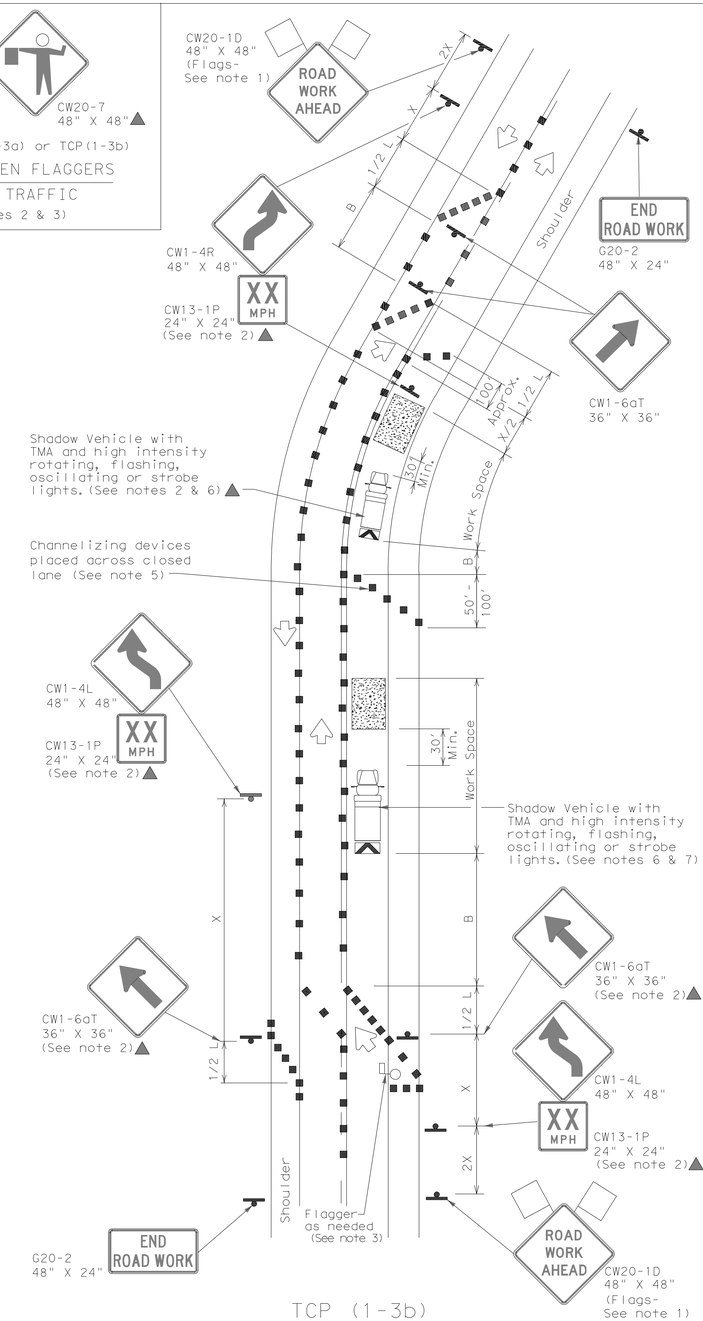


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW





TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON
TWO LANE ROADS

TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18				

153

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CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL TCP(1-3)-18 DETAIL

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CHECK SCALE AND ADJUST ACCORDINGLY.

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SEQ. 30 / 58 | SHEET 30

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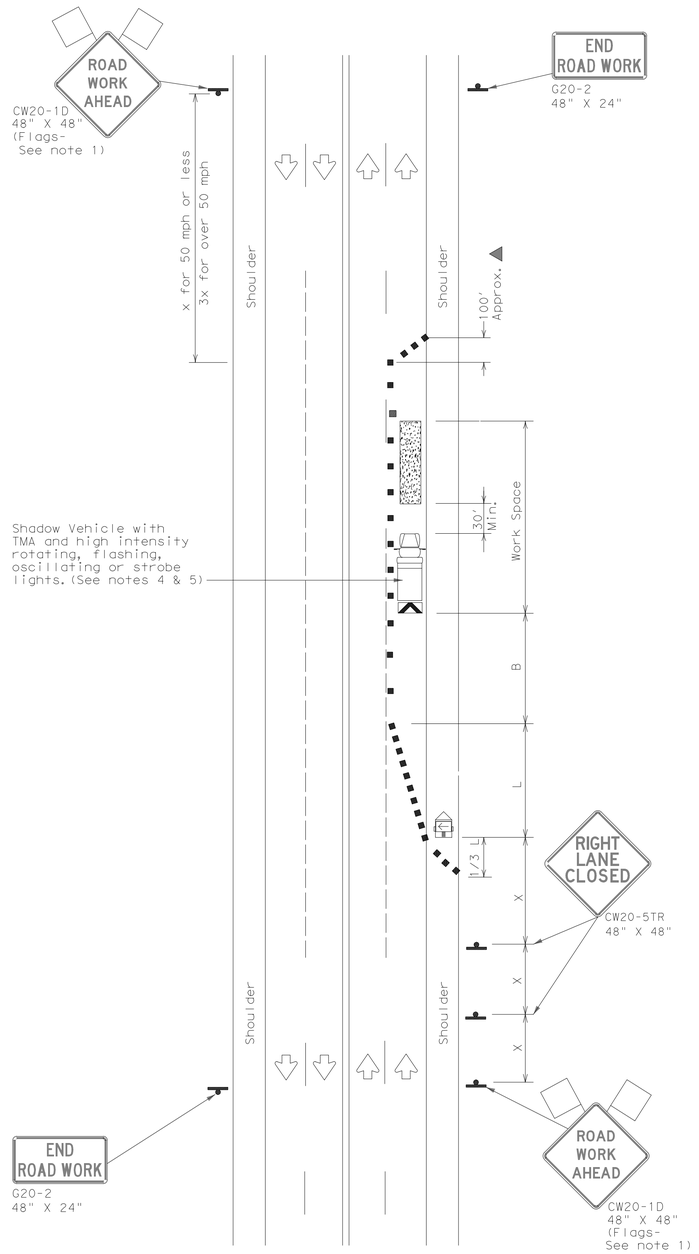
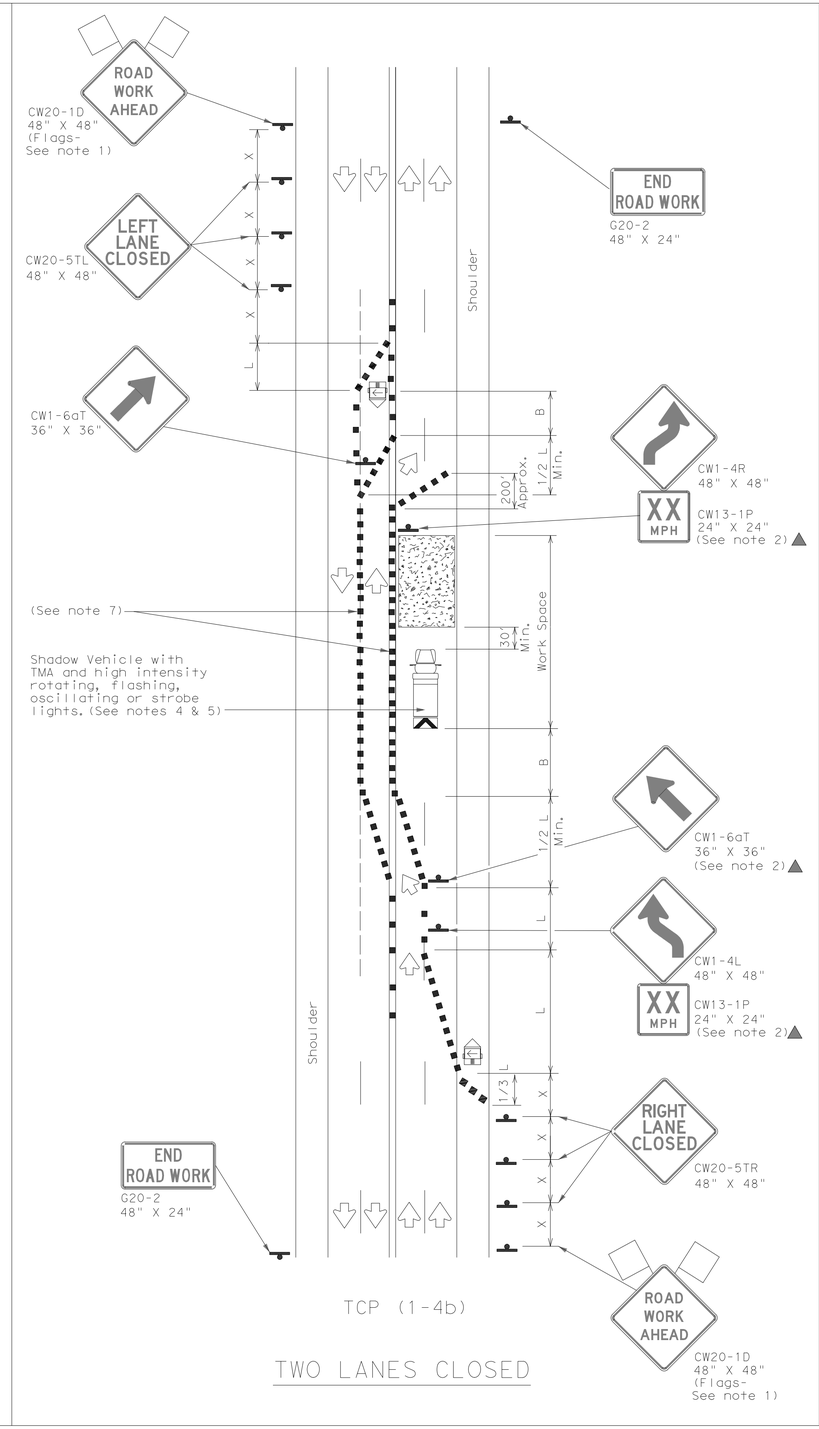
FILE:



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18				

154

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL TCP(1-4)-18 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 31 | SHEET 31 / 58

X:\CL_Keene\25510 - CR 317 Reconstruction - Keene\Drafting_Plans_C_Civil\25510_28_DTLS_TXDOT-TCP4.dwg Save Time: 5/14/2026 4:01 PM Saved By: svanderpool Plotted by: nic kirk Plot Date: 5/18/2026 3:16 PM

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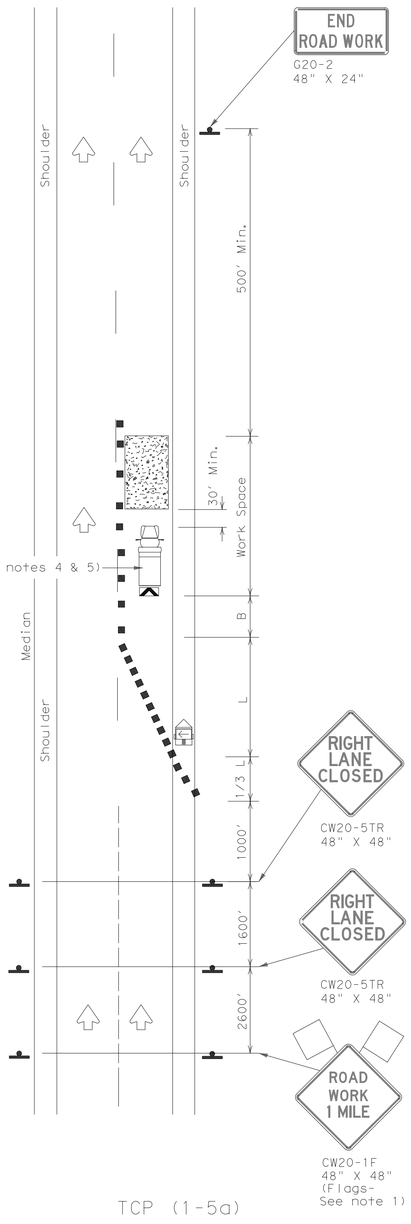
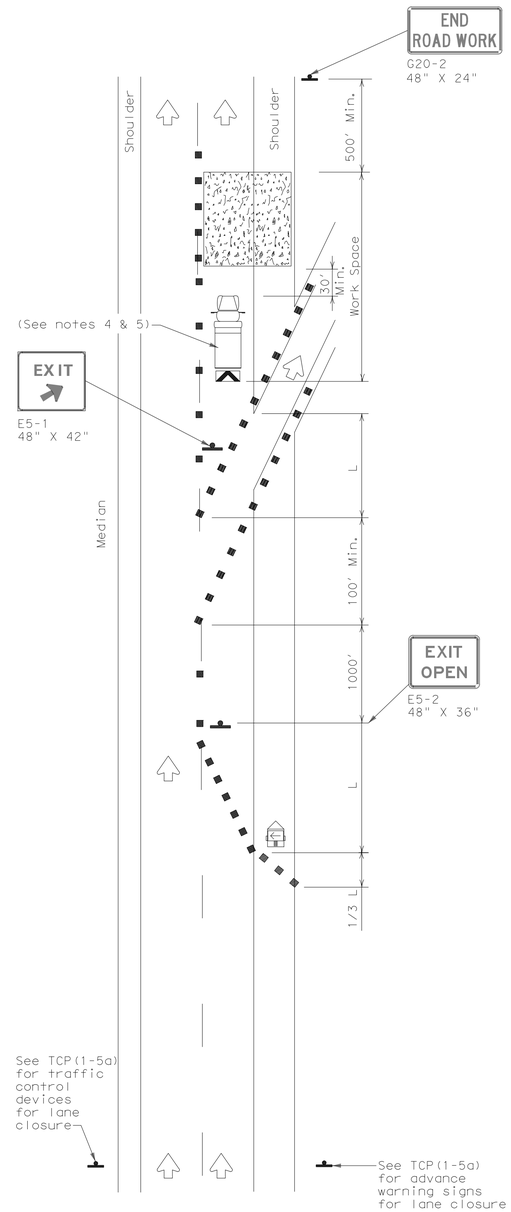
DATE:
FILE:



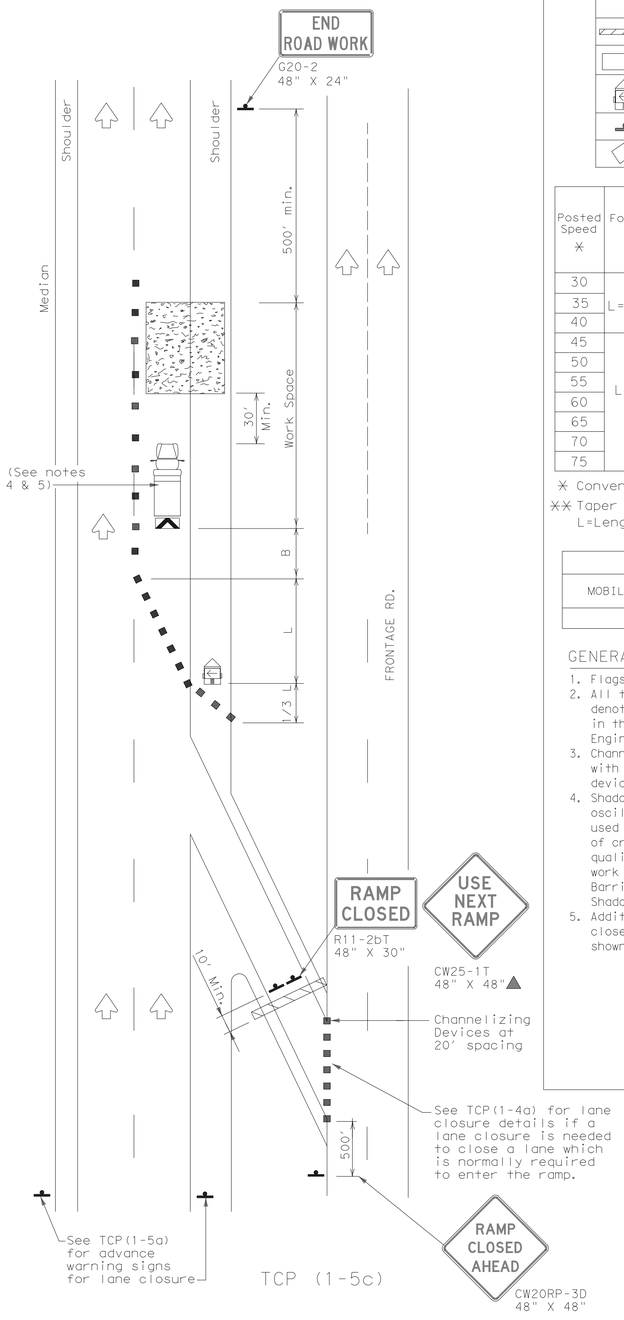
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

✳ Conventional Roads Only

✳✳ Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓		

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18				
	DIST	COUNTY		SHEET NO.
155				

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL TCP(1-5)-18 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
IF NOT ONE INCH, CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 32 / 58 | SHEET 32

Save Time: 5/14/2026 4:04 PM Plotted by: nic kirk Plot Date: 5/18/2026 3:17 PM Saved By: svanderpool
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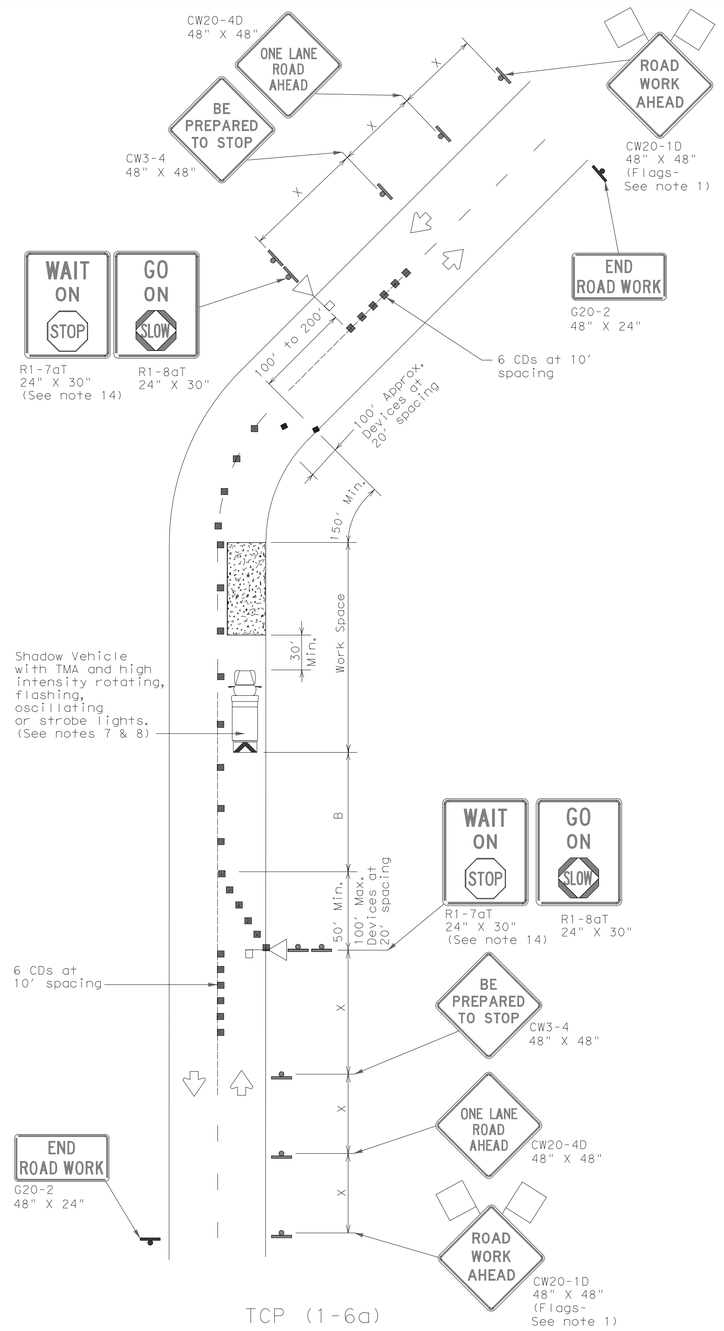
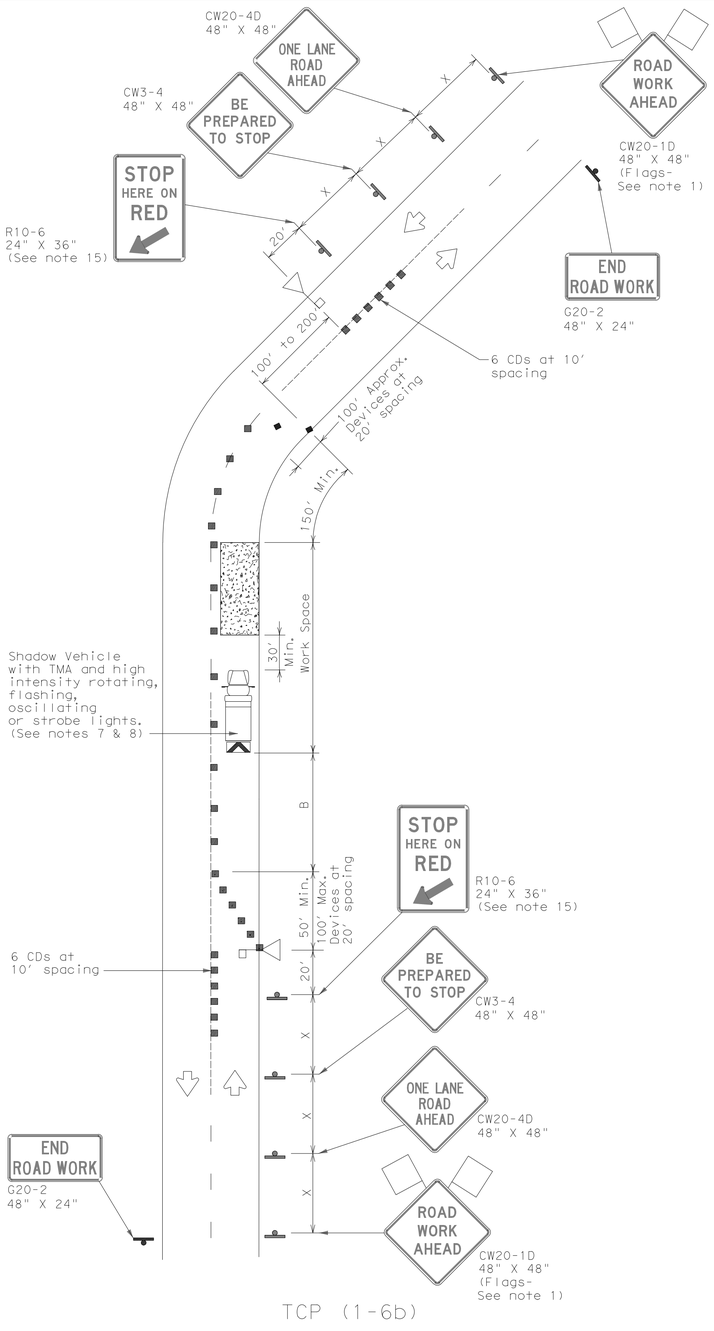
DATE:
FILE:



TCP (1-6a)

ONE LANE TWO-WAY
CONTROL WITH STOP/SLOW AFADs



TCP (1-6b)

ONE LANE TWO-WAY CONTROL
WITH RED/YELLOW LENS AFADs

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Automated Flagger Assistance Device (AFAD)	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. AFADs shall only be used in situations where there is one lane of approaching traffic in the direction to be controlled.
3. Adequate stopping sight distance must be provided to each AFAD location for approaching traffic. (See table above).
4. Each AFAD shall be operated by a qualified/certified flagger. Flaggers operating AFADs shall not leave them unattended while they are in use.
5. One flagger may operate two AFADs only when the flagger has an unobstructed view of both AFADs and of the approaching traffic in both directions.
6. When pilot cars are used, a flagger controlling traffic shall be located on each approach. AFADs shall not be operated by the pilot car operator.
7. All AFADs shall be equipped with gate arms with an orange or fluorescent red-orange flag attached to the end of the gate arm. The flag shall be a minimum of 16" square.
8. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
9. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
10. Flaggers should use two-way radios or other methods of communication to control traffic.
11. Length of work space should be based on the ability of flaggers to communicate.
12. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the AFAD.
13. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
14. The R1-7aT "WAIT ON STOP" sign and the R1-8aT "GO ON SLOW" sign shall be installed at the AFAD location on separate supports or they may be fabricated as one 48" x 30" sign. They shall not obscure the face of the STOP/SLOW AFAD.
15. The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the AFAD.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADS)

TCP(1-6)-18

FILE: tcp1-6-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	DIST	COUNTY		SHEET NO.
156				

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL TCP(1-6)-18 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 33 / 58 | SHEET 33

Save Time: 5/14/2026 4:06 PM Saved By: svanderpool Plotted by: nic kirk Plot Date: 5/18/2026 3:17 PM
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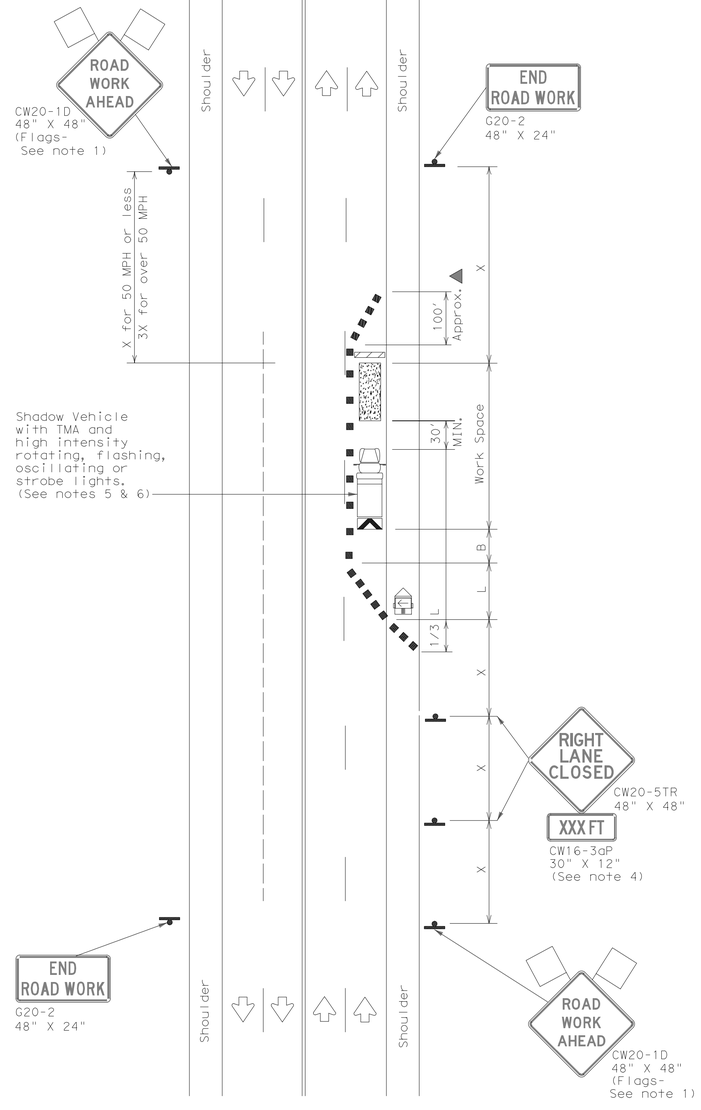
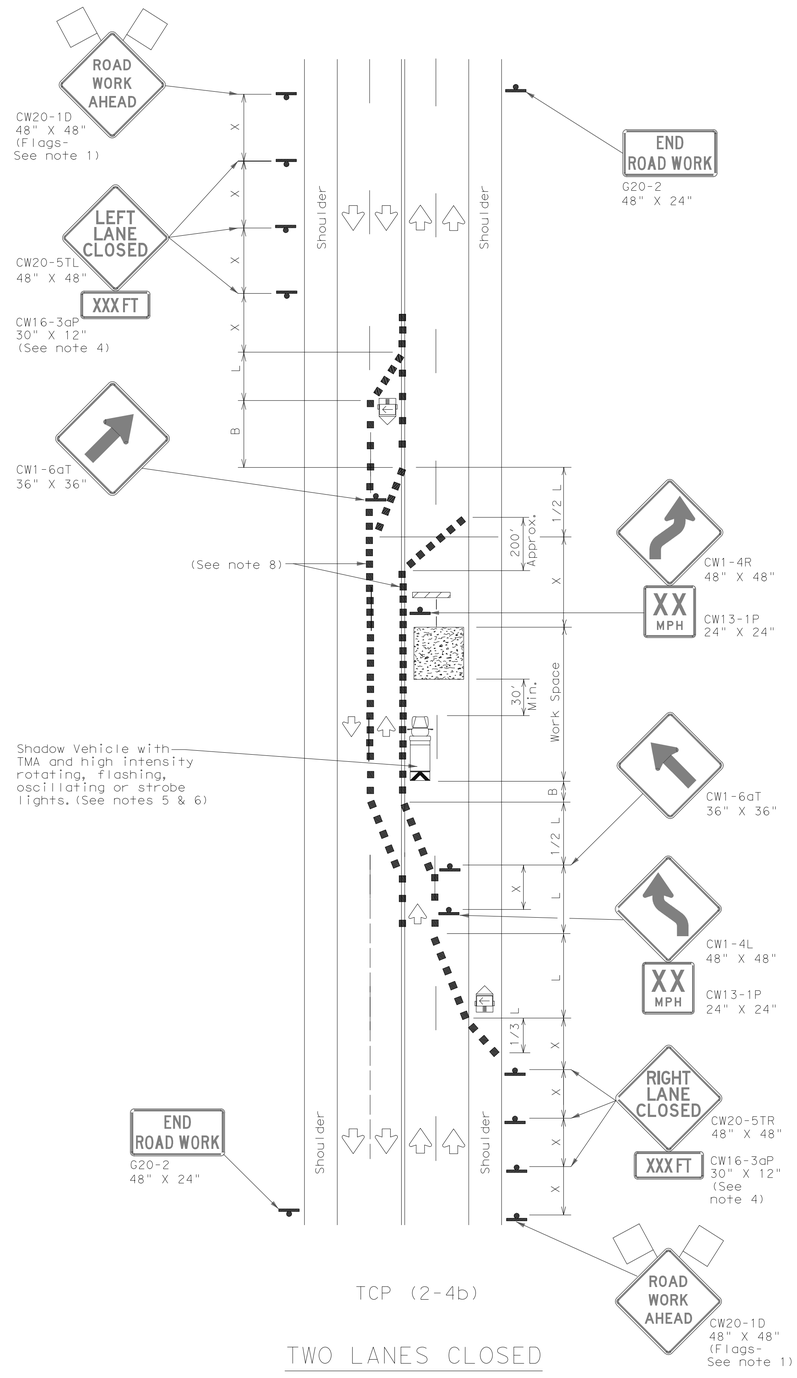


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
		✓	✓	

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12				
4-98 2-18				
164				

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL TCP(2-4)-18 DETAIL

NO.	REVISION	DATE

PROJECT # 25510
SCALE N.T.S.
BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 34
SHEET 34
58

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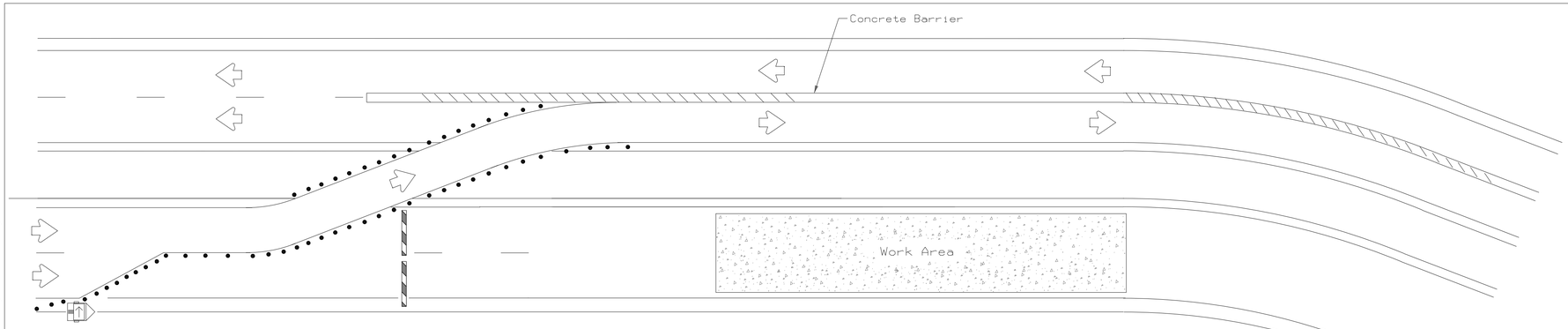
DATE:
FILE:

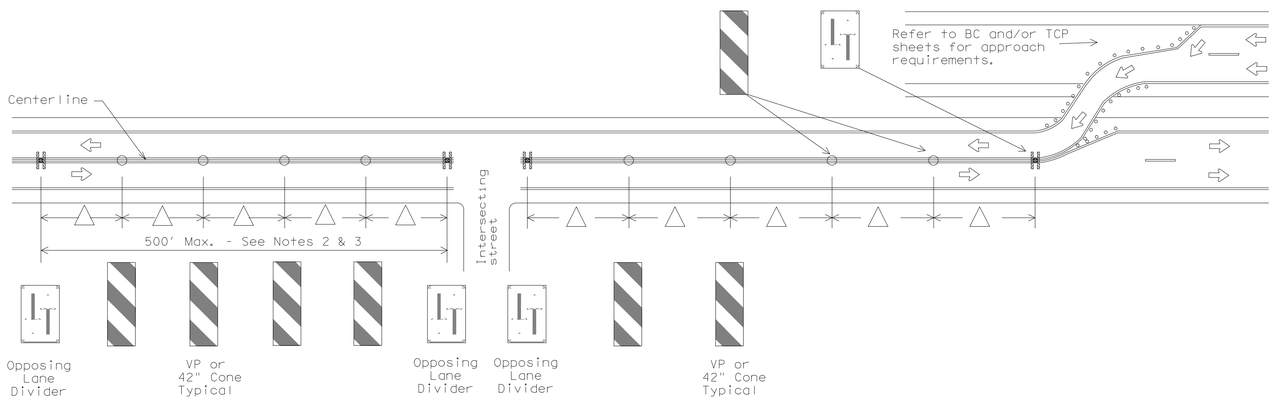


LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\ \ \ \	Safety glare fence

NOTES:

1. Length of Safety Glare Fence will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one unit.
3. Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

BARRIER DELINEATION WITH MODULAR GLARE SCREENS



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.
2. △ Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.
3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TYPICAL DETAILS

WZ(TD)-13

FILE:	wztd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS					
4-98		DIST	COUNTY		SHEET NO.
3-03					
7-13					
110					

Nicholas Kirk
STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL WZ(TD)-13 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
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PROJECT # 25510 | SCALE N.T.S.

SEQ. 35 | SHEET 35 / 58

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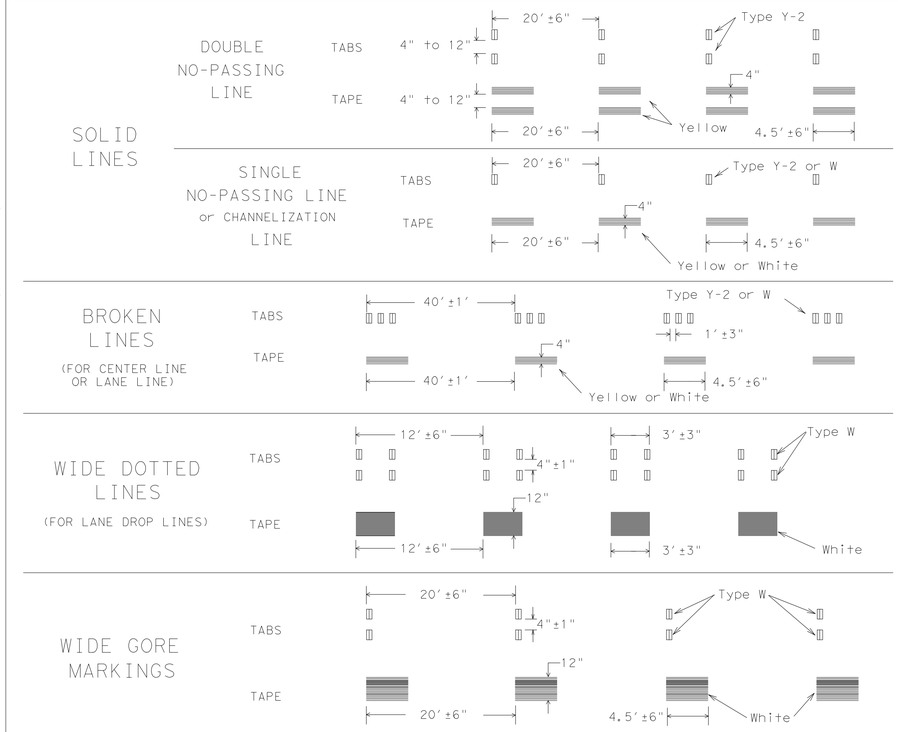
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



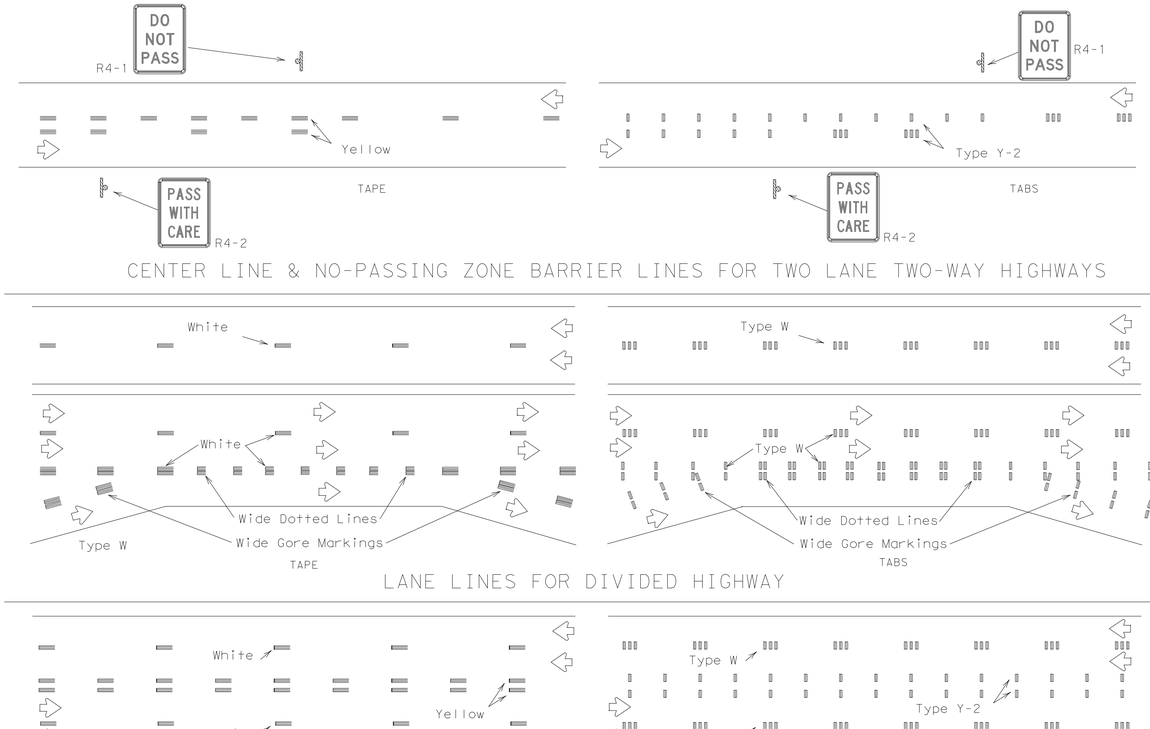
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
5. No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
6. For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
7. For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
8. For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
4. No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS

LANE LINES FOR DIVIDED HIGHWAY

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS

TWO-WAY LEFT TURN LANE

If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation | Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS					
1-97		DIST	COUNTY		SHEET NO.
3-03					
7-13					
111					

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL WZ(STPM)-13 DETAIL

NO.	REVISION	DATE

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PROJECT # 25510 | SCALE N.T.S.

SEQ. 36 | SHEET 36 of 58

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DATE:
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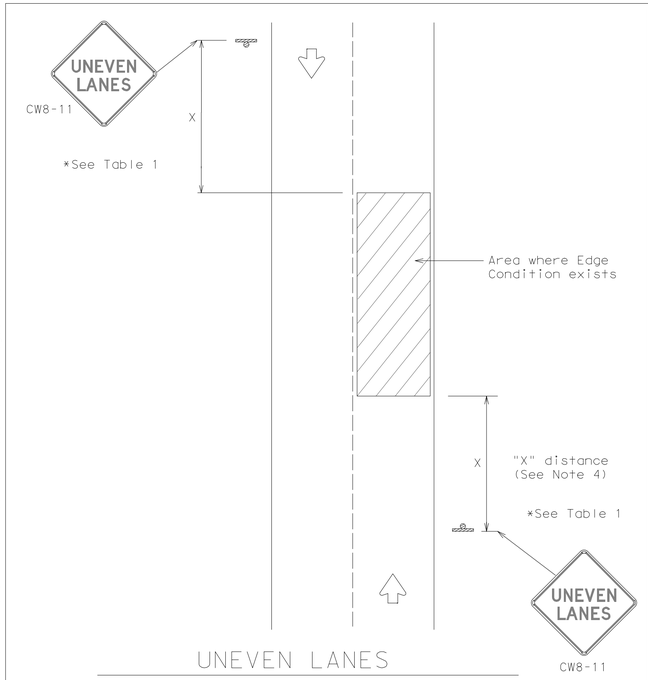
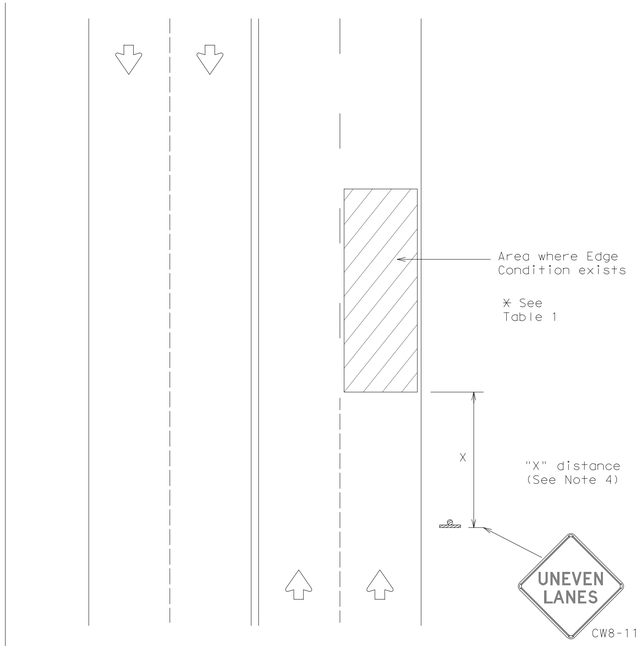
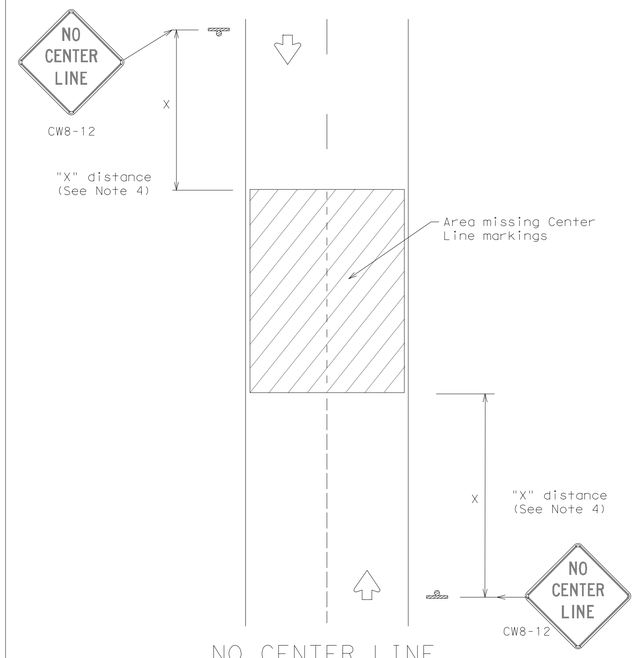


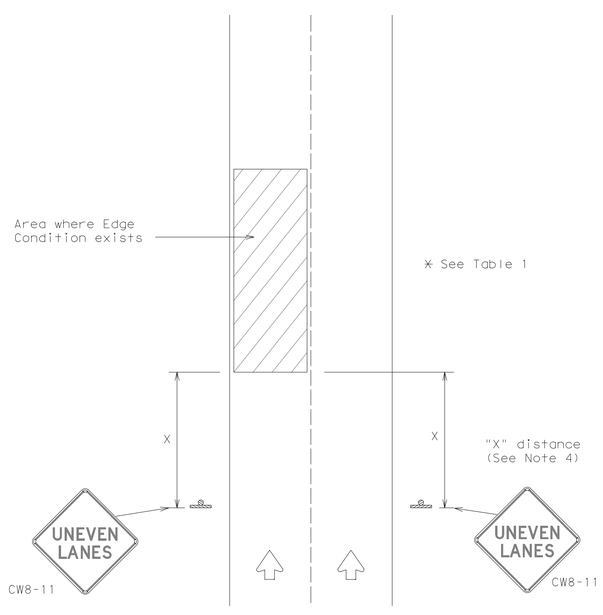
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

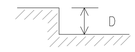
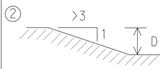
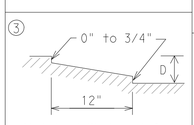
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation | Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS				
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03				
112				

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

TRAFFIC CONTROL WZ(UL)-13 DETAIL

NO.	REVISION	DATE

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SEQ. 37 | SHEET 37 / 58

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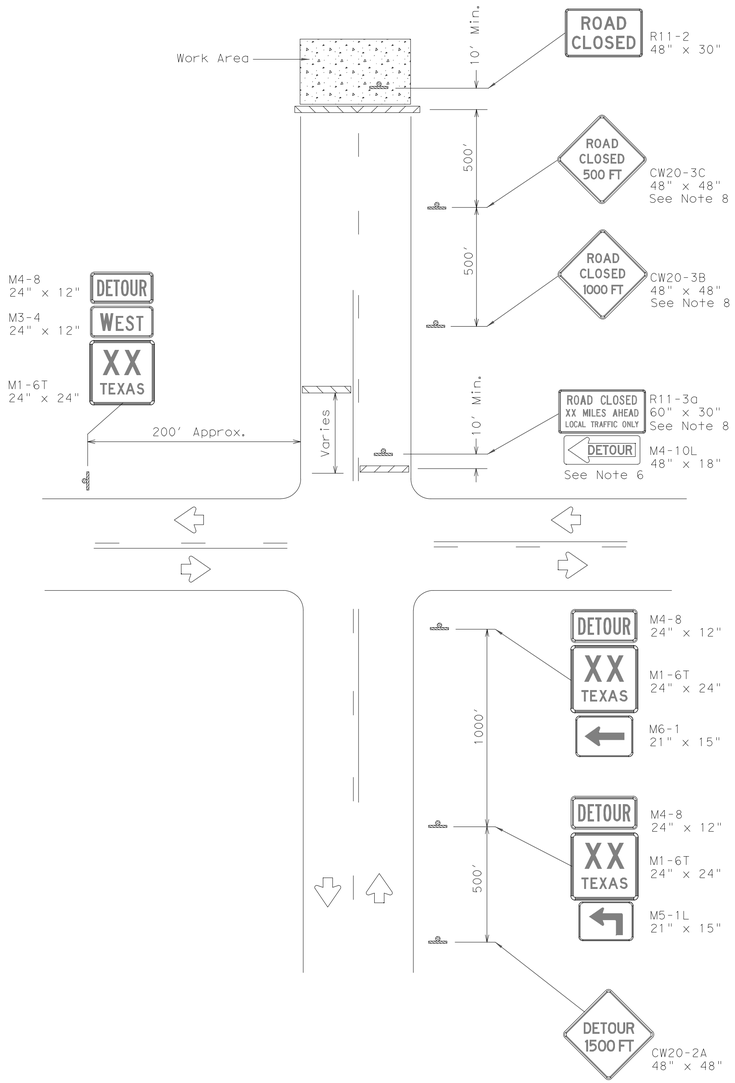
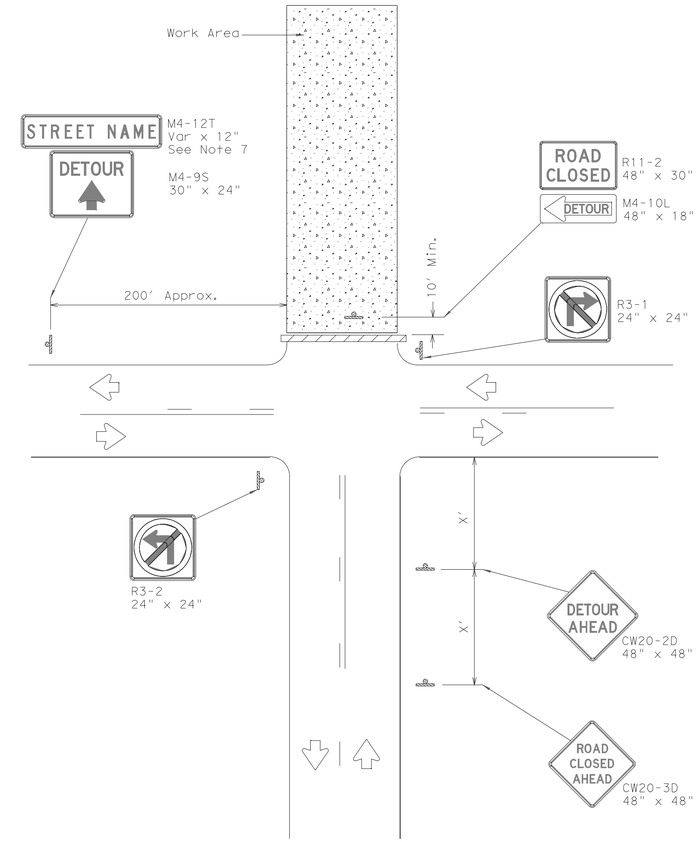


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

Texas Department of Transportation | Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03				
113				

STATE OF TEXAS
NICHOLAS KIRK
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CR 317 RECONSTRUCTION
TRAFFIC CONTROL WZ(RCD)-13 DETAIL

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SEQ. 38 | SHEET 38 / 58

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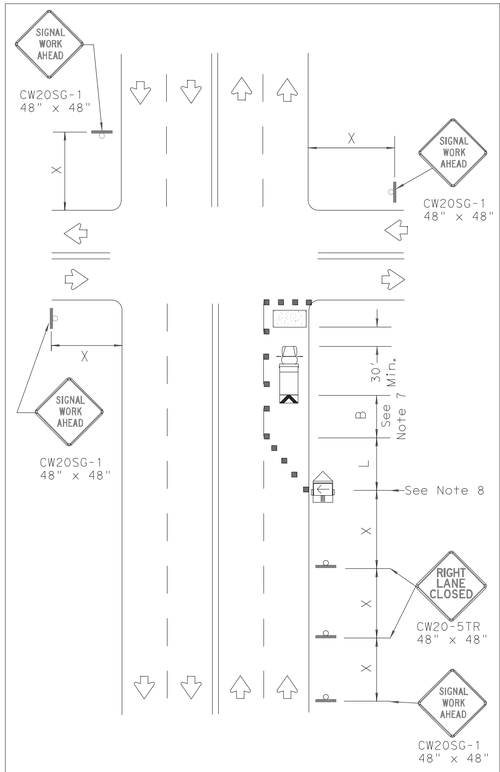
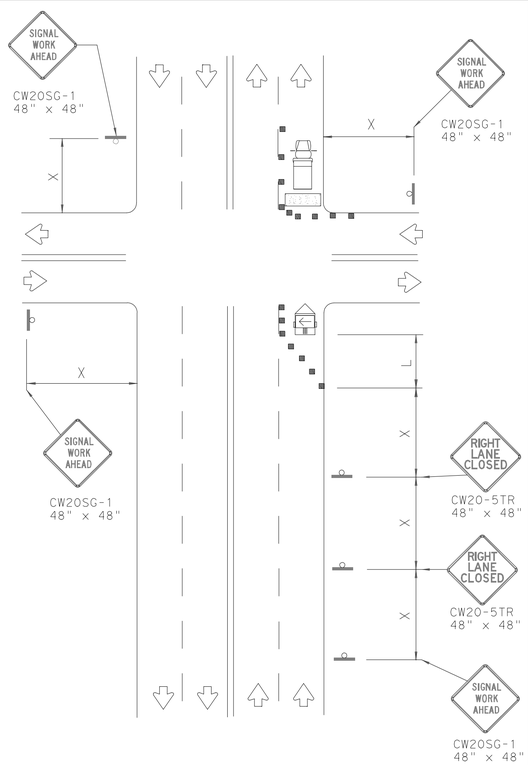


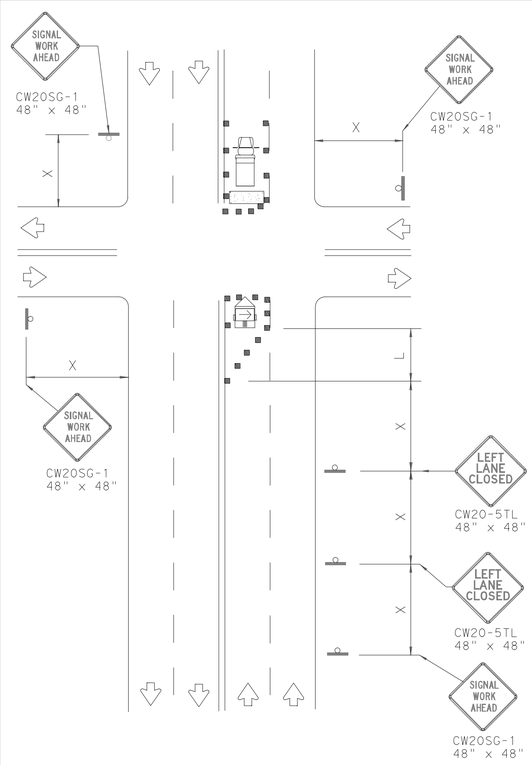
NEAR SIDE LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE

SHORT DURATION OR SHORT TERM STATIONARY

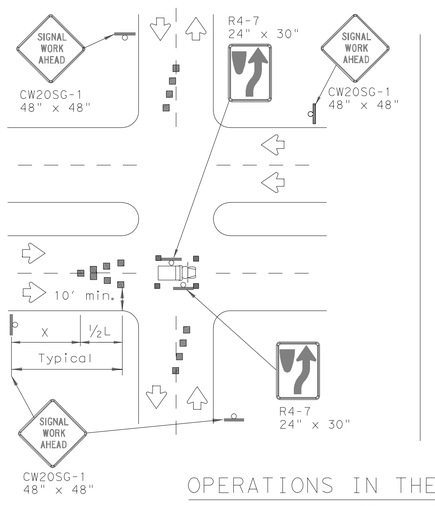
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

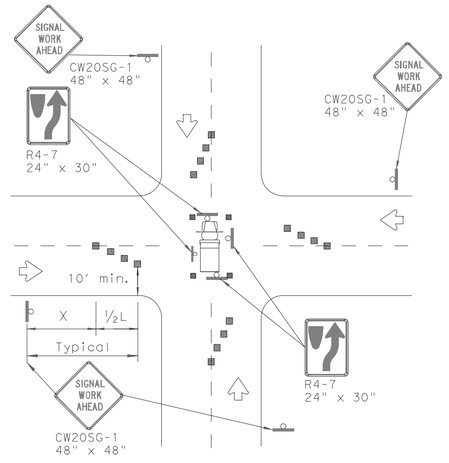
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L=WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only

** Taper lengths have been rounded off.
L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.





OPERATIONS IN THE INTERSECTION

SHORT DURATION

GENERAL NOTES

1. The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
2. Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
3. Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
4. Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
5. High level warning devices (flag trees) may be used at corners of the vehicle.
6. When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
7. For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
8. The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
9. Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

SHEET 1 OF 2

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
2-98 10-99 7-13 4-98 3-03	DIST	COUNTY		SHEET NO.
114				

DATE:
FILE:

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
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TBPELS FIRM # 10194493
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TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
TRAFFIC CONTROL WZ(BTS-1)-13 DETAIL

NO.	REVISION	DATE

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CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 39 / 58 | SHEET 39

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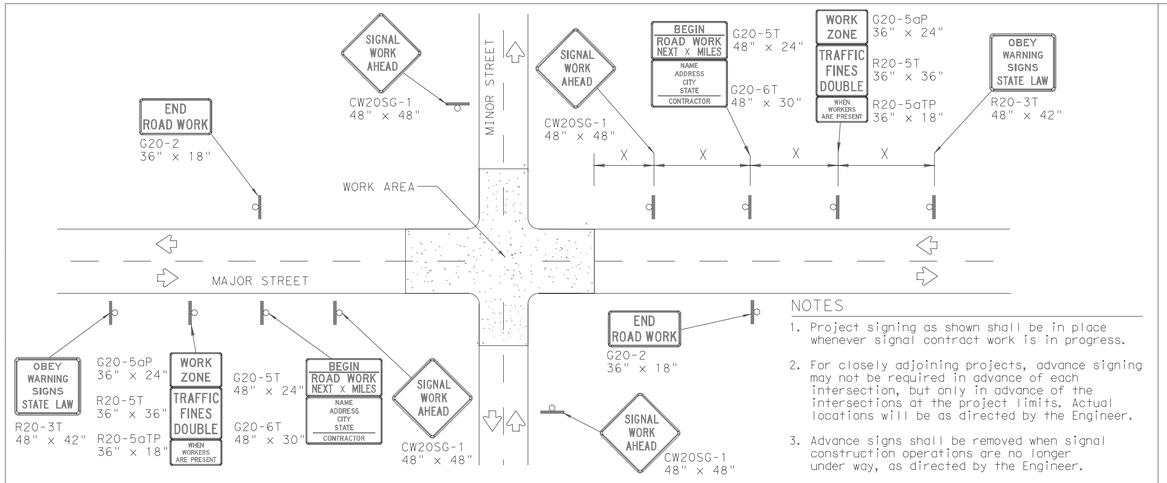


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

1. Project signing as shown shall be in place whenever signal contract work is in progress.
2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
4. Warning sign spacing shown is typical for both directions.
5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

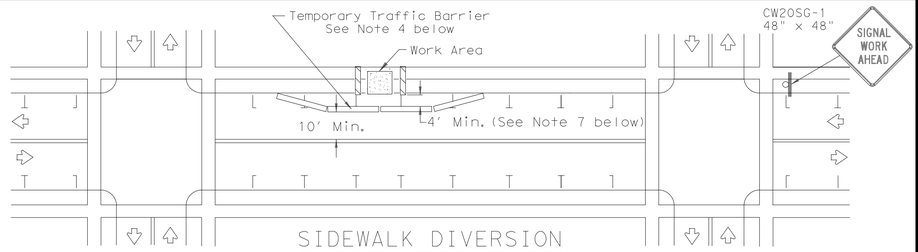
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as tire inner tubes, shall not be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fastners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

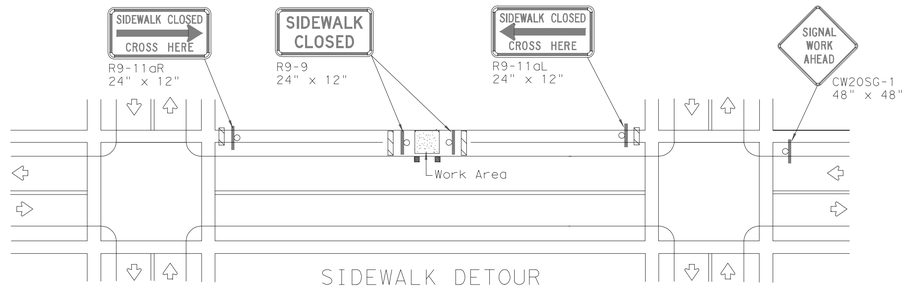
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

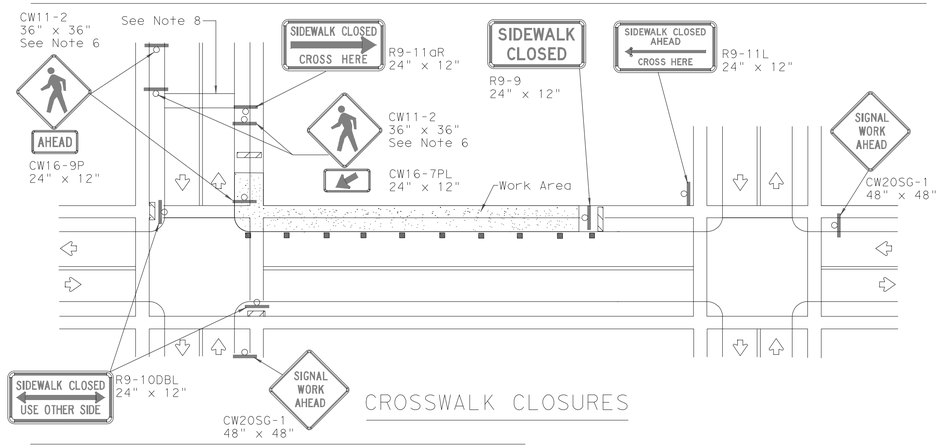
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

SHEET 2 OF 2

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	DIST	COUNTY		SHEET NO.
2-98 10-99 7-13 4-98 3-03				
115				

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
TRAFFIC CONTROL WZ(BTS-2)-13 DETAIL

NO.	REVISION	DATE

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PROJECT # 25510 | SCALE N.T.S.

SEQ. 40 | SHEET 40 of 58

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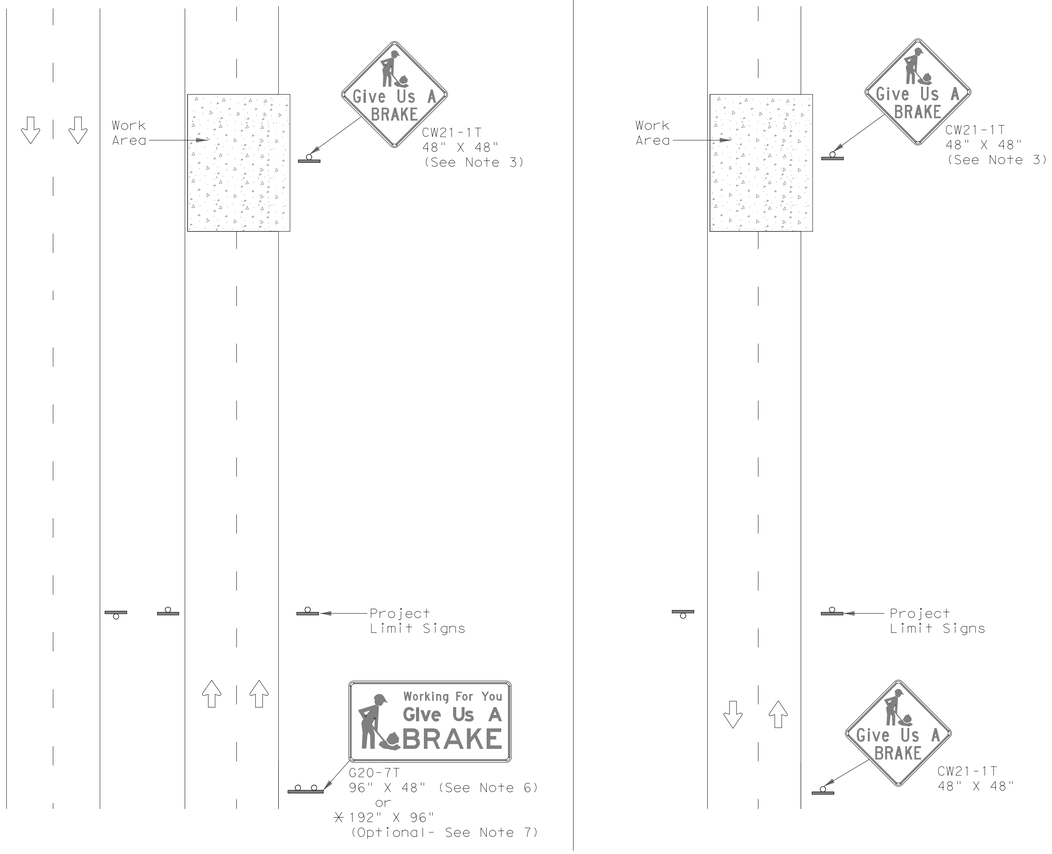

DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

DATE:
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SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL}
BLACK	LEGEND & BORDERS	NON-REFLECTIVE ACRYLIC FILM

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation | Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

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REVISIONS				
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03				
116				

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
TRAFFIC CONTROL WZ(BRK)-13 DETAIL

NO.	REVISION	DATE

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SEQ. 41/58 | SHEET 41

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
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TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

BARRICADE & CONSTRUCTION BC(1)-21 DETAIL

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SEQ. 42/58 | SHEET 42

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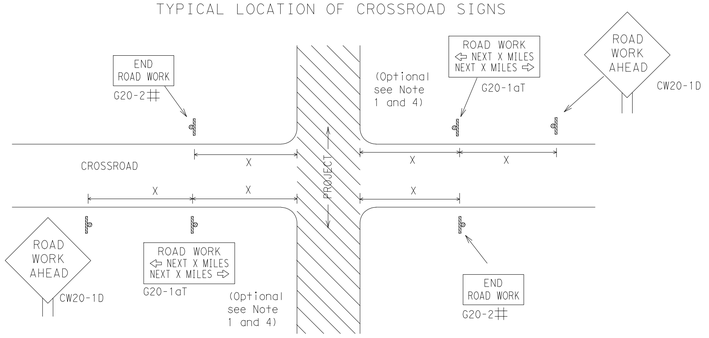
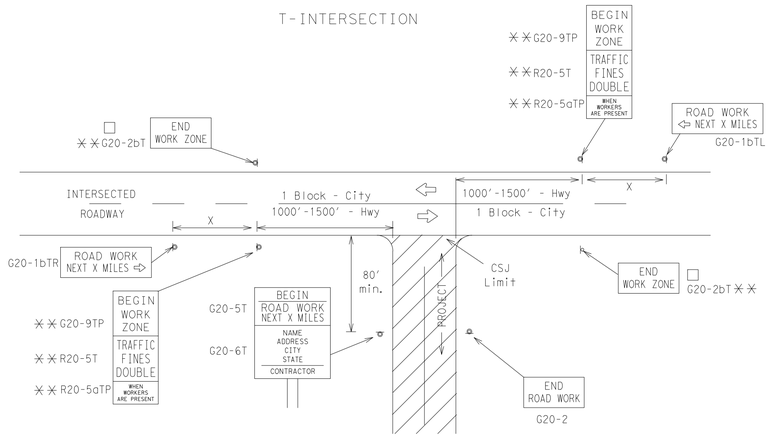
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
✳	✳[3]

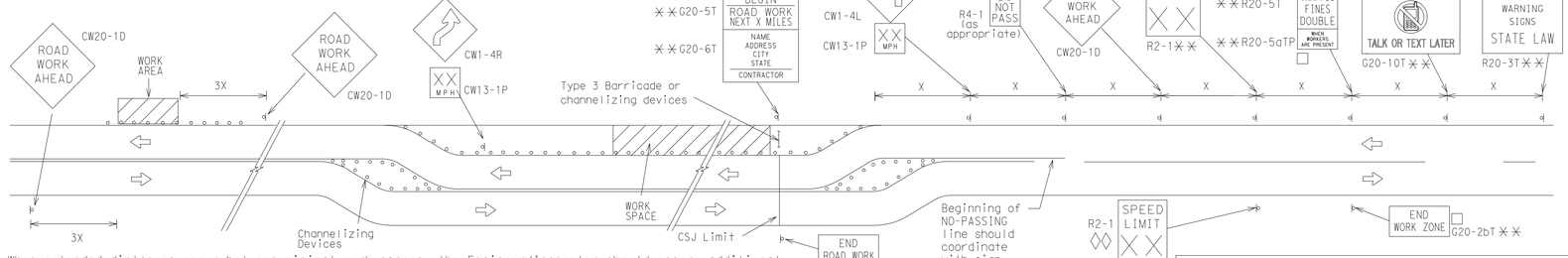
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

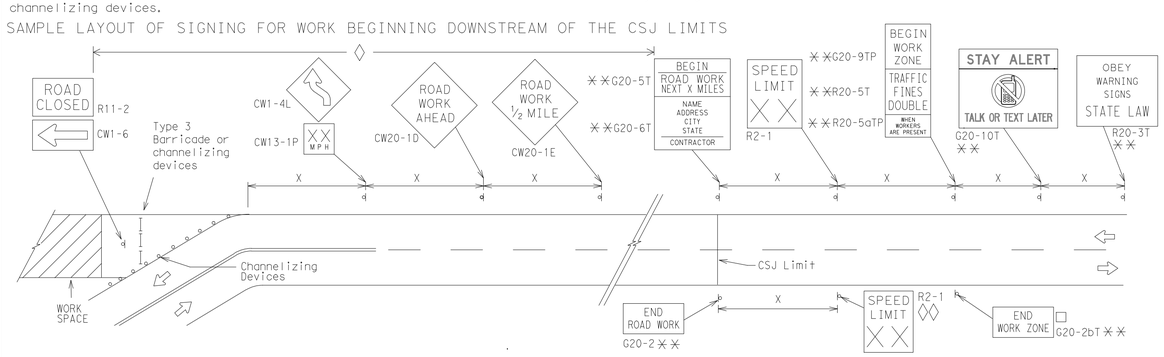
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✳✳ CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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7-13	5-21				

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SEQ. 43 / 58 | SHEET 43

CITY OF KEENE, TEXAS
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BARRICADE & CONSTRUCTION DETAIL BC(2)-21

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05-18-2026
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JACOB MARTIN — TBPELS FIRM # 10194493 — TBAE FIRM # BR 2261 — TBPE FIRM # 2448

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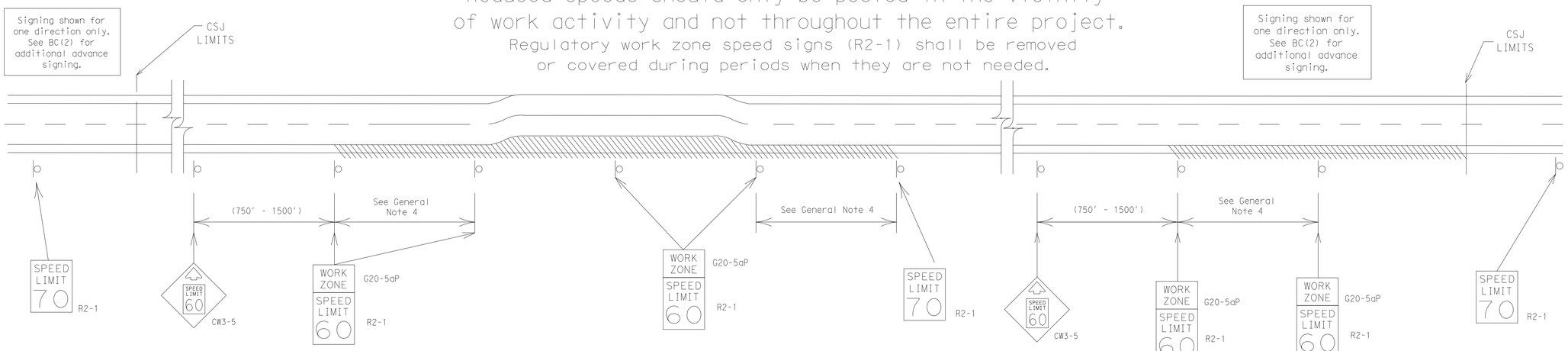
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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SHEET 3 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 9-07 8-14 7-13 5-21	DIST	COUNTY		SHEET NO.

97

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

BARRICADE & CONSTRUCTION BC(3)-21 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 44 | SHEET 44 / 58

Plotted by: nic kirk Plot Date: 5/18/2026 3:18 PM
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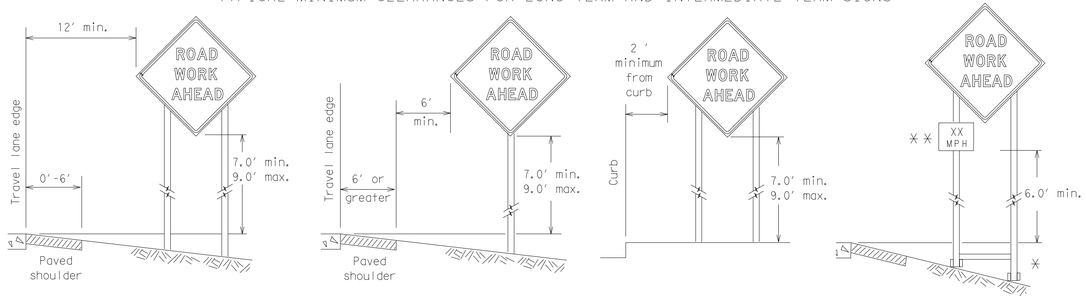
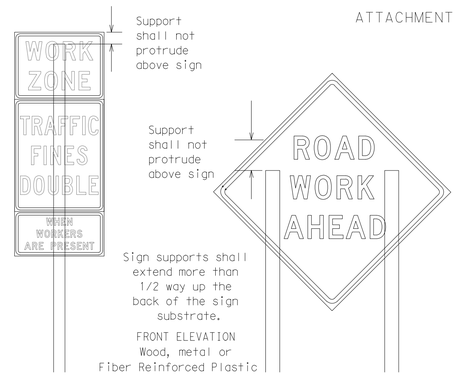
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



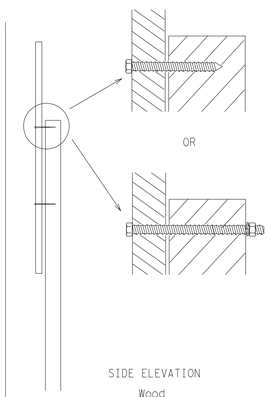
⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⚹⚹ When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

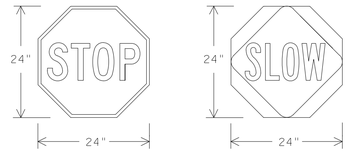


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
2. STOP/SLOW paddles shall be retroreflectorized when used at night.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6′ to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13 5-21				
98				

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
BARRICADE & CONSTRUCTION BC(4)-21 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 45 | SHEET 45 of 58

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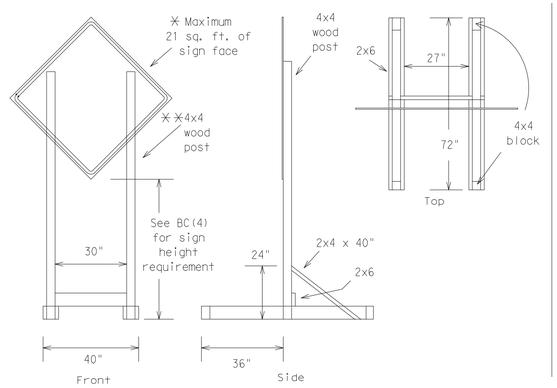
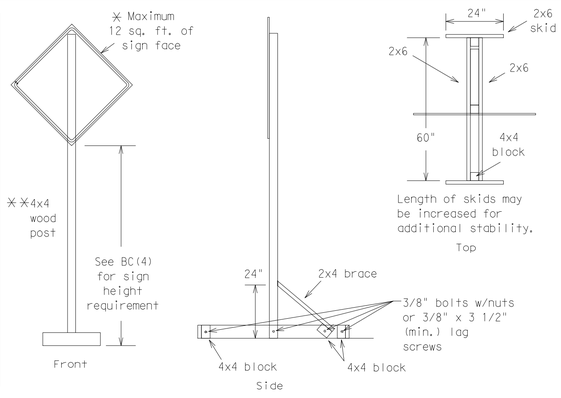
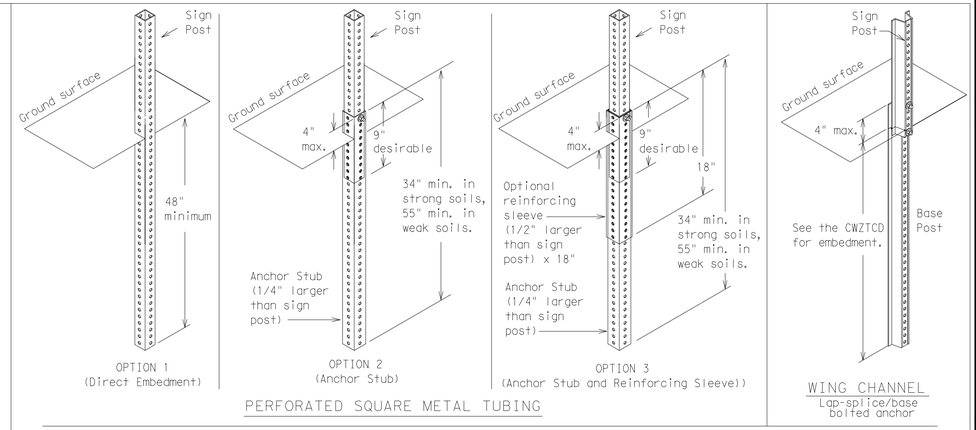




SKID MOUNTED WOOD SIGN SUPPORTS

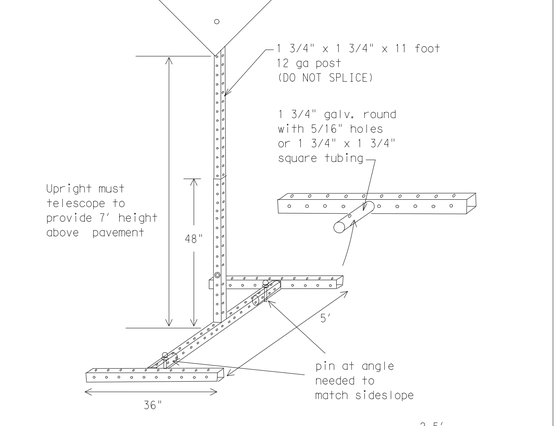
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

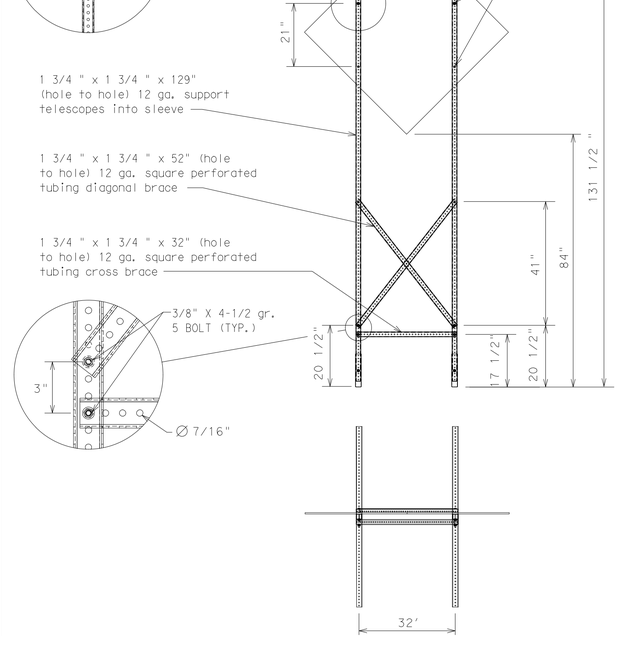


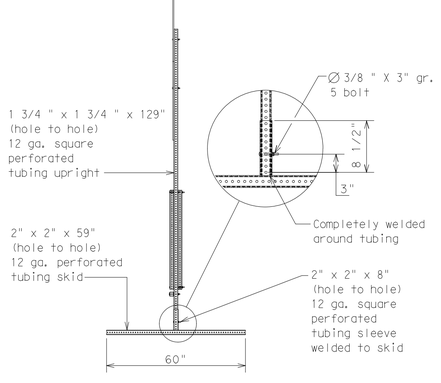
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

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WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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99

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
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TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
BARRICADE & CONSTRUCTION BC(5)-21 DETAIL

NO.	REVISION	DATE

PROJECT # 25510 | SCALE N.T.S.

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 46/58 | SHEET 46

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXX BLVD CLOSED	

Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE *	

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXX TO XXXXXXX
US XXX TO FM XXXX

Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

** Advance Notice List

TUE-FRI XX AM- X PM
APR XX-XX X PM-X AM
BEGINS MONDAY
BEGINS MAY XX
MAY X-X XX PM - XX AM
NEXT FRI-SUN
XX AM TO XX PM
NEXT TUE AUG XX
TONIGHT XX PM- XX AM

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13 5-21	DIST	COUNTY		SHEET NO.
100				

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION BC(6)-21
BARRICADE & CONSTRUCTION DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH LONG ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 47 | SHEET 47 / 58

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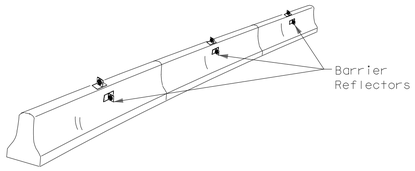
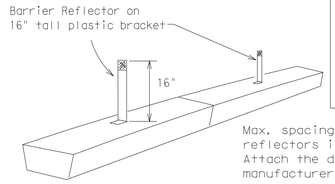
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.



CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

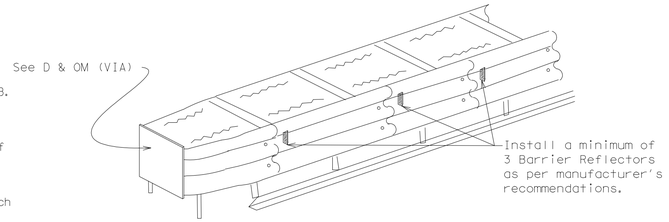


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.



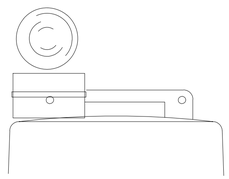
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

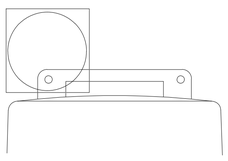
End treatments used on CTB's in work zones shall meet the apppropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

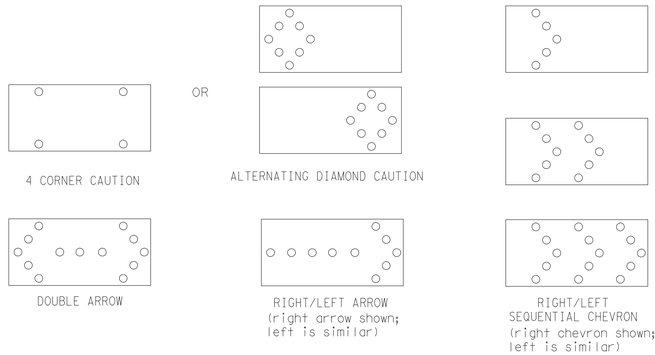
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

SHEET 7 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21				
101				

DATE:
FILE:

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
BARRICADE & CONSTRUCTION BC(7)-21 DETAIL

NO. REVISION | DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 48/58 | SHEET 48

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Saved By: svanderpool Save Time: 5/14/2026 4:59 PM
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DATE:
FILE:

GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

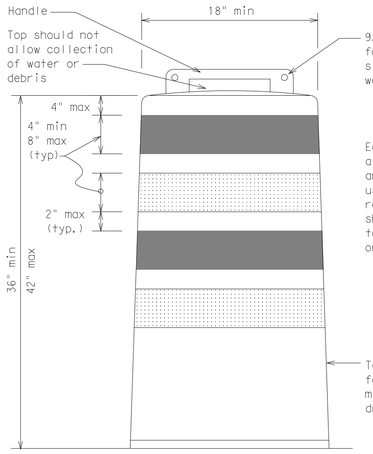
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

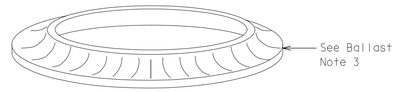
RETROREFLECTIVE SHEETING

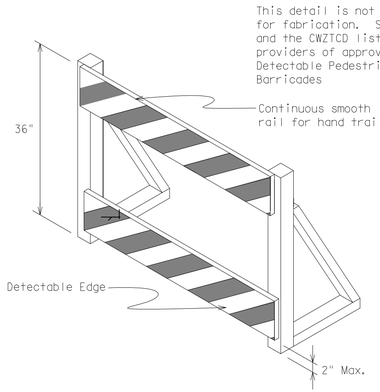
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

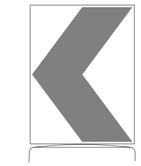




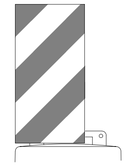


DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21				
7-13				
102				

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

BARRICADE & CONSTRUCTION BC(8)-21 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 49/58 | SHEET 49

Plotted by: nic kirk Plot Date: 5/18/2026 3:19 PM
Save Time: 5/14/2026 5:01 PM Saved By: svanderpool
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Plotted by: nic kirk Plot Date: 5/18/2026 3:19 PM
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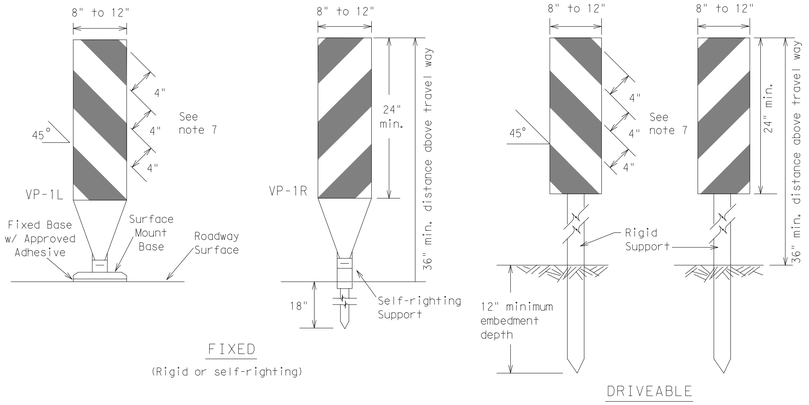
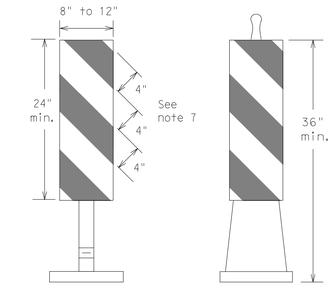


FIXED

(Rigid or self-righting)

DRIVEABLE

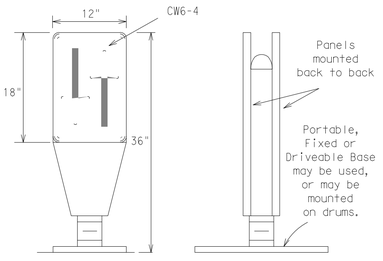


(Rigid or self-righting)

PORTABLE

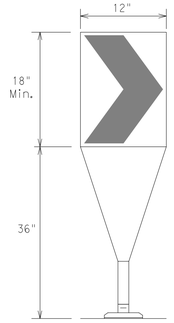
VERTICAL PANELS (VPs)

1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



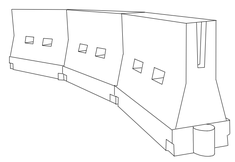
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

CHEVRONS

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

Posted Speed	Formula	Minimum Desirable Taper Lengths ✕✕ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L=WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

✕✕Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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REVISIONS 9-07 8-14 7-13 5-21	DIST	COUNTY		SHEET NO.

103

DATE:
FILE:

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
BARRICADE & CONSTRUCTION BC(9)-21 DETAIL

NO. REVISION DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 SCALE N.T.S.

SEQ. 50 SHEET 50 / 58

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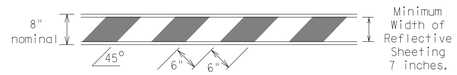
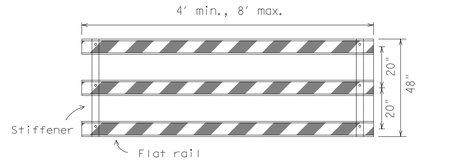
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



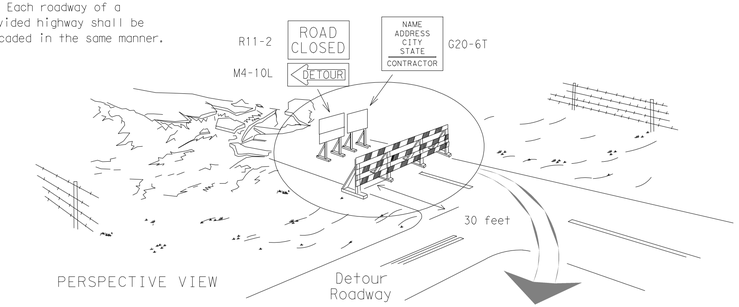
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

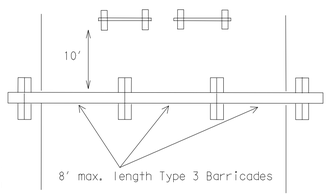
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

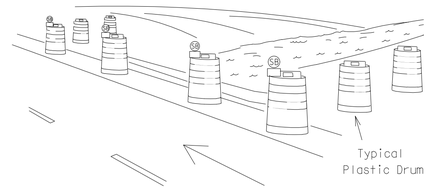
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

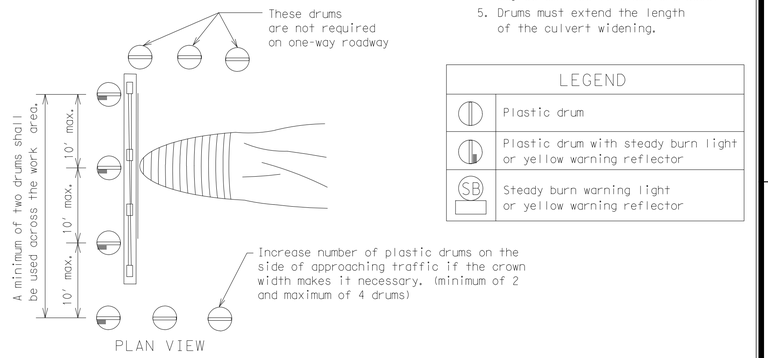
PLAN VIEW

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

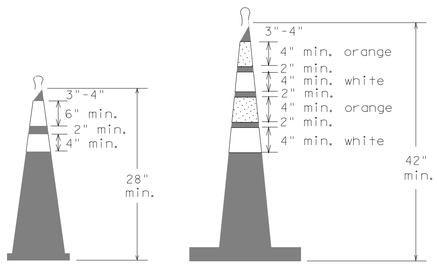
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.

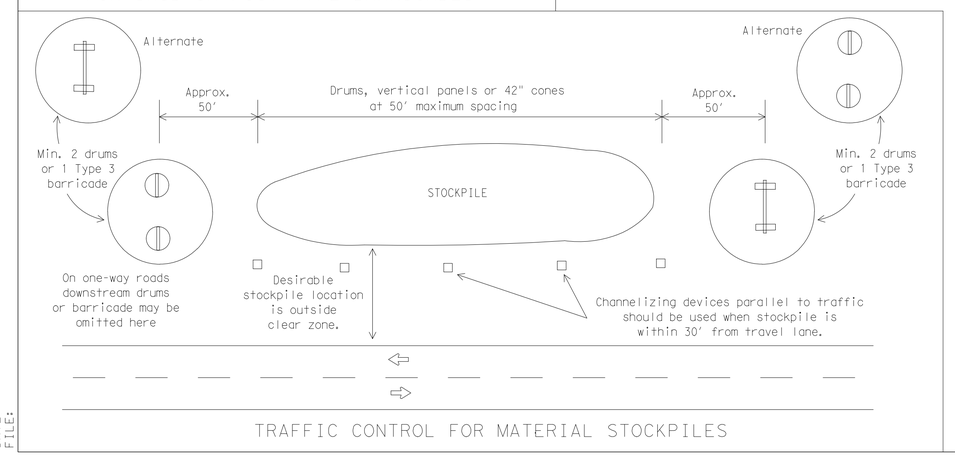


LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS





TRAFFIC CONTROL FOR MATERIAL STOCKPILES

28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.

SHEET 10 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

BARRICADE & CONSTRUCTION BC(10)-21 DETAIL

NO.	REVISION	DATE

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PROJECT # 25510 | SCALE N.T.S.

SEQ. 51 | SHEET 51 / 58

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

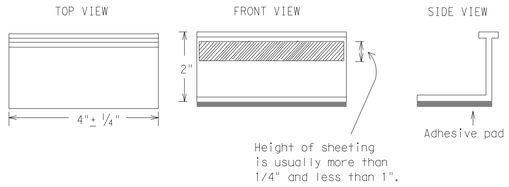
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

SHEET 11 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13				
11-02 8-14				
105				

05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN — TBPELS FIRM # 10194493 — TBAE FIRM # BR 2261 — TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

BARRICADE & CONSTRUCTION BC(11)-21 DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 52/58 | SHEET 52

Plotted by: nic kirk Plot Date: 5/18/2026 3:19 PM
Saved By: svanderpool Save Time: 5/14/2026 5:11 PM
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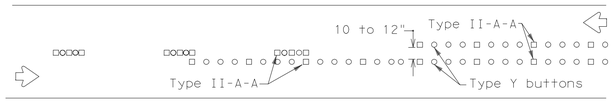
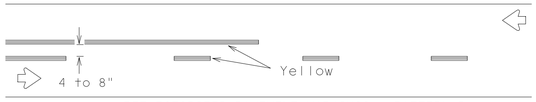
PAVEMENT MARKING PATTERNS

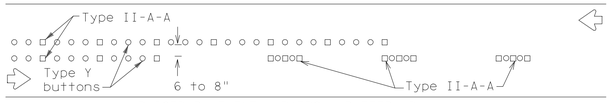
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



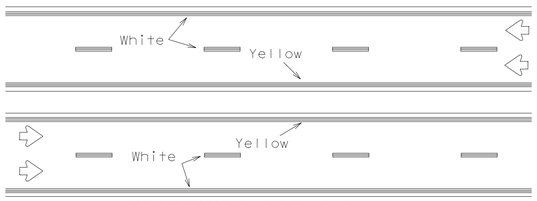
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



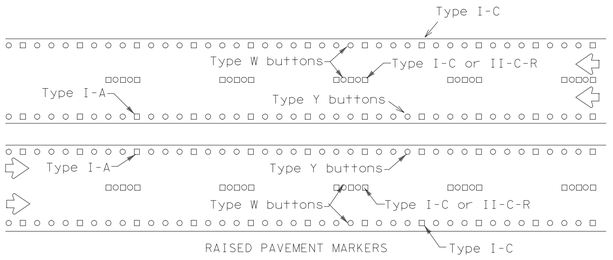
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



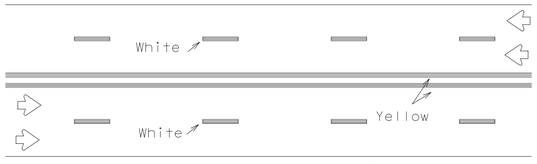
REFLECTORIZED PAVEMENT MARKINGS



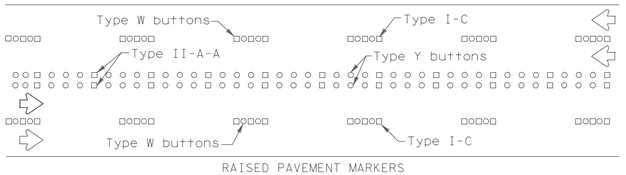
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



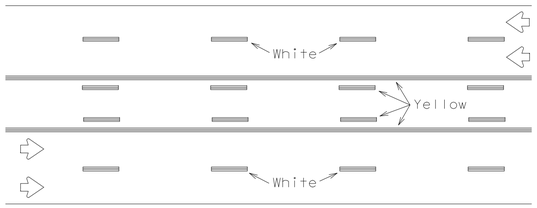
REFLECTORIZED PAVEMENT MARKINGS



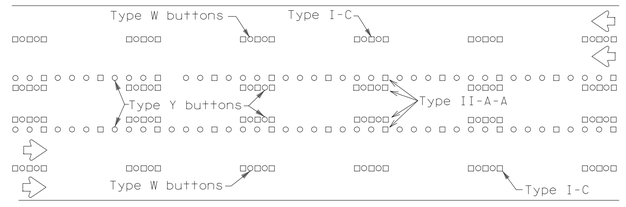
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

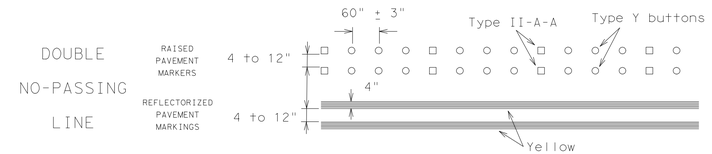
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

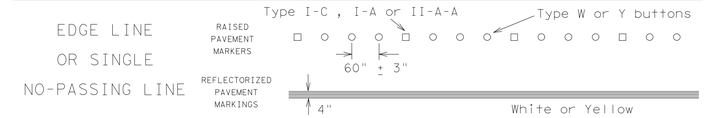
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

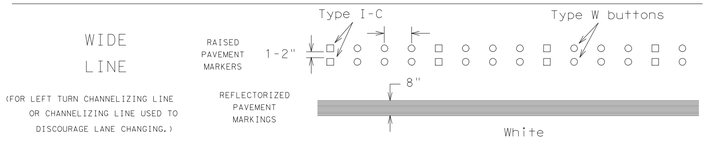


EDGE LINE OR SINGLE NO-PASSING LINE



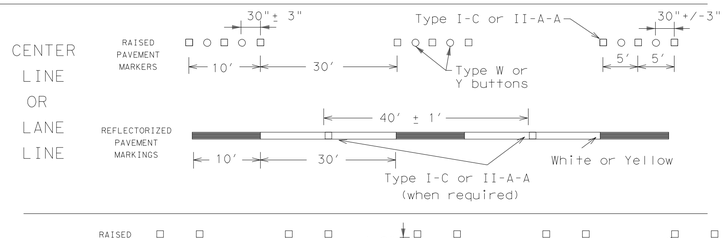
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

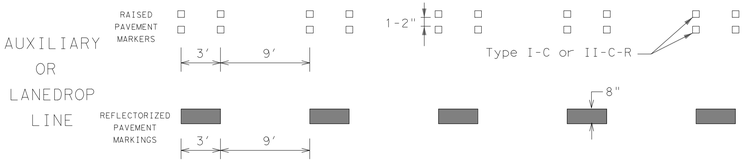


BROKEN LINES

CENTER LINE OR LANE LINE

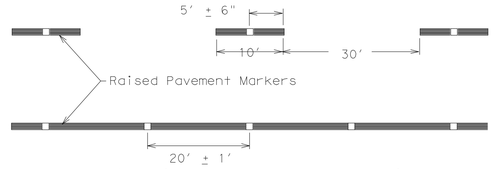


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14 106	DIST	COUNTY		SHEET NO.

NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

BARRICADE & CONSTRUCTION DETAIL BC(12)-21

DATE | NO. | REVISION

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING.
CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 53 | SHEET 53

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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

1. ☐ It is not anticipated that any erosion, sedimentation, or environmental control devices will be needed on this project. The Contractor must still implement appropriate practices to prevent pollution from construction activities from reaching waters of the state. If it becomes necessary to implement control devices, payment for that work must be in accordance with Item 506 Article 4.4, "Change in the Work".
2. ☐ The project will disturb less than 1 acre of soil and has EPICs that require the implementation of erosion, sedimentation, or environmental control devices. The SWP3 summary sheet and associated plan information has been developed and included in the plans. Additional documentation must be maintained during construction in accordance with Department policy.
3. ☐ The project will disturb 1 acres or more of soil therefore requires the implementation of erosion, sedimentation, or environmental control devices. The SWP3 summary sheet and associated plan information has been developed and included in the plans. Additional documentation must be maintained during construction in accordance with Department policy and Texas Commission on Environmental Quality Construction General Permit (TXR150000) requirements.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

1. ☐ No Permit Required
2. ☐ USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and conditions associated with the following permit(s):
   - ☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
   - ☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
   - ☐ Other Nationwide Permit Required: NWP#
   - ☐ Individual Standard Permit Required

The SWP3 describes the BMPs planned to control erosion, sedimentation and post-project TSS.

The following lists the impacted water, its stationing, planned disturbed acreage,and additional notes:

1.
2.
3.
4.
5.
6.
7.
8.
9.

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☐ Additional Required Actions:

1.
2.
3.
4.

IV. VEGETATION RESOURCES

The Contractor must preserve native vegetation to the extent practical. Follow vegetative buffers defined in the SWP3 for work adjacent to water bodies. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ Additional Required Actions:

1.
2.
3.

V. PROTECTED SPECIES AND MIGRATORY BIRDS

The work must not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately. Do not disturb or handle bats found under bridges and other structures. Do not harm or kill wildlife that enters the project area, including rattlesnakes. Implement measures to avoid infesting water bodies with zebra mussels, including inspecting equipment prior to placing in water and clean, drain, dry practices.

If any listed species are observed, cease work in the immediate area, do not disturb the species or habitat, and contact the Engineer immediately.

☐ Additional Required Actions:

1.
2.
3.
4.

DATE:
FILE:

LIST OF ABBREVIATIONS

BMP: Best Management Practice
CGP: Construction General Permit
DSHS: Texas Department of State Health Services
FHWA: Federal Highway Administration
MBTA: Migratory Bird Treaty Act
MOA: Memorandum of Agreement
MOU: Memorandum of Understanding
MS4: Municipal Separate Stormwater Sewer System
NOI: Notice of Intent
NOT: Notice of Termination
NWP: Nationwide Permit
OHWM: Ordinary High Water Mark
OSHA: Occupational Safety and Health Administration
PCN: Pre-Construction Notification
PSL: Project Specific Location
SDS: Safety Data Sheet
SPCC: Spill Prevention Control and Countermeasure
SW3P: Stormwater Pollution Prevention Plan
TCEQ: Texas Commission on Environmental Quality
TPDES: Texas Pollutant Discharge Elimination System
TPWD: Texas Parks and Wildlife Department
TxDOT: Texas Department of Transportation
TSS: Total Suspended Solids
USACE: U.S. Army Corps of Engineers
USFWS: U.S. Fish and Wildlife Service

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

FILE: epic.dgn	DN:	CK: KM	DW: CES	CK:
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REVISIONS	DIST	COUNTY		SHEET NO.

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

ENVIRONMENTAL EPIC(1 OF 2) DETAIL

NO.	REVISION	DATE

PROJECT # 25510 | SCALE N.T.S.

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

SEQ. 54/58 | SHEET 54

Plotted by: nic.kirk Plot Date: 5/18/2026 3:19 PM
Saved By: svanderpool Save Time: 5/14/2026 5:18 PM
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VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

For all projects the Contractor will comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Safety Data Sheets (SDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bareground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Pollutant housekeeping is also required in accordance with items listed in Section I of this EPIC sheet.

Maintain an adequate supply of on-site spill response materials, as indicated in the SDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Responsibility for Hazardous Materials: Except in cases where the generation of hazardous materials are introduced by the Contractor on any work done by the Contractor on State-owned or controlled sites, the Contractor is not the generator of hazardous materials indentified in the ROW as shown in the plans or as discovered during construction.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

The following list identifies non-asbestos/lead contamination or waste issues (location, contamination/waste type, if a soil and groundwater management plan applies, and any additional notes)

1.

2.

3.

Demolition Activities - Does the project involve the demolition of any bridge class structure (not including buried culverts) for the purpose of replacement or permanent removal?

1. ☐ No - no further action required for demolition activities
2. ☐ Yes - the Contractor must provide the dates for demolition to the Engineer at least 30 days in advance, to allow the Department sufficient time to prepare and submit the pre-demolition notification to the DSHS at least 10 working days prior to the scheduled demolition.

Asbestos Concerns:

1. ☐ The project does not involve any bridge rehabilitation or replacements. No further action required for bridge asbestos concerns.
2. ☐ The project involves bridge rehabilitation or replacements. The asbestos inspection results are negative. No abatement action is required.
3. ☐ The project involves bridge rehabilitation or replacements. The asbestos inspection results are positive and asbestos abatement is required.
   The asbestos is located at the following (structure ID and station):

   Location 1.

   Location 2.

   Location 3.

   For positive asbestos results, the following action will apply:

   ☐ The Department has retained a DSHS licensed asbestos abatement contractor under a separate contract to perform the abatement, provide DSHS abatement notification, and perform asbestos management activities. This work must occur prior to the Contractor commencing any work that might disturb asbestos.

   ☐ The Department has included the work to perform the abatement, provide DSHS abatement notification, and perform asbestos management activities in this contract under Item 6.10 and related Special Provision and Special Specification. The Contractor must perform abatement work prior to commencing any work that might disturb asbestos.

Lead Paint Concerns - The project involves demolition or repair work that could require cutting, torch cutting, welding, or abrasive blasting of painted steel.

1. ☐ No - no further action required for lead paint concerns
2. ☐ Yes - the lead paint inspection results are negative. No action required for lead paint concerns.
3. ☐ Yes - the lead paint inspection results are positive. Lead is at the following locations and concentrations:

Location (location/structure ID)	Concentration (ppm)
Location 1.	
Location 2.	
Location 3.	

For positive lead results, the following action will apply:

☐ The work is under Item 446 (Field Cleaning & Painting Steel), management of hazardous materials is addressed in the specification and additional mitigation is not required.

☐ The lead concentration of the coating is known to be less than 90 ppm (Consumer Product Safety Commission threshold for paint to be designated as lead-containing), additional mitigation is not required.

☐ Mitigation for lead hazards is required in accordance with OSHA. The Contractor must provide mitigation as part of this contract. Mitigation may include stripping back of paint from steel at cut points or other areas where paint will be disturbed. The Contractor may select other OSHA-compliant controls or work practices instead of paint stripping to mitigate lead hazards. Manage painted steel in accordance with Standard Specification Item 6.10, Painted Steel Requirements.

☐ Mitigation for lead hazards is required in accordance with OSHA. The Department will provide lead paint removal. The Contractor must notify the Engineer of locations where paint-disturbing activities will occur at least 90 days prior to the work, to allow sufficient time for the Department to remove the paint. Manage painted steel in accordance with Standard Specification Item 6.10, Painted Steel Requirements.

VII. OTHER ENVIRONMENTAL ISSUES

(includes program areas such as Air, Noise, Edwards Aquifer Protection Program, etc.)

☐ Additional Required Actions:

1.

2.

3.

DATE:
FILE:

LIST OF ABBREVIATIONS

BMP: Best Management Practice
CGP: Construction General Permit
DSHS: Texas Department of State Health Services
FHWA: Federal Highway Administration
MBTA: Migratory Bird Treaty Act
MOA: Memorandum of Agreement
MOU: Memorandum of Understanding
MS4: Municipal Separate Stormwater Sewer System
NOI: Notice of Intent
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OHWM: Ordinaty High Water Mark
OSHA: Occupational Safety and Health Administration
PCN: Pre-Construction Notification
PSL: Project Specific Location
SDS: Safety Data Sheet
SPCC: Spill Prevention Control and Countermeasure
SW3P: Stormwater Pollution Prevention Plan
TCEQ: Texas Commission on Environmental Quality
TPDES: Texas Pollutant Discharge Elimination System
TPWD: Texas Parks and Wildlife Department
TxDOT: Texas Department of Transportation
TSS: Total Suspended Solids
USACE: U.S. Army Corps of Engineers
USFWS: U.S. Fish and Wildlife Service

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN:	CK: KM	DW: CES	CK:
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REVISIONS				
	DIST	COUNTY		SHEET NO.

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

ENVIRONMENTAL EPIC(2 OF 2) DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

PROJECT # 25510 | SCALE N.T.S.

SEQ. 55/58 | SHEET 55

Plotted by: nic kirk Plot Date: 5/18/2026 3:20 PM
Save Time: 5/14/2026 5:20 PM Saved By: svanderpool
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Plotted by: nic kirk Plot Date: 5/18/2026 3:20 PM
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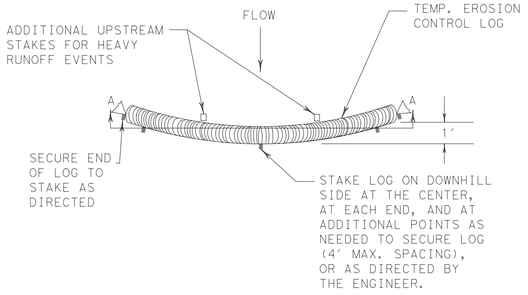
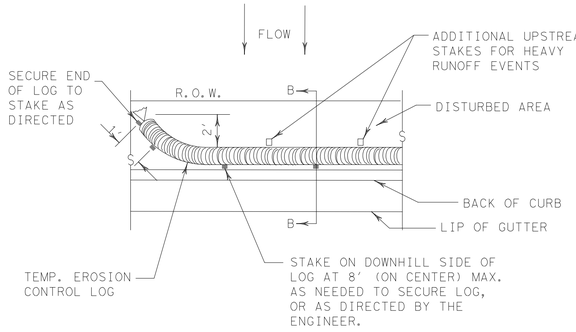
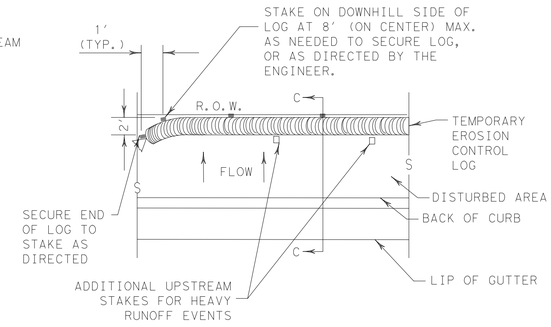


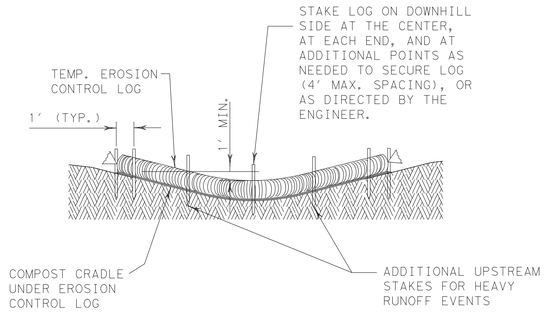
PLAN VIEW



PLAN VIEW



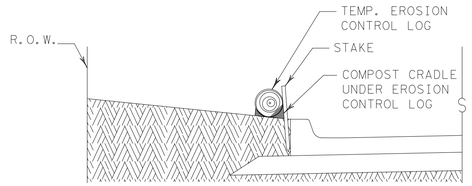
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

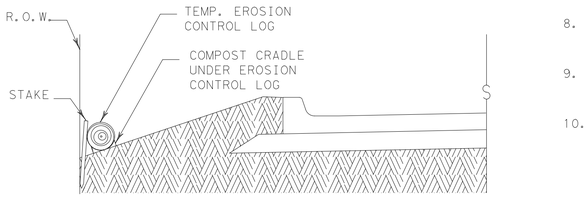
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



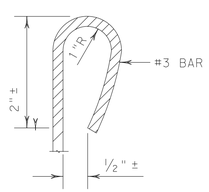
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

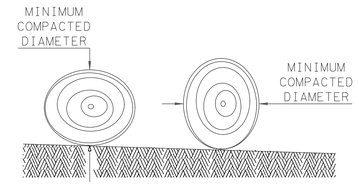
1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS				
	DIST	COUNTY		SHEET NO.

DATE:
FILE:

STATE OF TEXAS
NICHOLAS KIRK
135937
LICENSED PROFESSIONAL ENGINEER
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

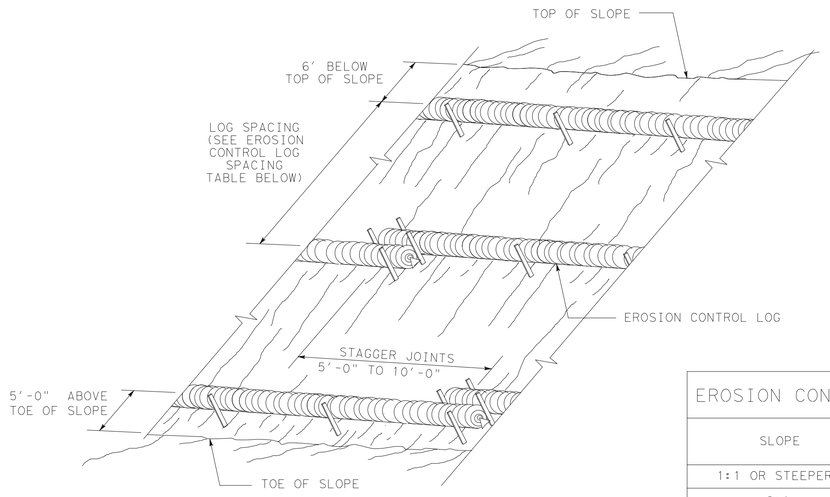
EROSION CONTROL EC(9)-16 (1 OF 3) DETAIL

NO.	REVISION	DATE

BAR IS ONE INCH IN LENGTH ON ORIGINAL DRAWING. CHECK SCALE AND ADJUST ACCORDINGLY.

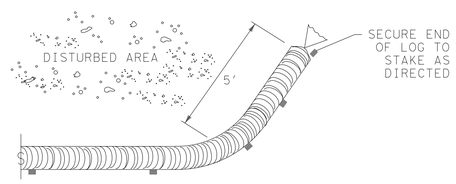
PROJECT # 25510 | SCALE N.T.S.

SEQ. 56 | SHEET 56 of 58



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

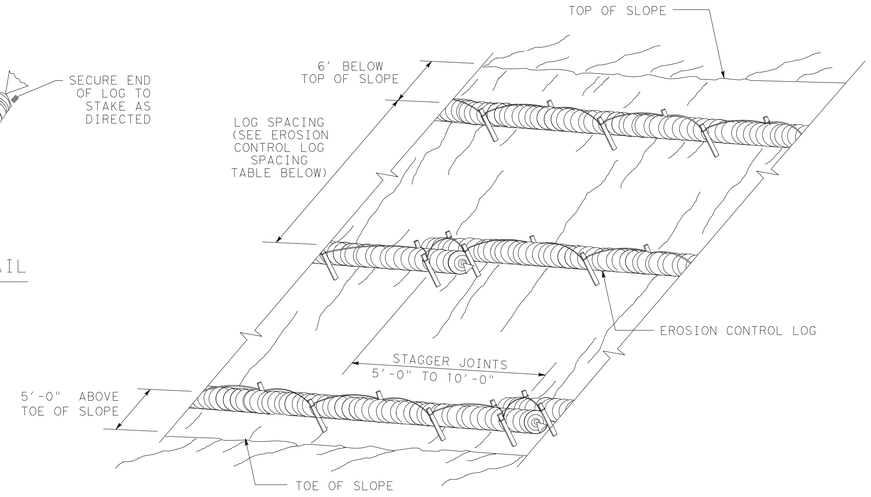
CL-SST



END SECTION RAP DETAIL

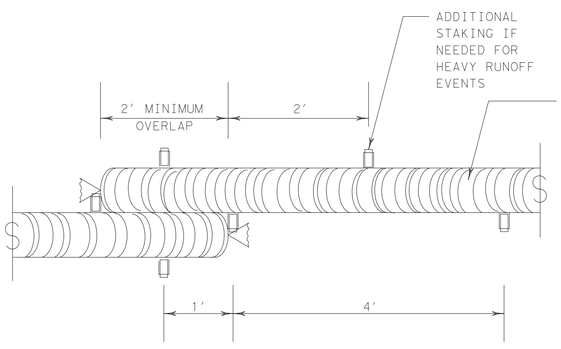
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

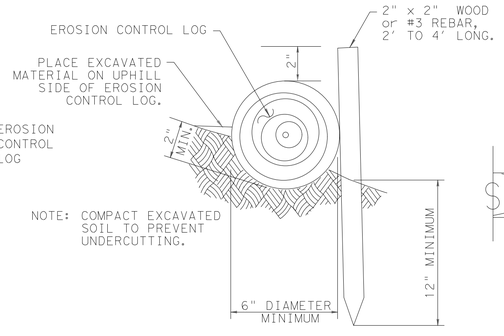
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

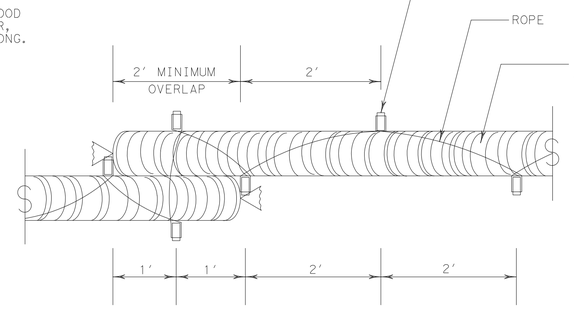




STAKE AND TRENCHING ANCHORING DETAIL

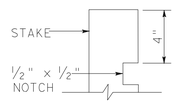
CL-SST

TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"

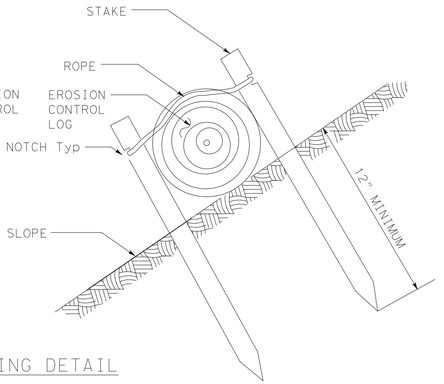


STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL



SHEET 2 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
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FILE:

NICHOLAS KIRK 135937 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
05-18-2026
ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION
EROSION CONTROL EC(9)-16 (2 OF 3) DETAIL

NO.	REVISION	DATE

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SEQ. 57 / 58 | SHEET 57

Plotted by: nic kirk Plot Date: 5/18/2026 3:20 PM
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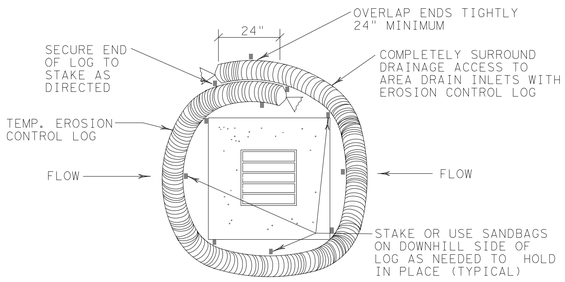
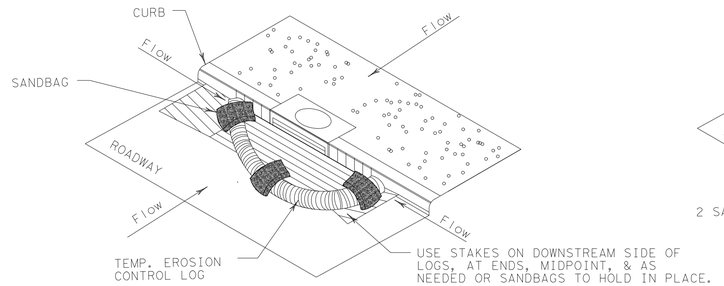


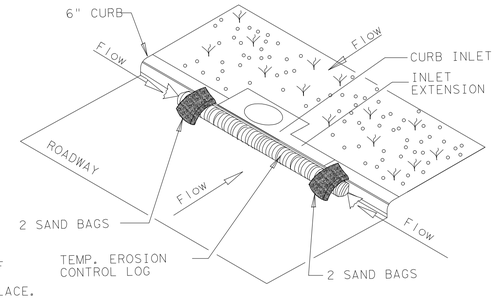
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

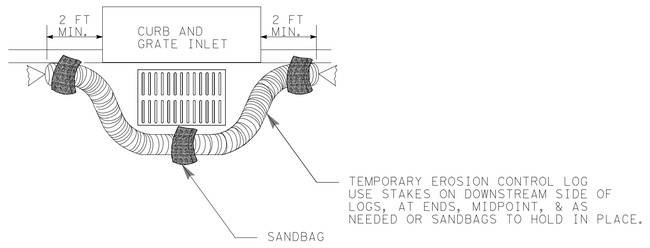
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

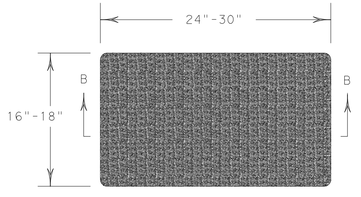
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
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STATE OF TEXAS
05-18-2026

ISSUED FOR REVIEW

JACOB MARTIN
TBPELS FIRM # 10194493
TBAE FIRM # BR 2261
TBPE FIRM # 2448

CITY OF KEENE, TEXAS
CR 317 RECONSTRUCTION

EROSION CONTROL EC(9)-16 (3 OF 3) DETAIL

NO.	REVISION	DATE

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PROJECT # 25510 | SCALE N.T.S.

SEQ. 58/58 | SHEET 58

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