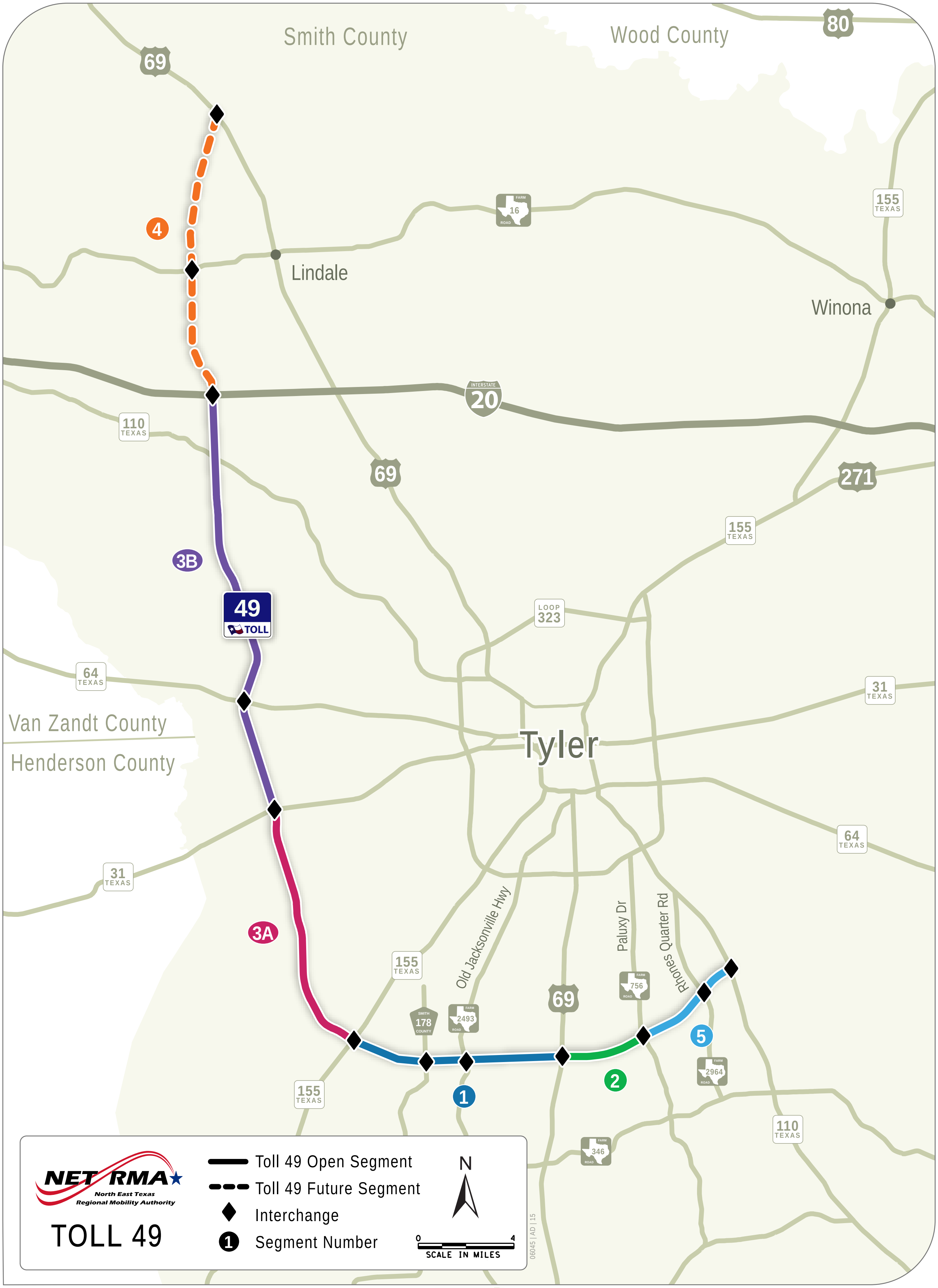
TOLL 49 TOTAL MAINTENANCE CONTRACT

REQUEST FOR PROPOSALS

RFP Issue Date	Friday, June 30, 2017
Questions Due	Wednesday, July 12, 2017, 3:00 PM
Proposals Due (Submittal Deadline)	Thursday, July 27, 2017, 3:00 PM
Bid Opening Date	Thursday, July 27, 2017, 3:10 PM
Selection Date (Board Meeting)	Tuesday, August 8, 2017
Selected Team Notification Date	Friday, August 11, 2017

North East Texas Regional Mobility Authority
1001 ESE Loop 323; Suite 420
Tyler, Texas 75701


Smith County
Wood County
Van Zandt County
Henderson County
Lindale
Winona
Tyler
49 TOLL
4
3B
3A
1
2
5
69
80
20
271
155
110
64
31
323
16
178
2493
756
2964
346
Old Jacksonville Hwy
Paluxy Dr
Rhones Quarter Rd
NET RMA
North East Texas Regional Mobility Authority
TOLL 49
Toll 49 Open Segment
Toll 49 Future Segment
Interchange
Segment Number
N
0
4
SCALE IN MILES

NOTICE #1

All bids must be submitted
in a sealed envelope
BEFORE 3:00 P.M. (CST)
on the Bid Opening Date to

NORTH EAST TEXAS
REGIONAL MOBILITY AUTHORITY

1001 ESE Loop 323; Suite 420

Tyler, Texas 75701

Attn: Chris Miller

NOTICE #2

Toll 49 TOTAL MAINTENANCE CONTRACT

Drawings and Specifications for this project are available on Compact Disc. To obtain a copy of the Bid Documents for this project, please contact **klin.noble@netrma.org** .

BIDS OPEN: **Thursday, July 27, 2017 at 3:10 p.m.**

Free bid packets are also available for pick-up at:

North East Texas Regional Mobility Authority
1001 ESE Loop 323, Suite 420
Tyler, Texas 75701

Bidders must acknowledge the receipt of any and all amendments on the solicitation response. Failure to acknowledge may be cause for your bid to be considered non-responsive.

NOTICE #3

Last day to submit all questions is

Wednesday, July 12, 2017 at 3:00 P.M.

All questions must be submitted in writing to Everett Owen

Everett.Owen@netrma.org

NOTICE #4

Method of Award has a special provision for this project:

All contractors must be pre-qualified by TxDOT to bid this project.

All questions regarding the prequalification process please visit:

http://www.txdot.gov/business/contractors.html

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TABLE OF DOCUMENTS TO BE FILLED OUT BY BIDDER

AND RETURNED WITH THE BID

Toll 49 Total Maintenance Contract

Contract Components Checklist for a Non-Responsive Bid

Non-responsive Proposals. Nonresponsive proposals will not be considered, including those that have one or more of the deficiencies listed below.

A. The bid is submitted by an unqualified Bidder.

B. The person (or in the case of a joint venture – persons) does not sign the proposal.

C. The bid is in a form other than the official bid documents issued to the Bidder.

D. The bid was received after the time deadline or at some location other than that specified in the notice or as may have been extended.

E. The bid guaranty does not comply with Section 5.18 of the North East Texas Regional Mobility Authority Policies and Procedures Governing the Procurement of Goods and Services ("NET RMA Procurement Policies").

http://www.netrma.org/assets/policies_pdf/NET%20RMA%20Procurement%20Policies%20Updated.pdf

F. The bidder was not authorized to submit a bid under the NET RMA Procurement Policies.

G. More than one bid involves a bidder under the same or different names (A Bidder may submit a bid proposal and participate as a material supplier, subcontractor, or both to any or all Bidders contemplating submitting a proposal for this work).

H. The proposal bid bond does not comply with the requirements contained in the proposal.

I. The proposal submitted has the incorrect number of items.

J. A computer printout, when used, is not signed in the name of the Bidder (or joint Bidders, in the case of a joint venture), is not in the proper format, or omits required Items or includes an Item or Items not shown in the proposal.

K. The Bidder fails to acknowledge or improperly acknowledges receipt of all amendments issued.

L. The Bidder modifies the proposal in a manner that alters the conditions or requirements for work as stated in the proposal form.

M. The bid is not submitted on the prescribed form or all blank spaces for bid prices are not filled in, with ink or typewritten. Failure to fill in all blank spaces shall cause the bid proposal to be deemed not responsive and bid proposal will not be considered in determining the lowest responsible bidder.

N. Each bid must be submitted in a sealed envelope bearing on the outside the name of the Bidder, his/her address and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified.

Toll 49 Total Maintenance Contract

INVITATION TO BID

Sealed bids will be received by the North East Texas Regional Mobility Authority (NET RMA), 1001 ESE Loop 323, Suite 420; Tyler, Texas 75701 or HAND DELIVERED to the Office of the NET RMA **before 3:00 p.m., July 27, 2017**, publicly opened and read in the office of the NET RMA, unless posted otherwise, for furnishing the NET RMA with the **Toll 49 Total Maintenance Contract.**

The NET RMA reserves the right to accept or reject any or all bids and to waive formalities. In case of ambiguity in stating the price in the bid, the NET RMA reserves the right to consider the most advantageous construction thereof or to reject any bids.

Each bid must be submitted on the prescribed form and all blank spaces for bid prices must be filled in, with ink or typewritten. FAILURE TO FILL IN ALL BLANK SPACES SHALL CAUSE THE BID PROPOSAL TO BE DEEMED NOT RESPONSIVE AND THE BID PROPOSAL WILL NOT BE CONSIDERED IN DETERMINING THE RESPONSIBLE BIDDER WITH THE LOWEST RESPONSIVE BID. Line item entries shall prevail over sum total entries. When discrepancies exist between unit prices and corresponding extended prices, unit prices shall prevail.

The items and quantities listed on the prescribed bid form contained herein are approximate. All bid items listed may not be used, and additional items not listed may be used in performance of the work. Actual quantities of work performed may be over or under the quantities shown. The bid form is an aid to be used in identifying the lowest responsive bid.

Cone of Silence Period: Please note requirements of "Cone of Silence" Period found in the Section on “Information for Bidders”, item number 25. The Cone of Silence Period prohibits any communication except as provided in item number 25. The Cone of Silence Period begins on the day the bid is advertised and terminates on the day that the NET RMA Board of Directors takes action on this procurement (expected to be August 8, 2017).

Please note the NET RMA's qualification for award of this project in Section 5, Construction and Building Contracts of the NET RMA Procurement Policies, items 5.2, Qualification of Bidders:

Only Bidders pre-certified by TxDOT may submit bids on this project.

Instructions to bidders: Free bid packets (Bid Documents, Specifications and all required forms) are available from K'Lin Noble, NET RMA Administrative Officer, 903-630-7447 (klin.noble@netrma.org) or in person at: NET RMA; 1001 ESE Loop 323, Suite 420; Tyler, Texas 75701.

Bid Security: Each bid must be accompanied by a bid bond naming the NET RMA as obligee and duly executed by the Bidder as principal and having a surety thereon from a surety company approved by the NET RMA, in the amount of five percent (5%) of the total bid price (including base bid(s), option(s) and alternate(s). **ALL BID BOND FORMS MUST CONTAIN ORIGINAL SIGNATURES (S).**

The successful bidder(s) must furnish a performance and payment bond as required by law, and the terms of this contract.

Everett Owen
Project Director
NORTH EAST TEXAS REGIONAL MOBILITY AUTHORITY
1001 ESE Loop 323, Suite 420
Tyler, Texas 75701

Advertised in the Tyler Morning Telegraph and the Longview News Journal on Friday, June 30, 2017, and posted at www.netrma.org on Friday, June 30, 2017.

Toll 49 Total Maintenance Project

SCOPE OF WORK

This work consists of the routine maintenance, pavement repairs and preservation improvements on existing Segments 1, 2, 3A, 3B, and 5 of Toll 49 (from I-20 to SH 110 east) in Smith County, Texas. The work will also include Segment 4 of Toll 49 upon completion of construction and opening to traffic. Pavement repairs and preservation will include, but not be limited to, such things as pothole repairs; crack sealing; removal and replacement of the hot mixed asphaltic concrete (HMAC) pavement surface course, pavement asphalt base course, and/or flexible base course to repair areas of alligator cracking, block cracking, edge failure and other similar pavement distresses. Repairs may also include removing surface paving and flexible base courses and installing full-depth asphalt sections. Improvements will include, but not be limited to, placement of seal coats, one and/or two-course surface treatments, milling and inlays, striping and markings, and other items as needed to provide a uniform seal and riding surface to the existing roadway, and/or to present a uniform and pleasing appearance to areas of pavement that have had previous repairs.

The bid items and quantities contained in these bid documents represent the items and quantities expected to be needed for Toll 49 over the contract period. Work will be performed on a CALL OUT basis at locations identified by each WORK ORDER. Individual work orders will be issued to the winning bidder(s) by the NET RMA for routine maintenance, pavement repairs and preservation improvements on an as-needed basis, and in accordance with budget requirements of NET RMA. This is a CALL OUT contract and Plan Quantity Measurement does not apply.

For each work order issued, the Contractor will be required to initiate work within seventy-two hours (72-hrs) for routine maintenance and normal repairs and within twenty-four hours (24-hrs) for emergency repairs or as approved by the NET RMA Representative.

In response to issuance of a routine or normal work order, the Contractor shall provide to the NET RMA in writing (e-mail accepted) information detailing the Contractor's proposed schedule, estimated cost, and traffic control methods to be utilized for completion of the work order. The bidder's notices shall be addressed to: **mark.mcclanahan@netrma.org**.

The description of this scope of work, as shown above, is only a general overview of this project. Contractor shall refer to the Contract Specifications for further information. It is noted that there are no Construction Drawings (plans) for this project, only Typical Sections of the existing Toll 49 from I-20 to SH 110 east and applicable Standard Sheets.

END SCOPE OF WORK

Toll 49 Total Maintenance Contract

INFORMATION FOR BIDDERS

1. RECEIPT AND OPENING OF BIDS

The NORTH EAST TEXAS REGIONAL MOBILITY AUTHORITY ("NET RMA"), invites bids on the attached form hereto, all blanks of which must be appropriately filled in. Bids will be received by the NET RMA at the office of the NET RMA, as specified in the "Invitation to Bid", and then publicly opened and read aloud at **the NET RMA Offices**, unless otherwise posted. The envelopes containing the bids must be sealed and addressed to: Mr. Everett Owen, NET RMA, 1001 ESE Loop 323, Suite 420, Tyler TX 75701 or delivered to the NET RMA at such address.

The NET RMA reserves the right to accept or reject any or all bids and, to the extent permitted by law, to waive informalities or irregularities that are not material and do not cause the bid to be non-responsive pursuant to the Contracts Component Checklist. All bids are to be prepared and submitted in accordance with the provisions of the Information for Bidders, and NET RMA reserves the right to reject any bid as being nonresponsive to the bid request. The NET RMA may, in its sole discretion, determine that any non-material defect in the bid is harmless if such defect relates to an element that is not material, mandatory or essential to the responsiveness of the bid, and the NET RMA may accept the bid in spite of the existence of such a harmless non-material defect. Any bid received after the time and date specified shall not be considered. No Bidder may withdraw a bid within ninety (90) consecutive calendar days after the actual date of the opening thereof.

2. PREPARATION OF BID

Each bid must be submitted on the prescribed form and all blank spaces for bid prices must be filled in, in ink or typewritten. FAILURE TO FILL IN ALL BLANK SPACES SHALL CAUSE THE BID PROPOSAL TO BE DEEMED NOT RESPONSIVE AND THE BID PROPOSAL WILL NOT BE CONSIDERED IN DETERMINING THE LOWEST RESPONSIVE BID FROM A RESPONSIBLE BIDDER. LINE ITEM ENTRIES SHALL PREVAIL OVER SUM TOTAL ENTRIES. WHEN DISCREPANCIES EXIST BETWEEN UNIT PRICES AND CORRESPONDING EXTENDED PRICES, UNIT PRICES SHALL PREVAIL.

Each bid must be submitted in a sealed envelope bearing on the outside the name of the Bidder, his/her address, and the name of the project for which the bid is submitted. If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed as specified in Paragraph 1.

Only ONE (1) COPY of the Bidder's bid is required to be submitted.

*** N O T I C E ***

STATE SALES TAX

The NET RMA is a "tax exempt" agency. However, the successful Bidder may be required to pay state sales tax for the purchase, rental or lease of tools, machinery and equipment used in the performance of the awarded contract and for materials purchased which are not incorporated into the completed project. It is the obligation of the Bidder to ascertain the amount of state sales tax to be paid under Chapter 151 of the Texas Tax Code and to include this amount in his/her bid submitted to the NET RMA. For further information, the Bidder may wish to contact the office of the Texas Comptroller of Public Accounts at 1-800-252-5555.

3. SIGNATURE FORMALITIES

THE FULL COMPANY NAME OF THE BIDDER SHOULD BE NOTED ON EVERY PAGE OF THE BID PROPOSAL AND SHALL BE SIGNED WITH THE BIDDER'S OFFICIAL SIGNATURE. The name of the signing party or parties should be typewritten or printed under all signatures on the signature page of the proposal.

The Bidder should observe the following additional formalities specific to its form or ownership:

a. If a corporation, a Corporate Certificate must be completed by the Secretary or by another officer if the proposal is signed by the Secretary. In lieu of the certificate, there may be attached to the proposal copies of as much of the records of the corporation as will show the official character and authority of the officers signing, duly certified by the Secretary or Assistant Secretary under the corporate seal to be true copies.

b. If the Bidder should be operating as a partnership, each general partner should sign the proposal. If the proposal is not signed by each partner, there should be attached to the proposal a duly authenticated power of attorney evidencing the signer's authority to sign such proposal for and in behalf of the partnership.

c. If the Bidder is an individual, the trade name (if the Bidder is operating under an assumed name) should be indicated in the proposal and the proposal should be signed by such individual. If signed by one other than the Bidder, there should be attached to the proposal a duly authenticated power of attorney evidencing the signer's authority to execute such proposal for and in behalf of the Bidder.

4. SUBCONTRACTS

The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a subcontract under this contract must be found acceptable by the NET RMA BEFORE the contract is awarded.

5. METHOD OF AWARD-LOWEST RESPONSIBLE AND RESPONSIVE BIDDER

A contract will be awarded to the responsible bidder with the lowest responsive bid. **Conditional bids will not be accepted.**

6. TIME OF AWARD

Each Contract shall be deemed as having been awarded when formal written Notice of Award shall have been duly served upon the Bidder to whom the NET RMA has awarded the contract by some officer or agent of the NET RMA duly authorized to give such notice. Upon receipt of such written notice, the Contractor will proceed to verify the availability of the required materials or equipment needed to perform the repairs and submit a notice of availability to Mr. Mark McClanahan, NET RMA Maintenance Director. If problems are encountered in the availability of materials or equipment, the NET RMA will be notified in writing prior to scheduling of the Preconstruction Conference.

7. BID SECURITY

Each bid must be accompanied by an original Bid Bond prepared in the form of a Bid Bond attached hereto, naming NET RMA as obligee and duly executed by the Bidder as principal, and having as surety thereon a surety company approved by the NET RMA, in the amount of five percent (5%) of the TOTAL base bid price (cash, personal checks, company checks, cashier's checks or any security other than a bid bond will not be accepted). Each Bid Bond submitted must be an original Bid Bond with original signatures of the principal and surety. The surety company providing the Bid Bond shall designate an agent resident who resides within the County of Smith to whom any requisite notices may be delivered and with whom service of process may be rendered in matters arising out of the suretyship. Such bid bonds will be returned to all except the three lowest Bidders within five (5) consecutive calendar days after the opening of the bids, and the remaining bid bonds will be returned promptly after the NET RMA and the accepted Bidder have executed the Contract, or, if no award has been made, within ninety (90) consecutive calendar days after the date of the opening of bids, upon demand of the Bidder at any time thereafter, so long as he/she has not been notified of the acceptance of his/her bid.

8. LIQUIDATED DAMAGES FOR FAILURE TO ENTER INTO CONTRACT

The successful Bidder, upon its failure or refusal to execute and deliver the Contract, insurance certificates and bonds required herein within fourteen (14) consecutive calendar days after it has received notice of the acceptance of its bid, shall forfeit to the NET RMA, as liquidated damages for such failure or refusal, the security deposited with its bid.

9. BONDING REQUIREMENTS

In accordance with Chapter 2253, Texas Government Code, NET RMA requires the following for all public works contracts:

a. A Performance Bond for all public works contracts in excess of **$25,000**. The performance bond shall be for one hundred percent (100%) of the contract price and conditioned on the faithful performance of work in accordance with the drawings, specifications, and contract documents.

b. A Payment Bond for all public works contracts in excess of **$25,000**. The payment bond shall be for one hundred percent (100%) of the contract price for the protection and use of the payment bond beneficiaries who have a direct contractual relationship with the prime contractor or subcontractor to supply public work labor or material.

The surety company providing the Payment Bond shall designate an agent resident who resides within the County of Smith to whom any requisite notices may be delivered and with whom service of process may be rendered in matters arising out of suretyship.

In accordance with Section 3503.004 of the TEXAS INSURANCE CODE, if a Performance or Payment Bond is an amount in excess of ten percent (10%) of the surety's capital and surplus, NET RMA will require, as a condition to accepting the bond(s), a written certification from the surety that the surety has reinsured the portion of the risk that exceeds ten percent (10%) of the surety's capital and surplus with one or more reinsurers who are duly authorized, accredited or trusted to do business in the State of Texas. If any portion of the surety's obligation is reinsured, the amount reinsured may not exceed 10% of the reinsurer's capital and surplus.

The required bonds shall be executed only by a surety company that is authorized to write surety bonds in Texas.

10. TIME OF COMMENCEMENT, COMPLETION AND LIQUIDATED DAMAGES

Bidder agrees to commence work on a date to be specified in a written "Work Order" issued by the NET RMA. The Contract Time shall begin on the date to commence work specified in the Work Order and shall run for the contract time as specified in the Work Order. Liquidated damages in the amount of Five Hundred Dollars ($500.00) per calendar day may be assessed for the Contractor's failure to commence or complete an issued Work Order on time.

11. CONDITIONS OF WORK

Each Bidder must inform itself fully of the conditions relating to the maintenance of the project and the employment of labor related thereto. Failure to do so will not relieve a successful Bidder of its obligation to furnish all material and labor necessary to carry out the provisions of the contract. Insofar as possible, the contractor, in carrying out its work, must employ such methods or means as will

not cause any interruption of, or interference with, the work of any other contractor.

12. OBLIGATION OF BIDDER

At the time of the opening of bids, each Bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the drawings, general notes and other contract documents, including all addenda. The failure or omissions of any Bidder to examine any form, instrument, bid document, or contract document shall in no way relieve any Bidder from any obligation in respect of its bid.

The undersigned Bidder represents to NET RMA and to the other Bidders that its bid, and the estimates on which it is based, has been carefully checked and contains no errors, and nothing has been omitted or overlooked in determining the amount bid.

13. ADDENDA AND INTERPRETATIONS

No interpretation of the meaning of drawings, specifications, or other pre-bid documents will be made to any Bidder orally. Every request for such interpretation should be in writing addressed to Mr. Everett Owen, NET RMA Project Director. To be given consideration, the request for interpretation must be received at least fourteen (14) calendar days prior to the dated fixed for the opening of bids. Any and all such interpretations, and any supplemental instructions, will be in the form of written addenda to the specifications which, if issued, will be delivered by Email or Fax to all prospective Bidders at the respective addresses furnished for such purposes. Failure of any Bidder to receive any such addendum or interpretation shall not relieve such Bidder from any obligation under his/her bid as submitted. All addenda so issued shall become part of the contract documents and must be acknowledged on the proposal form.

14. POWER OF ATTORNEY

Attorneys-in-Fact who sign bid bonds or contract bonds must file with each bond a certified and effectively dated copy of their power of attorney.

15. DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENT

There is no DBE requirement for this contract. However, NET RMA does encourage use of minority, disadvantaged and small businesses as stated in its Business Utilization Program and Policy. The Contractor will be: (a) encouraged to use DBE's in subcontracting and material supply activities; and (b) prohibited from discriminating against DBE's.

16. LAWS AND REGULATIONS APPLICABLE

The Bidder's attention is directed to the fact that all applicable federal laws, including but not limited to, the Immigration Reform and Control Act of 1986, state laws, municipal ordinances and the rules and regulations of all authorities having jurisdiction over maintenance of the project shall apply to the contract throughout and they will be deemed to be included in the contract the same as though herein written out in full.

17. PREVAILING WAGE RATES AND WAGE RATE PENALTY

Since this is a repair contract, wage rates and wage rate penalties do not apply to this contract.

18. ON-THE-JOB TRAINING

Since this is a repair contract, there are no on-the-job training or apprenticeship requirements for this contract.

19. INSURANCE AND WORKER'S COMPENSATION INSURANCE

THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FURNISH CERTIFICATES OF INSURANCE to the NET RMA that comply with Item 3.4.3, of the TxDOT 2014 Standard Specifications. The Bidder's attention is directed to these insurance and workers' compensation requirements. It will be presumed that each Bidder has read these requirements and that any cost associated with these requirements has been incorporated into the bid submitted to the NET RMA and the successful Bidder will have no claim for compensation against the NET RMA.

20. BIDDER ACKNOWLEDGEMENT AND AGREEMENT OF CONTRACT

All Bidders, by submitting a bid hereunder, acknowledge, understand and agree to the following: All terms, covenants, conditions and any other provisions of the bid documents shall become a part of the contract documents for the Toll 49 Total Maintenance Contract for all purposes. The Bidder formally awarded this contract, shall execute the contract, and shall be bound to all provisions of this contract in the performance of the contract maintenance.

21. TRAFFIC CONTROL PLANS

Traffic control plans, if needed, must be submitted to Mr. Mark McClanahan, NET RMA Maintenance Director immediately following issuance of a work order to the Contractor. Traffic control plans shall follow the provisions of the "Texas Manual on Uniform Traffic Control Devices – Part 6 – Temporary Traffic Control".

22. PROJECT PROGRESS & PAYMENT SCHEDULES

The Contractor shall present monthly invoices for repair work conducted under each Work Order. The invoices will be reviewed by the NET RMA's General Engineering Consultant (GEC) and recommendations will be made for approval to the NET RMA. The NET RMA will pay invoices within thirty days (30 days) following receipt of an approved invoice.

23. ORGANIZATION CERTIFICATE, ASSUMED NAME CERTIFICATE/DBA CERTIFICATE, AND BUSINESS AFFIDAVIT.

Each bidder must submit with its offer a copy of the company's organization certificate issued by the Secretary of State of the State in which the bidder was organized. If the bidder uses a trade name other than the name under which the company was organized, bidder must also submit a copy of the Assumed Name or DBA Certificate. Further, each bidder must complete and submit an affidavit (see page 54 hereof) stating what names the company uses and has used in the past and attest that all such names describe the company currently submitting a bid or proposal.

24. CONE OF SILENCE / ANTI LOBBYING PERIOD

The NET RMA Cone of Silence / Anti Lobbying Period is to ensure a fair and competitive bidding environment by preventing communication between the NET RMA officials, employees, or representatives and parties involved in the bidding process that could create an unfair advantage to any party with respect to the award of a NET RMA contract.

The Cone of Silence period begins on the day that this Request for Proposal (RFP) is advertised, and ends on the day that a contract award is authorized by the NET RMA Board of Directors.

The Cone of Silence / Anti Lobbying period prohibits any communication or lobbying activities during the Cone of Silence period, by any person, including but not limited to, bidders, lobbyists or consultants of bidders, service providers or potential vendors and any the following:

1. The NET RMA Staff and the NET RMA Consultants, a list of which may be found at https://www.netrma.org/assets/Conflict-of-Interest-Policy-for-Consultants-Key-Personnel.pdf including any employee of the NET RMA, any person retained by NET RMA as a Consultant on the project, or any person having participated in the development, design, or review of documents related to the project.

2. NET RMA Officials, including the Board of Directors and their respective staff.

The Cone of Silence / Anti Lobbying Period does not apply to:

1. Questions of Process and Procedure, including oral communications with the NET RMA Project Director, provided the communications are strictly limited to matters of process or procedure already contained in the solicitation document. A minimum of ten days will be provided for questions during the solicitation unless otherwise stated in the Solicitation Schedule of Events in the documents.

2. Written Communications to the Project Director as identified in the solicitation.

A person who knowingly or intentionally lobbies in violation of the provisions of this policy, or who shall knowingly obstruct or prevent compliance with this policy shall be disqualified from consideration under this RFP.

Furthermore, any person who knowingly or intentionally violates the provisions of this policy, with respect to the solicitation or award of a discretionary contract may be prohibited by the NET RMA from entering into any contract with NET RMA for a period not to exceed three years.

NET RMA - Toll 49 Total Maintenance Contract

BID PROPOSAL

The undersigned, having familiarized themselves with the local conditions affecting the cost of work and with the bid documents and contract documents including but not limited to the Invitation to Bid, Information for Bidders, Bid Proposal, Contract Form, General Notes, drawings, specifications, and addenda on file in the office of the NET RMA, hereby propose to perform everything required to be performed and to provide furnish and install all the labor, materials, necessary structure adjustments, necessary tools, expendable equipment, and all utility and transportation services, and to complete in a workmanlike manner all the work required for the

Toll 49 Total Maintenance Contract

Within the specified limits and in accordance with the drawings and specifications as prepared by the NET RMA including **Addenda numbers** _____, AT THE FOLLOWING UNIT PRICES.

Each bid must be submitted on the prescribed form and all blank spaces for bid prices must be filled in, in ink or typewritten. FAILURE TO FILL IN ALL BLANK SPACES SHALL CAUSE THE BID PROPOSAL TO BE DEEMED NOT RESPONSIVE AND THE BID PROPOSAL WILL NOT BE CONSIDERED IN DETERMINING THE LOWEST RESPONSIBLE BIDDER. Line item entries shall prevail over sum total entries. When discrepancies exist between unit prices and corresponding extended prices, unit prices shall prevail.

NOTE: The quantities shown in the unit price schedule are ESTIMATES ONLY. They are shown here only for the purpose of comparing bids as an expected total expenditure. NET RMA, at its sole discretion, will direct exactly how many actual units will be placed, and will pay for only those units that are ordered and accepted. No payments will be made regarding the estimated quantities, they are estimates only. Some work items listed may not be used, and work items not listed may be used for actual repair work orders.

Note: For this solicitation, the lowest responsive bid will be determined in the following manner:

The SUM TOTAL of the Base Bid

COMPANY NAME: _____

NOTICE TO THE BIDDER

In the space provided below, please enter your total bid amount for this project. Only this figure will be read publicly by the Authority at the bid opening.

It is understood and agreed by the bidder in signing this proposal that the total bid amount entered below is not binding on either the bidder or the Authority. It is further agreed that **the official total bid amount for this proposal will be determined by multiplying the unit bid prices for each pay item by the respective estimated quantities shown in this proposal and then totaling all of the extended amounts.**

$_____

Total Bid Amount

E X A M P L E

ALT	ITEM	DESC	SP	Bid Item Description	Unit	Quantity	Bid Price	Amount	Seq
104	509			REMOV CONC (SDWLK)	SY	266.400	$10.000	$2,664.00	1

Total Bid Amount $2,664.00

Signed _____

Title _____

Date _____

Additional Signature for Joint Venture:

Signed _____

Title _____

Date _____

EXAMPLE OF BID PRICES SUBMITTED BY COMPUTER PRINTOUT

EXAMPLES

BID PRICES SUBMITTED BY HAND WRITTEN FORMAT

ALT	ITEM-CODE ITEM NO	DESC NO	S.P. NO.	UNIT BID PRICE ONLY WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	190	026		RED OAK 1 1/2 - 1 3/4 GAL BB EXAMPLE One hundred fifty DLRS and No CENTS	EA	9.000	1

Unit price for each plant in place

	249	014		FLEX BASE(DEL)(DENSCOT)(TY A GR4 CL2) EXAMPLE Seven DLRS and Fifty three CENTS	TON	56,787.00	14

Unit price for each ton of Flexible Base

	430	001	001	CL A CONC FOR EXT STR (CULV) EXAMPLE Three hundred five DLRS and No CENTS	CY	45.000	27

Unit price for each cubic yard of Concrete

	610	007	001	RDWY ILL ASSEM(TY ST 50T-8-8)(.4 KW)S EXAMPLE Fourteen hundred sixteen DLRS and Thirty seven CENTS	EA	13.000	7

Unit price of each Roadway Illumination Assembly

CONTRACT TIME AND LIQUIDATED DAMAGES

Bidder agrees to commence work on a date to be specified in each written "Work Order" issued by the Owner. The Work Order shall specify the time allotted for commencement and completion of the Work Order. Bidder shall Substantially Complete the project within the time specified. Bidder agrees to pay, as liquidated damages, the sum of **FIVE HUNDRED DOLLARS AND ZERO CENTS ($500.00)** for each calendar day after the expiration of the time specified in the Work Order for commencement and completion of the subject work. NET RMA may, in its sole discretion, offset liquidated damages owed by the Bidders/Contractor against amounts owed for work performed.

Proposal Sheet

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	105	6008		REMOVE STABILIZED BSE AND ASPH (6″) DOLLARS and CENTS	SY	100.000	1
	105	6074		REMOVE STABILIZED BSE AND ASPH (4″) DOLLARS and CENTS	SY	300.000	2
	132	6005		EMBANKMENT (FINAL)(ORD COMP)(TY C) DOLLARS and CENTS	CY	400.000	3
	134	6003		BACKFILL (TY C) DOLLARS and CENTS	STA	100.000	4
	134	6010		BACKFILL (TY B) DOLLARS and CENTS	LF	1,000.000	5
	160	6003		FURNISHING AND PLACING TOPSOIL (4″) DOLLARS and CENTS	SY	300.000	6
	161	6017		COMPOST MANUF TOPSOIL (4″) DOLLARS and CENTS	SY	300.000	7
	162	6004		MULCH SODDING DOLLARS and CENTS	SY	300.000	8
	164	6013		HAY/STRAW MULCH SEED(PERM)(RURAL)(SANDY) DOLLARS and CENTS	SY	300.000	9
	168	6001		VEGETATIVE WATERING DOLLARS and CENTS	MG	15.000	10
	169	6002		SOIL RETENTION BLANKETS (CL 1)(TY B) DOLLARS and CENTS	SY	300.000	11
	169	6004		SOIL RETENTION BLANKETS (CL 1)(TY D) DOLLARS and CENTS	SY	300.000	12

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	275	6069		CEMENT TREAT (EXIST MATL) (7 IN) (DC) DOLLARS and CENTS	SY	300.000	13
	305	6014		SALV, HAUL & STKPL RCL APH PAV (0-6″) DOLLARS and CENTS	CY	200.000	14
	310	6009		PRIME COAT (MC-30) DOLLARS and CENTS	GAL	1,000.000	15
	315	6002		FOG SEAL (SS-1H) DOLLARS and CENTS	GAL	1,000.000	16
	316	6024		ASPH (CRS-2P) (SURF TREAT) DOLLARS and CENTS	GAL	1,000.000	17
	316	6191		AGGR (TY-D GR-4 SAC-B) DOLLARS and CENTS	CY	100.000	18
	316	6193		AGGR (TY-D GR-5 SAC-B) DOLLARS and CENTS	CY	100.000	19
	340	6047		D-GR HMA (SQ) TY-C SAC-A PG70-22 DOLLARS and CENTS	TON	100.000	20
	340	6103		D-GR HMA (SQ) TY-D SAC-A PG70-22 DOLLARS and CENTS	TON	100.000	21
	351	6001		FLEXIBLE PAVEMENT STRUCTURE REPAIR (5″) DOLLARS and CENTS	SY	300.000	22
	354	6021		PLANE ASPH CONC PAV (0′ TO 2″) DOLLARS and CENTS	SY	200.000	23

Proposal Sheet

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	354	6025		PLANE ASPH CONC PAV (4″ TO 6″) DOLLARS and CENTS	SY	200.000	24
	361	6004		FULL – DEPTH REPAIR CRCP (10″) DOLLARS and CENTS	SY	300.000	25
	416	6002		DRILL SHAFT (24″) DOLLARS and CENTS	LF	5.000	26
	416	6016		DRILL SHAFT (SIGN MTS) (12 IN) DOLLARS and CENTS	LF	5.000	27
	429	6007		CONC STR REPAIR (VERTICAL & OVERHEAD) DOLLARS and CENTS	SF	7.000	28
	429	6009		CONC STR REPAIR (STANDARD) DOLLARS and CENTS	SF	7.000	29
	432	6026		RIPRAP (STONE COMMON) (DRY) (18 IN) DOLLARS and CENTS	CY	80.000	30
	438	6002		CLEANING AND SEALING EXISTING JOINTS (CL 3) DOLLARS and CENTS	LF	100.000	31
	438	6004		CLEANING AND SEALING EXISITNG JOINTS (CL 7) DOLLARS and CENTS	LF	100.000	32
	480	6001		CLEAN EXISTING CULVERTS DOLLARS and CENTS	EA	10.000	33

Proposal Sheet

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	500	6001		MOBILIZATION DOLLARS and CENTS	LS	1.000	34
	502	6002		BARR, SIGNS, TRAFFIC HANDLING DOLLARS and CENTS	MO	12.000	35
	506	6001		ROCK FILTER DAMS (INSTALL) (TY-1) DOLLARS and CENTS	LF	25.000	36
	506	6002		ROCK FILTER DAMS (INSTALL) (TY-2) DOLLARS and CENTS	LF	25.000	37
	506	6011		ROCK FILTER DAMS (REMOVE) DOLLARS and CENTS	LF	50.000	38
	506	6027		EXCAV EROSN & SEDMT CONT, IN VEH DOLLARS and CENTS	CY	400.000	39
	506	6033		BULLDOZER WORK (EROSION & SEMNT CONT.) DOLLARS and CENTS	HR	5.000	40
	506	6038		TEMP SEDMT CONT FENCE (INSTALL) DOLLARS and CENTS	LF	500.000	41
	506	6039		TEMP SEDMT CT FENCE (REMOVE) DOLLARS and CENTS	LF	500.000	42
	510	6001		ONE WAY TRAFFIC CONTROL (FLAGGER CONT) DOLLARS and CENTS	HR	40.000	43
	510	6002		ONE WAY TRAFFIC CONTROL (PILOT CAR) DOLLARS and CENTS	HR	40.000	44
	533	6001		RUMBLE STRIPS (SHOULDER) DOLLARS and CENTS	LF	1,000.000	45

Proposal Sheet

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	533	6002		RUMBLE STRIPS (CENTERLINE) DOLLARS and CENTS	LF	1,000.000	46
	540	6001		MTL W-BEAM GD FEN (TIM POST) DOLLARS and CENTS	LF	50.000	47
	540	6003		MTL THRIE-BEAM GB FEN (TIM POST) DOLLARS and CENTS	LF	50.000	48
	540	6006		MTL BEAM GD FEN TRANS (THRIE-BEAM) DOLLARS and CENTS	EA	1.000	49
	540	6008		MTL BEAM GD FEN TRANS (T101) DOLLARS and CENTS	EA	1.000	50
	540	6010		MTL W-BEAM GD FEN ADJUSTMENT DOLLARS and CENTS	LF	50.000	51
	540	6011		MTL THRIE-BEAM GD FN ADJUSTMENT DOLLARS and CENTS	LF	50.000	52
	540	6013		TRANSITION ADJUSTMENT DOLLARS and CENTS	EA	1.000	53
	540	6014		SHORT RADIUS DOLLARS and CENTS	LF	10.000	54
	540	6016		DOWNSTREAM ANCHOR TERMINAL SECTION DOLLARS and CENTS	EA	1.000	55
	542	6001		REMOVE METAL BEAM GUARD FENCE DOLLARS and CENTS	LF	25.000	56

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	542	6002		REMOVE TERMINAL ANCHOR SECTION DOLLARS and CENTS	EA	1.000	57
	544	6004		GDRAIL END TRT (INST) (WOOD POST) (TY 1) DOLLARS and CENTS	EA	1.000	58
	545	6005		CRASH CUSH ATTEN (REMOVE) DOLLARS and CENTS	EA	1.000	59
	636	6001		ALUMINUM SIGNS (TY A) DOLLARS and CENTS	SF	50.000	60
	636	6002		ALUMINUM SIGNS (TY G) DOLLARS and CENTS	SF	5.000	61
	636	6003		ALUMINUM SIGNS (TY O) DOLLARS and CENTS	SF	5.000	62
	636	6008		REPLACE EXISTING ALUMINUM SIGNS (TY G) DOLLARS and CENTS	SF	25.000	63
	636	6009		REPLACE EXISTING ALUMINUM SIGNS (TY O) DOLLARS and CENTS	SF	25.000	64
	644	6001		IN SM RD SN SUP&AM TY10BWG (1) SA (P) DOLLARS and CENTS	EA	1.000	65
	644	6004		IN SM RD SN SUP&AM TY10BWG (1) SA (T) DOLLARS and CENTS	EA	1.000	66
	644	6030		IN SM RD SN SUP&AM TYS80 (1) SA (T) DOLLARS and CENTS	EA	1.000	67
	644	6031		IN SM RD SN SUP&AM TYS80 (1) SA (T-2EXT) DOLLARS and CENTS	EA	1.000	68

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	644	6033		IN SM RD SN SUP&AM TYS80 (1) SA (U) DOLLARS and CENTS	EA	1.000	69
	644	6037		IN SM RD SN SUP&AM TYS80 (1) SA (U-WC) DOLLARS and CENTS	EA	1.000	70
	644	6056		IN SM RD SN SUP&AM TYTWT (1) US (P) DOLLARS and CENTS	EA	1.000	71
	644	6060		IN SM RD SN SUP&AM TYTWT (1) WS (P) DOLLARS and CENTS	EA	1.000	72
	644	6068		RELOCATE SM RD SN SUP&AM TY 10 BWG DOLLARS and CENTS	EA	1.000	73
	644	6070		RELOCATE SM RD SN SUP&AM TY S80 DOLLARS and CENTS	EA	1.000	74
	644	6071		RELOCATE SM RD SN SUP&AM TY TWT DOLLARS and CENTS	EA	1.000	75
	644	6076		REMOVE SM RD SN SUP&AM DOLLARS and CENTS	EA	1.000	76
	658	6001		INSTL DEL ASSM (D-SW)SZ 1(FLX) GND DOLLARS and CENTS	EA	35.000	77
	658	6013		INSTL DEL ASSM (D-SW)SZ (BRF) CTB DOLLARS and CENTS	EA	34.000	78
	658	6015		INSTL DEL ASSM (D-SW)SZ (BRF) GF1 DOLLARS and CENTS	EA	38.000	79
	658	6016		INSTL DEL ASSM (D-SW)SZ (BRF) GFI (BI) DOLLARS and CENTS	EA	7.000	80
	658	6018		INSTL DEL ASSM (D-SY)SZ 1(FLX) GND DOLLARS and CENTS	EA	39.000	81

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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	658	6026		INSTL DEL ASSM (D-SY)SZ (BRF) CTB DOLLARS and CENTS	EA	62.000	82
	658	6028		INSTL DEL ASSM (D-SY)SZ (BRF) GF 1 DOLLARS and CENTS	EA	14.000	83
	658	6036		INSTL DEL ASSM (D-DW)SZ 1 (FLX) GND DOLLARS and CENTS	EA	10.000	84
	658	6048		INSTL OM ASSM (OM-2Z) (FLX) GND DOLLARS and CENTS	EA	75.000	85
	658	6051		INSTL OM ASSM (OM-3L) (FLX) SRF DOLLARS and CENTS	EA	32.000	86
	658	6054		INSTL OM ASSM (OM-3R) (FLX) SRF DOLLARS and CENTS	EA	16.000	87
	658	6061		INSTL DEL ASSM (D-SW)SZ 1 (BRF) GF2 DOLLARS and CENTS	EA	200.000	88
	658	6062		INSTL DEL ASSM (D-SW)SZ 1 (BRF) GF2 (BI) DOLLARS and CENTS	EA	50.000	89
	658	6064		INSTL DEL ASSM (D-SY)SZ 1 (BRF) GF2 DOLLARS and CENTS	EA	200.000	90
	658	6068		INSTL DEL ASSM (D-DY)SZ 1 (BRF) GF2 DOLLARS and CENTS	EA	100.000	91
	662	6060		WK ZN PAV MRK REMOV (W)4" (BRK) DOLLARS and CENTS	LF	100.000	92
	662	6064		WK ZN PAV MRK REMOV (W)6"(BRK) DOLLARS and CENTS	LF	200.000	93

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	662	6093		WK ZN PAV MRK REMOV (Y)4"(BRK) DOLLARS and CENTS	LF	200.000	94
	662	6111		WK ZN PAV MRK SHT TERM (TAB) TY Y-2 DOLLARS and CENTS	EA	200.000	95
	666	6035		REFL PAV MRK TY I (W)8"(SLD)(090MIL) DOLLARS and CENTS	LF	4,000.000	96
	666	6038		REFL PAV MRK TY I (W)12"(LNDP)(090MIL) DOLLARS and CENTS	LF	100.000	97
	666	6040		REFL PAV MRK TY I (W)12"(SLD)(090MIL) DOLLARS and CENTS	LF	100.000	98
	666	6047		REFL PAV MRK TY I (W)24"(SLD)(090MIL) DOLLARS and CENTS	LF	900.000	99
	666	6053		REFL PAV MRK TY I (W) (ARROW) (9090MIL) DOLLARS and CENTS	EA	1.000	100
	666	6056		REFL PAV MRK TY I (W) (DBL ARROW) (9090MIL) DOLLARS and CENTS	EA	1.000	101
	666	6077		REFL PAV MRK TY I (W) (WORD) (090MIL) DOLLARS and CENTS	EA	1.000	102
	666	6167		REFL PAV MRK TY II (W) 4" (BRK) DOLLARS and CENTS	LF	300.000	103
	666	6170		REFL PAV MRK TY II (W) 4" (SLD) DOLLARS and CENTS	LF	1,400.000	104
	666	6171		REFL PAV MRK TY II (W) 6" (BRK) DOLLARS and CENTS	LF	1,200.000	105

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	666	6174		REFL PAV MRK TY II (W) 6" (SLD) DOLLARS and CENTS	LF	5,000.000	106
	666	6207		REFL PAV MRK TY II (Y) 4" (SLD) DOLLARS and CENTS	LF	1,200.000	107
	666	6208		REFL PAV MRK TY II (Y) 6" (BRK) DOLLARS and CENTS	LF	1,400.000	108
	666	6210		REFL PAV MRK TY II (Y) 6" (SLD) DOLLARS and CENTS	LF	5,000.000	109
	666	6224		PAVEMENT SEALER 4″ DOLLARS and CENTS	LF	100.000	110
	666	6225		PAVEMENT SEALER 6″ DOLLARS and CENTS	LF	1,200.000	111
	666	6226		PAVEMENT SEALER 8″ DOLLARS and CENTS	LF	100.000	112
	666	6228		PAVEMENT SEALER 12″ DOLLARS and CENTS	LF	100.000	113
	666	6230		PAVEMENT SEALER 24″ DOLLARS and CENTS	LF	100.000	114
	666	6231		PAVEMENT SEALER (ARROW) DOLLARS and CENTS	EA	1.000	115
	666	6232		PAVEMENT SEALER (WORD) DOLLARS and CENTS	EA	1.000	116
	666	6234		PAVEMENT SEALER (DBL ARROW) DOLLARS and CENTS	EA	1.000	117

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	666	6243		PAVEMENT SEALER (YLD TRI) DOLLARS and CENTS	EA	1.000	118
	666	6298		RE PM W/RET REQ TY I(W)4"(BRK)(060MIL) DOLLARS and CENTS	LF	100.000	119
	666	6301		RE PM W/RET REQ TY I (W)4"(SLD)(060MIL) DOLLARS and CENTS	LF	7,000.000	120
	666	6305		RE PM W/RET REQ TY I (W)6"(BRK)(090MIL) DOLLARS and CENTS	LF	7,000.000	121
	666	6308		RE PM W/RET REQ TY I (W)6"(SLD)(090MIL) DOLLARS and CENTS	LF	3,000.000	122
	666	6310		RE PM W/RET REQ TY I (Y)4"(BRK)(060MIL) DOLLARS and CENTS	LF	100.000	123
	666	6313		RE PM W/RET REQ TY I (Y)4"(SLD)(060MIL) DOLLARS and CENTS	LF	6,000.000	124
	666	6320		RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL) DOLLARS and CENTS	LF	3,000.000	125
	668	6074		PREFAB PAV MRK TY C (W) (12″) (SLD) DOLLARS and CENTS	LF	100.000	126
	668	6076		PREFAB PAV MRK TY C (W) (24″) (SLD) DOLLARS and CENTS	LF	100.000	127
	668	6077		PREFAB PAV MRK TY C (W) (ARROW) DOLLARS and CENTS	EA	1.000	128
	668	6078		PREFAB PAV MRK TY C (W) (DBL ARROW) DOLLARS and CENTS	EA	1.000	129

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	668	6084		PREFAB PAV MRK TY C (W) (NUMBER) DOLLARS and CENTS	EA	1.000	130
	668	6085		PREFAB PAV MRK TY C (W) (WORD) DOLLARS and CENTS	EA	1.000	131
	668	6092		PREFAB PAV MRK TY C (W) (36")(YLD TRI) DOLLARS and CENTS	EA	1.000	132
	672	6006		REFL PAV MRKR TY I-A DOLLARS and CENTS	EA	400.000	133
	672	6007		REFL PAV MRKR TY I-C DOLLARS and CENTS	EA	100.000	134
	672	6008		REFL PAV MRKR TY I-R DOLLARS and CENTS	EA	150.000	135
	672	6009		REFL PAV MRKR TY II-A-A DOLLARS and CENTS	EA	500.000	136
	672	6010		REFL PAV MRKR TY II-C-R DOLLARS and CENTS	EA	1,000.000	137
	677	6001		ELIM EXT PAV MRK & MRKS (4") DOLLARS and CENTS	LF	5,000.000	138
	677	6002		ELIM EXT PAV MRK & MRKS (6") DOLLARS and CENTS	LF	1,200.000	139
	677	6003		ELIM EXT PAV MRK & MRKS (8") DOLLARS and CENTS	LF	50.000	140
	677	6007		ELIM EXT PAV MRK & MRKS (24") DOLLARS and CENTS	LF	250.000	141

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	677	6008		ELIM EXT PAV MRK & MRKS (ARROW) DOLLARS and CENTS	EA	1.000	142
	677	6009		ELIM EXT PAV MRK & MRKS (DBL ARROW) DOLLARS and CENTS	EA	1.000	143
	677	6012		ELIM EXT PAV MRK & MRKS (WORD) DOLLARS and CENTS	EA	1.000	144
	677	6019		ELIM EXT PAV MRK & MRKS (36")(YLD TRI) DOLLARS and CENTS	EA	1.000	145
	678	6001		PAV SURF PREP FOR MRK (4") DOLLARS and CENTS	LF	100.000	146
	678	6002		PAV SURF PREP FOR MRK (6") DOLLARS and CENTS	LF	100.000	147
	678	6004		PAV SURF PREP FOR MRK (8") DOLLARS and CENTS	LF	100.000	148
	678	6006		PAV SURF PREP FOR MRK (12") DOLLARS and CENTS	LF	100.000	149
	678	6008		PAV SURF PREP FOR MRK (24") DOLLARS and CENTS	LF	100.000	150
	678	6009		PAV SURF PREP FOR MRK (ARROW) DOLLARS and CENTS	EA	1.000	151
	678	6010		PAV SURF PREP FOR MRK (DBL ARROW) DOLLARS and CENTS	EA	1.000	152
	678	6015		PAV SURF PREP FOR MRK (NUMBER) DOLLARS and CENTS	EA	1.000	153

Proposal Sheet

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	678	6016		PAV SURF PREP FOR MRK (WORD) DOLLARS and CENTS	EA	1.000	154
	678	6023		PAV SURF PREP FOR MRK (36")(YLD TRI) DOLLARS and CENTS	EA	1.000	155
	700	6001		POTHOLE REPAIR (STANDARD) DOLLARS and CENTS	SY	50.000	156
	700	6009		EMERGENCY MOBILIZATION DOLLARS and CENTS	EA	10.000	157
	712	6008		JT / CRCK SEAL (RUBBER - ASPHALT) DOLLARS and CENTS	LMI	20.000	158
	730	6001		STRIP MOWING (40’) DOLLARS and CENTS	AC	690.000	158
	730	6002		FULL - WIDTH MOWING DOLLARS and CENTS	AC	1,890.000	160
	731	6007		PAVEMENT EDGES, STRUCTURES & FIX-TURES DOLLARS and CENTS	MI	100.000	161
	731	6011		BROADCAST APPLICATION DOLLARS and CENTS	AC	100.000	162
	734	6001		LITTER REMOVAL DOLLARS and CENTS	AC	1,380.000	163
	735	6005		DEBRIS REMOVAL (ENTRANCE/EXIT RAMPS) DOLLARS and CENTS	CYC	12.000	164
	735	6007		DEBRIS REMOVAL (SPOT DEBRIS) DOLLARS and CENTS	MI	12.000	165

PROJECT: TOTAL MAINTENANCE CONTRACT
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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	RMA USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	735	6068		DEBRIS REMOVAL -CNTR MEDIANS / MAINLANES DOLLARS and CENTS	CYC	52.000	166
	738	6003		CLEANING / SWEEPING (OUTSIDE MAIN LANE) DOLLARS and CENTS	CYC	12.000	167
	740	6001		GRAFFITI REMOVAL (BLAST CLEANING) DOLLARS and CENTS	SF	10.000	168
	740	6002		GRAFFITI REMOVAL (PAINTING) DOLLARS and CENTS	SF	84.000	169
	740	6003		GRAFFITI REMOVAL (CHEMICAL CLEAN-ING) DOLLARS and CENTS	SF	20.000	170
	752	6003		TREE TRIMMING / BRUSH REMOVAL DOLLARS and CENTS	MI	1.000	171
	752	6004		TREE TRIMMING / BRUSH REMOVAL(CHANNELS) DOLLARS and CENTS	AC	10.000	172
	752	6005		TREE REMOVAL (4" - 12" DIA) DOLLARS and CENTS	EA	20.000	173
	752	6006		TREE REMOVAL (12" - 18" DIA) DOLLARS and CENTS	EA	15.000	174
	752	6007		TREE REMOVAL (18" - 24" DIA) DOLLARS and CENTS	EA	5.000	175
	752	6008		TREE REMOVAL (24" - 30" DIA) DOLLARS and CENTS	EA	5.000	176
	752	6009		TREE REMOVAL (30" - 36" DIA) DOLLARS and CENTS	EA	2.000	177

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ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	752	6010		TREE REMOVAL (36" - 42" DIA) DOLLARS and CENTS	EA	2.000	178
	752	6011		TREE REMOVAL (42" - 48" DIA) DOLLARS and CENTS	EA	1.000	179
	752	6012		TREE REMOVAL (48" - 60" DIA) DOLLARS and CENTS	EA	1.000	180
	752	6013		TREE REMOVAL (60" - 72" DIA) DOLLARS and CENTS	EA	1.000	181
	760	6001		DITCH CLEANING AND RESHAPING (FOOT) DOLLARS and CENTS	LF	2,000.000	182
	770	6001		REPAIR RAIL ELEMENT (W - BEAM) DOLLARS and CENTS	LF	280.000	183
	770	6002		REPAIR RAIL ELEMENT (THRIE - BEAM) DOLLARS and CENTS	LF	10.000	184
	770	6003		REP RAIL ELMNT(THRIE-BM TRANS TO W - BM) DOLLARS and CENTS	LF	10.000	185
	770	6010		REM / REPL TIMBER/STL POST W/O CONC FND DOLLARS and CENTS	EA	4.000	186
	770	6011		REM / REPL TIMBER / STL POST W/CONC FND DOLLARS and CENTS	EA	2.000	187
	770	6012		REM / REPL TIMBER POST W / O CONC FND DOLLARS and CENTS	EA	25.000	188

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	770	6016		REPAIR STEEL POST WITH BASE PLATE DOLLARS and CENTS	EA	1.000	189
	770	6017		REALIGN POSTS DOLLARS and CENTS	EA	25.000	190
	770	6018		INSTALL BLOCKOUT DOLLARS and CENTS	EA	2.000	191
	770	6019		REMOVE & REPLACE BLOCKOUT DOLLARS and CENTS	EA	2.000	192
	770	6021		REPLACE SINGLE GDRAIL TERMINAL RAIL DOLLARS and CENTS	LF	105.000	193
	770	6022		REPLACE SINGLE GDRAIL TERMINAL POST DOLLARS and CENTS	EA	7.000	194
	770	6024		REPLACE TERMINAL ANCHOR POSTS DOLLARS and CENTS	EA	1.000	195
	770	6027		REMOVE GDRAIL END TRT / REPL WITH SGT DOLLARS and CENTS	EA	2.000	196
	770	6028		REPL SINGLE GDRAIL TERM IMPACT HEAD DOLLARS and CENTS	EA	1.000	197
	770	6029		REM & RESET SGT IMPACT HEAD DOLLARS and CENTS	EA	1.000	198
	770	6030		REPLACE SGT CABLE ASSEMBLY DOLLARS and CENTS	EA	1.000	199
	770	6031		REPLACE SGT CABLE ANCHOR DOLLARS and CENTS	EA	1.000	200

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	770	6032		REPLACE SGT STRUT DOLLARS and CENTS	EA	1.000	201
	770	6033		REPLACE SGT OBJECT MARKER DOLLARS and CENTS	EA	1.000	202
	774	6006		REPAIR (TRACC) DOLLARS and CENTS	EA	1.000	203
	774	6015		REPAIR (NARROW QUAD) DOLLARS and CENTS	EA	1.000	204
	774	6028		REPAIR (QUAD) (N) (BAY) DOLLARS and CENTS	EA	1.000	205
	774	6038		REMOVE AND REPLACE (FASTRACC) DOLLARS and CENTS	EA	1.000	206
	774	6052		REPAIR (FASTRACC) DOLLARS and CENTS	LF	10.000	207
	774	6055		REPAIR (FASTRACC) (BAY) DOLLARS and CENTS	EA	1.000	208
	776	6001		REPAIR (STEEL POST W/ W-BEAM - T101) DOLLARS and CENTS	LF	10.000	209
	776	6004		REPAIR (STL POST W/ DOUBLED W-BEAMS-T6) DOLLARS and CENTS	LF	10.000	210
	776	6032		REPAIR(STEEL POST W/ CHANNEL IRON RAIL) DOLLARS and CENTS	LF	10.000	211
	6000	6001		PORTABLE CHANGEABLE MESSAGE SIGN DOLLARS and CENTS	DAY	10.000	212

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	6000	6003		REPLACE ABOVE-GROUND CONDUIT DOLLARS and CENTS	LF	2.000	213
	6000	6006		REPLACE UNDERGROUND CONDUIT DOLLARS and CENTS	LF	11.000	214
	6000	6009		REPLACE CONDUCTOR DOLLARS and CENTS	LF	63.000	215
	6000	6016		INSTALL ELECTRICAL SPLICE DOLLARS and CENTS	EA	1.000	216
	6000	6020		ROAD BORE DOLLARS and CENTS	LF	11.000	217
	6000	6023		REPLACE ROADWAY ILLUM ASSEMBLY (HPS) DOLLARS and CENTS	EA	1.000	218
	6000	6026		REPLACE ROADWAY ILLUM ASSEMBLY (LED) DOLLARS and CENTS	EA	1.000	219
	6000	6043		REPLACE LUMINAIRE POLE DOLLARS and CENTS	EA	1.000	220
	6000	6044		REPLACE LUMINAIRE ARMS DOLLARS and CENTS	EA	1.000	221
	6000	6046		MAINTAIN HIGH MAST ILLUMINATION DOLLARS and CENTS	EA	1.000	222
	6000	6052		REPLACE ELECTRICAL SERVICE DOLLARS and CENTS	EA	1.000	223
	6000	6053		REPLACE TIMBER SERVICE POLE DOLLARS and CENTS	EA	1.000	224

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	6000	6056		INSTALL GROUND BOX DOLLARS and CENTS	EA	1.000	225
	6000	6059		INSTALL FOUNDATION DOLLARS and CENTS	EA	1.000	226
	6000	6061		REPLACE TRANSFORMER BASE DOLLARS and CENTS	EA	1.000	227
	6000	6062		REPLACE TRANSFORMER BASE COVER DOLLARS and CENTS	EA	1.000	228
	6000	6072		REPLACE LAMP (POLE MOUNT FIXTURE) DOLLARS and CENTS	EA	6.000	229
	6000	6073		REPLACE LAMP (UNDERPASS FIXTURE) DOLLARS and CENTS	EA	1.000	230
	6000	6074		REPLACE LAMP (WALL PACK FIXTURE) DOLLARS and CENTS	EA	1.000	231
	6000	6076		REPLACE WALL PACK LUMINAIRE DOLLARS and CENTS	EA	1.000	232
	6000	6082		REPLACE FUSE DOLLARS and CENTS	EA	16.000	233
	6000	6084		REPLACE BREAKAWAY FUSE HOLDER DOLLARS and CENTS	EA	2.000	234
	6000	6093		REPLACE HAND-OFF-AUTO SWITCH DOLLARS and CENTS	EA	1.000	235
	6000	6094		REPLACE CONTACTOR DOLLARS and CENTS	EA	1.000	236

Proposal Sheet

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

ALT	ITEM-CODE			UNIT BID PRICE ONLY. WRITTEN IN WORDS	UNIT	APPROX QUANTITIES	DEPT USE ONLY
	ITEM NO	DESC CODE	S.P. NO.				
	6000	6097		REPLACE BREAKER PANEL DOLLARS and CENTS	EA	1.000	237
	6000	6099		REPLACE CIRCUIT BREAKER DOLLARS and CENTS	EA	1.000	238
	6000	6108		REPLACE LUMINAIRES DOLLARS and CENTS	EA	3.000	239
	6000	6109		REPLACE PHOTOCELL DOLLARS and CENTS	EA	2.000	240

PROJECT: TOTAL MAINTENANCE CONTRACT
COUNTY: S M I T H

BID PROPOSAL EXECUTION PAGE

Enclosed with this bid proposal is a bid bond for five percent (5%) of the TOTAL base bid price, which is agreed shall be collected and retained by the NET RMA as liquidated damages in the event this proposal is accepted by the NET RMA within ninety (90) consecutive calendar days after the date advised for the reception of bids and the undersigned fails to execute the contract and the required performance and payment bonds with the NET RMA within fourteen (14) consecutive calendar days after the date said proposal is accepted; otherwise, the said bid security shall be returned to the undersigned upon demand.

THE UNDERSIGNED BIDDER REPRESENTS TO THE NET RMA AND TO THE OTHER BIDDERS THAT ITS BID, AND THE ESTIMATES ON WHICH IT IS BASED, HAVE BEEN CAREFULLY CHECKED AND CONTAINS NO ERRORS, AND NOTHING HAS BEEN OMITTED OR OVERLOOKED IN DETERMINING THE AMOUNTS BID.

BIDDER'S NAME: _____
(AS IT APPEARS ON ORGANIZATION CERTIFICATE ISSUED BY STATE IN WHICH COMPANY WAS ORGANIZED)

BY: _____ _____
Signature Date

_____
Print Signer's name and title

_____ _____
Address City, State, Zip Code

_____ _____
Physical Address (if different) City, State, Zip Code

IF THE BIDDER BE A CORPORATION, THE FOLLOWING CERTIFICATE SHOULD BE EXECUTED:

I, _____, certify that I am the Secretary of the corporation named as Bidder hereinabove; that the person who signed the afore going bid proposal contract on behalf of the Bidder, was then an authorized representative of said corporation; that said proposal was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

CORPORATE SECRETARY SIGNATURE AND CORPORATE SEAL

THE STATE OF TEXAS }
COUNTY OF SMITH }

SURETY'S NO. _____

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that _____, (hereinafter called the Principal), as Principal, and _____ as Surety, are hereby held and firmly bound unto the NET RMA, as Owner/Obligee (hereafter "Owner"), in the penal sum of _____. _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

SIGNED, this _____ day of _____ , 20_____.

The conditions of the above obligation are such that, whereas the Principal has submitted to NET RMA a certain bid, attached hereto and hereby made a part hereof, to enter into a contract in writing for the **TOLL 49 Total Maintenance Contract project,** NOW, THEREFORE,

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

b) If said bid shall be accepted and within fourteen (14) consecutive calendar days after the Principal has received notice of acceptance, the Principal shall properly complete, execute, and deliver insurance certificates and a contract in the form approved by the Owner and shall furnish a bond for its faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void; otherwise the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation, as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the OWNER MAY ACCEPT such bid, such extension to be upon notice to the Surety by the Principal.

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

_____	_____ (Seal)
Principal ● Company Name	Signed by (Principal Agent)
_____	_____
Address	Principal Agent's Name (Printed or Typed)
_____	_____ _____
City, State, Zip Code	Telephone No. Fax No.
_____	_____ (Seal)
Surety ● Company Name	Signed by (Surety Agent)
_____	_____
Address	Surety Agent's Name (Printed or Typed)
_____	_____ _____
City, State, Zip Code	Telephone No. Fax No.

USE BID BOND FORM ON

PREVIOUS PAGE

DO NOT SUBSTITUTE BID BOND FORM

NOTE:

THE BID BOND MUST BE SIGNED & SEALED

BY BOTH THE SURETY & THE PRINCIPAL

SUBCONTRACTOR AND/OR SUPPLIER IDENTIFICATION

Toll 49 Total Maintenance Contract

BIDDER: _____

The Bidder shall indicate below the name of each subcontractor and/or supplier the bidder will use in the performance of the contract. The Bidder shall specify the work to be performed by the subcontractor or the materials to be provided by the supplier, the amount of the subcontract or purchase order, and the percentage of the contract the Bidder will expand throughout the life of the project. **Any changes in subcontractor and/or supplier listed below shall require additional approval prior to contract execution.**

Name & Address	DBE	Service/Supply	$ Value	% of Contract
		TOTAL:		
			(Dollars)	(% of Contract)

STATEMENT OF INCORPORATED MATERIALS

Toll 49 Total Maintenance Contract

BIDDER: _____

The Successful Bidder shall be required to pay state sales tax on materials not incorporated into the completed project. Materials not incorporated into the completed project include, but are not limited to, the purchase, rental or lease of tools, machinery and equipment used in the performance of the awarded contract.

The Successful Bidder may be required to pay state sales tax on consumables used in construction contracts. Consumables are items used or consumed by a contractor on a project such as, but not limited to, non-reusable concrete forms, masking tape, corrugated cardboard, natural gas, and electricity.

It is the obligation of the Bidder to ascertain the amount of state sales tax to be paid and to include this amount in its bid submitted to the Owner.

The Successful Bidder is not required to pay state sales tax on materials incorporated into the completed project such as mortar, bricks, nails and caulk which are annexed to and become part of the completed project.

The State of Texas requires a "separated contract" for tax exemption purposes. The Bidder must separate or identify the amount of incorporated materials to be used in the completed project that are not subject to state sales tax. This form complies with the requirement.

The amounts entered for base bids, alternates and unit prices are the agreed contract prices for *incorporated materials which are not subject to state sales tax*

Base Bid $_____

AFFIDAVIT

Before me, the undersigned official, on this day, personally appeared _____, a person known to me to be the person whose signature appears below, whom after being duly sworn upon his/her oath deposed and said:

1. My name is _____. I am over the age of 18, have never been convicted of a crime and am competent to make this affidavit.

2. I am an authorized representative of the following company or Firm:_____

   _____

3. Listed below are all the names the company/firm uses and has used in the past and I attest that all such names describe the company currently submitting a response to the bid request for Toll 49 Total Maintenance Contract project.

   _____

   _____

   _____

4. In addition to completing this Affidavit, I have included a copy of the Organization Certificate issued by the Secretary of State of the state in which the company was organized and if using a trade name in the solicitation documents other than the name under which the company was organized, a copy of the Assumed Name Certificate/DBA Certificate from the County.

5. **Note: This bidder understands that by providing false information on this Affidavit, it may be considered a non-responsible bidder on this and future solicitations and may result in discontinuation of any/all business with NET RMA.**

_____
Signature

SUBSCRIBED AND SWORN to before me on this _____ day of _____ , _____.

NOTARY PUBLIC _____

PRINT NAME_____ MY COMMISSION EXPIRES _____

LETTER OF COMMITMENT

A bidder/offeror may provide a letter of commitment or other similar document signed by a duly authorized agent of a surety that meets the requirements for sureties contained in these bid documents and the construction contract documents, wherein the surety commits to issue the performance and all other bonds required by these bid documents and the general conditions of the contract documents. Said commitment document shall specify the bidder/offeror and the project that is the subject of these bid documents by name and shall commit to issuing such bonds in the full amount of the contract amount in the event the bidder/offeror is awarded the contract under the terms of these bid documents.

The letter of commitment is not a substitute for the bid bond.

A bidder/offeror who provides the above described commitment letter shall not be required to submit detailed financial statements to the NET RMA.

A letter of commitment is not required at the time the bid is submitted but is required upon request by NET RMA. NET RMA may request the letter of commitment any time after opening the bids/offers and before submitting the proposed award of the construction contract to the NET RMA Board of Directors. A letter of commitment must be provided within five (5) consecutive calendar days of notification by NET RMA. If the bidder/offeror does not provide the letter of commitment, then it must provide detailed financial statements to the NET RMA.

[Form of Contract]

Toll 49 Total Maintenance Contract

THIS AGREEMENT, made this_____day of _____, 2017 by and between NET RMA, hereinafter called "Owner", acting herein through its Executive Director, Chris Miller and _____(circle one of the following: a corporation, a partnership, an individual), located in: CITY OF_____COUNTY OF_____and 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 routine maintenance, pavement repairs and preservation improvements for the Owner's Toll 49 Contract Project hereinafter called the "Project", for the sum of the dollar amount equal to all Work Orders issued by Owner under the contract, and all extra work in connection therewith, under the terms as stated in the contract documents; and at Contractor(s) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance and other accessories and services necessary to complete the said Project, in accordance with the conditions and prices stated in the Bid Proposal, the general notes, the drawings and other printed or written explanatory matter thereof, the specifications and all other bid documents and contract documents as furnished by NET RMA or designated representative, all of which are made a part hereof and collectively evidence and constitute the Contract.

The Contractor agrees to commence work on a date to be specified in each written "Work Order" and to complete the assigned project work within the time specified in the Work Order. If the Contractor does not commence the work by the specified date for starting work or substantially complete the work within the time period specified, then liquidated damages in the amount of Five Hundred Dollars and No Cents per day ($ 500.00 / day) may be assessed. The unit price quantities of this contract are estimated.

Base Bid $ _____

IN WITNESS, WHEREOF, the parties to these presents have executed this Toll 49 Total Maintenance Contract on the _____ day of _____, 20___ in two (2) counterparts, each of which shall be deemed an original, in the year and day first mentioned.

OWNER – NET RMA

by_____
Chris Miller, Executive Director

Contractor:

_____

by _____

_____
Typed Name & Title

_____
Address, City, State, Zip Code

_____ _____
Telephone Number Fax Number

If the Contractor be a corporation, the following certificate should be executed:

I, _____, certify that I am the _____Secretary of the corporation named as Contractor, hereinabove; and that _____, who signed the foregoing Contract on behalf of the Contractor was then _____of said corporation; that said proposal was duly signed for and in behalf of said corporation by authority of its governing body, and is within the scope of its corporate powers.

_____
CORPORATE SECRETARY SIGNATURE AND CORPORATE SEAL

PERFORMANCE BOND

(Value of this Bond must be 100% of Contract amount)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT, _____ hereinafter called the "Principal", as Principal and _____, a Corporation organized and existing under the laws of the State of _____ with its principal office in the City of _____, hereinafter called the "Surety", as Surety, are held and firmly bound unto NET RMA hereinafter called the "Obligee", in the amount of _____ Dollars and _____Cents ($00.00), for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into that certain Toll 49 Total Maintenance Contract with the Obligee, dated the _____day of _____, 20___ to provide certain routine maintenance, pavement repairs and preservation improvements, which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that, if the said Principal shall faithfully perform the work in accordance with the drawings, specifications and contract documents, then this obligation shall be void; otherwise, to remain in full force and effect.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of Chapter 2253, Texas Government Code, as amended, and all liabilities on this Bond shall be determined in accordance with the provisions of said Chapter to the same extent as if it were copied at length herein. The Surety hereby waives notice of any change, including changes of time, to the construction contract, related subcontracts and purchase orders, which is made in accordance with Section 252.048, Texas Local Government Code.

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

WITNESS: _____

ATTEST:_____

_____	_____ (Seal)
Principal - Company Name	Signed By (*Principal Agent*)
_____	_____
Address	Principal Agent's Name (Printed or Typed)
_____	_____
City, State, Zip Code	
_____	_____
Telephone No.	Email
_____	_____ (Seal)
Surety - Company Name	Signed By (*Surety Agent*)
_____	_____
Address	Surety Agent's Name (Printed or Typed)
_____	
City, State, Zip Code	
_____	_____
Telephone No.	Email

INSERT

POWER OF ATTORNEY

AFTER

PERFORMANCE BOND

NOTE:

- **TO BE SUBMITTED AFTER AWARD OF CONTRACT.**
- **DO NOT SUBSTITUTE BOND FORM**
- **BOND MUST BEAR FOUR (4) SIGNATURES: (1) WITNESS, (2) ATTEST, (3) CONTRACTOR AND (4) ATTORNEY-IN-FACT**
- **DATE ON POWER OF ATTORNEY MUST BE SAME AS DATE ON BOND**
- **SEPARATE POWER OF ATTORNEY FORMS MUST BE PROVIDED FOR EACH BOND (PERFORMANCE & PAYMENT BOND)**
- **AGENT RESIDENT DESIGNATION MUST CONTAIN SURETY'S SEAL, ASSIGNMENT BY SURETY AGENT, AND ACKNOWLEDGMENT OF SUCH ASSIGNMENT BY AGENT RESIDENT.**

PAYMENT BOND

(Value of this Bond must be 100% of Contract amount)

KNOW ALL PERSONS BY THESE PRESENTS:

THAT _____, hereinafter called the "Principal", as Principal and _____, a Corporation organized and existing under the laws of the State of_____ with its principal office in the City of _____, hereinafter called the "Surety", as Surety, are held and firmly bound unto NET RMA hereinafter called the "Obligee", in the amount of _____ Dollars and _____ Cents ($00.00), for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain **Toll 49 Total Maintenance Contract** with the Obligee, dated the _____day of _____, 20___ to provide certain routine maintenance, pavement repairs and improvements, which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that, if the said Principal shall faithfully pay all valid and timely claims of subcontractors, suppliers, material men and mechanics with respect to the contract, then this obligation shall be void; otherwise, to remain in full force and effect.

PROVIDED, HOWEVER, that this Bond is executed pursuant to the provisions of Chapter 2253, Texas Government Code, as amended, and all liabilities on this Bond shall be determined in accordance with the provisions of said Chapter to the same extent as if it were copied at length herein. The Surety hereby waives notice of any change, including changes of time, to the construction contract, related subcontracts and purchase orders, which is made in accordance with Section 252.048, Texas Local Government Code.

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

WITNESS: _____

ATTEST:_____

_____	_____ (Seal)
Principal - Company Name	Signed By (*Principal Agent*)
_____	_____
Address	Principal Agent's Name (Printed or Typed)
_____	_____
City, State, Zip Code	
_____	_____
Telephone No.	Email
_____	_____ (Seal)
Surety - Company Name	Signed By (*Surety Agent*)
_____	_____
Address	Surety Agent's Name (Printed or Typed)
_____	
City, State, Zip Code	
_____	_____
Telephone No.	Email

INSERT

POWER OF ATTORNEY

AFTER

PAYMENT BOND

NOTE:

- **TO BE SUBMITTED AFTER AWARD OF CONTRACT**
- **DO NOT SUBSTITUTE BOND FORM**
- **BOND MUST BEAR FOUR (4) SIGNATURES: (1) WITNESS, (2) ATTEST, (3) CONTRACTOR AND (4) ATTORNEY-IN-FACT**
- **DATE ON POWER OF ATTORNEY MUST BE SAME AS DATE ON BOND**
- **SEPARATE POWER OF ATTORNEY FORMS MUST BE PROVIDED FOR EACH BOND (PERFORMANCE & PAYMENT BOND)**
- **AGENT RESIDENT DESIGNATION MUST CONTAIN SURETY'S SEAL, ASSIGNMENT BY SURETY AGENT, AND ACKNOWLEDGMENT OF SUCH ASSIGNMENT BY AGENT RESIDENT.**

NOTIFICATION TO CONSTRUCTION CONTRACTORS

INSURANCE REQUIREMENTS

The Contractor selected for the NET RMA's Toll 49 Total Maintenance Contract shall provide insurance for the contract in the amounts and manner specified in Item 3.4.3 of the TxDOT 2014 Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges.

Builder’s Risk Insurance (fire and extended coverage) is NOT required for

Toll 49 Total Maintenance Contract

Toll 49 Total Maintenance Contract

TxDOT 2014 STANDARD SPECIFICATIONS FOR CONSTRUCTION

AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES

("2014 STANDARD SPECIFICATIONS")

ARE ADOPTED FOR THIS PROJECT.

NOTE: All references to the "Department" in the 2014 Standard Specifications shall refer to the North East Texas Regional Mobility Authority ("Authority"), and all references to the "Engineer" shall be to the Authority's "Project Director".

TxDOT
SUPPLEMENTAL CONDITIONS

TxDOT Specifications

6.1. Source Control. Use only materials that meet Contract requirements. Unless otherwise specified or approved, use new materials for the work. Secure the NET RMA's Project Director's approval of the proposed source of materials to be used before their delivery. Materials can be approved at a supply source or staging area but may be re-inspected in accordance with Article 6.4, "Sampling, Testing, and Inspection."

8.7. Termination of Contract. The NET RMA (Authority) may terminate the Contract in whole or in part whenever: (i) the Contractor is prevented from proceeding with the work as a direct result of an executive order of the President of the United States or the Governor of the State; (ii) the Contractor is prevented from proceeding with the work due to a national emergency, or when the work to be performed under the Contract is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor as the result of an order or a proclamation of the President of the United States; (iii) the Contractor is prevented from proceeding with the work due to an order of any federal authority; (iv) the Contractor is prevented from proceeding with the work by reason of a preliminary, special, or permanent restraining court order where the issuance of the restraining order is primarily caused by acts or omissions of persons or agencies other than the Contractor; or (v) the Authority determines that termination of the Contract is in the best interest of the public. This includes but is not limited to the discovery of significant hazardous material problems, right of way acquisition problems, or utility conflicts that would cause substantial delays or expense to the Contract.

A. Procedures and Submittals. The Project Director will provide written notice to the Contractor of termination specifying the extent of the termination and the effective date. Upon notice, immediately proceed in accordance stop

work as specified in the notice; place no further subcontracts or orders for materials, services, or facilities, except as necessary to complete a critical portion of the Contract, as approved by the Project Director; terminate all subcontracts to the extent they relate to the work terminated; complete performance of the work not terminated; settle all outstanding liabilities and termination settlement proposals resulting from the termination for public convenience of the Contract; create an inventory report, including all acceptable materials and products obtained for the Contract that have not been incorporated in the work that was terminated (include in the inventory report a description, quantity, location, source, cost, and payment status for each of the acceptable materials and products); and take any action necessary, or that the Project Director may direct, for the protection and preservation of the materials and products related to the Contract that are in the possession of the Contractor and in which the Authority has or may acquire an interest.

B. Settlement Provisions. Within 60 calendar days of the date of the notice of termination, submit a final termination settlement proposal, unless otherwise approved. The Project Director will prepare a Work Order that reduces the affected quantities of work and adds acceptable costs for termination. No claim for loss of anticipated profits will be considered. The Authority will pay reasonable and verifiable termination costs including: all work completed at the unit bid price and partial payment for incomplete work; the percentage of Item 500, “Mobilization,” equivalent to the percentage of work complete or actual cost that can be supported by cost records, whichever is greater; expenses necessary for the preparation of termination settlement proposals and support data; the termination and settlement of subcontracts; storage, transportation, restocking, and other costs incurred necessary for the preservation, protection, or disposition of the termination inventory; and other expenses acceptable to the Authority.

8.8. Subcontracting. Do not sublet any portion of a construction Contract without the Project Director's written approval. A subcontract does not relieve any responsibility under the Contract and bonds. Ensure that all subcontracted work complies with all governing labor provisions.

A. Construction Contracts and Federally Funded Routine Maintenance Contracts. Perform work with own organization on at least 30% of the total original Contract cost (25% if the Contractor is a Small Business Enterprise on a wholly State or local funded Contract), excluding any specialty items as determined by the Project Director. Specialty items are those that require highly specialized knowledge, abilities, or equipment not usually available in the contracting firm expected to bid on the proposed Contract as a whole. Specialty items will be shown on the drawings or as determined by the Project Director. Bid cost of specialty items performed by subcontractors will be deducted from the total original Contract cost before computing the required amount of work to be performed by the Contractor's own organization. The term "perform work with own organization" includes only: workers employed and paid directly by the Contractor or wholly owned subsidiary; equipment owned by the Contractor or wholly owned subsidiary; rented or leased equipment operated by the Contractor's employees or wholly owned subsidiary's employees; materials incorporated into the work if the majority of the value of the work involved in incorporating the material is performed by the Contractor's own organization, including a wholly owned subsidiary's organization; and labor provided by staff leasing firms licensed under Chapter 91 of the Texas Labor Code for nonsupervisory personnel if the Contractor or wholly owned subsidiary maintains direct control

9.5. Force Account. The Project Director may provide for payment for extra work on the force account basis, which includes compensation for the use of small tools, overhead expense, and profit. Execute a Work Order to establish labor and equipment rates and Payment for extra work directed on a force account basis will be as follows:

A. **Labor.** Compensation will be made for payroll rates for each hour that the labor and foremen or others approved by the Project Director are actually engaged in the work. In no case will the rate of wages be less than the minimum shown in the Contract for a particular category. An additional 25% of the above sum will be paid for overhead, superintendence, profit, and small tools.

B. **Insurance and Taxes.** An additional 55% of the labor cost, excluding the 25% compensation provided in Section 9.5.A, “Labor,” will be paid as compensation for all insurance and taxes including the cost of premiums on public liability and workers compensation insurance, Social Security, and unemployment insurance taxes.

C. **Materials.** Compensation will be made for materials associated with the work based on actual delivered invoice costs, less any discount. An additional 25% of this sum will be paid as compensation for overhead and profit.

D. **Equipment.** Payment will be made for the established equipment hourly rates for each hour that the equipment is involved in the work. An additional 15% will be paid as compensation for overhead and profit not included in the rates.

Transportation cost for mobilizing equipment will be included if the equipment is mobilized from an off-site location.

If a rate has not been established for a particular piece of equipment in the *Rental Rate Blue Book*, the Project Director will allow a reasonable hourly rate, as agreed upon in writing before work is begun. This price will include operating costs.

The Authority reserves the right to withhold payment for low production or lack of progress.

1. Contractor-Owned Equipment. For Contractor-owned machinery, trucks, power tools, or other equipment necessary for use on force account work, use the Rental Rate Blue Book as modified by the following to establish hourly rates. Use the rates in effect for each section of the Rental Rate Blue Book at the time of use.

Compute the hourly rates as follows:
H = MxR1xR2 + OP
176
where:
H = Hourly Rate M = Monthly Rate
R1 = Rate Adjustment Factor
R2 = Regional Adjustment Factor
OP = Operating Costs.

Payment for equipment will be made for the actual hours used in the work. Payment will not be made for time lost for equipment breakdowns, time spent to repair equipment, or time after equipment is no longer needed. If equipment is used intermittently while dedicated solely to the force account work, payment will be made for the duration the equipment is assigned to the work but no more than 8 hours per day.

2. Equipment Not Owned by the Contractor. If equipment is rented exclusively for force account work from a third party not owned by the Contractor, payment will be made at the invoice daily rental rate for each day the equipment is needed for the work. The Authority reserves the right to limit the daily rate to comparable Rental Rate Blue Book rates. When the invoice specifies that the rental rate does not include fuel, lubricants, repairs, and servicing, the Rental Rate Blue Book hourly operating cost for each hour the equipment is operated will be added.

E. Basis. Provide copies of these records daily, signed by the Contractor's representative, for verification by the Authority. Request payment for extra work performed on the force account basis, including copies of all applicable invoices, no later than the tenth day of the month following the month in which the work was performed.

If the Project Director directs extra work to be performed on a force account basis, and the estimated cost is less than $10,000, submit for approval an invoice including the actual cost for materials, equipment, labor, tools, and incidentals necessary to complete the extra work. Also include on the invoice additional compensation allowed in this Article.

9.6. Progress Payments. The Project Director will prepare a monthly estimate of the amount of work performed, including materials in place. Payment of the monthly estimate is determined at the Contract Item prices less any withholdings or deductions in accordance with the Contract. Progress payments may be withheld for failure to comply with the Contract.

A. Retainage.

1. Retainage WILL NOT BE HELD on this contract.

B. Payment Provisions for Subcontractors. Pay the subcontractor for work performed within 10 days after receiving payment for the work performed by the subcontractor. Also, pay any retainage (if applicable) on a subcontractor's work within 10 days after satisfactory completion of all of the subcontractor's work. Completed subcontractor work includes vegetative establishment, test, maintenance, performance, and other similar periods that are the responsibility of the subcontractor. For the purpose of this Section, satisfactory completion is accomplished when: the subcontractor has fulfilled the Contract requirements of both the Authority and the subcontract for the subcontracted work, including the submittal of all information required by the

specifications and the Authority; and the work done by the subcontractor has been inspected and approved by the Authority and the final quantities of the subcontractor's work have been determined and agreed upon. The inspection and approval of a subcontractor's work does not eliminate the Contractor's responsibilities for all the work as defined in Article 7.14, "Contractor's Responsibility for Work." The Authority may pursue actions against the Contractor, including withholding of estimates and suspending the work, for noncompliance with the subcontract requirements of this Section upon receipt of written notice with sufficient details showing the subcontractor has complied with contractual obligations as described in this Article. These requirements apply to all tiers of subcontractors. Incorporate the provisions of this Article into all subcontract agreements.

9.7. Final Payment. When the Contract has been completed, all work has been approved, final acceptance has been made and Contractor submittals have been received, the Project Director will prepare and/or approve a final estimate for payment showing the total quantity of work completed and the money owed the Contractor. The final payment will reflect the entire sum due, less any sums previously paid.

9.8 Lane Closures and Traffic Control. Lane closures are allowed, with prior approval of the NET RMA, except during the hours of 7 am to 9 am and 4 pm to 6 pm Monday through Friday. All lane closure signage, lane markers and other traffic control systems must conform to the TxDOT Manual on Uniform Traffic Control Devices (TMUTCD). Plans for traffic control must also be approved by the NET RMA prior to implementation.

SAFETY STANDARD AND ACCIDENT PREVENTION

With respect to all work performed under this contract, the Contractor shall:

a. Comply with the safety standards provisions of applicable laws, building and construction codes, and the “Manual of Accident Prevention in Construction” published by the Associated General Contractors of America, the requirements of the Occupational Safety and Health Act (OSHA) of 1970 (Public Law 91-596), including but not limited to OSHA Standards.

b. Maintain at their office or other well-known place at the job site, all articles necessary for giving first aid to the injured, and shall make standing arrangements for the immediate removal to a hospital or a doctor’s care of person (including employees), who may be injured on the job site. In no case shall employees be permitted to work at a job site before the employer has made a standing arrangement for removal of injured persons to a hospital or a doctor’s care.

c. Shall exercise proper precaution at all times for the protection of persons and property and shall be responsible for all damages to persons or property, either on or off the site, which occurs as a result of his prosecution of the works. NET RMA may require additional safety and health measures as it may determine to be reasonably necessary. Accident prevention measures such as safety training and education, proper illumination, fire prevention, and provisions of personal protective equipment shall comply with OSHA Standards.

Toll 49 Pavement Repairs and Improvements

BID PROTEST PROCEDURES

The procedures for submittal of any claim of an alleged deficiency or protest shall comply with Section 5.15 (Bid Protests) of the Policies and Procedures Governing Procurements of Goods and Services by the NET RMA, a copy of which may be downloaded at https://www.netrma.org/net-rma-policies/.

APPENDIX A

TOLL 49 MAINTENANCE CONTRACT

PLAN QUANTITIES AND STANDARDS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX

NORTH EAST TEXAS
REGIONAL MOBILITY AUTHORITY

PLANS OF PROPOSED
TOLL 49 ROUTINE MAINTENANCE CONTRACT

ROUTINE MAINTENANCE PROJECT NO. XXXXXXXXXX

TOTAL MAINTENANCE

CONSISTING OF MILL AND INLAY, FULL DEPTH PAVEMENT REPAIR, GUARDRAIL REPAIR, LONG LINE AND SHORT LINE STRIPING, RAISED PAVEMENT MARKERS, SWEEPING, HERBICIDE, FULL-WIDTH MOWING, DEBRIS REMOVAL, GUIDE SIGN REPLACEMENT, ILLUMINATION, ETC...

SMITH CO.

TOLL 49

FED.RD. DIV.NO.	MAINTENANCE CONTRACT NO.		SHEET NO.
6	XXXXXXXX		1
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
6298	51	001	TOLL 49

TTLSHT / 100

FINAL PLANS

DATE CONTRACT LETTING: _____

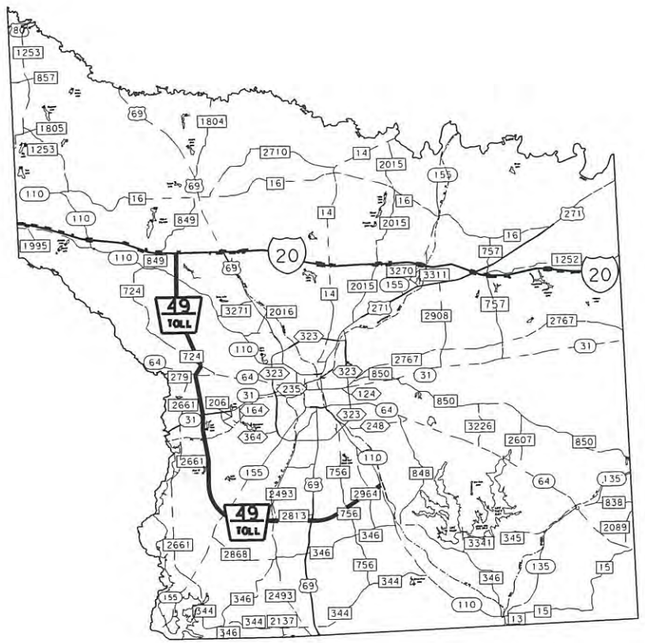
DATE CONTRACTOR BEGAN WORK: _____

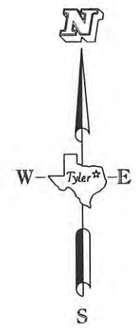
DATE WORK COMPLETED & ACCEPTED: _____

CONTRACTOR: _____

USED ____ OF ____ ALLOTTED DAYS _____

FINAL CONTRACT COST : $ _____





STATE OF TEXAS
TAMMY B. SIMS
94059
LICENSED PROFESSIONAL ENGINEER

Tammy B Sims P.E. 6/20/2017

FIRM #F-474

SIGNING IN ACCORDANCE WITH STANDARD BC SHEETS AND PART VI OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

NO EXCEPTIONS
NO EQUATIONS
NO R.R. CROSSINGS ELIMINATED
LAYOUT SCALE: NTS

COUNTY SMITH _____ CONT. NO. XXXXXXXX
HWY. NO. TOLL 49 _____ LETTING DATE 2017
DATE ACCEPTED _____

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIAL SPECIFICATION ITEMS INCLUDED IN THE CONTRACT SHALL GOVERN ON THIS PROJECT.

NORTH EAST TEXAS
REGIONAL MOBILITY AUTHORITY

SUBMITTED FOR LETTING: _____ 20__

RECOMMENDED & APPROVED FOR LETTING: _____ 20__

MAINTENANCE ENGINEER

DIRECTOR OF MAINTENANCE

SUPPLEMENTAL INDEX

The Standard Sheets specifically identified above have been issued by me and are applicable to this project.

Tammy B. Sims , P.E. 6-28-2017

TAMMY B. SIMS Date

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND SPECIAL SPECIFICATION ITEMS INCLUDED IN THE CONTRACT SHALL GOVERN ON THIS PROJECT.

SUPPLEMENTAL INDEX

FILENAME /

FED. RD. DIV. NO.	MAINTENANCE CONTRACT NO.		SHEET NO.
6	XXXXXXXX		2
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
6298	51	001	TOLL 49

ESTIMATE SUMMARY

PROJECT TMC 100051860
CONTROL 3487-01-006
TOTAL MAINTENANCE

EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	ALT.	ITEM-CODE ITEM NO	ITEM-CODE DESC CODE	ITEM-CODE SP NO	DESCRIPTION	UNIT	TOTAL EST.	TOTAL FINAL
								100.000			105	6008		REMOVING STAB BASE AND ASPH PAV (6")	SY	100.000	
								300.000			105	6074		REMOVING STAB BASE AND ASPH PAV (4")	SY	300.000	
								400.000			132	6005		EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY	400.000	
								100.000			134	6003		BACKFILL (TY C)	STA	100.000	
								1000.000			134	6010		BACKFILL (TY B)	LF	1000.000	
								300.000			160	6003		FURNISHING AND PLACING TOPSOIL (4")	SY	300.000	
								300.000			161	6017		COMPOST MANUF TOPSOIL (4")	SY	300.000	
								300.000			162	6004		MULCH SODDING	SY	300.000	
								300.000			164	6013		HAY/STRAW MLCH SEED(PERM)(RURAL)(SANDY)	SY	300.000	
								15.000			168	6001		VEGITATIVE WATERING	MG	15.000	
								300.000			169	6002		SOIL RETENTION BLANKETS (CL 1) (TY B)	SY	300.000	
								300.000			169	6004		SOIL RETENTION BLANKETS (CL 1) (TY D)	SY	300.000	
								300.000			275	6069		CEMENT TREAT (EXIST MATL) (7 IN) (DC)	SY	300.000	
								200.000			305	6014		SALV, HAUL & STKPL RCL APH PAV (0-6")	CY	200.000	
								1000.000			310	6009		PRIME COAT (MC-30)	GAL	1000.000	
								1000.000			315	6002		FOG SEAL (SS-1H)	GAL	1000.000	
								1000.000			316	6024		ASPH (CRS-2P) (SURF TRMT)	GAL	1000.000	
								100.000			316	6191		AGGR (TY-D GR-4 SAC-B)	CY	100.000	
								100.000			316	6193		AGGR (TY-D GR-5 SAC-B)	CY	100.000	
								100.000			340	6047		D-GR HMA (SQ) TY-C SAC-A PG70-22	TON	100.000	
								100.000			340	6103		D-GR HMA (SQ) TY-D SAC-A PG70-22	TON	100.000	
								300.000			351	6001		FLEXIBLE PAVEMENT STRUCTURE REPAIR(5")	SY	300.000	
								200.000			354	6021		PLANE ASPH CONC PAV(0" TO 2")	SY	200.000	
								200.000			354	6025		PLANE ASPH CONC PAV(4" TO 6")	SY	200.000	
								300.000			361	6004		FULL - DEPTH REPAIR CRCP (10")	SY	300.000	
								5.000			416	6002		DRILL SHAFT (24 IN)	LF	5.000	
								5.000			416	6016		DRILL SHAFT (SIGN MTS)(12 IN)	LF	5.000	
								7.000			429	6007		CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7.000	
								7.000			429	6009		CONC STR REPAIR (STANDARD)	SF	7.000	
								80.000			432	6026		RIPRAP (STONE COMMON)(DRY)(18 IN)	CY	80.000	
								100.000			438	6002		CLEANING AND SEALING EXIST JOINTS(CL3)	LF	100.000	
								100.000			438	6004		CLEANING AND SEALING EXIST JOINTS(CL7)	LF	100.000	
								10.000			480	6001		CLEAN EXIST CULVERTS	EA	10.000	
								1.000			500	6001		MOBILIZATION	LS	1.000	
								12.000			502	6002		BARR, SIGNS, TRAFFIC HANDLING	MO	12.000	
								25.000			506	6001		ROCK FILTER DAMS (INSTALL)(TY 1)	LF	25.000	
								25.000			506	6002		ROCK FILTER DAMS (INSTALL)(TY 2)	LF	25.000	
								50.000			506	6011		ROCK FILTER DAMS (REMOVE)	LF	50.000	
								400.000			506	6027		EXCAV EROSN & SEDMT CONT, IN VEH	CY	400.000	
								5.000			506	6033		BULLDOZER WORK (EROSION & SEDMT CONT)	HR	5.000	
								500.000			506	6038		TEMP SEDMT CONT FENCE (INSTALL)	LF	500.000	
								500.000			506	6039		TEMP SEDMT CONT FENCE (REMOVE)	LF	500.000	
								40.000			510	6001		ONE-WAY TRAF CONT (FLAGGER CONT)	HR	40.000	
								40.000			510	6002		ONE-WAY TRAF CONT (PILOT CAR)	HR	40.000	
								1000.000			533	6001		RUMBLE STRIPS (SHOULDER)	LF	1000.000	
								1000.000			533	6002		RUMBLE STRIPS (CENTERLINE)	LF	1000.000	
								50.000			540	6001		MTL W-BEAM GD FEN (TIM POST)	LF	50.000	
								50.000			540	6003		MTL THRIE-BEAM GD FEN (TIM POST)	LF	50.000	
								1.000			540	6006		MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	1.000	
								1.000			540	6008		MTL BEAM GD FEN TRANS (T101)	EA	1.000	

NET RMA
North East Texas Regional Mobility Authority

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
10	SMITH	TOLL 49	4A

ESTIMATE SUMMARY

PROJECT TMC 100051860
CONTROL 3487-01-006
TOTAL MAINTENANCE

EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	ALT.	ITEM-CODE ITEM NO	ITEM-CODE DESC CODE	ITEM-CODE SP NO	DESCRIPTION	UNIT	TOTAL EST.	TOTAL FINAL
								50.000			540	6010		MTL W-BEAM GD FEN ADJUSTMENT	LF	50.000	
								50.000			540	6011		MTL THRIE-BEAM GD FEN ADJUSTMENT	LF	50.000	
								1.000			540	6013		TRANSITION ADJUSTMENT	EA	1.000	
								10.000			540	6014		SHORT RADIUS	LF	10.000	
								1.000			540	6016		DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1.000	
								25.000			542	6001		REMOVE METAL BEAM GUARD FENCE	LF	25.000	
								1.000			542	6002		REMOVE TERMINAL ANCHOR SECTION	EA	1.000	
								1.000			544	6004		GDRAIL END TRT(INST)(WOOD POST)(TY I)	EA	1.000	
								1.000			545	6005		CRASH CUSH ATTEN (REMOVE)	EA	1.000	
								50.000			636	6001		ALUMINUM SIGNS (TY A)	SF	50.000	
								5.000			636	6002		ALUMINUM SIGNS (TY G)	SF	5.000	
								5.000			636	6003		ALUMINUM SIGNS (TY O)	SF	5.000	
								25.000			636	6008		REPLACE EXISTING ALUMINUM SIGNS(TY G)	SF	25.000	
								25.000			636	6009		REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	25.000	
								1.000			644	6001		IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1.000	
								1.000			644	6004		IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1.000	
								1.000			644	6030		IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	1.000	
								1.000			644	6031		IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	EA	1.000	
								1.000			644	6033		IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	1.000	
								1.000			644	6037		IN SM RD SN SUP&AM TYS80(1)SA(U-WC)	EA	1.000	
								1.000			644	6056		IN SM RD SN SUP&AM TYTWT(1)UA(P)	EA	1.000	
								1.000			644	6060		IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	1.000	
								1.000			644	6068		RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1.000	
								1.000			644	6070		RELOCATE SM RD SN SUP&AM TY S80	EA	1.000	
								1.000			644	6071		RELOCATE SM RD SN SUP&AM TY TWT	EA	1.000	
								1.000			644	6076		REMOVE SM RD SN SUP&AM	EA	1.000	
								35.000			658	6001		INSTL DEL ASSM (D-SW)SZ 1(FLX)GND	EA	35.000	
								34.000			658	6013		INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	34.000	
								38.000			658	6015		INSTL DEL ASSM (D-SW)SZ (BRF)GF1	EA	38.000	
								7.000			658	6016		INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)	EA	7.000	
								39.000			658	6018		INSTL DEL ASSM (D-SY)SZ 1(FLX)GND	EA	39.000	
								62.000			658	6026		INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	62.000	
								14.000			658	6028		INSTL DEL ASSM (D-SY)SZ (BRF)GF1	EA	14.000	
								10.000			658	6036		INSTL DEL ASSM (D-DW)SZ 1(FLX)GND	EA	10.000	
								75.000			658	6048		INSTL OM ASSM (OM-2Z)(FLX)GND	EA	75.000	
								32.000			658	6051		INSTL OM ASSM (OM-3L)(FLX)SRF	EA	32.000	
								16.000			658	6054		INSTL OM ASSM (OM-3R)(FLX)SRF	EA	16.000	
								200.000			658	6061		INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	200.000	
								50.000			658	6062		INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	50.000	
								200.000			658	6064		INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	200.000	
								100.000			658	6068		INSTL DEL ASSM (D-DY)SZ 1(BRF)GF2	EA	100.000	
								100.000			662	6060		WK ZN PAV MRK REMOV (W)4"(BRK)	LF	100.000	
								200.000			662	6064		WK ZN PAV MRK REMOV (W)6"(BRK)	LF	200.000	
								200.000			662	6093		WK ZN PAV MRK REMOV (Y)4"(BRK)	LF	200.000	
								200.000			662	6111		WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	200.000	
								4000.000			666	6035		REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	4000.000	
								100.000			666	6038		REFL PAV MRK TY I (W)12"(LNDP)(090MIL)	LF	100.000	
								100.000			666	6040		REFL PAV MRK TY I (W) 12" (SLD)(090MIL)	LF	100.000	
								900.000			666	6047		REFL PAV MRK TY I (W) 24" (SLD)(090MIL)	LF	900.000	
								1.000			666	6053		REFL PAV MRK TY I (W) (ARROW)(090MIL)	EA	1.000	

NET RMA ★ North East Texas Regional Mobility Authority

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
10	SMITH	TOLL 49	4B

ESTIMATE SUMMARY

								PROJECT TMC 100051860			ITEM-CODE					
								CONTROL 3487-01-006								
								TOTAL MAINTENANCE								
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	ALT.	ITEM NO	DESC CODE	SP NO	DESCRIPTION	UNIT	TOTAL EST.	TOTAL FINAL
								1.000			666	6056		REFL PAV MRK TY I (W)(DBL ARROW)(090MIL)	EA	1.000	
								1.000			666	6077		REFL PAV MRK TY I (W) (WORD)(090MIL)	EA	1.000	
								300.000			666	6167		REFL PAV MRK TY II (W) 4" (BRK)	LF	300.000	
								1400.000			666	6170		REFL PAV MRK TY II (W) 4" (SLD)	LF	1400.000	
								1200.000			666	6171		REFL PAV MRK TY II (W) 6" (BRK)	LF	1200.000	
								5000.000			666	6174		REFL PAV MRK TY II (W) 6" (SLD)	LF	5000.000	
								1200.000			666	6207		REFL PAV MRK TY II (Y) 4" (SLD)	LF	1200.000	
								1400.000			666	6208		REFL PAV MRK TY II (Y) 6" (BRK)	LF	1400.000	
								5000.000			666	6210		REFL PAV MRK TY II (Y) 6" (SLD)	LF	5000.000	
								100.000			666	6224		PAVEMENT SEALER 4"	LF	100.000	
								1200.000			666	6225		PAVEMENT SEALER 6"	LF	1200.000	
								100.000			666	6226		PAVEMENT SEALER 8"	LF	100.000	
								100.000			666	6228		PAVEMENT SEALER 12"	LF	100.000	
								100.000			666	6230		PAVEMENT SEALER 24"	LF	100.000	
								1.000			666	6231		PAVEMENT SEALER (ARROW)	EA	1.000	
								1.000			666	6232		PAVEMENT SEALER (WORD)	EA	1.000	
								1.000			666	6234		PAVEMENT SEALER (DBL ARROW)	EA	1.000	
								1.000			666	6243		PAVEMENT SEALER (YLD TRI)	EA	1.000	
								100.000			666	6298		RE PM W/RET REQ TY I (W)4"(BRK)(060MIL)	LF	100.000	
								7000.000			666	6301		RE PM W/RET REQ TY I (W)4"(SLD)(060MIL)	LF	7000.000	
								7000.000			666	6305		RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	7000.000	
								3000.000			666	6308		RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	3000.000	
								100.000			666	6310		RE PM W/RET REQ TY I (Y)4"(BRK)(060MIL)	LF	100.000	
								6000.000			666	6313		RE PM W/RET REQ TY I (Y)4"(SLD)(060MIL)	LF	6000.000	
								3000.000			666	6320		RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	3000.000	
								100.000			668	6074		PREFAB PAV MRK TY C (W) (12") (SLD)	LF	100.000	
								100.000			668	6076		PREFAB PAV MRK TY C (W) (24") (SLD)	LF	100.000	
								1.000			668	6077		PREFAB PAV MRK TY C (W) (ARROW)	EA	1.000	
								1.000			668	6078		PREFAB PAV MRK TY C (W) (DBL ARROW)	EA	1.000	
								1.000			668	6084		PREFAB PAV MRK TY C (W) (NUMBER)	EA	1.000	
								1.000			668	6085		PREFAB PAV MRK TY C (W) (WORD)	EA	1.000	
								1.000			668	6092		PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	1.000	
								400.000			672	6006		REFL PAV MRKR TY I-A	EA	400.000	
								100.000			672	6007		REFL PAV MRKR TY I-C	EA	100.000	
								150.000			672	6008		REFL PAV MRKR TY I-R	EA	150.000	
								500.000			672	6009		REFL PAV MRKR TY II-A-A	EA	500.000	
								1000.000			672	6010		REFL PAV MRKR TY II-C-R	EA	1000.000	
								5000.000			677	6001		ELIM EXT PAV MRK & MRKS (4")	LF	5000.000	
								1200.000			677	6002		ELIM EXT PAV MRK & MRKS (6")	LF	1200.000	
								50.000			677	6003		ELIM EXT PAV MRK & MRKS (8")	LF	50.000	
								250.000			677	6007		ELIM EXT PAV MRK & MRKS (24")	LF	250.000	
								1.000			677	6008		ELIM EXT PAV MRK & MRKS (ARROW)	EA	1.000	
								1.000			677	6009		ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	1.000	
								1.000			677	6012		ELIM EXT PAV MRK & MRKS (WORD)	EA	1.000	
								1.000			677	6019		ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	1.000	
								100.000			678	6001		PAV SURF PREP FOR MRK (4")	LF	100.000	
								100.000			678	6002		PAV SURF PREP FOR MRK (6")	LF	100.000	
								100.000			678	6004		PAV SURF PREP FOR MRK (8")	LF	100.000	
								100.000			678	6006		PAV SURF PREP FOR MRK (12")	LF	100.000	
								100.000			678	6008		PAV SURF PREP FOR MRK (24")	LF	100.000	

NET RMA
North East Texas Regional Mobility Authority

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
10	SMITH	TOLL 49	4C

ESTIMATE SUMMARY

								PROJECT TMC 1000551860		ALT.	ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
								CONTROL 3487-01-006									
								TOTAL MAINTENANCE									
EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL		ITEM NO	DESC CODE	SP NO			EST.	FINAL
								1.000			678	6009		PAV SURF PREP FOR MRK (ARROW)	EA	1.000	
								1.000			678	6010		PAV SURF PREP FOR MRK (DBL ARROW)	EA	1.000	
								1.000			678	6015		PAV SURF PREP FOR MRK (NUMBER)	EA	1.000	
								1.000			678	6016		PAV SURF PREP FOR MRK (WORD)	EA	1.000	
								1.000			678	6023		PAV SURF PREP FOR MRK (36")(YLD TRI)	EA	1.000	
								50.000			700	6001		POTHOLE REPAIR (STANDARD)	SY	50.000	
								10.000			700	6009		EMERGENCY MOBILIZATION	EA	10.000	
								20.000			712	6008		JT / CRCK SEAL (RUBBER - ASPHALT)	LMI	20.000	
								690.000			730	6001		STRIP MOWING (40')	AC	690.000	
								1890.000			730	6002		MOWING - FULL WIDTH	AC	1890.000	
								100.000			731	6007		PAVEMENT EDGES, STRUCTURES & FIXTURES	MI	100.000	
								100.000			731	6011		BROADCAST APPLICATION	AC	100.000	
								1380.000			734	6001		LITTER REMOVAL	AC	1380.000	
								12.000			735	6005		DEBRIS REMOVAL (ENTRANCE/EXIT RAMPS)	CYC	12.000	
								12.000			735	6007		DEBRIS REMOVAL (SPOT DEBRIS)	MI	12.000	
								52.000			735	6068		DEBRIS REMOVAL-CNTR MEDIANS/MAINLANES	CYC	52.000	
								12.000			738	6003		CLEANING / SWEEPING (OUTSIDE MAIN LANE)	CYC	12.000	
								10.000			740	6001		GRAFFITI REMOVAL (BLAST CLEANING)	SF	10.000	
								84.000			740	6002		GRAFFITI REMOVAL (PAINTING)	SF	84.000	
								20.000			740	6003		GRAFFITI REMOVAL (CHEMICAL CLEANING)	SF	20.000	
								1.000			752	6003		TREE TRIMMING / BRUSH REMOVAL	MI	1.000	
								10.000			752	6004		TREE TRIMMING / BRUSH REMOVAL(CHANNELS)	AC	10.000	
								20.000			752	6005		TREE REMOVAL (4" - 12" DIA)	EA	20.000	
								15.000			752	6006		TREE REMOVAL (12" - 18" DIA)	EA	15.000	
								5.000			752	6007		TREE REMOVAL (18" - 24" DIA)	EA	5.000	
								5.000			752	6008		TREE REMOVAL (24" - 30" DIA)	EA	5.000	
								2.000			752	6009		TREE REMOVAL (30" - 36" DIA)	EA	2.000	
								2.000			752	6010		TREE REMOVAL (36" - 42" DIA)	EA	2.000	
								1.000			752	6011		TREE REMOVAL (42" - 48" DIA)	EA	1.000	
								1.000			752	6012		TREE REMOVAL (48" - 60" DIA)	EA	1.000	
								1.000			752	6013		TREE REMOVAL (60" - 72" DIA)	EA	1.000	
								2000.000			760	6001		DITCH CLEANING AND RESHAPING (FOOT)	LF	2000.000	
								280.000			770	6001		REPAIR RAIL ELEMENT (W - BEAM)	LF	280.000	
								10.000			770	6002		REPAIR RAIL ELEMENT (THRIE - BEAM)	LF	10.000	
								10.000			770	6003		REP RAIL ELMNT(THRIE-BM TRANS TO W -BM)	LF	10.000	
								4.000			770	6010		REM / REPL TIMBER/STL POST W/O CONC FND	EA	4.000	
								2.000			770	6011		REM / REPL TIMBER / STL POST W/CONC FND	EA	2.000	
								25.000			770	6012		REM / REPL TIMBER POST W / O CONC FND	EA	25.000	
								1.000			770	6016		REPAIR STEEL POST WITH BASE PLATE	EA	1.000	
								25.000			770	6017		REALIGN POSTS	EA	25.000	
								2.000			770	6018		INSTALL BLOCKOUT	EA	2.000	
								2.000			770	6019		REMOVE & REPLACE BLOCKOUT	EA	2.000	
								105.000			770	6021		REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	105.000	
								7.000			770	6022		REPLACE SINGLE GDRAIL TERMINAL POST	EA	7.000	
								1.000			770	6024		REPLACE TERMINAL ANCHOR POSTS	EA	1.000	
								2.000			770	6027		REMOVE GDRAIL END TRT / REPL WITH SGT	EA	2.000	
								1.000			770	6028		REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	1.000	
								1.000			770	6029		REM & RESET SGT IMPACT HEAD	EA	1.000	
								1.000			770	6030		REPLACE SGT CABLE ASSEMBLY	EA	1.000	
								1.000			770	6031		REPLACE SGT CABLE ANCHOR	EA	1.000	

NET RMA ★
North East Texas
Regional Mobility Authority

ESTIMATE & QUANTITY SHEET

DIST. NO. STATE	COUNTY	PROJECT NO.	SHEET NO.
10	SMITH	TOLL 49	4D

ESTIMATE SUMMARY

PROJECT TMC 100051860
CONTROL 3487-01-006
TOTAL MAINTENANCE

EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL	ALT.	ITEM-CODE ITEM NO	ITEM-CODE DESC CODE	ITEM-CODE SP NO	DESCRIPTION	UNIT	TOTAL EST.	TOTAL FINAL
								1.000			770	6032		REPLACE SGT STRUT	EA	1.000	
								1.000			770	6033		REPLACE SGT OBJECT MARKER	EA	1.000	
								1.000			774	6006		REPAIR (TRACC)	EA	1.000	
								1.000			774	6015		REPAIR (NARROW QUAD)	EA	1.000	
								1.000			774	6028		REPAIR (QUAD) (N) (BAY)	EA	1.000	
								1.000			774	6038		REMOVE AND REPLACE (FASTRACC)	EA	1.000	
								10.000			774	6052		REPAIR (FASTRACC)	LF	10.000	
								1.000			774	6055		REPAIR (FASTRACC) (BAY)	EA	1.000	
								10.000			776	6001		REPAIR (STEEL POST W/ W-BEAM - T101)	LF	10.000	
								10.000			776	6004		REPAIR (STL POST W/ DOUBLED W-BEAMS-T6)	LF	10.000	
								10.000			776	6032		REPAIR(STEEL POST W/ CHANNEL IRON RAIL)	LF	10.000	
								10.000			6000	6001		PORTABLE CHANGEABLE MESSAGE SIGN	DAY	10.000	
								2.000			6000	6003		REPLACE ABOVE-GROUND CONDUIT	LF	2.000	
								11.000			6000	6006		REPLACE UNDERGROUND CONDUIT	LF	11.000	
								63.000			6000	6009		REPLACE CONDUCTOR	LF	63.000	
								1.000			6000	6016		INSTALL ELECTRICAL SPLICE	EA	1.000	
								11.000			6000	6020		ROAD BORE	LF	11.000	
								1.000			6000	6023		REPLACE ROADWAY ILLUM ASSEMBLY (HPS)	EA	1.000	
								1.000			6000	6026		REPLACE ROADWAY ILLUM ASSEMBLY (LED)	EA	1.000	
								1.000			6000	6043		REPLACE LUMINAIRE POLE	EA	1.000	
								1.000			6000	6044		REPLACE LUMINAIRE ARMS	EA	1.000	
								1.000			6000	6046		MAINTAIN HIGH MAST ILLUMINATION	EA	1.000	
								1.000			6000	6052		REPLACE ELECTRICAL SERVICE	EA	1.000	
								1.000			6000	6053		REPLACE TIMBER SERVICE POLE	EA	1.000	
								1.000			6000	6056		INSTALL GROUND BOX	EA	1.000	
								1.000			6000	6059		INSTALL FOUNDATION	EA	1.000	
								1.000			6000	6061		REPLACE TRANSFORMER BASE	EA	1.000	
								1.000			6000	6062		REPLACE TRANSFORMER BASE COVER	EA	1.000	
								6.000			6000	6072		REPLACE LAMP (POLE MOUNT FIXTURE)	EA	6.000	
								1.000			6000	6073		REPLACE LAMP (UNDERPASS FIXTURE)	EA	1.000	
								1.000			6000	6074		REPLACE LAMP (WALL PACK FIXTURE)	EA	1.000	
								1.000			6000	6076		REPLACE WALL PACK LUMINAIRE	EA	1.000	
								16.000			6000	6082		REPLACE FUSE	EA	16.000	
								2.000			6000	6084		REPLACE BREAKAWAY FUSE HOLDER	EA	2.000	
								1.000			6000	6093		REPLACE HAND-OFF-AUTO SWITCH	EA	1.000	
								1.000			6000	6094		REPLACE CONTACTOR	EA	1.000	
								1.000			6000	6097		REPLACE BREAKER PANEL	EA	1.000	
								1.000			6000	6099		REPLACE CIRCUIT BREAKER	EA	1.000	
								3.000			6000	6108		REPLACE LUMINAIRES	EA	3.000	
								2.000			6000	6109		REPLACE PHOTOCELL	EA	2.000	

NET RMA
North East Texas Regional Mobility Authority

ESTIMATE & QUANTITY SHEET

STATE DIST. NO.	COUNTY	PROJECT NO.	SHEET NO.
10	SMITH	TOLL 49	4E

BASIS OF ESTIMATE

ITEM	DESCRIPTION	RATE		TOLL 49 AMOUNT	UNIT	TOLL 49 QUANTITY	PAY UNIT
(1) 166	FERTILIZER	1	LB/9 SY	1,300	SY	0.07	TON
168	VEGETATIVE WATERING	11	GAL/SY	1,300	SY	15	MG
315	FOG SEAL (SS-1H)	0.09	GAL/SY	900	SY	1,000	GAL
340	D-GR HMA (SQ) TY-C SAC-A PG70-22	220	LB/SY	800	SY	200	TON
	D-GR HMA (SQ) TY-C SAC-A PG70-22	550	LB/SY	405	SY		
500	MOBILIZATION				LS	1	LS
502	BARRICADES, SIGNS AND TRAFFIC HANDLING				MO	12	MO

(1) FOR CONTRACTOR'S INFORMATION ONLY. SUBSIDIARY TO ITEM 164.

PAVEMENT SUMMARY

LOCATION	ITEM 275	ITEM 310	ITEM 316			ITEM 340		ITEM 351	ITEM 354		ITEM 361	ITEM 510		ITEM 700	
	CEMENT TREAT (EXIST MATL) (7 IN) (DC)	PRIME COAT (MC-30)	ASPH (CRS-2P) (SURF TRMT)	AGGR (TY-D GR-4 SAC-B)	AGGR (TY-D GR-5 SAC-B)	D-GR HMA (SQ) TY-C SAC-A PG70-22	D-GR HMA (SQ) TY-D SAC-A PG 70-22	FLEXIBLE PAVEMENT STRUCTURE REPAIR (5")	PLANE ASPH CONC PAV (4" TO 6")	PLANE ASPH CONC PAV (2")	FULL-DEPTH REPAIR CRCP (10")	ONE-WAY TRAF CONT (FLAGGER CONT)	ONE-WAY TRAF CONT (PILOT CAR)	POTHOLE REPAIR (STANDARD)	EMERGENCY MOBILIZATION
	SY	GAL	GAL	CY	CY	TON	TON	SY	SY	SY	SY	HR	HR	SY	EA
TOLL 49	300	1,000	1,000	100	100	100	100	300	200	200	300	40	40	50	10
TOTAL	300	1,000	1,000	100	100	100	100	300	200	200	300	40	40	50	10

A MINIMUM OF 60% OF ALL QUANTITIES IN THIS SUMMARY IS PLANNED EXCLUDING POTHOLE REPAIR AND EMERGENCY MOBILIZATION.
NET RMA RESERVES THE RIGHT TO OVER/UNDERRUN THESE QUANTITIES.

BACKFILL SUMMARY

LOCATION	ITEM 132	(2) ITEM 134	
	EMBANKMENT (FINAL) (ORD COMP) (TY C)	BACKFILL (TY B)	BACKFILL (TY C)
	CY	LF	STA
TOLL 49	400	1,000	100
TOTAL	400	1,000	100

(2) APPLY EMULSION TO BACKFILL AREA. THIS ITEM WILL BE SUBSIDIARY TO ITEM 134.

REMOVAL SUMMARY

LOCATION	ITEM 105		ITEM 305
	REMOVING STAB BASE AND ASPH PAV (4")	REMOVING STAB BASE AND ASPH PAV (6")	SALV, HAUL & STKPL RCL APH PAV (0-6")
	SY	SY	CY
TOLL 49	300	100	200
TOTAL	300	100	200

STATE OF TEXAS
RANDY W. HARRIS
93663
LICENSED
PROFESSIONAL ENGINEER
Randy W. Harris P.E.
6/28/17

1 OF 8

ATKINS
TBPE REG. # F-474

NET RMA
North East Texas Regional Mobility Authority

TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		5
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 11:00:01 AM
FILE: $FILE$

BRIDGE JOINT SUMMARY

LOCATION	ITEM 438 CLEAN AND SEAL EXIST JOINTS (CL-3)	ITEM 438 CLEAN AND SEAL EXIST JOINTS (CL-7)	REMARKS
	LF	LF	
TOLL 49	100	100	
TOTAL	100	100	

SHOULDER TEXTURING SUMMARY

LOCATION	ITEM 315	ITEM 533		REMARKS
	FOG SEAL (SS-1H)	RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)	
	GAL	LF	LF	
TOLL 49	1,000	1,000	1,000	
TOTAL	1,000	1,000	1,000	

EROSION CONTROL SUMMARY

LOCATION	ITEM 160	ITEM 161	ITEM 162	ITEM 164	ITEM 169		ITEM 432	ITEM 480	ITEM 506							ITEM 760
	FURNISHING AND REPLACING TOPSOIL (4")	COMPOST MANUF TOPSOIL (4")	MULCH SODDING	STRAW/HAY MLCH SEED (PERM) (RURAL) (SANDY)	SOIL RETENTION BLANKETS (CL 1) (TY B)	SOIL RETENTION BLANKETS (CL 1) (TY D)	RIPRAP (STONE COMMON) (DRY) (18")	CLEAN EXIST CULVERTS	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (REMOVE)	EROSN & SEDMT CONT, IN VEH	BULLDOZER WORK (EROSION & SEDM CONT)	TEMPORARY SEDIMENT CONTROL FENCE INSTALL	TEMPORARY SEDIMENT CONTROL FENCE REMOVE	DITCH CLEANING AND RESHAPING (FOOT)
	SY	SY	SY	SY	SY	SY	CY	EA	LF	LF	LF	CY	HR	LF	LF	LF
TOLL 49	300	300	300	300	300	300	80	10	25	25	50	400	5	500	500	2,000
TOTAL	300	300	300	300	300	300	80	10	25	25	50	400	5	500	500	2,000

CRACK SEAL SUMMARY

LOCATION	ITEM 712 JT/CRACK SEAL (RUBBER-ASPALT)	REMARKS
	LMI	
TOLL 49	20	
TOTAL	20	

STATE OF TEXAS
RANDY W. HARRIS
93663
LICENSED
PROFESSIONAL ENGINEER

Randy W. Harris, P.E. 6/28/17

ATKINS TBPE REG. # F-474

NET RMA North East Texas Regional Mobility Authority

TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		6
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 11:00:02 AM
FILE: $FILE$

GUARD RAIL SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
429	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7
429	CONC STR REPAIR (STANDARD)	SF	7
540	MTL W-BEAM GD FEN (TIM POST)	LF	50
540	MTL THRIE-BEAM GD FEN (TIM POST)	LF	50
540	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	1
540	MTL BEAM GD FEN TRANS (T101)	EA	1
540	MTL BEAM GD FEN ADJUSTMENT	LF	50
540	MTL THRIE-BEAM GD FEN ADJUSTMENT	LF	50
540	TRANSITION ADJUSTMENT	EA	1
540	SHORT RADIUS	LF	10
540	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
542	REMOVING METAL BEAM GUARD FENCE	LF	25
542	REMOVING TERMINAL ANCHOR SECTION	EA	1
544	GDRAIL END TRT(INST)(WOOD POST)(TY I)	EA	1
545	CRASH CUSH ATTEN (REMOVE)	EA	1
770	REPAIR RAIL ELEMENT (W-BEAM)	LF	280
770	REPAIR RAIL ELEMENT (THRIE-BEAM)	LF	10
770	REP RAIL ELMNT(THRIE-BM TRANS TO W-BM)	LF	10
770	REM/REPL TIMBER/STL POST W/O CONC FND	LF	4
770	REM/REPL TIMBER/STL POST W/ CONC FND	EA	2
770	REM/REPL TIMBER POST W/O CONC FND	EA	25
770	REPAIR STEEL POST WITH BASE PLATE	EA	1
770	REALIGN POSTS	EA	25
770	INSTALL BLOCKOUT	EA	2
770	REMOVE & REPLACE BLOCKOUT	EA	2
770	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	105
770	REPLACE SINGLE GDRAIL TERMINAL POST	EA	7
770	REPLACE TERMINAL ANCHOR POSTS	EA	1
770	REMOVE GDRAIL END TRT/ REPL WITH SGT	EA	2
770	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	1
770	REM & RESET SGT IMPACT HEAD	EA	1
770	REPLACE SGT CABLE ASSEMBLY	EA	1
770	REPLACE SGT CABLE ANCHOR	EA	1
770	REPLACE SGT STRUT	EA	1
770	REPLACE SGT OBJECT MARKER	EA	1
774	REAPAIR (TRACC)	EA	1
774	REPAIR (NARROW QUAD)	EA	1
774	REPAIR (QUAD)(N)(BAY)	EA	1
774	REMOVE AND REPLACE (FASTRACC)	EA	1
774	REPAIR (FASTRACC)	LF	10
774	REPAIR (FASTRACC)(BAY)	EA	1
776	REPAIR (STEEL POST W/W-BEAM-T101)	LF	10
776	REPAIR (STL POST W/DOUBLED W-BEAMS-T6)	LF	10
776	REPAIR (STEEL POST W/CHANNEL IRON RAIL)	LF	10

GUIDE SIGN SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
416	DRILL SHAFT (24 IN)	LF	5
416	DRILL SHAFT (SGN MTS)(12 IN)	LF	5
636	ALUMINUM SIGNS (TY A)	SF	50
636	ALUMINUM SIGNS (TY G)	SF	5
636	ALUMINUM SIGNS (TY O)	SF	5
636	REPLACE EXISTING ALUMINUM SIGNS (TY G)	SF	25
636	REPLACE EXISTING ALUMINUM SIGNS (TY O)	SF	25
644	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1
644	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
644	IN SM RD SN SUP&AM TY S80(1)SA(T)	EA	1
644	IN SM RD SN SUP&AM TY S80(1)SA(T-2EXT)	EA	1
644	IN SM RD SN SUP&AM TY S80(1)SA(U)	EA	1
644	IN SM RD SN SUP&AM TY S80(1)SA(U-WC)	EA	1
644	IN SM RD SN SUP&AM TYTWT(1)UA(P)	EA	1
644	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	1
644	RELOCATE SM RD SN SUP & AM TY 10BWG	EA	1
644	RELOCATE SM RD SN SUP & AM TY S80	EA	1
644	RELOCATE SM RD SN SUP & AM TY TWT	EA	1
644	RELOCATE SM RD SN SUP & AM	EA	1

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6/28/17

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ATKINS
TBPE REG. # F-474

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TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED.RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		7
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 11:00:02 AM
FILE: $FILE$

LONG LINE			
ITEM	DESCRIPTION	UNIT	TOLL 49
662	WK ZN PAV MRK REMOV (W) 4" (BRK)	LF	100
662	WK ZN PAV MRK REMOV (W) 6" (BRK)	LF	200
662	WK ZN PAV MRK REMOV (Y) 4" (BRK)	LF	200
662	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	200
666	REFL PAV MRK TY I (W) 8" (SLD)(090MIL)	LF	4,000
666	REFL PAV MRK TY I (W) 12" (LNDP)(090MIL)	LF	100
666	REF PAV MRK TY II (W) 4" (BRK)	LF	300
666	REF PAV MRK TY II (W) 4" (SLD)	LF	1,400
666	REF PAV MRK TY II (W) 6" (BRK)	LF	1,200
666	REF PAV MRK TY II (W) 6" (SLD)	LF	5,000
666	REF PAV MRK TY II (Y) 4" (SLD)	LF	1,200
666	REF PAV MRK TY II (Y) 6" (BRK)	LF	1,400
666	REF PAV MRK TY II (Y) 6" (SLD)	LF	5,000
666	RE PM W/RET REQ TY I (W) 4" (BRK)(060MIL)	LF	100
666	RE PM W/RET REQ TY I (W) 4" (SLD)(060MIL)	LF	7,000
666	RE PM W/RET REQ TY I (W) 6" (BRK)(090MIL)	LF	7,000
666	RE PM W/RET REQ TY I (W) 6" (SLD)(090MIL)	LF	3,000
666	RE PM W/RET REQ TY I (Y) 4" (BRK)(060MIL)	LF	100
666	RE PM W/RET REQ TY I (Y) 4" (SLD)(060MIL)	LF	6,000
666	RE PM W/RET REQ TY I (Y) 6" (SLD)(090MIL)	LF	3,000
677	ELIM EXT PAV MRK & MRKS (4")	LF	5,000
677	ELIM EXT PAV MRK & MRKS (6")	LF	1,200
677	ELIM EXT PAV MRK & MRKS (8")	LF	50

SHORT LINE			
ITEM	DESCRIPTION	UNIT	TOLL 49
666	REFL PAV MRK TY I (W) 12" (SLD)(090MIL)	LF	100
666	REFL PAV MRK TY I (W) 24" (SLD)(090MIL)	LF	900
666	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	1
666	REFL PAV MRK TY I (W)(DBL ARROW)(090MIL)	EA	1
666	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	1
668	PREFAB PAV MRK TY C (W) (12")(SLD)	LF	100
668	PREFAB PAV MRK TY C (W) (24")(SLD)	LF	100
668	PREFAB PAV MRK TY C (W) (ARROW)	EA	1
668	PREFAB PAV MRK TY C (W) (DBL ARROW)	EA	1
668	PREFAB PAV MRK TY C (W) (NUMBER)	EA	1
668	PREFAB PAV MRK TY C (W) (WORD)	EA	1
668	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	1
677	ELIM EXT PAV MRK & MRKS (24")	LF	250
677	ELIM EXT PAV MRK & MRKS (ARROW)	EA	1
677	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	1
677	ELIM EXT PAV MRK & MRKS (WORD)	EA	1
677	ELIM EXT PAV MRK & MRKS (36")(YLD TRI)	EA	1

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TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		8
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 1:42:00 PM
FILE: $FILE$

PAVEMENT PREP SUMMARY			
ITEM	DESCRIPTION	UNIT	TOLL 49
666	PAVEMENT SEALER 4"	LF	100
666	PAVEMENT SEALER 6"	LF	1,200
666	PAVEMENT SEALER 8"	LF	100
666	PAVEMENT SEALER 12"	LF	100
666	PAVEMENT SEALER 24"	LF	100
666	PAVEMENT SEALER (ARROW)	EA	1
666	PAVEMENT SEALER (WORD)	EA	1
666	PAVEMENT SEALER (DBL ARROW)	EA	1
666	PAVEMENT SEALER (YLD TRI)	EA	1
678	PAV SURF PREP FOR MRK (4")	LF	100
678	PAV SURF PREP FOR MRK (6")	LF	100
678	PAV SURF PREP FOR MRK (8")	LF	100
678	PAV SURF PREP FOR MRK (12")	LF	100
678	PAV SURF PREP FOR MRK (24")	LF	100
678	PAV SURF PREP FOR MRK (ARROW)	EA	1
678	PAV SURF PREP FOR MRK (DBL ARROW)	EA	1
678	PAV SURF PREP FOR MRK (NUMBER)	EA	1
678	PAV SURF PREP FOR MRK (WORD)	EA	1
678	PAV SURF PREP FOR MRK (36") (YLD TRI)	EA	1

RAISED PAVEMENT MARKER SUMMARY			
ITEM	DESCRIPTION	UNIT	TOLL 49
672	REFL PAV MRKR TY I-A	EA	400
672	REFL PAV MRKR TY I-C	EA	100
672	REFL PAV MRKR TY I-R	EA	150
672	REFL PAV MRKR TY II-A-A	EA	500
672	REFL PAV MRKR TY II-C-R	EA	1,000

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TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		9
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 11:00:03 AM
FILE: $FILE$

DELINEATOR & OBJECT MARKER SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
658	INSTL DEL ASSM (D-SW)SZ 1(FLX)GND	EA	35
658	INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB	EA	34
658	INSTL DEL ASSM (D-SW)SZ (BRF)GFI	EA	38
658	INSTL DEL ASSM (D-SW)SZ (BRF)GFI(BI)	EA	7
658	INSTL DEL ASSM (D-SY)SZ 1(FLX)GND	EA	39
658	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	62
658	INSTL DEL ASSM (D-SY)SZ (BRF)GFI	EA	14
658	INSTL DEL ASSM (D-DW)SZ 1(FLX)GND	EA	10
658	INSTL OM ASSM (OM-2Z)(FLX)GND	EA	75
658	INSTL OM ASSM (OM-3L)(FLX)SRF	EA	32
658	INSTL OM ASSM (OM-3R)(FLX)SRF	EA	16
658	INSTL DEL ASSM (D-SW)SZ 1(FLX)GF2	EA	200
658	INSTL DEL ASSM (D-SW)5Z (BRF)GF2(BI)	EA	50
658	INSTL DEL ASSM (D-SY)5Z 1(BRF)GF2	EA	200
658	IN5TL DEL ASSM (D-DY)SZ 1(BRF)GF2	EA	100

MOWING SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
730	STRIP MOWING (40')	AC	690
730	MOWING - FULL WIDTH	AC	1,890

DEBRIS REMOVAL SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
735	DEBRIS REMOVAL (ENTRANCE/EXIT RAMPS)	CYC	12
735	DEBRIS REMOVAL (SPOT DEBRIS)	MI	12
735	DEBRIS REMOVAL -CNTR MEDIANS/MAINLANES	CYC	52

LITTER REMOVAL SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
734	LITTER REMOVAL	AC	1,380

GRAFFITI REMOVAL SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
740	GRAFFITI REMOVAL (BLAST CLEANING)	SF	10
740	GRAFFITI REMOVAL (PAINTING)	SF	84
740	GRAFFITI REMOVAL (CHEMICAL CLEANING)	SF	20

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QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		10
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 11:00:03 AM
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SWEEPING SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
738	CLEANING/SWEEPING (OUTSIDE MAIN LANE)	CYC	12

TREE TRIMMING & REMOVAL SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
752	TREE TRIMMING/BRUSH REMOVAL	MI	1
752	TREE TRIMMING/BRUSH REMOVAL (CHANNEL)	AC	10
752	TREE REMOVAL (4"-12" DIA)	EA	20
752	TREE REMOVAL (12"-18" DIA)	EA	15
752	TREE REMOVAL (18"-24" DIA)	EA	5
752	TREE REMOVAL (24"-30" DIA)	EA	5
752	TREE REMOVAL (30"-36" DIA)	EA	2
752	TREE REMOVAL (36"-42" DIA)	EA	2
752	TREE REMOVAL (42"-48" DIA)	EA	1
752	TREE REMOVAL (48"-60" DIA)	EA	1
752	TREE REMOVAL (60"-72" DIA)	EA	1

HERBICIDE SUMMARY

ITEM	DESCRIPTION	UNIT	TOLL 49
731	PAVEMENT EDGES, STRUCTURES & FIXTURES	MI	100
731	BROADCAST APPLICATION	AC	100

(1) PORTABLE CHANGEABLE MESSAGE SIGN

LOCATION	ITEM 6000 PORTABLE CHANGEABLE MESSAGE SIGN DAY
TOLL 49	10

(1) THIS SUMMARY DENOTES THE USE OF SIGNS REQUESTED IN addition TO THOSE REQUIRED BY THE APPLICABLE TCP AND BC SHEETS.

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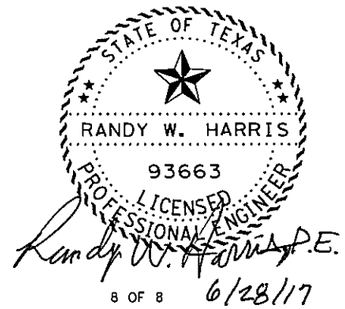
TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		11
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

DATE: $DATE$ 11:00:03 AM
FILE: $FILE$

ILLLUMINATION SUMMARY			
ITEM	DESCRIPTION	UNIT	TOLL 49
6000	REPLACE ABOVE - GROUND CONDUIT	LF	2
6000	REPLACE UNDERGROUND CONDUIT	LF	11
6000	REPLACE CONDUCTOR	LF	63
6000	INSTALL ELECTRICAL SPLICE	EA	1
6000	ROAD BORE	LF	11
6000	REMOVE ROADWAY ILLUM ASSEMBLY (HPS)	EA	1
6000	REMOVE ROADWAY ILLUM ASSEMBLY (LED)	EA	1
6000	REPLACE LUMINAIRE POLE	EA	1
6000	REPLACE LUMINAIRE ARMS	EA	1
6000	MAINTAIN HIGH MAST ILLUMINATION	EA	1
6000	REPLACE ELECTRICAL SERVICE	EA	1
6000	REPLACE TIMBER SERVICE POLE	EA	1
6000	INSTALL GROUND BOX	EA	1
6000	INSTALL FOUNDATION	EA	1
6000	REPLACE TRANSFORMER BASE	EA	1
6000	REPLACE TRANSFORMER BASE COVER	EA	1
6000	REPLACE LAMP SOCKET (POLE MOUNTED FIXTURE)	EA	6
6000	REPLACE LAMP (UNDERPASS FIXTURE)	EA	1
6000	REPLACE LAMP (WALL PACK FIXTURE)	EA	1
6000	REPLACE WALL PACK LUMINAIRE	EA	1
6000	REPLACE FUSE	EA	16
6000	REPLACE BREAKAWAY FUSE HOLDER	EA	2
6000	REPLACE HAND - OFF - AUTO SWITCH	EA	1
6000	REPLACE CONTACTOR	EA	1
6000	REPLACE BREAKER PANEL	EA	1
6000	REPLACE CIRCUIT BREAKER	EA	1
6000	REPLACE LUMINAIRES	EA	3
6000	REPLACE PHOTO CELL	EA	2



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ATKINS
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TOLL 49 MAINTENANCE

QUANTITY SUMMARIES

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		12
STATE	DIST.	COUNTY	
TEXAS	TYLER	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
			TOLL 49

CK:
DW:
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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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

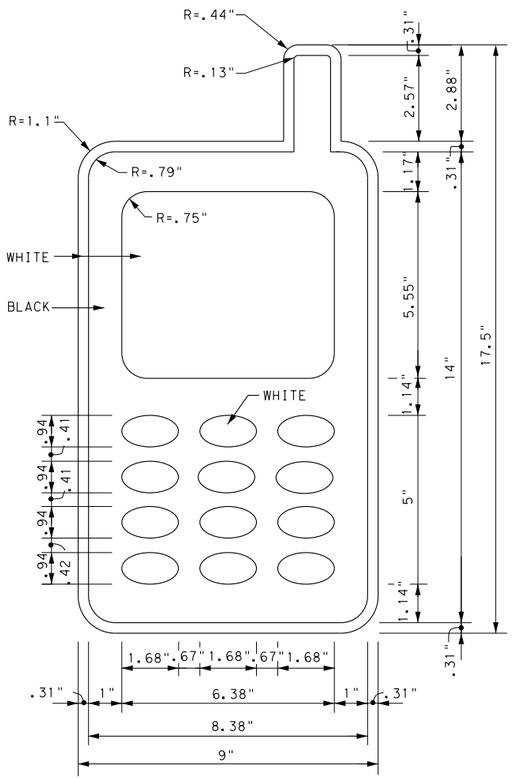
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

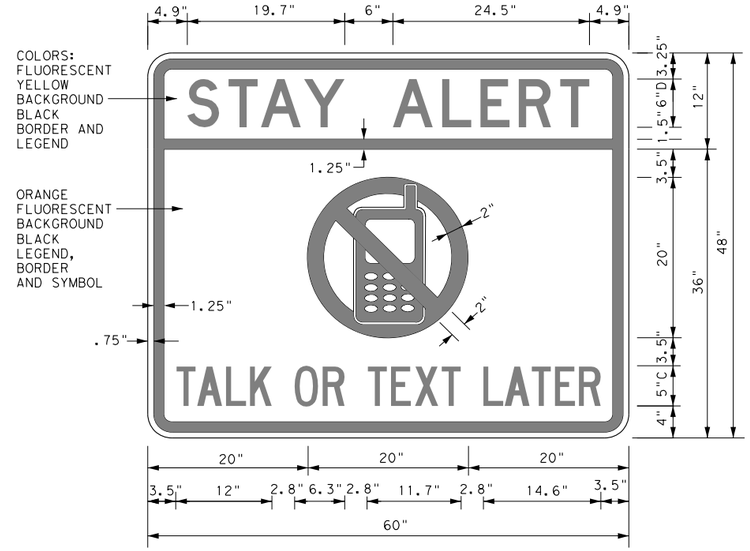
12. The Engineer has the final decision on the location of all traffic control devices.

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 APPAREL 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.





3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	TYL	SMITH		13

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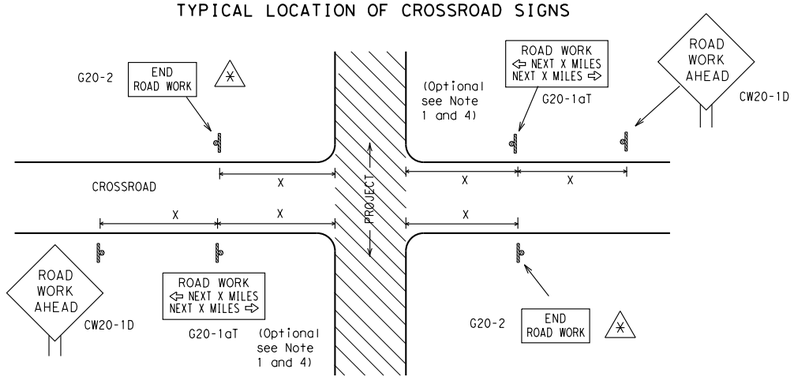
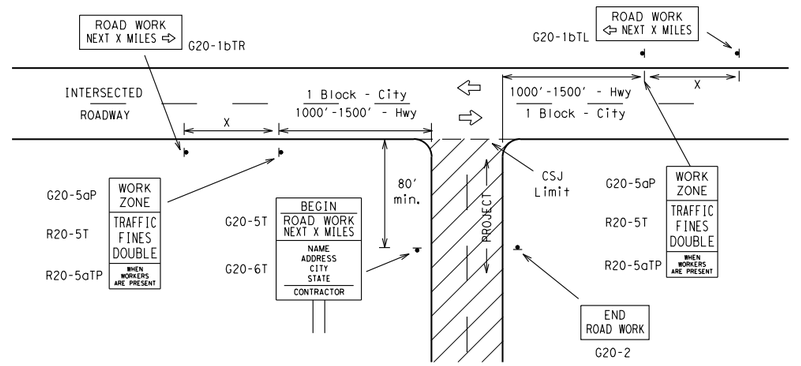
TYPICAL LOCATION OF CROSSROAD SIGNS



✳ 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. 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]

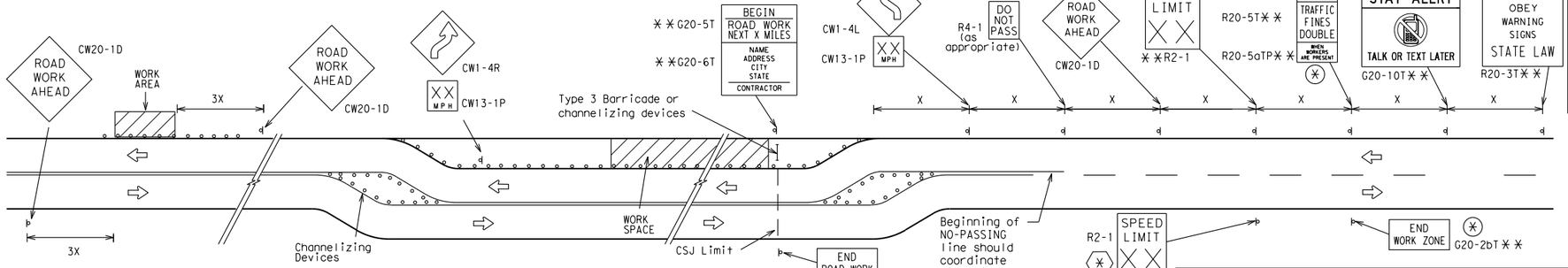
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

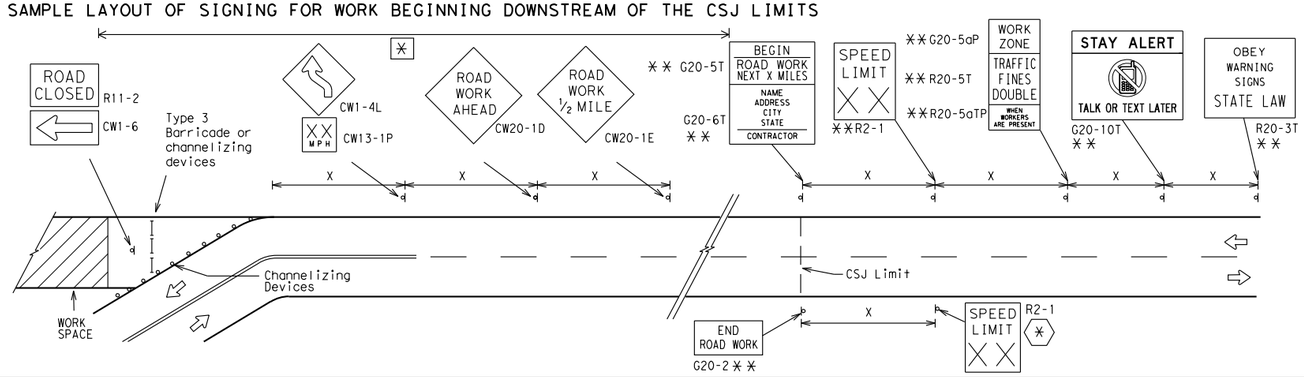
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. 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 DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT 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.

✳✳ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

✳ 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.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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REVISIONS	3487	01	001	TOLL 49
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	TYL	SMITH		14

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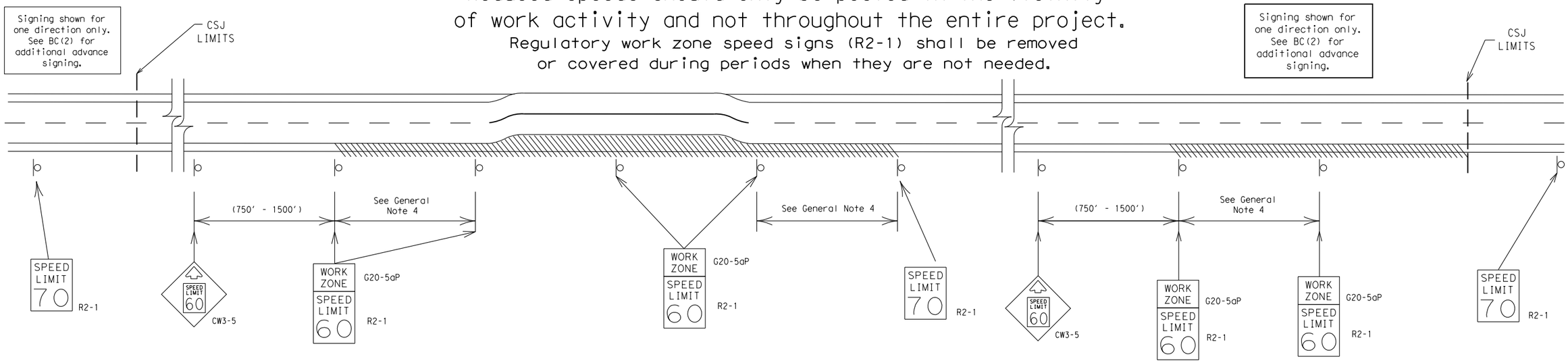
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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 travelled 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.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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	DIST	COUNTY		SHEET NO.
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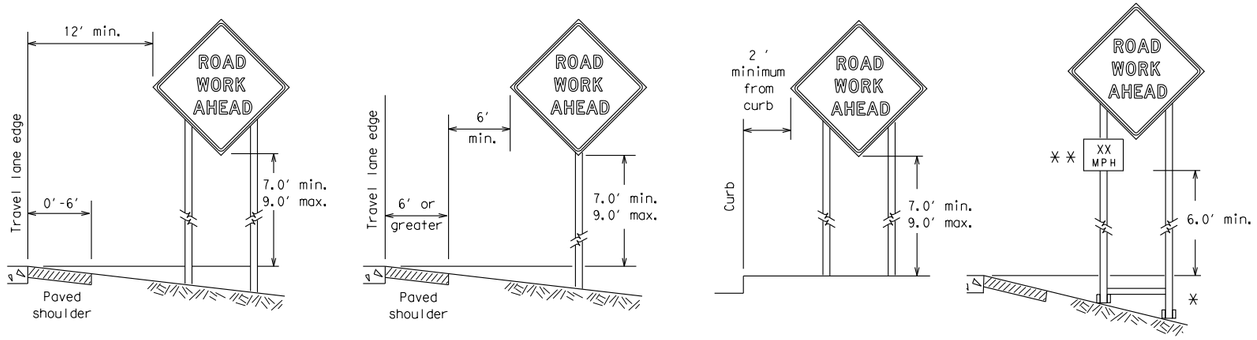
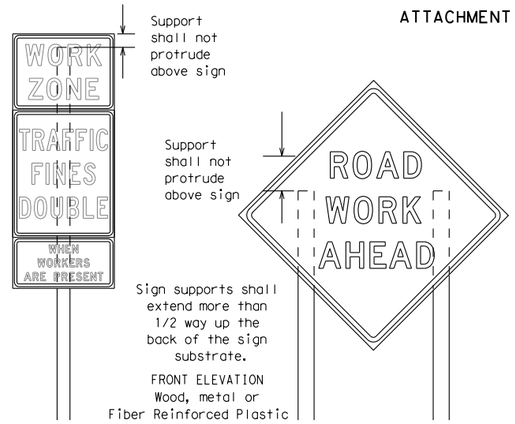
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



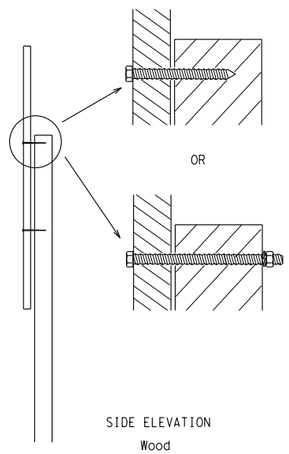
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

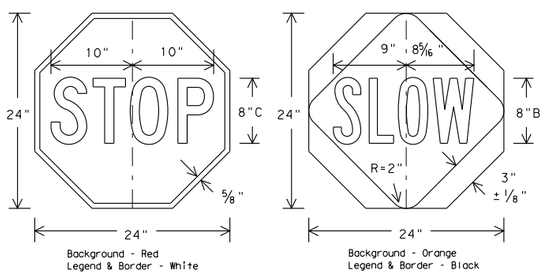
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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.

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" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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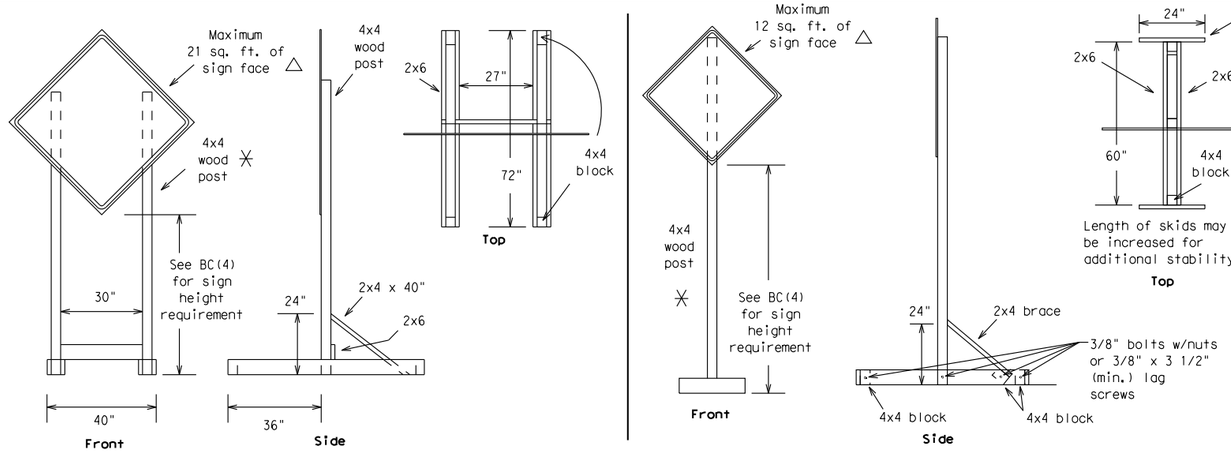
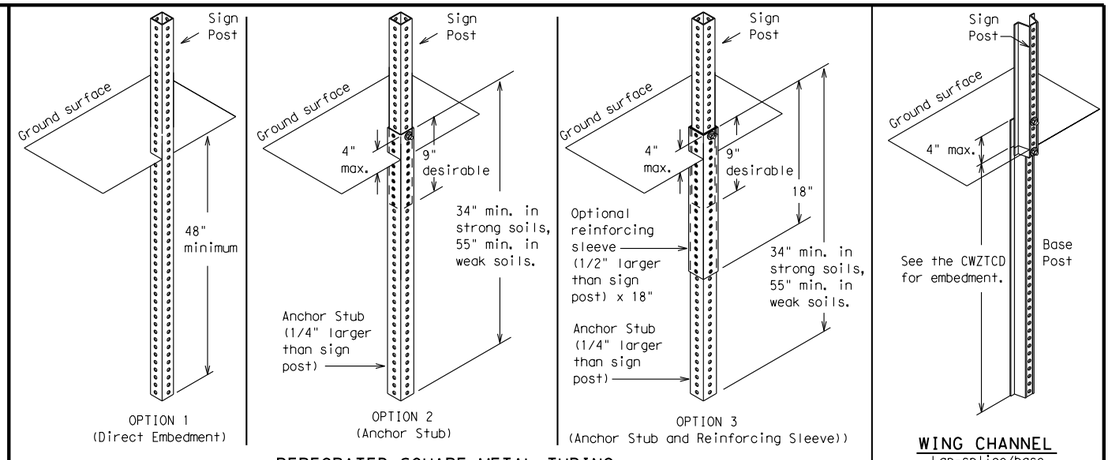


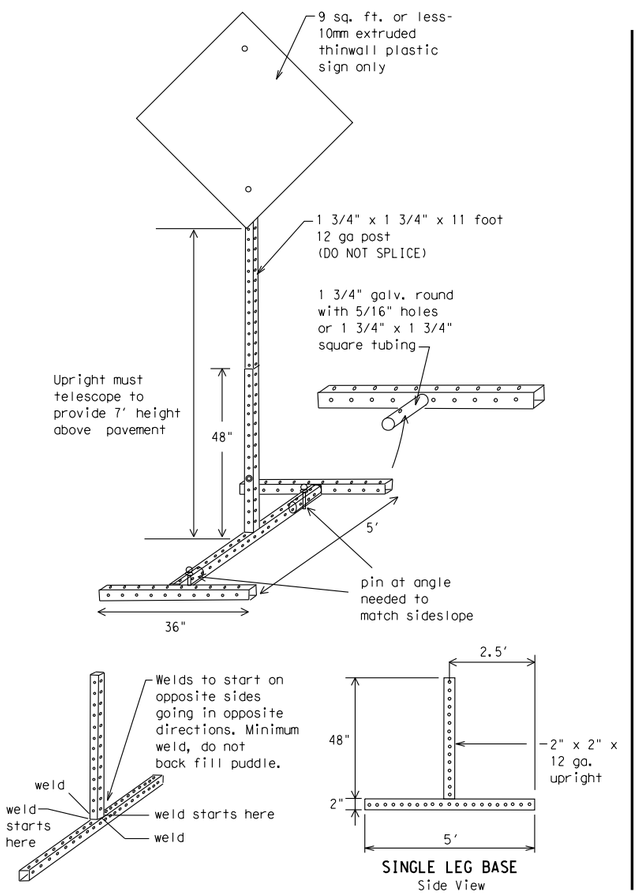
SKID MOUNTED WOOD SIGN SUPPORTS

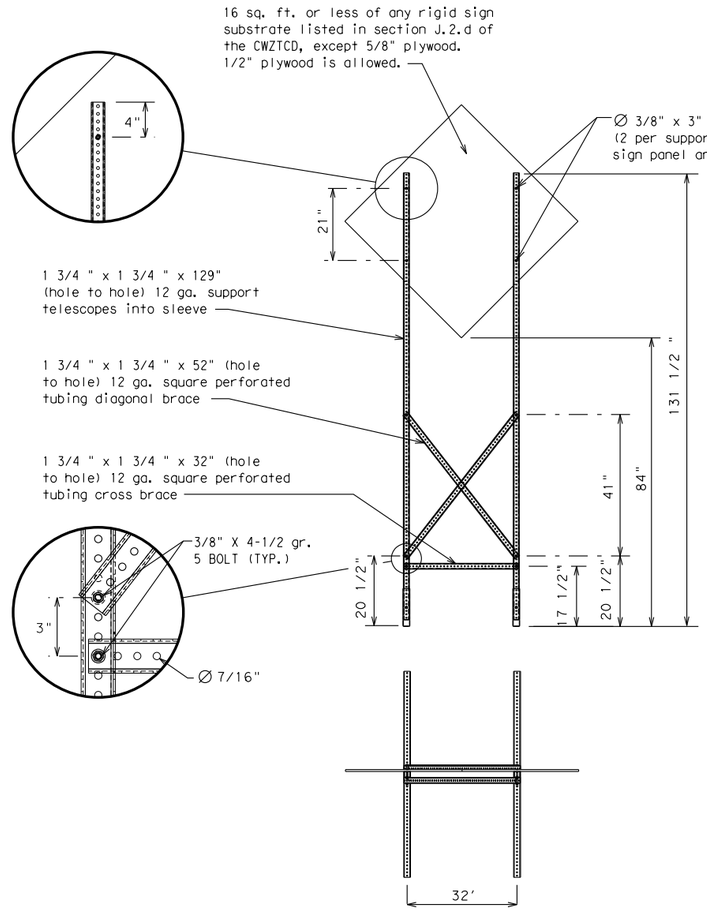
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

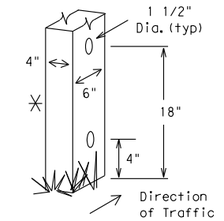


GROUND MOUNTED SIGN SUPPORTS

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.

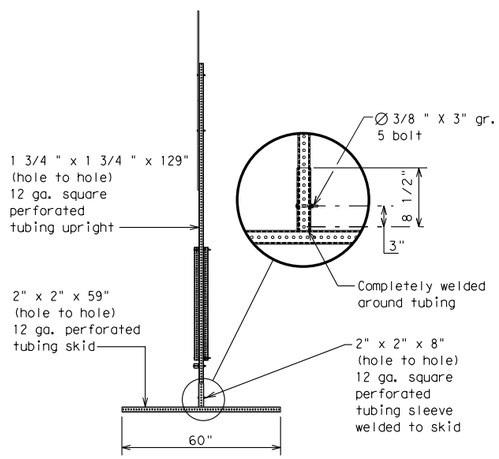






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



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.

Texas Department of Transportation

Traffic Operations Division Standard

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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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 Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	TYL	SMITH		18

100

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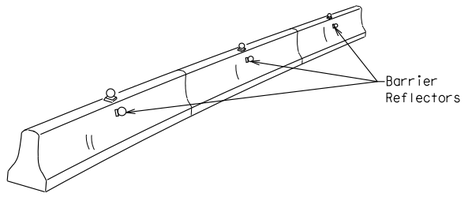
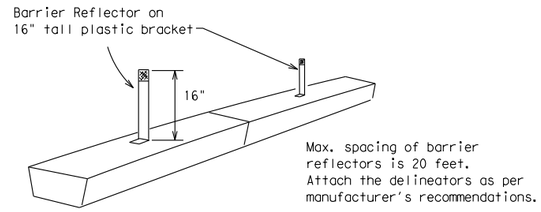
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

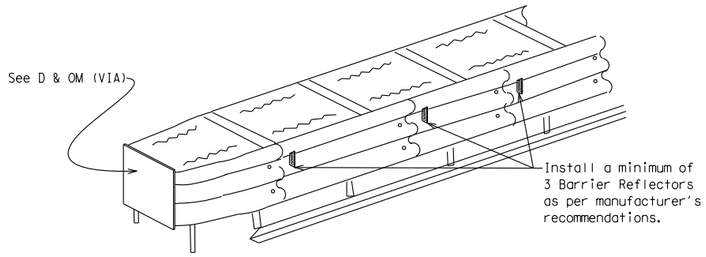


CONCRETE TRAFFIC BARRIER (CTB)

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.



LOW PROFILE CONCRETE BARRIER (LPCB)

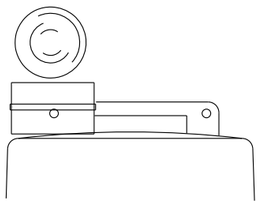


DELINEATION OF END TREATMENTS

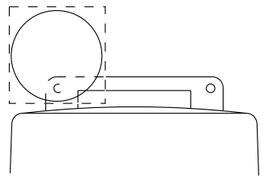
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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

WARNING LIGHTS

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

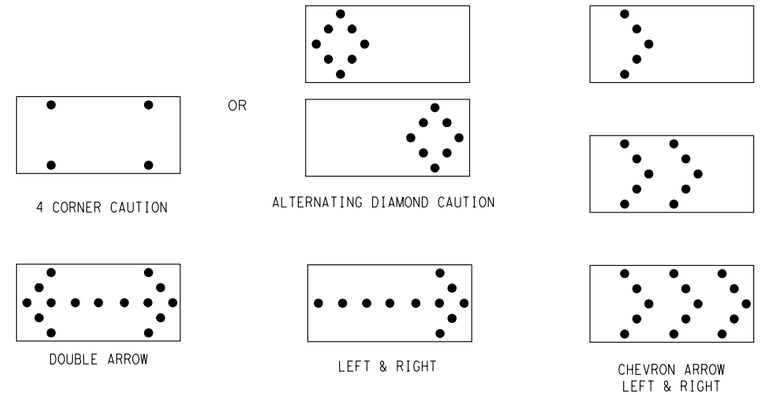
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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:



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 National Cooperative Highway Research Report No. 350 (NCHRP 350) or 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.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	TYL	SMITH		19

101

DATE: $DATE$ 11:00:08 AM
FILE: $FILE$

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DATE: $DATE$ 11:00:08 AM
FILE: $FILE$

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:

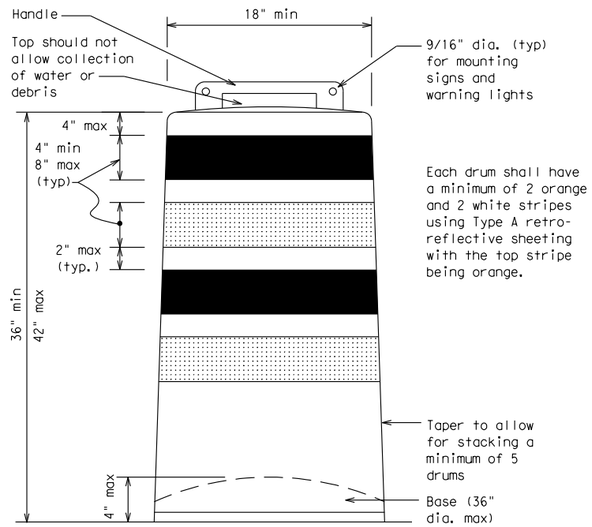
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

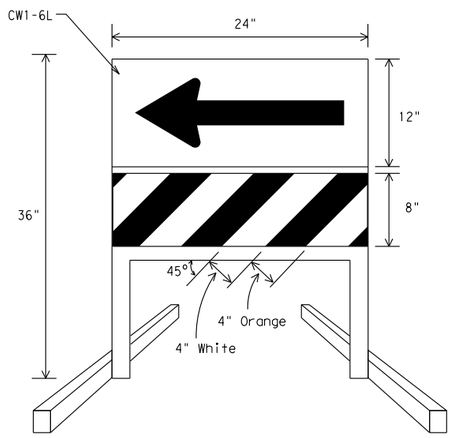
RETROREFLECTIVE SHEETING

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 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.





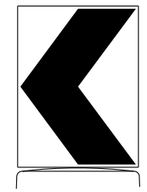
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

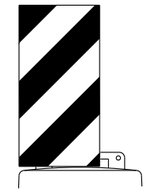
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may 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 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.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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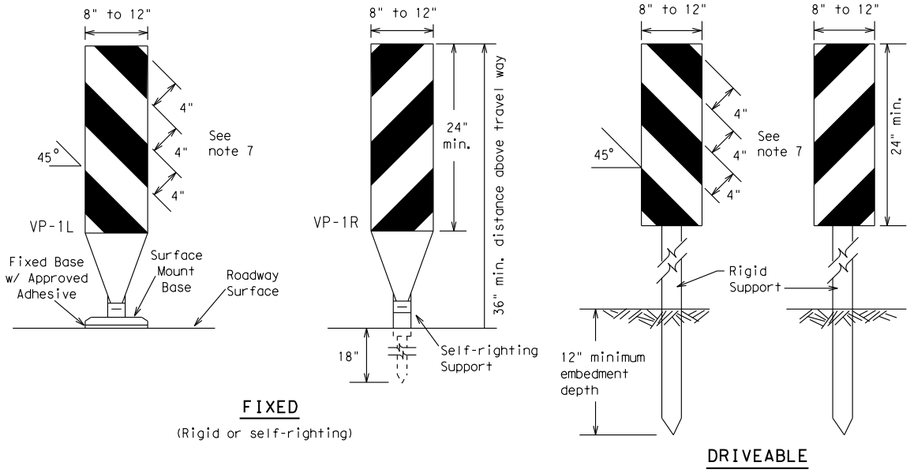
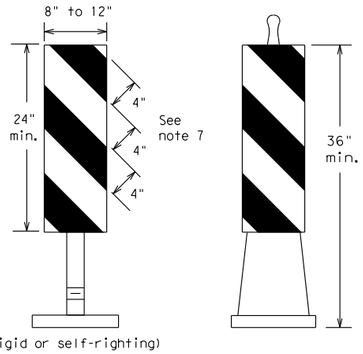


FIXED

(Rigid or self-righting)

DRIVEABLE

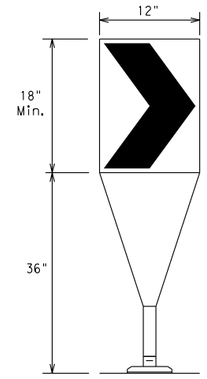


(Rigid or self-righting)

PORTABLE

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 Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 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.

VERTICAL PANELS (VPs)



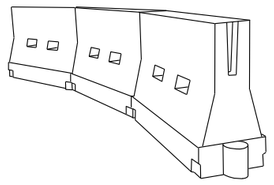
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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.

CHEVRONS

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) placed 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 NCHRP 350 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.

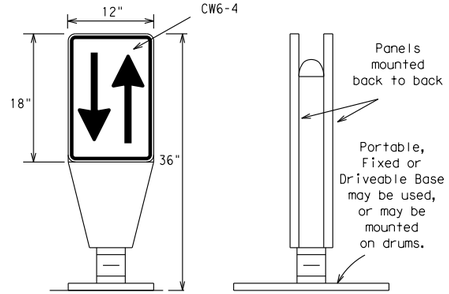
If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

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



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.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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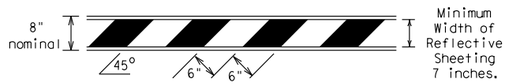
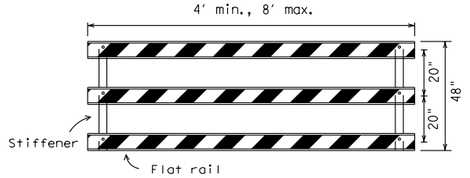
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



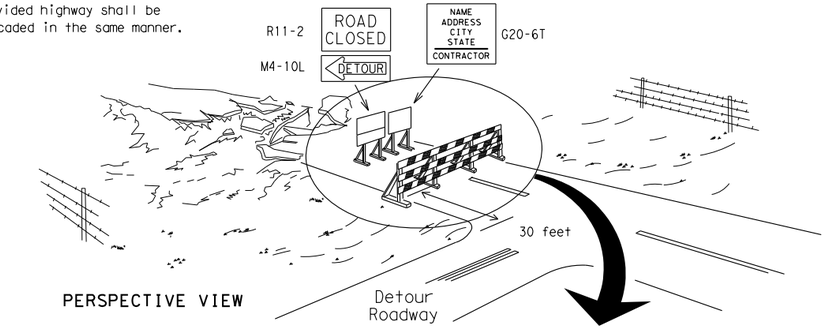
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

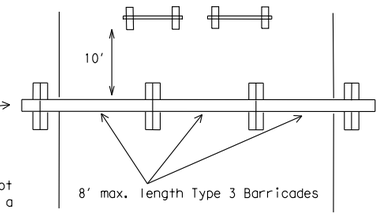
Each roadway of a divided highway shall be barricaded in the same manner.



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.

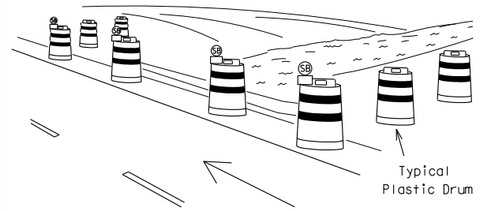
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

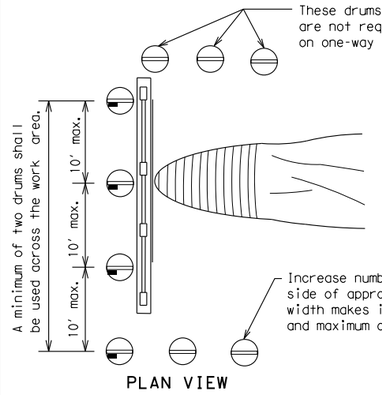
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

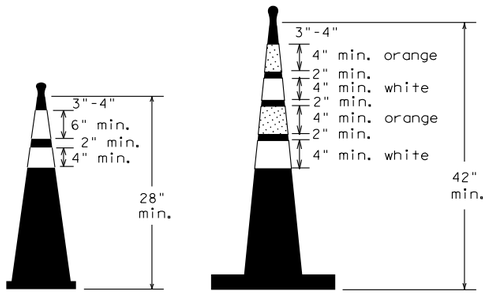
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones

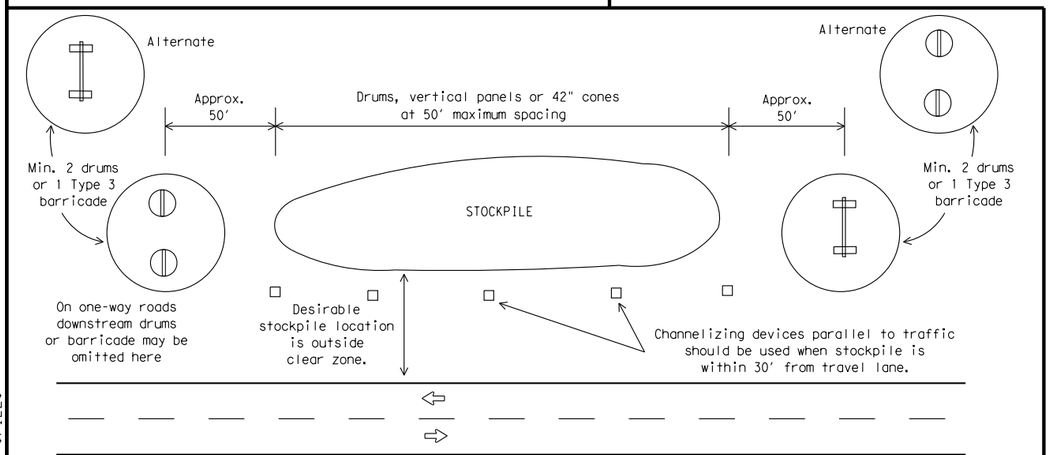
One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

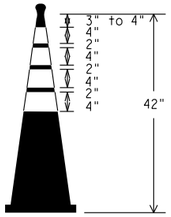
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
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.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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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.

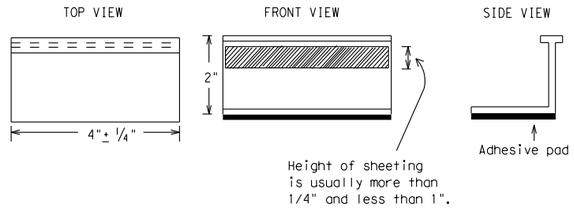
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

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Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

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REVISIONS	3487	01	001	TOLL 49
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	TYL	SMITH		23
11-02 8-14				

105

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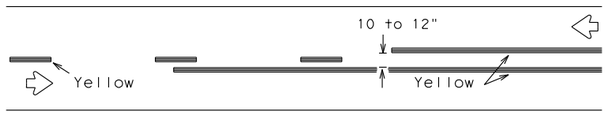
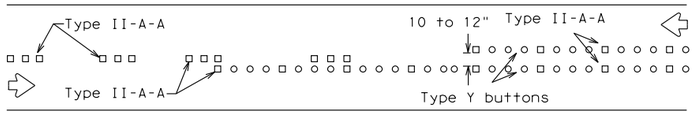
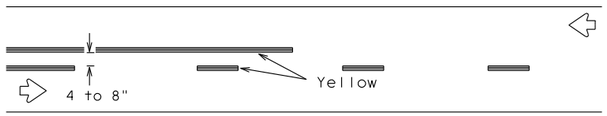
PAVEMENT MARKING PATTERNS



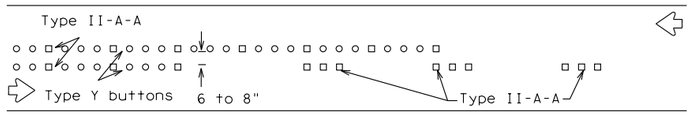
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



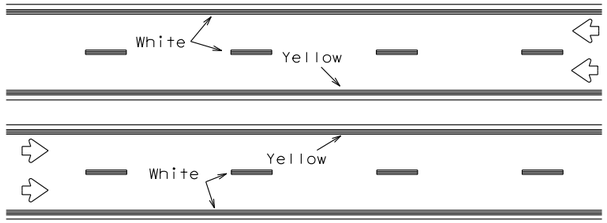
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



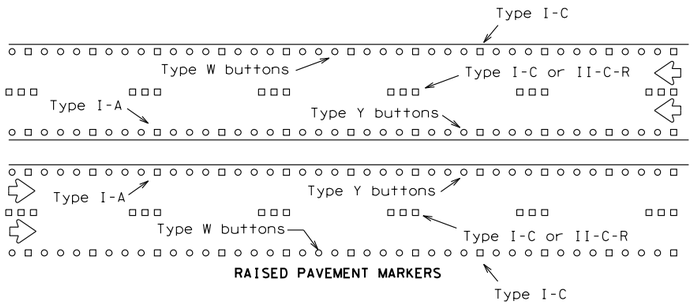
RAISED PAVEMENT MARKERS - PATTERN B

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



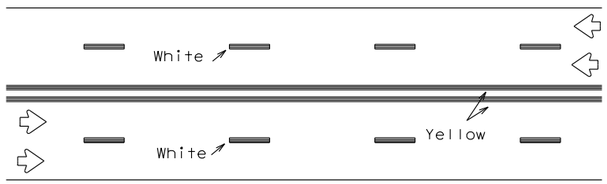
REFLECTORIZED PAVEMENT MARKINGS



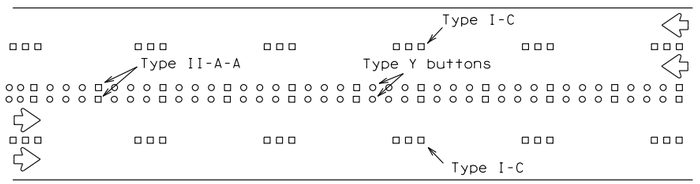
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



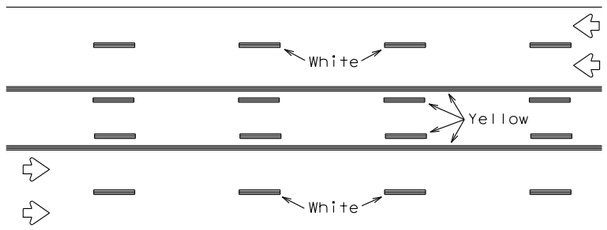
REFLECTORIZED PAVEMENT MARKINGS



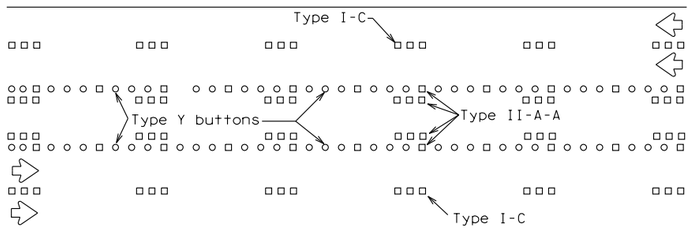
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

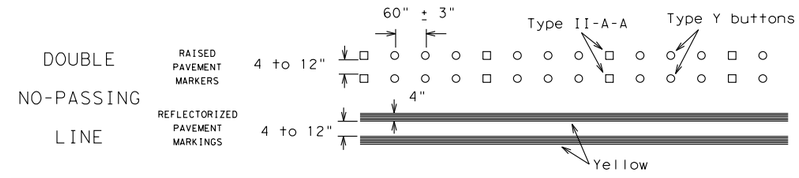
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

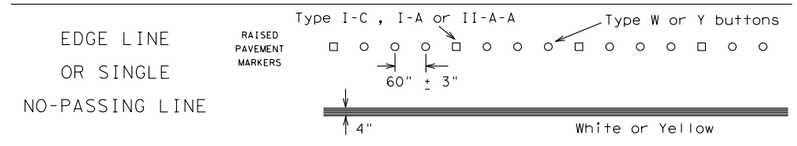
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

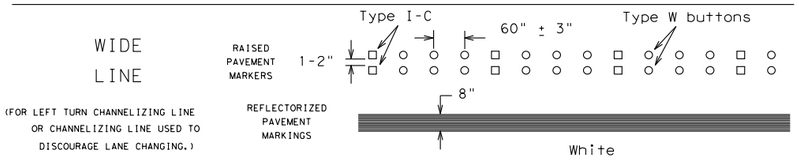


EDGE LINE OR SINGLE NO-PASSING LINE



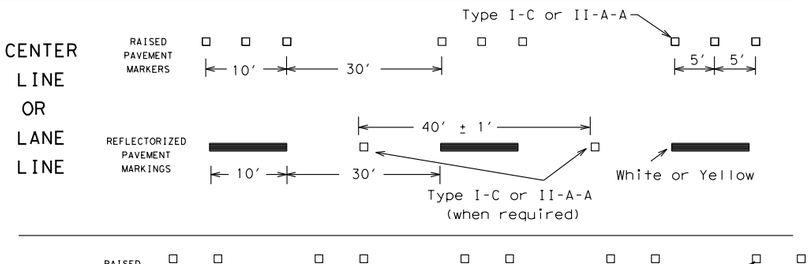
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

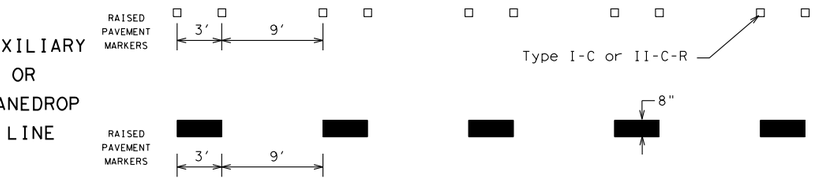


BROKEN LINES

CENTER LINE OR LANE LINE

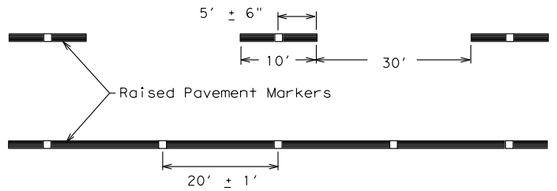


AUXILIARY OR LANEDROP LINE



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 Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	TYL	SMITH		24
11-02 8-14				

106

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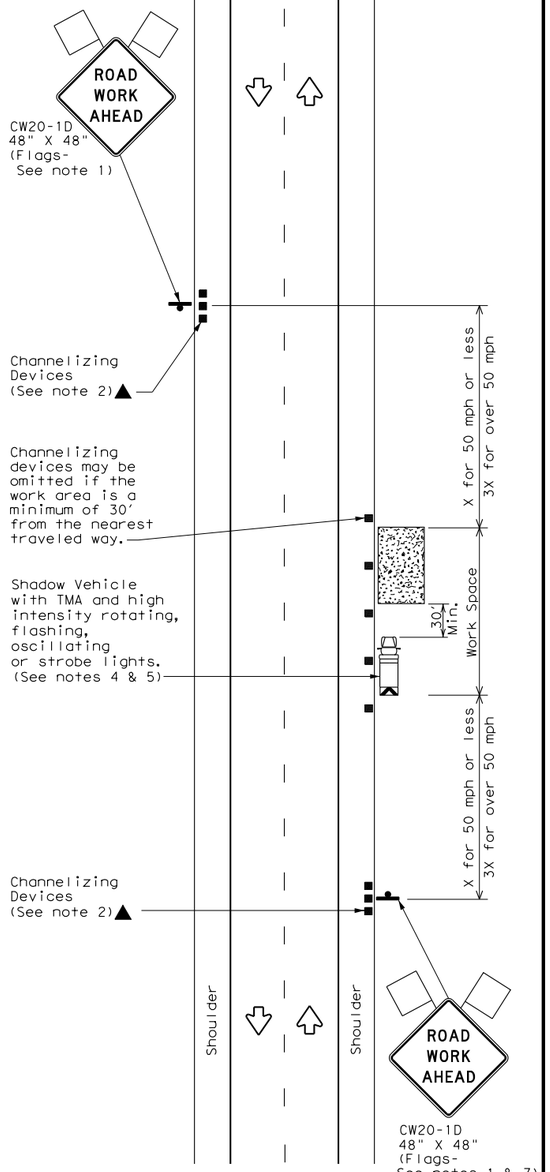
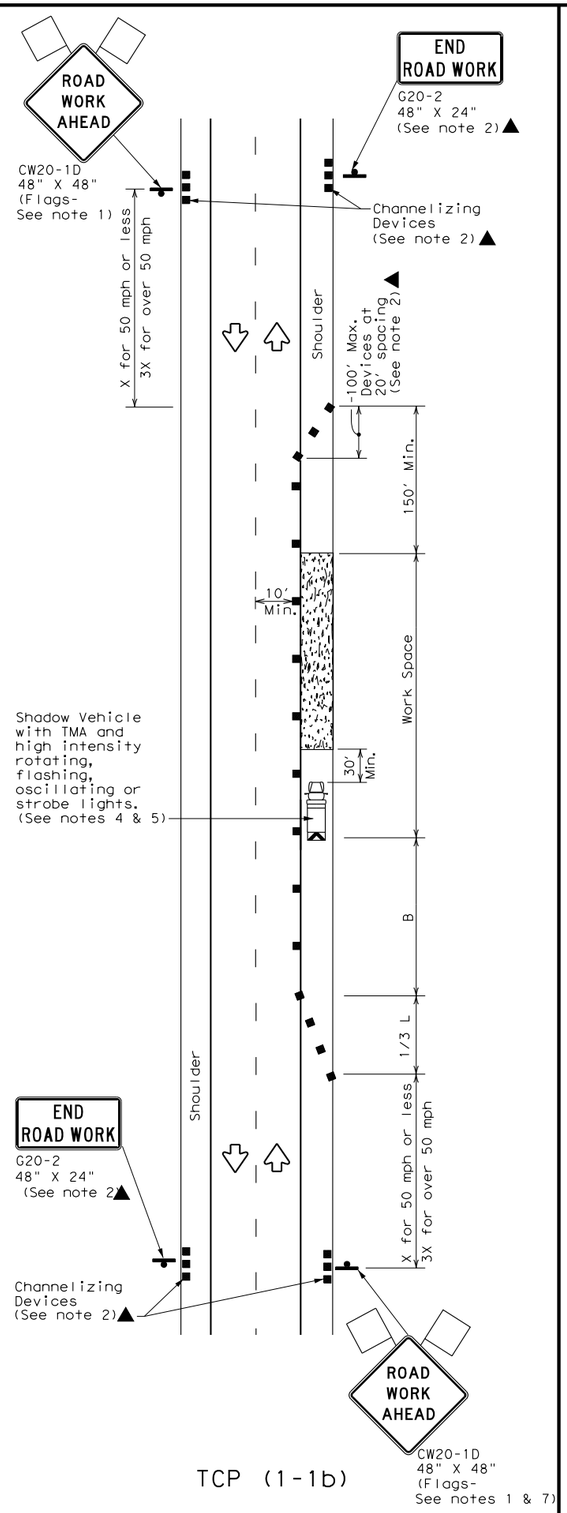


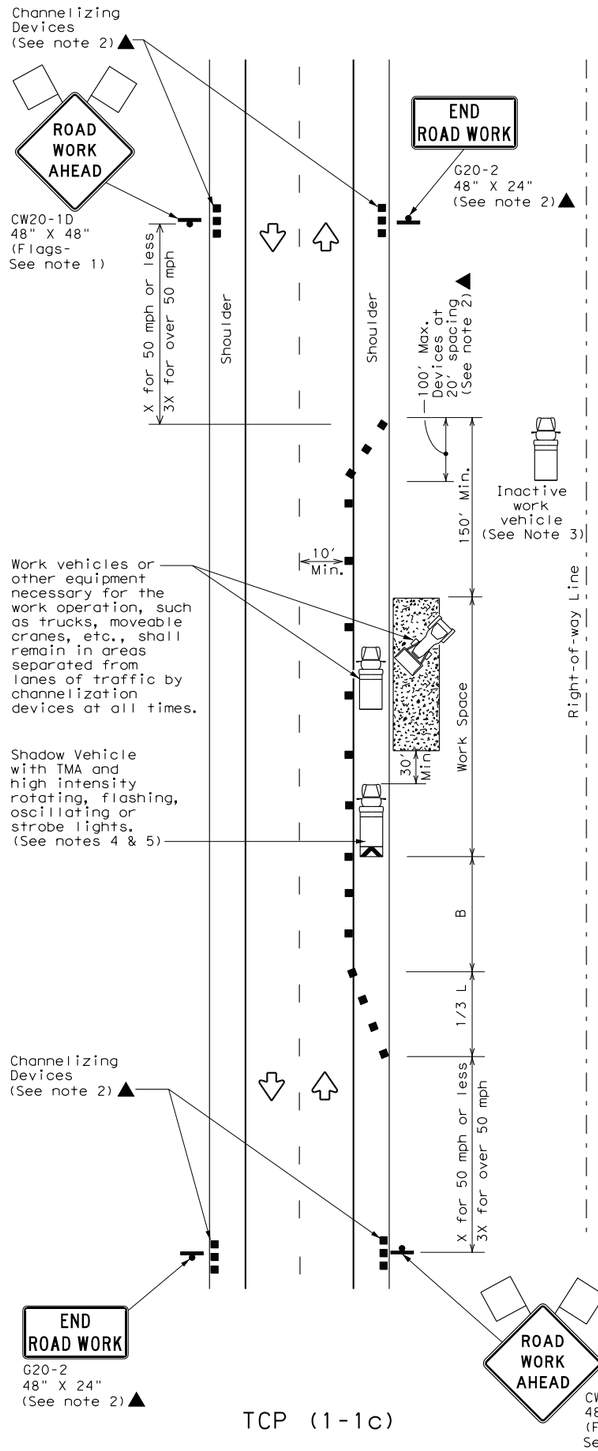
TCP (1-1a)

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	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"
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.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-12

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2-94 2-12	CONT	SECT	JOB	HIGHWAY
8-95	3487	01	001	TOLL 49
1-97	DIST	COUNTY		SHEET NO.
4-98	TYL	SMITH		25

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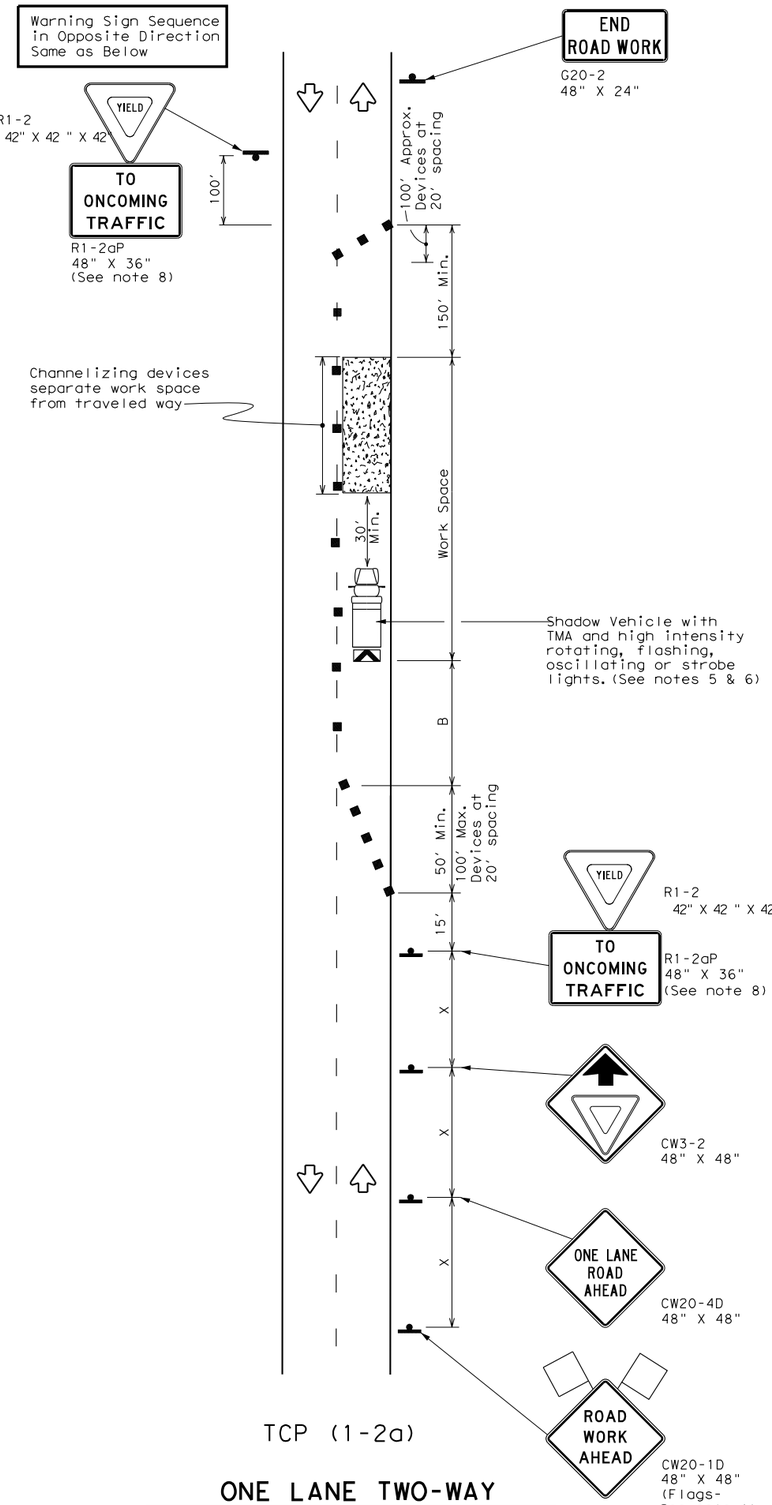
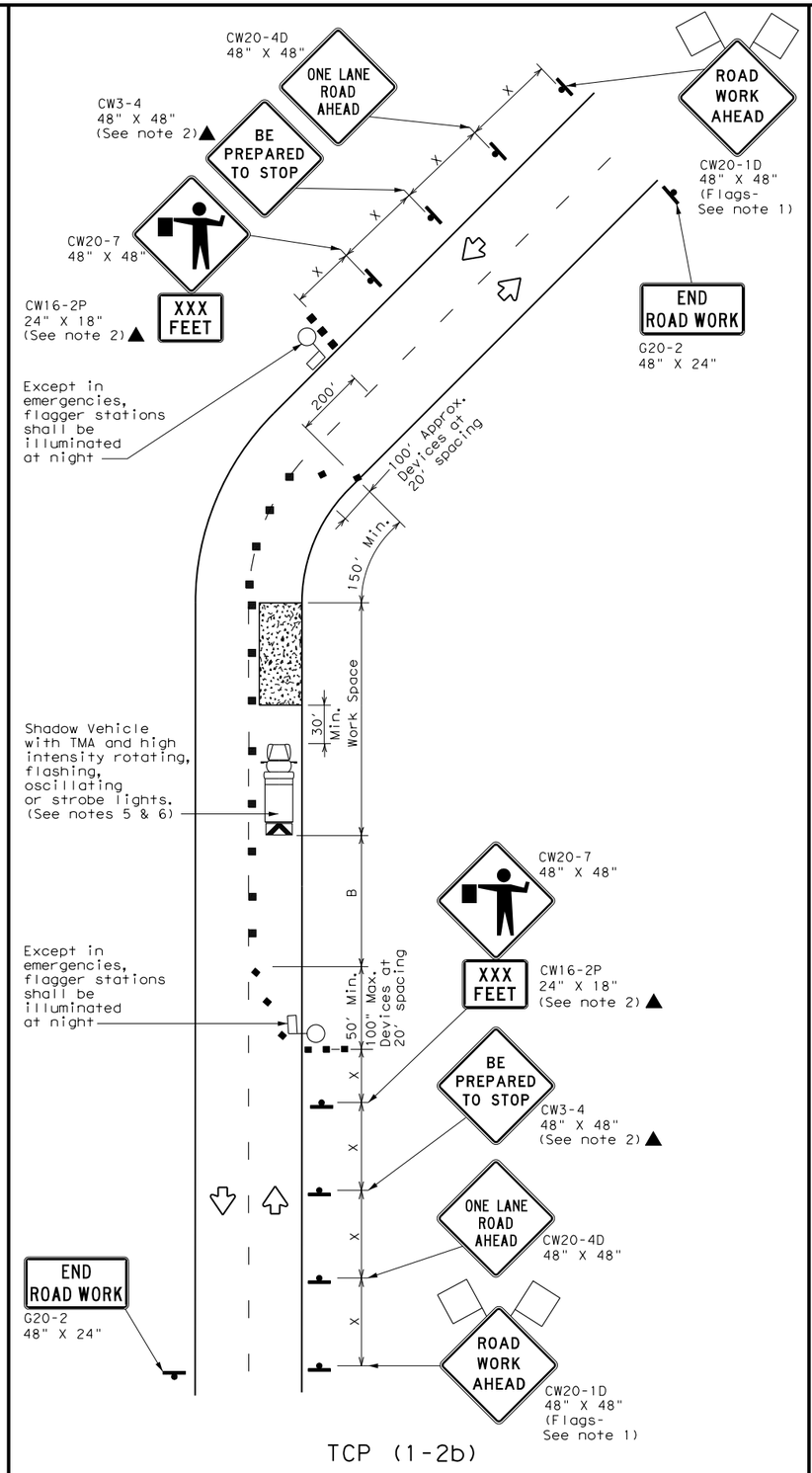


TCP (1-2a)

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	$L = \frac{WS^2}{60}$	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. 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.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-12

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DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
4-90 2-12
2-94
1-97
4-98

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		26

152

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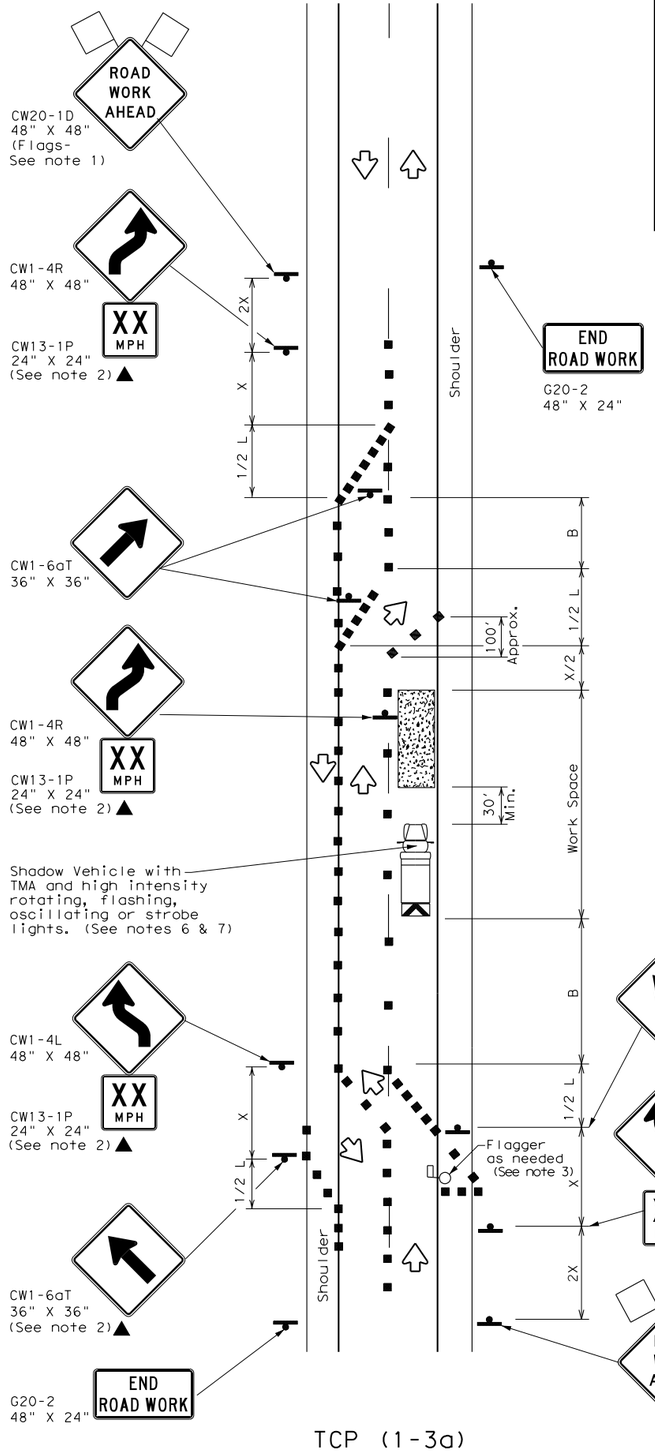
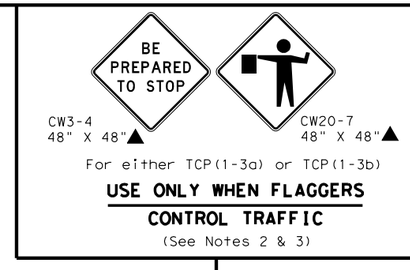
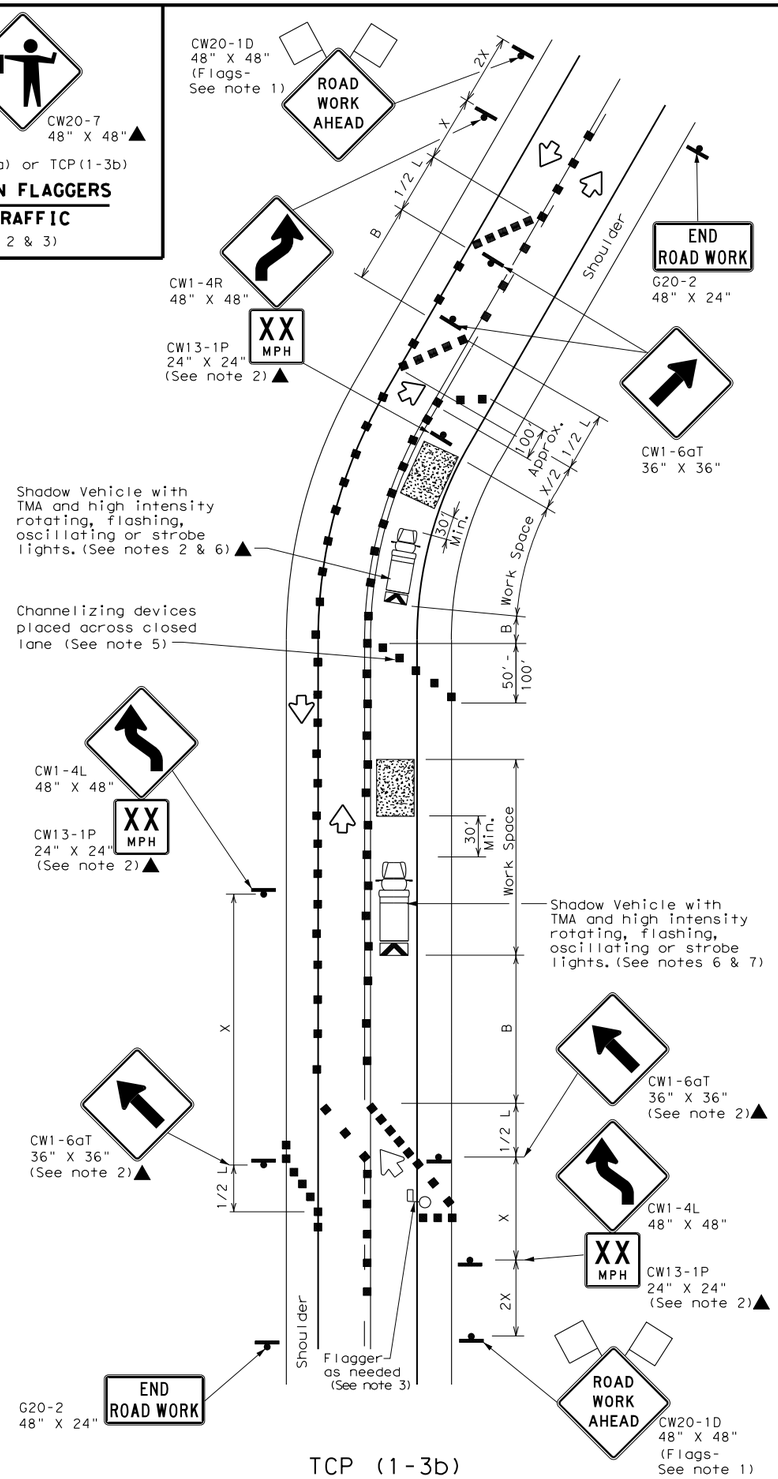


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

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	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"
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.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-12

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REVISIONS	CONT	SECT	JOB	HIGHWAY
2-94 2-12	3487	01	001	TOLL 49
8-95	DIST	COUNTY		SHEET NO.
1-97	TYL	SMITH		27
4-98				

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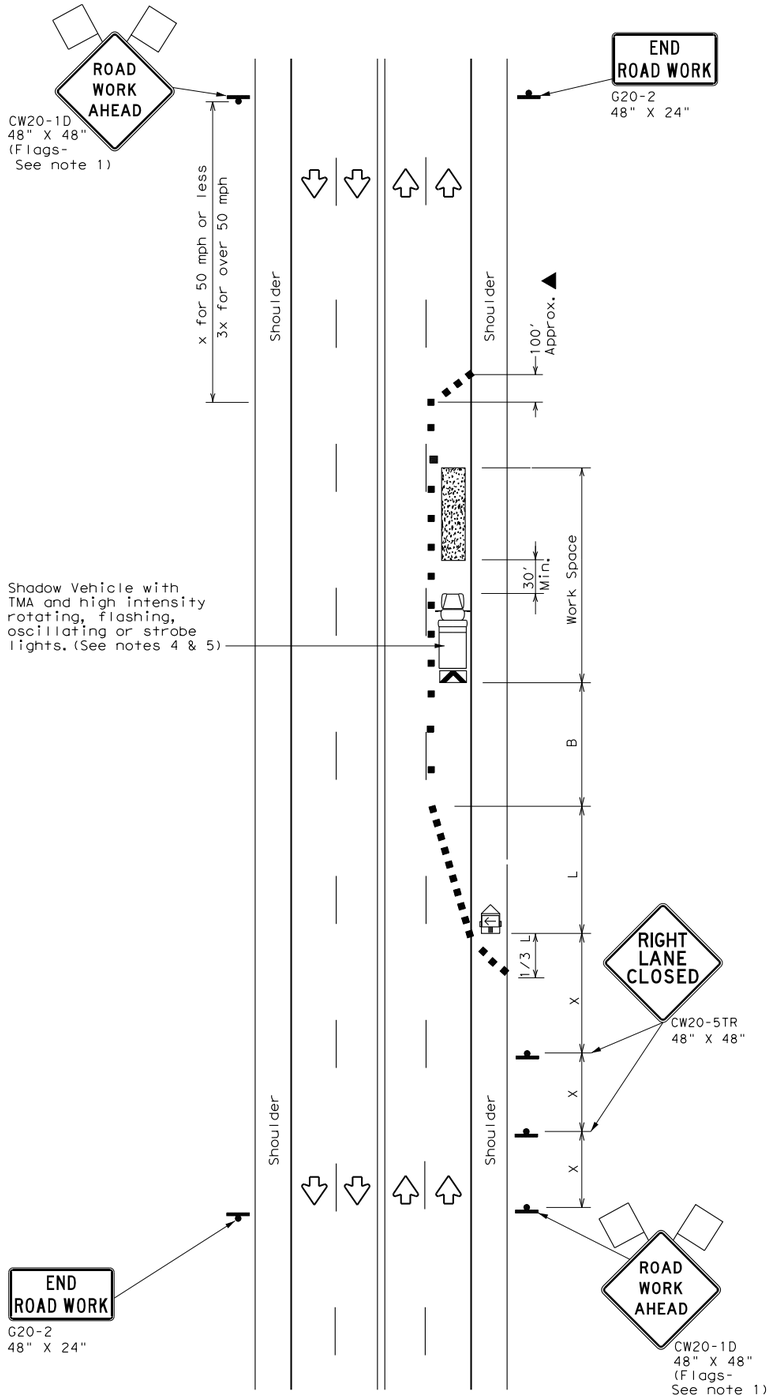
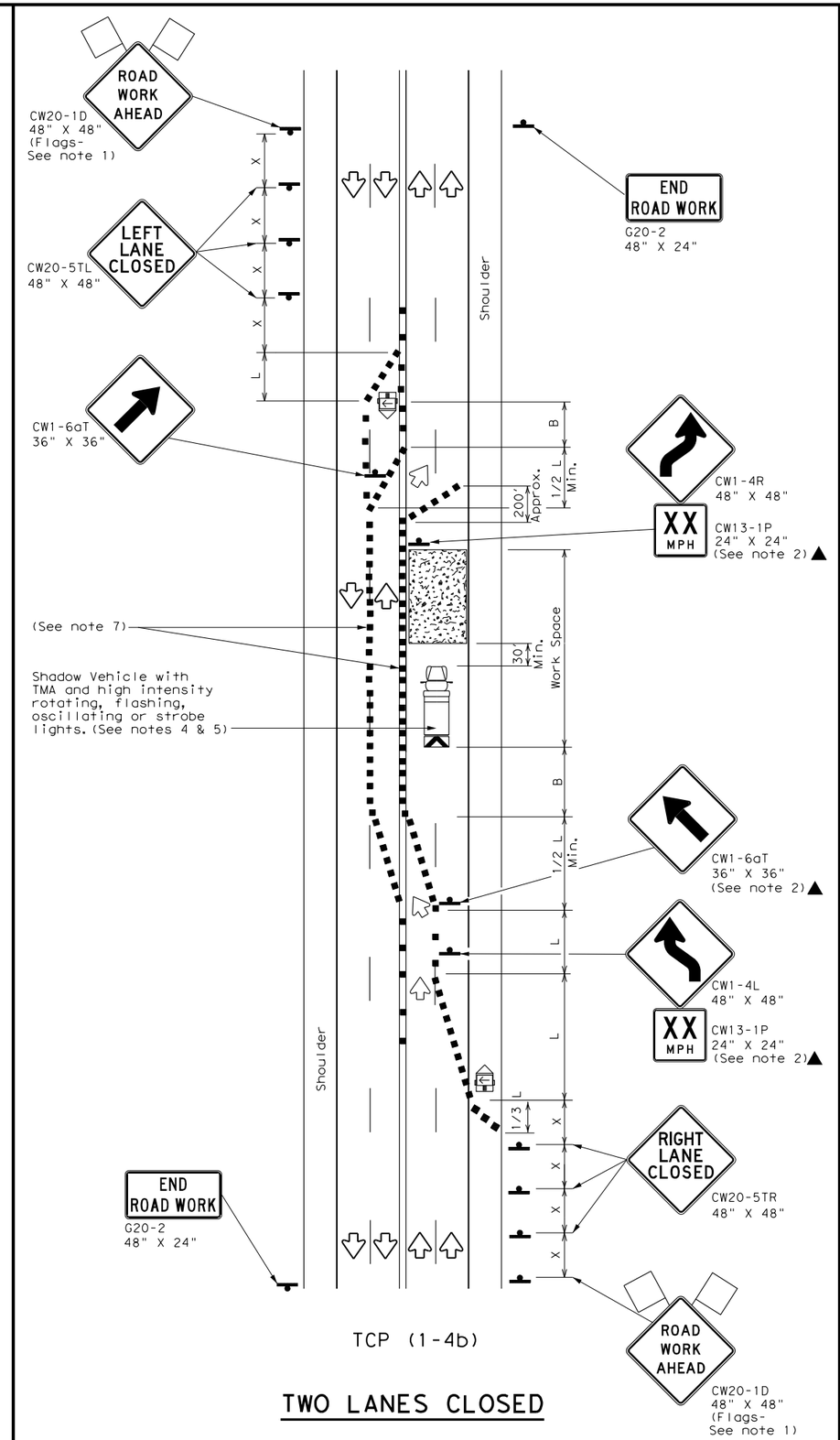


TCP (1-4a)

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	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"
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.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-12

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REVISIONS
2-94 2-12
8-95
1-97
4-98

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		28

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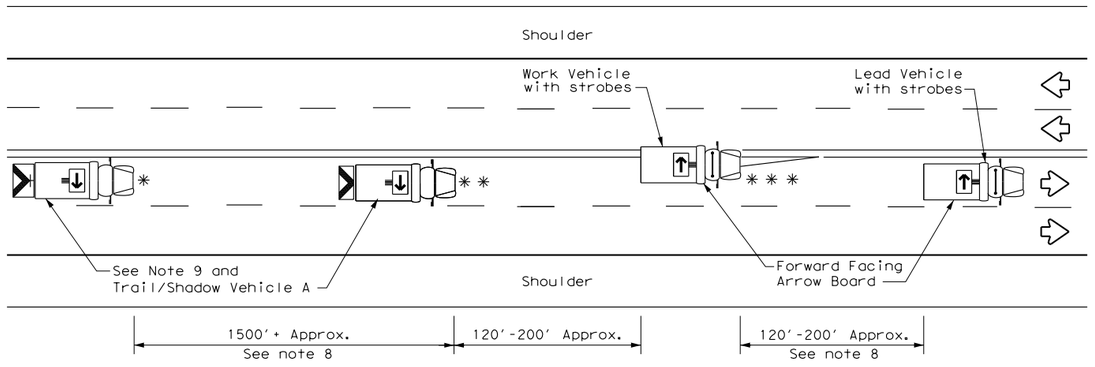
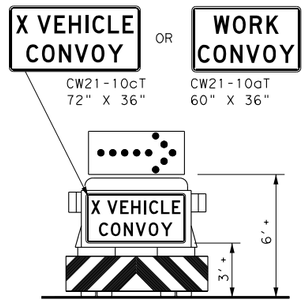


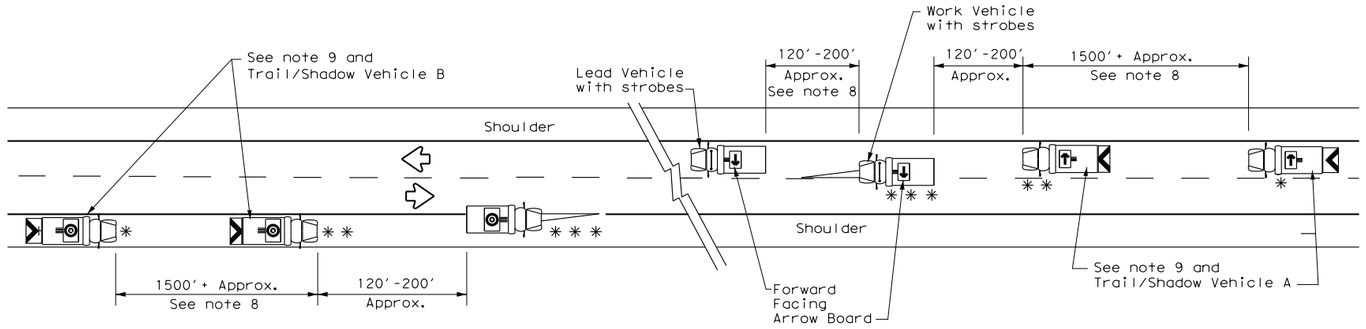
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

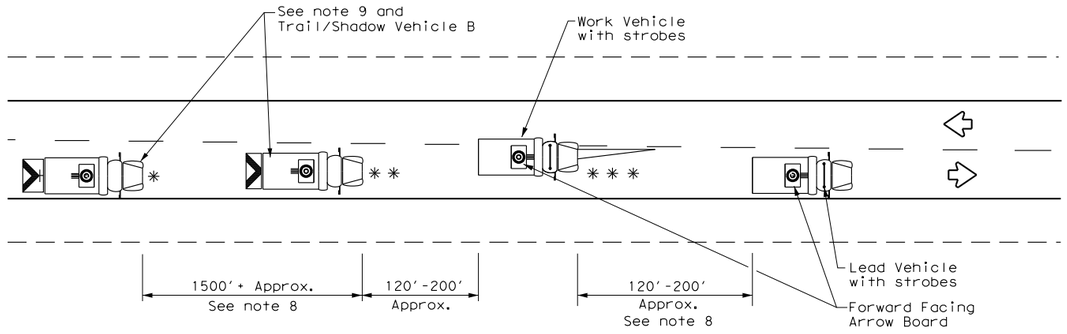


WORK ON SHOULDER

WORK ON TRAVEL LANE

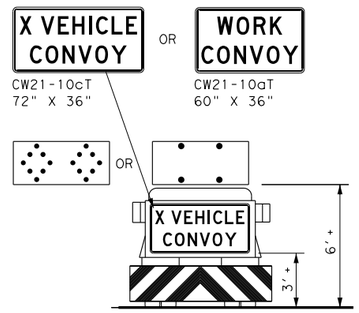
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

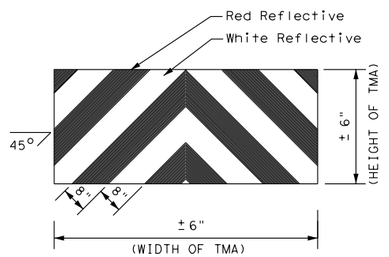
with Flashing Arrow Board in CAUTION display

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
* *	Shadow Vehicle		
* * *	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		29

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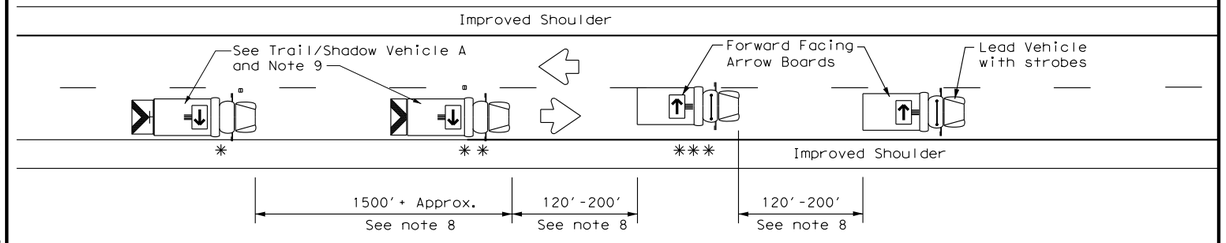
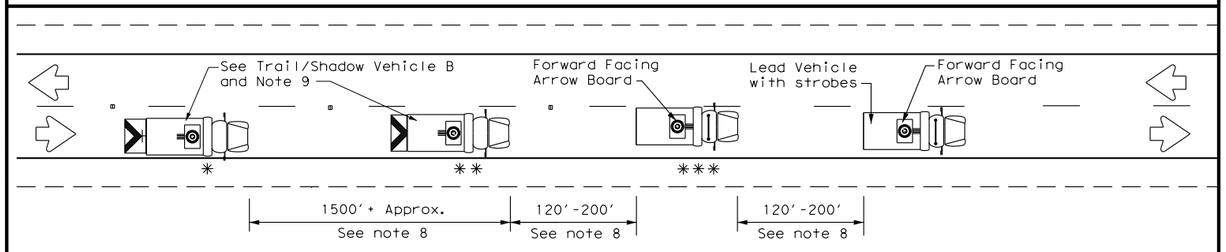


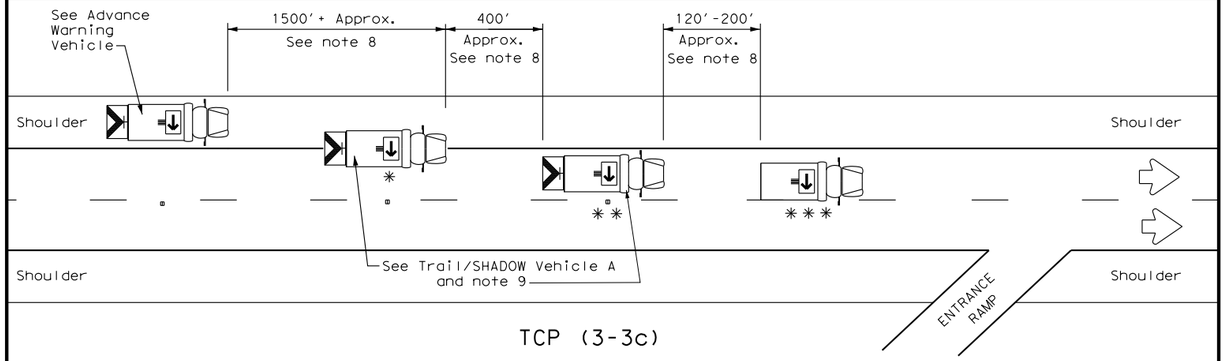
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)



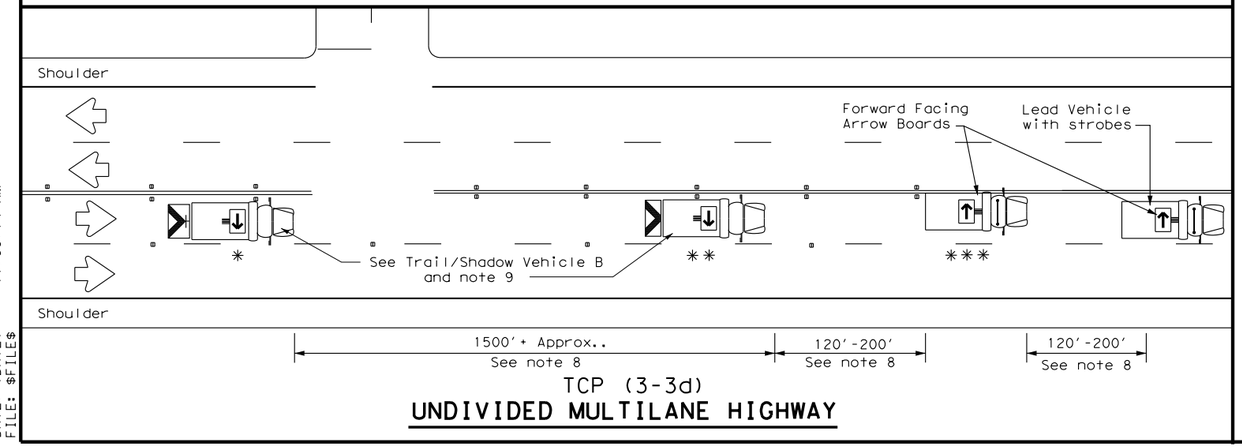
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)



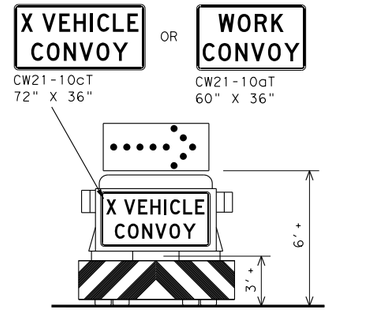
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



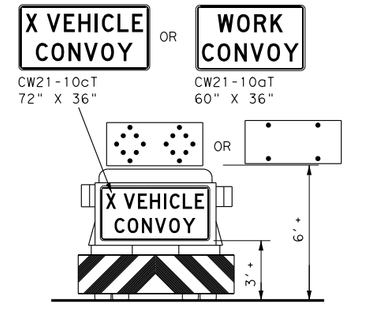
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



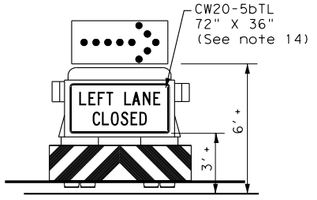
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

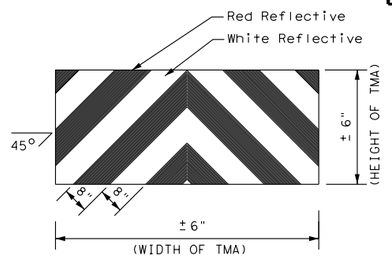


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

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REVISIONS	3487	01	001	TOLL 49
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	TYL	SMITH		30
1-97 7-14				

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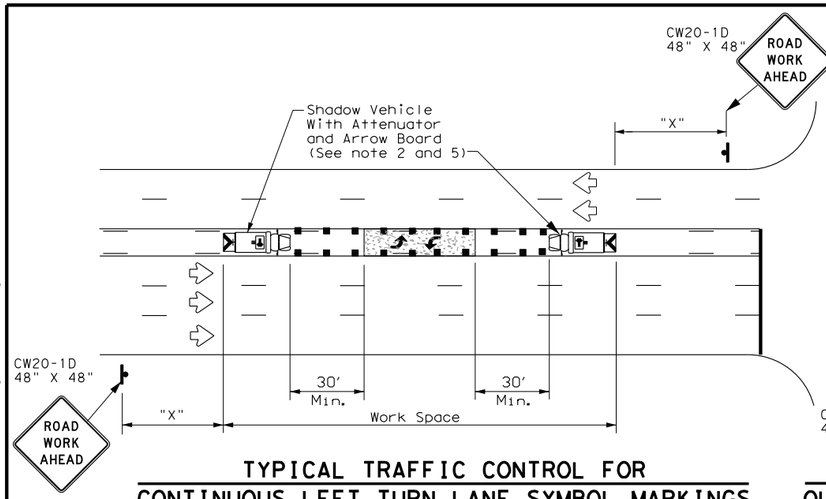
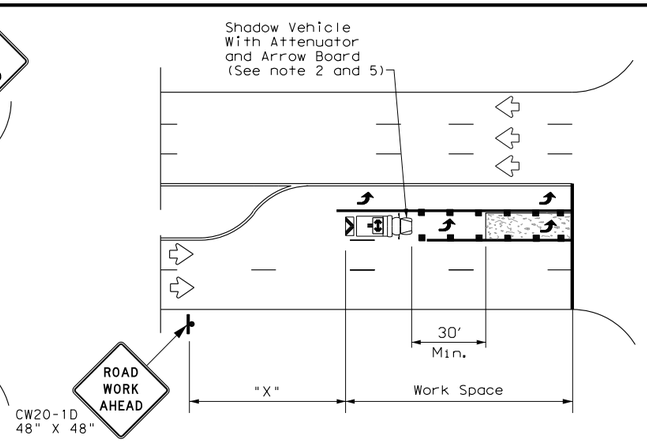
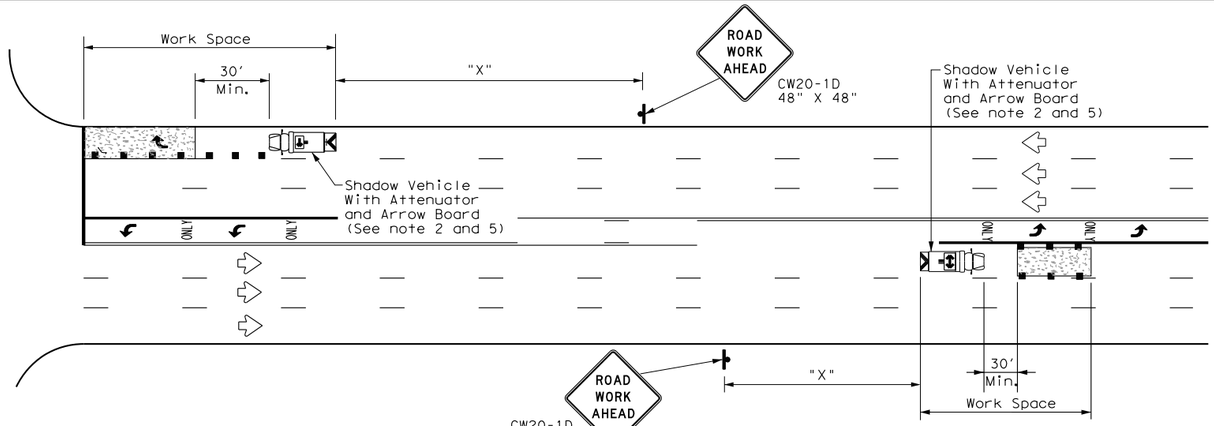


TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

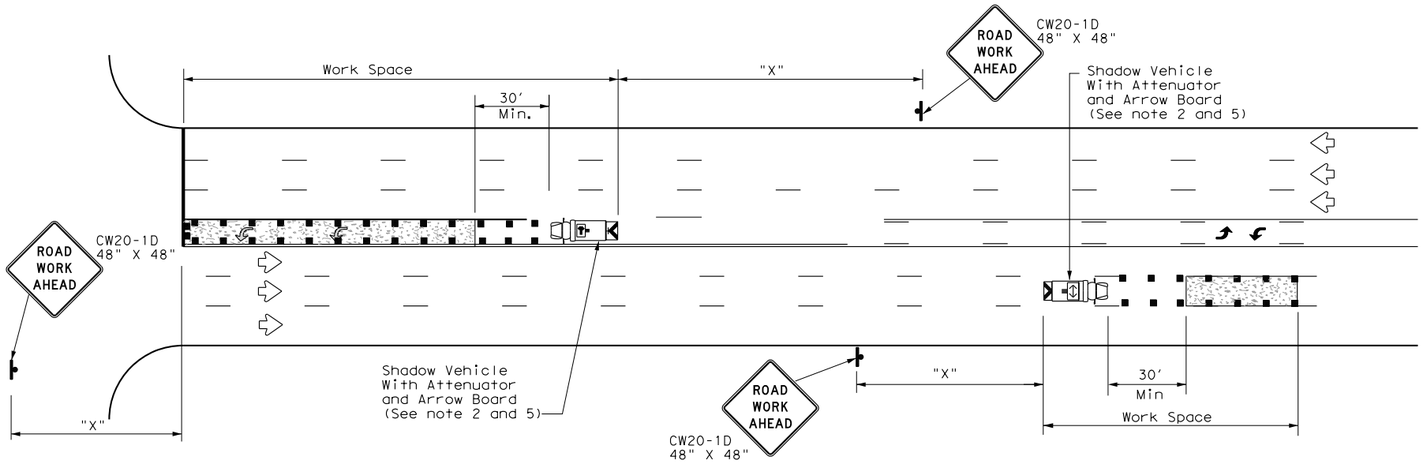


TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR
OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
CENTER LANE MARKINGS

LEGEND			
✳	Trail Vehicle	ARROW BOARD DISPLAY	
✳✳	Shadow Vehicle		
✳✳✳	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow	■ ■ ■	Channelizing Devices

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

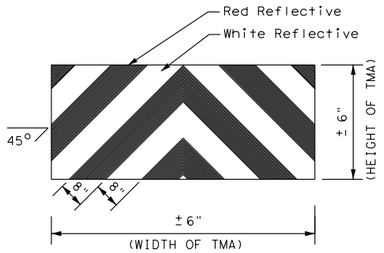
1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.

2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.

3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.

4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		31

178

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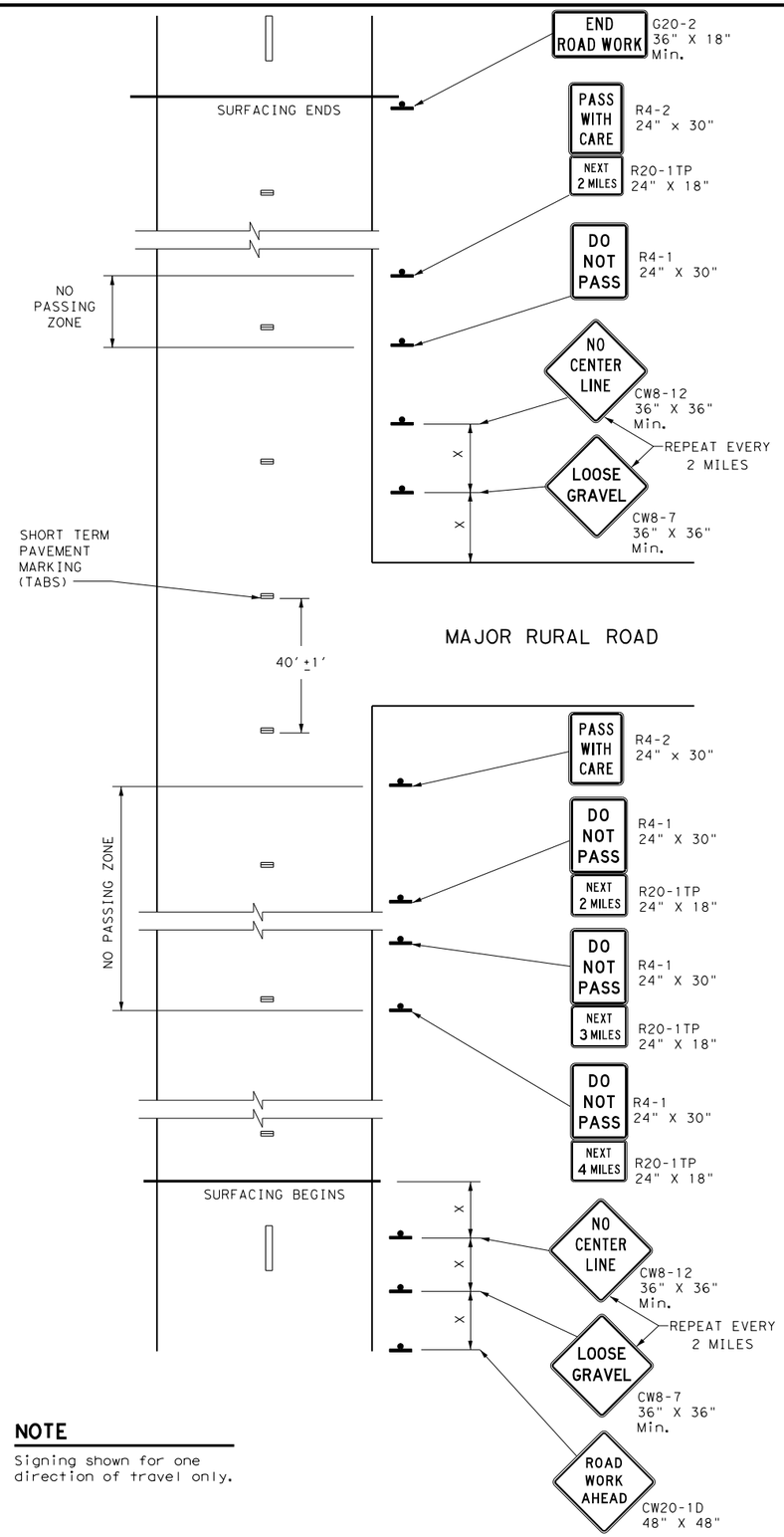
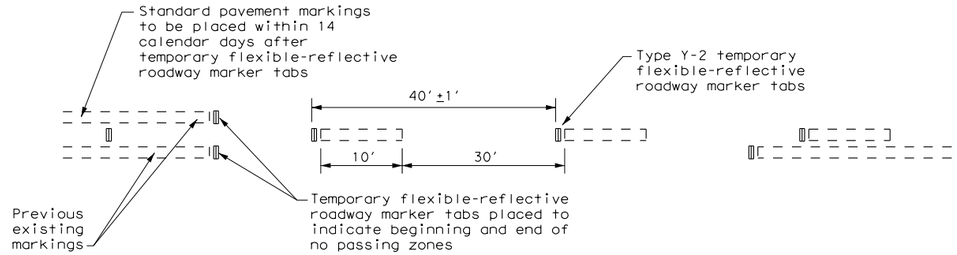


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
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4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	TYL	SMITH		32

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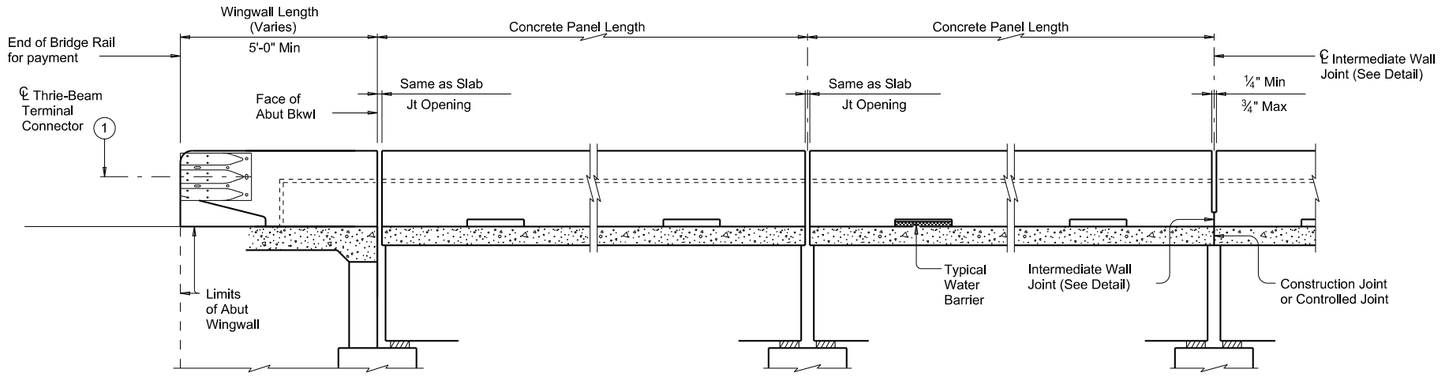
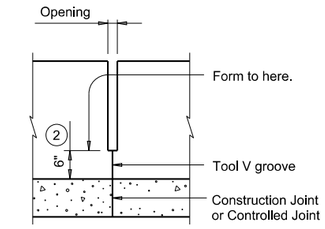


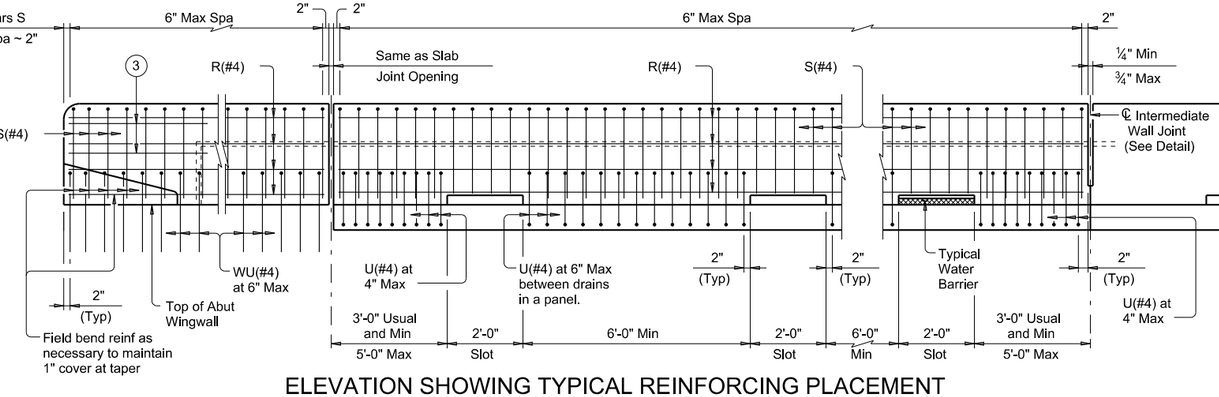
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

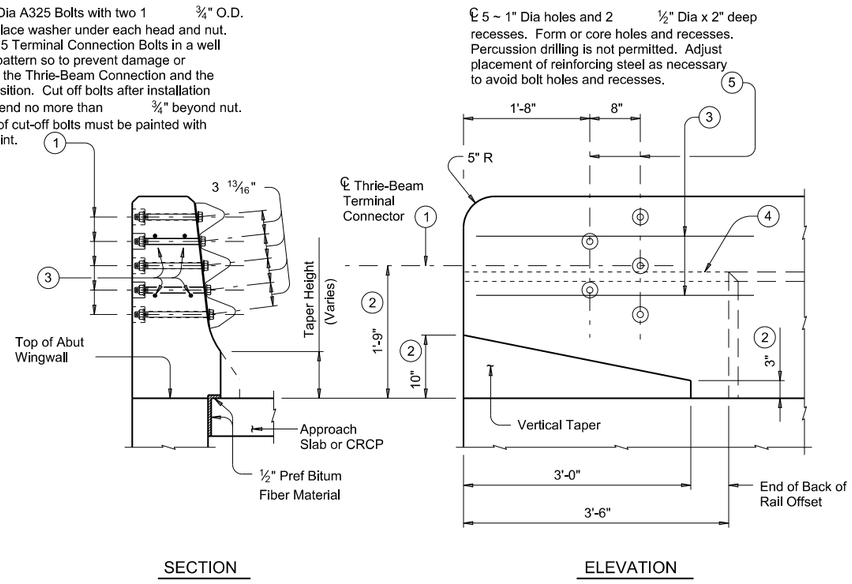


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with ACP Overlay.
3. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.
4. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
5. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL

TYPE T552

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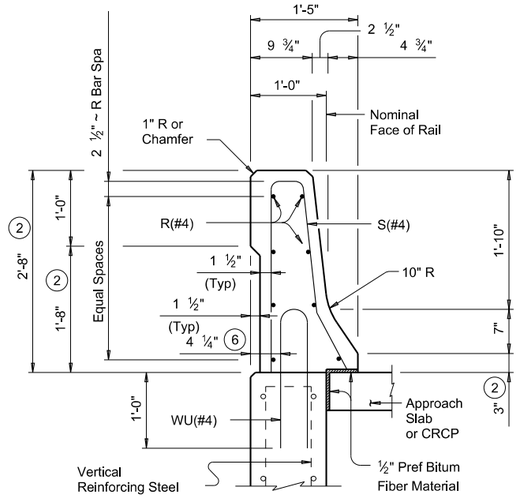
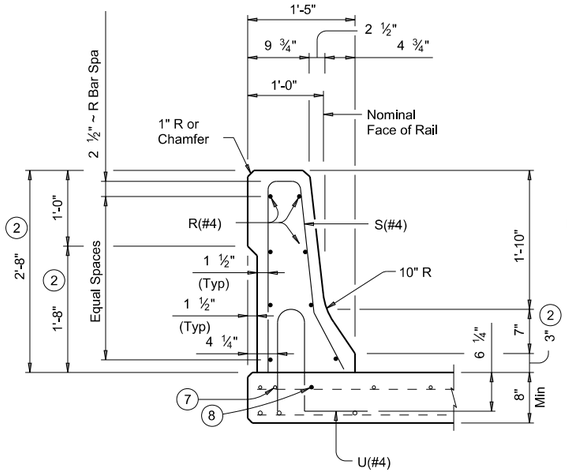
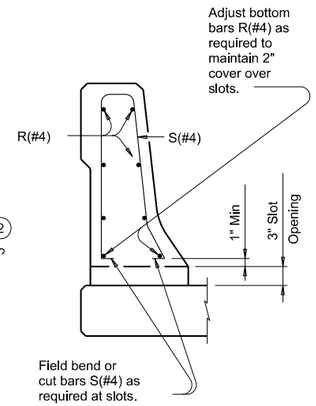


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB



ON BRIDGE SLAB AT SIDE SLOT DRAIN

SECTIONS THRU RAIL

(2) Increase 2" for structures with ACP Overlay.

(6) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(7) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars will be furnished at the Contractor's expense.

(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) Bend or cut as required to clear drain slots.

(10) No longitudinal wires may be in top center of cage.

CONSTRUCTION NOTES:

This railing may be constructed with slip-forms when approved by the Engineer, with equipment approved by the Engineer. Sensor control for both line and grade must be provided. Tack welding to provide bracing for slip-form operations is acceptable. Welding can be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to U, WU and S bars at any location on the cage. If increased bracing is needed, additional anchorage devices must be added and welding must be performed in the upper two thirds of the cage.

The back of railing must be vertical unless otherwise shown on the plans or approved by the Engineer.

Water barriers must be provided at openings draining onto railroad tracks, undercrossing roadways and sidewalks. They may be cast in place or precast in convenient length and bonded to the bridge deck with an approved epoxy cement.

MATERIAL NOTES:

Galvanize all steel components except reinforcing steel unless otherwise shown in plans.

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat all rail reinforcement if slab bars are epoxy coated.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated ~ #4 = 1'-5"

Epoxy coated ~ #4 = 2'-1"

GENERAL NOTES:

This rail has been evaluated and approved to be of equal strength to railings with like geometry, which have been crash tested to meet NCHRP Report 350 TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

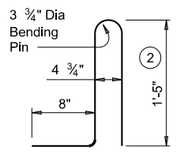
Shop drawings will not be required for this rail.

Average weight of railing with no overlay is 370 plf.

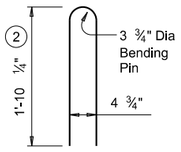
Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

BARS S (#4)



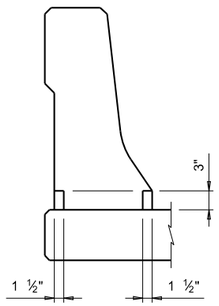
BARS U (#4)



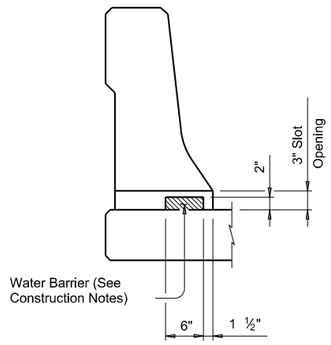
BARS WU (#4)

OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



CAST-IN-PLACE WATER BARRIER



PRECAST WATER BARRIER

OPTIONAL WATER BARRIERS

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T552

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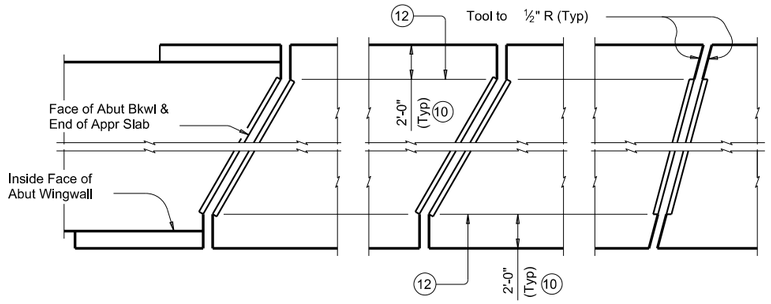
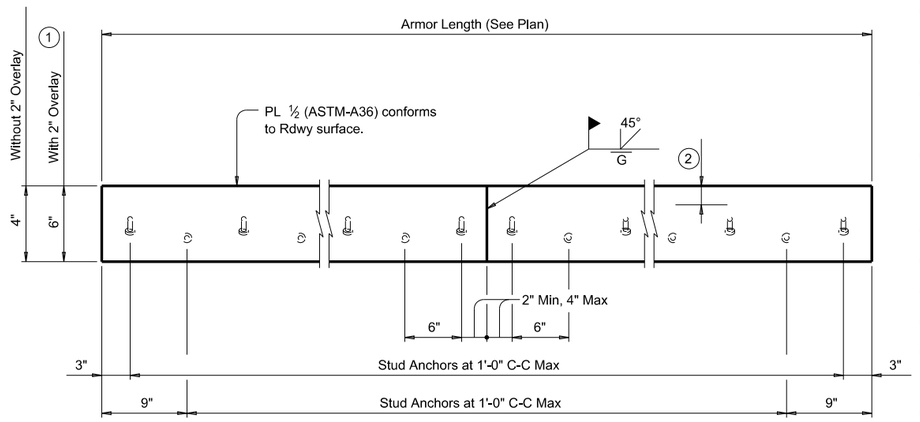
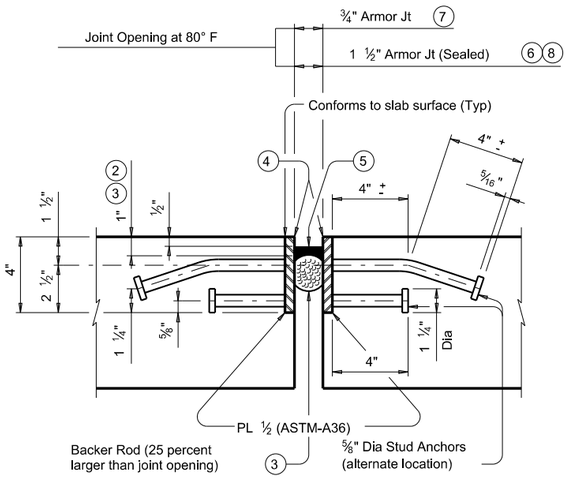


PLANS OF ARMOR PLATES

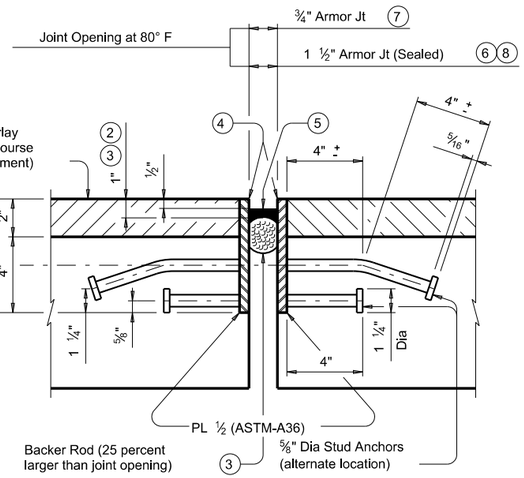


ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust values by 1.70 Lbs for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor Joint does not include joint sealant or backer rod.
8. Armor Joint (Sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



SHOWN WITH 2" OVERLAY AT JOINT LOCATION 1

ARMOR JOINT SECTIONS

Showing Armor Joint (Sealed)

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint portions of plate not in contact with concrete with the primer specified for System II paint.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

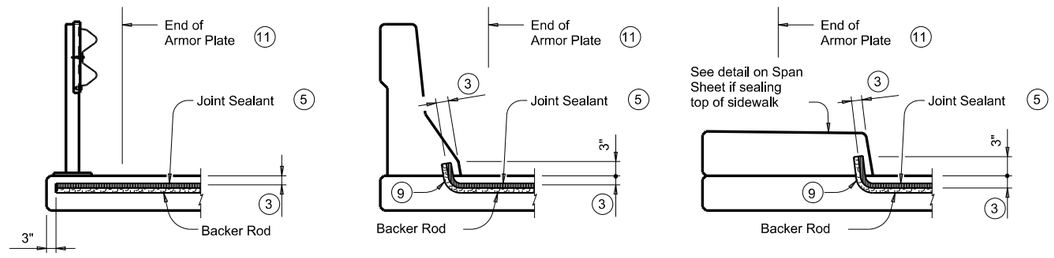
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans.

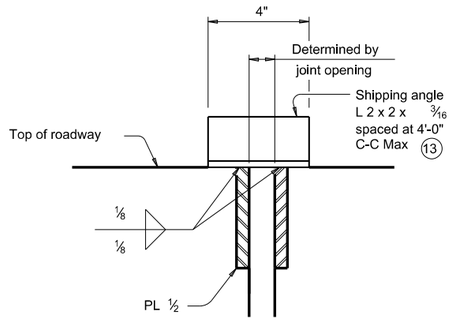
These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅝" closure movement).

Payment for armor joint, with or wthout seal, is based on length of armor plate.



JOINT SEALANT TERMINATION DETAILS

Armor Joint (Sealed) only. Armor Plate is not shown for clarity.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS P.L.F. FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 Lb
WITH 2" OVERLAY 1	22.90 Lb

Texas Department of Transportation

Bridge Division Standard

ARMOR JOINT DETAILS

AJ

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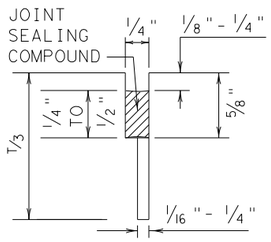
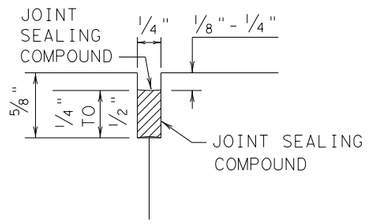
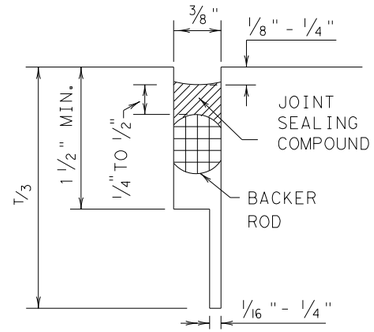
METHOD B: JOINT SEALING COMPOUND



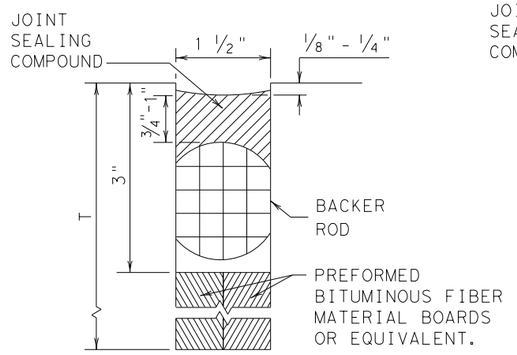
LONGITUDINAL SAWED CONTRACTION JOINT



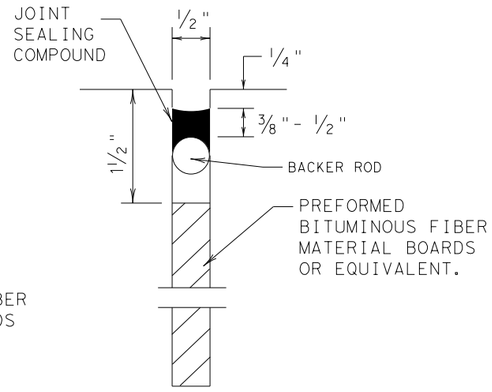
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

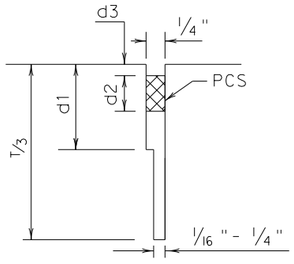


TRANSVERSE FORMED EXPANSION JOINT

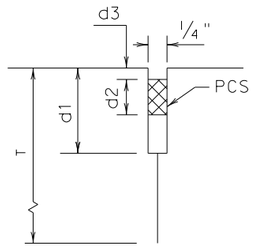


FORMED ISOLATION JOINT

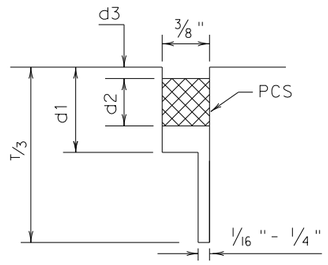
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



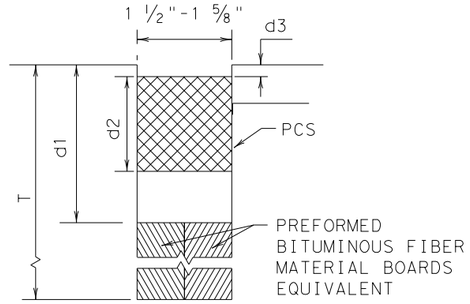
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
2. THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
3. THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
4. DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
5. REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
6. FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
7. FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7,OR 8 FOR MAINTAINING EXISTING JOINTS.
8. THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
9. ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

Texas Department of Transportation

Design Division Standard

CONCRETE PAVING DETAILS

JOINT SEALS

JS-14

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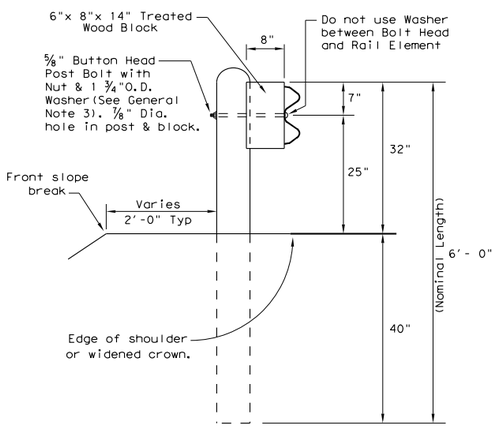
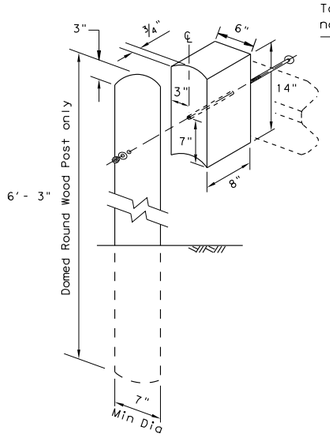
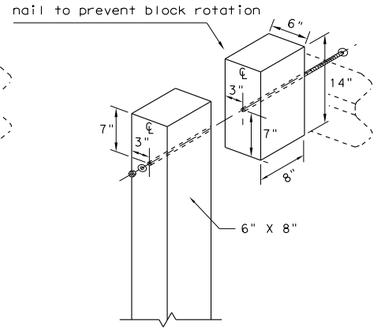


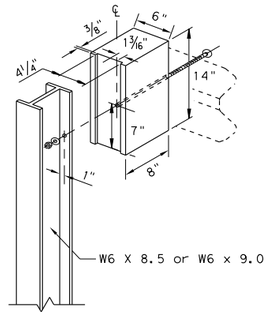
TYPICAL POST



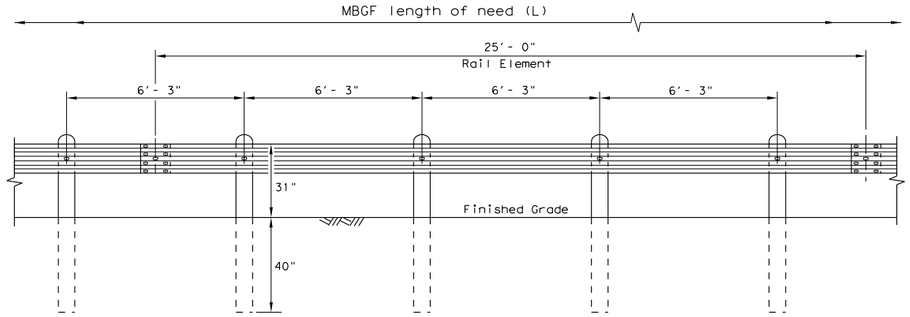
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

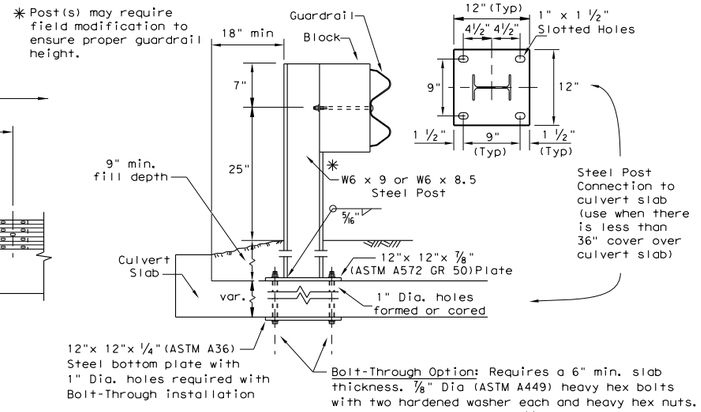


WOOD BLOCK TO STEEL POST



ELEVATION
MID-SPAN RAIL SPLICE

Showing a 25'- 0" section of W-Beam rail, 12'- 6" rail sections may also be supplied (See General Note 2)



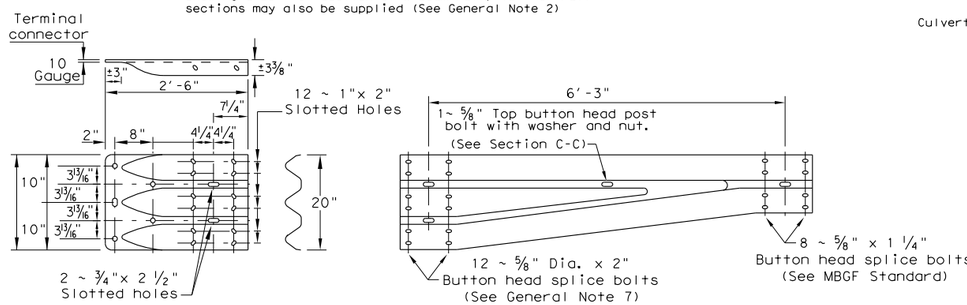
LOW FILL CULVERT POST

Culverts of 25 ft. or less, see GF(31)LS standard for "Long Span" option.

Epoxy Note:
Epoxy Anchor Option: This option may only be used if the culvert slab is 8" min. thick. Threaded anchor rods must be ⅞" Dia. ASTM A449 or A193 Grade B7 with heavy hex nut, and one hardened washer each. Embed anchor rods 6" with Hilti HIT RE 500 epoxy adhesive. Other Type III Class C epoxy adhesives meeting the requirements of DMS-6100, "Epoxies and Adhesives", may be used if it can be demonstrated that they meet or exceed the strength of Hilti HIT RE 500 with the same embedment depth and threaded rod dia. Follow the manufacturer's requirements for installing epoxied threaded rods. Extend rods ¼" min. beyond nut.

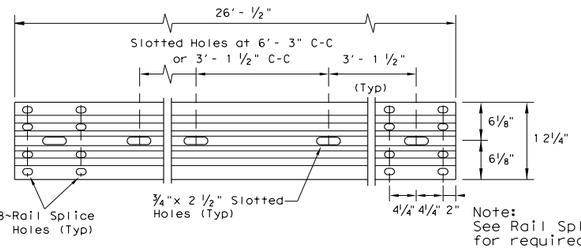
GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of MBGF shall be shown in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
2. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'- 0", or 12'- 6" (nom.) lengths. Rail elements may have slotted holes at 3'-1½" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563). Thrie beam "connection" ⅞" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
7. If shown elsewhere in the plans or as directed by the Engineer, the guard fence may be flared at a rate of 25:1 or flatter.
8. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the rail. Rail placed over curbs shall be installed so that the post bolt is located approximately 25 inches above the gutter pan or edge of shoulder.
9. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever maybe less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
10. Posts shall not be set in concrete, of any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL may furnish composite material posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.



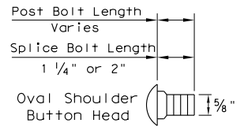
THRIE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 6 & 7 FOR REQUIRED HARDWARE)

NON-SYMMETRICAL TRANSITION
TO W-BEAM (10 Gauge)

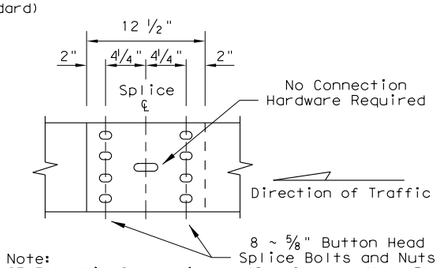


Note:
See Rail Splice Detail for required hardware.

ELEVATION 25'- 0"(NOM.) W-BEAM SECTION
12'- 6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)

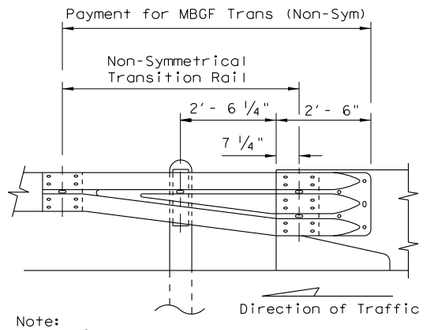


BUTTON HEAD BOLT
Post and Splice Bolts
(See General Note 3)



Note:
GF(31), Mid-Span rail splices are required with 6'-3" post spacings.

MID-SPAN
RAIL SPLICE DETAIL



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DOWNSTREAM RAIL ATTACHMENT

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE

GF(31)-14

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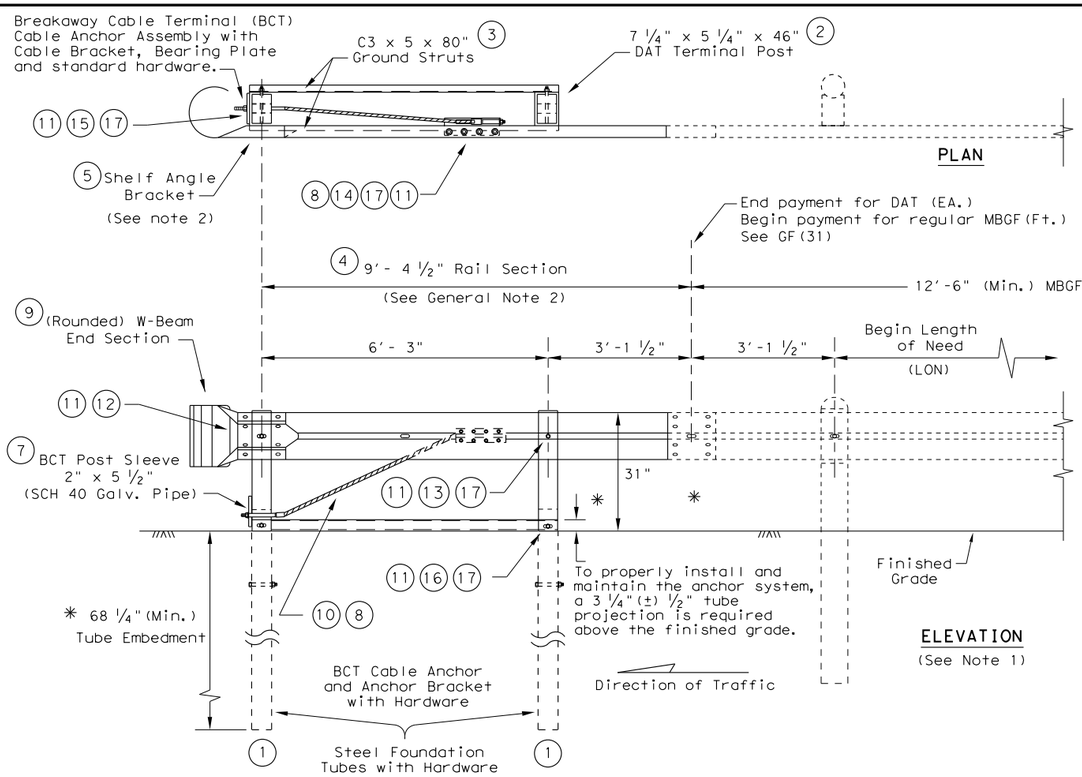


DOWNSTREAM ANCHOR TERMINAL (DAT)

Only for downstream use, when located outside the horizontal clearance area of opposing traffic.

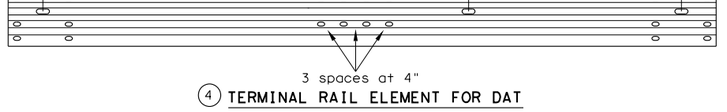
GENERAL NOTES

1. The detail shown is the minimum Length of Need (LON) for a DAT connected to a concrete rail.
2. The rail section at the end post is supported by the Shelf Angle Bracket. The rail element is not attached to the end post.
3. The foundation tubes shall not project more than 3 3/4" above the finished grade.
4. All hardware for DAT shall be ASTM A307 unless otherwise shown.
5. Refer to GF(31) sheet for terminal connection details.

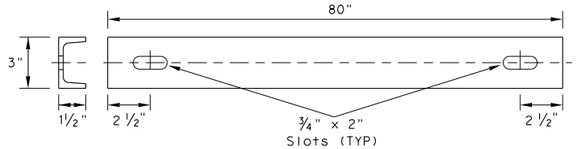
MOW STRIP INSTALLATION

If a mow strip is required with the DAT installation the leave-out area around the steel foundation tubes and the two channel struts may be omitted. This will require a full pour at the foundation tubes.

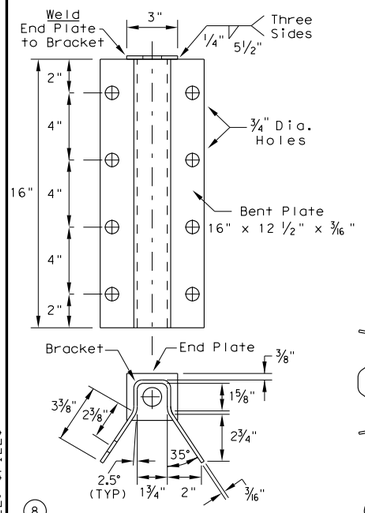
#	(DAT) PARTS LIST	QTY
(1)	Steel Foundation Tube	2
(2)	DAT Terminal Post	2
(3)	Channel Strut	2
(4)	Terminal Rail Element	1
(5)	Shelf Angle Bracket	1
(6)	BCT Bearing Plate	1
(7)	BCT Post Sleeve	1
(8)	Guardrail Anchor Bracket	1
(9)	(Rounded) W-Beam End Section	1
(10)	BCT Cable Anchor	1
(11)	Recessed Nut, Guardrail	20
(12)	1 1/4" Button Head Bolt	4
(13)	10" Button Head Bolt	2
(14)	5/8" x 2" Hex Head Bolt	8
(15)	5/8" x 8" Hex Head Bolt	4
(16)	5/8" x 10" Hex Head Bolt	2
(17)	5/8" Flat Washer	18



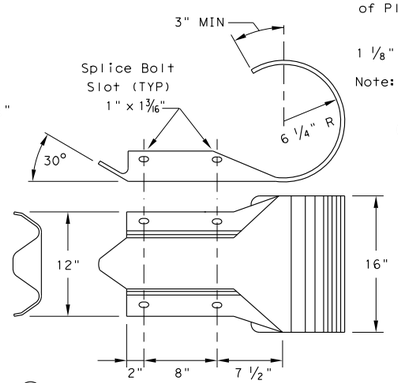
(4) TERMINAL RAIL ELEMENT FOR DAT



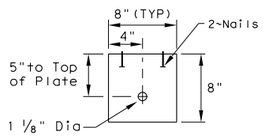
(3) CHANNEL STRUT
C3 x 5 x 80", Grade A36



(8) GUARDRAIL ANCHOR BRACKET

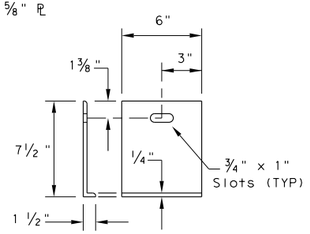


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

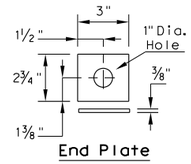


Note: Drive nails and bend over to prevent plate rotation

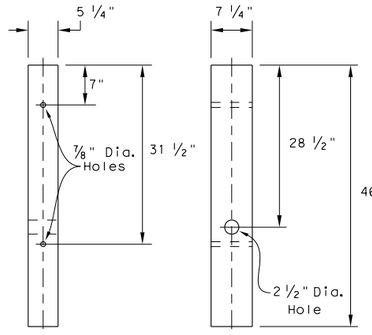
(6) BEARING PLATE
8"x 8"x 5/8" R



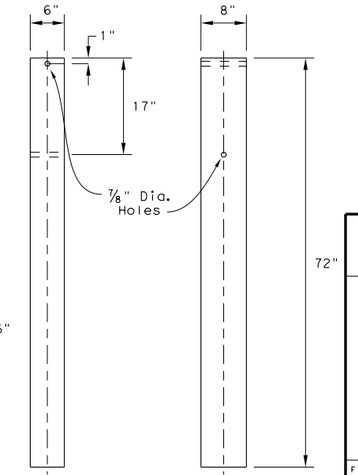
(5) SHELF ANGLE BRACKET



End Plate



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" Wood Post



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" Steel Tube

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
(Downstream Anchor Terminal)

GF(31)DAT-14

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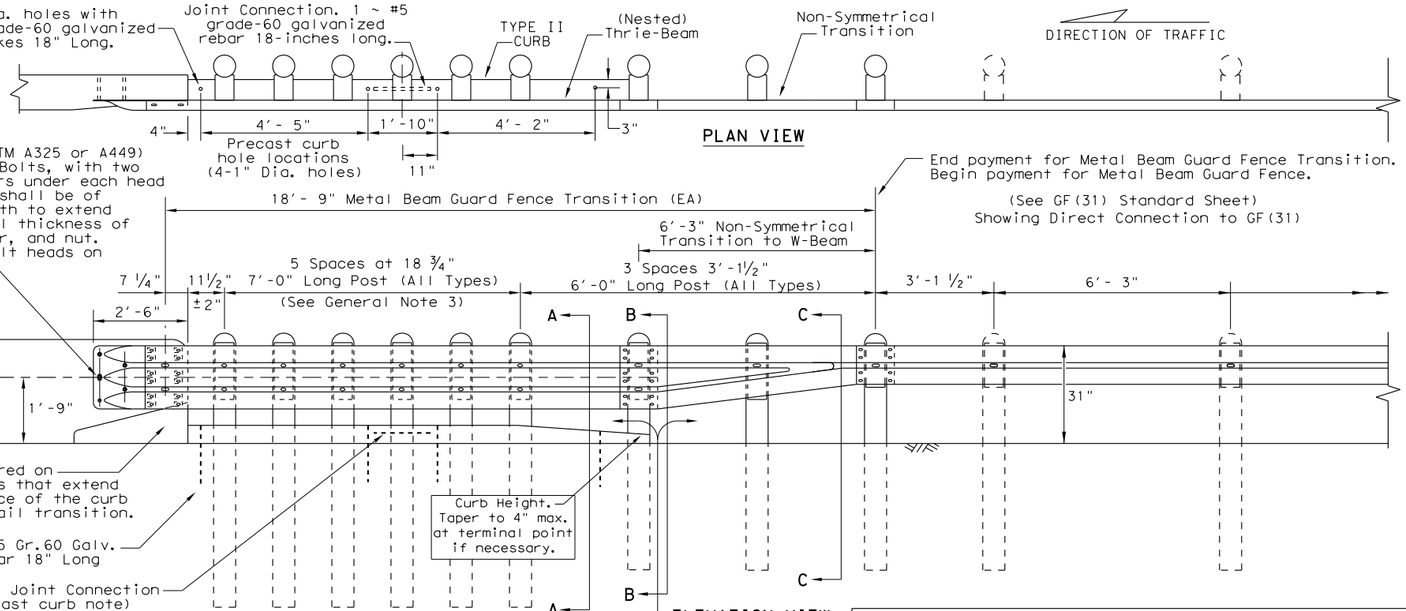
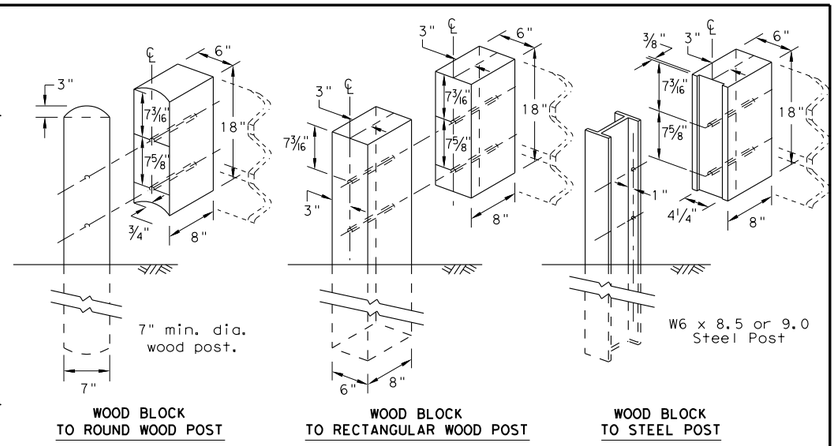




GENERAL NOTES

1. Concrete curb may be cast-in-place or precast as shown on this sheet. When used in conjunction with thrie-beam guard fence transitions, curb shall be Type II (Typically 5-3/4" height above surface; See CCCG standard sheet) unless otherwise shown in the plans. If other curb heights are shown in the plans in conjunction with the transition, the curb height may be from 4" to 8" with a relatively vertical face. Concrete curb shall be continuous to the seventh post.

   Contact the Design Division for drainage cut out options needed within the curb section of the transition.

2. The type of post (round wood post, rectangular wood post or steel post) will be as shown in the plans.

3. The post length shall be marked on all 7'- 0" long posts by the Manufacturer. The mark shall be located within the top 1 ft. region of the post, at least 5/8" in height, and visible after installation. Wooden posts shall be marked with a brand, and steel posts with a stencil before galvanizing.

4. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified on the plans. The thrie-beam terminal connector and the thrie-beam transition to w-beam shall be of the same material, but shall not be less than 10 gauge.

   Contractor shall verify that the locations of bolt holes match those in the thrie-beam terminal connector prior to ordering materials.

5. Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.

6. Galvanized washers used with the 5/8" dia. post bolts shall be Type A 1-3/4" O.D. washers. The (12) plate washers (FWR03) required at the terminal connector splice.

7. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) 5/8" dia.x 2" (at triple rail splices) with 5/8" double recessed nuts.

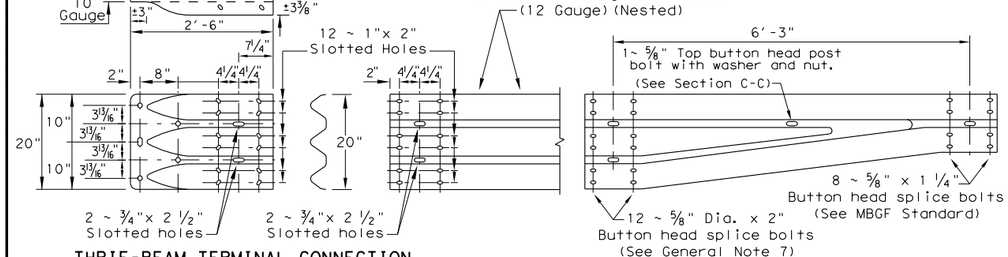
8. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445,"Galvanizing". Fittings shall be subsidiary to the bid item.

9. Crown shall be widened to accommodate transitions.

10. If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.

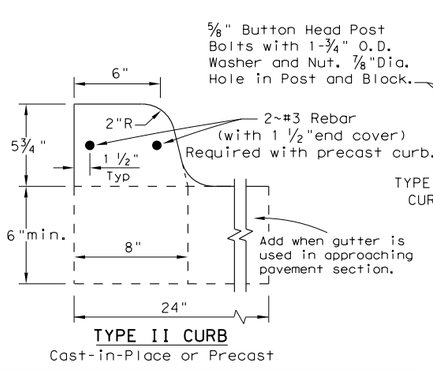
11. Posts shall not be set in concrete.

12. Unless otherwise shown in the plans, a composite material (post or block) that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for (post or block) of similar dimensions. TxDOT's Construction Division maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



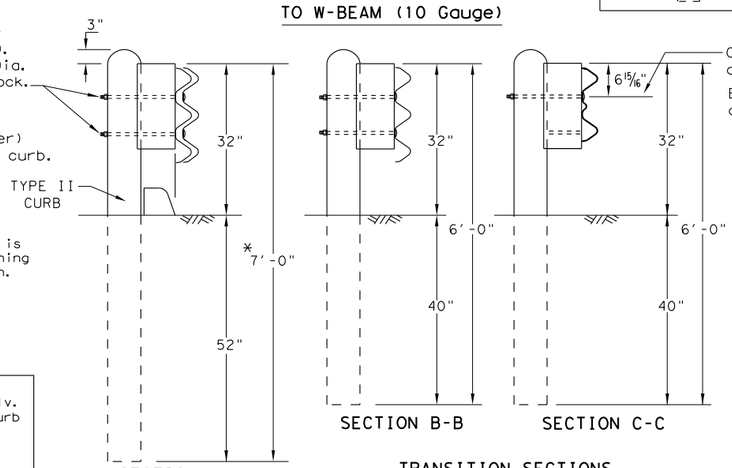
THRIE-BEAM TERMINAL CONNECTION
(See General Notes 6 & 7 for required hardware)

NON-SYMMETRICAL TRANSITION TO W-BEAM (10 Gauge)



TYPE II CURB
Cast-in-Place or Precast

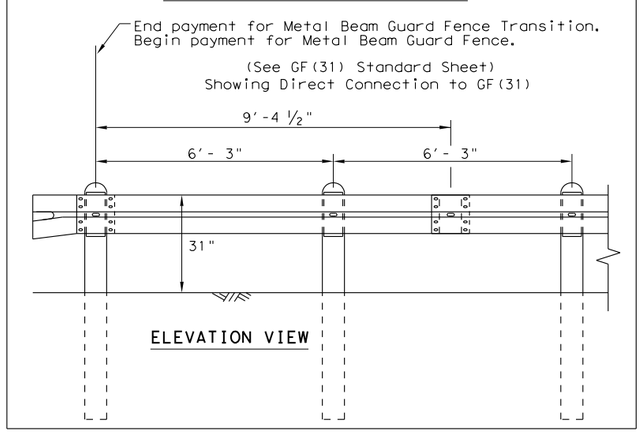
PRECAST CURB:
Type II Precast Curb secured with 4~#5 Gr.60 Galv. Rebar stakes 18" long. The 12'- 2" section of curb may be cast in two sections.
Section ① 5'- 8" long
Section ② 6'- 6" long with the last 3'- 6" of curb tapered to a 4" height.
The Joint Connection is two 9" long 1" Dia. female ends connected with 1~#5 Gr.60 Galv.Rebar 18" long.

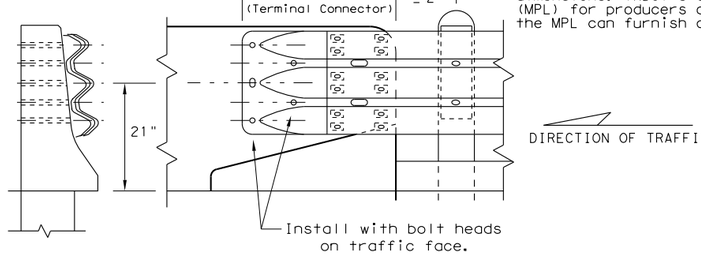


*Note: (All post types) (See General Note 3)

TRANSITION SECTIONS

ALTERNATE CONNECTION OPTION





CONNECTION TO CONCRETE BRIDGE RAIL AND TRAFFIC BARRIERS

(12) Galvanized rectangular washers (FWR03) are required under the recessed nut at the terminal connector splice to nested thrie-beam. (See General Notes 6 & 7).

DIRECTION OF TRAFFIC

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE TRANSITION
(Thrie-Beam Transition)
GF(31)TR-14

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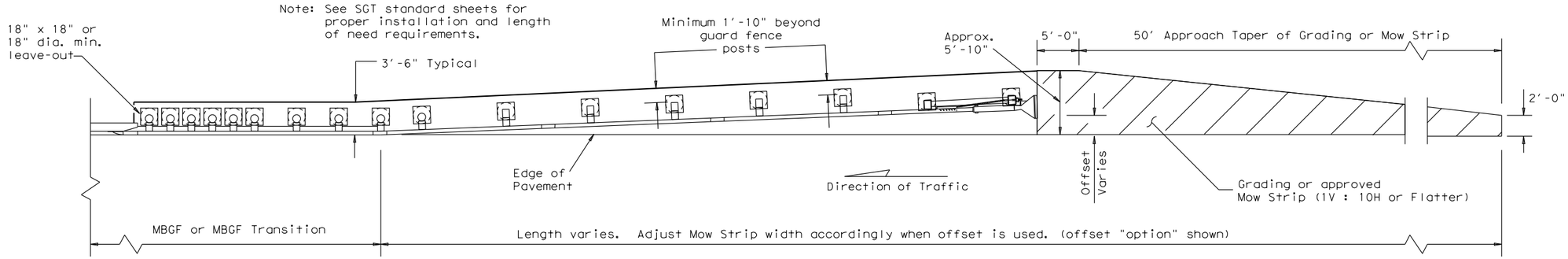
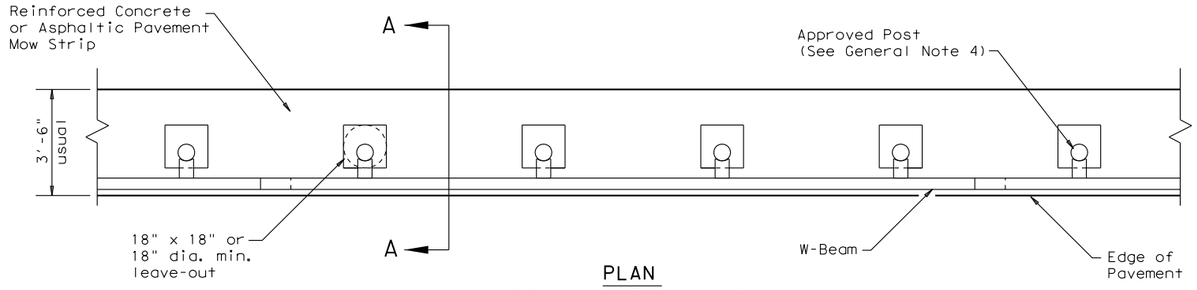
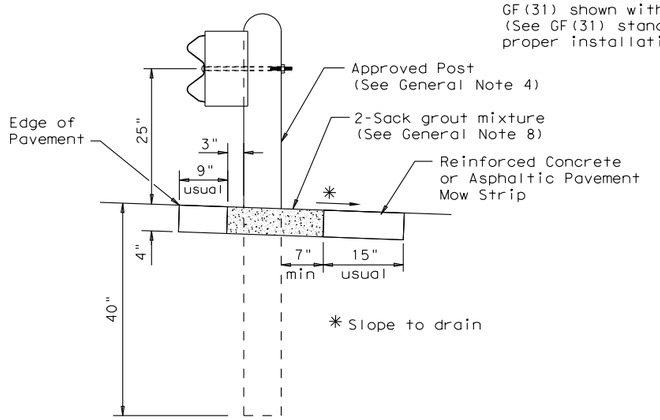


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



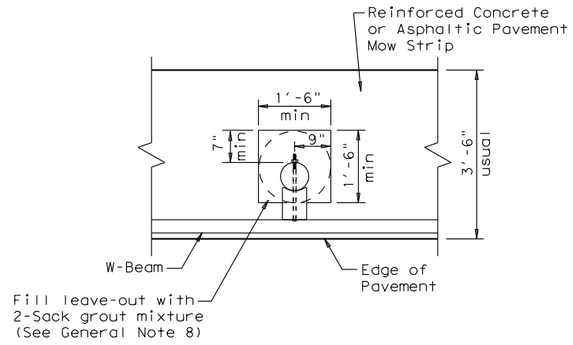
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



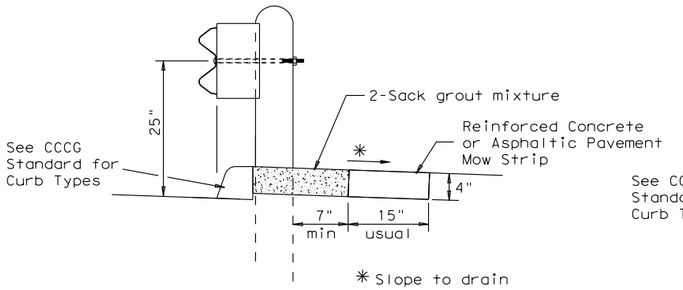
SECTION A-A

Typical



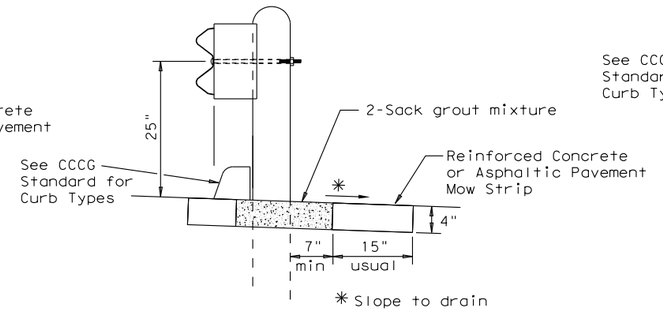
MOW STRIP DETAIL

Reinforced Concrete or Asphaltic Pavement Mow Strip with 18" x 18" or 18" dia. minimum leave-out.



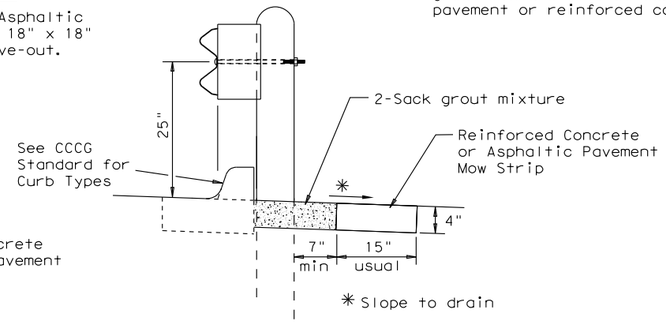
CURB OPTION (1)

This option will increase the post embedment through out the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments (See SGT standards for proper SGT installation).
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown in the plans. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. The type of approved post will be as shown in the plans. See the applicable standard sheets for additional details and information.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for asphaltic pavement or reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with no more than a 2-sack grout mixture and placed in accordance with Section 421.2.F, "Mortar and Grout." Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of asphaltic pavement or reinforced concrete.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE

(MOW STRIP)

GF(31)MS-11

FILE: gf31ms11.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		40

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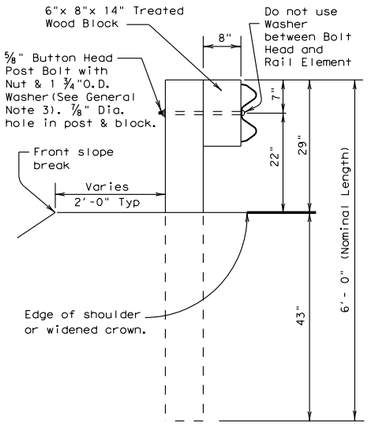
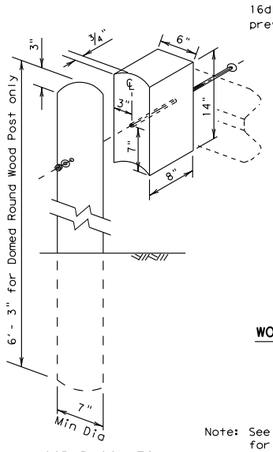
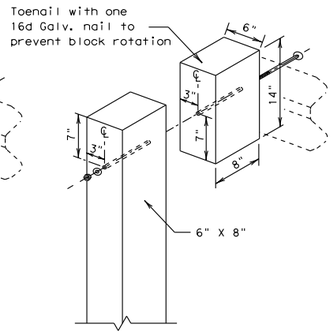


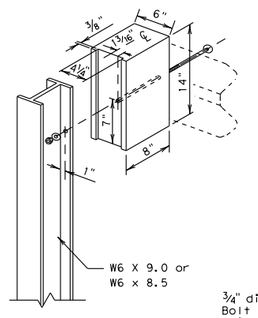
TYPICAL POST



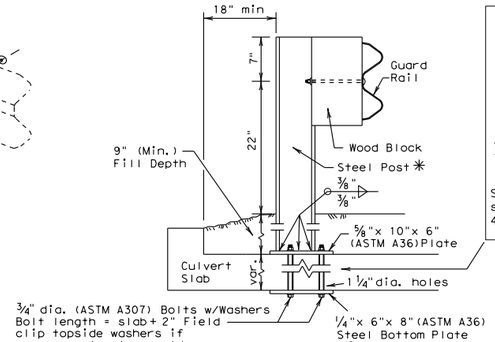
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

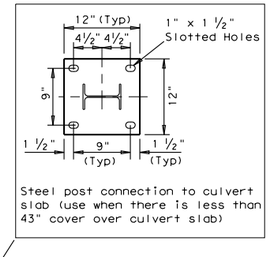


WOOD BLOCK TO STEEL POST

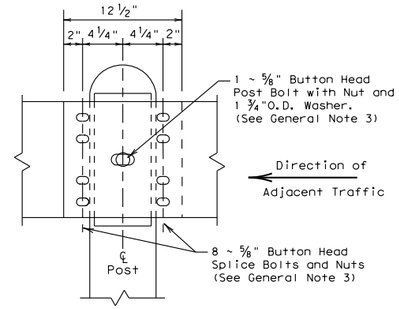


✳ LOW FILL CULVERT POST

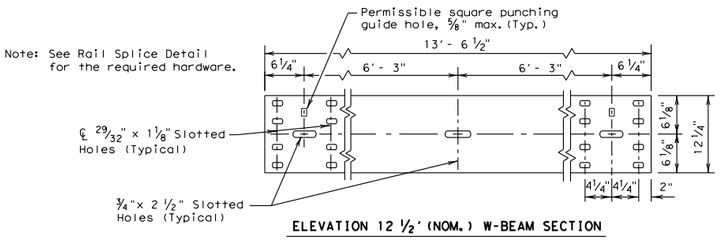
FOR USE ON NON-BRIDGE CLASS CULVERTS ONLY



✳ Post(s) may require field modifications to ensure proper guardrail height.



RAIL SPLICE DETAIL

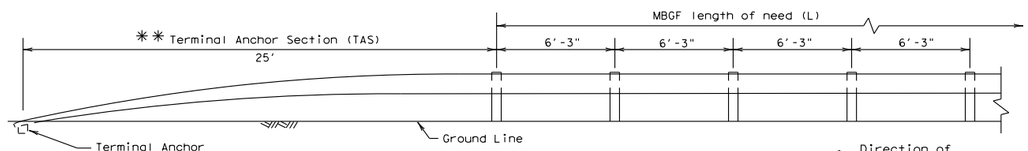


ELEVATION 12 ½' (NOM.) W-BEAM SECTION

25 foot sections may also be supplied (See General Note 2)

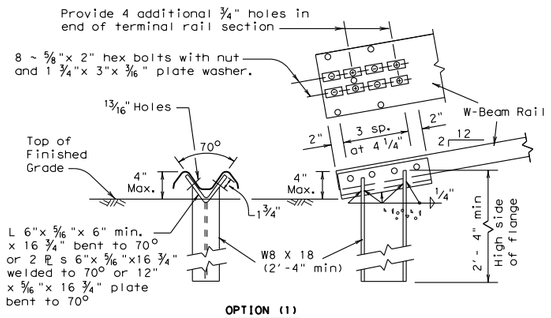
GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
2. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 ½ or 25 foot nominal lengths.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.)washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563).
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
7. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
8. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18",drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
9. Posts shall not be set in concrete, of any depth.
10. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
11. The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421,"Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



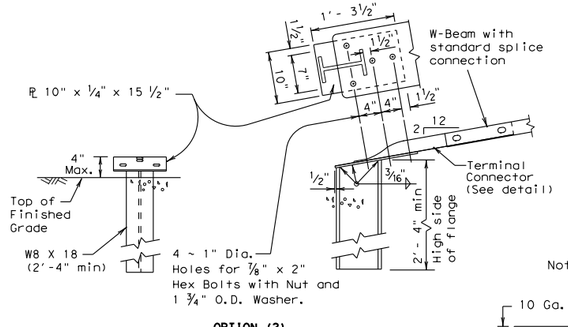
✳✳ TERMINAL ANCHOR SECTION (TAS)

Terminal anchor sections are only for downstream use, when located outside the horizontal clearance area of opposing traffic.



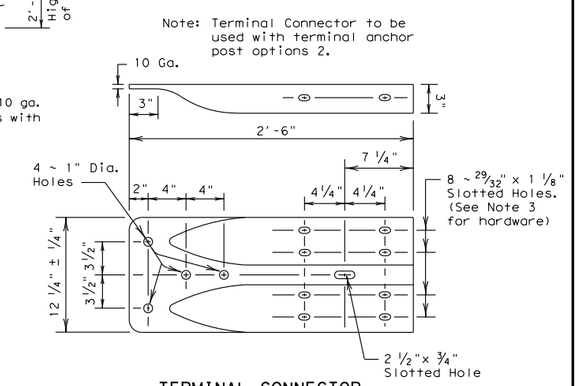
OPTION (1)

Note: This anchor post requires four additional ¾" holes (shop or field) in the rail member with eight ⅝" hex bolts with nut and plate washer.



OPTION (2)

Note: This anchor post requires the use of the 10 ga. terminal connector with four ⅞" hex bolts with nut and washer.



TERMINAL CONNECTOR

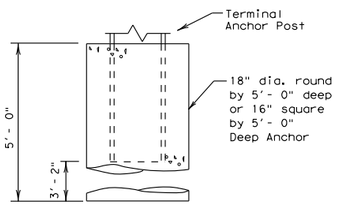
For connection hardware to concrete rails, see the MBGF transition standards.

BUTTON HEAD BOLT

Post and Splice Bolts (See General Note 3)

TERMINAL ANCHOR POST OPTIONS

(See General Note 11)



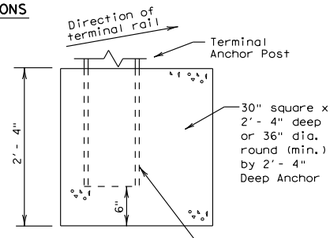
Notes:

Either concrete anchor may be used with either post option above.

No construction joint is allowed in the concrete anchor.

Terminal rail may be bolted to post and in twist position prior to placing concrete anchor.

If concrete anchor is precast, the area should be compacted as directed by the Engineer, when placed in the field.



TERMINAL CONCRETE ANCHOR OPTIONS

(See General Note 11)

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE

MBGF-11

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REVISIONS 12-2011	3487	01	001	TOLL 49
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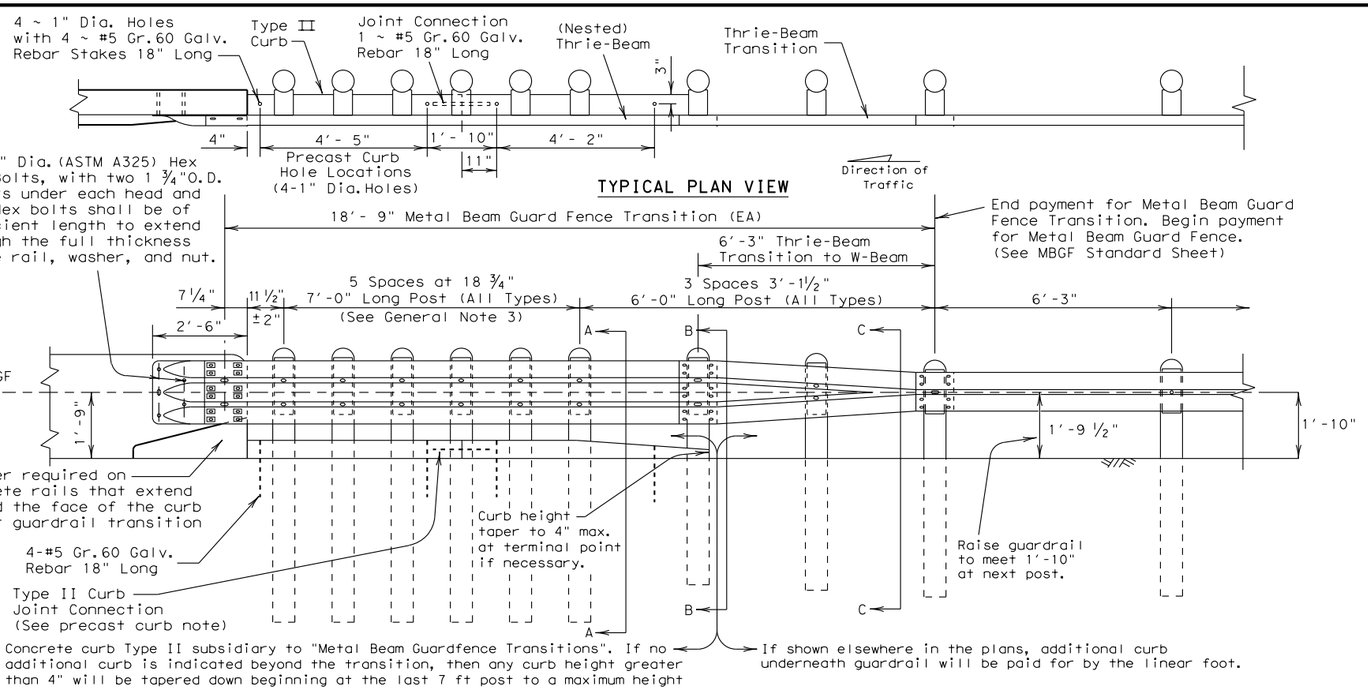
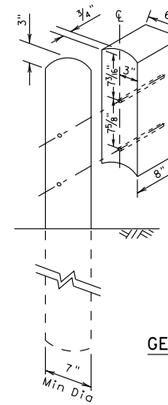
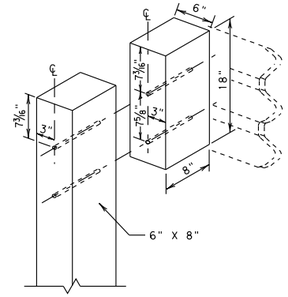
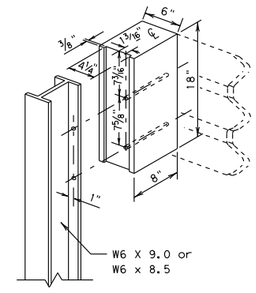




WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



WOOD BLOCK TO STEEL POST

GENERAL NOTES

1. Concrete curb may be cast-in-place or precast as shown on this sheet. When used in conjunction with thrie-beam guard fence transitions, curb shall be Type II (Typically 5 3/4" height above surface; See CCCG standard sheet) unless otherwise shown in the plans. If other curb heights are shown in the plans in conjunction with the transition, the curb height may be from 4" to 8" with a relatively vertical face. Concrete curb shall be continuous to the seventh post.

   Contact the Design Division for drainage cut options needed within the curb section of the transition.

2. The type of post (round wood, rectangular wood or steel) will be shown elsewhere in the plans.

3. The post length shall be marked on all 7'- 0" long posts by the Manufacturer. The mark shall be located within the top 1 ft. region of the post, at least 5/8" in height, and visible after installation. Wooden posts shall be marked with a brand, and steel posts with a stencil before galvanizing.

4. Rail element shall meet the requirements of Item 540,"Metal Beam Guard Fence" except as modified on the plans. The thrie-beam terminal connector and the thrie-beam transition to w-beam shall be of the same material, but shall not be less than 10 gauge.

   Contractor shall verify that the locations of bolt holes match those in the thrie-beam terminal connector prior to ordering materials.

5. Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.

6. Galvanized washers used with the 5/8" dia. post bolts shall be Type A 1 3/4" O.D. washers. The (24) plate washers required at the terminal connector splice are 1 3/4"x 3"x 3/16" plate washers with a 1 1/16"x 1" hole.

7. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) 5/8" Dia.x 2" (at triple rail splices) with 5/8" double recessed nuts.

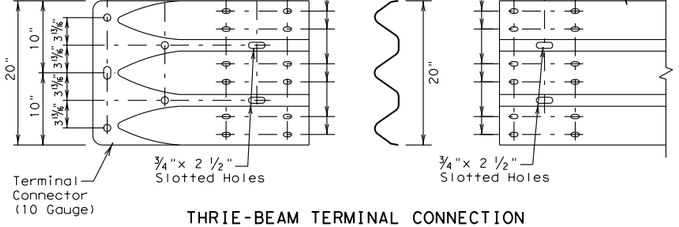
8. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445,"Galvanizing".Fittings shall be subsidiary to the bid item.

9. Crown shall be widened to accommodate transitions.

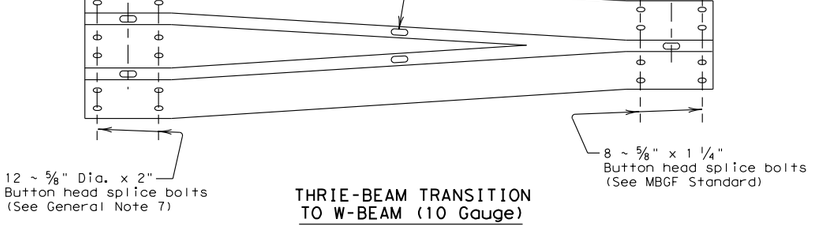
10. If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.

11. Posts shall not be set in concrete.

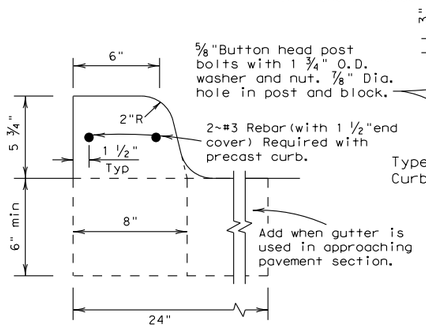
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210,"Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



THRIE-BEAM TERMINAL CONNECTION
(See General Notes 6 & 7 for required hardware)

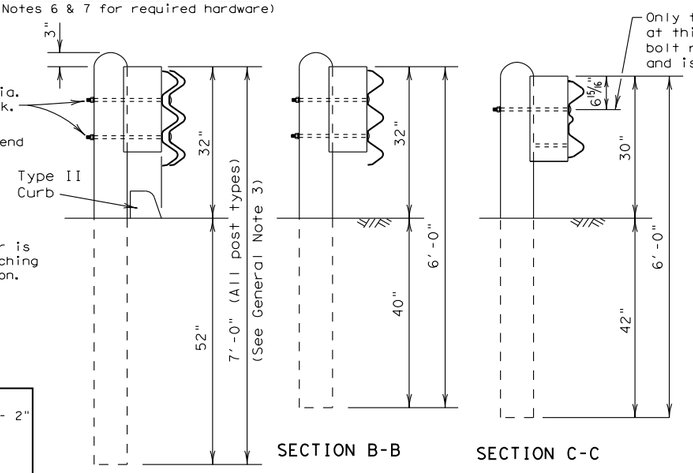


THRIE-BEAM TRANSITION TO W-BEAM (10 Gauge)

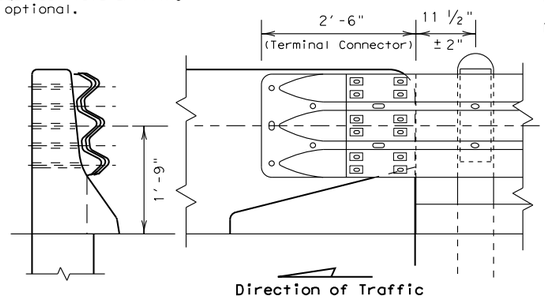


TYPE II CURB
Cast-in-Place or Precast

PRECAST CURB: Type II Precast Curb secured with 4~#5 Gr.60 Galv. Rebar stakes 18" long. The 12'- 2" section of curb may be cast in two sections.
Section ① 5'- 8" long
Section ② 6'- 6" long with the last 3'- 6" of curb tapered to a 4" height.
The Joint Connection is two 9" long 1" dia female ends connected with 1~#5 Gr.60 Galv.Rebar 18" long.



TRANSITION SECTIONS



CONNECTION TO CONCRETE BRIDGE RAIL AND TRAFFIC BARRIERS

Galvanized plate washers are required under the button head and nut at the terminal connector splice to nested thrie-beam. (See General Notes 6 & 7).
The 5 ~ 7/8" Dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE TRANSITION
(Thrie-Beam Transition)
MBGF(TR)-11

FILE: mbgftr11.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
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	TYL	SMITH		42

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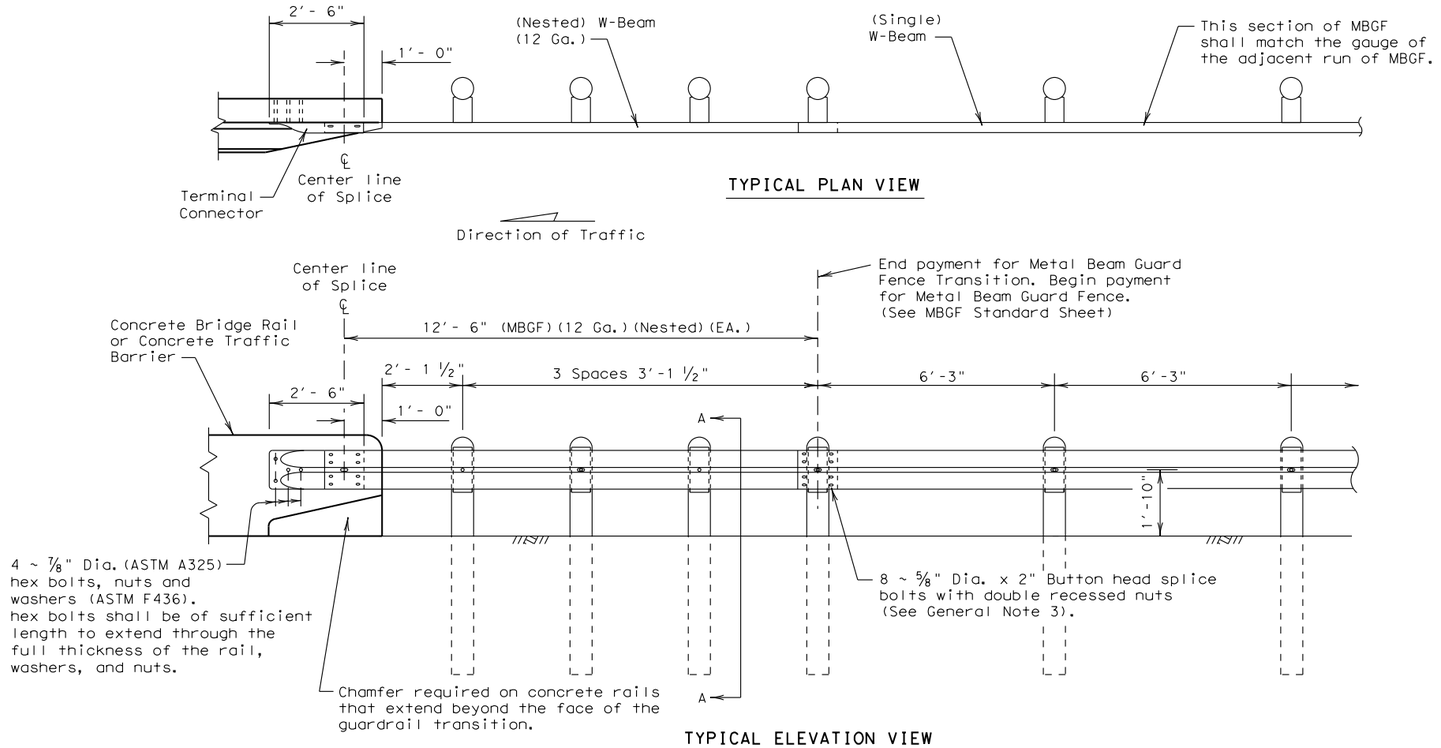
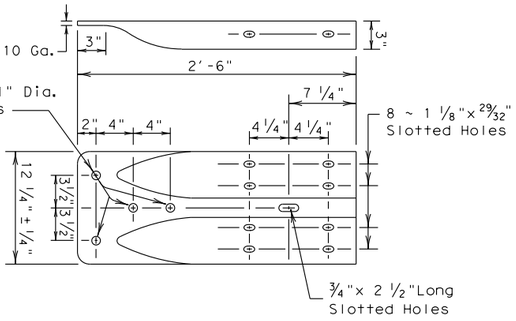


TYPICAL PLAN VIEW

TYPICAL ELEVATION VIEW

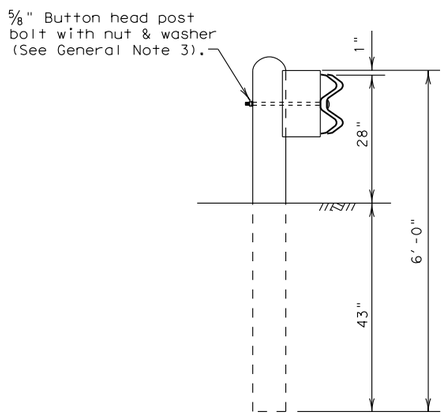
GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer.
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut and Type A 1 ¾" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 2" (at triple rail splices) with ⅝" double recessed nuts (ASTM A563).
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
5. Crown will be widened to accommodate transitions.
6. If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.
7. Posts shall not be set in concrete.
8. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT, maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.
9. Refer to MBGF standard sheet for additional details.

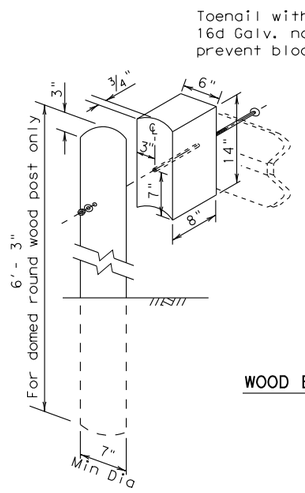


TERMINAL CONNECTOR

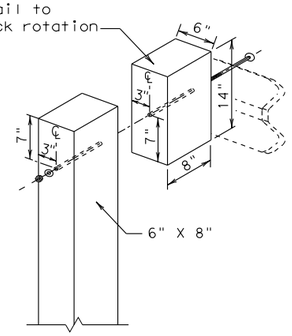
FOR USE WITH MBGF CONNECTIONS TO CONCRETE BRIDGE RAILS AND TRAFFIC BARRIERS



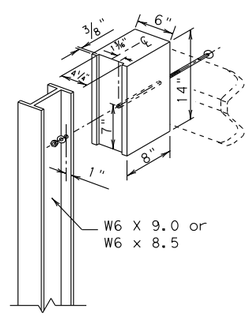
SECTION A-A



WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



WOOD BLOCK TO STEEL POST

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE TRANSITION (TL2)

(Low Speed Transition)

MBGF (TL2) - 11

FILE: mbgt1211.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
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REVISIONS 12-2011	3487	01	001	TOLL 49
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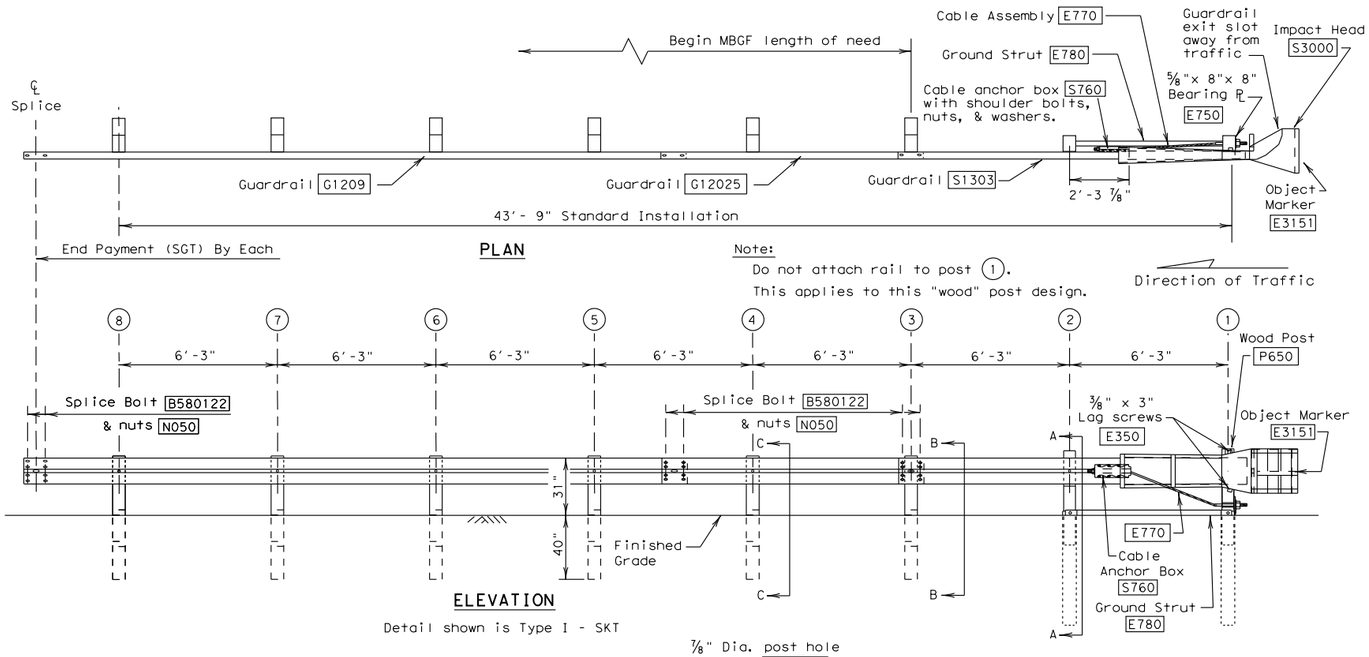

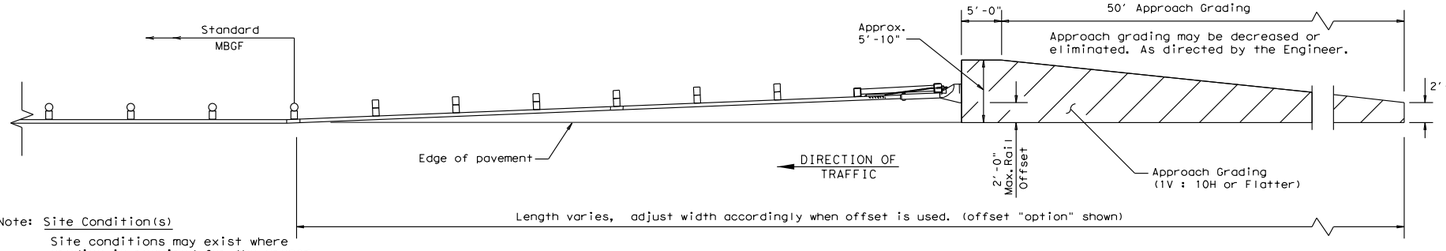

GENERAL NOTES

1. For additional information contact: Interstate Steel Inc. (432) 263-3725
2. The Type of SGT unit will be specified elsewhere in the plans. The numbers in the circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the systems performance.

	Post & Tube Options	Post Only
Type I	Posts (1) thru (2)	Posts (3) thru (8)
Type II	Posts (1) thru (4)	Posts (5) thru (8)
Type III	Posts (1) thru (8)	None

3. SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard rail elements may be installed within the radius, without special fabrication.
4. All bolts, nuts cable assemblies, cable anchors, steel tubes & bearing plates shall be galvanized.
5. A flare rate of 25:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer.
6. The steel tubes shall not protrude more than 4 inches above ground. Site grading may be necessary to meet this requirement.
7. The steel tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the steel tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent tube settlement.
8. If solid rock is encountered. See the Manufacturer's installation manual for the proper installation guidance.
9. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
10. The wood blocks shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks. The bearing plate on the front post shall also be "toe nailed" to prevent rotation.
11. For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the Engineer.
12. An object marker shall be installed on the front of the impact head as detailed on D&OM(VIA).

POST & TUBE OPTIONS	
Type I	post (1) thru (2)
Type II	post (1) thru (4)
Type III	post (1) thru (8)

BILL OF MATERIAL

Item #	POST & TUBE OPTIONS Type I	Type II	Type III	DESCRIPTION
S1303	1	1	1	Guardrail (12 Ga.) 12'- 6" SKT
G12025	1	1	1	Guardrail (12 Ga.) 9'- 4 1/2"
G1209	1	1	1	Guardrail (12 Ga.) 25'- 0"
S730	2	2	2	Steel Tube - 6" x 8" x 72" x 1/8" min. or 3/16"
S735	0	2	6	Steel Tube - 6" x 8" x 54" x 1/8" min. or 3/16"
P650	2	4	8	Wood Posts - 5 1/2" x 7 1/2" x 45"
P671	6	4	0	Wood CRT Posts - 6" x 8" x 72"
P675	6	6	6	Wood Block - 6" x 8" x 14"
E740	1	1	1	Pipe Sleeve - 2" Std. Pipe x 5 1/2"
E750	1	1	1	Bearing Plate - 5/8" x 8" x 8"
S760	1	1	1	Cable Anchor Box
E770	1	1	1	Cable Assembly
E780	1	1	1	Ground Strut
S3000	1	1	1	Impact Head
				HARDWARE
B580754	2	4	8	5/8" x 7 1/2" Hex Hd. Bolt
B581004	2	4	8	5/8" x 10" Hex Hd. Bolt (Top of Tubes)
W050	11	15	23	5/8" Washers
B581002	1	1	1	5/8" x 10" HGR Post Bolt (Post 2)
B580122	16	16	16	5/8" x 1 1/4" HGR Splice Bolt
B581802	6	6	6	5/8" x 18" HGR Post Bolt (Posts (3) thru (8))
N050	35	39	47	5/8" HGR Nut (24-Spl, Varies-Posts, 2-Strut)
E350	2	2	2	3/8" x 3" Lag Screw
N100	2	2	2	1" Hex Nut (Anchor Cable)
W100	2	2	2	1" Washer (Anchor Cable)
SB12A	8	8	8	Cable Anchor Box Shoulder Bolts
N012A	8	8	8	1/2" Structural Nut
W012A	8	8	8	1/2" Structural Washer
E3151	1	1	1	Object Marker - (18" x 18")

Texas Department of Transportation — Design Division Standard

SINGLE GUARDRAIL TERMINAL (SKT-31) (WOOD POST)

SGT(8)31-14

FILE: sgt83114.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: VP
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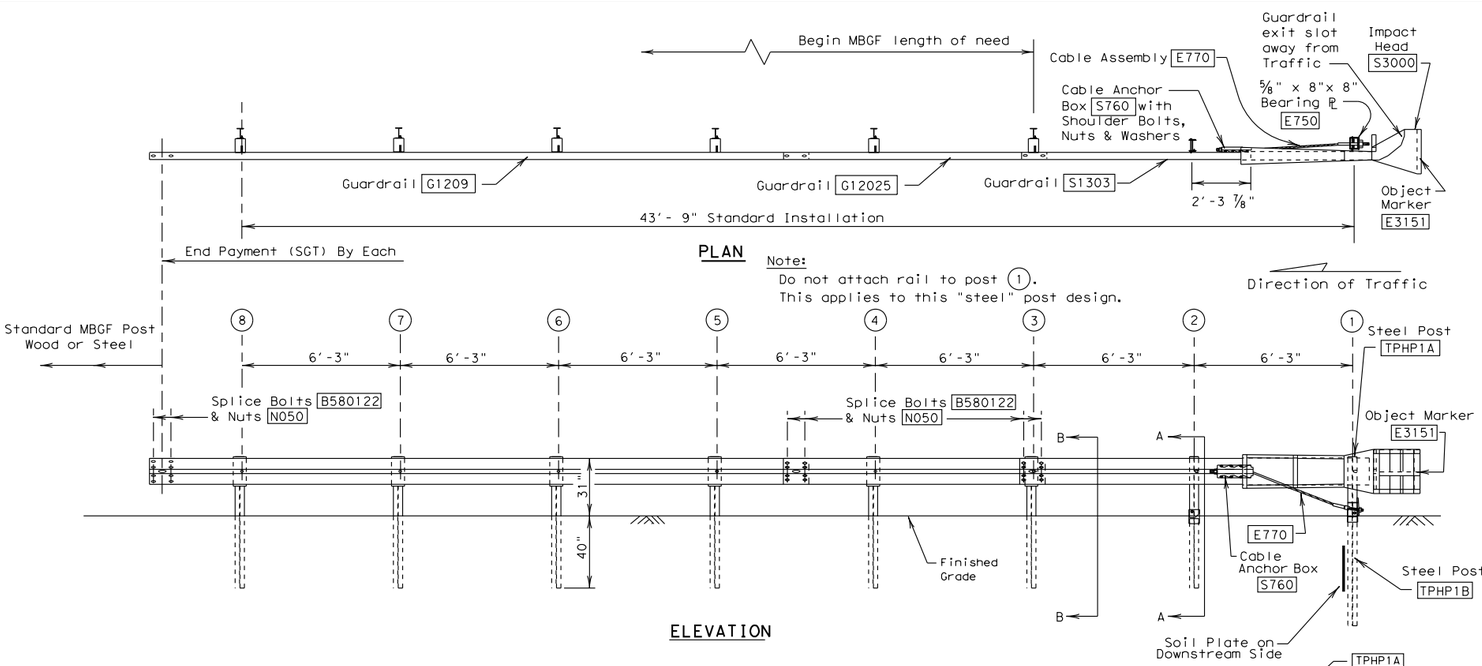
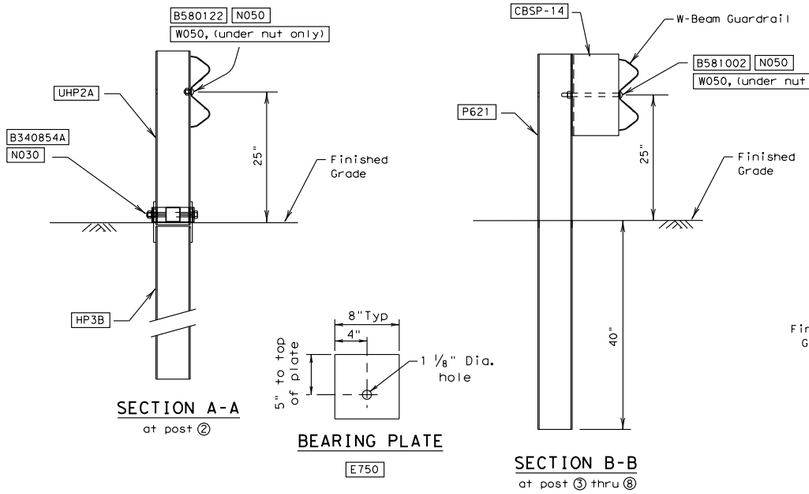
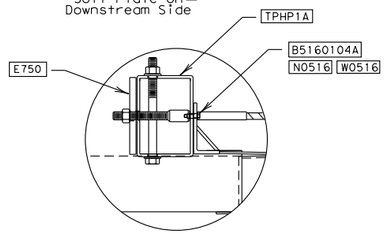
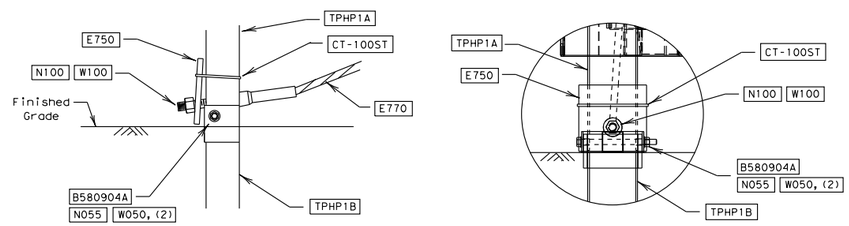
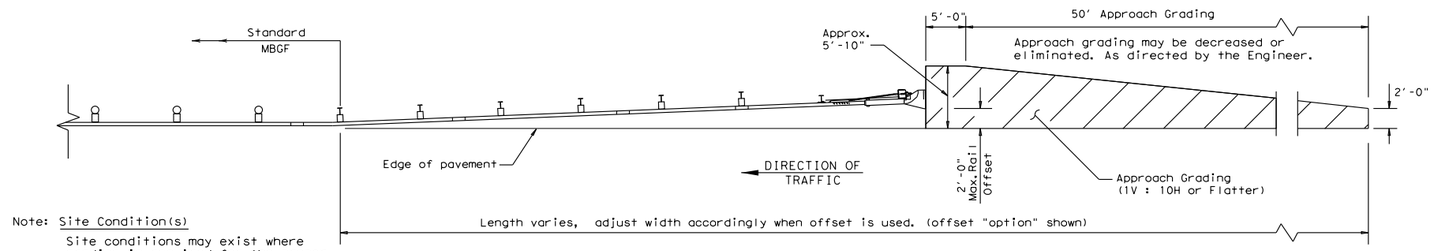








POST #1 CONNECTION DETAILS



Note: Site Conditions

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

1. For additional information contact: Interstate Steel Inc., (432) 263-3725.
2. All bolts, nuts cable assemblies, cable anchors, steel posts & bearing plates shall be galvanized.
3. SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard rail elements may be installed within the radius without special fabrication.
4. A flare rate of 25:1 may be used to prevent the terminal head from encroaching on the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer.
5. The lower sections of the post shall not protrude more than 4 inches above finished ground. Site grading may be necessary to meet this requirement.
6. The lower section of the steel posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
7. If solid rock is encountered. See manufacturer's installation manual for the proper installation guidance.
8. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
9. Hinge bolts shall not be set below finished grade. At curb locations the posts shall be installed at the proper grade elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed as directed by the Engineer.
10. An object marker shall be installed on the front of the impact head as detailed on D&OM(VIA).

ITEM NO.	QTY	BILL OF MATERIALS
S1303	1	GUARDRAIL (12 GA) 12'- 6" SKT Panel
G12025	1	GUARDRAIL (12 GA) 9' - 4 ½"
G1209	1	GUARDRAIL (12 GA) 25'- 0"
TPHP1A	1	FIRST POST ASSEMBLY TOP, TUBE
TPHP1B	1	FIRST POST ASSEMBLY BOTTOM, 6'- 0"
UHP2A	1	SECOND POST ASSEMBLY TOP
HP3B	1	SECOND POST ASSEMBLY BOTTOM, 3'- 5⅞"
P621	6	STANDARD STEEL LINE POST 6'- 0" (POST 3 THRU 8)
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
CT-100ST	1	CABLE TIE - STEEL
CBSP-14	6	ROUTED BLOCK
S3000	1	IMPACT HEAD
HARDWARE		
B580122	25	⅝" Dia. x 1 ¼" SPLICE BOLT
B580904A	1	⅝" Dia. x 9" HEX BOLT GR. 5
B340854A	1	¾" Dia. x 8 ½" HEX BOLT GR. 5
B581002	6	⅝" Dia. x 10" H.G.R. BOLT (Post 3 thru 8)
N055	1	⅝" Dia. HEX NUT (Post 1 only)
N050	31	⅝" Dia. H.G.R. NUT (at splices & at Post 2 thru 8)
W050	9	H.G.R. WASHER (At Post 1(2) & 2 thru 8)
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B5160104A	2	⅝" x 1" HEX BOLT, GR. 5
N0516	2	⅝" HEX NUT
W0516	4	⅝" WASHER
SB12A	8	CABLE ANCHOR BOX SHOULDER BOLT
N030	1	¾" HEX NUT
N012A	8	½" STR. NUT
W012A	8	½" STR. WASHER
E3151	1	OBJECT MARKER (18" x 18")

Texas Department of Transportation — Design Division Standard

SINGLE GUARDRAIL TERMINAL (SKT-31) (STEEL POST)

SGT(8S)31-14

FILE: sgt8s314.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: VP
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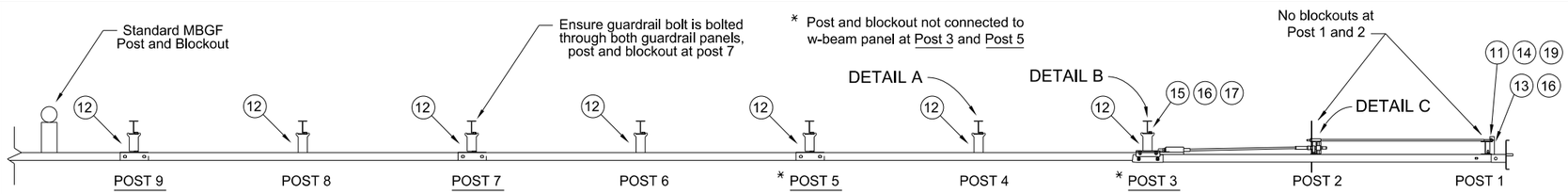
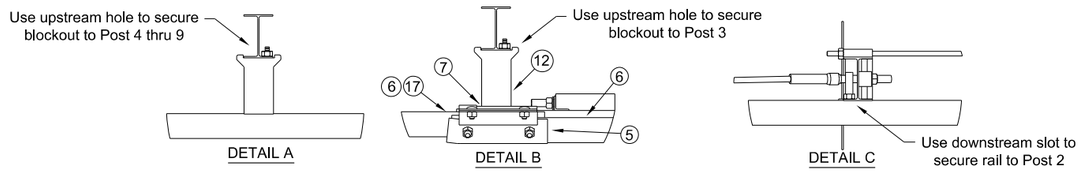
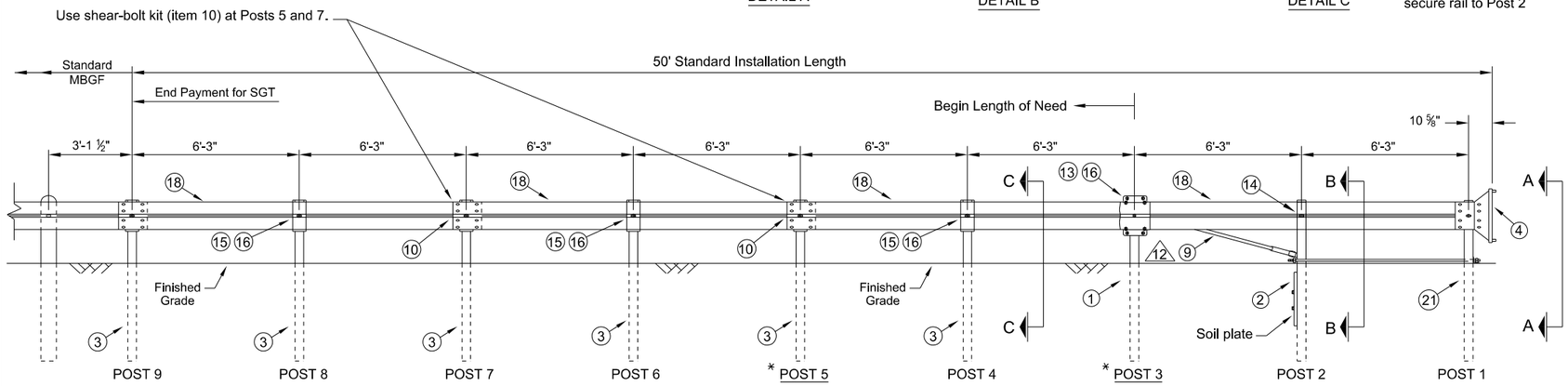


PLAN VIEW

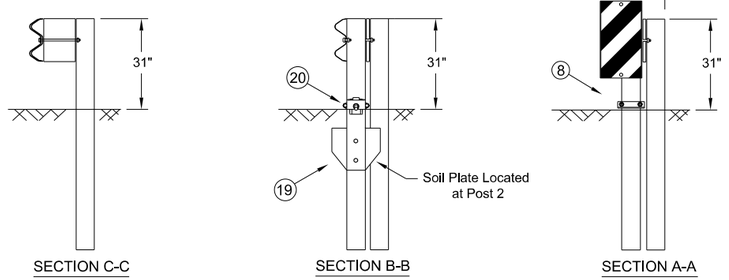
Direction of Traffic



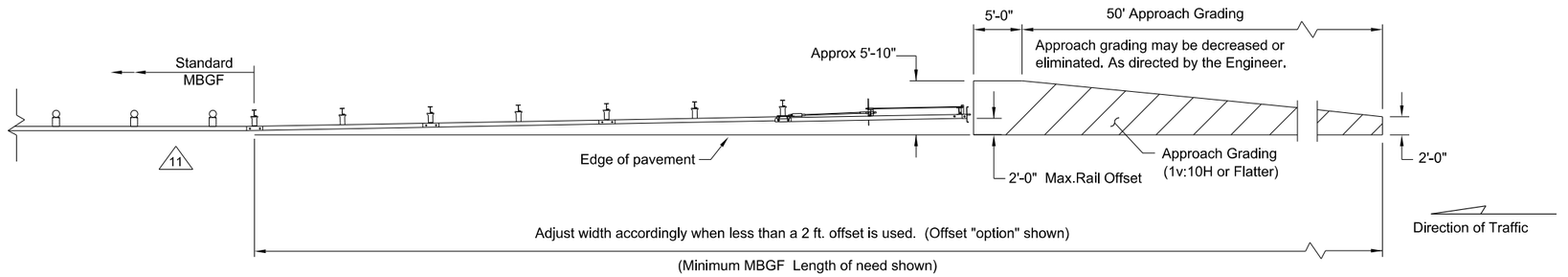


ELEVATION VIEW

See Note 10 for alternate post option.



SECTION C-C SECTION B-B SECTION A-A



APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

1. For additional information contact: Lindsay Transportation Solutions - Barrier Systems, 180 River Road, Rio Vista, CA 94571, (707) 374-6800
2. All dimensions are shown in inches except as otherwise indicated.
3. All cable assemblies, cable anchor, ground struts, slider pieces, impact heads, nuts, bolts and all steel components shall be galvanized unless otherwise is noted.
4. X-LITE placed within the minimum 150 ft. radius shall be installed straight. Standard rail elements may be installed within the radius without special fabrication.
5. A flare rate of 37.5:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching on the shoulder the flare may be decreased or eliminated for specific installations, or as directed by the engineer.
6. At curbed locations the post shall be installed at the proper grade of elevation behind the curb. The post will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed as directed by the engineer.
7. If rock excavation is encountered, the soil plate maybe modified if approved by the project engineer.
8. When site conditions permit, post may be driven. If posts are placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
9. An object marker shall be installed on the impact head as detailed on D&OM(VIA)
10. The X-LITE is a steel post SGT that is suitable for locations calling for wood post or steel post MBGF systems. When used with wood post guardrail system, post 7 thru 9 may be replaced with CRT posts.

△11 Minimum length of MBGF shown. See current guard fence Standards for further information.

△12 The breakaway cable assembly must be taut. A locking device (vice-grips or channel lock-pliers) should be used to prevent the cable from twisting when tightening the nut.

ITEM	PART NO.	DESCRIPTION	QTY
1	BSI-1310027-00	X-LITE, CRIMPED POST HOLES, GALV	1
2	BSI-1012086-00	POST II, X-LITE, GALV	1
3	BSI-1012078-00	LINE POST, X-LITE, GALV	6
4	BSI-1012103-00	IMPACT HEAD, X-LITE, GALV	1
5	BSI-1012093-00	SLIDER PANEL, FRONT, X-LITE, GALV	1
6	BSI-1012090-00	SLIDER BRACKET, X-LITE	1
7	BSI-1012096-00	BACK SLIDER PANEL, X-LITE, GALV	1
8	BSI-1102001-KT	GROUND STRUT KIT, X-LITE	1
9	BSI-1012104-00	CABLE ANCHOR ASSEMBLY, X-LITE	1
10	K080123	KIT, X-TENSION SHEAR BOLT,	2
11	BSI-1102027-00	WASHER, SQUARE, X-LITE, GALV	1
12	B090534	W-BEAM COMPOSITE BLOCKOUT 8 IN,	7
13	4001115	GUARDRAIL BOLT 5/8"-11X1 1/4"	24
14	2000302	BOLT CH 5/8"-11X2	2
15	2001635	BOLT CH 5/8"-11X10" GRADE 5 MGAL	7
16	4001116	GUARDRAIL NUT RECESSED 5/8"-11	33
17	2001580	WASHER 1 F436 FLAT RD STRUCT	1
18	4000443	W-BEAM GUARDRAIL RWM02a	4
19	BSI-1106016-KT	X-LITE, SOIL PLATE KIT	1
20	BSI-1303005-00	BRACKET, X-LITE CABLE RETENTION	1
21	BSI-1310024-00	X-LITE, CRIMPED POST SLOTS, GALV	1
22	MANXLT	X-LITE TANGENT INSTALLATION MANUAL	1

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL (X-LITE) STEEL POST

SGT(9S)31-14

FILE: sgt9s3114.dgn	DN: TxDOT	CK: RM	DW: VP	CK: CGL
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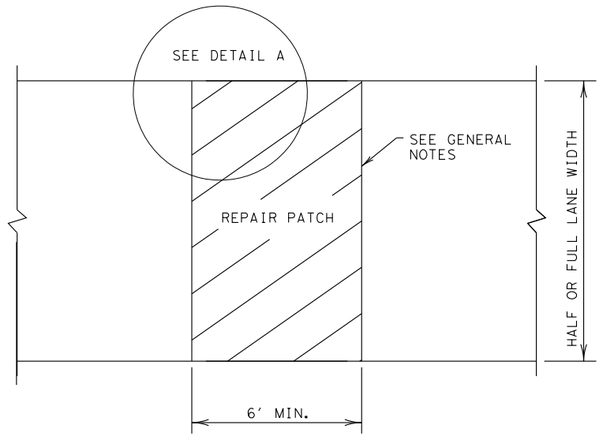
TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0		6.5	6.5		
	11.5		6.25	6.25		
	≥12.0		6.0	6.0		
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

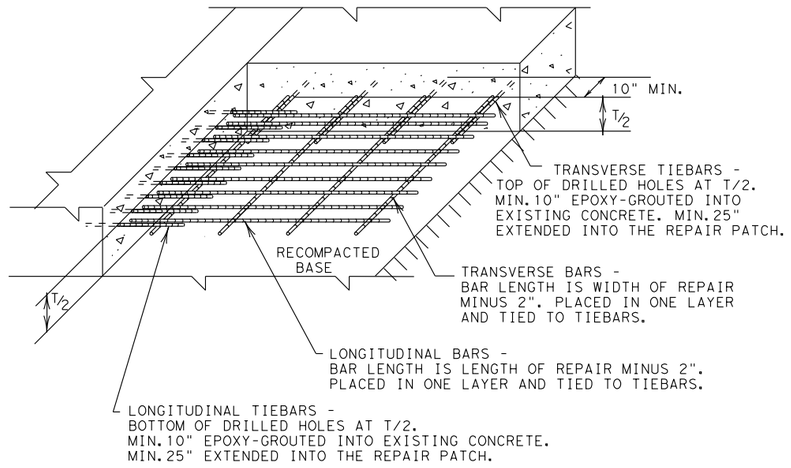
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



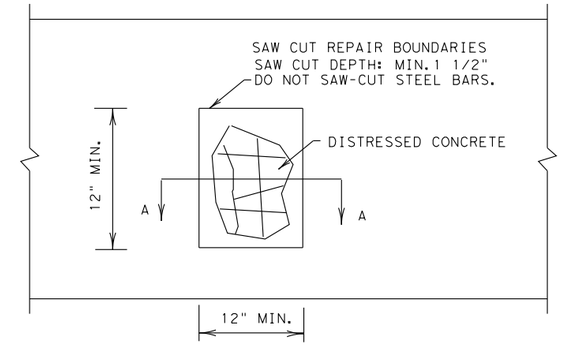
PLAN VIEW



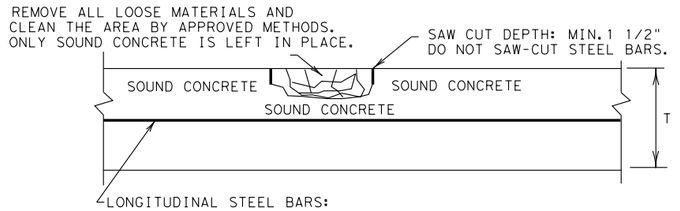
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
3. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:

*REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.

*INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A

HALF-DEPTH REPAIR

FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
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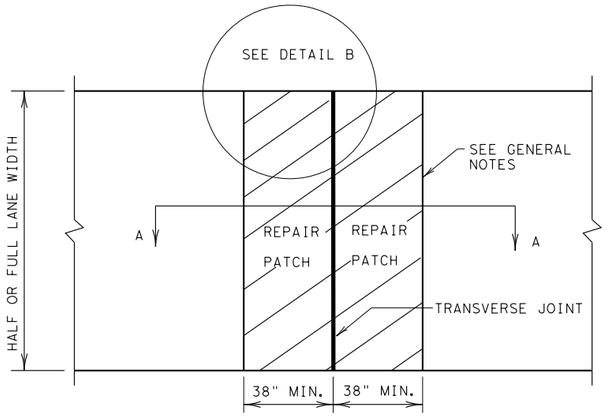
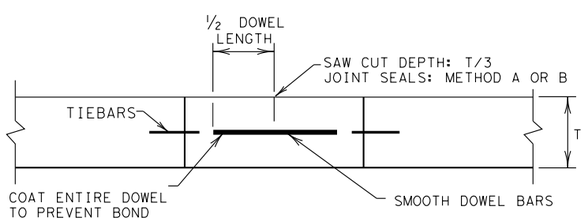
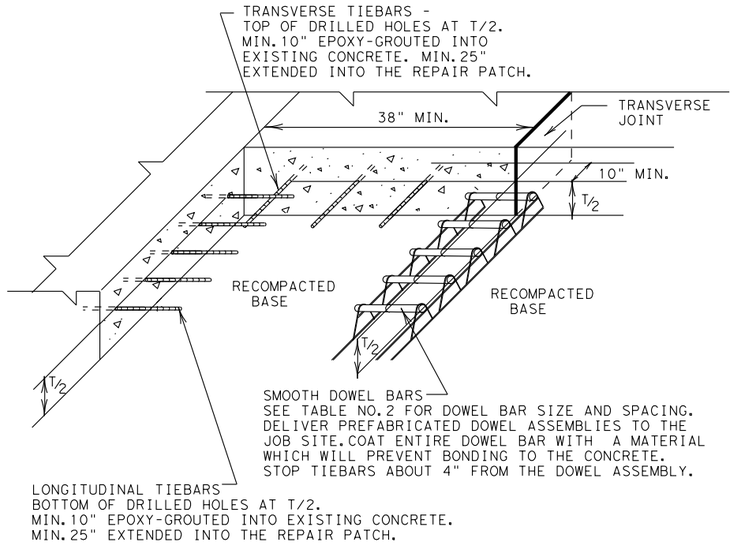


PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

REPAIR OF TRANSVERSE JOINT OF CPCD

Texas Department of Transportation

Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT		DN: HC		DW: HC		CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB		HIGHWAY		
REVISIONS	3487	01	001		TOLL 49		
	DIST	COUNTY			SHEET NO.		
	TYL	SMITH			48		

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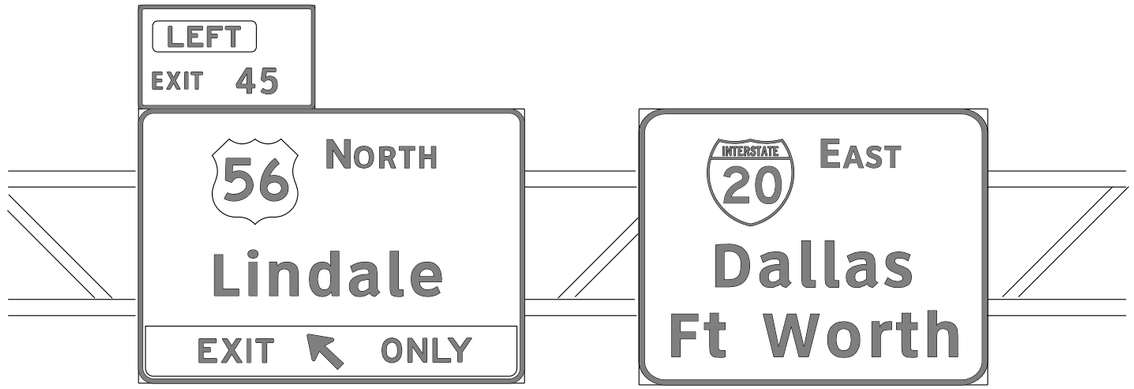
REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES



GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
   White legend shall use the Clearview Alphabet.
   The following Clearview fonts shall be used to replace the existing white FHWA lettering, when not specified in the SHSD or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

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 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 cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

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/

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE B OR C SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(1)-13

FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	SMITH		49

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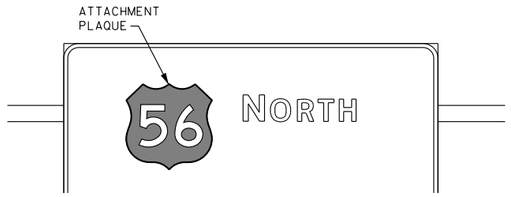
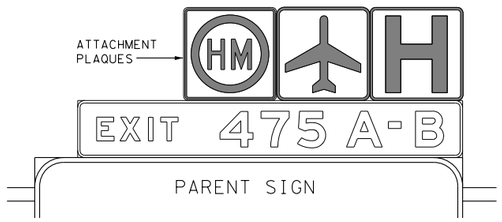
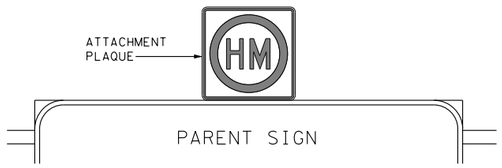
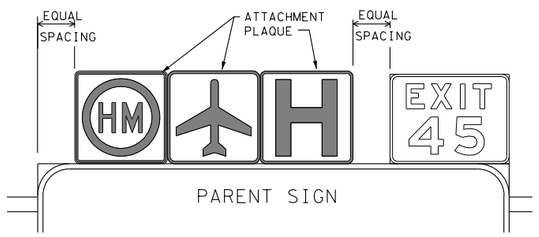
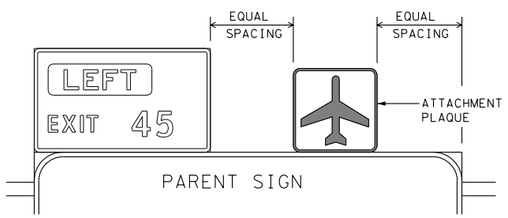
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS









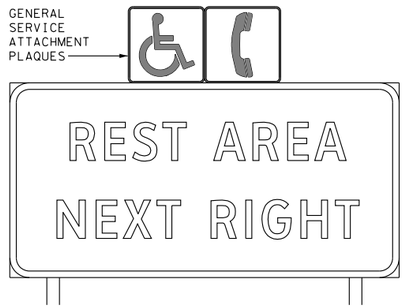


DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	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. Route Marker legends (ie. IH, US, SH and FM shields) 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 and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

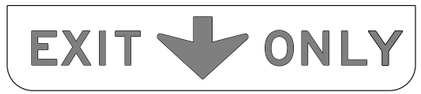


TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



TYPICAL EXAMPLES

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). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
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 shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

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(2)-13

FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3487	01	001	TOLL 49
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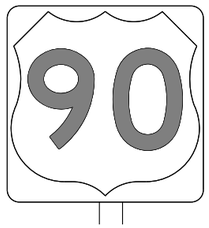
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

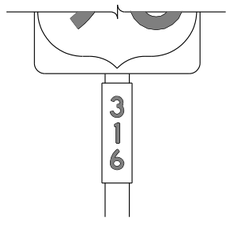
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING

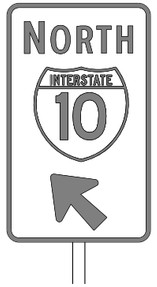


TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING





TYPICAL EXAMPLES

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. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. 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.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

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9-08	TYL	SMITH		51

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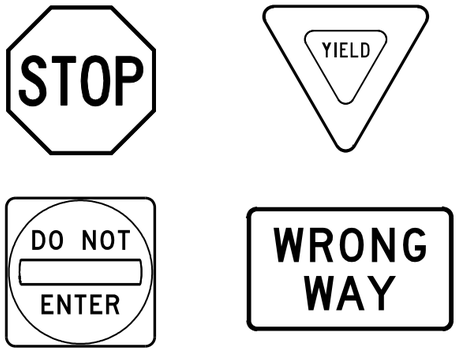
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(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

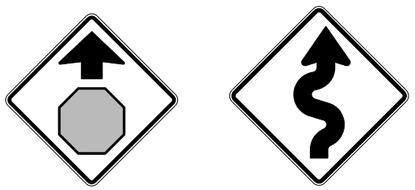
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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 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 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

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	DIST	COUNTY		SHEET NO.
	TYL	SMITH		52

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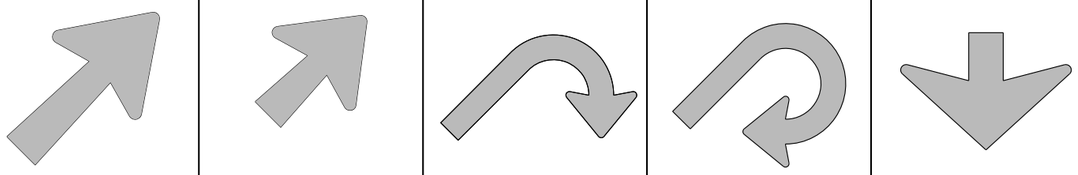
ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

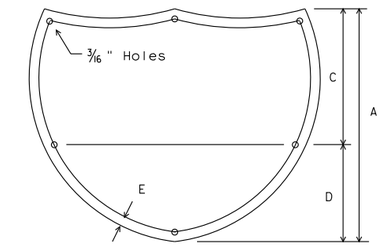
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

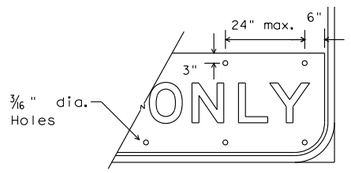
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

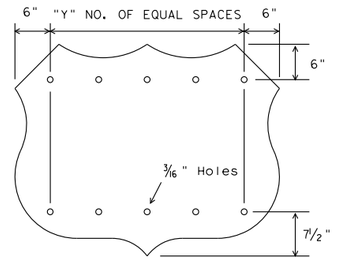


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

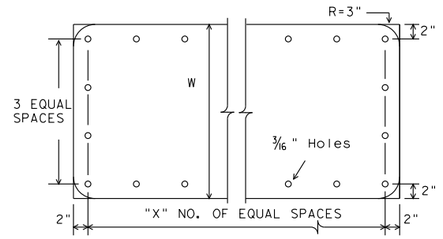


EXIT ONLY PANEL



U.S. ROUTE MARKERS

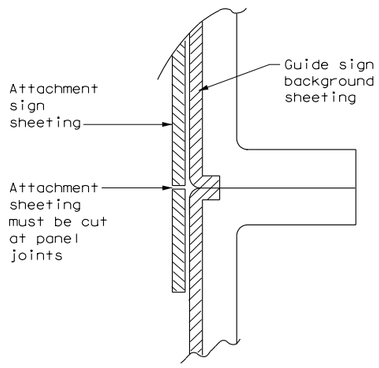
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



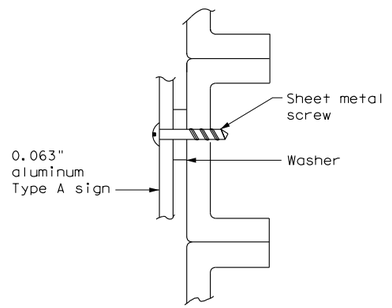
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

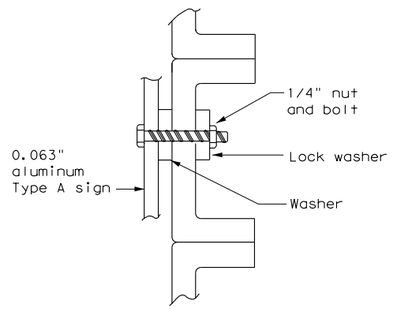
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

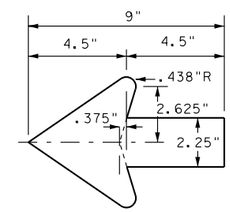
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

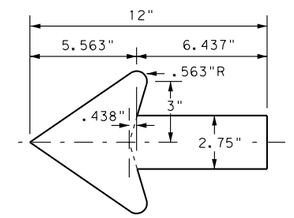
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	TYL	SMITH		53

5

DATE: $DATE$ 11:00:28 AM
FILE: $FILE$

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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)

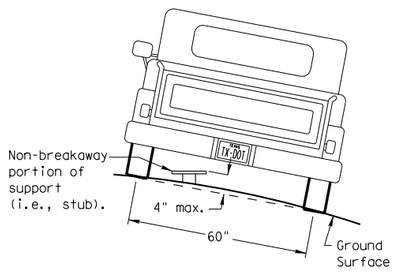
Anchor Type

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

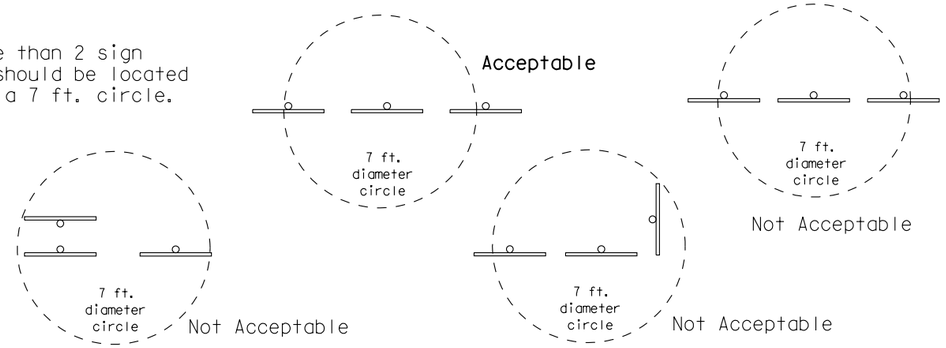
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



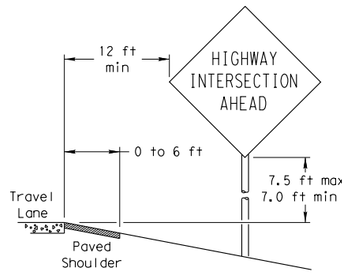
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

No more than 2 sign posts should be located within a 7 ft. circle.



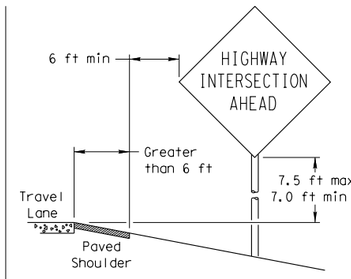
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

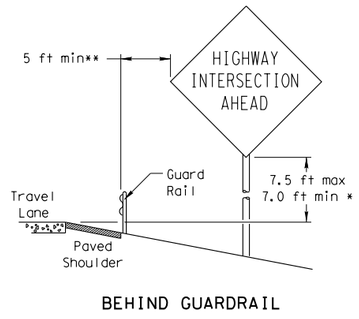
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



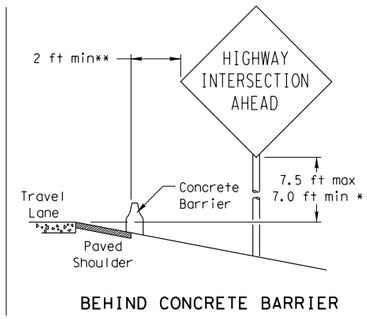
GREATER THAN 6 FT. WIDE

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



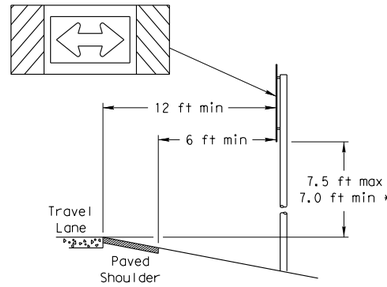
BEHIND GUARDRAIL



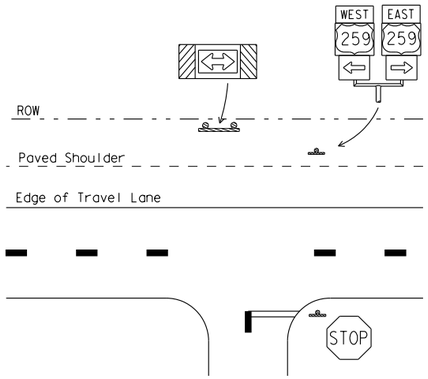
BEHIND CONCRETE BARRIER

**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.

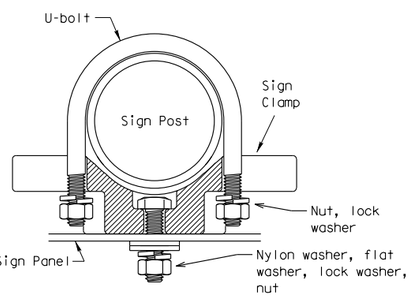
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

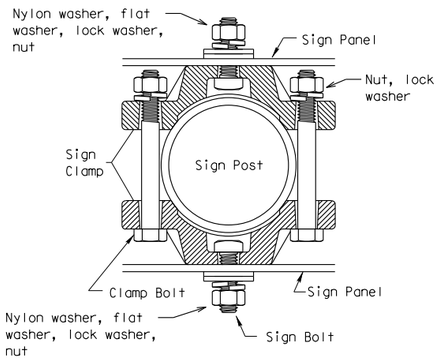
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



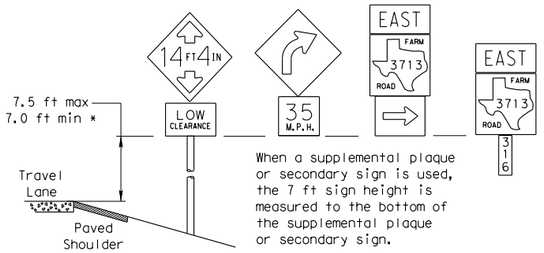
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

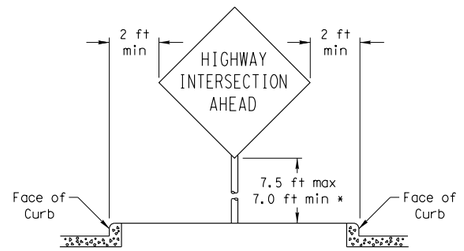
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



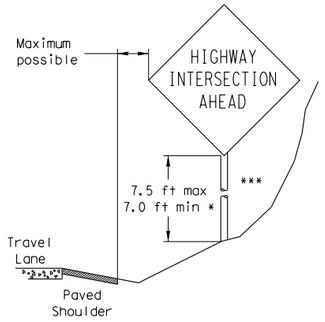
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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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CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		54

9-08 REVISIONS

26A

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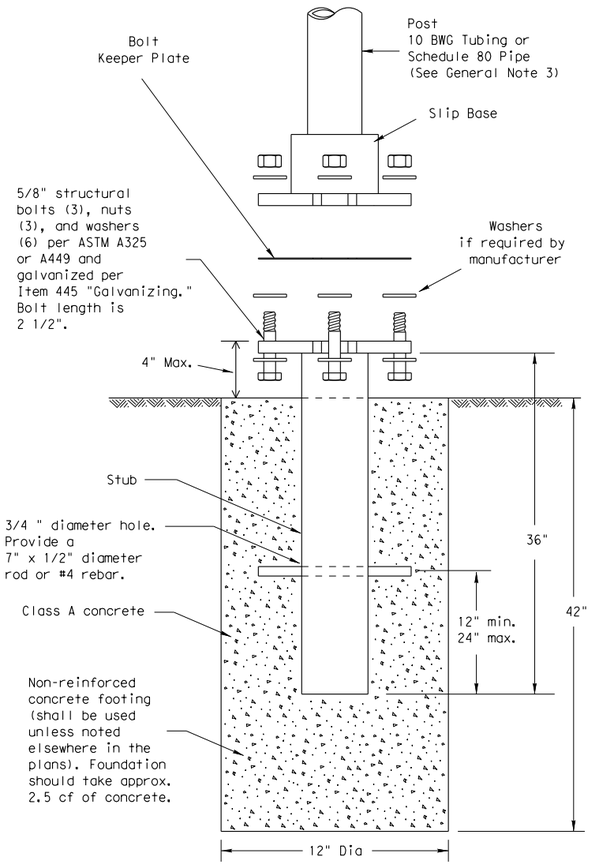
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

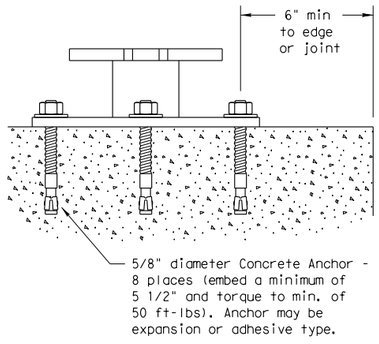
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49

DIST	COUNTY	SHEET NO.
TYL	SMITH	55

26B

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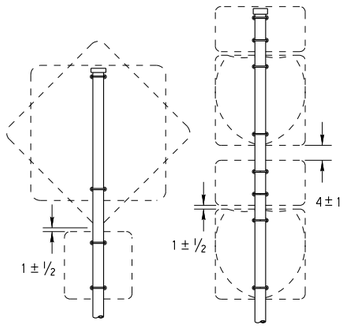
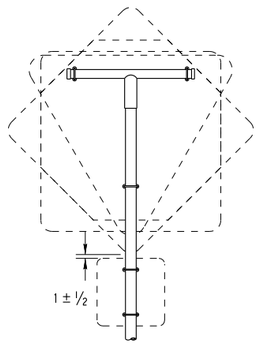


SM RD SGN ASSM TY XXXXX(1)XX(P)



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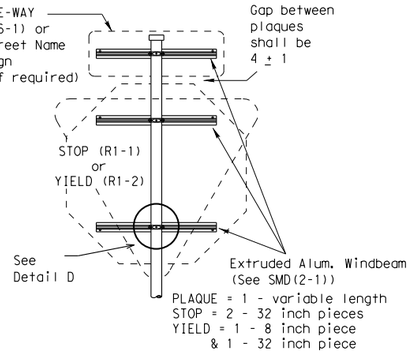

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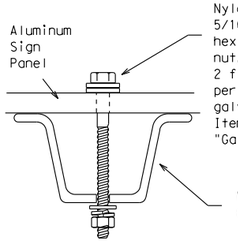
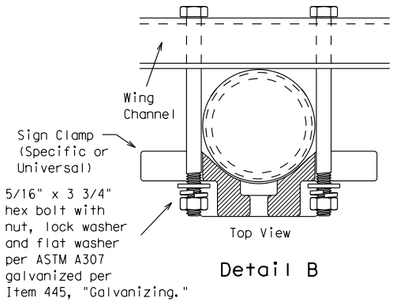
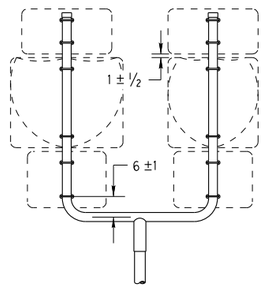


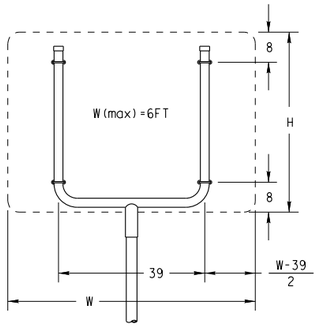
Detail A



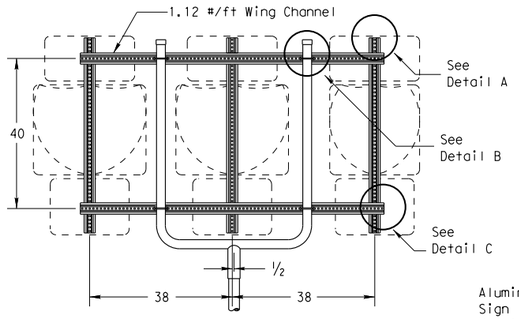
Detail B



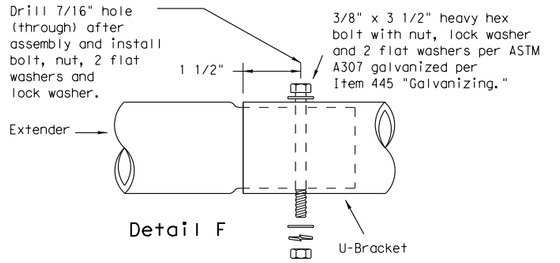
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

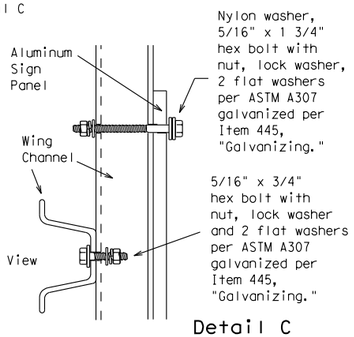


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



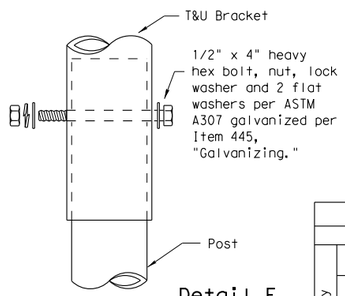
Detail F

Splices shall only be allowed behind the sign substrate.

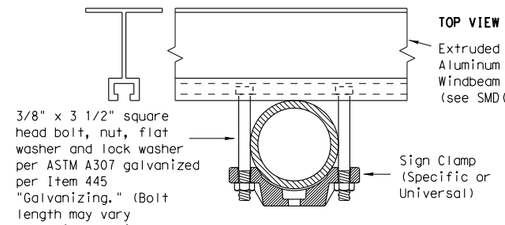


SIDE VIEW

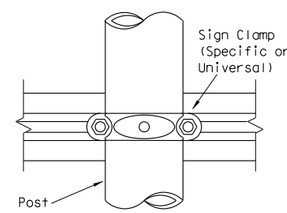
Detail C

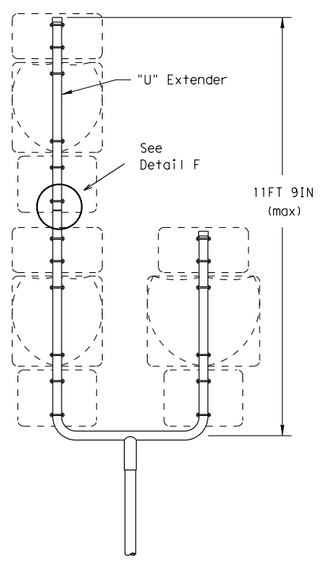


Detail E

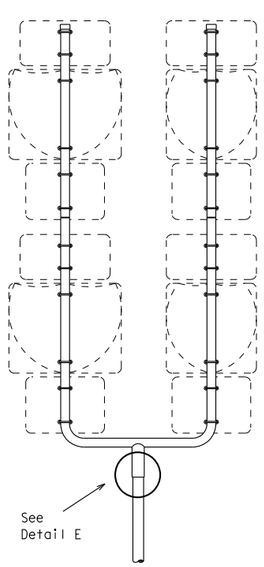


Detail D

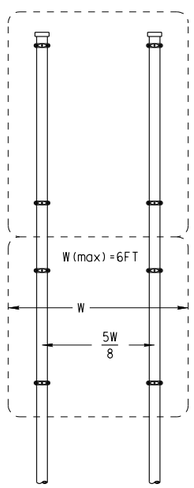




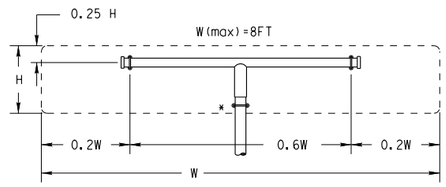
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



SM RD SGN ASSM TY S80(1)XX(U-2EXT)



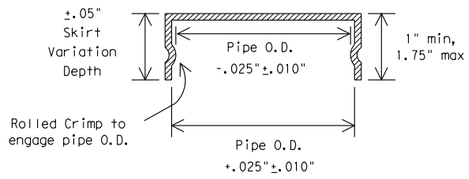
SM RD SGN ASSYM TY XXXXX(2)XX(P)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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9-08	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	TYL	SMITH		56

26C

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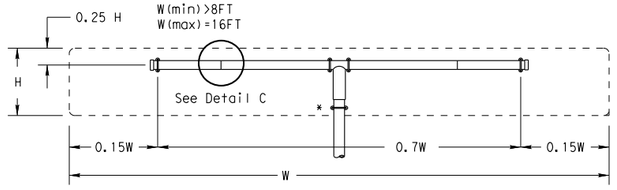
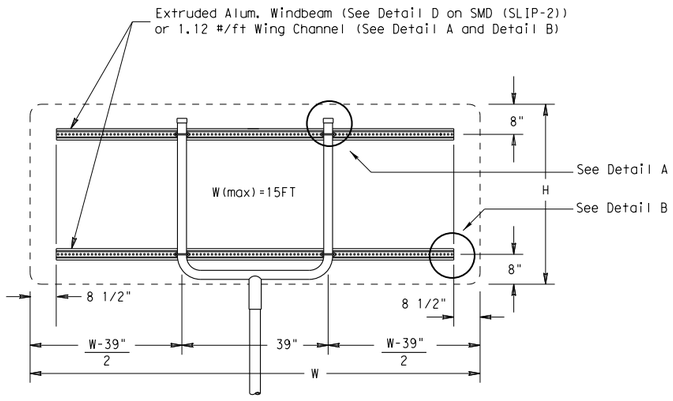
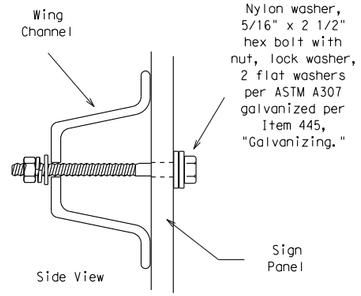


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

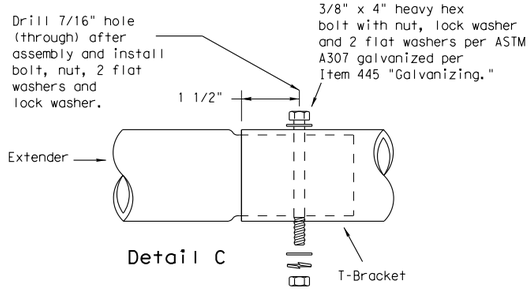
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Detail B



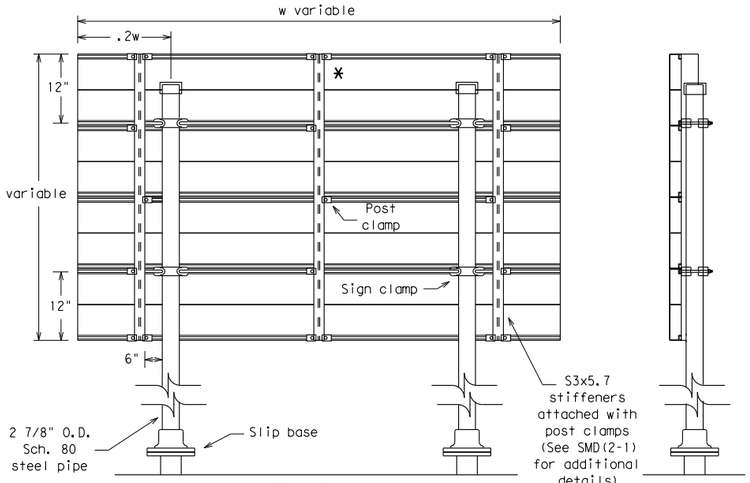
Detail C

Splices shall only be allowed behind the sign substrate.

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

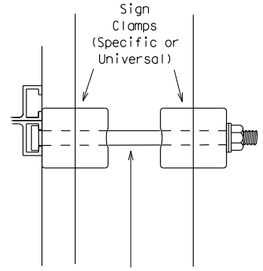


Typical Sign Mount

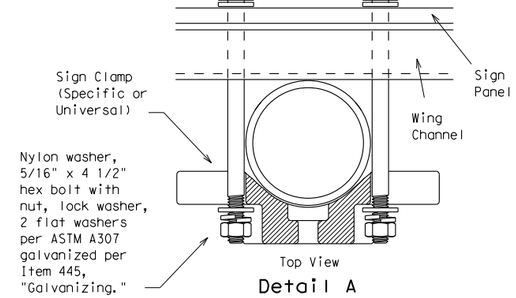
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

See Detail E
for clamp installation

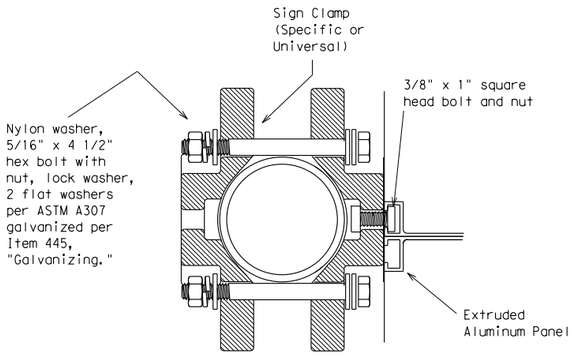


Detail E



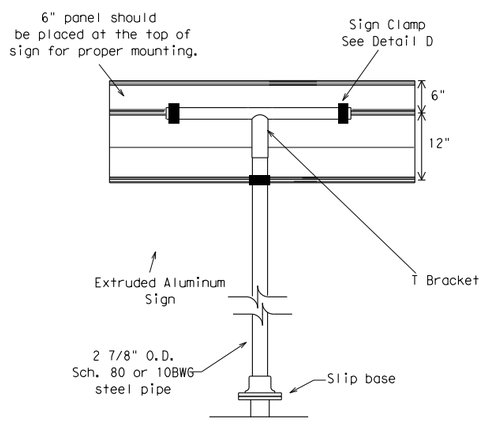
Top View

Detail A

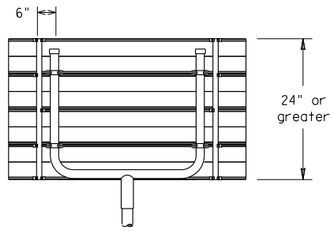


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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9-08

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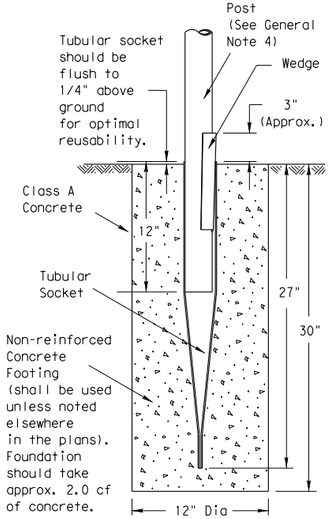
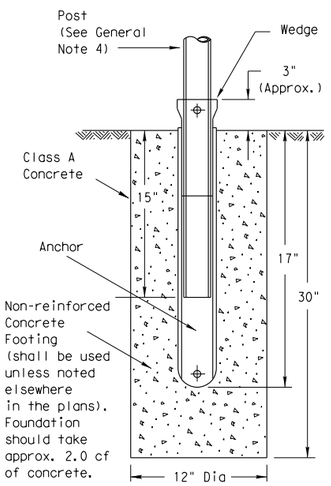
Wedge Anchor Steel System



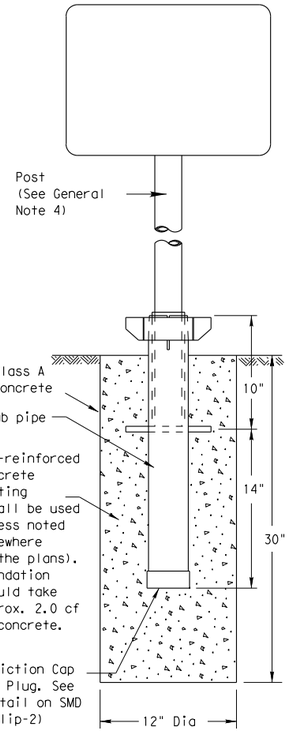
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

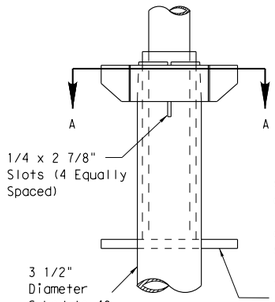


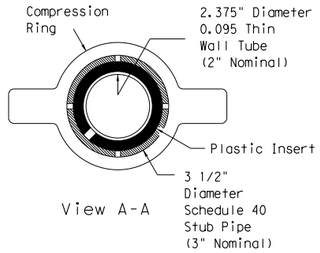
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



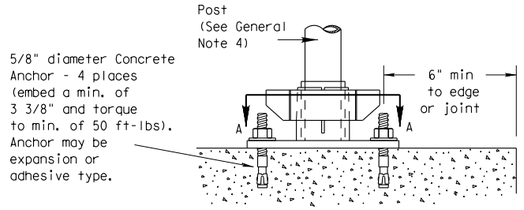
SM RD SGN ASSM TY TWT(X)UA(P)



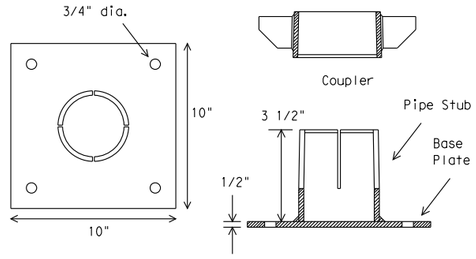


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

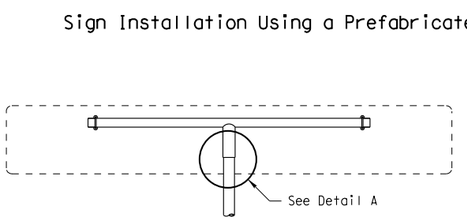


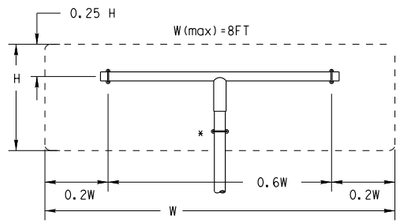
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



SM RD SGN ASSM TY TWT(X)UB(P)

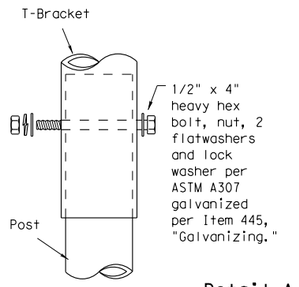
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   Other steels may be used if they meet the following:
   55,000 PSI minimum yield strength
   70,000 PSI minimum tensile strength
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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CONT	SECT	JOB	HIGHWAY
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TYL	SMITH		58

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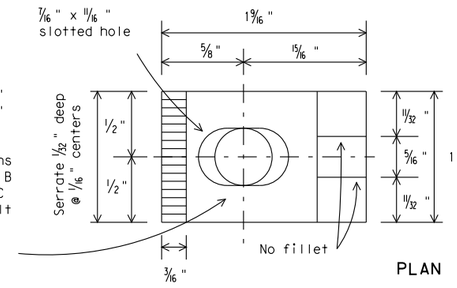
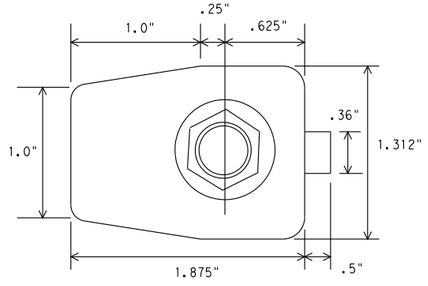
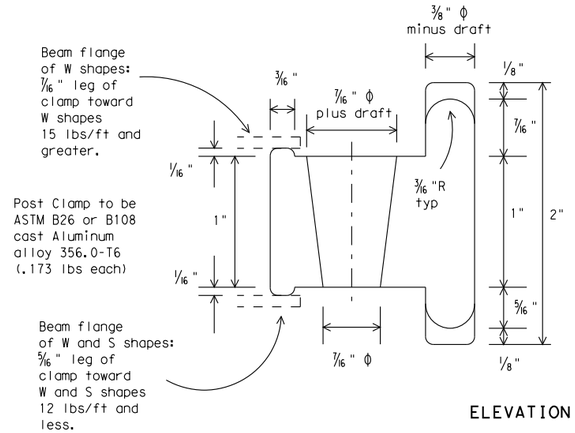
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

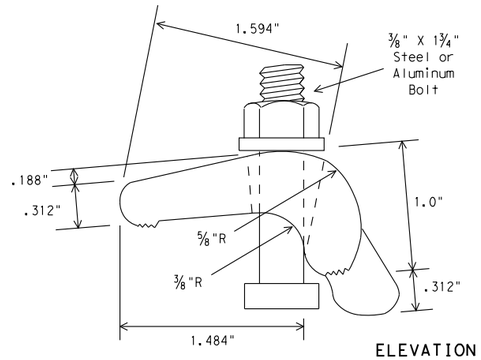


PLAN



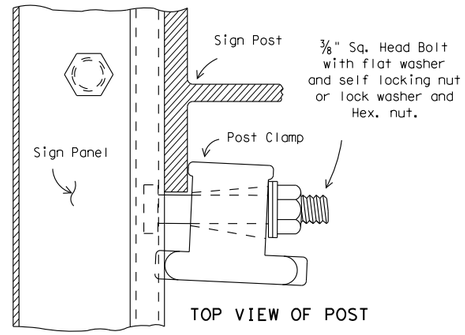
ELEVATION

POST CLAMP DETAIL

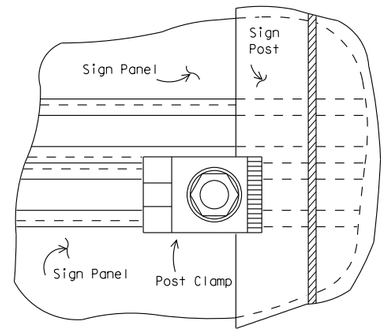


ELEVATION

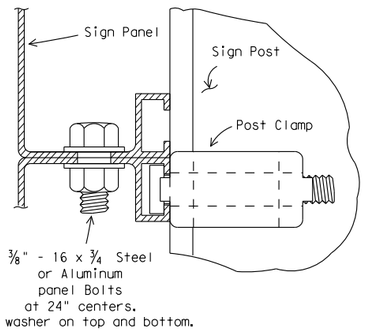
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST

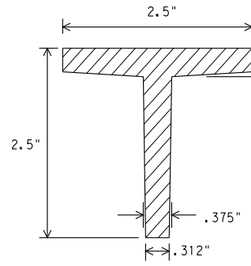


TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

CONNECTION DETAILS

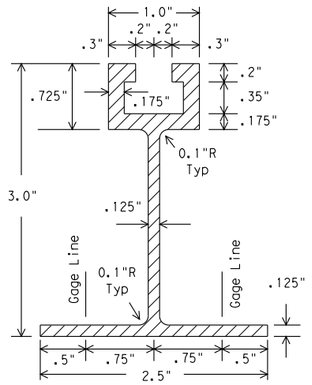


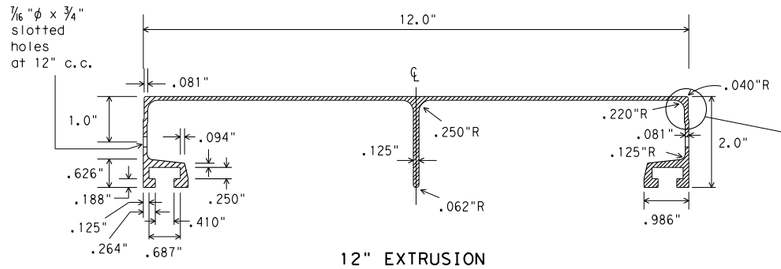
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

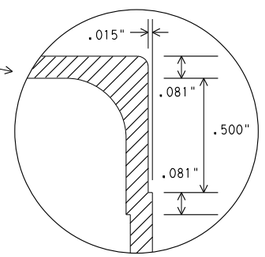
WINDBEAM CROSS SECTION

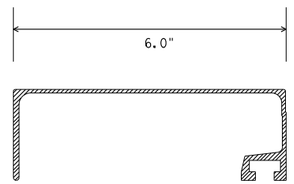
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



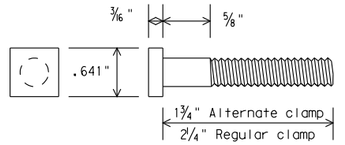


12" EXTRUSION





6" EXTRUSION



POST CLAMP BOLT DETAIL

ALUMINUM SIGN PANEL EXTRUSION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE — DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

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REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		59

27A

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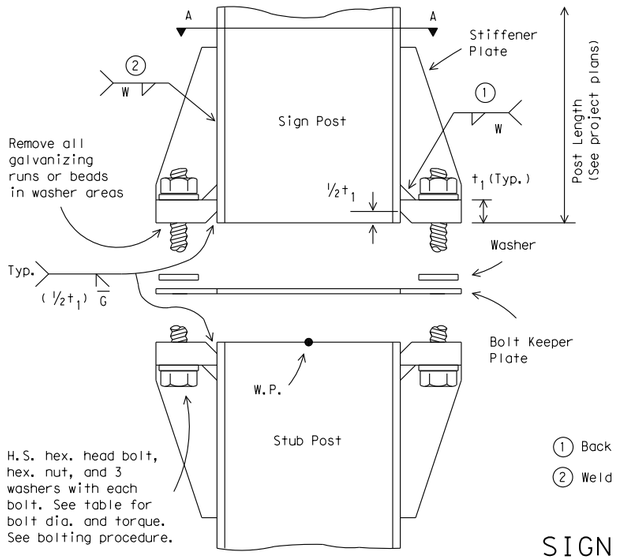
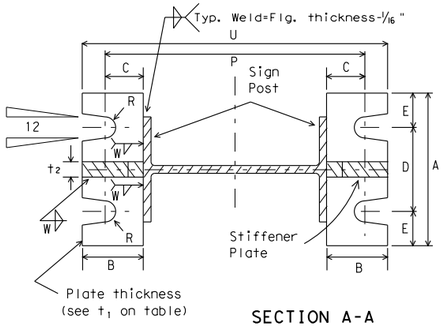
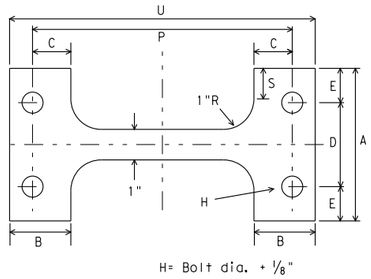


ELEVATION



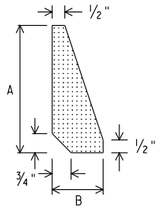
SECTION A-A



H= Bolt dia. + ⅛"

BOLT KEEPER PLATE

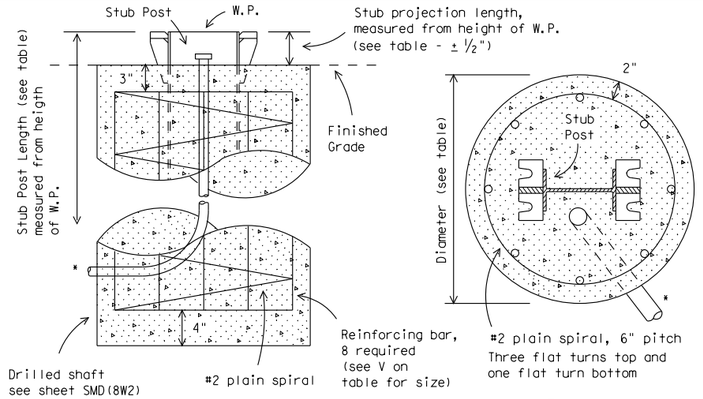
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

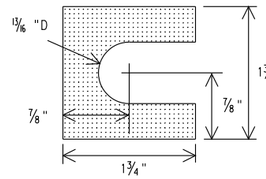
(See table for dimensions)



ELEVATION PLAN

FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



SHIM DETAIL

Furnish two .012"± thick and two .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.

① Back up weld to be made before installing stiffener plate

② Weld W may be continued across clips to seal joint

SIGN POST AND STUB POST

(For W Shapes)

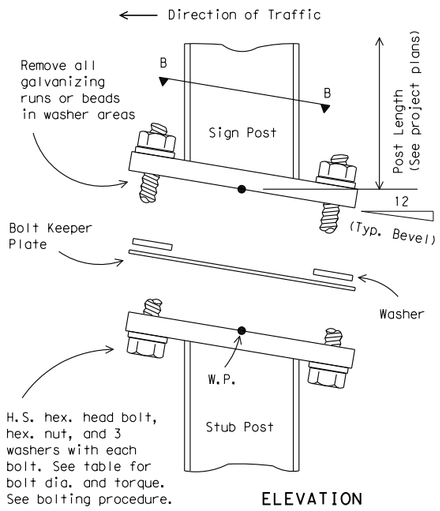
BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

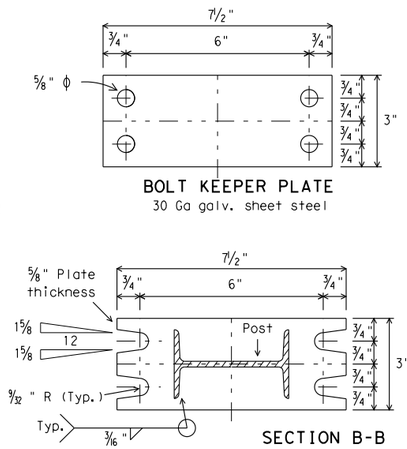
Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
W10x26										
W12x26										
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below								
S4x7.7										

Perforated Fuse Plate Data Table												Bolt Keeper Data			Foundation Data			
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length	P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"	8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
											8½"		10"				#5
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"	8½"		10"	2'-6"	3"		#6
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"	10⅝"		12⅛"	2'-6"	3"		#7
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"	11"	1½"	12¾"	3'-0"	2½"		#8
											12⅞"		14⅝"	3'-0"	2½"		#9
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"	13⅜"		14⅞"	3'-0"	2½"		#10
											15"		16¾"	3'-0"	2½"		#11
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"	See Detail Below			3'-3½"	3½"	12"	Non-reinforced ③

③ Foundation design shall be Type G Mount, see SMD (TY G).

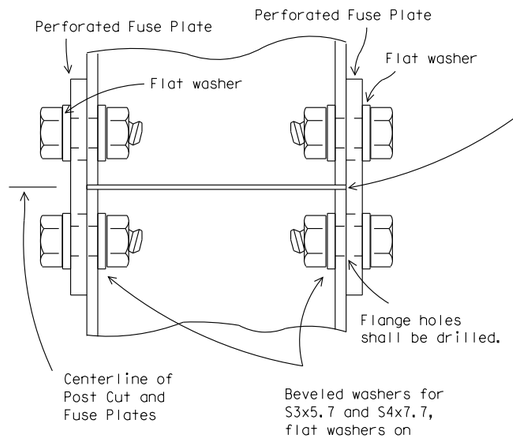


ELEVATION



SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

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4-98
9-08

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CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49

DIST	COUNTY	SHEET NO.
TYL	SMITH	60

27B

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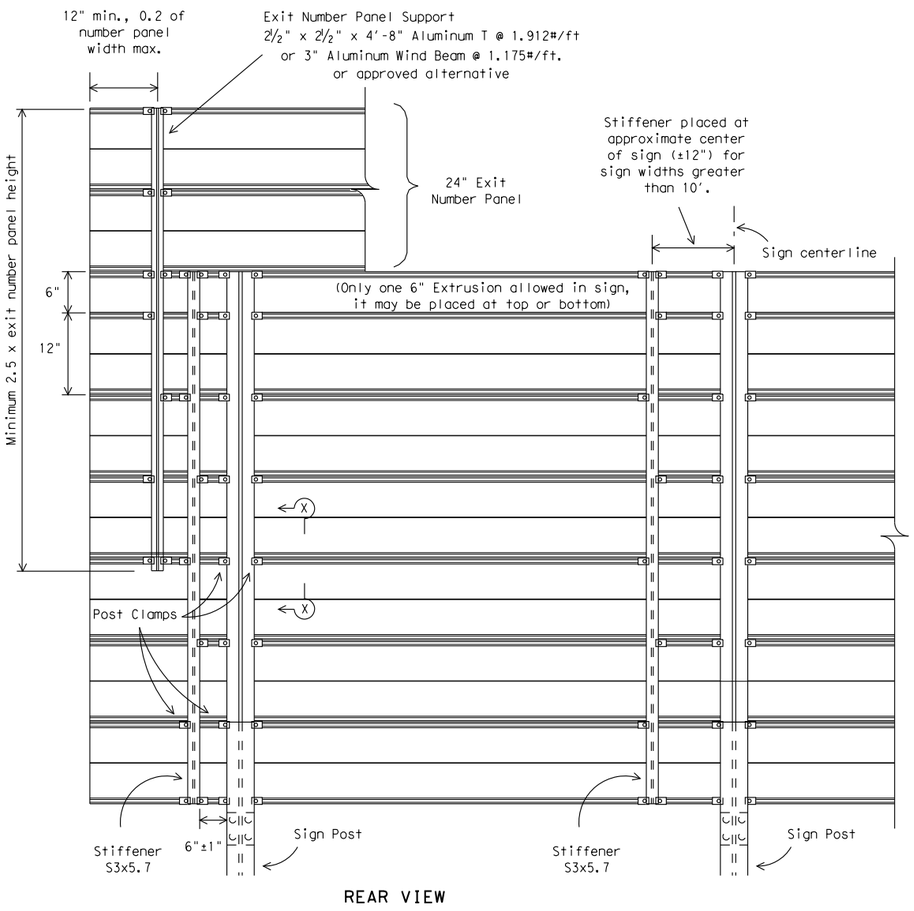
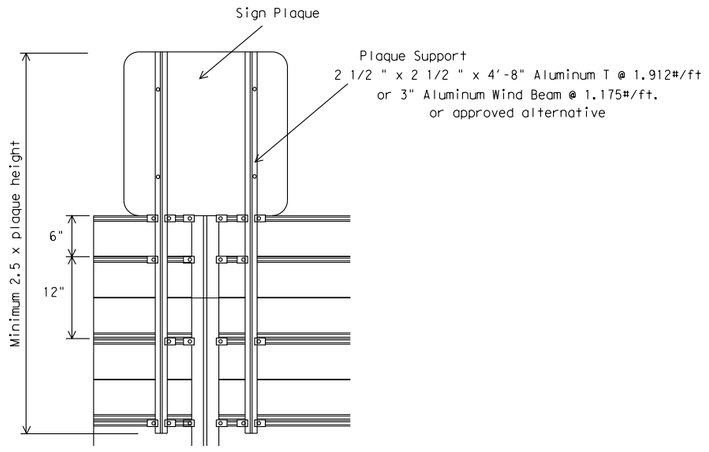
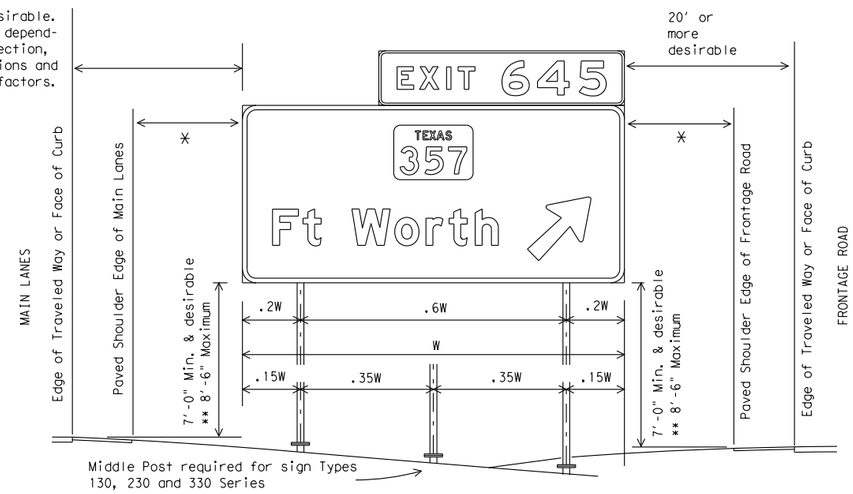


ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

✳ - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
2. Exit number panel support shall be symmetrical about number panel centerline.
3. Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
4. All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
5. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
6. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
7. Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
8. For fiberglass sign installation details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

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DIST	COUNTY	SHEET NO.
TYL	SMITH	61

27C

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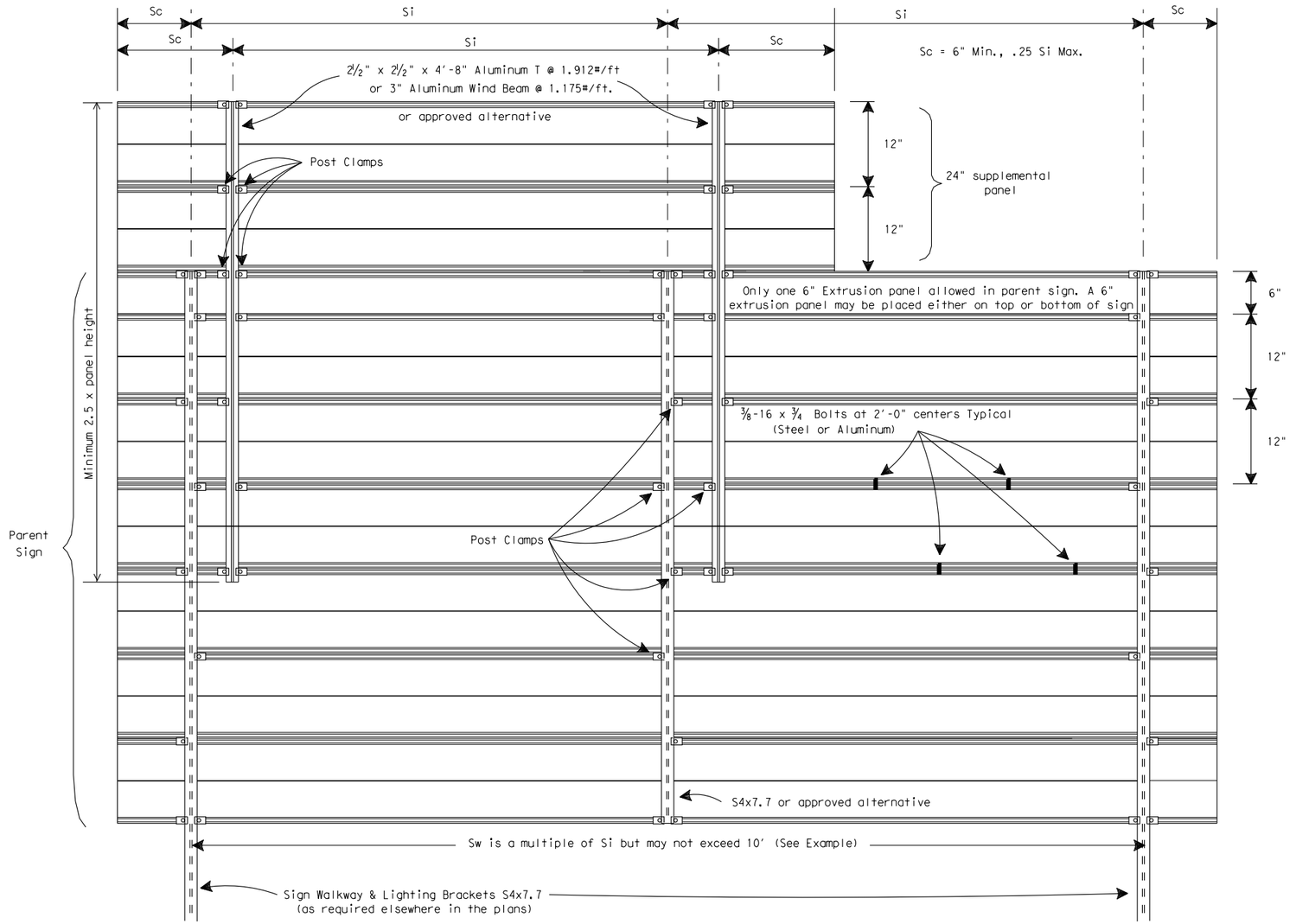
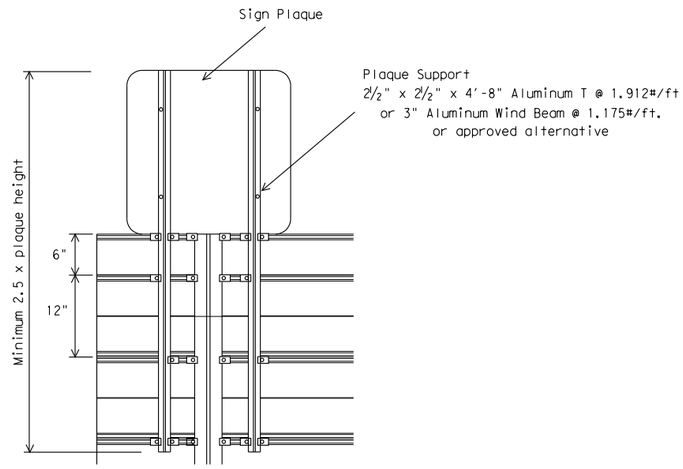


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si(Max.) or 10 feet.



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

"d" Deepest Sign in Group (Ft.)	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

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REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		62

27D

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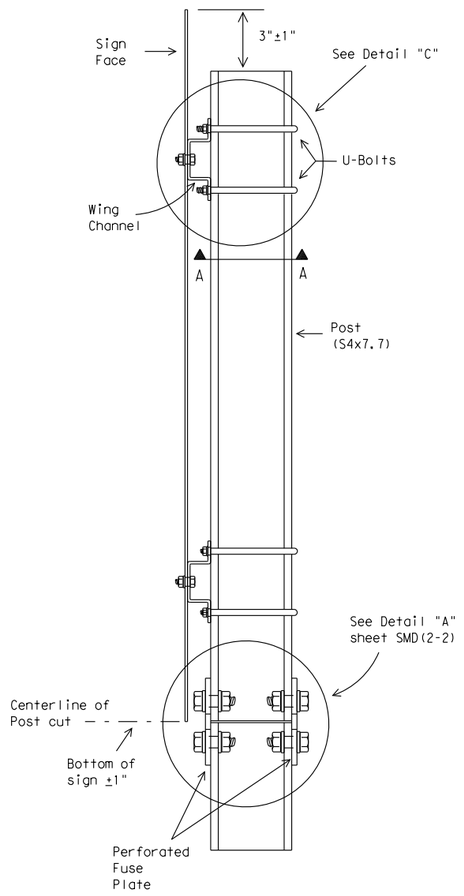
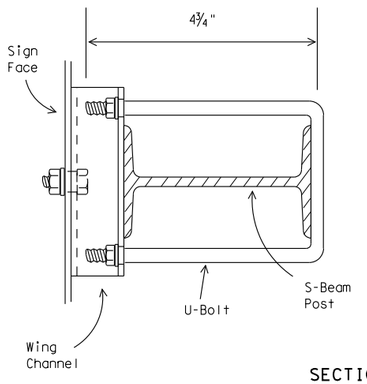
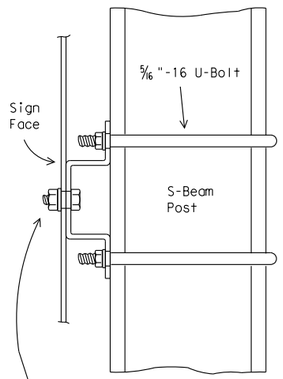
WING CHANNEL CLAMP DETAIL FOR TYPE G MOUNT



SIDE VIEW

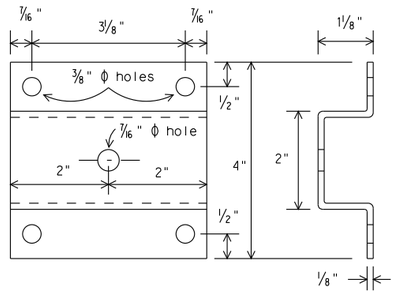


SECTION A-A



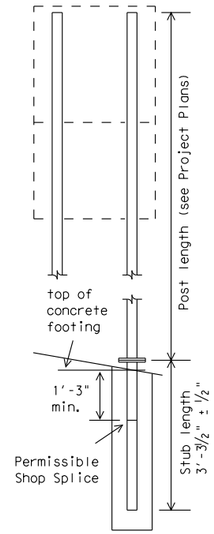
Galvanized steel or aluminum self-locking hex. head nut. 3/8 " - 16 x 3/4 " hex. head bolt for sheet metal. 3/8 " - 16 x 1 1/4 " hex. head bolt for plywood. 3/8 " galvanized medium washer.

DETAIL "C"

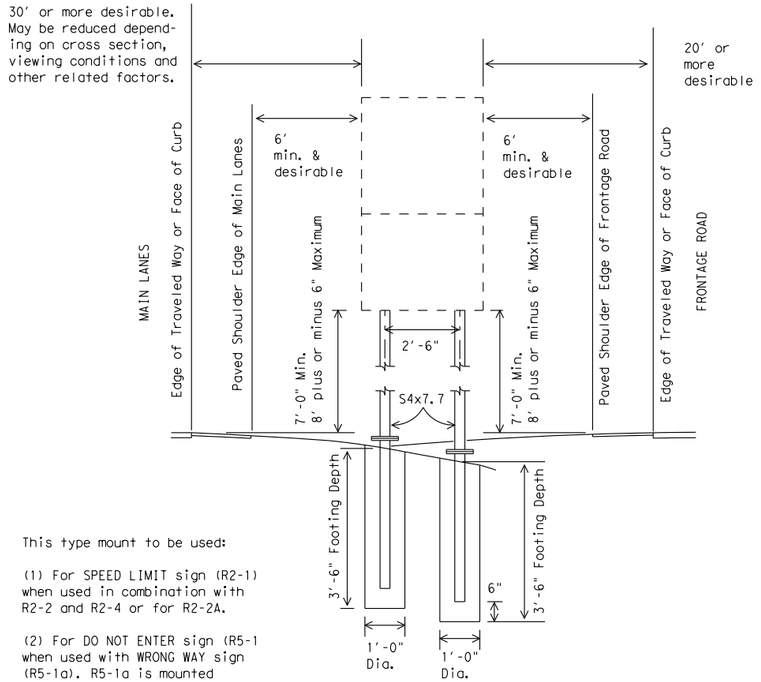


WING CHANNEL

Wing channel, 4" width x 1⅛" depth x ⅛" thickness, shall be aluminum (ASTM B221 6061-T6 or B308 6061-T6), galvanized steel (ASTM A36) or stainless steel (ASTM A167 type 304, No. 2B finish).



The weight of one S4x7.7 post is equal to 112.2 lbs. plus 7.7 lbs./ft x (post length in feet minus 10 ft). The weight of 112.2 lbs. includes 10 feet of post length, post foundation stub, related connection plates, friction fuse plate, and all high strength bolts, nuts and washers.



This type mount to be used:

(1) For SPEED LIMIT sign (R2-1) when used in combination with R2-2 and R2-4 or for R2-2A.

(2) For DO NOT ENTER sign (R5-1 when used with WRONG WAY sign (R5-1a). R5-1a is mounted above R5-1.

DEPARTMENTAL MATERIAL SPECIFICATIONS
SIGN HARDWARE — DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures."
4. Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing." (Cut surface will not be treated until plate is installed and all bolts fully tightened.)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS, TYPE G SUPPORT

SMD(TY G)-08

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1-97
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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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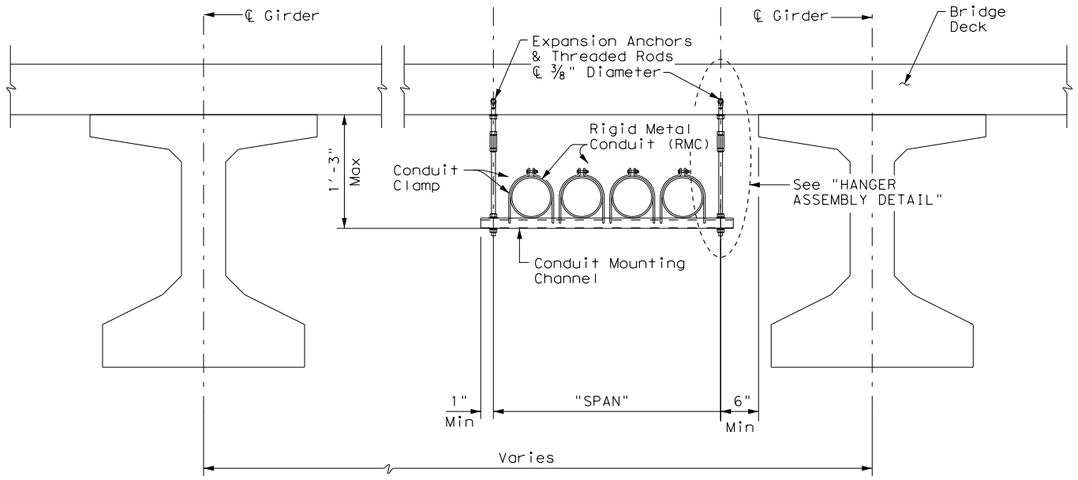
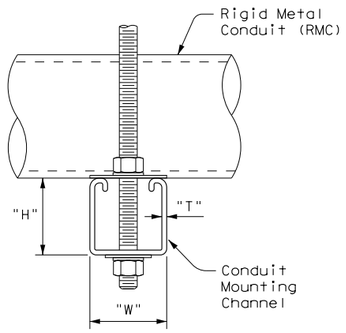
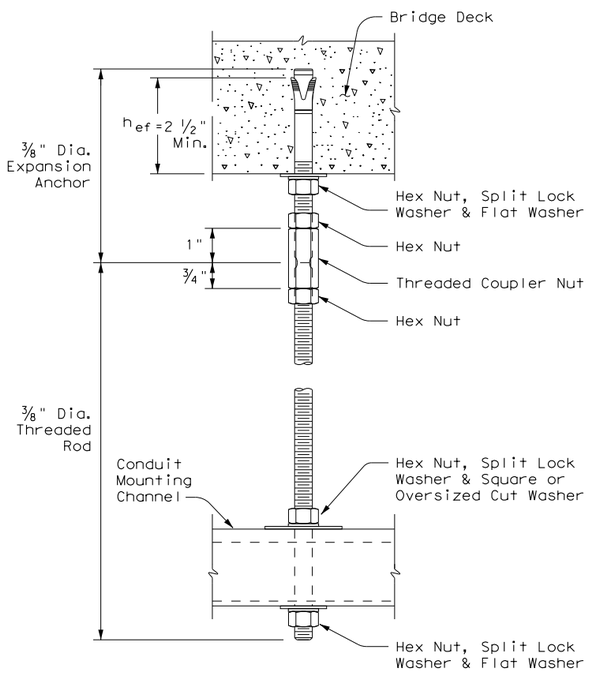


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

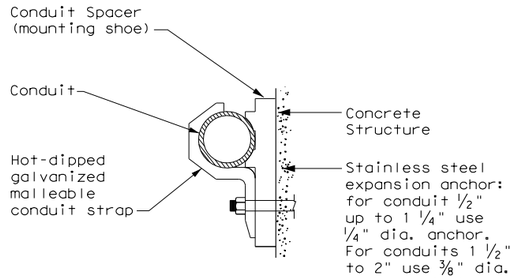
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

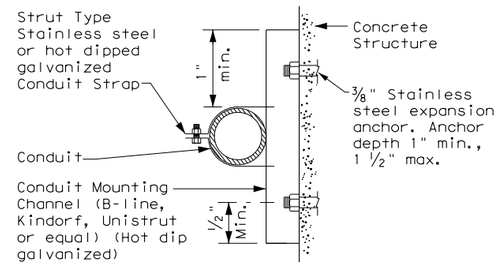




HANGER ASSEMBLY DETAIL

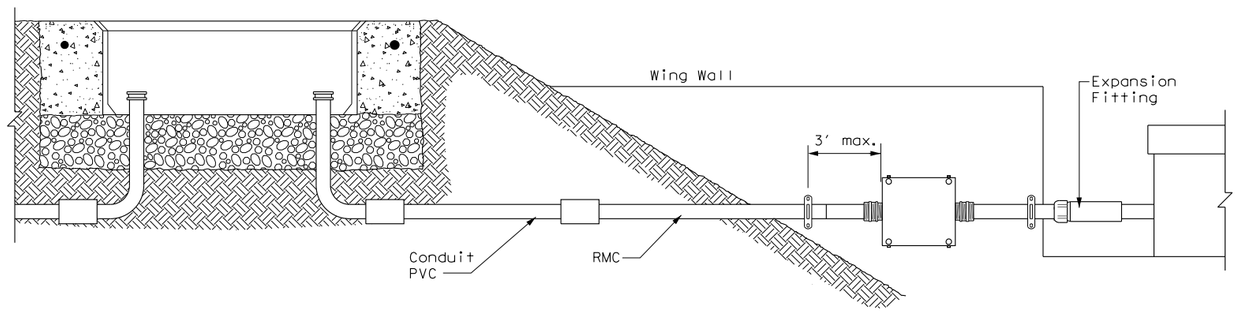
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.

4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.

5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.

6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUIT SUPPORTS

ED(2)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in specific locations including electrical service, see individual plan sheets.

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

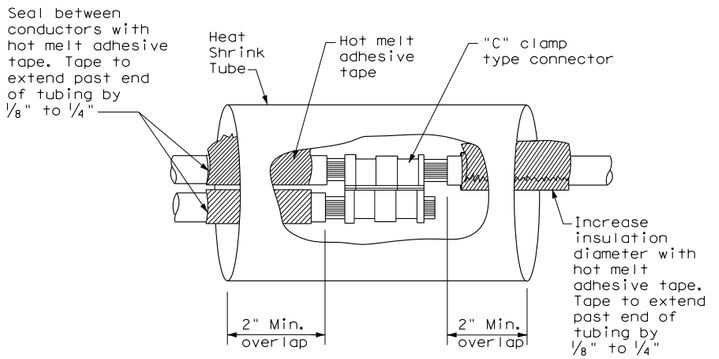
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

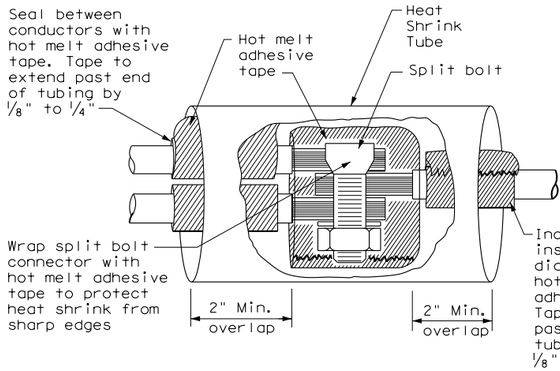
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

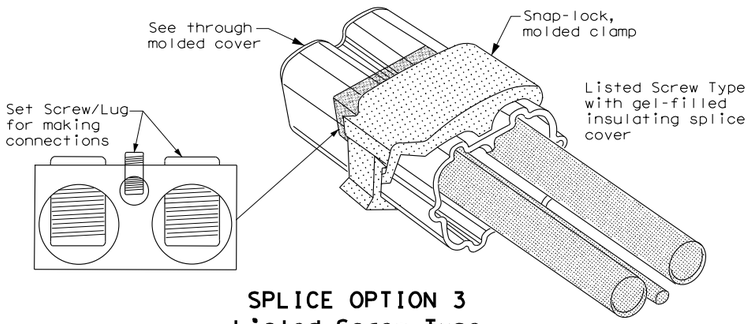
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
CONDUCTORS

ED(3)-14

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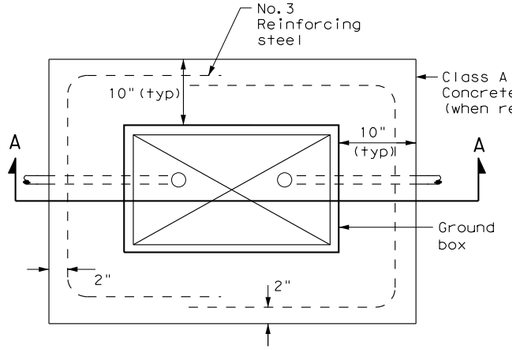
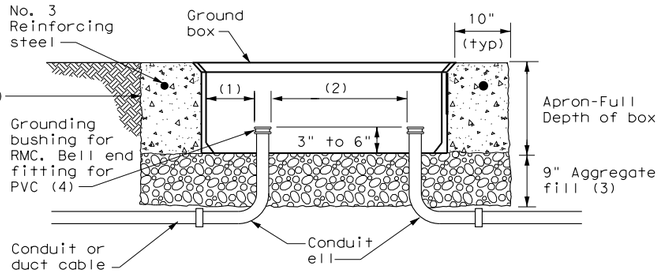


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

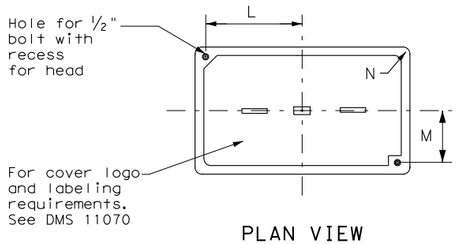
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

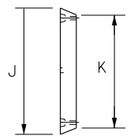
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOX DIMENSIONS	
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



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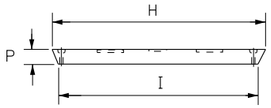

SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

ED(4)-14

FILE: ed4-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		67

71D

DATE: $DATE$ 11:00:36 AM
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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

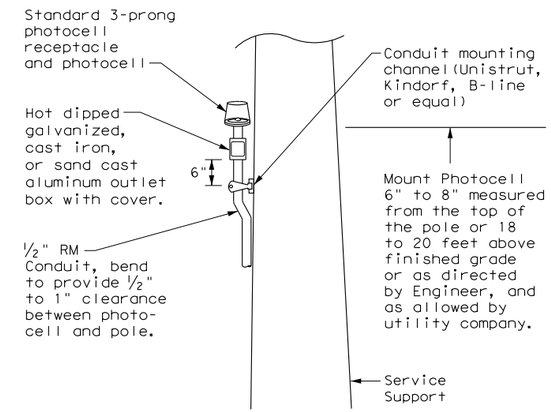
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	TYL	SMITH		68

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ROADWAY ILLUMINATION LIGHT FIXTURES

Fixture Housing:

A. Provide *UL listed fixture suitable for use in wet locations. Ensure optical compartment meets IEC Standard 60529-IP 65. Place a permanent label inside fixture indicating fixture meets *UL, IP 65 optical, and shows date of manufacture. Meet ANSI 136.15 wattage label requirements.
B. Construct fixture housing, lens frame, and door from 96% copper-free, die cast aluminum. Provide fixture mounting to a 2-in. pipe arm. Equip fixture with a 4-bolt clamp capable of adjustments plus or minus 5 degrees from level. Meet ANSI 136.31 3.0 G vibration requirements.
C. Attach a level bubble to the fixture housing. Ensure the level bubble is sensitive to 1 degree changes in position at any point within 5 degrees of the level position. Ensure the level bubble is clearly visible from the ground up to a 50 ft. mounting height. Ensure level bubble corresponds to level position of fixture.
D. Do not exceed 1.6 sq. ft. effective projected area. Do not exceed 60 lb. maximum weight.
E. Equip fixture with a 3-prong photocell receptacle with shorting cap installed.
F. Paint inside and outside of fixture light gray, when installing on galvanized poles. For all other fixtures, paint to match the color of the pole as directed by the Department.
G. Use a thermoset powder coat system. Ensure paint exceeds 1000-hr. salt-spray test in accordance with ASTM B117. Ensure a nominal thickness of 2.5 mil and no pigment loss upon 50 double-rubs using Methyl Ethyl Ketone (MEK) solvent in accordance with ASTM D5402, "Standard Practice for Assessing the Solvent Resistance of Organic Coatings Using Solvent Rubs."
H. Fabricate brackets, nuts, bolts, washers, ballast tray, and parts from stainless-steel, or aluminum of adequate thickness as approved by the Department except that:
   1. The 4 bolts/studs, 4 flat washers, 4 lock washers, and clamp that attach the luminaire to the arm may be galvanized in accordance with ASTM A123, A153 or B633. Provide means to ensure clamp is in the open position when installing.
   2. Glass lens retainer spring clips may be fabricated from galvanized steel in accordance with ASTM A153.
   3. Provide nylon throat or other approved locking means for all stainless steel nuts.
I. Provide optical assemblies which meet the following:
   1. Polished aluminum reflectors with Alzak or equal coating.
   2. Do not paint reflectors, except that, when approved by the Engineer, some surfaces may be painted with 92% reflective white paint.
   3. Reflectors may be one piece or segmented as follows.
      a. One piece reflectors:
         1. Seal photometric compartment by the use of a seamless or vulcanized seam, closed-cell silicone gasket, or other method approved by the Department.
         2. Provide a non-adjustable lamp socket mounting method so the lamp center is consistent with the reflector.
      b. Segmented reflectors:
         1. Attach segments at both ends (or opposite sides if segments are square) of the segment to a rigid aluminum base plate and side wall support assembly. Seal glass lens to lens frame with a one piece seamless silicone gasket.
   4. Equip the optical assembly with a lamp support in addition to the lamp socket to ensure the outer envelope is positioned as intended.
J. Provide 5/32 in. thick (min.) clear heat tempered or borosilicate glass.

Electrical Components:

K. Meet the following ballast requirements and pass tests in accordance with Test Method Tex-1130-T, "Ballasts of Lighting Assemblies."
   1. Mount electrical components on a removable stainless steel or aluminum tray of adequate thickness.
   2. Provide a fixture wiring diagram on or near the ballast.
   3. Use a copper wound magnetic regulating three isolated coil ballast.
   4. Provide ballast factor between 0.95 and 1.0.
   5. When the circuit voltage indicated on the plans is applied, the ballast input wattage during fluctuations of the test voltage of plus 10 percent and minus 10 percent, do not exceed the following:
      a. 220 Watts for 150 watt nominal lamp rating
      b. 440 Watts for 250 watt nominal lamp rating
      c. 552 Watts for 400 watt nominal lamp rating
   6. During fluctuation of the test voltage of plus 10 percent and minus 10 percent, ensure the lamp wattage fluctuation does not exceed a total of 20 percent and ballast maintains lamp wattage within the following limits.
      a. 110 Watts minimum and 180 Watts maximum for 150 Watt nominal lamp rating
      b. 175 Watts minimum and 370 Watts maximum for 250 Watt nominal lamp rating
      c. 280 Watts minimum and 475 Watts maximum for 400 Watt nominal lamp rating
   7. Ensure the ballast power factor, when tested at circuit voltage indicated on the plans, is not less than 90%.
   8. Permanently and clearly mark ballast or fixture to indicate following:
      a. Lamp type
      b. Catalog number
      c. Voltage rating
      d. Connection diagram
      e. Manufacturer
      f. *UL listing
L. Meet the following electronic starting aid requirements and pass tests in accordance with Test Method Tex-1140-T, "Electronic Starting Aids of High Pressure Sodium Vapor Lighting Assemblies."
   1. Provide a starting pulse with an amplitude of 2500 volts minimum, 4000 volts maximum.
   2. Ensure the pulse width is a minimum of 0.8 microseconds at 2250 volts.
   3. Ensure the pulse occurs when the open circuit voltage is equal to or greater than 90 percent of peak open circuit voltage.
   4. Ensure pulse repetition rate is a minimum of one per cycle.
   5. Provide a pulse current of 0.18 amperes (min.).
   6. Discontinue to pulse when, either,
      a. the lamp starts, or
      b. after a minimum of 3 minutes and a maximum of 10 minutes if the lamp fails to start.
M. Do not place fuses inside pole mounted luminaires. For wall mount or underpass mounted luminaires, provide internal 10 amp time-delay fuses.
N. Provide a two position terminal block for connecting supply wires which meet the following requirements:
   1. Insulate using nylon, porcelain, or phenolic material. Ensure phenolic terminal block is of adequate construction as approved by the Department.
   2. Fabricate terminals from nickel, tin plated brass, or aluminum.
O. Equip fixture with MOV surge protection in accordance with IEEE recommendations.
   1. Connect MOV from line to neutral or from line to line.
   2. Install MOV on the terminal block.

Lamp & Socket:

P. Provide *UL listed mogul base lamp sockets rated for 600 V, 1500 W that can withstand a 5000 V pulse. Meet *UL 496 requirements. Use porcelain-insulated lamp sockets with nickel plated copper alloy screw shells. Equip socket shell with a spring tensioned contact. Use nickel-plated copper alloy or stainless steel for the spring and contact.
Q. Supply and secure lamps inside the fixture that meet the following:
   1. Use pre-qualified high pressure sodium (HPS) lamps from TxDOT's material producers list of the wattages shown on the plans. No alternatives allowed.
   2. Average rated lamp life 30,000 hours.
   3. Fully extinguish at end of usable lamp life and remain extinguished without cycling.
   4. Do not provide lamps that burn at reduced output at end of life.
   5. Meet the Federal Toxic Characteristic Leachate Procedure (TCLP) limits.

Performance:

R. Meet the following photometric requirements using published photometric data and photometric data obtained by testing sampled fixtures.
   1. 150 Watt mast arm (underpass) mounted luminaire. Meet IESNA Cutoff requirements. Provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 110.0 ft. by 30.0 ft., when mounted in a level position as indicated on the properly mounted fixture level bubble 20.0 ft. above the midpoint of either long side of the surface area. Do not exceed 50:1 maximum to minimum horizontal illuminance uniformity ratio within the rectangular area.
   2. 250-watt mast arm mounted luminaire. Meet IESNA Cutoff requirements. Provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 190.0 ft. by 45.0 ft., when mounted properly in a level position as indicated on the level bubble 40.0 ft. above the midpoint either long side of the surface area. Ensure light intensities along a line parallel to and 20.0 ft. in from the long side of this rectangular area do not decrease by more than 0.50 foot-candles in any 5.0 ft. interval along the line from 10.0 ft. to 90.0 ft. on both sides of the luminaire and provide a minimum intensity of 0.30 foot-candles at any point along the line.Do not exceed 20:1 maximum-to-minimum horizontal illuminance uniformity ratio within the rectangular area.
   3. 400-watt mast arm mounted luminaire. Meet IESNA Cutoff requirements. Provide a minimum intensity of 0.20 foot-candle in a rectanglular area measuring 220.0 ft. by 60.0 ft. when mounted properly in a level position as indicated on the level bubble 50.0 ft. above the midpoint of either long side of the surface area. Ensure light intensities along a line parallel to and 30.0 ft. in from the long side of this rectangular area do not decrease by more than 0.75 foot-candle in any 10.0 ft. interval along the line from 10.0 ft. to 90.0 ft. on both sides of the luminaire and provide a minimum intensity of 0.30 foot-candle at any point along the line. Do not exceed 20:1 maximum-to-minimum horizontal illuminance uniformity ratio within the rectangular area.
S. Ensure photometric data is consistent from fixture to fixture. Match published photometric data (or approved photometric reports submitted during the prequalification process as the typical photometric output instead of published data) as follows:
   1. Point of maximum candela within 5 degrees horizontally and vertically.
   2. Maximum candela within 20% of published maximum candela.
   3. Fixture efficiency within 10% of published efficiency.

* When reference is made to UL, it can be considered to mean a Nationally Recognized Independent Testing Lab (NRTL). Comperable standards of Canadian Standard Association, Electrical Testing Laboratories or Factory Mutual can be equal to the referenced UL standard.

Sheet 1 of 2

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM LIGHT FIXTURES)
RID(LUM1)-07

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REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

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Prequalification:

T. Use only pre-qualified fixtures. No alternates will be considered.
   1. Only materials with approved product codes or designations from prequalified producers are accepted on bids. The Construction Division (CST) of the Texas Department of Transportation (TxDOT) maintains the material producers list of approved producer product codes or designations. Use the following website to view this list:
      http://www.dot.state.tx.us/business/producer_list.htm
      Use of prequalified material does not relieve the contractor of the responsibility to provide materials that meet the specifications. All materials, including those shown on the prequalified material list, may be inspected and tested at any time and may be rejected if not in compliance with the specifications.
   2. Notify the Department in writing as to which fixture from the prequalified list of approved fixtures will be supplied on each project.
   3. To have a fixture listed as pre-qualified:
      a. Submit a sample of each type of luminaire and all pertinent data, including published photometric data and recently tested photometric data (IES format, both "averaged" and both sides of "un-averaged" data) to:
         TXDOT- TRF 118 East Riverside Dr. Austin, TX 78704
      b. Demonstrate a commitment to quality.
      c. Submit the following documentation:
         1. QA/QC program documentation with the following minimum requirements;
            a. Written statement of the companies QA/QC policy.
            b. QA/QC person employed that has special QA/QC training and has QA/QC as their primary job responsibility.
            c. A written procedure specifically for handling orders for fixtures built to TxDOT specifications.
            d. A written procedure for keeping track of fixtures built, certified, and tested for TxDOT orders.
            e. A check list of features for TxDOT fixtures with QA/QC person signature.
         2. Fixture UL certification
         3. IP 65 certification
         4. 3G certification
         5. Aluminum casting and paint analysis
         6. Socket, MOV, and shutoff ignitor data
         7. Stainless steel and aluminum bracket data
         8. Ballast electrical data
         9. Photometric data
         10. Lamp data
      d. Prequalification samples, if approved, will not be returned to the manufacturer but will be retained by the the Department for comparison testing. Once a fixture has been approved, do not change any material or manufacturing method without prior approval of the Department. Unapproved changes will result in rejection of the fixture.
      e. In addition, luminaires will be tested for compliance with this specification. Luminaires that inconsistently pass testing or that are inconsistent with published photometric information will be removed from the pre-qualified list at the discretion of the Department.

Sampling:

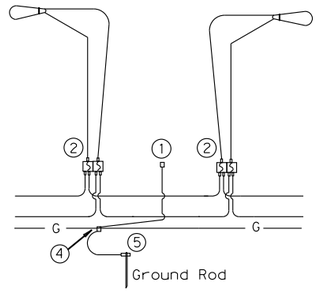
U. Sample in accordance with Test Method Tex-1110-T, "Sampling Lighting Assemblies."

Manufacturer Warranty:

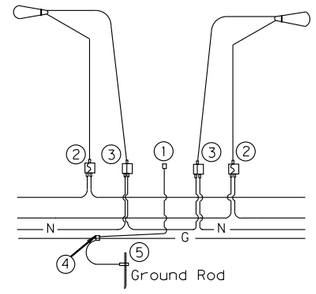
V. Replace failed fixtures, when non-operable due to defects in materials or workmanship within five years of installation with a fixture that passes all testing, delivered to the project location. Lamps and photocells are subject to the warranties of their respective manufacturers.

Testing:

W. Conduct electrical testing required in the Ballast section. Provide photometric testing of fixtures. Test fixtures at the following rates.
   1. Manufactuer Testing. Before fixtures are shipped from the manufacturer, test fixtures as follows. From each lot or manufacturing run, select one completed fixture of each 25, with a minimum of 2 and a maximum of 5. Test photometrics at an independent test lab inspected and approved by TxDOT. Electrical testing may be performed at manufacturer's facility.
      a. Provide IES photometric report in two formats:
         1. Standard averaged format for asymmetric fixtures.
         2. Un-averaged format showing both sides. Un-averaged data may be supplied in two files or as approved by the Department.
      b. Provide electrical and photometric test data directly to TRF-TE electronically for evaluation prior to shipping fixtures to the project. Do not ship fixtures until test data for each lot is approved by TRF-TE.
      c. Provide the following information on test reports:
         1. TxDOT's Control-Section-Job number, maintenance contract number, or purchase order number the fixtures are assigned to,
         2. a unique fixture test number per fixture,
         3. date of manufacture, and
         4. quantities supplied and lot number per fixture type.
      d. Write the unique lab report number on the top of the fixture housing with permanent marker. Ensure the test lab retains the results for 5 years. Provide the Department access to documentation.
      e. Retain records of manufacturing lots, test reports, lot quantities, and other pertinent details. Submit records to the Department upon request.
      f. Submit to TRF-TE a daily shipment report for shipments to each job.
      g. Make available to TxDOT inspectors upon request, all manufacturing facilities involved in the production of fixtures for use on Department projects, inventories of fixtures produced to Department specifications, and records of fixture testing and tracking.
   2. Departmental Test Reporting. Departmental test reports will be issued in accordance with Tex 1110-T.



FOR THREE-WIRE CIRCUIT-CENTER GROUNDED
LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR FOR 120/240 VOLT SERVICE.



FOUR-WIRE CIRCUIT-CENTER GROUNDED
LUMINAIRES SERVED AT 240V
(240/480 VOLT SERVICE)

NOTES:

① Use 1/2 in.-13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors.
②③ Use pre-qualified Breakaway Connectors for both T-Base and Shoe-Base installations.
④ Split Bolt or other connector.
⑤ Use Ground Rod Clamp listed for its intended purpose (i.e. concrete, direct burial...)

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

(RDWY ILLUM LIGHT FIXTURES)

RID(LUM2)-07

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REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		70

72B

DATE: $DATE$ 11:00:38 AM
FILE: $FILE$

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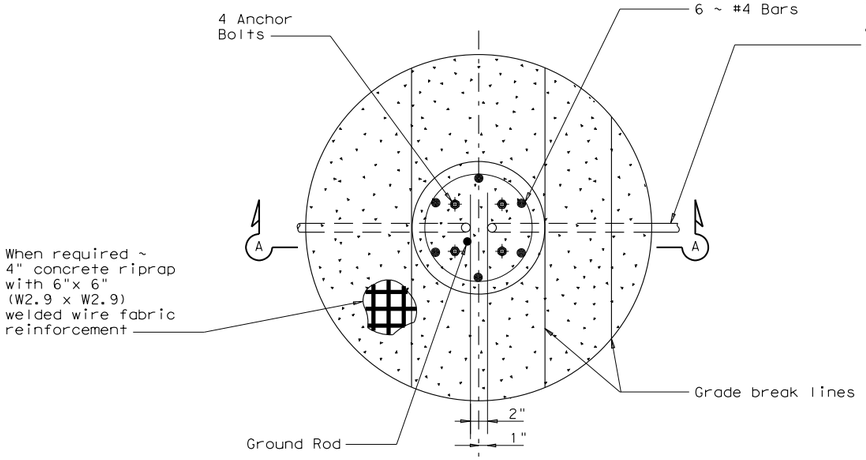
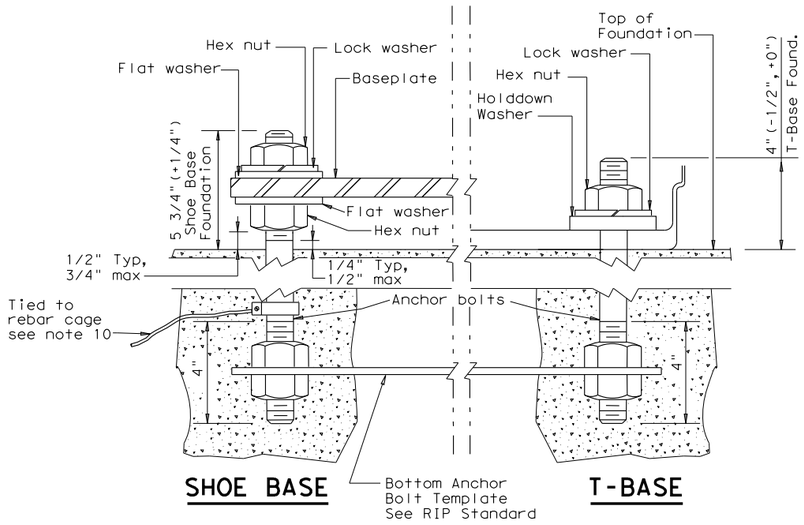
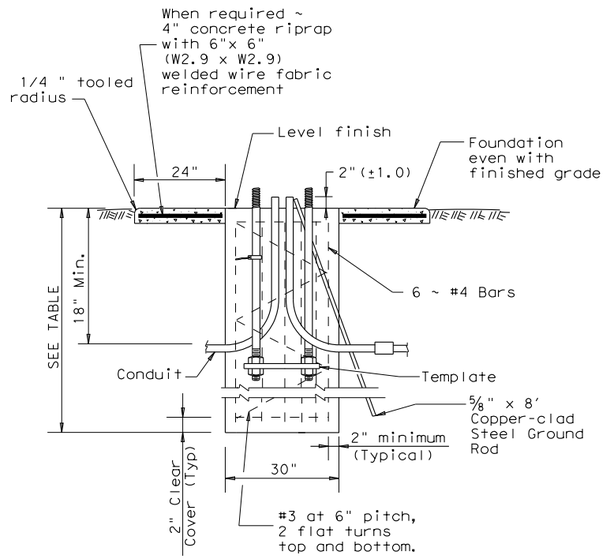


FOUNDATION DETAIL



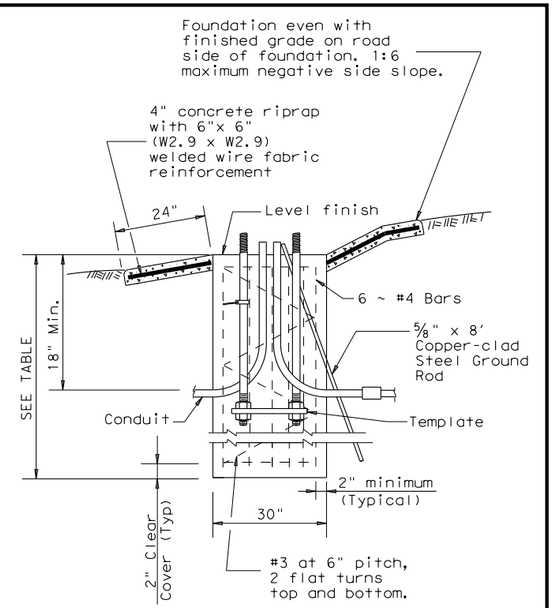
ANCHOR BOLT DETAIL

1. "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
2. Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
3. Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
4. Use appropriate class of concrete as specified in Items 416 and 432.
5. Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
6. Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less, see design guidelines for further information.
7. Use 8 hold down washers on transformer base poles as recommended by the manufacturer and supplied with base.
8. Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
9. Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
10. Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete.
11. Use rip rap on T-base foundations that are located on a sloped grades.



SECTION A-A

SHOWING CONSTANT GRADE



SECTION A-A

SHOWING SLOPED GRADE

PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)		
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

ANCHOR BOLTS			
POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
<40 ft.	13 in.	14 in.	1in. x 30in.
40-50 ft.	15 in.	17 1/4in.	1 1/4in. x 30in.

BREAKAWAY POLE PLACEMENT (See note 6)	
Roadway Functional Classification	** Pole offset (distance to transformer base, tolerance + 6in.-0in.)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

RECOMMENDED FOUNDATION LENGTHS (See note 1)			
MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤20 ft.	6′	6′	6′
>20 ft. to 30 ft.	8′	6′	6′
>30 ft. to 40 ft.	8′	8′	6′
>40 ft. to 50 ft.	10′	8′	6′

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION DETAILS

(RDWY ILLUM FOUNDATIONS)

RID(FND)-11

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DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
1-11

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49

DIST	COUNTY	SHEET NO.
TYL	SMITH	71

72C

DATE: $DATE$ 11:00:39 AM
FILE: $FILE$

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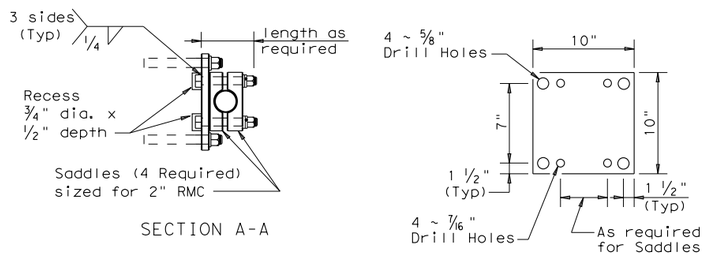
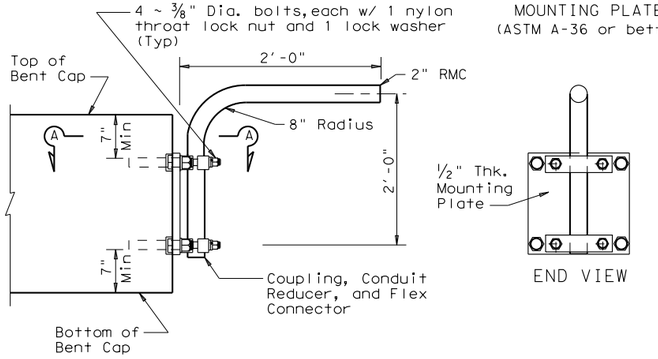
FILE: $FILE$



SECTION A-A

MOUNTING PLATE
(ASTM A-36 or better)



PROFILE VIEW
Or as Required
(See Note A.4)

END VIEW

UNDERPASS LIGHTING ARM TYPE 1

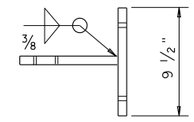
NOTES:

A. ALL 150 watt H.P.S. LUMINAIRES
1. Luminaire locations, conduit and conductor sizes and routing are typical and diagrammatic only. See project layout sheets for specific details.
2. Conduit will be paid for under Item 618, "Conduit" and conductors will be paid for under Item 620, "Electrical Conductor," unless otherwise shown on the plans. See lighting layout sheets.
3. Install a ground rod and attach to the equipment grounding conductor in all ground boxes containing conduit that extends above grade 6 in. or more. Install grounding bushings and properly bond RMC in these boxes.
4. Adjust conduit in saddles to place fixture height and orientation as required. See fixture orientation detail and layout sheet. Where practicable, place luminaires so the bottom of luminaire is above the bottom of the beam, maximum of 3 in. (See detail UNDER PASS LIGHTING ARM TYPE 2)
5. Except as noted, all structural steel and exposed bolts, nuts, washers shall be galvanized in accordance with Item 445 "Galvanizing".
6. Fabrication of brackets and support arms will not be paid for directly but is subsidiary to Item 610, "Roadway Illumination Assemblies."
7. Install a heavy duty NEMA 3R fused disconnect or breaker enclosure rated at 30 amps and 480 volts to switch underpass luminaires as shown on plans, with at least one per bridge circuit. Install 20 amp time-delay fuses or inverse-time circuit breakers. Mount disconnect or breaker enclosure 10 ft. (min) above grade on columns or bent caps as approved by the Department. Modify disconnect to allow padlocking in the "ON" and "OFF" positions. Padlocks and disconnect switches or circuit breakers for underpass fixtures will not be paid for directly but are subsidiary to the various bid items of the contract.

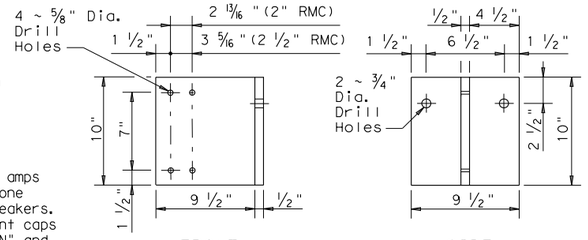
B. TYPE 1
1. Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) for Type 1 arm shaft.
2. Use 3/8 in. stainless steel bolt or stud non-epoxy type expansion anchors for concrete for Type 1 mounting. Except as noted, provide an allowable 2650 lbs minimum pull-out force (after consideration of adjustment factors for edge distance and bolt spacing) for each anchor. Install each anchor to the embedment depth recommended by the manufacturer.
3. Attach conduit to plate with 4 saddles, four - 3/8 in. diameter bolts, nylon throat lock nuts and lock washers.

C. TYPE 2
1. Provide 2 in. rigid metal conduit (2.375" O.D., 0.146" wall) or provide a combination of 2 1/2 in. (2.875" O.D., 0.193" wall) and 2 in. (2.375" O.D., 0.146" wall) rigid metal conduits with a reducing bushing as beam height stipulated for Type 2 arm shaft. Field cutting and threading will be permitted. Paint cut and threaded areas with zinc rich paint after conduit is connected to adjacent fitting.
2. Connecting conduit may be strapped to tapered section only of precast beams as shown. Anchor as approved by the Engineer. Maximum anchor depth is 1 in.
3. Indiscriminate drilling into precast concrete beams may result in reduced beam strength. Use drilling location and method as directed by the Engineer. See location of underpass lighting mounting bracket detail. The locations shown in the table are such that reinforcing strands will not be damaged.

NOTE: Conduit on columns, caps, and slab is shown surface mounted. For new columns and caps, embed PVC conduit in concrete. Bond and ground metal junction boxes and conduit.



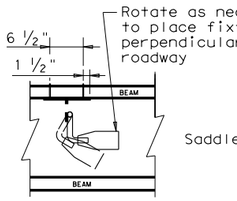
PLAN VIEW



FRONT SIDE

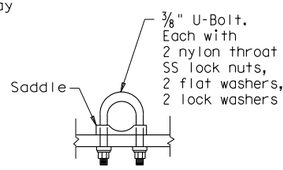
BRACKET DETAIL

Make from 1/2" plate
(ASTM A-36 or better)

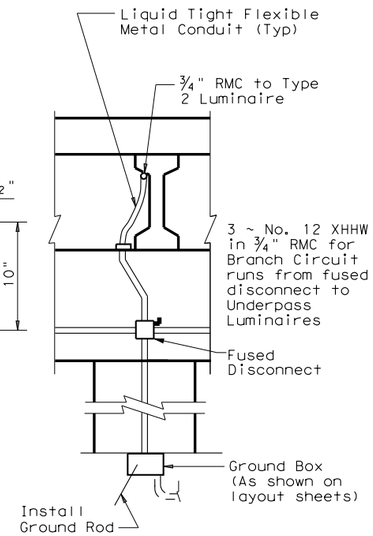


FIXTURE ORIENTATION

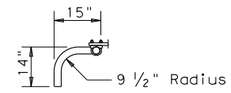
Plan View



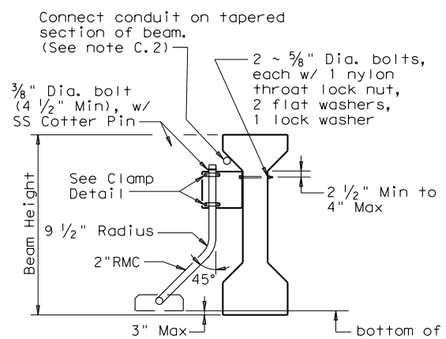
CLAMP DETAIL
(2 Req'd)



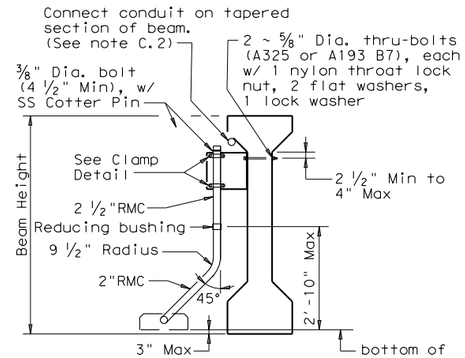
INS RD IL AM (U/P)(TY 2)(.15 KW)



PLAN VIEW

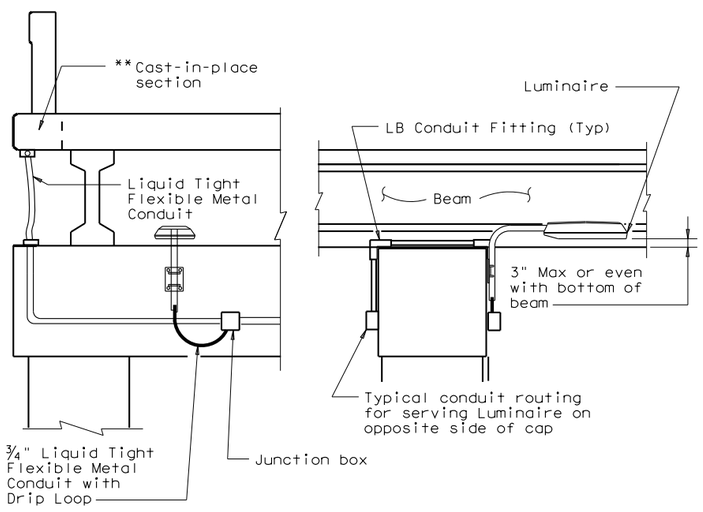


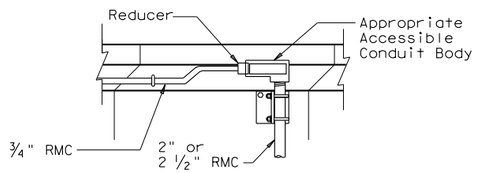
FRONT
(Beam height equal to or less than 54")



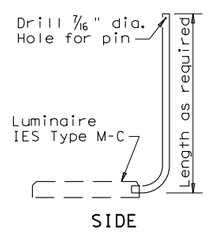
FRONT
(Beam height greater than 54")

UNDERPASS LIGHTING ARM TYPE 2





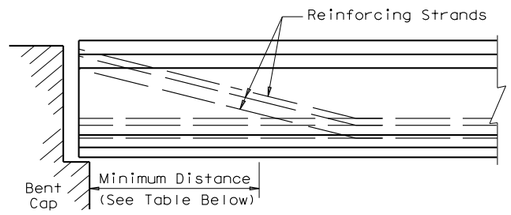
CONDUIT CONNECTION PROFILE



SIDE

INS RD IL AM (U/P)(TY 1)(.15 KW)

If bridge has pre-cast panels under deck, run circuit under deck edge.



LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET

LOCATION OF UNDERPASS LIGHT MOUNTING BRACKET TABLE

SPAN LENGTH	MINIMUM DISTANCE
≤ 50'	10'-0"
50' - 70'	15'-0"
70' - 90'	20'-0"
> 90'	25'-0"

Texas Department of Transportation

Traffic Operations Division Standard

ROADWAY ILLUMINATION DETAILS

(UNDERPASS LIGHT FIXTURES)

RID(UP)-14

FILE: ridup14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 2-14	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		72

72D

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DATE: $DATE$ 11:00:40 AM
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GENERAL NOTES:

Scope:
Details apply to Induction Fluorescent type Roadway Illumination Assemblies, bid under Item 610, "Roadway Illumination Assemblies". Associated hardware, mounting assemblies, parts, junction boxes, lamps, lenses, brackets, disconnect, tools, and labor required to install the underpass lighting assembly will not be paid for directly but are subsidiary to Item 610. Conduit and conductors supplying the fixtures are paid for separately. Mounting channel for conduit supports are not paid for directly but are subsidiary to the various bid items of the contract.

Fixture Housing:

A. Provide fixture with a maximum of 28 in. square housing and 13 in. maximum overall depth (mounting mechanism and junction box may extend outside the 28 in. square). Meet ANSI 136.31 3.0 G vibration requirements.
B. Provide cutoff fixture with flat glass. Provide polished aluminum reflector with a min. of 95% efficiency in reflecting light. Do not block light emitting from the fixture with lens retainer (i.e. lens retainer protruding over the reflecting surface).
C. Provide housing made of aluminum sheeting (0.10 in. min.), stainless steel (14 ga. min.), or low copper content die-cast aluminum (1/8 in. min. wall thickness). Ensure fixture housing is constructed of good workmanship. Provide external mounting mechanism on fixture without any penetrations into fixture housing. Protect and seal penetrations from junction box to ballast compartment to ensure the integrity of conductor insulation and to assure required International Protection (IP) rating. Seal openings or construction joints in housing. Construct seams with continuous welds. Grind flush any seams on frame and housing.
D. Provide a heat tempered C73 flat glass lens a minimum of 5/32 in. thick, or flat clear tempered glass lens with a minimum of 3/16 in. thick. Seal lens frame with a seamless or vulcanized seam, closed cell silicone gasket, or provide a gasket material as approved by the Engineer.
E. Secure lens frame to the housing with a minimum of eight #10 stainless steel screws. Ensure a minimum of IP65 rating will be maintained inside fixture housing, even after any maintenance is performed on the fixture.
F. Provide and mount junction box on the fixture housing to provide wire connection to fixture. Provide junction box with a minimum of 3/16 in. thick aluminum housing or hot dipped galvanized cast iron walls. Provide threaded knockout for a 3/4 in. conduit entry at junction box. Thread, seal, weld or use other department approved means to attach junction box to the fixture housing.
G. Provide fixtures painted completely inside and outside with gray thermal TGIC, consistent in color to "cobra head" luminaire. Use other colors as approved by the Engineer.

Ballast and Lamp:

A. Provide ballast that operates universally between 120 and 277 VAC(+-10%) and meets ANSI 62.41 category"A" transient protection.
B. Provide Induction Fluorescent lamp system with a minimum rated output of 150 watts.
C. Provide lamp system with a minimum Color Rating Index (CRI) of 80 and color temperature of 4100K.
D. Support "Icetron" lamps at each end of the lamp.
E. Provide lamp that passes the Toxicity Characteristics Leachate Procedure (TCLP) test.

Performance:

A. Provide fixture that operates at 11,000 minimum initial rated lumens. Provide fixture that emits minimum light levels as shown below (when mounted at 15 ft. above the midpoint of a circular area);
   1. 0.2 foot-candles in a 35 ft. radius,
   2. 1.0 foot-candle in a 22 ft. radius,
   3. 2.0 foot-candles in a 16 ft. radius,
   4. No point in a 35 ft. radius will exceed 27.0 foot-candles,
   5. Max. to min. ratio of 30 to 1.
B. Provide photometric data that complies with required TxDOT photometrics.

Manufacturer Warranty:

A. Provide warranty from lamp manufacturer certifying the fixture being capable of sufficient heat dissipation. Provide fixture listed to operate in ambient temperatures of 55 degrees C. Submit certification of approval with fixture submittal.
B. Provide a written 60,000-hour life replacement warranty from lamp and fixture manufacturers for the ballast/lamp combination for underpass installation conditions. Provide a 10-year fixture warranty from the date of installation. Provide full replacement of failed fixture for the first five-years delivered to project location. Provide replacement parts after 5-years up through 10-years of lifetime of fixture.
C. Lamp or fixture light-output dropping below 60% of initial rated lumens will be considered failed.
D. Present warranty for approval with the fixture submittal.

Mounting:

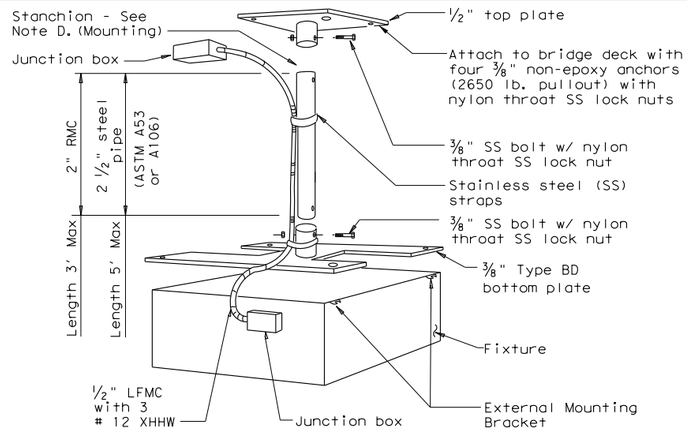
A. See RID(UP) for general routing of conduits under bridge structures. Embed conduit in concrete of bent caps and columns.
B. Install a heavy duty NEMA 3R fused disconnect or breaker enclosure rated at 30 amps and 480 volts to switch underpass luminaires as shown on plans, with at least one per bridge circuit. Install 20 amp time-delay fuses or inverse-time circuit breakers. Mount disconnect or breaker enclosure 10 ft.(min) above grade on columns or bent caps as approved by the Department. Modify disconnect to allow padlocking in the "ON" and "OFF" positions. Padlocks and disconnect switches or circuit breakers for underpass fixtures will not be paid for directly but are subsidiary to the various bid items of the contract.
C. Do not randomly drill into pre-cast concrete beams. Drill only as specifically shown or as approved by the Engineer.
D. Position fixture lens flush with bottom of beam and adjust stanchion to seat fully into the 2 1/2 in. (or 3 in.) steel pipe. Field drill pipe and pin with bolt as shown. Do not oversize hole for pin. Repair galvanized cut ends and drilled holes with three coats of zinc rich paint (dry completely between coats).
E. Use 3/8 in. stainless steel bolt or stud non-epoxy type expansion anchors for concrete for Type BD and UB mounting. Except as noted, provide an allowable 2650 lbs minimum pull-out force (after consideration of adjustment factors for edge distance and bolt spacing) for each anchor. Install each anchor to the embedment depth recommended by the manufacturer.
F. Except as noted, all structural steel and exposed bolts, nuts and washers shall be galvanized in accordance with Item 445 "Galvanizing."
G. For Type "UB" bracket, adjust vertical stanchion with fixture and align fixture lens flush with bottom of beam.
H. Adjust bracket dimensions as necessary to accommodate fixtures being supplied. Use Type "BD" for double T-beam mounting. Use other mounting arrangements as approved by the Engineer.
I. Provide a minimum clearance of 16.5 ft. from the roadway to the fixture, when mounting fixtures on box beams using "BB" type brackets. See Engineer for alternative underpass light mounting, if the 16.5 ft. clearance is not obtainable.
J. Submit other mounting arrangements designed according to the latest edition of the American Association of State Highway Transportation Officials (AASHTO) "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", and approved by the Engineer.

Pre-qualification:

A. Provide fixtures and brackets with approved product codes as listed on the Department's Material Producer List (MPL), under Item 610 in the file Roadway Illumination and Electrical Supplies. The MPL can be found on the Department website.
B. Use of pre-qualified material does not relieve the contractor of the responsibility to ensure that the material meets specifications. All materials may be tested at any time and may be rejected if not in compliance with the specifications. Do not change material or manufacturing methods of approved fixtures without prior approval by the Department. Unapproved changes may result in removal of the manufacturer from the prequalified list for 1 yr.
C. All materials, including those shown on the MPL, may be inspected and tested at any time and may be rejected if not in compliance with the specifications.

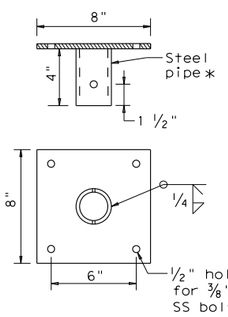
Storage:

A. Store all fixtures in a safe dry environment. Fixtures that arrive damaged or weathered at the testing facility will be rejected and replaced at the contractors expense.

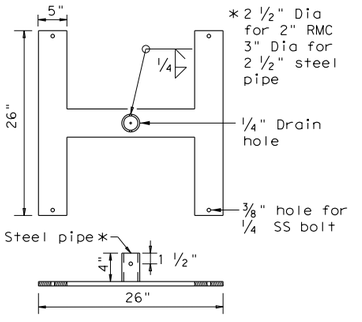


PERSPECTIVE TYPE BD

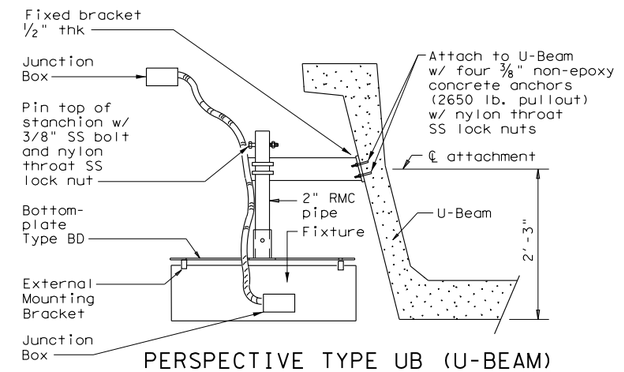
(BRIDGE DECK)



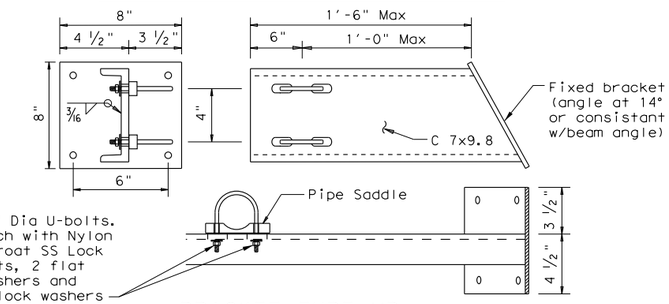
TOP PLATE - TYPE BD



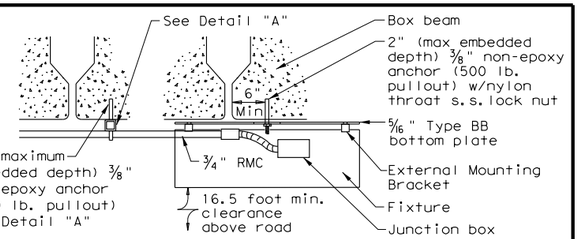
BOTTOM PLATE - TYPE BD



PERSPECTIVE TYPE UB (U-BEAM)

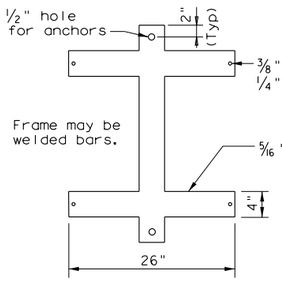


BRACKET TYPE UB

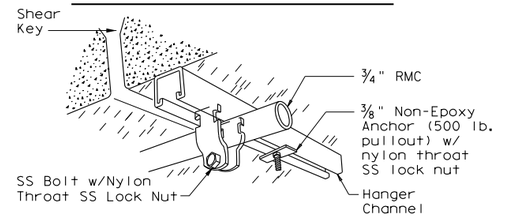


PERSPECTIVE TYPE BB

(BOX BEAM)

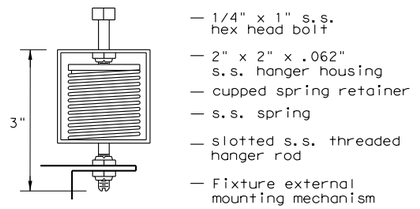


BOTTOM PLATE - TYPE BB



DETAIL "A"

Conduit Attachment to Box Beam
(shown longer than necessary for clarity)



Install Spring clip with three nylon throat s.s. lock nuts.

DETAIL "B"

SHOCK ABSORBER SPRING CLIP

(When required by Manufacturer)

Texas Department of Transportation

Traffic Operations Division Standard

ROADWAY ILLUMINATION DETAILS

(IF UNDERPASS LIGHT FIXTURES)

RID(IF)-14

FILE:	ridif14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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		DIST	COUNTY		SHEET NO.
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72E

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SHIPPING PARTS LIST ~ POLES AND LUMINAIRE ARMS

Nominal Mounting Ht. (ft)	Shoe Base Designation Pole	A1	A2	Luminaire	Quantity	T-Base Designation Pole	A1	A2	Luminaire	Quantity	CSB/SSCB Mounted Designation Pole	A1	A2	Luminaire	Quantity	OTHER Designation Pole	A1	A2	Luminaire	Quantity
20	(Type SA 20 S - 4)			(.15kW) S		(Type SA 20 T - 4)			(.15kW) S											
	(Type SA 20 S - 4 - 4)			(.15kW) S		(Type SA 20 T - 4 - 4)			(.15kW) S											
30	(Type SA 30 S - 4)			(.25kW) S		(Type SA 30 T - 4)			(.25kW) S		(Type SP 28 S - 4)			(.25kW) S						
	(Type SA 30 S - 4 - 4)			(.25kW) S		(Type SA 30 T - 4 - 4)			(.25kW) S		(Type SP 28 S - 4 - 4)			(.25kW) S						
	(Type SA 30 S - 8)			(.25kW) S		(Type SA 30 T - 8)			(.25kW) S		(Type SP 28 S - 8)			(.25kW) S						
	(Type SA 30 S - 8 - 8)			(.25kW) S		(Type SA 30 T - 8 - 8)			(.25kW) S		(Type SP 28 S - 8 - 8)			(.25kW) S						
40	(Type SA 40 S - 4)			(.25kW) S		(Type SA 40 T - 4)			(.25kW) S		(Type SP 38 S - 4)			(.25kW) S						
	(Type SA 40 S - 4 - 4)			(.25kW) S		(Type SA 40 T - 4 - 4)			(.25kW) S		(Type SP 38 S - 4 - 4)			(.25kW) S						
	(Type SA 40 S - 8)			(.25kW) S		(Type SA 40 T - 8)			(.25kW) S		(Type SP 38 S - 8)			(.25kW) S						
	(Type SA 40 S - 8 - 8)			(.25kW) S		(Type SA 40 T - 8 - 8)			(.25kW) S		(Type SP 38 S - 8 - 8)			(.25kW) S						
	(Type SA 40 S - 10)			(.25kW) S		(Type SA 40 T - 10)			(.25kW) S		(Type SP 38 S - 10)			(.25kW) S						
	(Type SA 40 S - 10 - 10)			(.25kW) S		(Type SA 40 T - 10 - 10)			(.25kW) S		(Type SP 38 S - 10 - 10)			(.25kW) S						
	(Type SA 40 S - 12)			(.25kW) S		(Type SA 40 T - 12)			(.25kW) S		(Type SP 38 S - 12)			(.25kW) S						
	(Type SA 40 S - 12 - 12)			(.25kW) S		(Type SA 40 T - 12 - 12)			(.25kW) S		(Type SP 38 S - 12 - 12)			(.25kW) S						
50	(Type SA 50 S - 4)			(.4kW) S		(Type SA 50 T - 4)			(.4kW) S		(Type SP 48 S - 4)			(.4kW) S						
	(Type SA 50 S - 4 - 4)			(.4kW) S		(Type SA 50 T - 4 - 4)			(.4kW) S		(Type SP 48 S - 4 - 4)			(.4kW) S						
	(Type SA 50 S - 8)			(.4kW) S		(Type SA 50 T - 8)			(.4kW) S		(Type SP 48 S - 8)			(.4kW) S						
	(Type SA 50 S - 8 - 8)			(.4kW) S		(Type SA 50 T - 8 - 8)			(.4kW) S		(Type SP 48 S - 8 - 8)			(.4kW) S						
	(Type SA 50 S - 10)			(.4kW) S		(Type SA 50 T - 10)			(.4kW) S		(Type SP 48 S - 10)			(.4kW) S						
	(Type SA 50 S - 10 - 10)			(.4kW) S		(Type SA 50 T - 10 - 10)			(.4kW) S		(Type SP 48 S - 10 - 10)			(.4kW) S						
	(Type SA 50 S - 12)			(.4kW) S		(Type SA 50 T - 12)			(.4kW) S		(Type SP 48 S - 12)			(.4kW) S						
	(Type SA 50 S - 12 - 12)			(.4kW) S		(Type SA 50 T - 12 - 12)			(.4kW) S		(Type SP 48 S - 12 - 12)			(.4kW) S						

GENERAL NOTES:

All work, materials and services not shown on the plans which may be necessary for complete and proper construction shall be performed, furnished and installed by the Contractor. Faulty fabrication or poor workmanship in any material, equipment or installation will be considered justification for rejection. Where manufacturers provide warranties or guarantees as a customary trade practice, Contractor shall furnish to the Department such warranties or guarantees.

The location of poles and fixtures are diagrammatic only and may be shifted by the Engineer to accommodate local conditions. Erection and/or removal of poles and luminaires located near overhead electrical lines shall be accomplished using established industry and utility safety practices and in accordance with laws governing such work. The Contractor shall consult with the appropriate utility company prior to beginning such work.

A. Standard Steel Pole Designs. Steel poles fabricated in accordance with the details and dimensions shown herein, shall be considered standard designs. Submission of shop drawings and design calculations for standard designs is not required.

B. Optional Steel Pole Designs. Multi-sided steel poles may be allowed as optional designs, if steel poles are permitted or required, pending approval by the Department as outlined below.
1. Shop Drawings. Optional designs require submission of shop drawings and design calculations bearing the seal of an engineer registered in the State of Texas, in accordance with Item 441, "Steel Structures." The Department may elect to pre-approve some shop drawings for optionally designed poles. Submission of shop drawings and design calculations is not required for structures fabricated in accordance with the details of shop drawings on the pre-approved list maintained by the TxDOT Traffic Operations Division. Any deviation from the pre-approved shop drawings will require submission of shop drawings of the complete assembly and design calculations as described above.
2. Structural Support Design for Luminaires. Lighting support structures shall be designed for a 25 year design life in accordance with the 2001 Edition of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." All poles shall be designed for 110 mph 3-second gust wind speeds. An additional 1.14 gust factor shall be applied to the wind loads. For transformer base poles, fabricator shall include transformer base and connecting hardware in design calculations and shop drawing submittals. All transformer bases shall have been structurally tested to resist the theoretical plastic moment capacity of the pole. Certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished shall be submitted with the shop drawings. Shop drawings shall show breakaway base model number, and manufacturer's name and logo. Manufacturer's shop drawings shall include the ASTM designations for all materials to be used.
3. Mast Arm Attachments. All poles and attachments shall be structurally designed to support two 12-foot mast arms and luminaires. Poles shall be supplied with mast arm combinations as shown in the plans. All mast arms shall be designed for a 60-pound luminaire having an effective projected area of 1.6 square feet.
4. Anchor Bolt Assembly. Anchor bolt assemblies for optionally designed poles shall be the same as those shown herein.

C. Aluminum Pole Designs. Aluminum pole designs may be allowed, if aluminum poles are permitted or required, pending approval by the Department as outlined below.
1. Meet all of the requirements stated above for optional steel pole designs and the following:
   a. Aluminum poles shall be fabricated in accordance with "Structural Welding Code-Aluminum" AWS D1.2.
   b. Aluminum pole designs shall use the same anchor bolt assembly and be subject to the same geometric restraints and other requirements for steel poles specified herein.
   C. Aluminum poles shall be equipped with vibration mitigation devices, as approved by the engineer.
   d. Pole components shall be constructed using the following material:
   Shaft: ASTM B221 or B241 Alloy 6063-T6, ASTM B209 Alloy 5086-H34, ASTM B221 Alloy 6005-T5.
   Base Flange: ASTM B26 Alloy 356.0-T6 or ASTM B108 Alloy 356.0-T6 (Yield strength test required).
   Mast Arm Fitting: ASTM B209 Alloy 6061-T6 or ASTM B221 Alloy 6005-T5.
   Mast Arms: ASTM B241 Alloy 6061-T6 or Alloy 6063-T6.
   Pole Cap: ASTM B209 Alloy 5086-H32 or ASTM B108 or B26 Alloy 356.0-T6.
   Bolts: Stainless Steel AISI 300 series. Bolts threading into aluminum threads shall be treated with anti-seize compound, Never-Seez Compound, Permatex 133K or equal.

D. Special Designs. Poles with architectural treatments shall meet the requirements shown elsewhere in the plans.

EXPLANATION OF ROADWAY ILLUMINAION ASSEMBLY DESIGNATIONS

(TYPE SA 50 T - X - X) (.4KW) S

SA: Pole and mast arm may be steel or aluminum.
ST: Pole and mast arm must be steel.
AL: Pole and mast arm must be aluminum.
SP: Squashed (ovalized) steel or aluminum pole for installing on CSB or SSCB. See standard sheet CSB (5), or SSCB (4).

Two numerical digits denote mounting height in feet.

Next letter denotes type of base, (S-Shoe Base, T-Transformer Base, or B-Shoe Base Bridge Mount)

First number denotes length of mast arm in feet.

Use of second mast arm is indicated by second dashed number which denotes length in feet.

Next three figures indicate luminaire rating (1 kW= 1000 watts, .4 kW= 400 watts, etc.) Fixtures for U/P (SPL-CO) (.15KW)S(TYPE 1) and (TYPE 2) as shown on RID(UP) shall be "cobra head" style fixtures that meet the specifications shown on RID(LUM) sheets 1 and 2. Fixtures bid under the descriptive code RDWY ILL ASSEM U/P TYPE IF shall meet the specifications shown on RID(IF). All other fixtures bid under Item 610 shall meet specifications shown elsewhere in the plans.

Last letter indicates the type of lamp (M- Metal Halide, S- High Pressure Sodium, L- Low Pressure Sodium).

SHEET 1 of 4

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION POLES

RIP(1)-11

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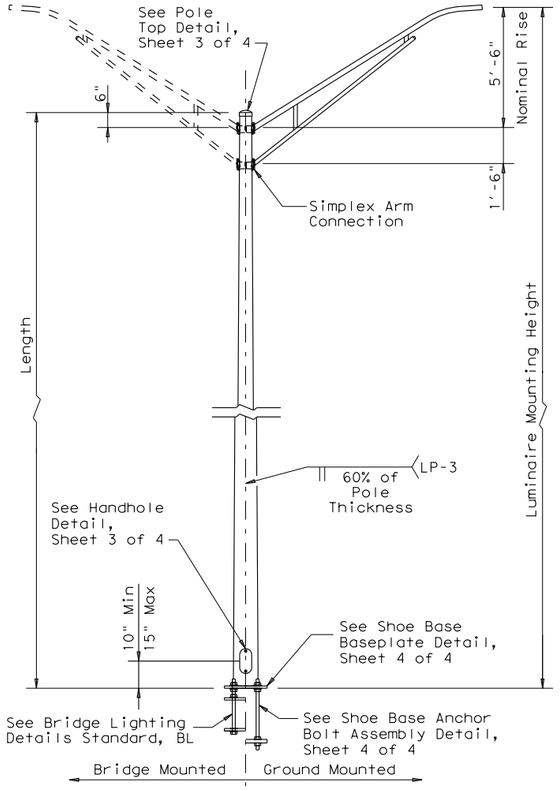


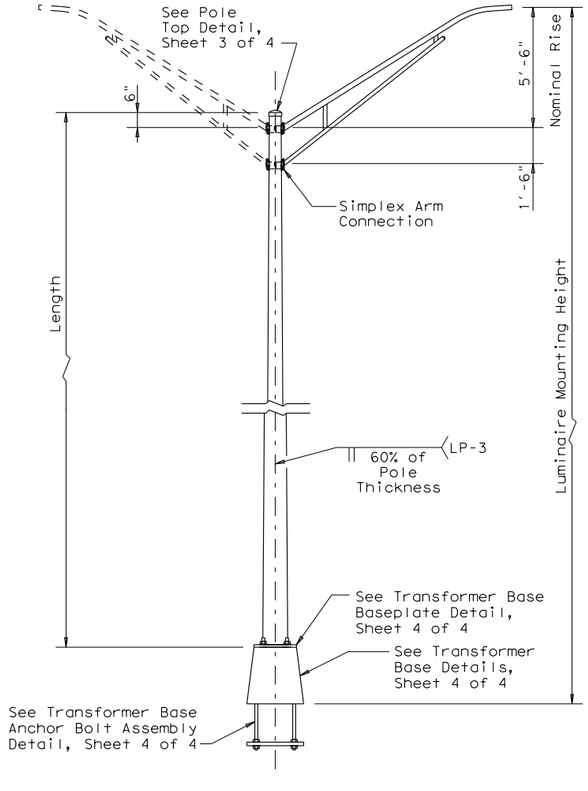
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3

Designs conform to 2001 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications. Design 3-Second Gust Wind Speed equal 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is less than 25' above natural ground level.

Design structures to support two 12' luminaire mast arms and luminaires. Design mast arms for a 60-pound luminaire having an effective projected area of 1.6 square feet.

Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.41	43.50	0.1196	30.3

For mounting heights between values shown in the tables, use base diameter and thickness values for the larger pole.

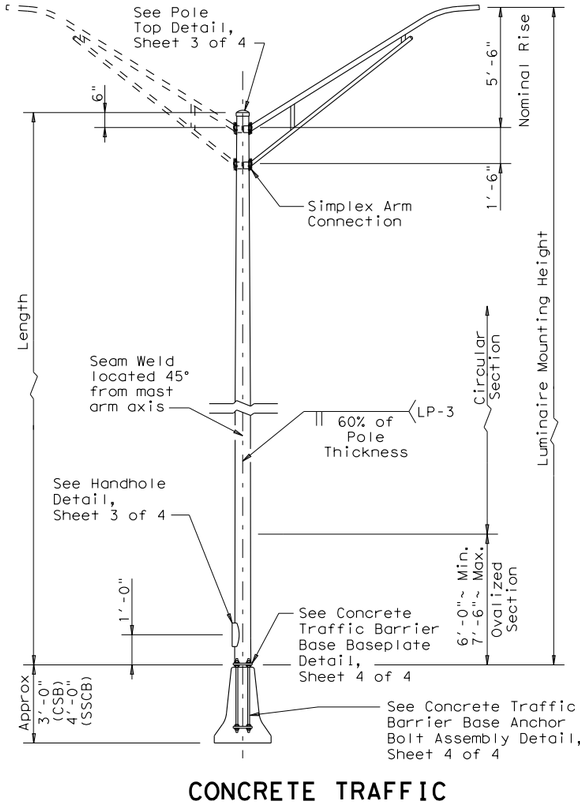
Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."

Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with the ANSI/AWS Structural Welding Code D1.1.

Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.

Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.

Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (ft)	Base ② Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About ℄ of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. Except for poles mounted on a concrete traffic barrier, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier.

The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."

MATERIAL DATA		
COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	A325 ①	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

① Lubricate in the field if necessary in lieu of the requirements in ASTM A325.

② Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.

③ A1011 SS Gr 50 may be used in lieu of HSLAS, provided the material meets the elongation requirements for HSLAS

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION POLES

RIP(2)-11

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REVISIONS
MOD 1/11 JSY/TGG Added Aditional M.H. in table and revised Anchor Bolt Assembly

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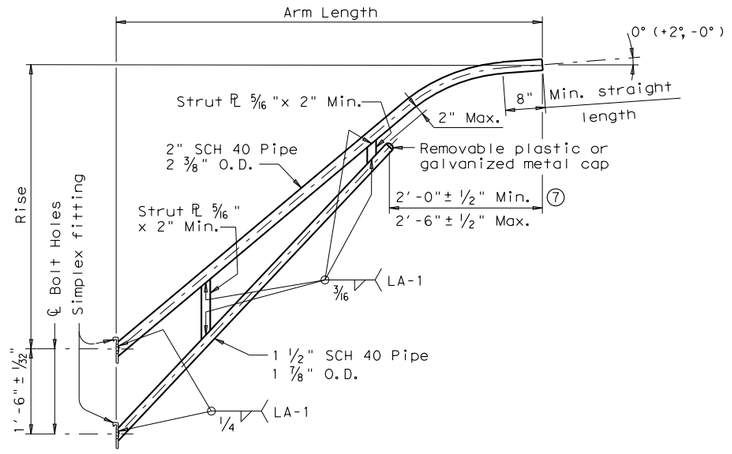
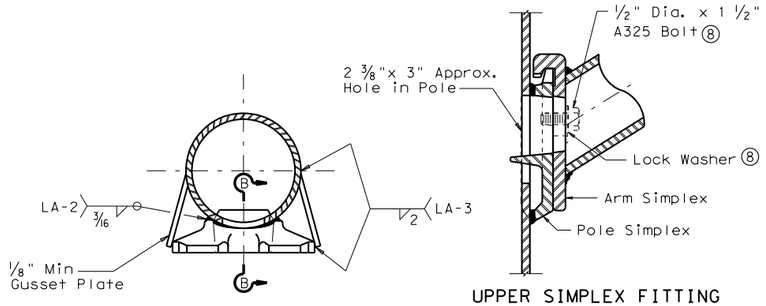


LUMINAIRE ARM

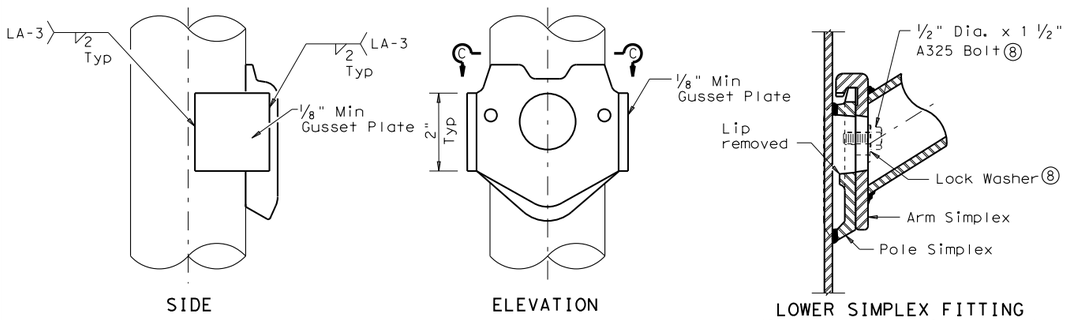
LUMINAIRE ARM DIMENSIONS		
Nominal Arm Length	Arm Length	Rise
4'-0"	3'-6"	2'-6" (10)
6'-0"	5'-6"	5'-6"
8'-0"	7'-6"	5'-6"
10'-0"	9'-6"	5'-6"
12'-0"	11'-6"	5'-6"

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr 65-35, A148 Gr 80-50, A576 Gr 1021 (5), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr A or B, A500 Gr B, A501, A 1008 HSLAS-F Gr 50 (6), or A1011 HSLAS-F Gr 50 (6)
Arm Struts and Gusset Plates (4)	ASTM A36, A572 Gr 50 (6), or A588
Misc.	ASTM designations as noted



SECTION C-C

UPPER SIMPLEX FITTING
(Gusset not shown for clarity)



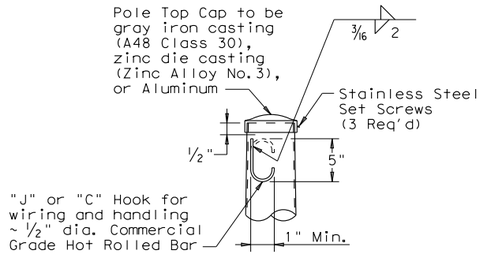
SIDE

ELEVATION

LOWER SIMPLEX FITTING
(Gusset not shown for clarity)

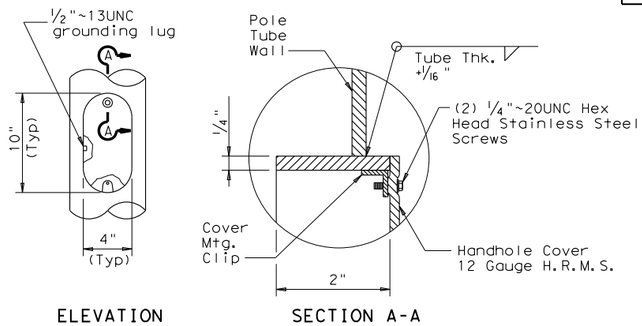
SIMPLEX ATTACHMENT DETAIL

SECTION B-B



POLE TOP

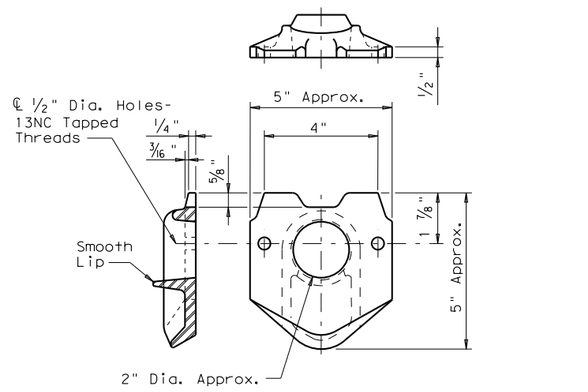
ARM ASSEMBLY FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Arm Length	±3"
Arm Rise	+1 3/4" in 10 ft
Arm Diameter	+3/16"
Overall length or width	+1/4"
Thickness	+1/4", -1/16"
Deviation from flat	1/8" in 12"
Spacing between holes	+3/32"
Bolt hole size	±1/16"
Strut location in truss arms	±1 1/2"



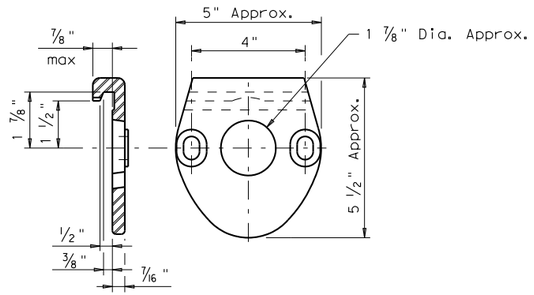
ELEVATION

SECTION A-A

HANDHOLE



POLE SIMPLEX DETAIL (9)



ARM SIMPLEX DETAIL (9)

(4) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

(5) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(6) A572, A1008 HSLAS-F, and A1011 HSLAS-F materials may have higher yield strengths but shall not have less elongation than the grade indicated.

(7) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(8) Each pole simplex fitting shall be supplied with 2 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans.

(9) Proposed deviations in arm simplex dimensions or materials must be submitted to the Department for approval.

(10) Luminaire mounting heights are based on assumed 5'-6" luminaire arm rise.

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION POLES

RIP(3)-11

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REVISIONS

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CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49

DIST	COUNTY	SHEET NO.
TYL	SMITH	76

73C

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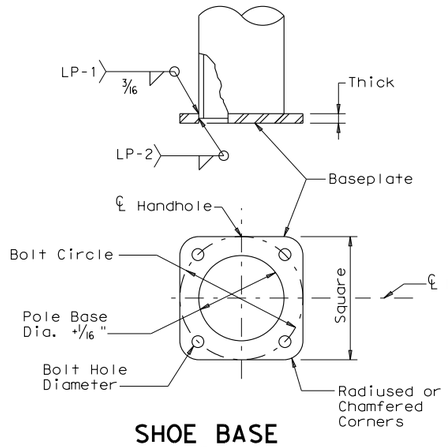
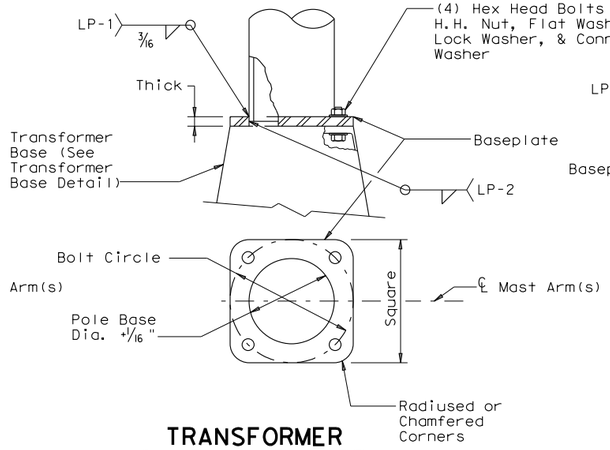


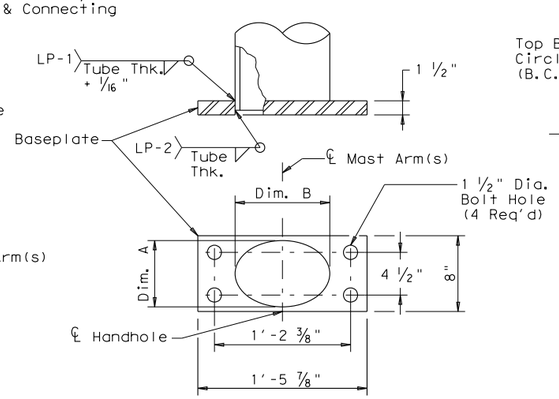
SHOE BASE BASEPLATE

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20′ - 39′	13"	13"	1 1/4"	1 1/4"
40′	15"	15"	1 1/4"	1 1/2"
50′	15"	15"	1 1/2"	1 1/2"



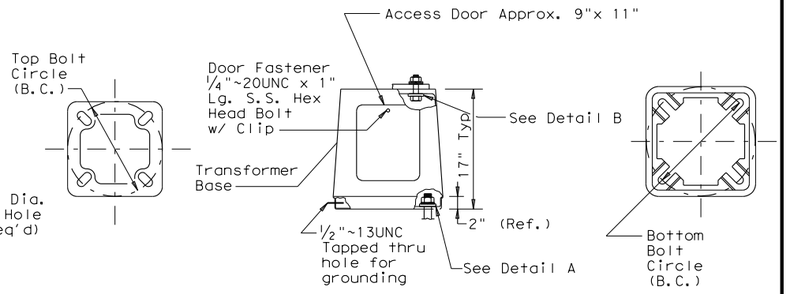
TRANSFORMER BASE BASEPLATE

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFOMER BASE TYPE
20′ - 39′	13"	13"	1 1/4"	1"	1 1/4"	A
40′	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50′	15"	15"	1 1/2"	1 1/4"	1 1/2"	B

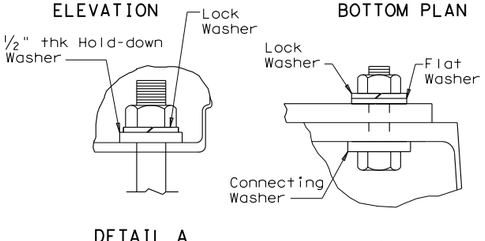


CONCRETE TRAFFIC BARRIER BASE BASEPLATE

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS	POLE DIA.⑫	DIM. A	DIM. B
28′ - 38′	9"	7" ± 1/4"	10" ± 1/4"
48′	10 1/2"	7" ± 1/4"	13" ± 1/4"



TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



TRANSFORMER BASE DETAILS

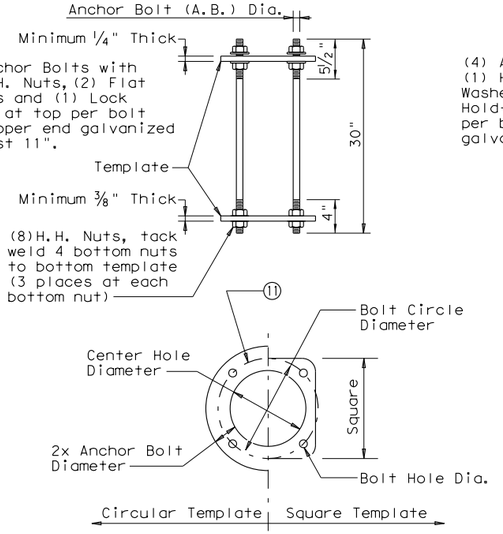
For mounting heights between those shown in the table, use the values in the table for the larger mounting height.

All breakaway bases shall meet the breakaway requirements of the 2001 Edition of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.

Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four hex head bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.

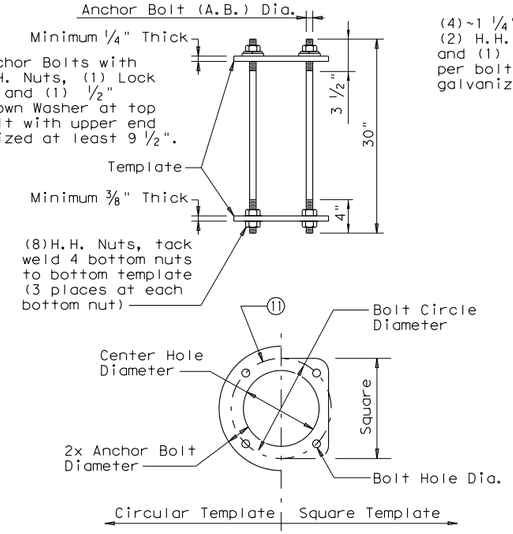
Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.

Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.



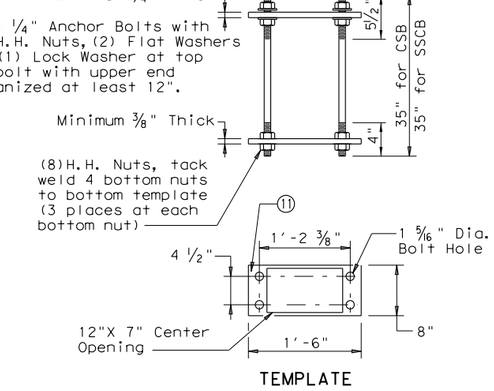
SHOE BASE ANCHOR BOLT ASSEMBLY

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE					
MOUNTING HEIGHTS	A.B. Dia.	BOLT CIRCLE DIAMETER	SQUARE	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′ - 39′	1"	13"	13"	11"	1 1/16"
40′ - 50′	1 1/4"	15"	14 1/2"	12 1/2"	1 5/16"



TRANSFORMER BASE ANCHOR BOLT ASSEMBLY

TRANSFORMER BASE ANCHOR BOLT ASSEMBLY TABLE					
MOUNTING HEIGHTS	A.B. Dia.	BOLT CIRCLE DIAMETER	SQUARE	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20′ - 39′	1"	14"	14"	12"	1 1/16"
40′ - 50′	1 1/4"	17 1/4"	16 3/4"	14 3/4"	1 5/16"



TEMPLATE

CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY

⑪ Anchor Bolt Templates need not be galvanized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

SHEET 4 of 4

Texas Department of Transportation
Traffic Operations Division

ROADWAY ILLUMINATION POLES

RIP(4)-11

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REVISIONS
MOD 1/11 JSY/TGC Revised Anchor Bolt Assemblies

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		77

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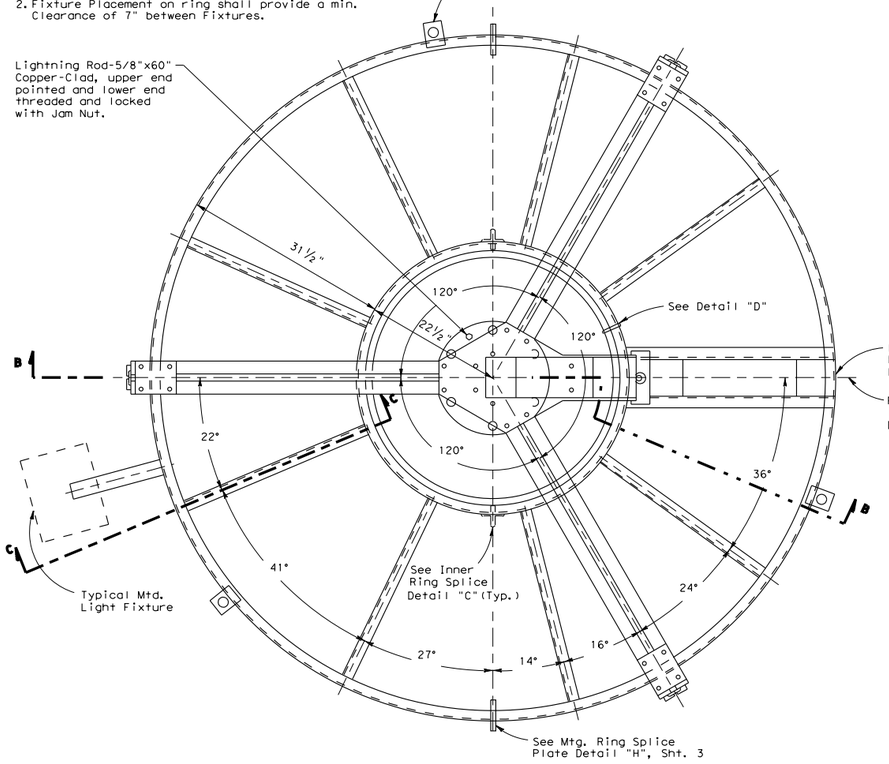
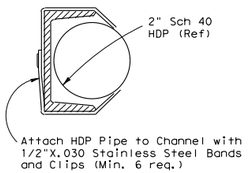
NOTES:

1. Pole, Ring, and Ring Support shall be assembled and erected so that Reference Line is parallel to center line of roadway or as shown on "Lighting Layouts" sheets.
2. Fixture Placement on ring shall provide a min. Clearance of 7" between Fixtures.

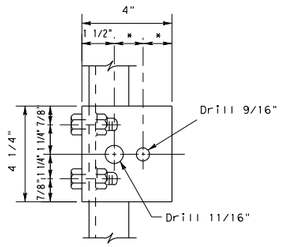


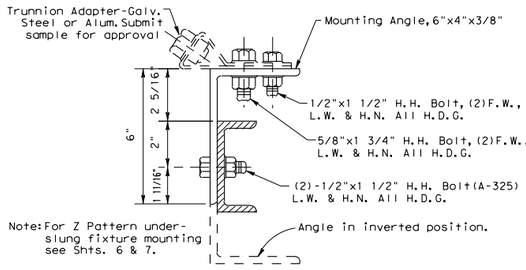
LIGHT MOUNTING RING & SUPPORT ASSEMBLY



DETAIL "D"
BUMPER RING ATTACHMENT

* As required by Trunnion Adapter supplied.

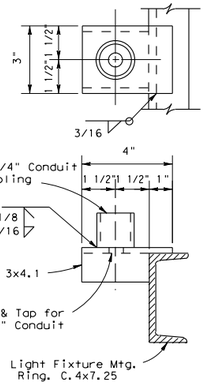




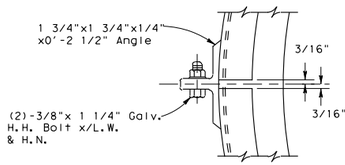
Note: Aiming capabilities may be by method shown or by Steel Mounting-Aiming Device as approved by the Engineer. Mark position of fixture with center punch or drill after fixture has been aligned to the right position on the roadway, as directed by the Engineer.

SECTION C-C
(FOR TRUNNION MOUNT)

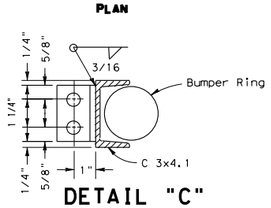
NOTE: Provide S.S. or galv. cable safety lanyard for Light Fixture when Trunnion Mount is used.



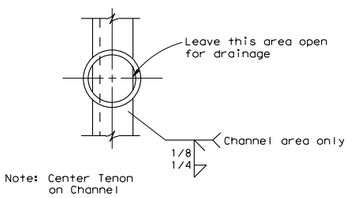
DETAIL "E"
(CONDUIT ATTACHMENT FOR OBSTRUCTION LIGHTS, TYPICAL (3) PLACES)

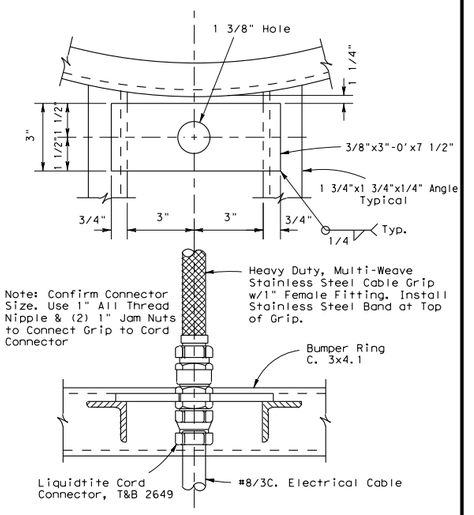


PLAN



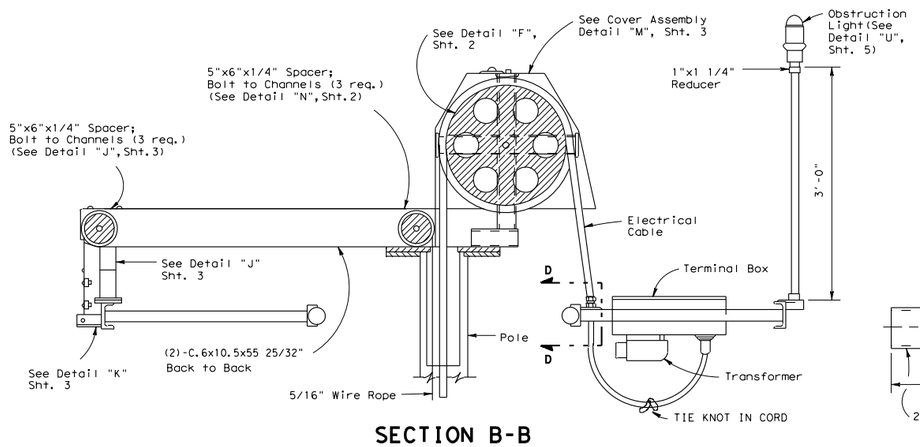
DETAIL "C"
INNER RING SPLICE



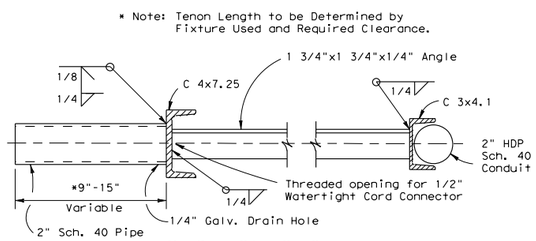


SECTION D-D

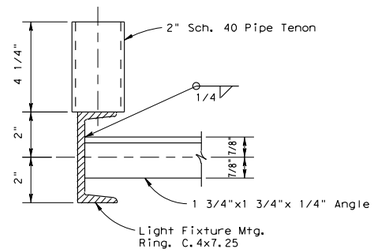
NOTE: COVER CORD WITH HEAT SHRINK TUBING FROM CABLE GRIP TO WITHIN ONE INCH OF GRIP TO CONNECTOR TRANSITION PRIOR TO INSTALLING CABLE GRIP.



SECTION B-B



SECTION C-C
(FOR AREA LIGHTS)



SECTION C-C
(FOR FLOODLIGHTS)

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Traffic Operations Division

HIGH MASK ILLUMINATION DETAILS

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3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
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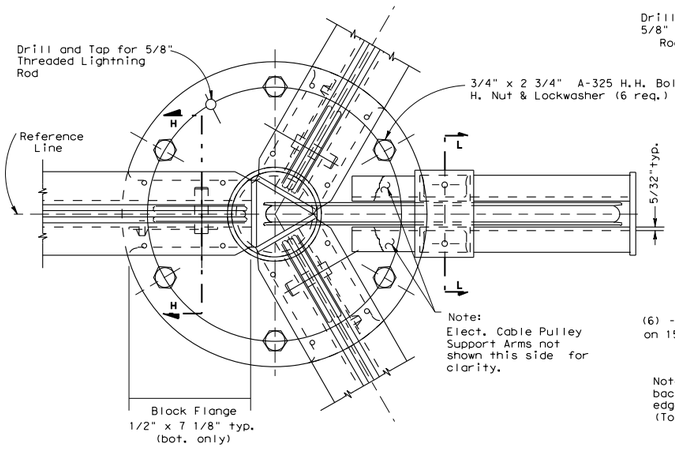
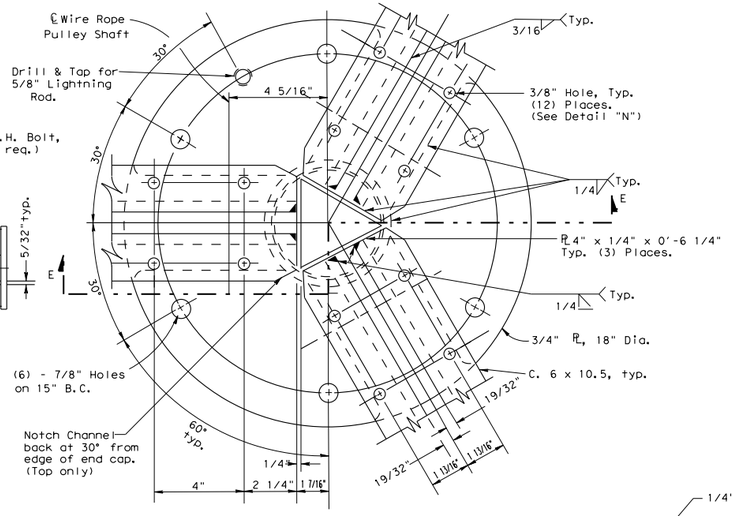
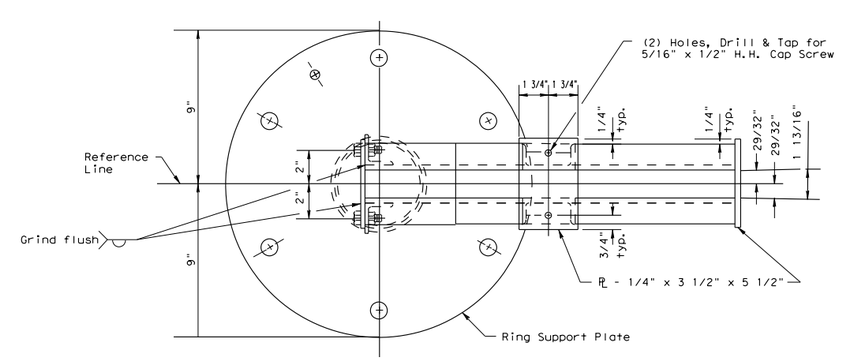


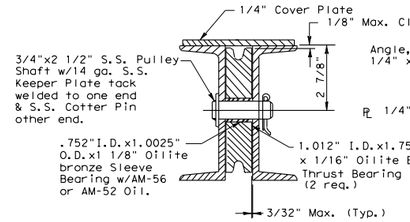
PLAN VIEW



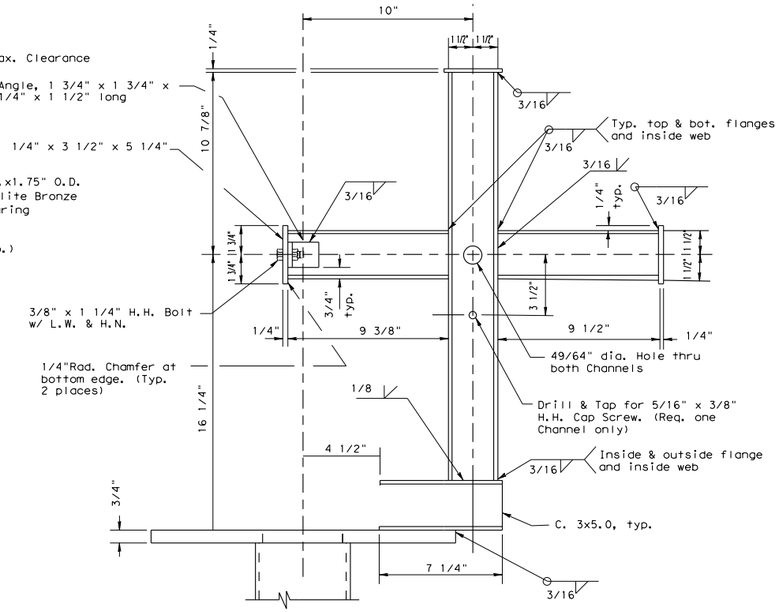
DETAIL "G"
TOP PLATE CONNECTION
(LESS ELECT. CABLE PULLEY SUPPORT)
(SEE DETAIL "L")



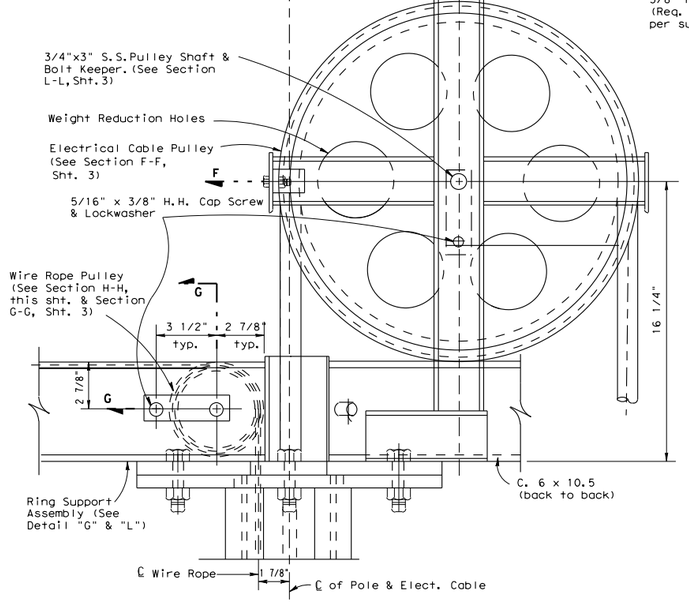
PLAN VIEW



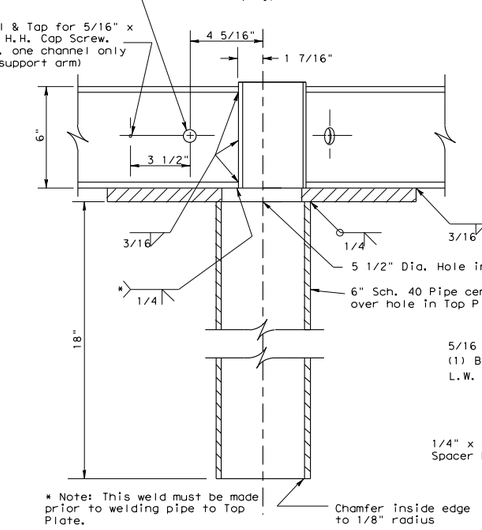
SECTION "H-H"
PULLEY MOUNTING FOR RING SUPPORT ARMS



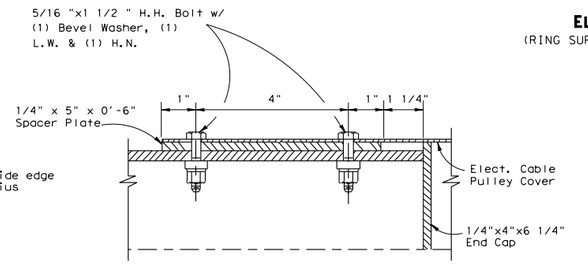
DETAIL "L"
ELECT. CABLE PULLEY SUPPORT
(RING SUPPORT ARMS NOT SHOWN FOR CLARITY)



DETAIL "F"
RING SUPPORT ASSEMBLY
(NEAR SIDE SUPPORT ARM & ELECT. CABLE PULLEY COVER NOT SHOWN FOR CLARITY)



SECTION "E - E"



DETAIL "N"

Texas Department of Transportation
Traffic Operations Division

HIGH MAST ILLUMINATION DETAILS

HMID(2)-03

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REVISIONS
4-86
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5-87
12-87
4-96

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		79

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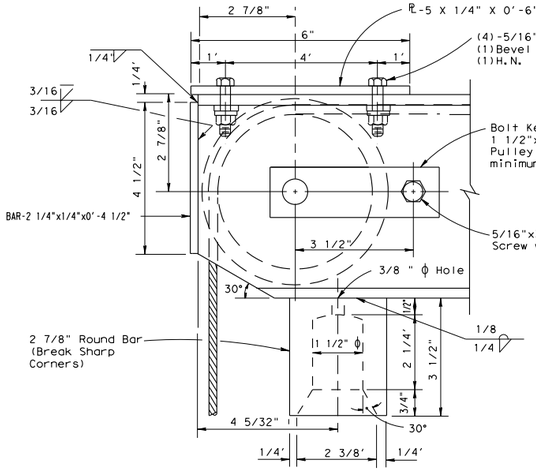
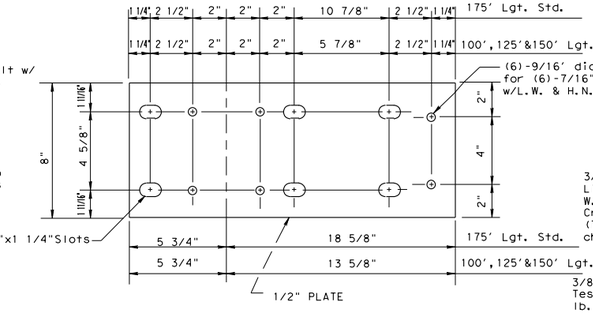


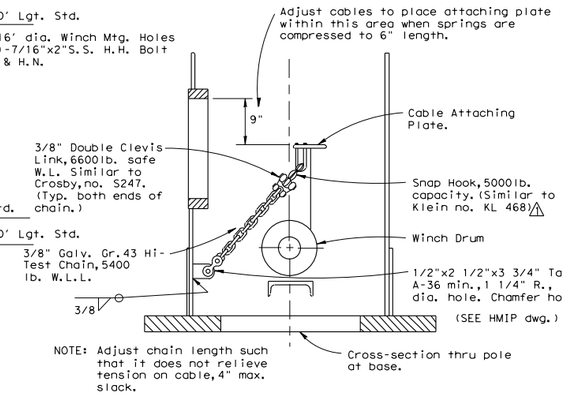
DETAIL "J"



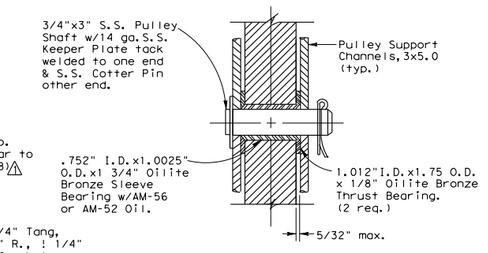
DETAIL "V"

WINCH MOUNTING PLATE

NOTE: Dimensions may vary-Verify with winch manufacturer.

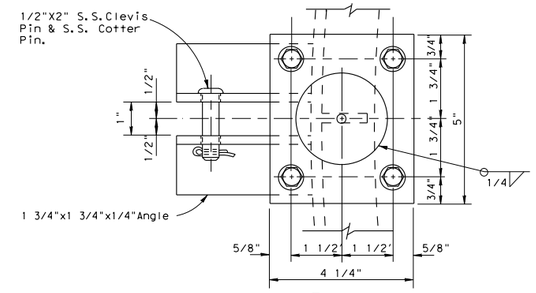


SAFETY LANYARD DETAIL

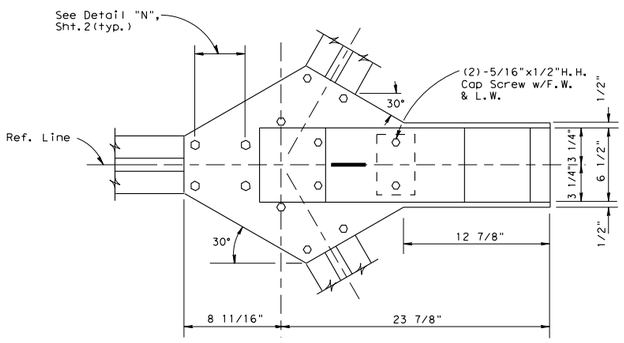


SECTION L-L

ELECTRICAL CABLE PULLEY MOUNTING



PLAN



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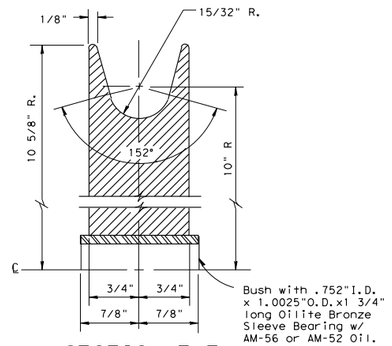
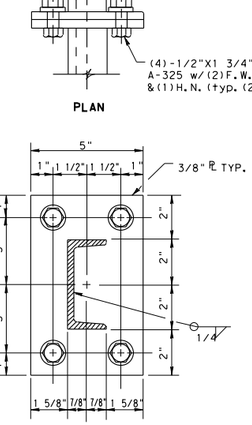


SECTION F-F

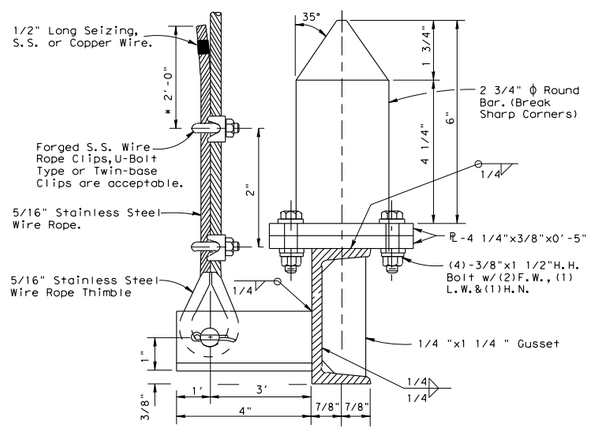
ELECTRICAL CABLE PULLEY

(Pulley material to be aluminum alloy, Type 356-T6 or equal)



DETAIL "H"

MOUNTING RING SPLICE PLATE

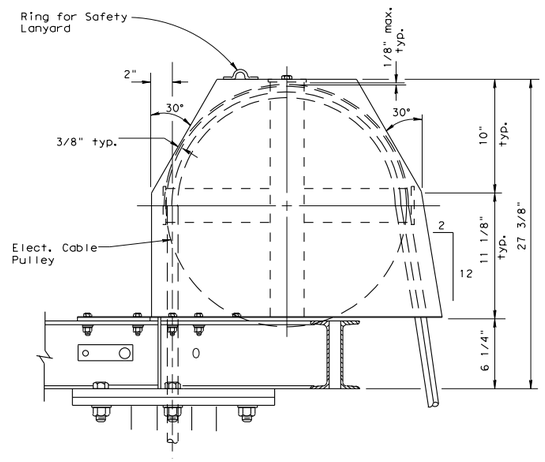


DETAIL "K'

MOUNTING RING CONNECTION & STABILIZER

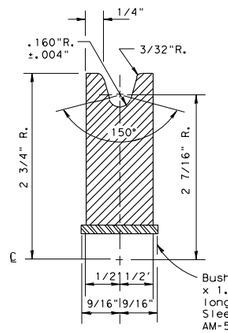
* EXTRA 2'-0" of wire cable to be attached to ring with SS Bands as directed by Engineer.

NOTE: Cover to be 14 ga. galv. sht. metal or 0.10" anodized aluminum sheet.



DETAIL "M"

COVER CAP ASSEMBLY



SECTION G-G

WIRE ROPE PULLEY

(Pulley material to be plated steel or Stainless Steel)

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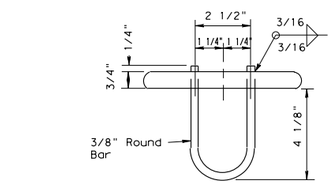
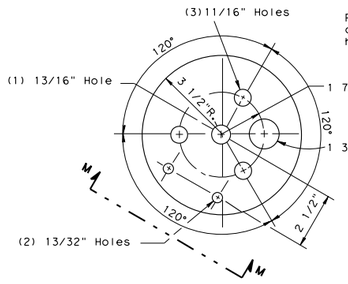
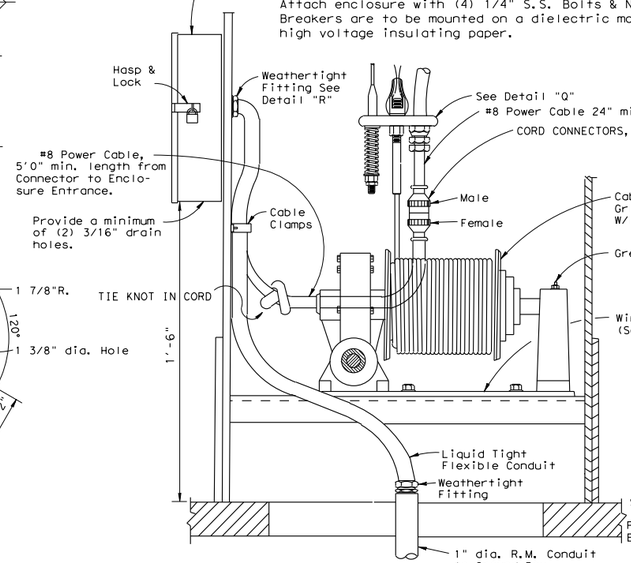


VIEW "M-M"

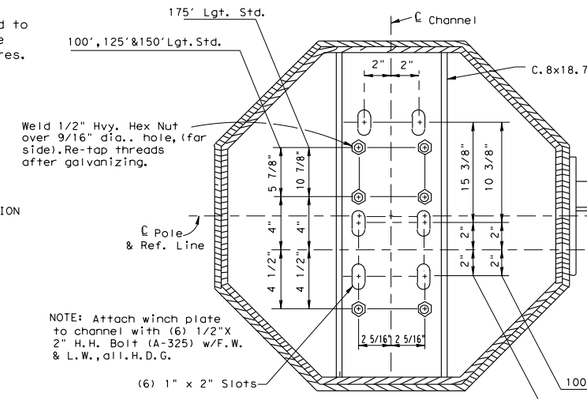


PLAN VIEW

50 A 480V. Circuit Breaker, NEMA 4 for total lamp watts exceeding 9000, 30A, 480V. Circuit Breaker, NEMA 4 for 9000 or less total lamp watts. Enclosure shall be stainless steel, 14 ga., weatherproof with full length vertical door hinge, welded hasp, lock and two sets of keys. Hinge pin shall be tack-welded to prevent removal. Lock(Master# 2195) and keys shall be furnished by the contractor and shall be the same type as used for the service enclosures. Enclosure dimensions shall be approx. 20" high x 9" wide x 5" deep. Attach enclosure with (4) 1/4" S.S. Bolts & Nuts w/ 1/4" Spacers Breakers are to be mounted on a dielectric mounting board or high voltage insulating paper.



SECTION J-J
(WINCH ASSEMBLY)



DETAIL "P"
(WINCH MOUNTING CHANNEL)
Dimensions may vary-Verify with winch manufacturer.

NOTE:
The drive train of the Power Drive Assembly between the driving motor and the winch shall be within two degrees of perfect alignment.

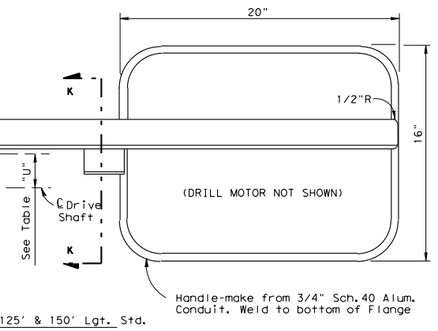
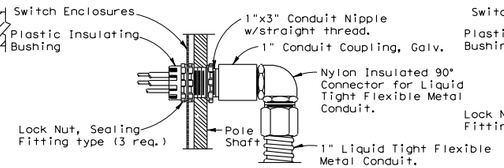
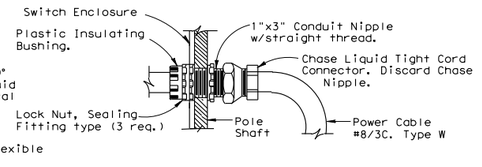


TABLE OF "U" DIMENSIONS

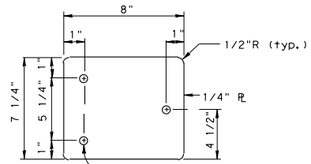
Pole Ht. Ft.	8 Sided 80 MPH	8 Sided 100 MPH	12 Sided 80 MPH	12 Sided 100 MPH
100	3 1/2"	3 1/2"	2 1/2"	2 1/2"
125	3 1/2"	3 1/2"	2 1/2"	2 1/2"
150	3 1/2"	3 1/2"	2 1/2"	2 1/2"
175	4 1/2"	4 1/2"	3 1/2"	3 1/2"



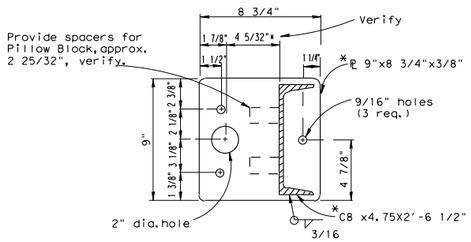
(POWER FEED FROM GROUND BOX)



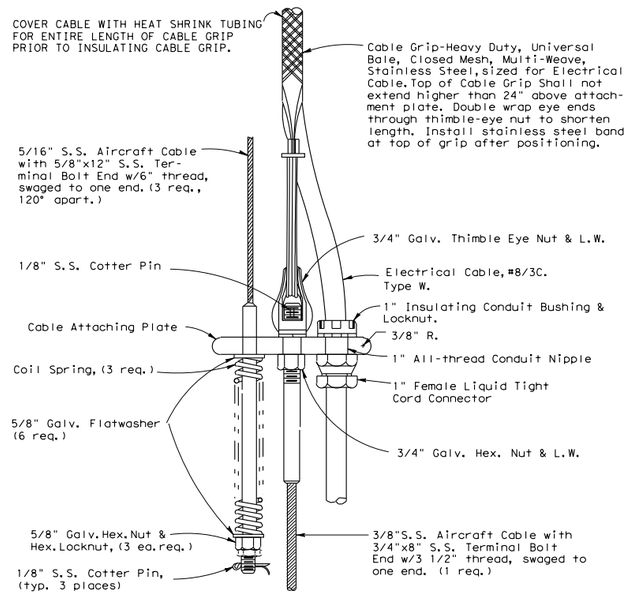
(POWER OUT TO LIGHT RING)



DETAIL "S"
(WINCH DRIVE ACCESS COVER)

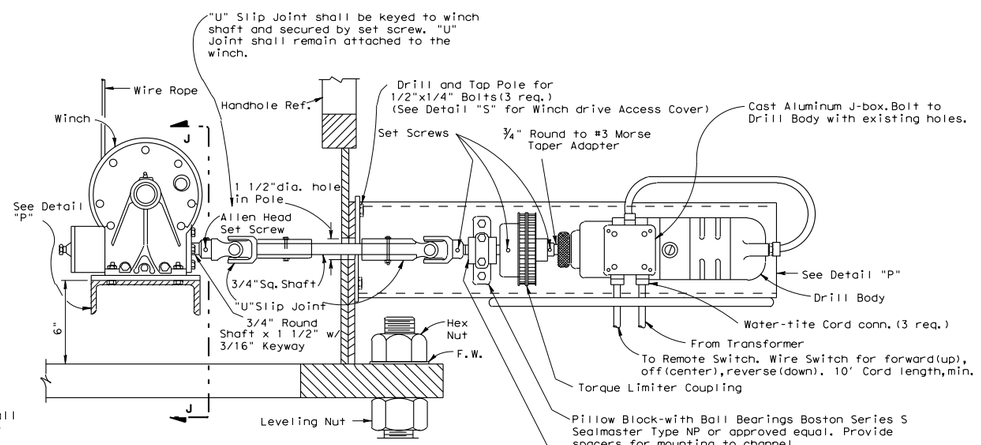


SECTION K-K
(DRILL MOTOR MOUNTING PLATE)
* Make from 6061-T6 Aluminum



DETAIL "Q"
(CABLE ATTACHING PLATE)

NOTE: 3/8"Cable for this Project shall be 19x7 Rotation Resistant per Sheet 9.



POWER DRIVE ASSEMBLY

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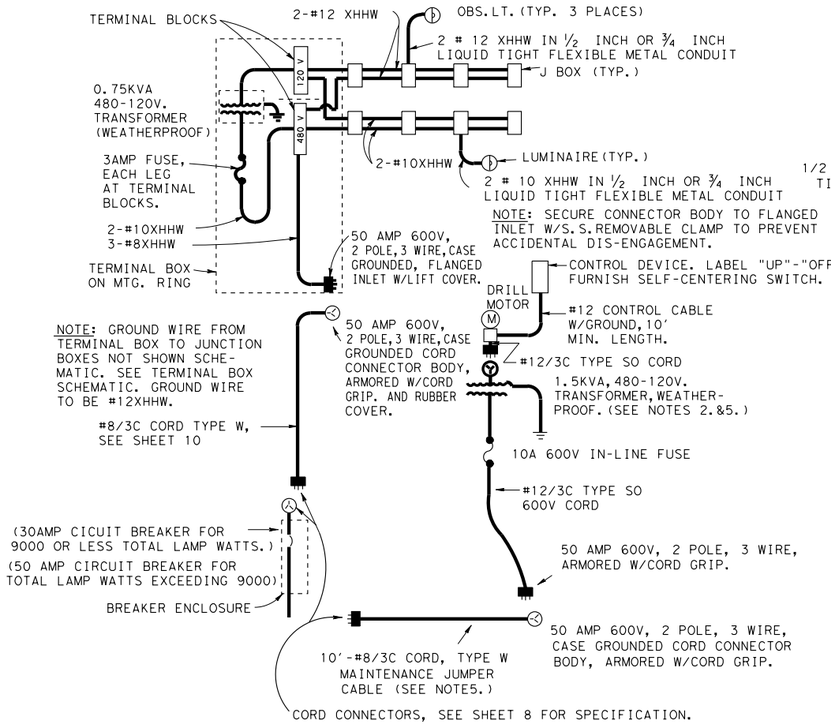
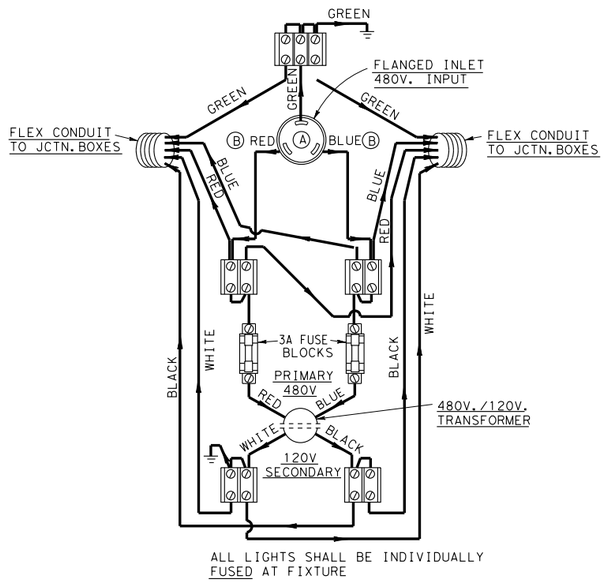


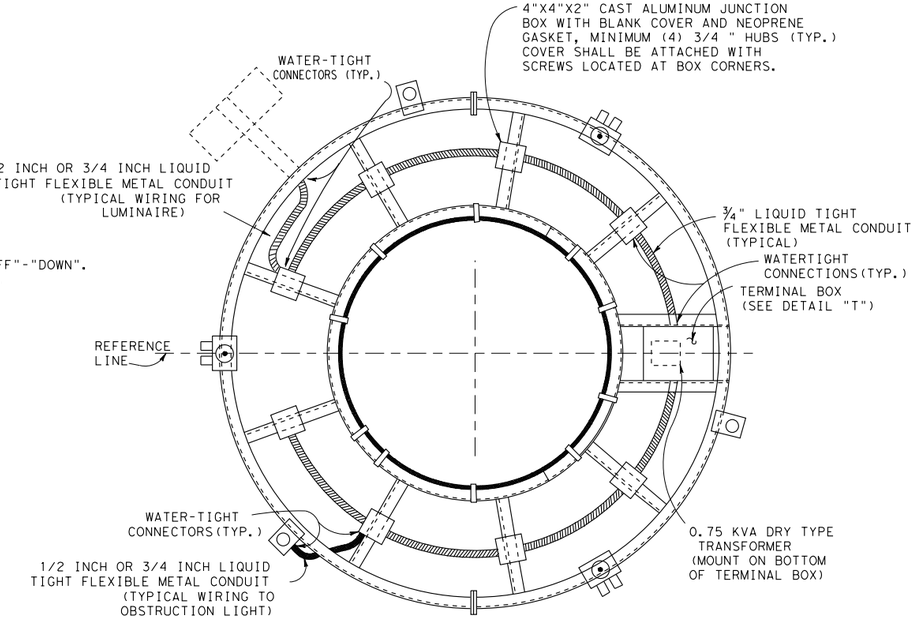
ONE-LINE SCHEMATIC



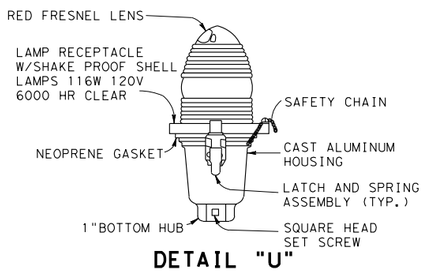
ALL LIGHTS SHALL BE INDIVIDUALLY FUSED AT FIXTURE

TERMINAL BOX SCHEMATIC

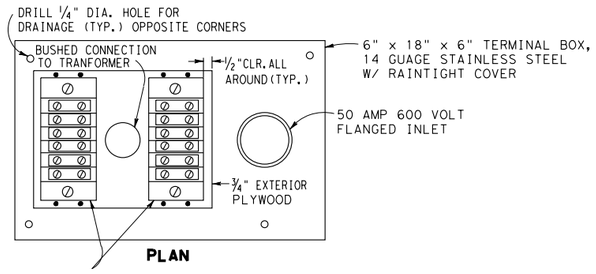
NOTES:
1. OBSTRUCTION LIGHTS COLOR CODE: FROM SECONDARY SIDE OF TRANSFORMER THROUGH-OUT-CIRCUIT TO SOCKET, WHITE-NEUTRAL, BLACK-LOAD.
2. POWER SUPPLY CORD TO FLANGED INLET: GREEN-GROUND, WHITE LINE, BLACK LINE. FROM FLANGED INLET Ⓐ TO TERMINAL BLOCKS: GREEN-GROUND, RED LINE, BLUE-LINE. FROM THERE ON ALL 480V. CIRCUIT WIRES TO BE RED AND BLUE TO JUNCTION BOXES.
3. WIRE SIZE FROM POWER SUPPLY TO TERMINAL BLOCKS SHALL BE #8 AWG-SEE Ⓑ.
4. WIRE SIZE FROM TERMINAL BLOCKS TO JUNCTION BOXES SHALL BE #12 AWG.
5. MOUNT TERMINAL BLOCKS ON ¾" EXTERIOR GRADE PLYWOOD.
6. FOR 2-WIRE, 480V. SERVICE, OMIT FUSE IN GROUNDED CONDUCTOR IN LEADS TO TRANSFORMER.



LIGHT MOUNTING RING

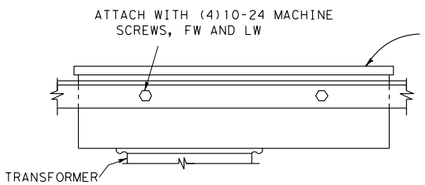


DETAIL "U"
(OBSTRUCTION LIGHT)



PLAN

600 VOLT TERMINAL BLOCKS



DETAIL "T"
(TERMINAL BOX)

NOTES:

1. PLUGS, CONNECTOR BODIES AND FLANGED INLETS AT CORD TO RING CONNECTION SHALL BE "TWIST LOCK" TYPE, 3-PRONG, RATED 50 AMPS AT 600V, AND 20 AMPS FOR 120 V. 50 AMP CONNECTORS SHALL BE 3 WIRE CASE GROUNDED, ARMORED, WITH CORD GRIP, 20 AMP CONNECTOR SHALL BE 3 WIRE GROUNDING WITH CORD GRIP, NEMA TYPE L5-20.
2. PROVIDE HANDLE ON 1.5KVA TRANSFORMER FOR PORTABILITY. (SEE ONE-LINE SCHEMATIC)
3. CIRCUIT BREAKERS SHALL BE ITE #E43B030 OR #E43B050, SQUARE "D" #FAL24030 S/N OR #FAL24050 S/N, OR EQUAL.
4. CONDUIT ENTRIES INTO TERMINAL BOX SHALL BE INTO THE SIDE OF THE BOX.
5. A MINIMUM OF ONE (1) MAINTENANCE JUMPER CABLE SHALL BE SUPPLIED FOR EACH PROJECT. SUPPLY ONE (1) PORTABLE TRANSFORMER FOR EACH POWER DRIVE UNIT REQUIRED FOR PROJECT.

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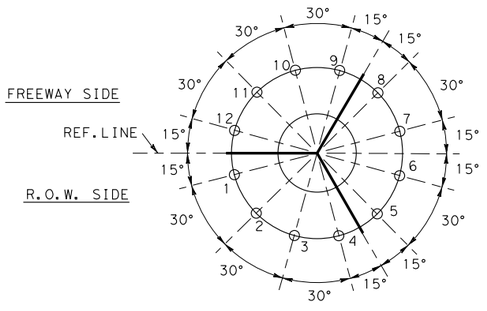
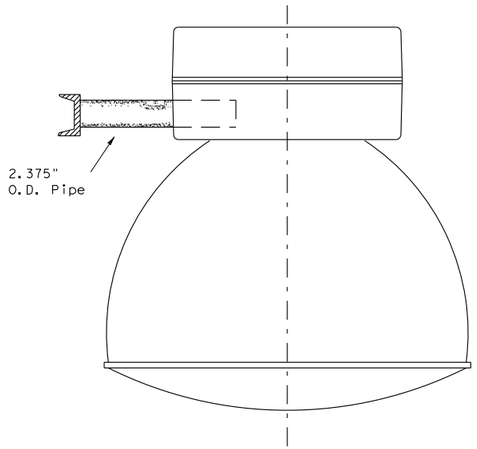


12-LIGHT SETTING

LUMINAIRE LOCATIONS

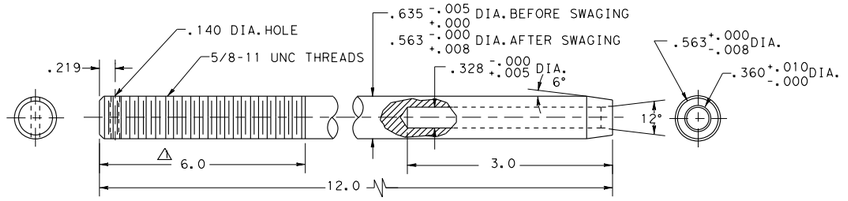
NOTE: AIRCRAFT OBSTRUCTION LIGHT LOCATIONS NOT SHOWN. THREE ARE REQUIRED LOCATED APPROX. 120° APART. LOCATIONS WILL VARY DEPENDENT ON THE LIGHT SETTING USED.



AREALIGHT MOUNTING ASSEMBLY
(SYMMETRIC AND ASYMMETRIC)

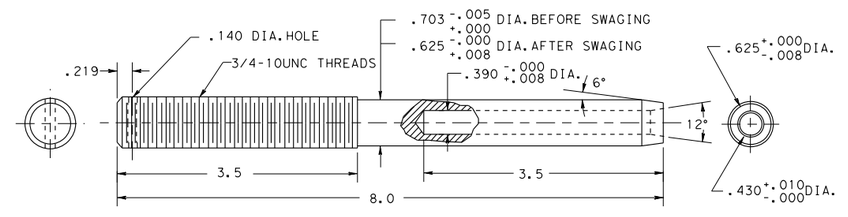
NOTES: IF ASYMMETRIC FIXTURES ARE USED, THE REFRACTORS SHALL BE ORIENTED TO PROPERLY ILLUMINATE THE ADJACENT ROADWAYS. ORIENTION SHALL BE AS SHOWN IN PLANS.

NOTE: MIN. SWAGE LENGTH = 2.06
MAX. SWAGE LENGTH = 2.94



TERMINAL FOR 5/16 "WIRE ROPE
MATERIAL: STAINLESS STEEL, TYPE 303SE OR 304
WITH 115,000 P.S.I. MAX. ULTIMATE TENSILE STRENGH.

NOTE: MIN. SWAGE LENGTH = 3.12
MAX. SWAGE LENGTH = 3.44



TERMINAL FOR 3/8 "WIRE ROPE
MATERIAL: STAINLESS STEEL, TYPE 303SE OR 304
WITH 115,000 P.S.I. MAX. ULTIMATE TENSILE STRENGH.

GENERAL NOTES:

1. AFTER FINAL AIMING HAS BEEN COMPLETED AND APPROVED BY THE ENGINEER, FIXTURES MUST BE LOCKED IN POSITION. CONTRACTOR MUST SUBMIT PROPOSED LOCKING SCHEME WITH THE FIXTURE SUBMITTAL. (FLOODLIGHTS ONLY).

△1 3/03 Revision

△1 Removed obsolete diagrams and updated drawings.

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1. AREA LIGHTING (Bid under Item 614, "High Mast Illumination Assemblies")

A. Area lighting shall be symmetric or asymmetric, as shown on the descriptive code. The number and wattage of the fixtures on each pole shall be as shown on the lighting layouts. The lighting pattern for symmetric fixtures shall be IES Type V; for asymmetric fixtures, it shall be IES Type II, III, or IV.

B. All luminaires shall be pre-qualified before installation. A sample of each type of luminaire to be considered for pre-qualification shall be submitted to TXDOT's Traffic Operations Division - Traffic Engineering Section (TRF-TE).

Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, TX 78701-2483

Sample luminaires are non-returnable. A list of pre-qualified luminaires may be obtained by contacting TRF-TE. In addition, luminaires will be sampled and tested in accordance with Item 614. Luminaires that inconsistently pass testing or that are inconsistent with published photometric information will be removed from the pre-qualified list at the discretion of the Engineer. Once a fixture has been approved, no changes shall be made in any material or manufacturing methods without prior approval of the Department. Unapproved changes will result in rejection of all fixtures.

C. Symmetric and Asymmetric fixtures shall meet the following requirements unless otherwise approved by the Engineer:

1. Luminaire Construction

a) The luminaire housing shall be formed, cast or drawn from low copper aluminum and shall be free of cracks and excessive porosity. Formed aluminum shall have a minimum thickness of 0.090, and shall have all seams welded. The minimum thickness of cast parts shall be as approved by the Engineer. Nuts, screws, and washers shall be made of Type 316 stainless steel. The housing shall be marked with minimum 2" letters to indicate the photometric type as being either A, B, C, or S as specified. Marking shall be permanent and shall be by stencil or stick on labels similar to "wattage" label on cobra heads. Wattage label will not be required on high mast fixtures. The fixture housing shall be constructed separate from the fixture reflector.

b) Fixtures shall be natural aluminum in color or shall be painted gray.

c) The slipfitter shall securely attach the luminaire to the tenon on the ring assembly with a minimum of 2 bolts and clamp. A positive means of vertical adjustment shall be provided.

d) For optical assemblies with lenses, reflectors shall be polished aluminum with Alzak or equal coating and shall not be painted. The optic assembly shall be sealed. The lens shall be tempered glass or prismatic glass, either flat or sag. The optic assembly shall be provided with a resilient seamless or sonically welded silicone rubber gasket, and constructed so that a positive seal against weather and other contaminants will be maintained. The latches shall be stainless steel, spring loaded, and hand operated (2 latches minimum, 3 attachment points),and shall provide a positive means of maintaining closure of the luminaire.

e) For optical assemblies without lenses, optical assembly shall consist of an open ventilated borosilicate glass reflector. The reflecting prisms shall be protected from dirt depreciation by a spun on hermetically sealed aluminum cover. There shall be no glass lens/refractor on this optical assembly.

f) Asymmetric fixtures shall have field rotatable optics with accurate degree of rotation markings. Reflector shall have "house side" and "street side" markings.

g) The socket shell shall be nickel plated and shall be rigidly attached to a high grade porcelain mogul base, which shall extend and enclose the metal shell. A locking means shall be incorporated in the shell of the socket to positively resist the removal of the lamp. This locking means shall be a spring loaded center tip. Lamp socket shall be non-adjustable and shall be riveted, welded, or otherwise permanently installed. Lamps shall be held securely in the proper position with a lamp support.

h) The terminal block shall use nickel plated brass connectors.

i) Fixture weight including ballast shall not exceed 80 pounds, and effective projected area (EPA) shall not exceed 2.62 square feet.

j) The Contractor may be responsible for fixture testing costs. See TXDOT's "Manual of Testing Procedures," Chapter 11 - "Traffic Systems and Illumination," TEX-1110-T - "Sampling Lighting Assemblies," at http://manuals.dot.state.tx.us/dynaweb/.

2. Photometrics

a) The Contractor shall submit a computer generated light level array of the area to be lighted by high mast poles. All computer generated arrays shall have 400 watt fixtures derated to 40,000 lumens per lamp.

b) The Type "A" 400 watt asymmetric fixture shall be IES cutoff. The Department will use the measured photometric data of sampled fixtures to run the following tests on a computer simulation:

(1) When mounted in the level position, 50 ft. above the midpoint and 20 ft outside of either long side of a rectangular area measuring 340 ft. by 50 ft., the fixture shall pass the following tests:

(a) The fixture shall provide a measured minimum intensity of 0.15 horizontal foot-candles at any point on the surface of this area.

(b) The fixture shall provide a measured maximum to minimum light ratio, based on horizontal foot-candles, of less than 25.

(c) The fixture shall provide an average measured intensity of 0.6 horizontal foot-candles on the surface area.

(2) When mounted in the level position, 50 ft. above the midpoint and 20 ft outside of either long side of a rectangular area measuring 260 ft. by 30 ft., the fixture shall provide a measured minimum intensity of 0.30 horizontal foot-candles at any point on the surface of this area.

c) The Type "B" 400 watt asymmetric fixture shall be IES cutoff. The Department will use the measured photometric data of sampled fixtures to run the following tests on a computer simulation:

(1) When mounted in the level position, 50 ft. above the midpoint and 20 ft outside of either long side of a rectangular area measuring 260 ft. by 65 ft., the fixture shall pass the following tests:

(a) The fixture shall provide a measured minimum intensity of 0.15 horizontal foot-candles at any point on the surface of this area.

(b) The fixture shall provide a measured maximum to minimum light ratio, based on horizontal foot-candles, of less than 25.

(c) The fixture shall provide an average measured intensity of 0.6 horizontal foot-candles on the surface area.

(2) When mounted in the level position, 50 ft. above the midpoint and 20 ft outside of either long side of a rectangular area measuring 200 ft. by 40 ft., the fixture shall provide a measured minimum intensity of 0.30 horizontal foot-candles at any point on the surface of this area.

d) The Type "C" 400 watt asymmetric fixture shall be IES cutoff. The Department will use the measured photometric data of sampled fixtures to run the following tests on a computer simulation:

(1) When mounted in the level position, 50 ft. above the midpoint and 20 ft. outside of either long side of a rectangular area measuring 220 ft. by 80 ft., the fixture shall pass the following tests:

(a) The fixture shall provide a measured minimum intensity of 0.15 horizontal foot-candles at any point on the surface of this area.

(b) The fixture shall provide a measured maximum to minimum light ratio, based on horizontal foot-candles, of less than 25.

(c) The fixture shall provide an average measured intensity of 0.6 horizontal foot-candles on the surface area.

(2) When mounted in the level position, 50 ft. above the midpoint and 20 ft. outside of either long side of a rectangular area measuring 160 ft. by 50 ft., the fixture shall provide a measured minimum intensity of 0.30 horizontal foot-candles at any point on the surface of this area.

e) The Type "S" 400 watt Symmetric fixture shall be IES cutoff. The Department will use the measured photometric data of sampled fixtures to run the following tests on a computer simulation:

(1) When mounted in the level position at 50 foot mounting height, the fixture shall provide the minimum light levels as shown below:

(a) 0.15 horizontal foot-candles within a 130 foot radius.

(b) 0.30 horizontal foot-candles within a 100 foot radius.

(c) 0.50 horizontal foot-candles within a 60 foot radius.

3. Ballasts

a) All ballasts shall be isolated-winding lag-type magnetic regulators designed to operate 400 watt high pressure sodium lamps rated 480 volts. Ballasts shall be capable of starting lamps at an ambient temperature of -20 degrees F. Ballast wiring shall include a grounding terminal bonded to metal housing. Ballasts shall be fused with a 5 amp time-delay fuse in an insulated fuse holder. Fuse holders shall be internal to the housing. Ballast wiring to the terminal board shall be through a quick-disconnect plug. Windings shall be made from copper wire.

b) When the circuit voltage indicated on the plans is applied, the ballast input wattage during fluctuations of the test voltage of +10% and -10% shall not exceed 552 watts for a 400 watt HPS lamp.

3/03 Revision

⚠1 Revised Area Lighting Requirements

Texas Department of Transportation
Traffic Operations Division

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c) During fluctuation of the line voltage of +10% or -10%, the lamp wattage fluctuation shall not exceed a total of 20%. Ballast shall maintain lamp wattage between 280 and 475 watts for a 400 watt HPS lamp.

d) The power factor of any ballast when tested at the circuit voltage indicated in the plans shall not be less than 90% at any point in life. Ballast factor shall be between .95 and 1.0.

e) The electronic starting aid shall provide a starting pulse with an amplitude of 2500 volts minimum, 4000 volts maximum. The pulse width shall be a minimum of 0.8 microseconds at 2250 volts. The pulse shall occur when the open-circuit voltage is equal to or greater than 90 percent of peak open-circuit voltage. Pulse repetition rate shall be a minimum of one per cycle and pulse current shall be a minimum of 0.18 amperes. Electronic starting aids shall be replaceable without the use of tools. The starting aid shall discontinue to pulse when the lamp starts. Starter shall sense an inoperative or missing HPS lamp and automatically shut down luminaire to protect ballast after 10 minutes.

f) Ballasts shall permanently and clearly indicate the following: lamp type, catalog number, voltage rating, connection diagram, and manufacturer. Capacitors in all luminaires shall be non-PCB type.

4. Lamps

a) All lamps shall be new and of recent manufacture.

b) Lamps shall be high pressure sodium and shall meet ANSI C78 requirements. Lamps shall be the type that extinguish at the end of usable lamp life and remain extinguished without cycling. 400 watt lamps shall contain less than 4.0 mg of mercury. Lamps shall be lead free and shall pass the Federal Toxic Characteristic Leachate Procedure (TCLP). Lamp shall be Osram-Sylvania LU400/Eco Plus. No alternatives will be approved.

c) 400 watt high pressure sodium lamps shall have average initial lumens of 50000 and average rated life of 24000 hours.

⚠1 2. GENERAL

A. All material shall be in accordance with the applicable sections of the NEC. All conduit and conductors shall be in accordance with the materials and construction methods requirements of Items 618 and 620. Heat shrink tubing for use with cable grips and cable splicing shall meet the requirements of Item 620.

B. Where stainless steel bands are called for on the HMID sheets, stainless steel hose clamps may be provided. Stainless steel bands and stainless steel hose clamps shall be provided with stainless steel clips or stainless steel screws.

C. Obstruction Lights

1. When obstruction lights are required by layout sheets, summary sheets or general notes, the entire high mast assembly shall be controlled by an FAA approved photocell mounted inside the service enclosure. Ring mounted luminaires shall be controlled by up to 4 additional ring mounted photocells, with each photocell controlling up to 3 fixtures. Photocells shall meet the following requirements:

a) All photocells shall consist of a photoelectric cell, an internal lightning arrestor, and a relay or bimetallic switch mounted inside a weather proof enclosure with standard 3-prong twist lock photocell plug and receptacle. The enclosure shall be made of poly-acrylic with clear acrylic window. Enclosure chassis shall be molded thermosetting plastic. The photocell shall have an arrestor rated 2.0kV sparkover with 5000 amps follow-through. Relay or switch shall be time delay type with normally closed contacts. Photocell shall be rated a minimum of 1800 VA.

b) Service enclosure mounted photocell (FAA photocell) shall turn on at light levels below 35 foot-candles and off at levels above 58 foot-candles, in accordance with FAA requirements. This photocell shall be rated for operation at 240 volts. A permanent placard shall be installed on the inside of the service enclosure door to indicate that an FAA approved photocell is required.

c) High mast assembly ring mounted photocells (one foot-candle photocells) shall turn on at light levels below 1.0 (plus or minus 0.5) foot-candle, and shall turn off at 2 foot-candles higher than this level. These photocells shall be rated for operation at 480 volts. Photocells shall be mounted upright on the terminal box or on various junction boxes around the ring as approved by the Engineer. Conduit entries shall not be made into the top of the terminal box or junction boxes. The Contractor shall submit mounting details to the Engineer for approval.

2. When obstruction lights are not required, eliminate the 3 obstruction light fixtures, 3 mounting posts, 480/120 volt transformer, 120 volt wiring, and 3 mounting post support connections shown on detail "E", sheet 1.

D. The male cord connector on the lower end of the Type W cord running up the pole, the female cord connector for the Type W cord running to the circuit breaker enclosure and the male connector on the maintenance jumper shall meet the following or approved equal specifications:

1. Arrow Hart pin and sleeve watertight connectors UL listed, catalog numbers AH330C7W and AH330P6W.

2. Bryant watertight pin and sleeve connectors UL listed, catalog numbers 330C6W and 330P6W.

3. Hubble pin and sleeve connectors UL listed, catalog numbers HBL330C7W and HBL 330P7W.

4. The male connector for use with the Type W maintenance jumper shall be a pin and sleeve connector of one of the above types. The Contractor shall attach a 50 amp twist lock receptacle to the opposite end of the maintenance jumper to match the flange mounted plug on the ring and the portable transformer.

5. The Contractor shall make a brochure submittal on the cord connectors.

E. When shown on the plans, spill light shall be restricted to less than 0.15 horizontal footcandles.

F. The Contractor shall provide shop drawings for high mast illumination assemblies in accordance with this Item and Item 441. An Engineer licensed in the State of Texas shall seal the shop drawings.

3. TESTING

A. Fixtures, lamps and ballasts will be sampled and tested in accordance with the Department "Manual of Testing Procedures" except as noted in these specifications.

B. Ballasts and fixtures will be tested using a reference lamp.

C. The Department will bear the cost of all testing of equipment that complies with the specification requirements. However, the source of supply of fixtures and ballasts must be approved as required in Article 6.1 of the Standard Specifications. Such approval will be contingent on the supplier agreeing to bear the cost of testing any equipment that fails to comply with the specification requirements listed in this specification.

D. All other equipment will be tested in accordance with Item 614 of the Standard Specifications and Materials and Test Division Test Standards.

E. After High Mast Assembly has been completely assembled, the Engineer may require Contractor to fully lower and raise each high mast ring one time to demonstrate proper operation of the lowering mechanism, or may require the ring to be lowered for ring or fixture inspection. If any malfunction occurs, the problem shall be corrected at the Contractor's expense and the lowering test will be repeated.

4. MOUNTING RING AND SUPPORT ASSEMBLY

A. Ring and support assembly shall be fabricated from steel having a minimum yield strength of 36 KSI.

B. Cover assemblies, fittings and miscellaneous parts shall be as outlined on the plans.

C. All hardware shall be hot-dipped galvanized per ASTM A153 or shall be stainless steel, unless noted otherwise on the plans.

5. WINCH

A. Housing shall be high tensile strength die-cast silicon aluminum. Cable drum shall be fabricated from seamless steel tubing with stamped steel flanges and shall be hot-dipped galvanized. Drum shall have a minimum diameter of 4.5 inches. Drum shall be keyed to drum shaft. Drum and flanges shall be sized so that, when the fixture mounting ring is in the raised position, the cable including one full layer will fill the drum to no more than two-thirds of full capacity. Drum shaft shall be ground from stainless steel and mounted on lubricated bronze bearings with seals. Wormgear shall be made of nickel-bronze and worm shaft shall be high-strength stress-proofed steel, ground and polished and supported by tapered roller bearings.

B. Gear ratio shall be 36:1 with safe hoisting capacity of not less than 4000 pounds.

C. Winch shall incorporate adjustable automatic brake to assure positive load suspension. Brake shall be multiple disc with friction plates running in oil bath and one-direction clutch which operates only when load is suspended or lowered. Winch shall not have throw-out clutch.

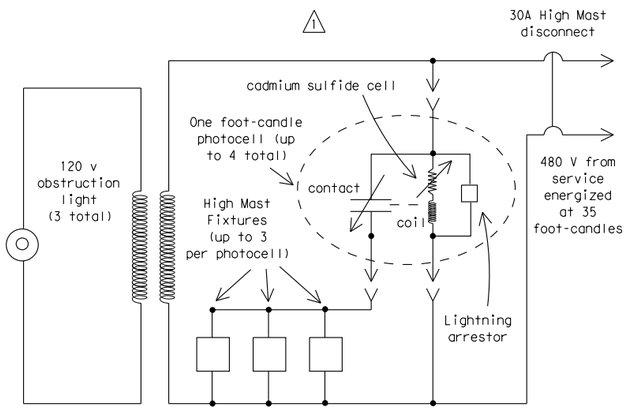
D. Any winch that is operated without oil shall be considered damaged and shall be replace by the contractor at the contractor's expense.

⚠2 6. WIRE ROPE AND TERMINALS

A. 5/16 and 3/8 wire rope shall be 19x7 Rotation Resistant IWRC stainless steel. 19x7 rotation resistant wire rope shall meet the construction requirements of Fed. Spec. RR-W-410D, Type IV, class 2, modified for stainless steel with a nominal breaking strength of 11,100 lbs. All wire rope shall be pre-formed and factory lubricated. Wire rope shall meet the requirements of the applicable specification except where modified by this specification. Quality Assurance testing shall be the responsibility of the manufacturer and shall meet recognized wire rope industry standards. No special tensile or torsion testing will be required. Mill Test Reports shall be furnished.

B. Winch cable shall be of sufficient length to leave a minimum of one full layer of cable on the drum when the fixture mounting ring is in the full down position.

C. Wire rope terminals shall be stainless steel, solid stud type as shown on Sheet 7. All terminals shall be drilled for cotter pin. Material to be 303 SE or 304 stainless steel with a maximum tensile strength of 115,000 p.s.i. Mill Test Reports shall be furnished.



One foot-candle photocell keeps High Mast fixtures
off when FAA photocell energizes
circuit at 35 foot-candles. Fixtures
come on when sun goes down at 1 foot-candle.

One Foot-candle Photocell Schematic

Use on ring when obstruction lights are installed
and FAA photocell is installed in electrical service.

3/03 Revision

⚠1 Revised General requirements; add diagram

⚠2 Revised Wire Rope and Terminals

Texas Department of Transportation
Traffic Operations Division

HIGH MAST ILLUMINATION DETAILS

HMID(8)-03

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REVISIONS	CONT	SECT	JOB	HIGHWAY
4-89	3487	01	001	TOLL 49
10-93	DIST	COUNTY		SHEET NO.
4-96	TYL	SMITH		85
3-03				

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DATE: $DATE$ 11:00:46 AM
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D. All terminals shall be proof-tested by the manufacturer to 40% of rated strength of the wire rope. Each terminal shall be identified by manufacturer's logo permanently incised on terminal. Manufacturer shall furnish certification of tests. Contractor shall also furnish one sample of each size of terminal with 5 ft. of wire rope for load tests by the State. Samples tested must withstand test load not less than 100% of rated breaking strength of wire rope. If sample fails test, all terminals of same size will be rejected.

E. Wire rope shall be delivered from the manufacturer on a reel.

7. SPRINGS

A. Provide three steel springs as shown on plans.

B. Springs shall have an uncompressed length of approximately 8 inches and shall compress 3 inches under 700-pound load.

C. Springs shall contain approximately 19 total coils with ID of 0.875 and OD of 1.375 inches. Ends shall be closed and ground. Springs shall be zinc-plated.

D. Springs shall be made from 1/4" diameter oil-tempered MB Steel treated for overstress. Springs shall not develop permanent set from 3-inch compression.

8. ELECTRICAL POWER CABLE

A. Power cable shall be No. 8 AWG three-conductor round Type W, rated 90 degrees C, 600 volt or 2000 volt. Each conductor shall be tinned copper and shall consist of 133 strands. Insulation shall be ethylene propylene rubber. Jacket shall be chlorosulfonated polyethylene (CSPE), with glass fiber or nylon reinforcing mesh between two layers of CSPE. Nominal diameter shall be 0.91". Filler shall be rubber compound or other approved non-hygroscopic compound. Jacket shall be Hypalon Power Flex 90, with no substitutions allowed.

9. POWER DRIVE ASSEMBLY (ONE ONLY THIS CONTRACT UNLESS OTHERWISE SHOWN ELSEWHERE ON THE PLANS)

A. Drive Motor

1. Drive motor shall be 1-1/4" heavy-duty reversible portable electric drill modified as shown on plans.

2. Shall have a minimum of 6 radial ball bearings, one thrust bearing, and one needle bearing.

3. Shall have No. 3 Morse Taper socket.

4. Shall be designed for 115 volt 60 Hertz single phase operation 250 RPM at no load.

5. Shall be designed for continuous rated duty of 160 RPM and 15 amperes at 115 volts with delivery of 33-pound-feet of torque. Drill motor to be operated only at low speed range. (i.e. 150 to 160 RPM)

6. Shall develop 240 pound-feet of torque at stalled rotor condition.

B. Torque Limiter Coupling

1. Torque limiter coupling shall consist of standard torque limiter with Type A sprocket center member coupled to a Type B sprocket by an ASA double strand roller chain. Type A sprocket shall be chrome-plated.

2. Coupling shall have torque capacity minimum of 15 pound-feet and a maximum of 55 pound-feet.

3. Limiter section of coupling shall consist of integral hub and pressure plate, two friction facings, sintered iron bushing, pilot plate, disk spring, lock washer and hex adjustment nut. All major components except spring and friction facings shall be cadmium-plated with dichromate treatment.

4. Type A center sprocket shall have ground face (63 micro-inch) and shall be run-in for 4 minutes at approximately 60 RPM at a torque setting 70% to 80% of spring rating. Contractor shall provide written certification that run-in has been accomplished.

5. The torque limiter coupling shall, after run-in, be set to a torque limit of 35 pound-feet or as directed by the Engineer. The proper setting of the coupling shall be demonstrated to the Engineer.

C. Universal Joints

1. Shall be slip-type with 4-inch barrel. A grease fitting shall be so located in the spider that all caps and needle bearings may be adequately serviced. The assembly shall be disassembled and zinc-plated, then reassembled and properly lubricated.

2. Shall have a minimum torque rating of 1270 inch-pounds at 200 RPM.

3. Shall have set screw and keyed coupling as shown on plans.

⚠1

10. CONSTRUCTION METHODS

A. Fabrication

1. Fabrication and welding shall be in accordance with Item 441, "Steel Structures".

2. All holes supporting pulley shafts shall be drilled (not punched) prior to galvanizing.

3. All component parts shall be galvanized where galvanizing is applicable, after fabrication.

4. Galvanizing on all parts which have become scratched, chipped or otherwise damaged shall be thoroughly cleaned and the cleaned area painted with two coats of zinc dust-zinc oxide paint conforming to the requirements of repair compounds meeting Federal Specification TT-P-641 b.

5. Mounting rings and ring support assemblies shall be fabricated with the use of jigs that have been inspected and approved by Material and Test Division personnel prior to their usage.

6. The fabricator shall submit his proposed welding procedures in accordance with Item 441, "Steel Structures".

B. Installing Wire Rope

1. Extreme care shall be used to prevent wire rope from kinking, nicking, or from sustaining other damage during installation. Rope shall not be installed by pulling from flat coil, but shall be carefully unrolled its full length or placed on a horizontal axis and unreeled according to wire rope industry standards.

2. For right lay rope, the rope shall be attached to the drum on the end opposite the winch gear train, and wound on drum so that the free end of the rope comes off the backside of the drum during normal operation of the winch. Rope must be unreeled carefully as stated above. Care must be taken to insure that all layers lay full and tight on drum.

3. Installation of all wire rope shall be accomplished only under direct supervision of the Engineer or his authorized representative. Contractor shall not remove wire rope from manufacturer's reel until authorized by the Engineer. Installation of wire rope on winch shall be in accordance with the above and accepted industry practice. Installation of the three hoist cables shall be made from the top end of the pole and as directed by the Engineer or his representative.

C. Installing Wire Rope Clips

1. Turn back approx. 2' 3" of rope, measured from the top of thimble. Apply seizing to pigtail end of wire rope prior to cutting to length. See detail "K", Sheet 3. Apply first clip approx. 3" from the dead end of the wire rope with U-bolt over dead end and live end in clip saddle. Tighten nuts evenly to 30 pound-feet of torque, or as recommended by manufacturer.

2. Install second clip as near loop as possible, take out slack and torque nuts evenly to 30 pound-feet or as recommended by manufacturer.

3. After final erection and assembly of the pole and high mast assembly, retighten nuts to required torque.

D. Installing Light Ring and Luminaires

1. Prior to mounting luminaires to the light ring, Contractor shall ensure the ring is level. Luminaires shall be mounted level on the light ring. Luminaires shall be oriented as shown on plans.

3/03 Revision

⚠1 Revised Construction Methods.

Texas Department of Transportation
Traffic Operations Division

HIGH MAST ILLUMINATION DETAILS

HMID(9)-03

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DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS: 10-93, 10-95, 4-96, 3-03

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49

DIST	COUNTY	SHEET NO.
TYL	SMITH	86

761

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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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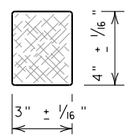
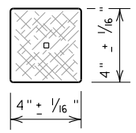
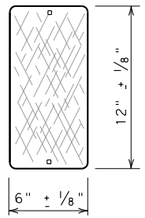
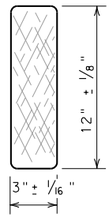
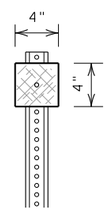
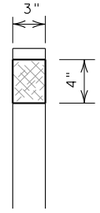
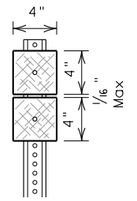
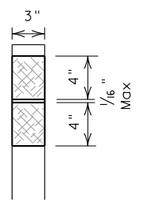
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	FLX	WC	FLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX) SZ X (XXX) XXX (XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
FLX = Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXX) XXX (XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
FLX = Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
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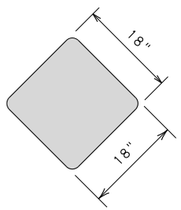
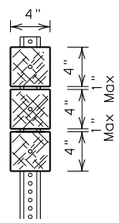
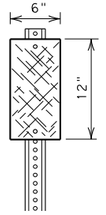
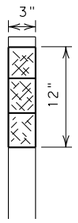
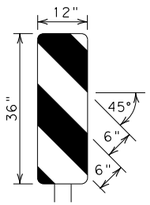
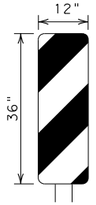
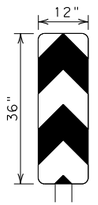
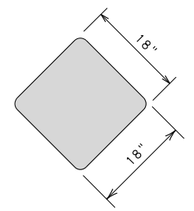
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	FLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

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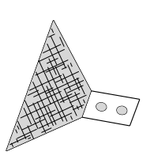
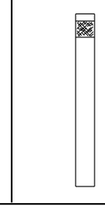
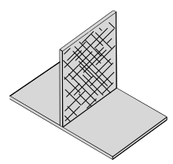
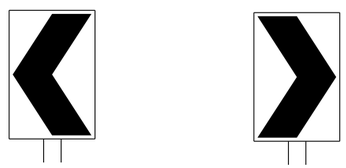
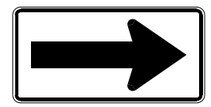
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Minimum 9 square inches of reflective sheeting surface area.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. The Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTIONAL LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:
Delineator and object marker backplates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-15

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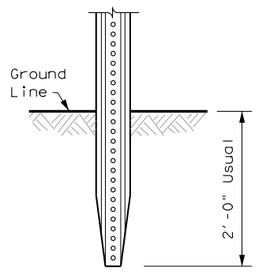
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

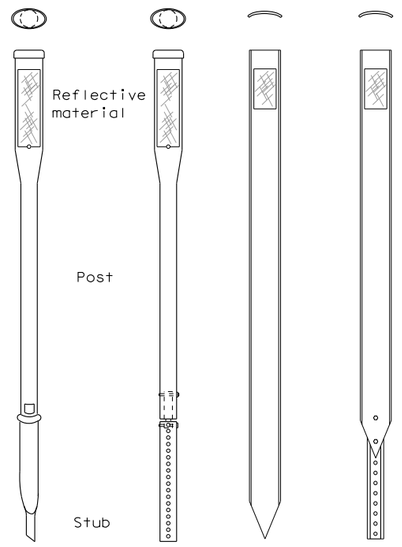


NOTES

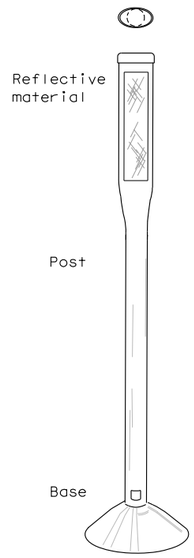
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (FLX)

GND



SRF



EMBEDDED

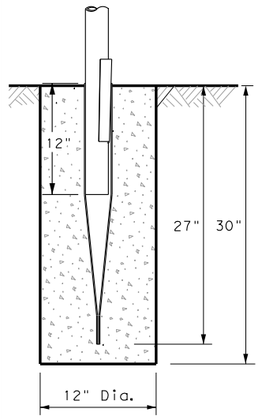
SURFACE MOUNT

NOTES

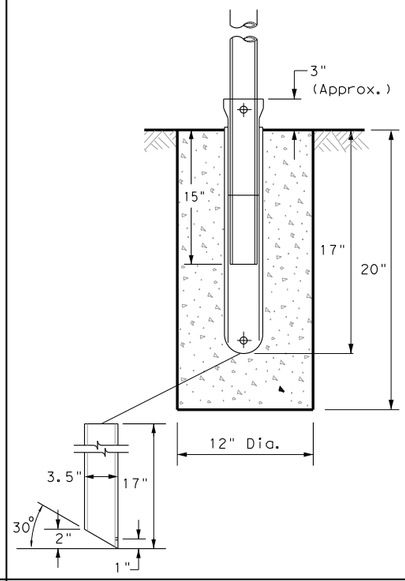
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL

PLASTIC

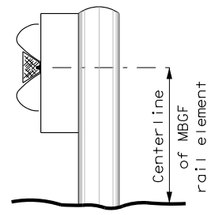
NOTE

1. Install per manufacturer's recommendations.

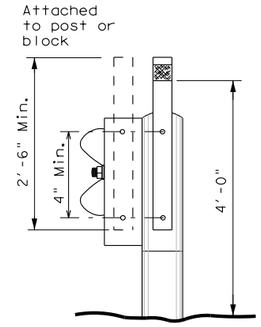
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

GF1

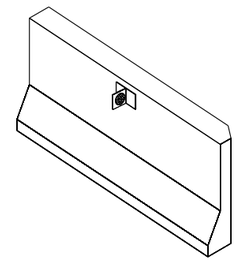


GF2



CONCRETE BARRIER / BRIDGE RAIL

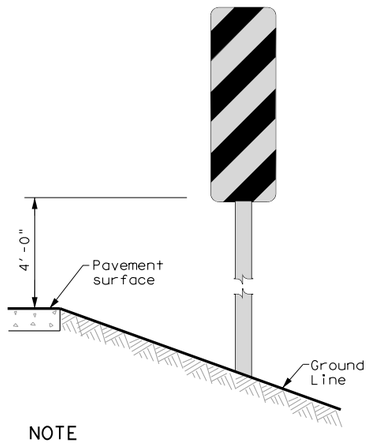
CTB



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.

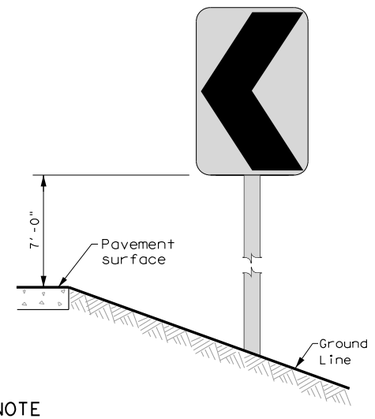
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

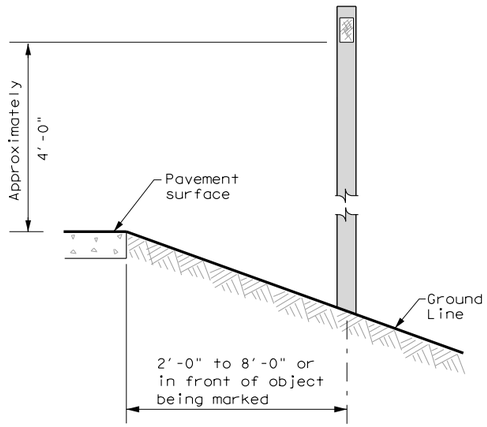
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTIONAL LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-15

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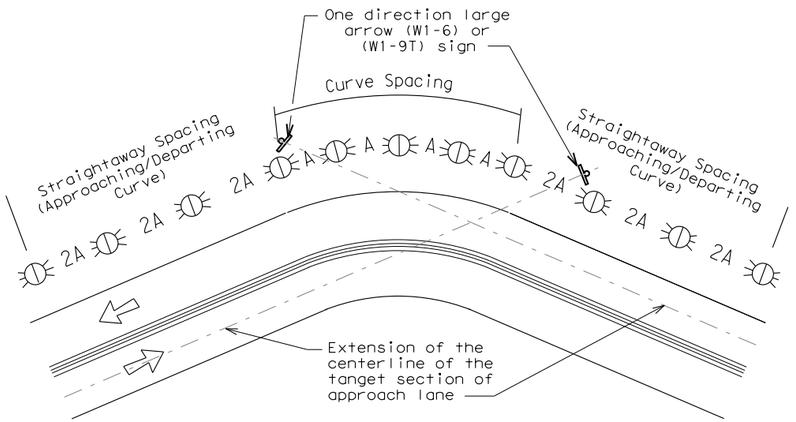
USE OF WARNING DEVICES AT CURVES WITH ADVISORY SPEED LIMITS

Amount by which Advisory Speed Is less than Posted Speed	Warning Devices Needed
5 MPH & 10 MPH	RPMs
15 MPH & 20 MPH	RPMs, and Delineators or RPMs and ONE DIRECTION LARGE ARROW (W1-6) or (W1-9T) sign
25 MPH & Greater	RPMs and Chevrons

SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES

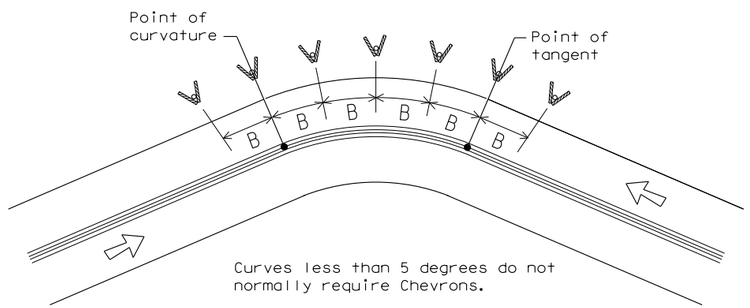


Curves less than 1 degree do not normally require delineators.

NOTE

ONE DIRECTIONAL LARGE ARROW (W1-6) or(W1-9T) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



Curves less than 5 degrees do not normally require Chevrons.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve[1]	Single delineators on right side	See delineator spacing table
FRWY/EXP. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 4 on D&OM(4))	100 feet on ramp tangents. Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves).
Acceleration/Deceleration Lane	Double delineators (see Detail 4 on D&OM(4))	100 feet (See Detail 4 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence or CTB	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end. Undivided 2-lane highways - Object marker on approach and departure end.	Requires Type 3 Object Marker or reflective sheeting provided by manufacturer per D & OM(VIA).
Bridges with no Approach Rail	Type 3 Object Marker at end of rail and 3 single delineators approaching rail.	See Detail 2 on D & OM(4)
Reduced Width Approaches to Bridge Rail	Type 2 Object Markers and 3 single delineators approaching bridge.	See Detail 1 on D & OM(4)
Culverts without MBGF	Type 2 Object Markers	See Detail 3 on D & OM(4)
Crossovers	Double yellow delineators or RPM's	See Detail 5 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Delineators not required in urban areas with continuous illumination.
2. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
3. Barrier reflectors may be used to replace required delineators.
4. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-15B

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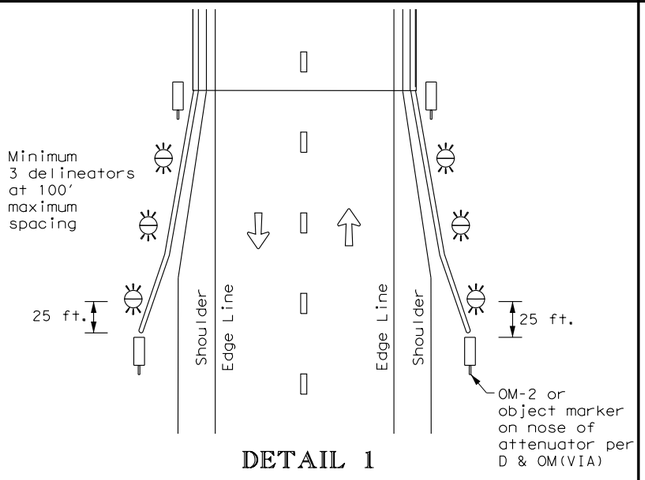
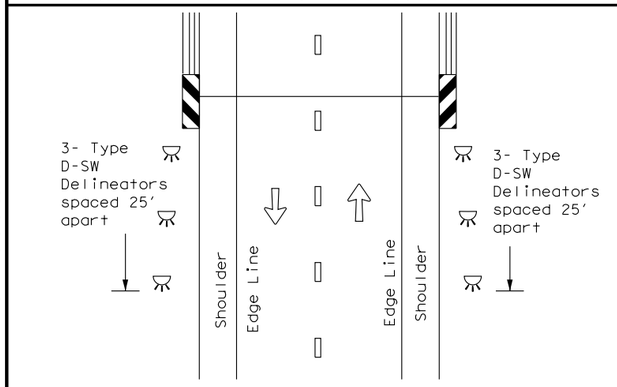
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH



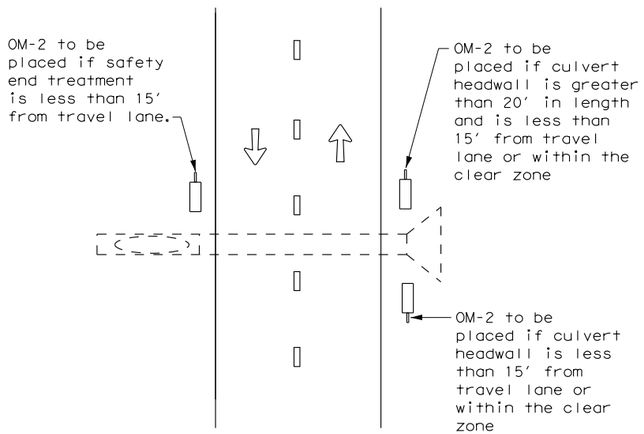
DETAIL 1

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



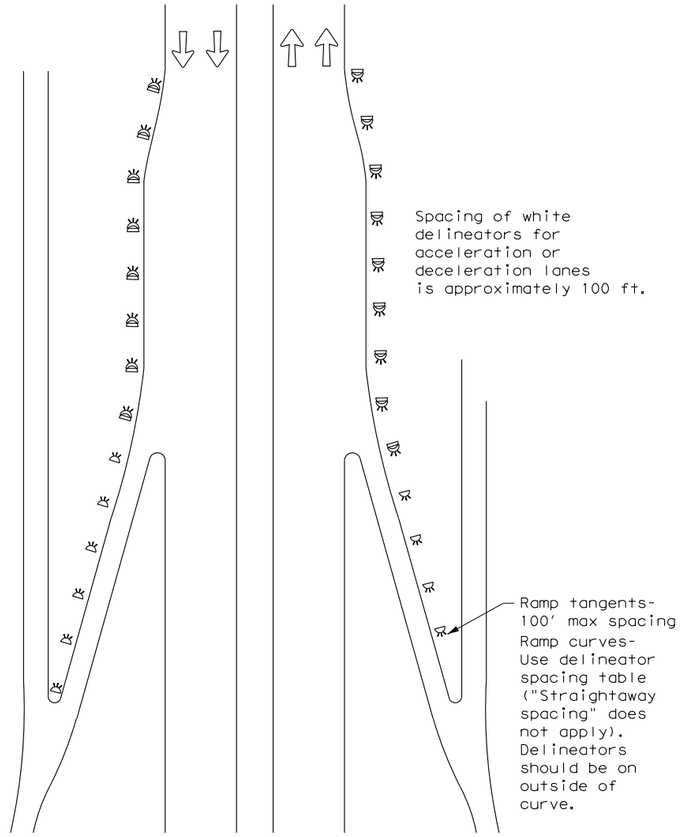
DETAIL 2

FOR CULVERTS WITHOUT MBGF



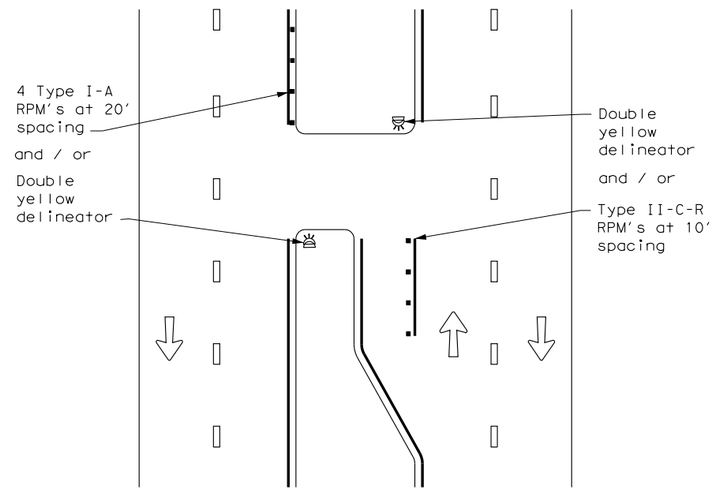
DETAIL 3

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



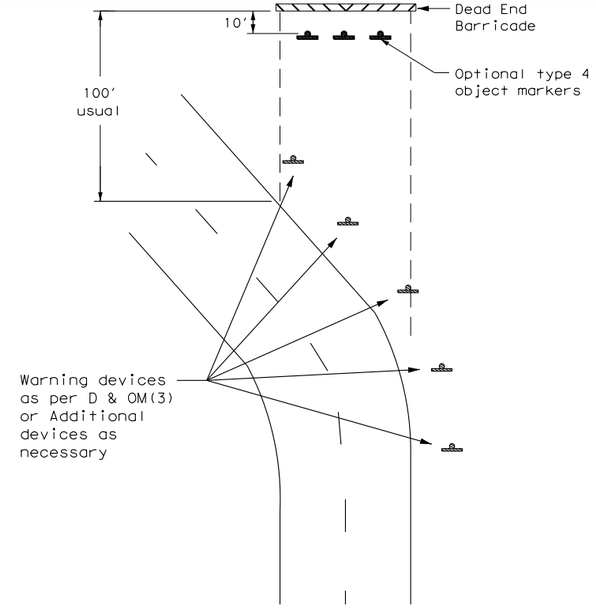
DETAIL 4

CROSSOVERS



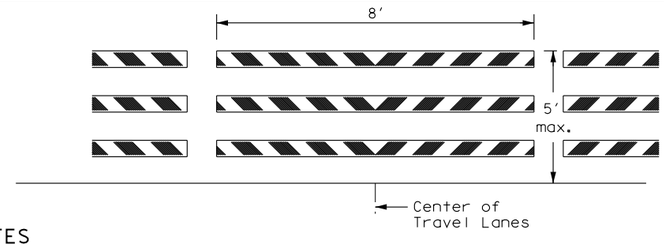
DETAIL 5

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 6

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 7

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-15

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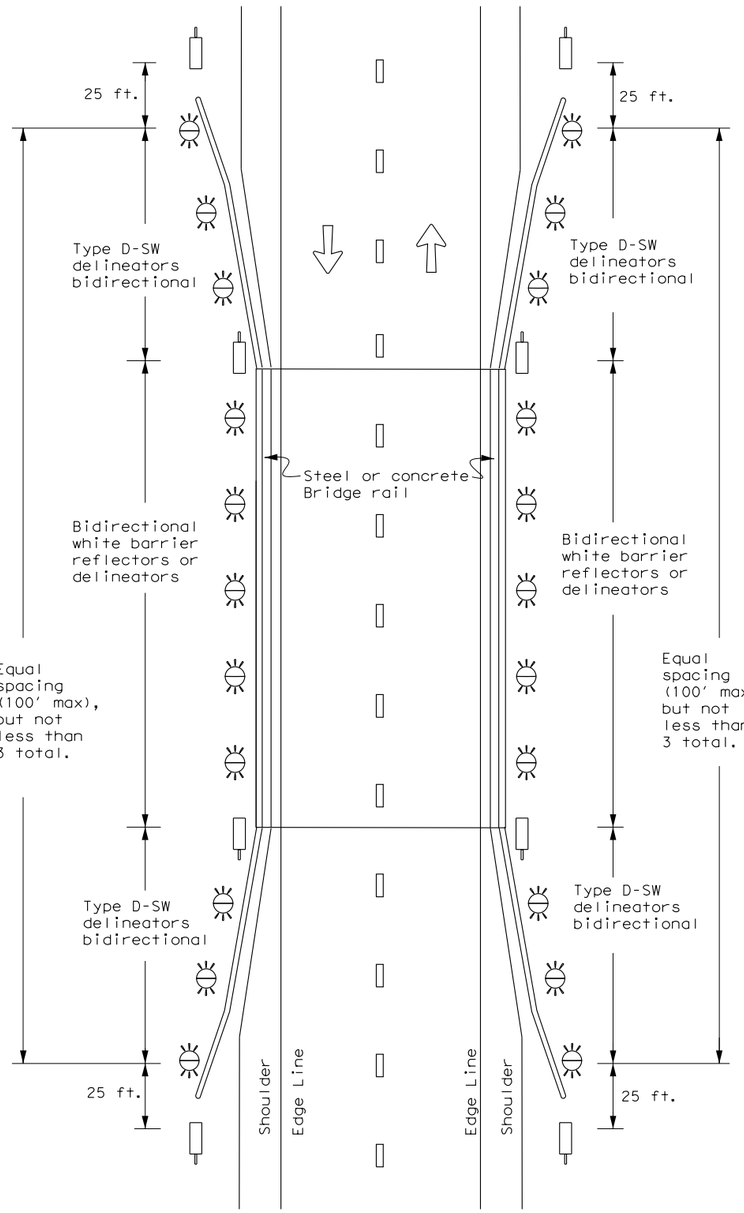
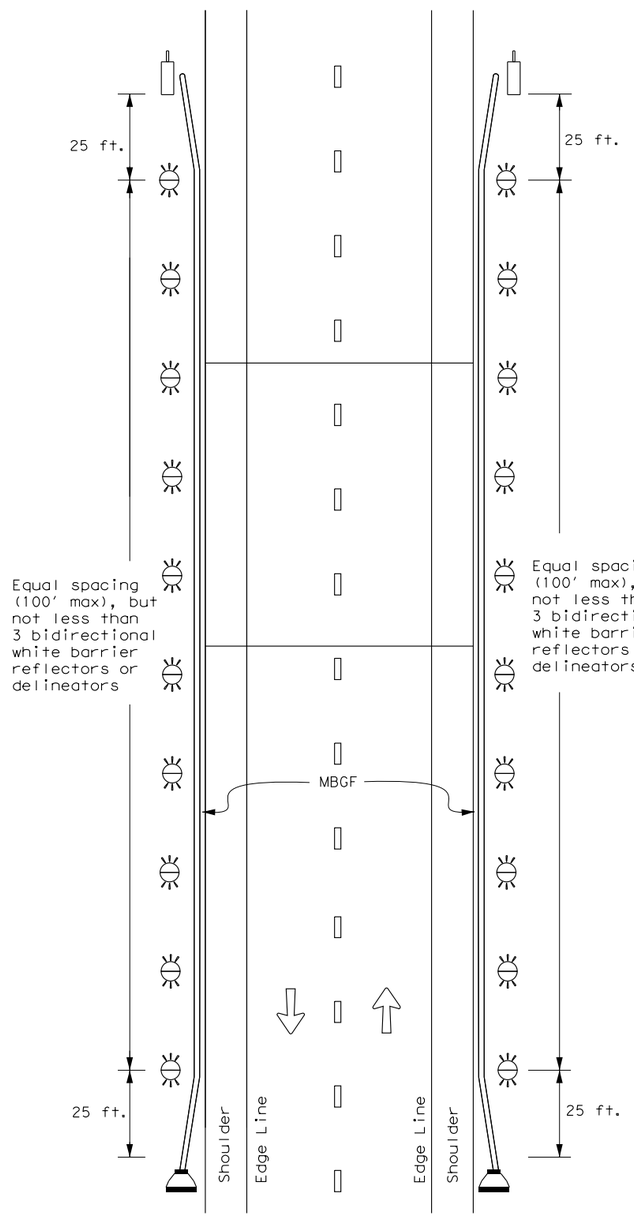
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



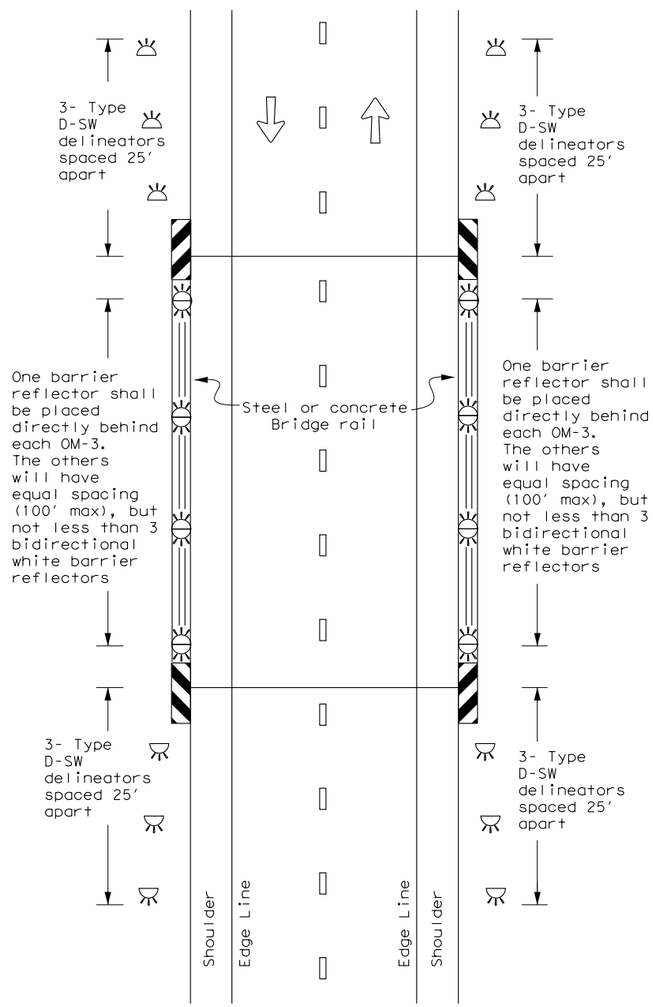
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

If terminal ends include an object marker, there is no need to install an OM-2 in front of terminal.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	TRAFFIC FLOW

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-15

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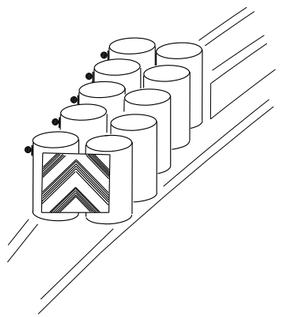
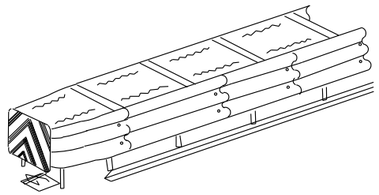
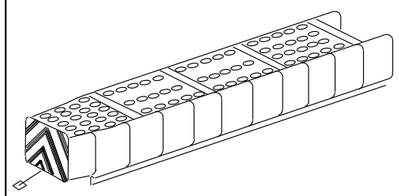
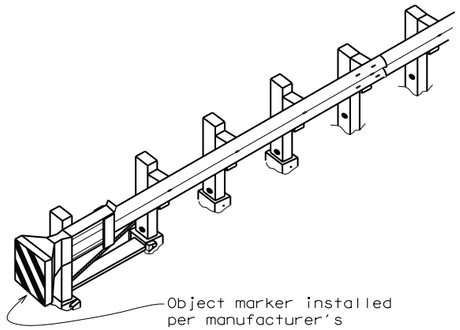
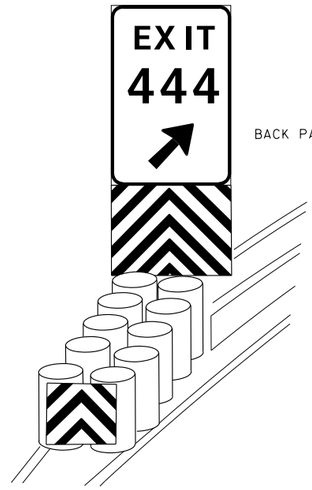
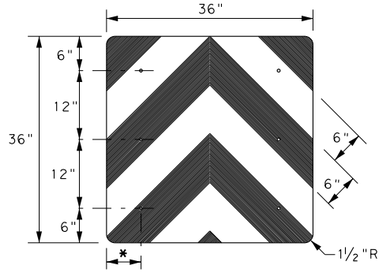


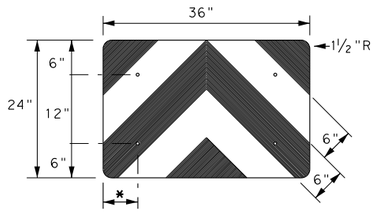




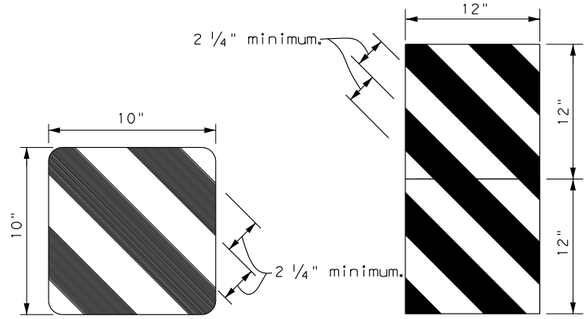




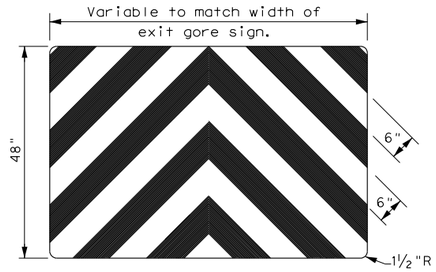


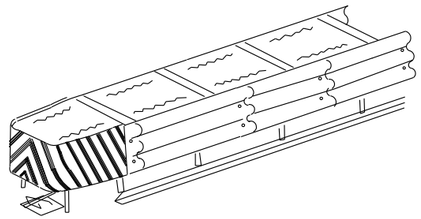


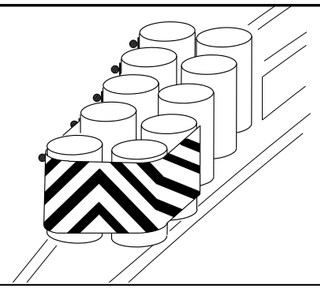
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

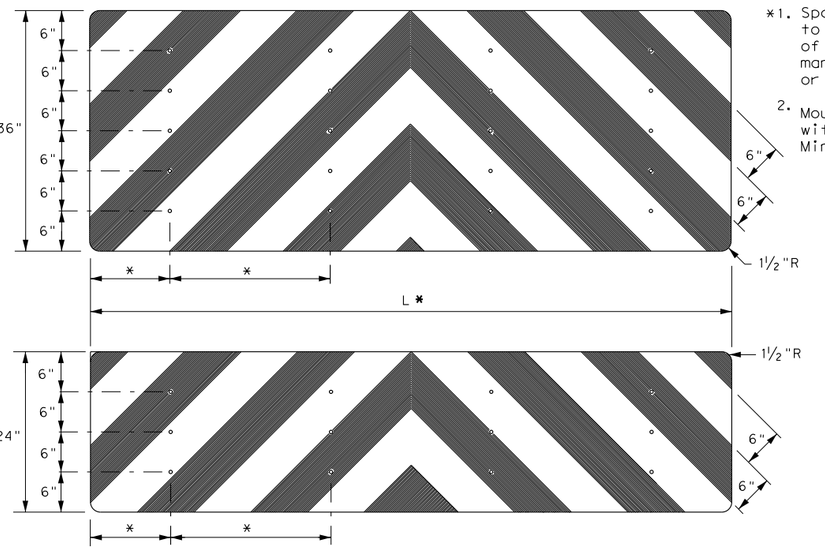


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Operations Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-15

FILE: domvia15.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	TYL	SMITH		92
4-98				
20G				

DATE: $DATE$ 11:00:49 AM
FILE: $FILE$

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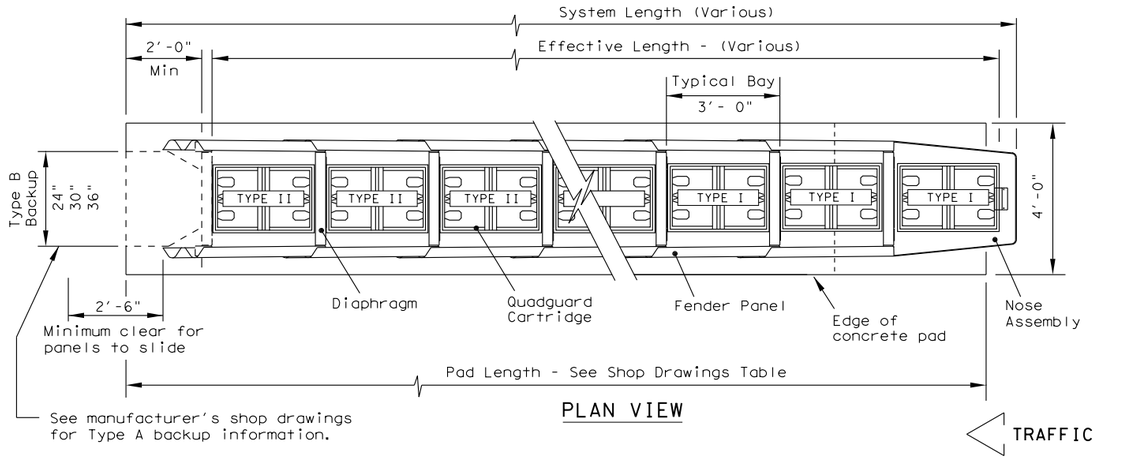
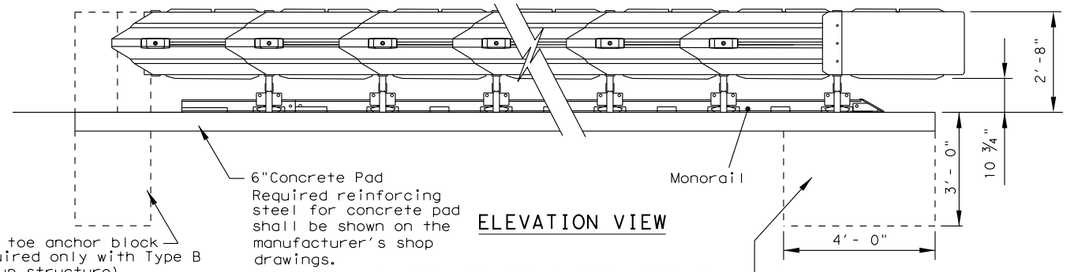


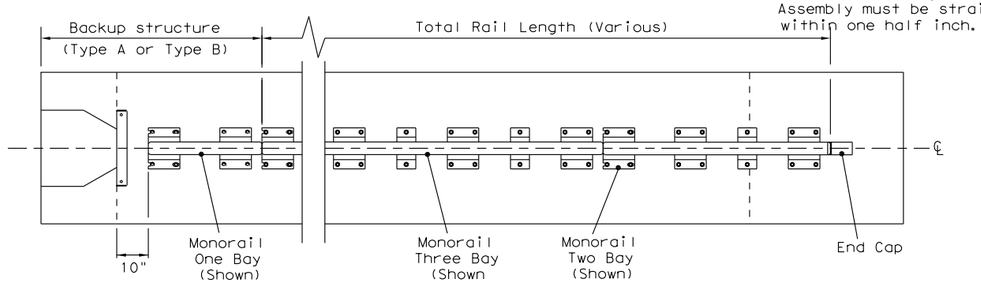
PLAN VIEW



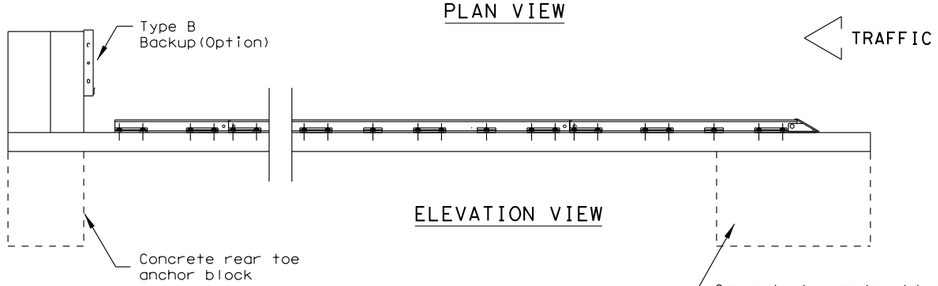
ELEVATION VIEW

QUADGUARD II SYSTEM DETAIL

Note: Monorail & Backup Assembly must be straight within one half inch.



PLAN VIEW



ELEVATION VIEW

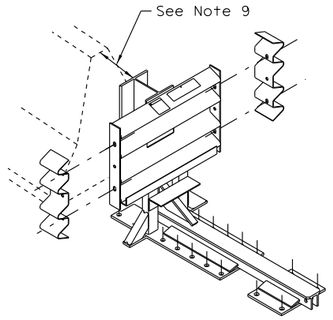
MONORAIL ASSEMBLY DETAIL

(See the manufacturer's shop drawings for monorail hardware installation.)

QUADGUARD II (NARROW) SYSTEM				
Test Level	NO. OF BAYS	UNIT EFFECTIVE LENGTH	PAD LENGTH TYPE A	PAD LENGTH TYPE B
TL-2	2	8'- 8"	9'- 0"	8'- 6"
TL-3	5	17'- 8"	18'- 0"	17'- 6"

Additional bays may be added if special considerations warrant and site conditions will accommodate additional length.

QUAD II (N) units are available in 24", 30", or 36" widths from 2 to 8 bays. Unit width, number of bays, and backup type shall be specified elsewhere in the plans.



TYPE A
TENSION STRUT BACKUP

TENSION STRUT: Consists of diagonal struts, connections, and accessories, as detailed by the Manufacturer, located at the rear of the QUAD unit. Typical application is for QUAD units attached to double-face guardrail. When used, a 4'-0"x 4'-0"x 3'-0" concrete toe anchor block shall be provided beneath the front portion of the concrete pad, except where the QUAD unit is to be placed on continuously reinforced concrete pavement or bridge deck (7" minimum, 4,000 p.s.i.) or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.)

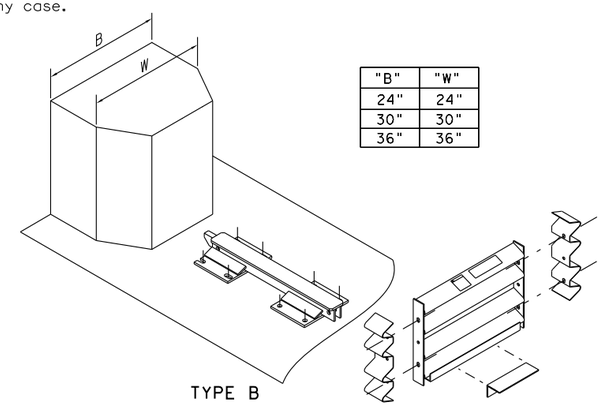
Anchorage requirements are as follows:

WITH FOUNDATION TYPE:	ANCHOR WITH:
Minimum six inch portland cement concrete pad	Epoxy anchoring system with 7" studs, 5.5" embedment
Minimum three inch asphaltic concrete over minimum three inch portland cement concrete	Epoxy anchoring system with 18" studs, 16.5" embedment
Minimum six inch asphaltic concrete over minimum six inch compacted base	Epoxy anchoring system with 18" studs, 16.5" embedment
Minimum eight inch asphaltic concrete	Epoxy anchoring system with 18" studs, 16.5" embedment

If the unit is anchored to asphaltic concrete, it should be relocated to fresh, undisturbed asphalt and re-anchored after each impact to ensure adequate future performance. A zero clearance between the backup and barrier wall is recommended in no case should this distance exceed 7 inches.

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. For bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the QUAD and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require levelling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The QUAD system should be approximately parallel with the barrier or ℄ of merging barriers.
8. Unit width selected should be adequate to protect an errant vehicle travelling at 15 degrees to the roadway from the face or corner of the fixed object.
9. For the permanent steel backup, (Type A) the distance between the back of backup and the barrier wall should not exceed 7 inches in any case.



"B"	"W"
24"	24"
30"	30"
36"	36"

TYPE B
CONCRETE BACKUP

CAST-IN-PLACE CONCRETE WALL BACKUP: If cast-in-place structures such as bridge parapets, columns, or special walls are used as backup structures, then intermediate walls shall be provided between the structures and the QUAD unit. Intermediate walls shall be equal in height and width to the QUAD unit and reinforced with a steel cage. A cast-in-place transition section from concrete barrier may be used. Reinforcing steel should transition from the standard barrier section to the standard backup section. Details for the intermediate walls, cast-in-place transition sections, or other modifications will be shown elsewhere in the plans. Concrete wall backups may be used on continuously reinforced concrete pavement pavement or bridge deck (7" minimum, 4,000 p.s.i)or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.) In those cases, all vertical steel will be doweled (5 inch minimum) into existing decks or located and placed prior to pouring proposed decks as approved by the Engineer.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION (QUADGUARD II) (NARROW)

QUAD(N)-17

FILE: quadn17.dgn	DN: TxDOT	CK: KM	DW: VP	CK: KM
©TxDOT: FEBRUARY 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
REVISED 06,2013 VP REVISED 03,2016 VP REVISED 03,2017 KM	DIST	COUNTY		SHEET NO.
	TYL	SMITH		93

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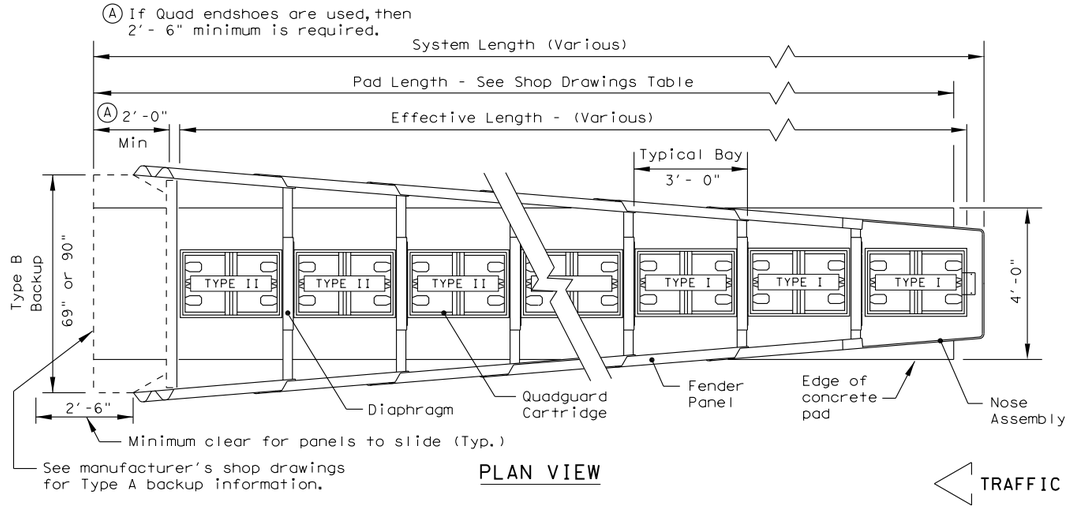
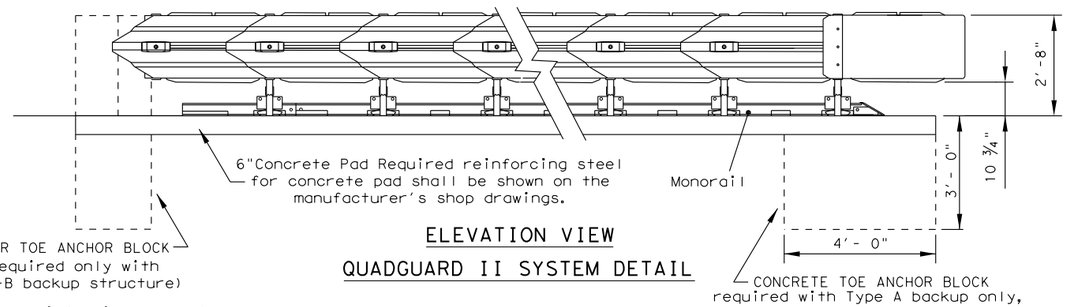


PLAN VIEW

TRAFFIC

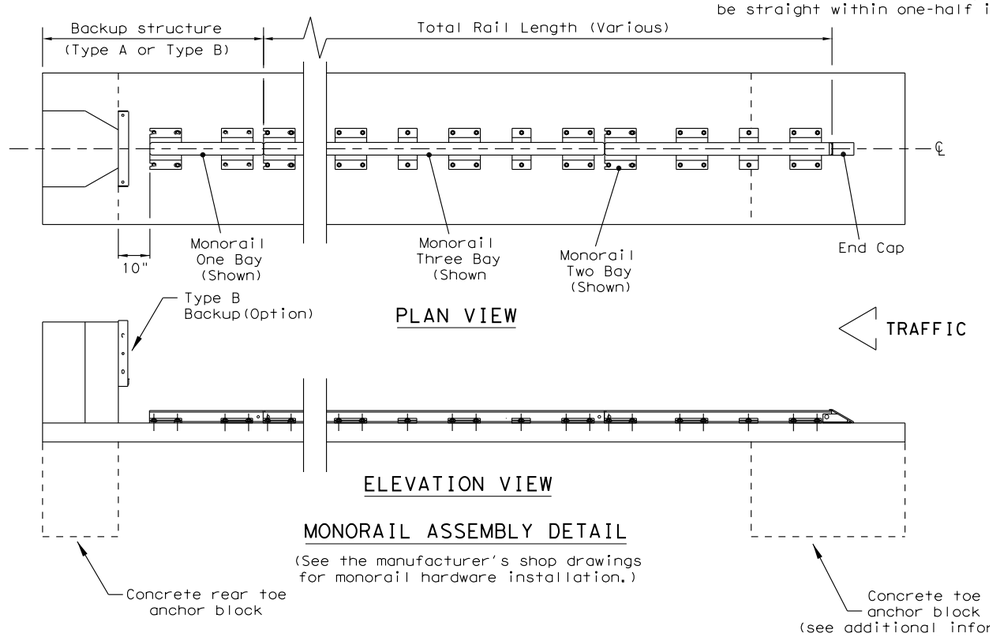


ELEVATION VIEW

QUADGUARD II SYSTEM DETAIL

Required reinforcing steel for concrete anchor shall be shown on the manufacturer's shop drawings.

Note: Monorail and Backup Assembly must be straight within one-half inch.



PLAN VIEW

TRAFFIC

ELEVATION VIEW

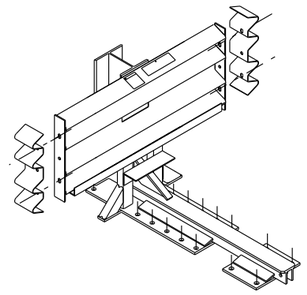
MONORAIL ASSEMBLY DETAIL

(See the manufacturer's shop drawings for monorail hardware installation.)

QUADGUARD II (WIDE) SYSTEM				
Test Level	NO. OF BAYS	UNIT EFFECTIVE LENGTH	PAD LENGTH TYPE A	PAD LENGTH TYPE B
TL-2	3	11′- 8"	12′- 0"	11′- 6"
TL-3	5	17′- 8"	18′- 0"	17′- 6"

Additional bays may be added if special considerations warrant and site conditions will accommodate additional length.

QUAD II (W) units are available in 69" and 90" widths from 3 to 8 bays.
Unit width, number of bays, and backup type shall be specified elsewhere in the plans.



TYPE A
TENSION STRUT BACKUP

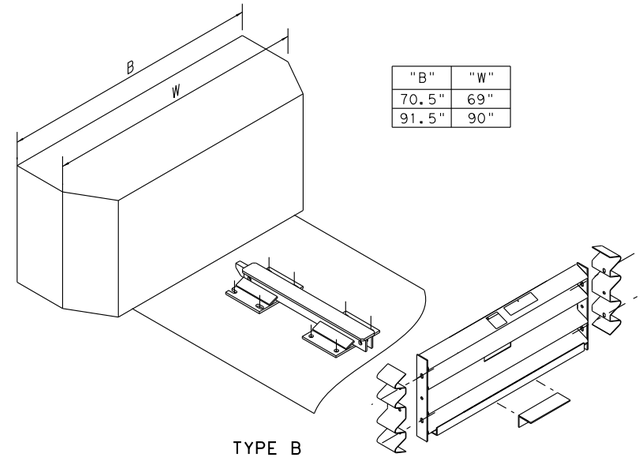
TENSION STRUT: Consists of diagonal struts, connections, and accessories, as detailed by the Manufacturer, located at the rear of the QUAD unit. Typical application is for QUAD units attached to double-face guardrail. When used, a 4′-0"x 4′-0"x 3′-0" concrete toe anchor block shall be provided beneath the front portion of the concrete pad, except where the QUAD unit is to be placed on continuously reinforced concrete pavement or bridge deck (7" minimum, 4,000 p.s.i.) or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.)

Anchorage requirements are as follows:

WITH FOUNDATION TYPE:	ANCHOR WITH:
Minimum six inch portland cement concrete pad	Epoxy anchoring system with 7" studs, 5.5" embedment

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway - Energy Absorption at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. For bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the QUAD and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require levelling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The QUAD system should be approximately parallel with the barrier or ℄ of merging barriers.
8. Unit width selected should be adequate to protect an errant vehicle travelling at 15 degrees to the roadway from the face or corner of the fixed object.



"B"	"W"
70.5"	69"
91.5"	90"

TYPE B
CONCRETE BACKUP

CAST-IN-PLACE CONCRETE WALL BACKUP: If cast-in-place structures such as bridge parapets, columns, or special walls are used as backup structures, then intermediate walls shall be provided between the structures and the QUAD unit. Intermediate walls shall be equal in height and width to the QUAD unit and reinforced with a steel cage. A cast-in-place transition section from concrete barrier may be used. Reinforcing steel should transition from the standard barrier section to the standard backup section. Details for the intermediate walls, cast-in-place transition sections, or other modifications will be shown elsewhere in the plans. Concrete wall backups may be used on continuously reinforced concrete pavement pavement or bridge deck (7" minimum, 4,000 p.s.i)or non-reinforced concrete pavement (8" minimum, 4,000 p.s.i.) In those cases, all vertical steel will be doweled (5 inch minimum) into existing decks or located and placed prior to pouring proposed decks as approved by the Engineer.

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION (QUADGUARD II) (WIDE)

QUAD(W)-17

FILE: quadw17.dgn	DN: TxDOT	CK: KM	DW: VP	CK: KM
©TxDOT: FEBRUARY 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06,2013 VP REVISED 03,2016 VP REVISED 03,2017 KM	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		94

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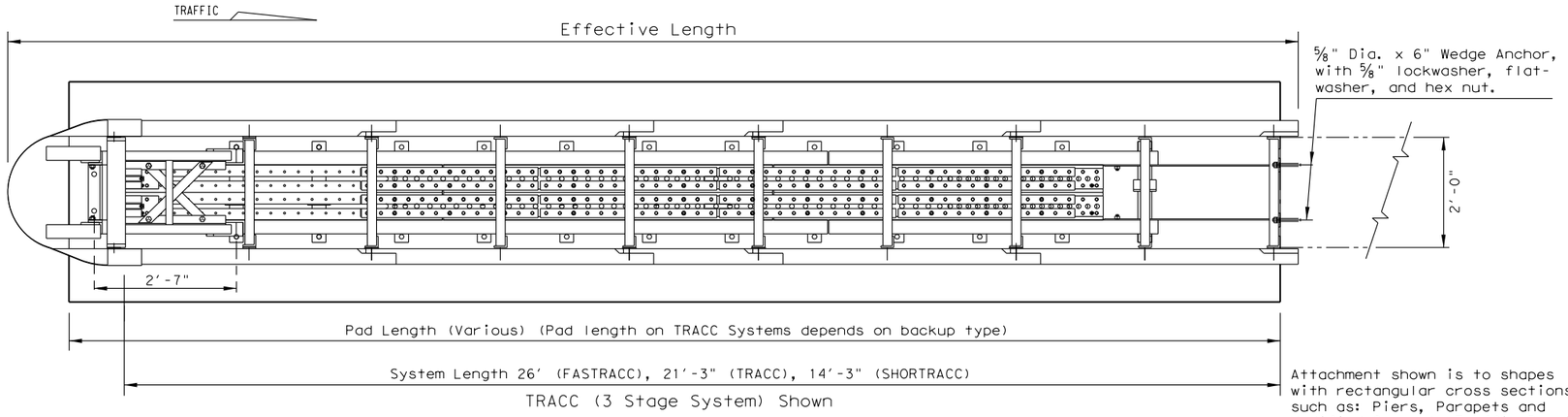
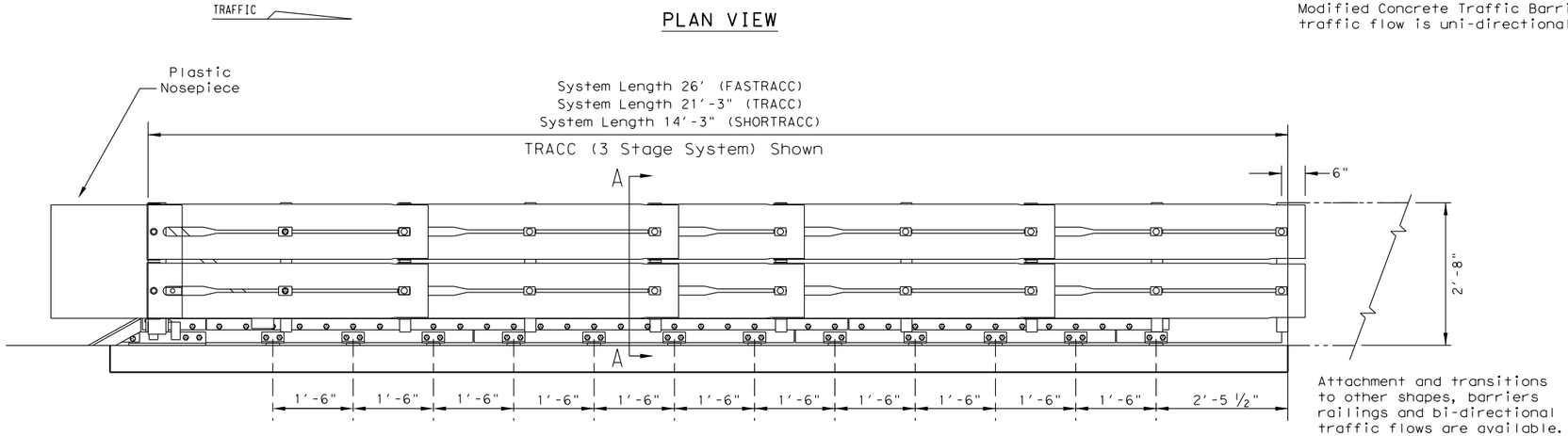


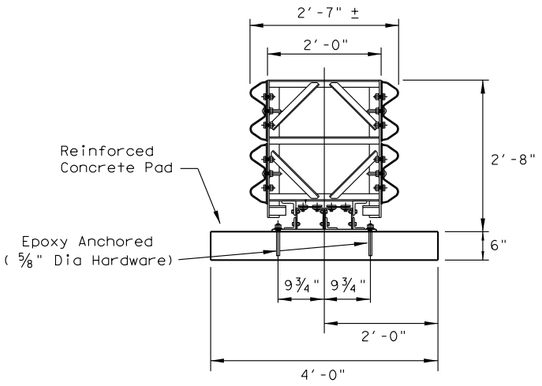
PLAN VIEW

Attachment shown is to shapes with rectangular cross sections such as: Piers, Parapets and Modified Concrete Traffic Barriers, traffic flow is uni-directional.



ELEVATION VIEW

Attachment and transitions to other shapes, barriers railings and bi-directional traffic flows are available. (See manufacturer's product manual)



SECTION A-A

BACKUP SUPPORT OPTIONS
Square Concrete Backup
Concrete Barrier (CTB) Backup
Single Slope Concrete Barrier (SSCB)
Guardrail Backup (Base-Plated Post)
Guardrail Backup (Driven Post)
TRANSITION OPTIONS
Vertical Wall
Modified (CTB) to Vertical Wall
Concrete Barrier (CTB)
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

For bi-directional transition panel details (See manufacturer's product manual)

Backup and Transition types are shown elsewhere on the plans, (i.e. Attenuator location details or in the general notes).

TYPE (NARROW)	TEST LEVEL	SYSTEM LENGTH	EFFECTIVE LENGTH	PAD LENGTHS
FASTRACC (4 Stage System)	70	26'	27'- 9"	26'- 8"
TRACC (3 Stage System)	TL-3	21'- 3"	23'- 0"	22'- 0" 23'- 0" 24'- 0"
SHORTRACC (2 Stage System)	TL-2	14'- 3"	16'- 0"	15'- 0" 16'- 0" 17'- 0"

The Stage System refers to number of replaceable sled sections that could be replaced independently.

Concrete pad length on TRACC & SHORTRACC depends on backup type.

FOUNDATION OPTIONS
6" Reinforced Concrete
8" Unreinforced Concrete
3" Min. Asphalt over 3" Min. Concrete
6" Asphalt over 6" Compact Subbase
8" Minimum Asphalt

For steel placement in concrete foundations (See manufacturer's product manual)

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway at 1(888)323-6374. 2525 N. Stemmons Freeway - Dallas, TX 75207
2. For bi-directional traffic, appropriate transition panels will be required.
3. Details of components for the TRACC and backups and reinforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a minimum compressive strength of 4,000 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope is 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The TRACC system should be approximately parallel with the barrier or ℄ of merging barriers.

	FAST TRACC	TRACC	SHORT TRACC	BILL OF MATERIAL
PART #	QTY	QTY	QTY	DESCRIPTION
25936A	1			FASTRACC Unit Assembly
25980A		1		TRACC Unit Assembly
25997A			1	SHORTRACC Unit Assembly
3310G	4	4	4	5/8" Lockwasher
4451G	4	4	4	5/8" Dia x 6" Wedge Exp. Anchor
6531B	1	1	1	Plastic Nosepiece
6668B	4	4	4	Reflective Sheeting
✳ ANCHOR HARDWARE (CONCRETE BASE)				
5204G	32	26	18	5/8"Dia x 7 1/2" All Thd. Rod
3310G	32	26	18	5/8" Lockwasher
3361G	32	26	18	5/8" Hex Nut
3300G	32	26	18	5/8" Flat Washer
5206B	3	3	2	TRACC Adhesive HIT HY150 Kit
✳ ANCHOR HARDWARE (ASPHALT BASE)				
6380G	32	26	18	5/8" Dia x 18" All Thd. Rod
3310G	32	26	18	5/8" Lockwasher
3361G	32	26	18	5/8" Hex Nut
3300G	32	26	18	5/8" Flat Washer
5206B	7	5	4	TRACC Adhesive HIT HY150 Kit

✳ See manufacturer's product manual

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
CRASH CUSHION (NARROW)
TRACC(N)-16

FILE: traccn16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 06, 2013 (VP) REVISED 03, 2016 (VP)	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		95

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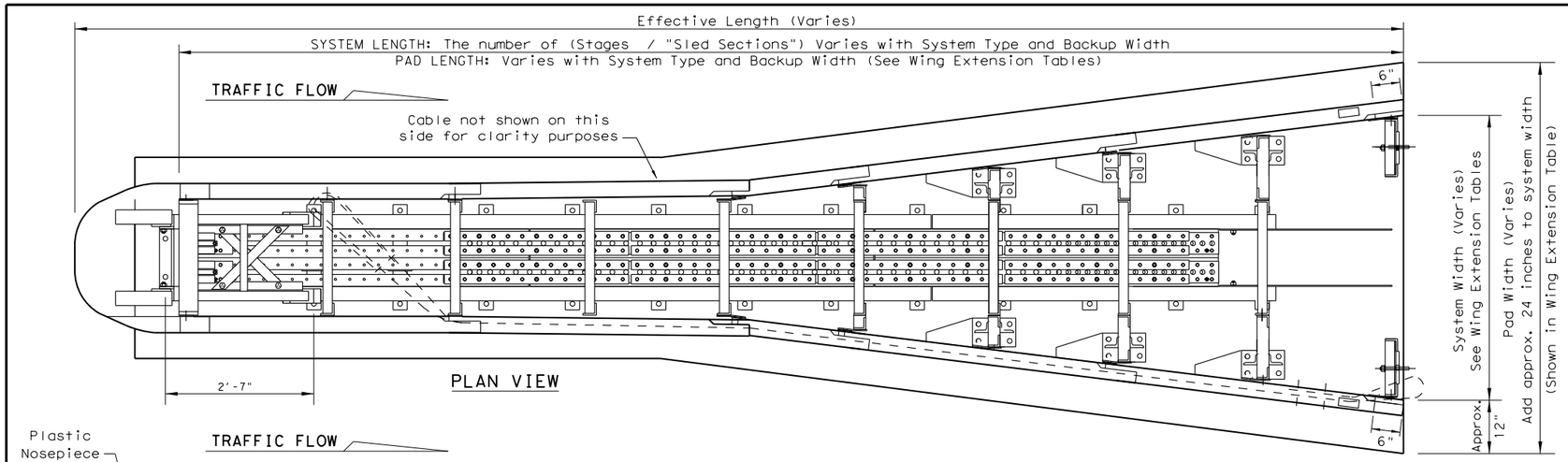
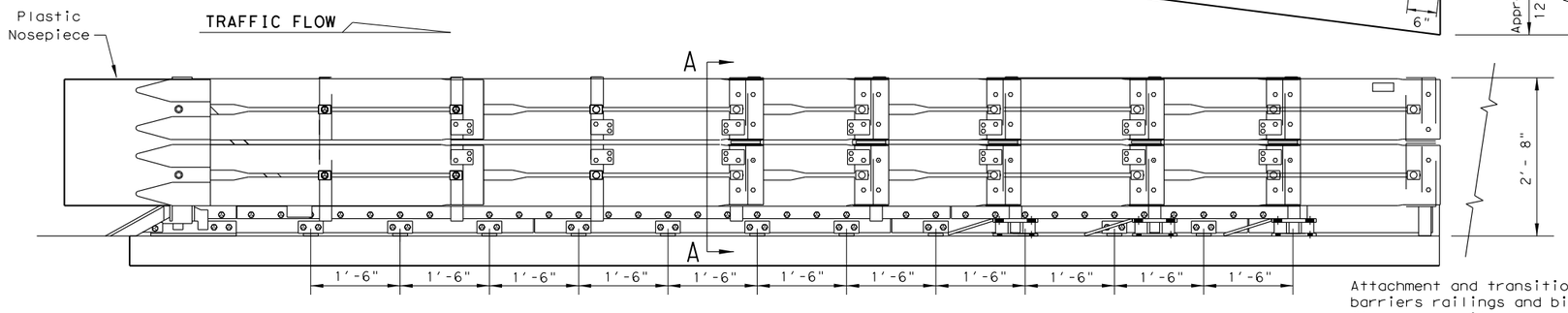
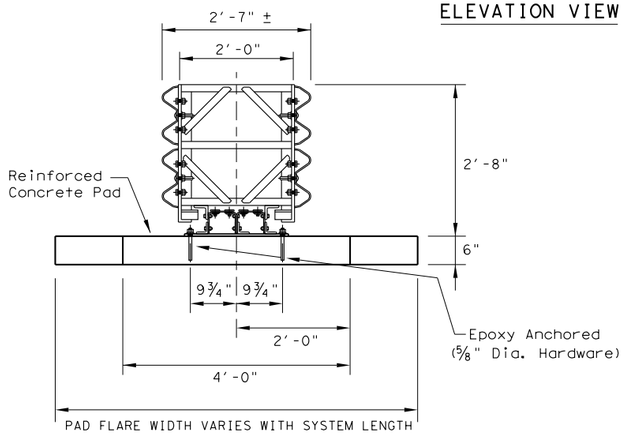


PLAN VIEW



ELEVATION VIEW



SECTION A-A

TYPE (WIDE)	TEST LEVEL
FASTRACC (4 Stage System)	70
TRACC (3 Stage System)	TL-3
SHORTRACC (2 Stage System)	TL-2

NOTE: The Stage System refers to number of replaceable "sled sections" that could be replaced independently.

Wide-FASTRACC WING EXTENSIONS

NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-FASTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	71"	25'-11"	27'-11"	
1	78"	28'-3"	30'-3"	33940
2	85"	30'-7"	32'-7"	33941 / 33942
3	92"	32'-11"	34'-11"	33943 / 33944
4	99"	35'-2"	37'-2"	33945 / 33946
5	106"	37'-6"	39'-6"	33947 / 33948
6	113"	39'-10"	41'-10"	33949 / 33950
7	120"	42'-2"	44'-2"	33951 / 33952
8	127"	44'-5"	46'-5"	33953 / 33954
9	134"	46'-9"	48'-9"	33955 / 33956
10	141"	49'-1"	51'-1"	33957 / 33958
10+				CONSULT TRINITY SALES PERSON

Wide-TRACC WING EXTENSIONS

NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-TRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	58"	21'	23'	
1	65"	23'-4"	25'-4"	33940
2	72"	25'-8"	27'-8"	33941 / 33942
3	79"	28'	30'	33943 / 33944
4	86"	30'-4"	32'-4"	33945 / 33946
5	92"	32'-8"	34'-8"	33947 / 33948
6	99"	35'	37'	33949 / 33950
7	106"	37'-4"	39'-4"	33951 / 33952
8	113"	39'-8"	41'-8"	33953 / 33954
9	120"	42'	44'	33955 / 33956
10	127"	44'-4"	46'-4"	33957 / 33958
10+				CONSULT TRINITY SALES PERSON

Wide-SHORTRACC WING EXTENSIONS

NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-SHORTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	39"	15'	17'	
1	46"	17'-4"	19'-4"	33940
2	53"	18'-9"	20'-9"	33941 / 33942
3	60"	21'-1"	23'-1"	33943 / 33944
4	66"	23'-5"	25'-5"	33945 / 33946
5	73"	25'-8"	27'-8"	33947 / 33948
6	80"	28'-1"	30'-1"	33949 / 33950
7	87"	30'-4"	32'-4"	33951 / 33952
8	94"	32'-7"	34'-7"	33953 / 33954
9	101"	34'-11"	36'-11"	33955 / 33956
10	108"	37'-3"	39'-3"	33957 / 33958
10+				CONSULT TRINITY SALES PERSON

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway at 1(888)323-6374. 2525 N. Stemmons Freeway - Dallas, TX 75207
2. Contact the company for: Custom widths from 31" up to 57" wide, and transition panels for bi-directional traffic applications.
3. Details of components for the WideTRACC, Backups and re-inforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
4. Concrete shall be class "S" with a min. compressive strength 4,000 p.s.i.
5. If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope 8%.
6. The installation area should be free from curbs, elevated objects, or depressions.
7. The WideTRACC system should be approximately parallel with the barrier or ℄ of merging barriers.
8. The Unit shown is flared on both sides, but can be flared on a single side ether left or right. The flares will effect the length and width of the system. (See Wing Extension Tables)

Attachment and transitions to other shapes, barriers railings and bi-directional traffic flows are available. (See manufacturer's product manual).

BACKUP SUPPORT OPTIONS
SQUARE CONCRETE BACKUP
CONCRETE BARRIER (CTB) BACKUP
SINGLE SLOPE CONCRETE BARRIER(SSCB)
GUARDRAIL BACKUP (BASE-PLATED POST)
GUARDRAIL BACKUP (DRIVEN POST)
TRANSITION OPTIONS
VERTICAL WALL
MODIFIED (CTB) TO VERTICAL WALL
CONCRETE BARRIER (CTB)
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

FOR BI-DIRECTIONAL TRANSITION PANEL DETAILS (SEE MANUFACTORER'S PRODUCT MANUAL).

BACKUP AND TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS, (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
3" MIN. ASPHALT OVER 3" MIN. CONCRETE
6" ASPHALT OVER 6" COMPACT SUBBASE
8" MINIMUM ASPHALT

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, (SEE MANUFACTURER'S PRODUCT MANUAL).

Wide-TRACC - BILL OF MATERIAL

PART #	FAST TRACC QTY	TRACC QTY	SHORT TRACC QTY	DESCRIPTION
25937A	1			WIDEFASTRACC UNIT ASSEMBLY
25939A		1		WIDETRACC UNIT ASSEMBLY
25997A			1	WIDESHORTRACC UNIT ASSEMBLY
3310G	4	4	4	⅝" LOCKWASHER
4372G	4	4	4	⅝" FLATWASHER
4451G	4	4	4	⅝" DIA X 6" EXP. WEDGE ANCHOR
6531B	1	1	1	PLASTIC NOSEPIECE
6668B	4	4	4	REFLECTIVE SHEETING
ANCHOR HARDWARE (CONCRETE BASE)				
5204B	72	50	18	⅝" DIA X 7-1/16" THD ANCHOR STUD
4372G	72	50	18	⅝" FLATWASHER
3310G	72	50	18	⅝" LOCKWASHER
3361G	72	50	18	⅝" HEX NUT
5206B	6	4	2	Adhesive, Hilti Hit HY-150
ANCHOR HARDWARE (ASPHALT BASE)				
6380G	72	50	18	⅝"Dia x 18" Thd Anchor Stud
4372G	72	50	18	⅝" Flatwasher
3310G	72	50	18	⅝" Lockwasher
3361G	72	50	18	⅝" HEX NUT
5206B	15	11	4	ADHESIVE, HILTI HIT HY-150
ANCHOR HARDWARE (OPTIONAL ITEMS, AS NEEDED)				
5207B	A/R	A/R	A/R	NOZZLE, MIXER, HILTI HIT HY-150
5208B	A/R	A/R	A/R	EXT. TUBE, MIXER, HILTI HIT HY-150
5205B	A/R	A/R	A/R	DISPENSER GUN, HILTI HIT HY-150
5209B	A/R	A/R	A/R	DRILL BIT, 11/16", HILTI SDS

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
CRASH CUSHION (WIDE UNIT)
TRACC(W)-16

FILE: traccw16.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT February 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
REVISED 06, 2013 (VP)	DIST	COUNTY		SHEET NO.
REVISED 03, 2016 (VP)	TYL	SMITH		96

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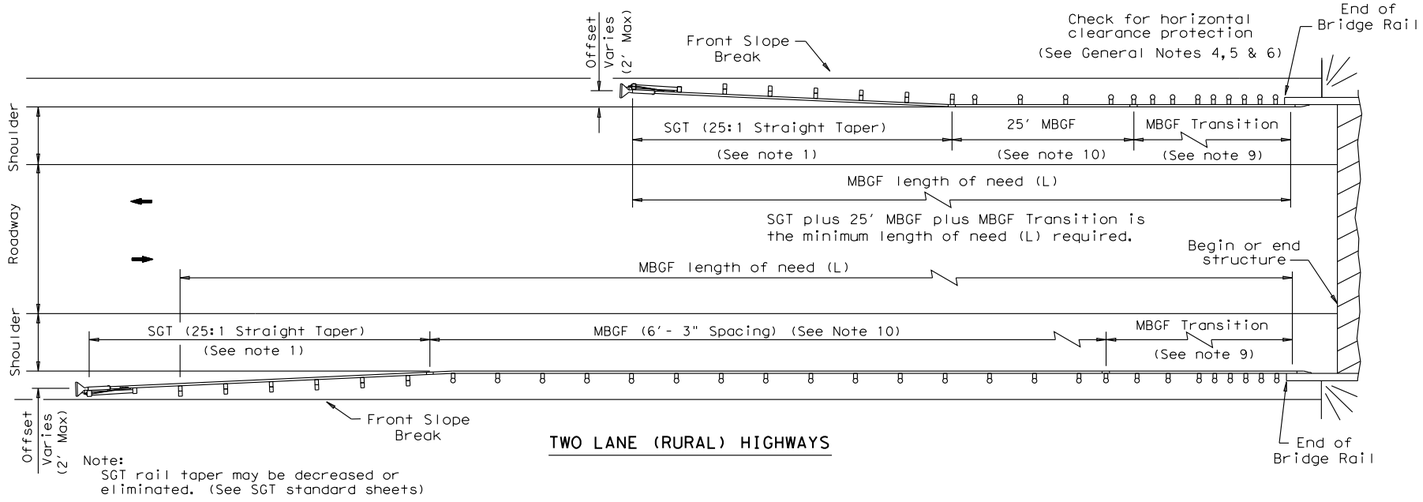
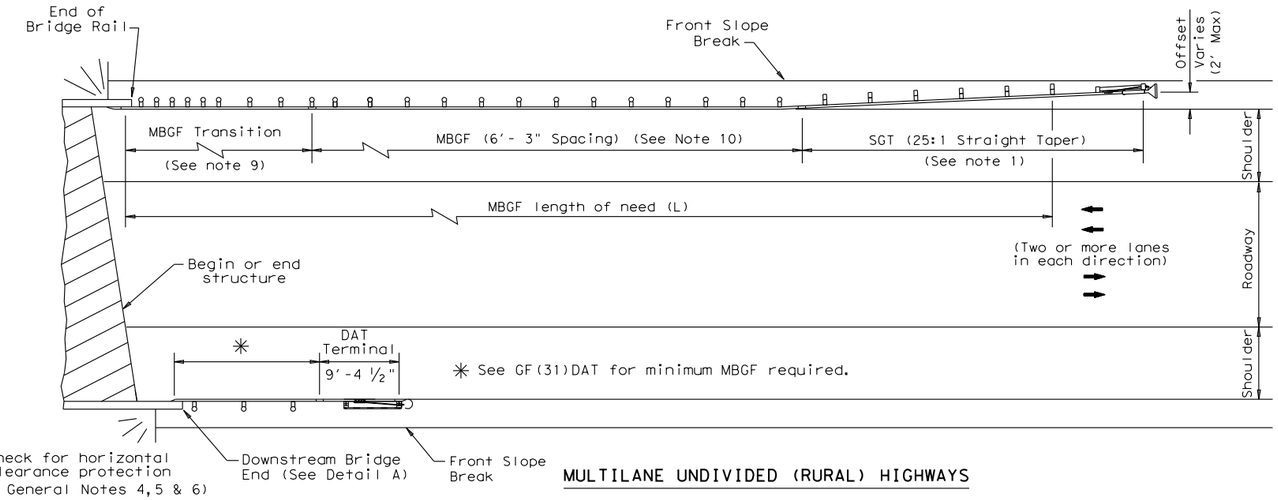
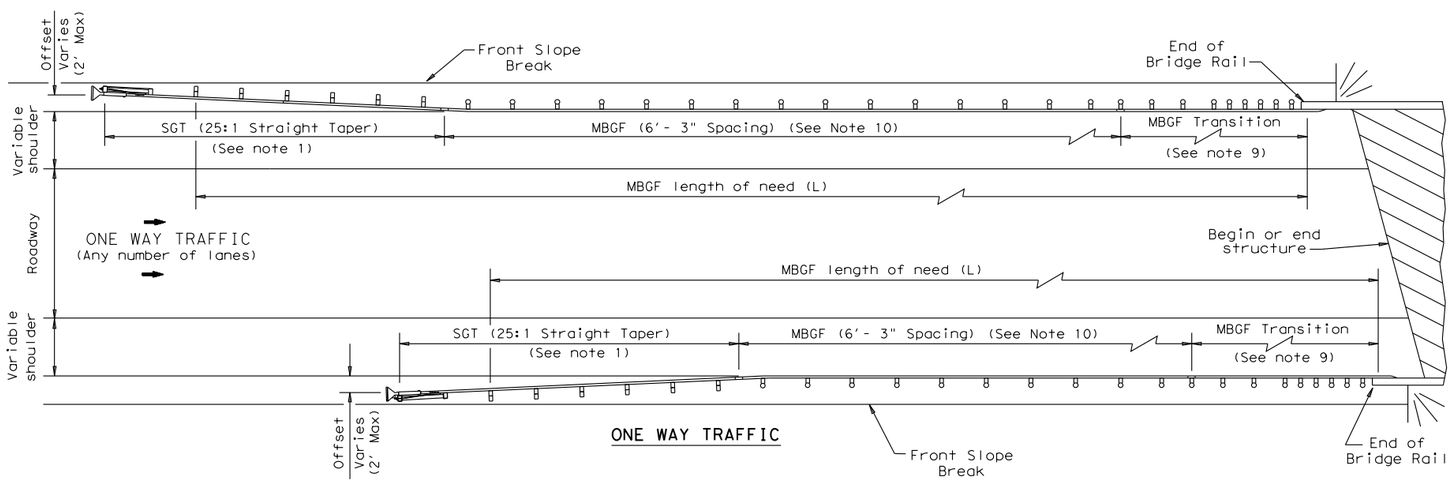


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



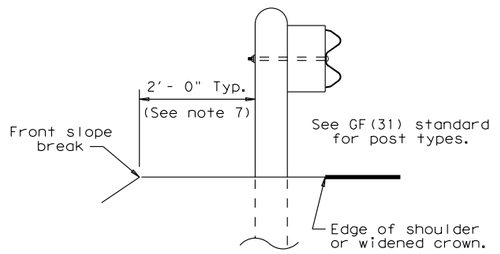
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF

Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		97

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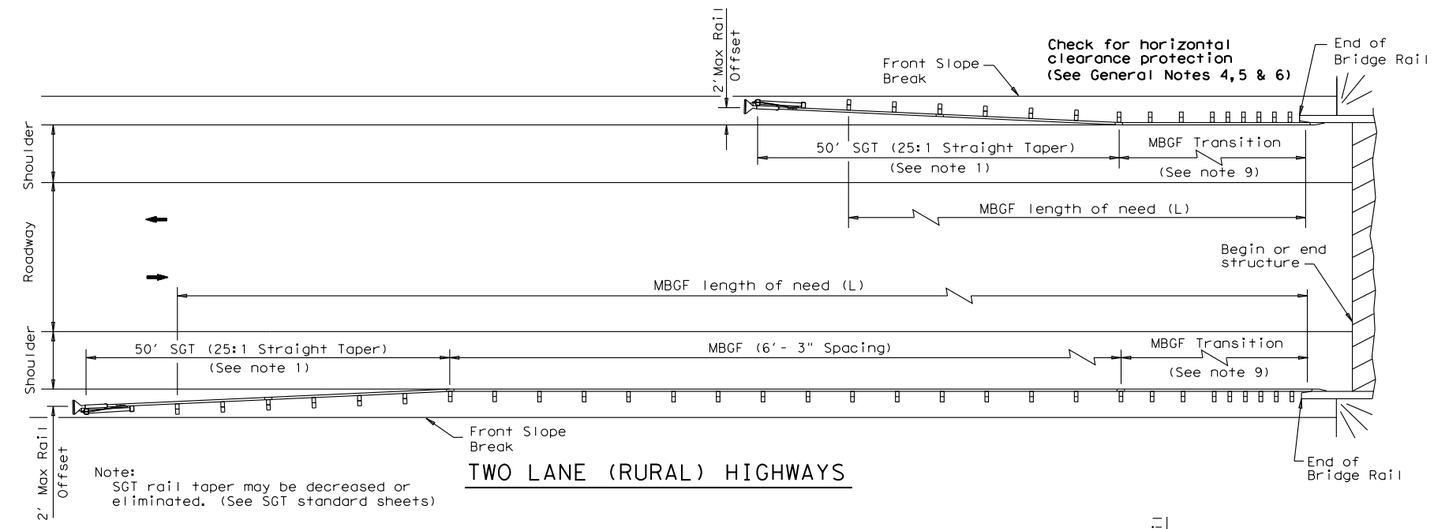
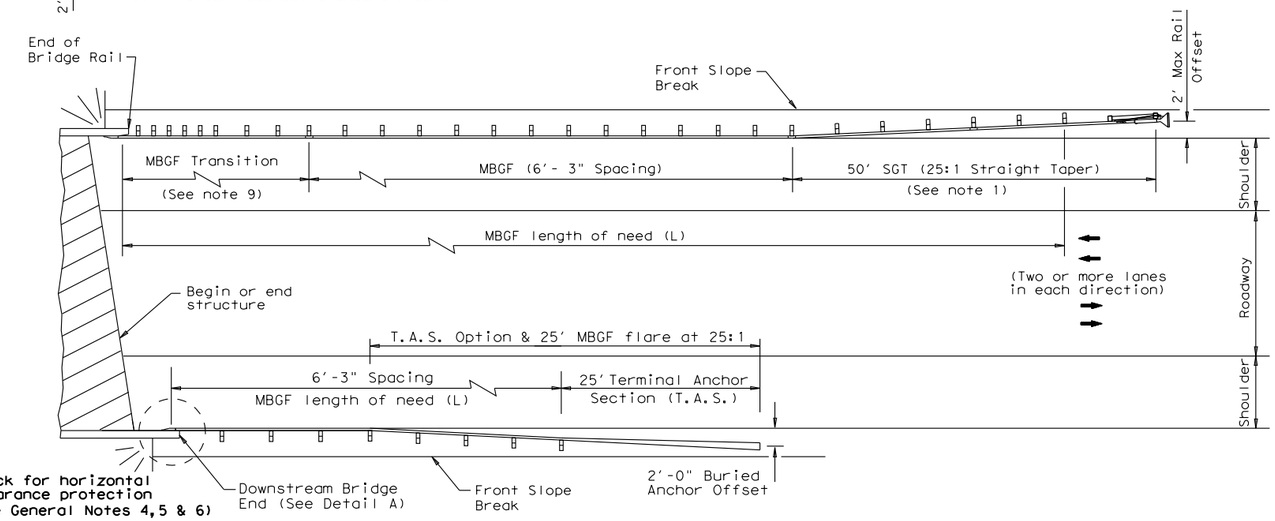
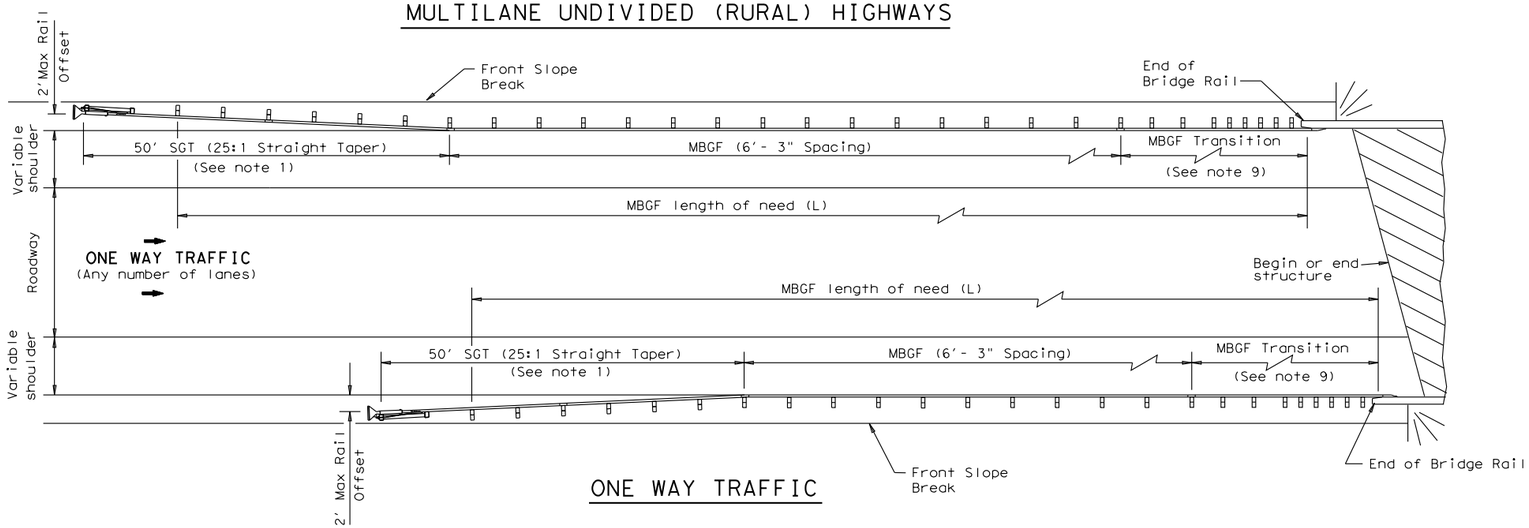


Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)

TWO LANE (RURAL) HIGHWAYS



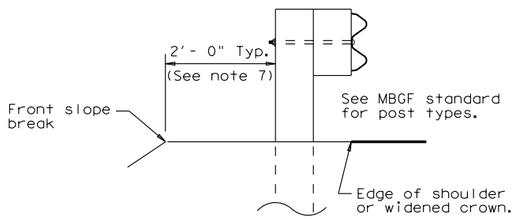
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



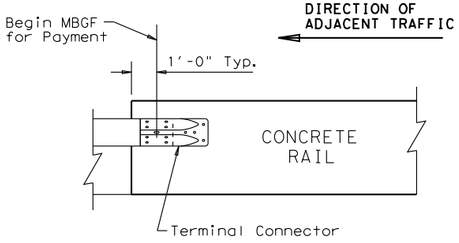
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See MBGF, SGT, and MBGF Transition standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are shown elsewhere in plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Terminal anchor sections (TAS) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF (at 6'-3" post spacing without transition) to concrete rail are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.



TYPICAL CROSS SECTION AT MBGF



DETAIL A

All rail elements shall be lapped in the direction of adjacent traffic.

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS
(28" Metal Beam Guard Fence Applications to Rigid Rails)

BED(28)-11

FILE: bed2811.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2001	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-2011	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		98

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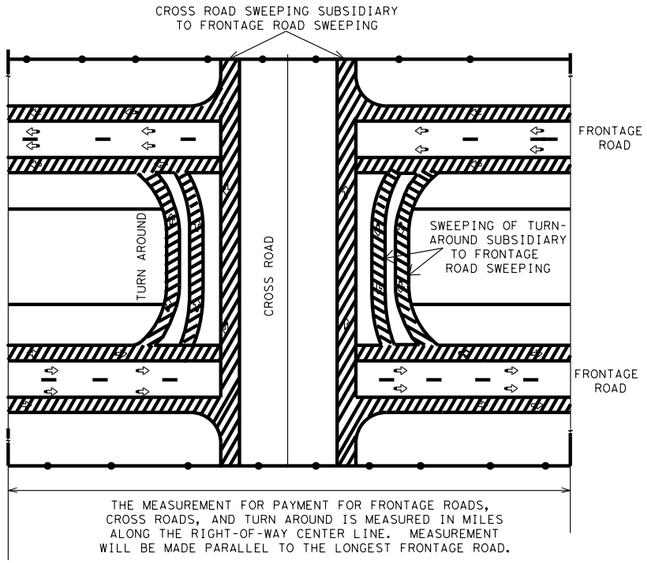
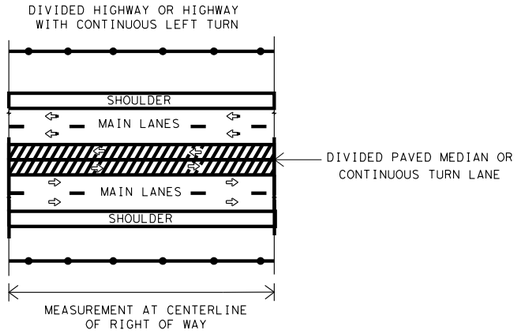
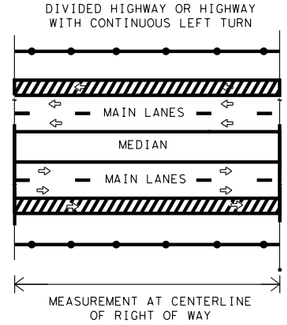
FRONTAGE ROAD SWEEPING



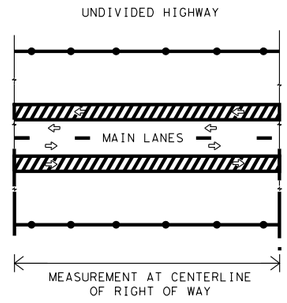
CENTER MEDIAN SWEEPING

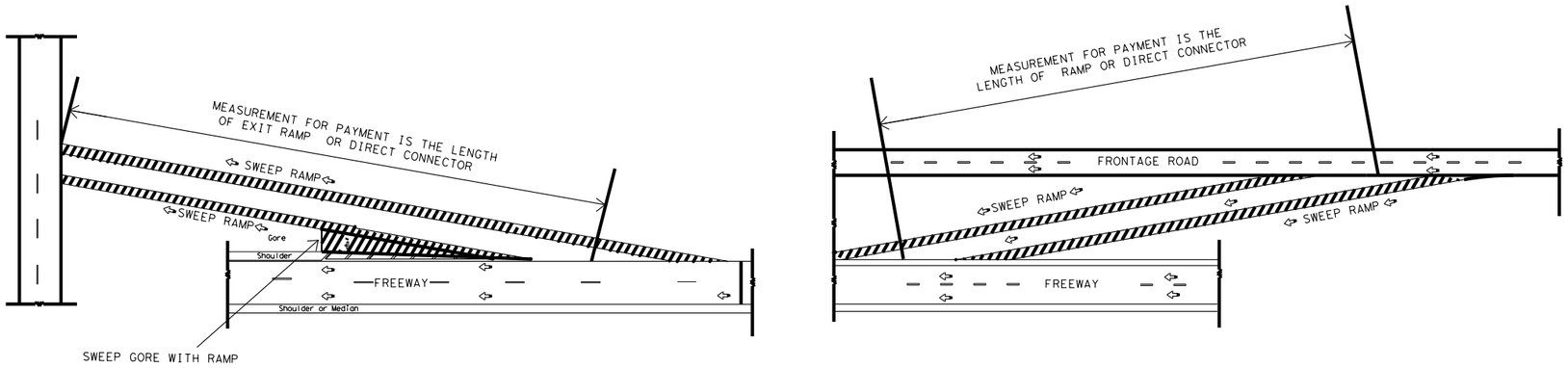


OUTSIDE MAIN LANE SWEEPING



OUTSIDE MAIN LANE SWEEPING





RAMPS OR DIRECT CONNECTORS

PAYMENT ITEM	NORMAL NUMBER OF PASSES OF THE SWEEPER	MEASUREMENT OF CENTER LINE MILES	OTHER AREAS SUBSIDARY TO PAYMENT ITEM
SWEEPING (CENTER MEDIAN)	2	OF RIGHT OF WAY	NONE
SWEEPING (OUTSIDE MAIN LANE)	2	OF RIGHT OF WAY	NONE
SWEEPING (ONE FRONTAGE ROAD)	2	OF RIGHT OF WAY	CROSS ROADS & TURN AROUNDS
SWEEPING (TWO FRONTAGE ROADS)	4	OF RIGHT OF WAY	CROSS ROADS & TURN AROUNDS
SWEEPING (RAMP)	2	OF RAMP	GORE AREA
SWEEPING (DIRECT CONNECTOR)	2	OF CONNECTOR	GORE AREA

KEY

- PATH OF SWEEPER
- DIRECTION OF TRAFFIC & SWEEPER
- LANE DIVIDER STRIPE
- RIGHT-OF-WAY LINE

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

Texas Department of Transportation

Maintenance Division
Standard Plans

SWEEPING HIGHWAYS

SHEET 1 OF 1

SWEEP - 04

NOT TO SCALE

FILE: SWEEP04.DGN	DN: LJB	CK: JG	DW: -	CK: -	NEG NO.:	
©TxDOT MAY 2004	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
REVISED:	TYL					99
REVISED:	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
REVISED:	SMITH		3487	01	001	TOLL 49

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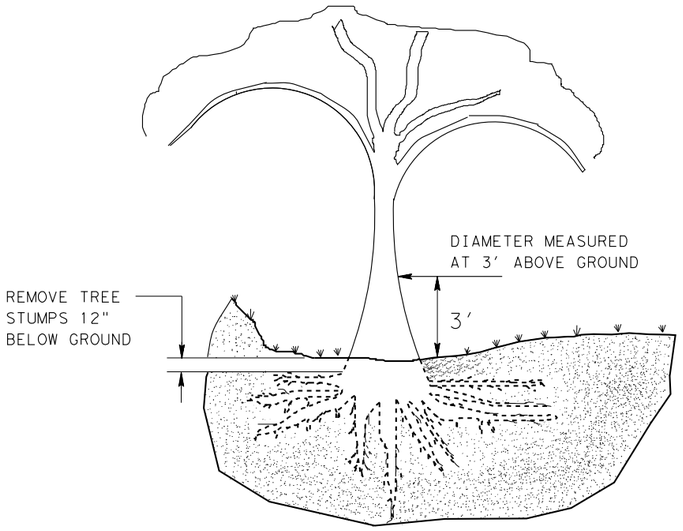
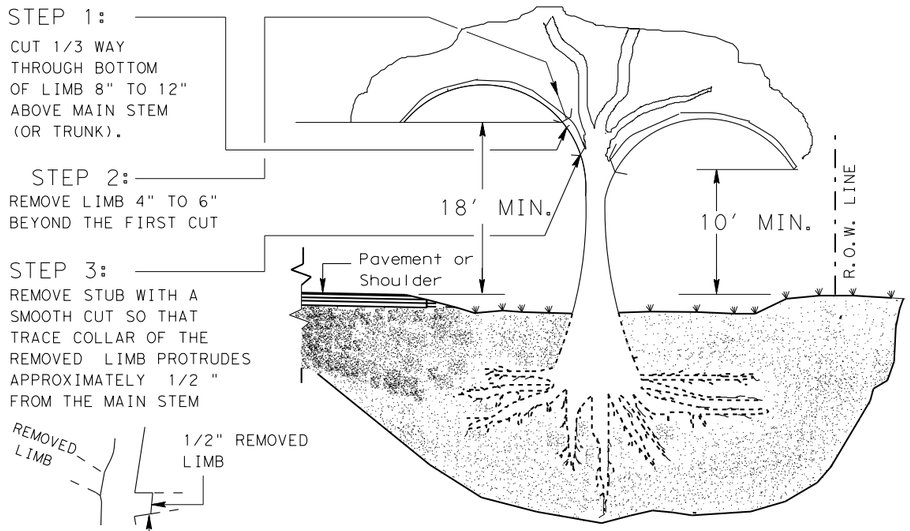
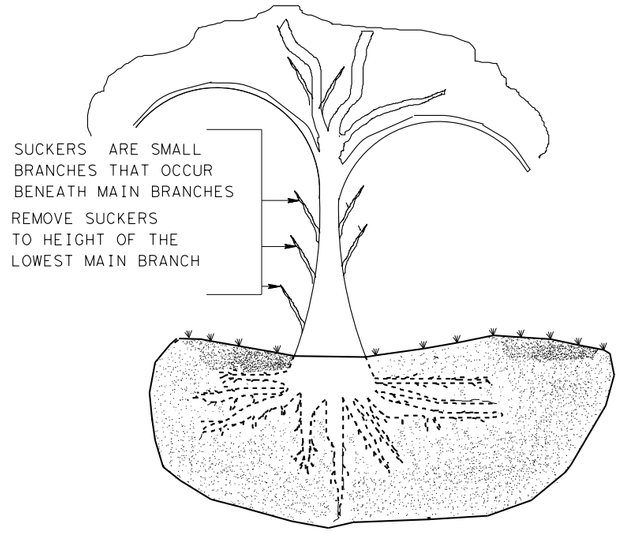


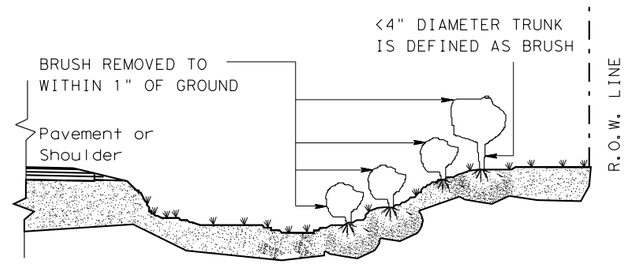
TREE REMOVAL



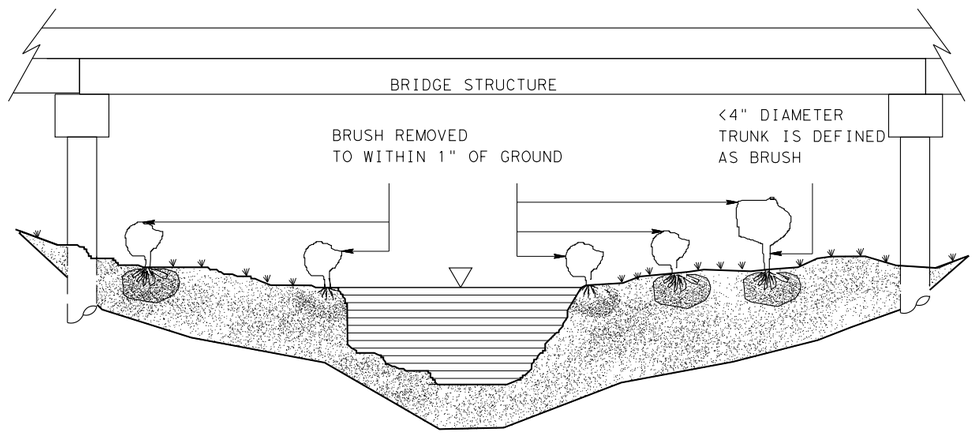
TREE TRIMMING



STEPS 1, 2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.



BRUSH REMOVAL



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 10' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.

4. MEASUREMENTS FOR PAYMENT OF TREE DIAMETERS ARE DIVIDED INTO THE RANGES SHOWN IN TABLE 1.

TABLE 1
TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT

PAY ITEM	RANGE FOR PAY ITEMS			
	TRUNK DIAMETER *		TRUNK CIRCUMFERENCE	
	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO
752 6005	4	12	12 1/2	37 1/2
752 6006	12	18	37 1/2	56 1/2
752 6007	18	24	56 1/2	75 1/2
752 6008	24	30	75 1/2	94
752 6009	30	36	94	113
752 6010	36	42	113	132
752 6011	42	48	132	151
752 6012	48	60	151	188 1/2
752 6013	60	72	188 1/2	226
752 6019	72	84	226	264
	84	GREATER THAN 84	264	NOT APPLICABLE

*SEE GENERAL NOTE #3.

Texas Department of Transportation

Maintenance Division Standard

TREE AND BRUSH REMOVAL

TRB-15(1)

FILE:	DN: JEO	CK: LJB	DW: JEO	CK:
© TxDOT MARCH 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
Revised table 1 to 2014 Specification	DIST	COUNTY		SHEET NO.
	TYL	SMITH		100

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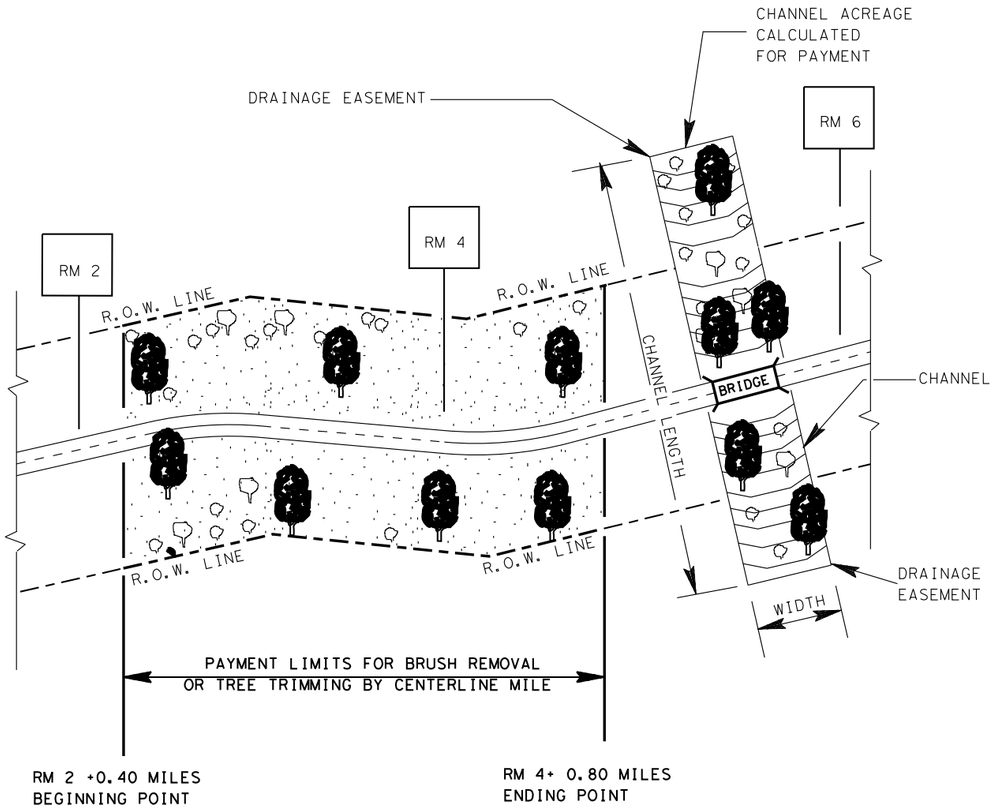
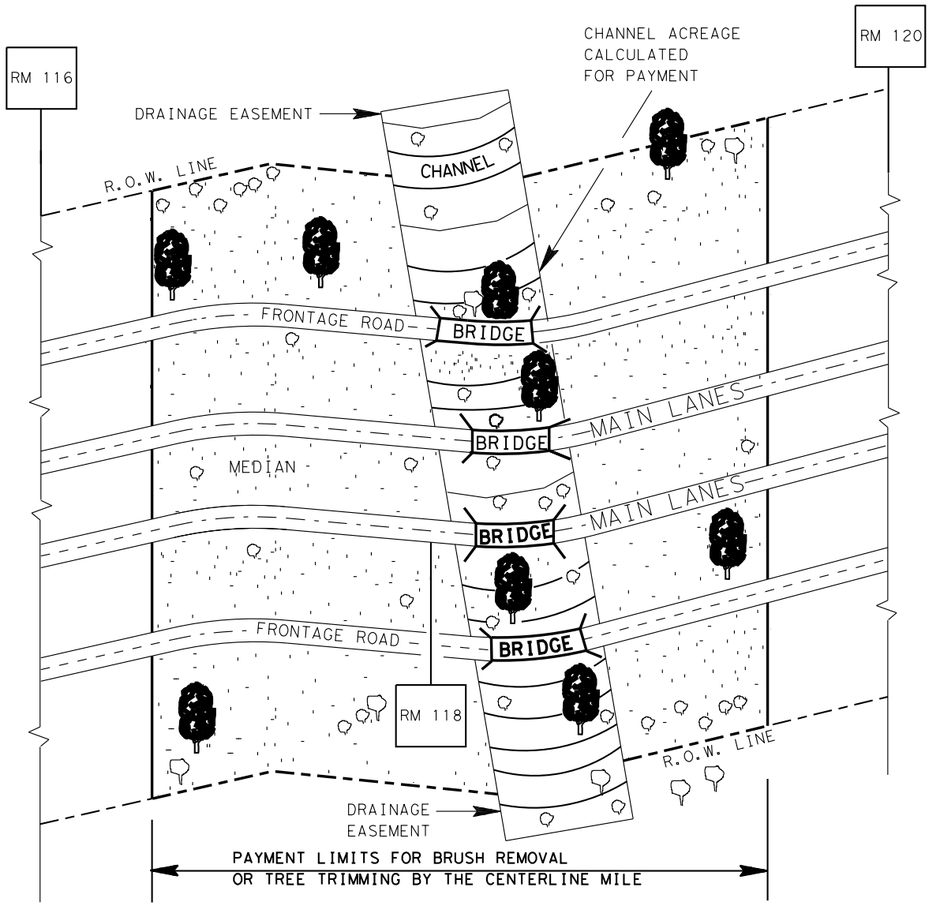


BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: UNDIVIDED HIGHWAY



BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: DIVIDED HIGHWAY WITH FRONTAGE ROADS

GENERAL NOTES:

TREE TRIMMING AND BRUSH REMOVAL

1. PAYMENT BY THE CENTERLINE MILE IS MADE TO THE NEAREST 1/100 (0.01) MILE.
2. LIMITS OF WORK ARE SHOWN AS DISTANCES FROM REFERENCE MARKERS (RM).
3. PAY ITEMS BY THE CENTERLINE MILE INCLUDE ALL TREE TRIMMING OR BRUSH REMOVAL IN THE RIGHT OF WAY ON BOTH SIDES OF THE HIGHWAY. FOR DIVIDED HIGHWAYS, THE MEDIAN IS INCLUDED. FOR HIGHWAYS WITH FRONTAGE ROADS, THE AREAS BETWEEN THE FRONTAGE ROADS AND MAIN LANES, AND THE AREAS OUTSIDE OF THE FRONTAGE ROADS ARE INCLUDED.
4. BRUSH REMOVAL AND TREE TRIMMING UNDER BRIDGES, IN AND ALONG CHANNELS AND EASEMENTS ARE PAID FOR BY THE ACRE FOR AREAS DESIGNATED ON THE PLANS.

LEVELS DISPLAYED
1

Texas Department of Transportation
Maintenance Division
Standard Plans

TREE AND BRUSH REMOVAL

TRB-15(2)

NOT TO SCALE — SHEET 2 OF 2

FILE: TRB-15(2).DGN	DRAWN: JEO	CHECKED: DM;LJB	DW: -	CK: -	NEG NO.:		
	MODIFIED:						
© TxDOT APRIL 2015	STATE DISTRICT	FEDERAL REGION	ROUTINE MAINTENANCE PROJECT				SHEET
REVISED: 5/13/2004	LJB	TYL					101
REVISED: 9/24/2004	LJB	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
REVISED: APRIL 2015	JEO	SMITH		348701		001	TOLL 49

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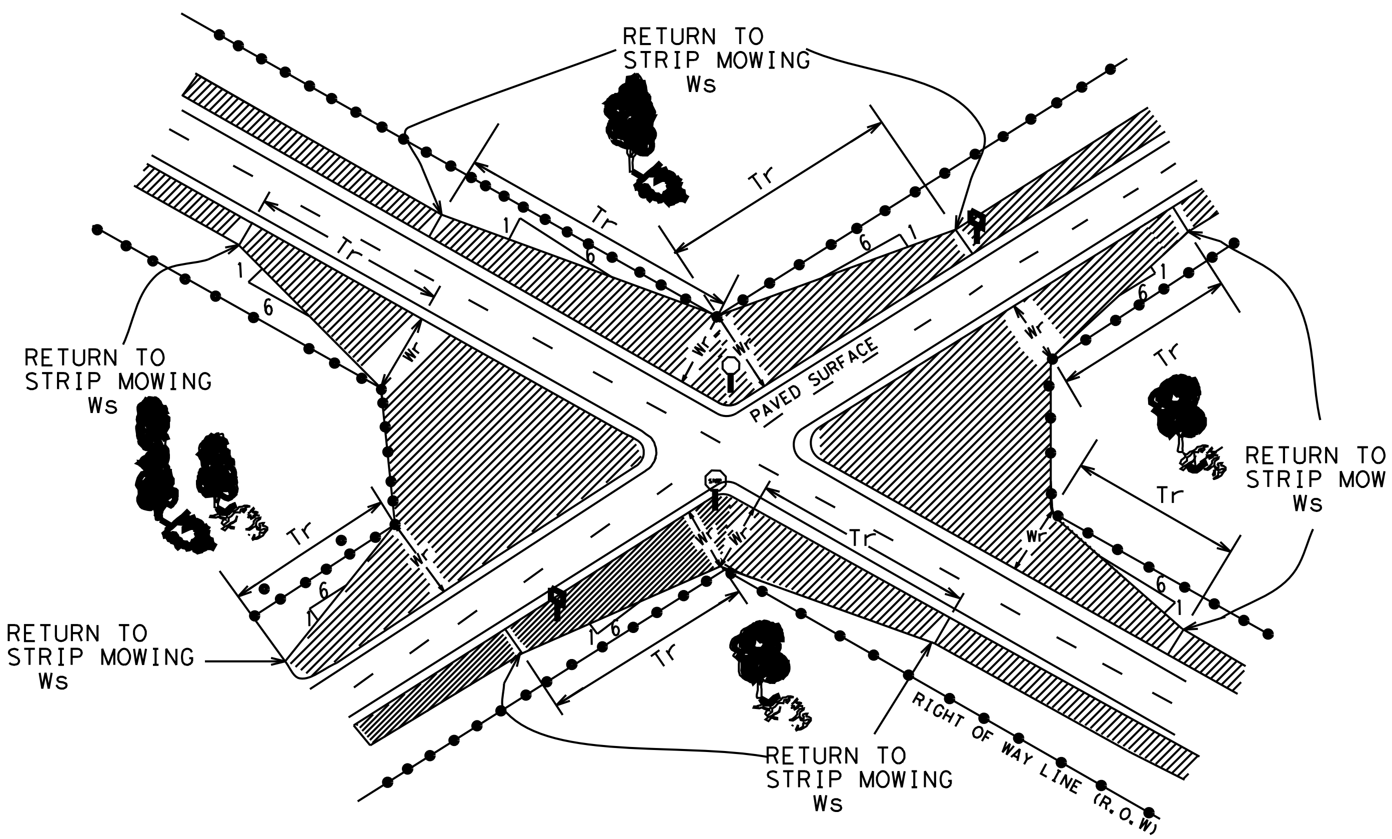
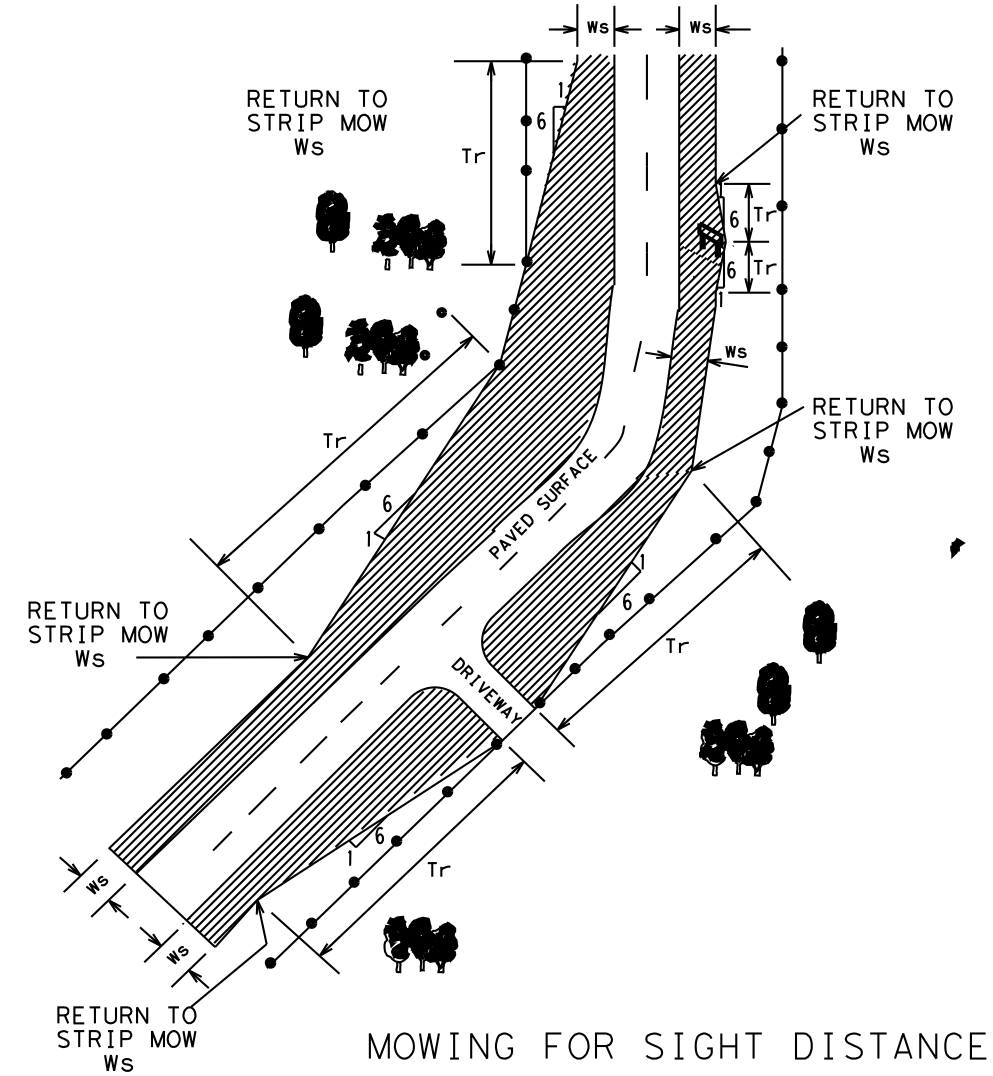


MOWING FOR SIGHT DISTANCE

WITH TRANSITION FROM INTERSECTION
BACK TO STRIP MOWING



MOWING FOR SIGHT DISTANCE

TRANSITIONS AT DRIVEWAYS,
SIGNS, AND CURVES

GENERAL NOTES:

1. THE NORMAL WIDTH FOR STRIP MOWING IS 15' UNLESS OTHERWISE SHOWN ON THE PLANS.

2. MOW TO THE R.O.W. LINE IN FRONT OF BUSINESSES, RESIDENCES, CHURCHES, OR CULTIVATED FIELDS UNLESS OTHERWISE SHOWN ON THE PLANS.

3. TRANSITION FOR SIGHT DISTANCE TO R.O.W LINE OR AROUND SIGNS AS SHOWN ON THIS SHEET UNLESS OTHERWISE SHOWN ON THE PLANS.

●——●——● RIGHT OF WAY LINE

▨ MOWING LOCATION

Wr - R.O.W. WIDTH (AT START OF TRANSITION)

Ws - STRIP MOWING WIDTH

Tr - TRANSITION

LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

Texas Department of Transportation

Maintenance Division
Standard Plans

STRIP MOWING NON-DIVIDED HIGHWAYS

SHEET 1 OF 1 — STRIP-MOW-ND-04 — NOT TO SCALE

FILE: SMOWND04.DGN	DN: LJB	CK: JG	DW: -	CK: -	NEG NO.:

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REVISED: 5/18/2004	LJB	TYL					102
REVISED:		COUNTY		CONTROL	SECTION	JOB	HIGHWAY
REVISED:		SMITH		3487	01	001	TOLL 49

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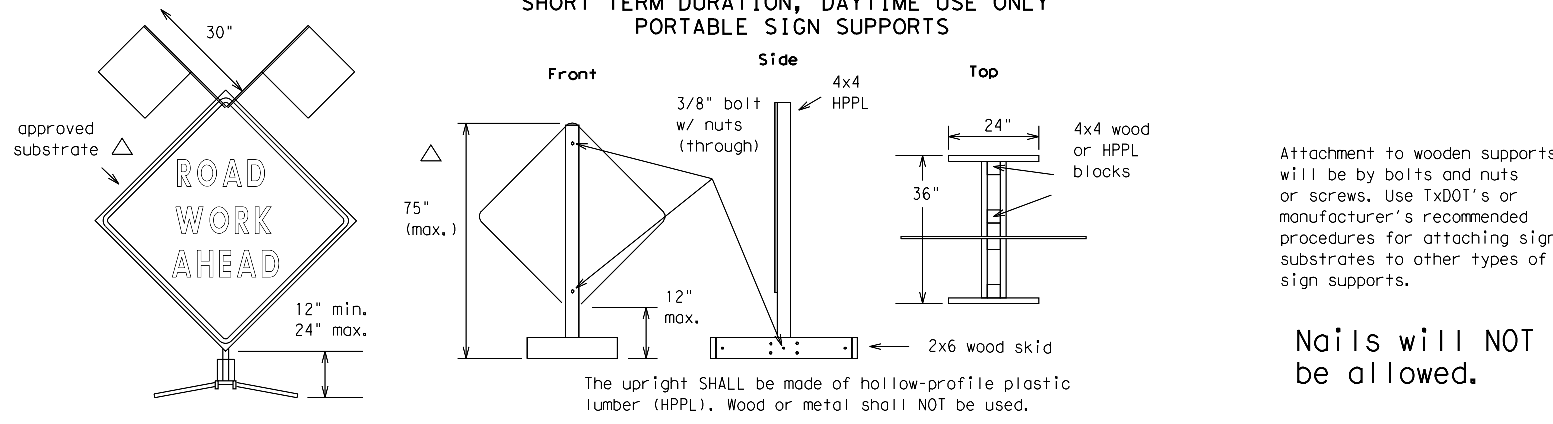
LEVELS DISPLAYED

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

EXAMPLES OF SIGN SUPPORTS

SHORT TERM DURATION, DAYTIME USE ONLY PORTABLE SIGN SUPPORTS

△ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.



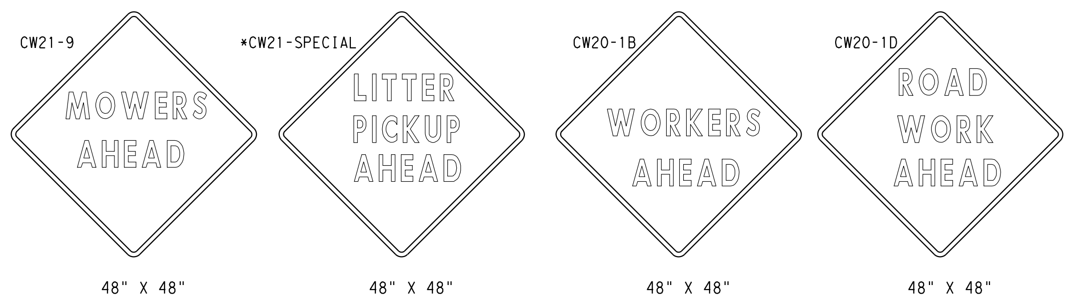
Flags as required by Engineer or as shown on plans

The upright SHALL be made of hollow-profile plastic lumber (HPPL). Wood or metal shall NOT be used.

1 Foot Mounting Height

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 will NOT be allowed.



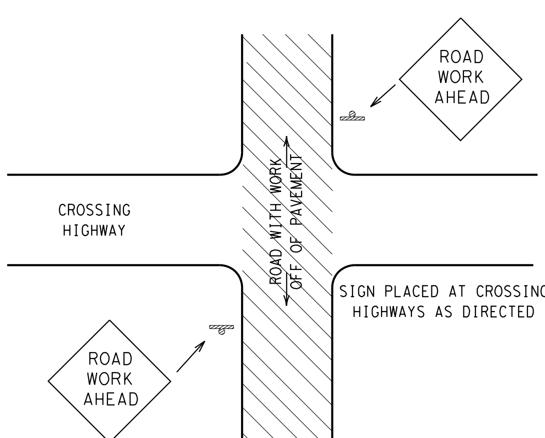
SIGN IN ACCORDANCE WITH THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS

MOWERS AHEAD SIGNS ARE USED FOR MOWING OPERATIONS.

LITTER PICKUP AHEAD, ROAD WORK AHEAD AND WORKER AHEAD SIGNS ARE USED AS DIRECTED FOR OTHER MAINTENANCE OPERATIONS WHEN ALL WORK OCCURS OFF OF THE PAVED HIGHWAY SURFACE.

ROLL-UP SIGNS CONFORMING TO DMS-8310 AND THE CWZTCD ALLOWED

*Letter dimensions and spacing for "CW21-SPECIAL" is the same as C20-1D>



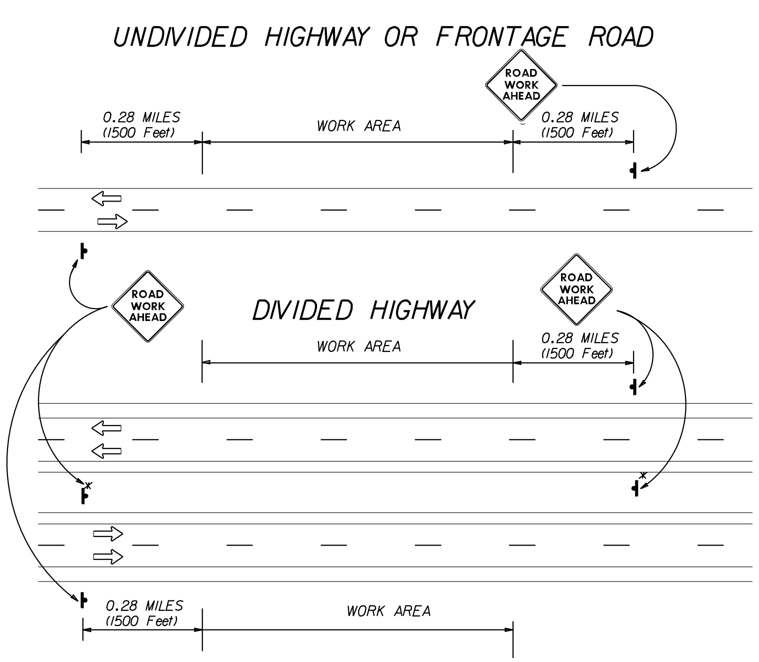
TYPICAL LOCATION OF SIGNS AT HIGHWAY CROSSING

WORK AREA IS A MAXIMUM OF 2.0 MILES UNLESS OTHERWISE DIRECTED. SIGNS MAY REMAIN IN PLACE ONLY DURING DAYLIGHT HOURS.

SIGNS ARE TO BE PLACED 6' TO 12' OFF OF THE PAVED SURFACE UNLESS OTHERWISE DIRECTED.

ROAD WORK AHEAD SIGNS SHOWN AS EXAMPLES. ONE OF THE FOUR TYPE SIGNS WILL BE USED AS DIRECTED.

** SIGNS IN THE MEDIAN ARE REQUIRED WHEN WORK OCCURS IN MEDIAN*



TRAFFIC CONTROL PLAN FOR WORK OFF OF THE PAVED SURFACE.

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. 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. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
6. 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. The additional signs requested by the Engineer/Inspector shall not be subsidiary.
7. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). 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 that the Engineer can verify the correct procedures are being followed.
8. The Contractor is responsible for sign installations and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
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. 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 VI)

1. The Contractor is responsible for ensuring the sign support and substrate meets crashworthiness. For mowing operation all signs and supportS are Short-term Duration for daytime work.
2. The Contractor shall furnish the sign sizes shown on this sheet or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure that the sign substrate is allowed 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.
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 faces.

REFLECTIVE SHEETING

1. Reflectorized signs shall be constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 or DMS-8310. The DMS specifications can be accessed from the following web address:
   http://manuals.dot.state.tx.us:80/dynaweb/colmates/@Generic__CollectionView;cs=default;ts=default
2. White sheeting, meeting the requirements of DMS-8300 Type C (High Specific Intensity), shall be used for signs with white background and channelizing devices.
3. Orange sheeting, meeting the requirements of DMS-8300 Type E (Fluorescent Prismatic), shall be used for 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. Signs should be removed or completely covered when not mowing.
2. Duct tape or other adhesive material shall NOT be affixed to a sign face.
3. Signs and supports shall be removed by the end of the day.

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 is recommended.
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.
6. Rubber (such as tire inner tubes) shall NOT be used for sandbags.
7. Rubber ballasts (such as those used with cones or edgeline channelizers) shall NOT be used as sign support weights.
8. 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 supports.
9. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

Any sign, sign support or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced or repaired as soon as possible by the Contractor at the Contractor's expense.

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 obtained by contacting:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3120
Fax (512) 416-3299

Instructions to locate the "CWZTCD" on TxDOT website are:

Start at website - www.dot.state.tx.us
Click on "About TxDOT",
Click on "Organizational Chart",
Click on Traffic Operations Box,
Click on "Compliant Work Zone Traffic Control Devices",
Click on "View PDF".
This site is printable.

Texas Department of Transportation

Maintenance Division
Standard Plans

ROADSIDE TRAFFIC CONTROL PLAN

SHEET 1 OF 1 | RS-TCP-05 | NOT TO SCALE

FILE: RSTCP05.DGN	DN: LJB	CK: JG	DW: -	CK: -	NEG NO.:
©TxDOT FEBRUARY 2005	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
REVISED: September 17, 2004	TYL				103
REVISED: FEBRUARY 2, 2005 Sign placement in TCP	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
REVISED:	SMITH	3487	01	001	TOLL 49

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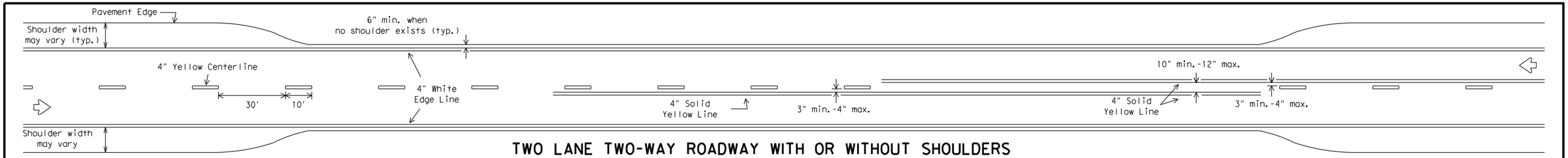
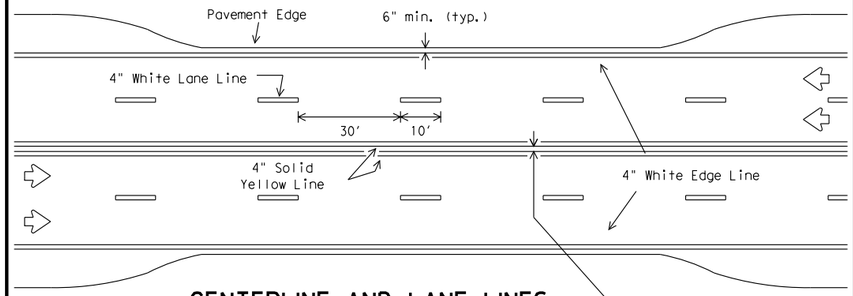
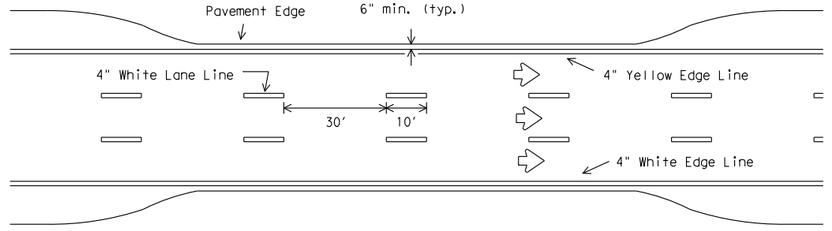


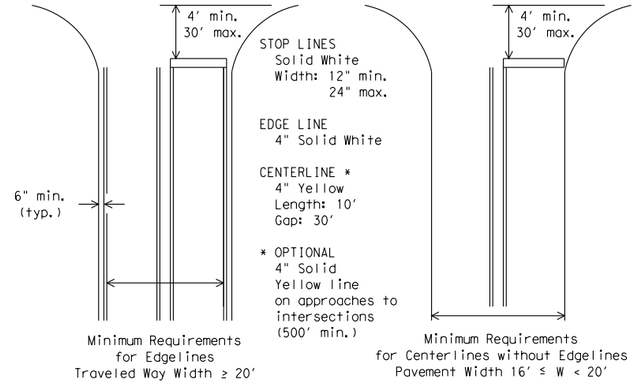
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

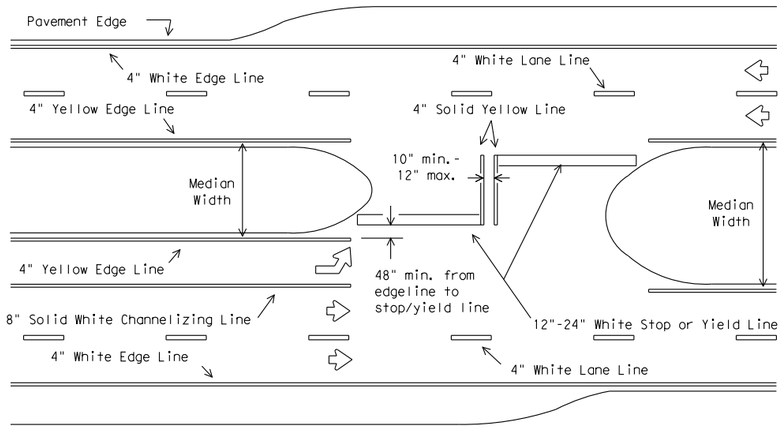


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



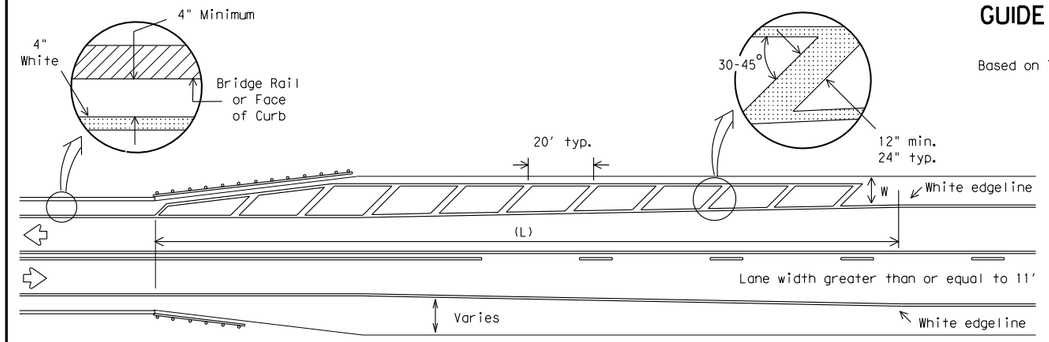
GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways



All medians shall be field measured to determine the location of necessary striping. Stop/Yield bars and centerlines shall be placed when the median width is greater than 30 ft. The median width is defined as the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges and of opposite approaches of the same intersection. The narrow median width will be the controlling width to determine if markings are required.

FOUR LANE DIVIDED ROADWAY INTERSECTIONS



NOTES:

1. No-passing zone on bridge approach is optional but if used, it shall be a minimum 500 feet long.
2. For crosshatching length (L) see Table 1.
3. The width of the offset (W) and the required crosshatching width is the full shoulder width in advance of the bridge.
4. The crosshatching is not required if delineators or barrier reflectors are used along the structure.
5. For guard fence details, refer elsewhere in the plans.

ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

TABLE 1 - TYPICAL LENGTH (L)

Posted Speed *	Formula
≤ 40	$L = \frac{WS^2}{60}$
≥ 45	L=WS

* 85th Percentile Speed may be used on roads where traffic speeds normally exceed the posted speed limit. Crosshatching length should be rounded up to nearest 5 foot increment.

L=Length of Crosshatching (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

EXAMPLES:

An 8 foot shoulder in advance of a bridge reduces to 4 feet on a 70 MPH roadway. The length of the cross-hatching should be:

$L = 8 \times 70 = 560$ ft.

A 4 foot shoulder in advance of a bridge reduces to 2 feet on a 40 MPH roadway. The length of the cross-hatching should be:

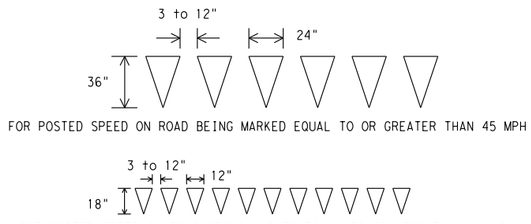
$L = 4(40)^2 / 60 = 106.67$ ft. rounded to 110 ft.

GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should typically be placed a minimum of 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines 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 and not the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to inside of edgeline 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.



YIELD LINES

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-12

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8-95 2-12	3487	01	001	TOLL 49
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8-00	TYL	SMITH		104
3-03				

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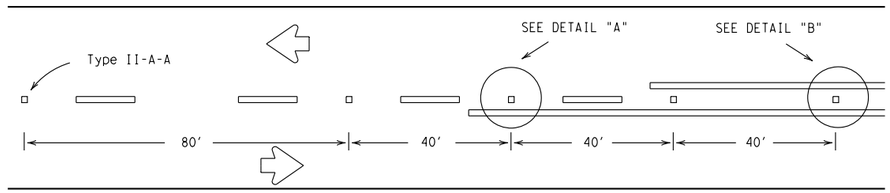
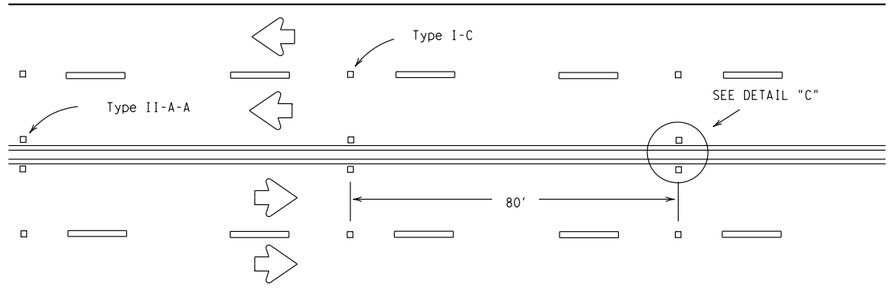
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

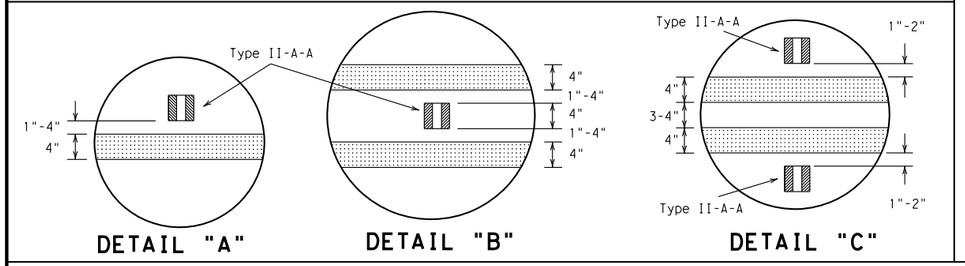


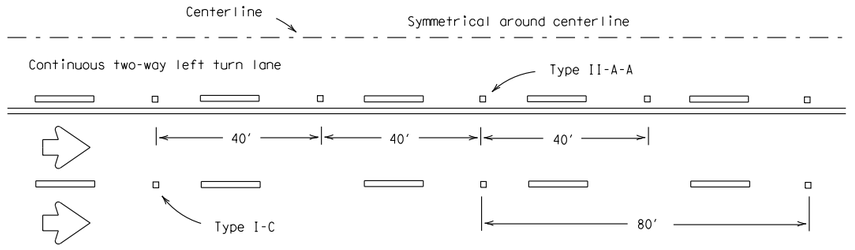
CENTERLINE FOR ALL TWO LANE ROADWAYS



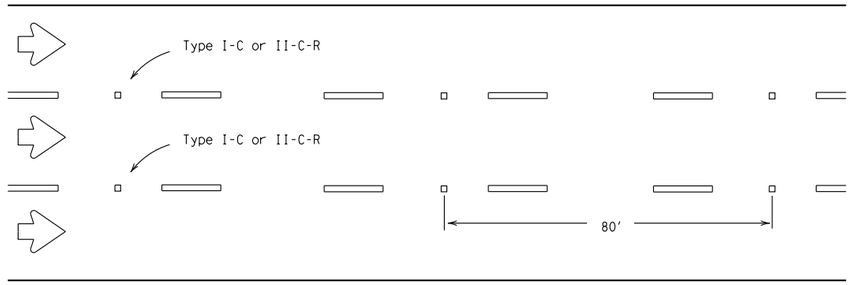
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS

Raised pavement marker Type I-C, clear face toward normal traffic, shall be placed on 80-foot centers.



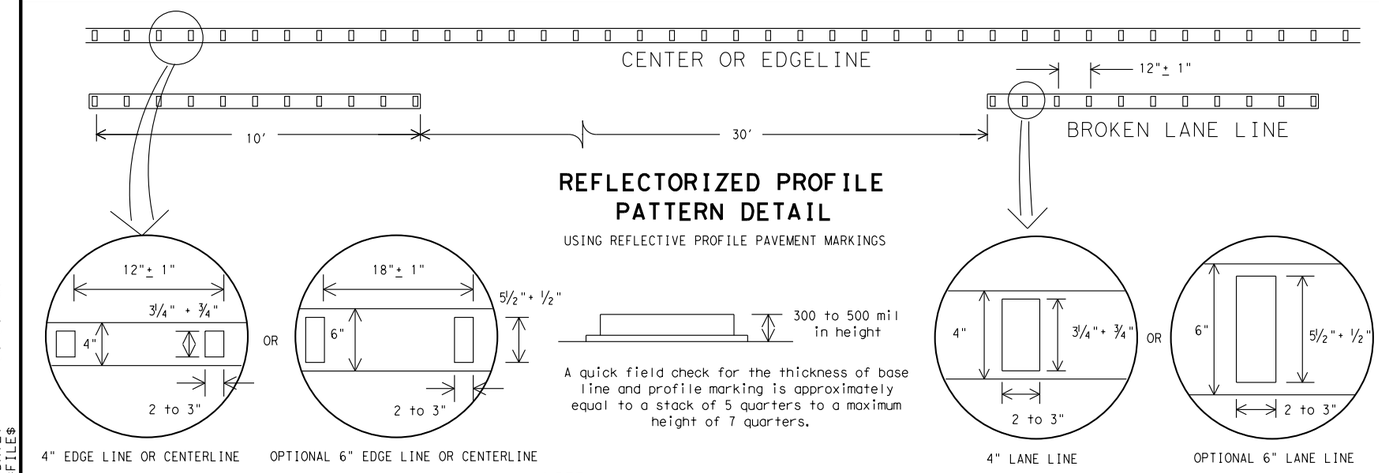


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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.



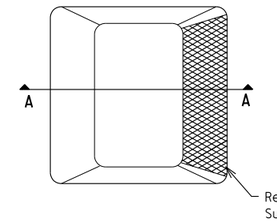
NOTE:
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

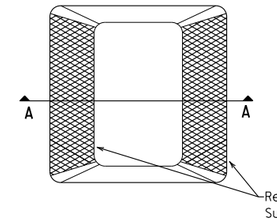
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

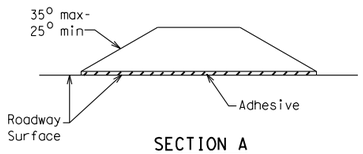
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

POSITION GUIDANCE USING RAISED MARKERS
REFLECTORIZED PROFILE MARKINGS
PM(2)-12

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REVISIONS
4-92 2-10
5-00 2-12
8-00
2-08

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DIST	COUNTY		SHEET NO.
TYL	SMITH		105

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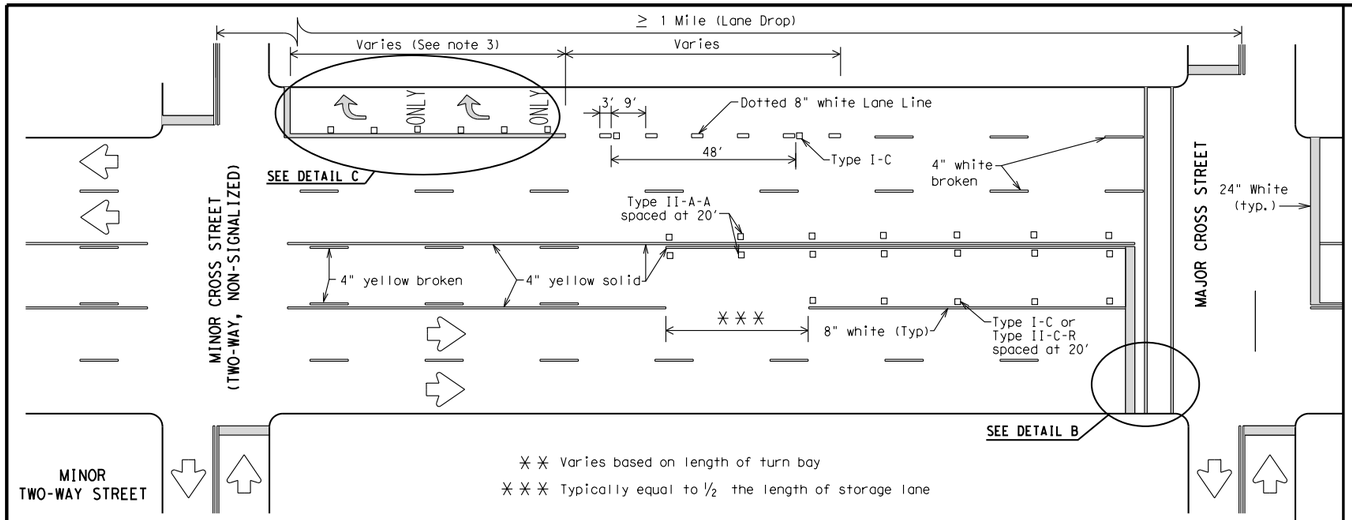
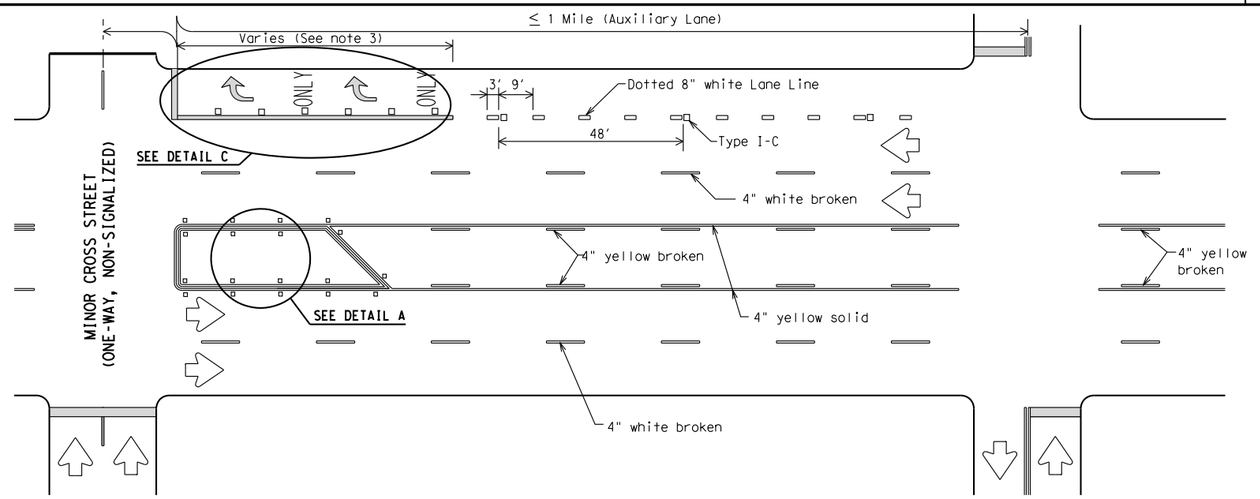
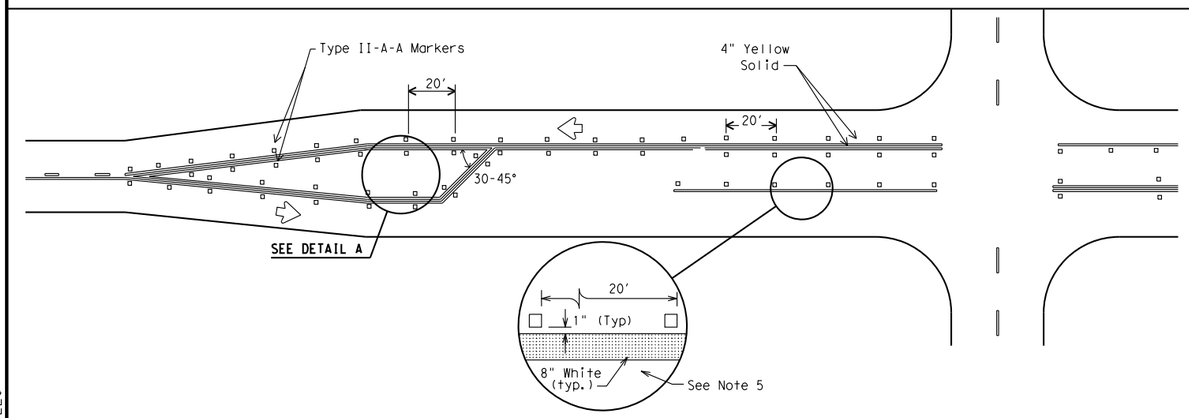


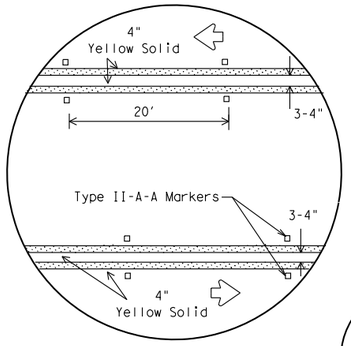
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



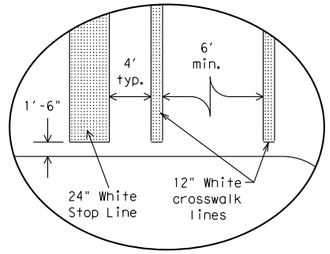
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS

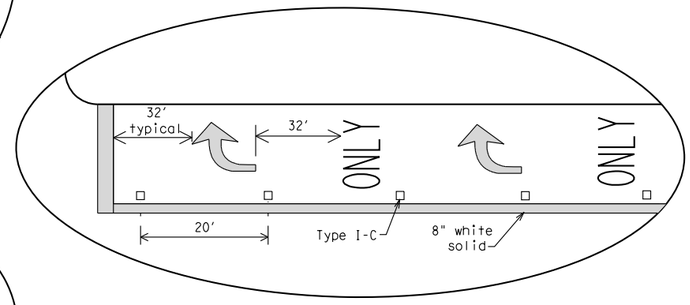


DETAIL A



Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

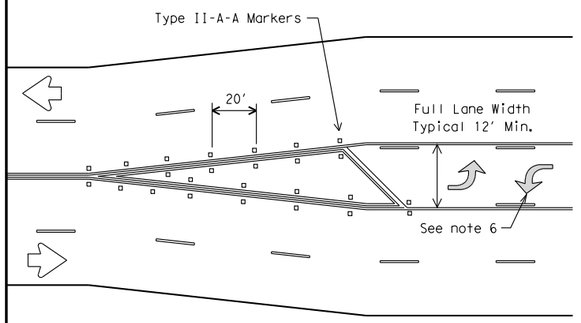
DETAIL B



DETAIL C

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.



TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

1. Refer elsewhere in plans for additional RPM placement and details.
2. 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 as shown in the Standard Highway Sign Designs for Texas.
3. When lane used word 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.
4. Other crosswalk paterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used.
5. Raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Raised pavement marker Type II-C-R with divided highways and raised medians.
6. 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.

Texas Department of Transportation
Traffic Operations Division

PAVEMENT MARKINGS FOR TWO-WAY LEFT TURN LANES DIVIDED HIGHWAYS AND RURAL LEFT TURN BAYS

PM(3)-12

© TxDOT April 1998

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
5-00 2-12	CONT	SECT	JOB	HIGHWAY
8-00	3487	01	001	TOLL 49
3-03	DIST	COUNTY		SHEET NO.
2-10	TYL	SMITH		106

22C

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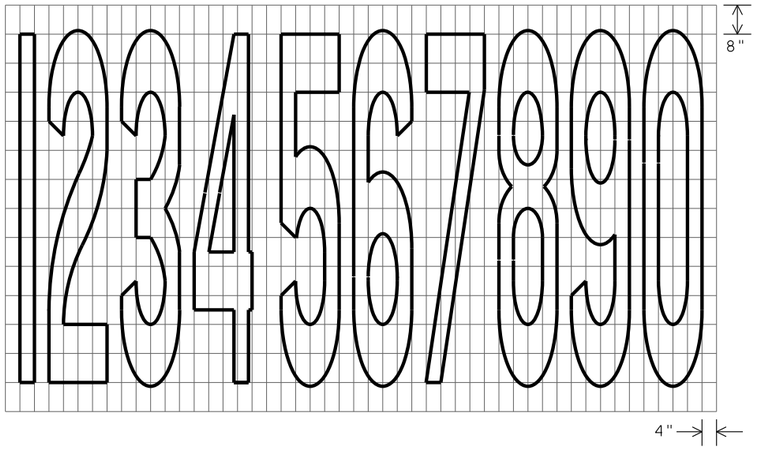

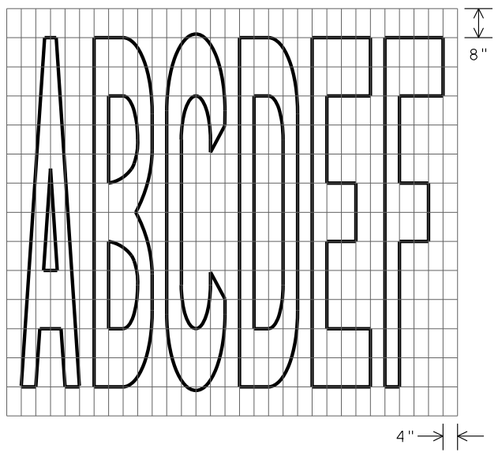

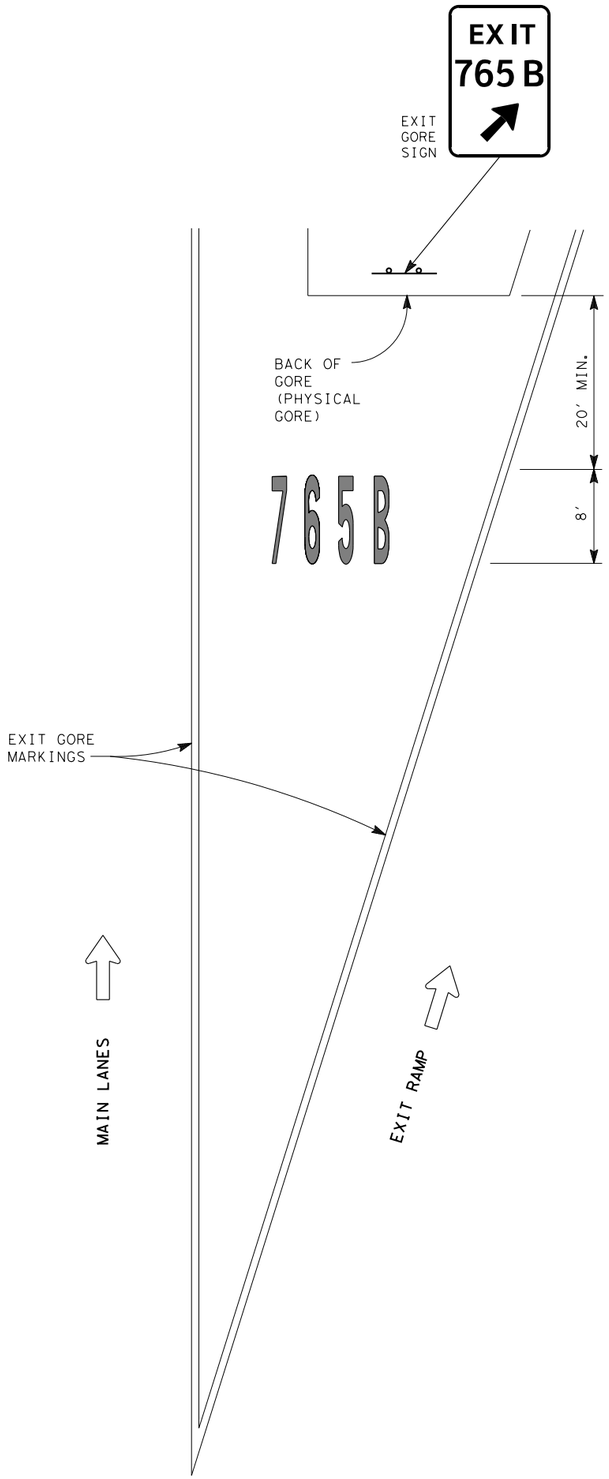

GENERAL NOTES

1. Minimum 8 foot white markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. All pavement marking materials shall meet the required Departmental Material Specifications or as specified in these plans.

DATE: $DATE$ 11:01:05 AM
FILE: $FILE$

Texas Department of Transportation
Traffic Operations Division

EXIT NUMBER GORE MARKINGS FOR AERIAL VIEW DETAIL

PM(4)-12

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DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
2-10
2-12

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49

DIST	COUNTY	SHEET NO.
TYL	SMITH	107

22D

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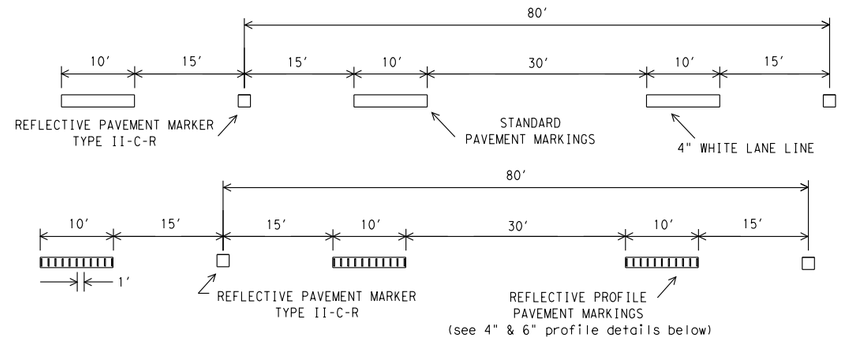
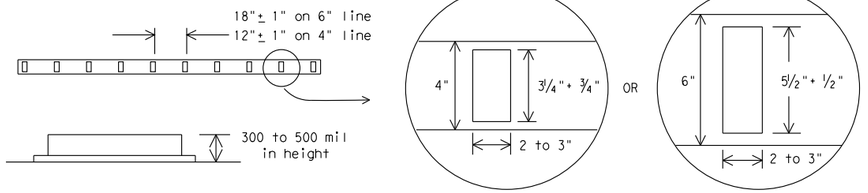


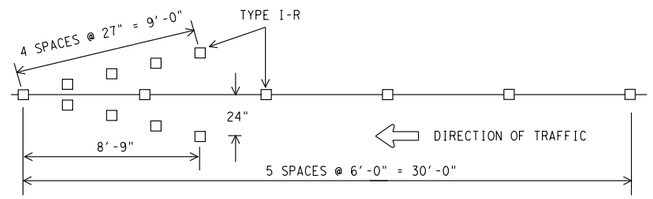
PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

EDGELINES SHOULD TYPICALLY BE 4" WIDE AND THE MATERIALS SHALL BE AS SPECIFIED IN THE PLANS.
IF RAISED PROFILE PAVEMENT MARKINGS ARE USED SEE DETAILS BELOW.



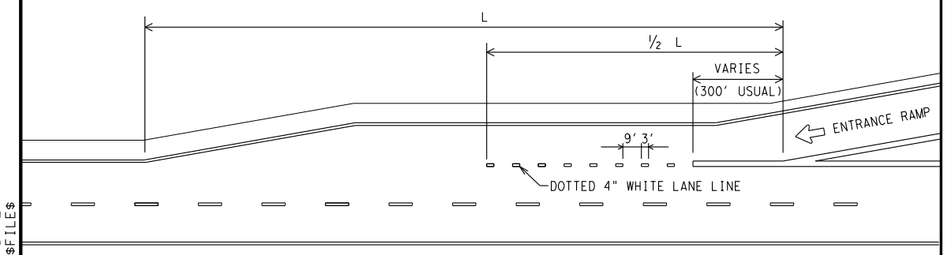
EDGELINE PAVEMENT MARKINGS



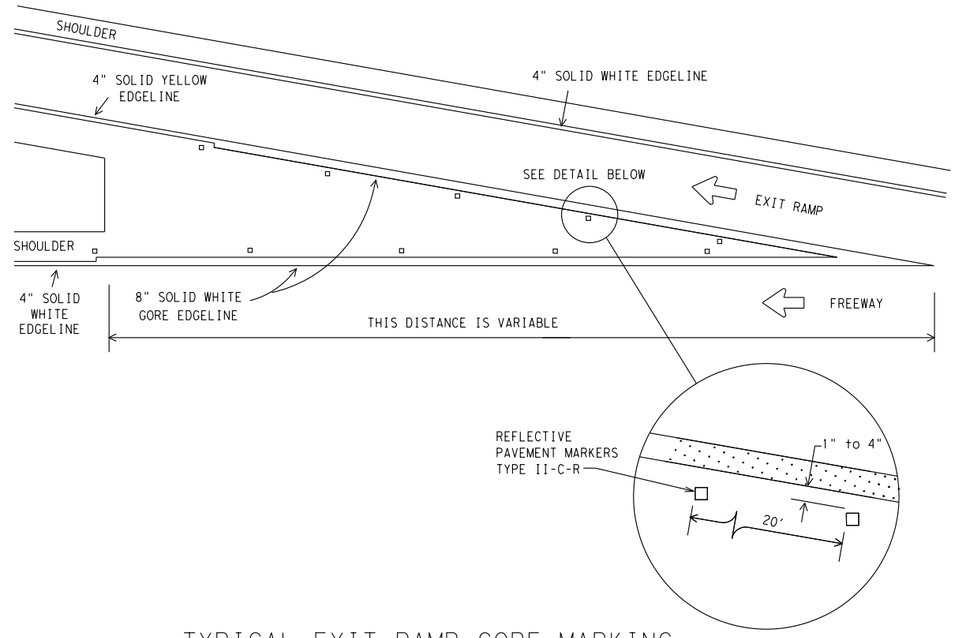
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMPS.
LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

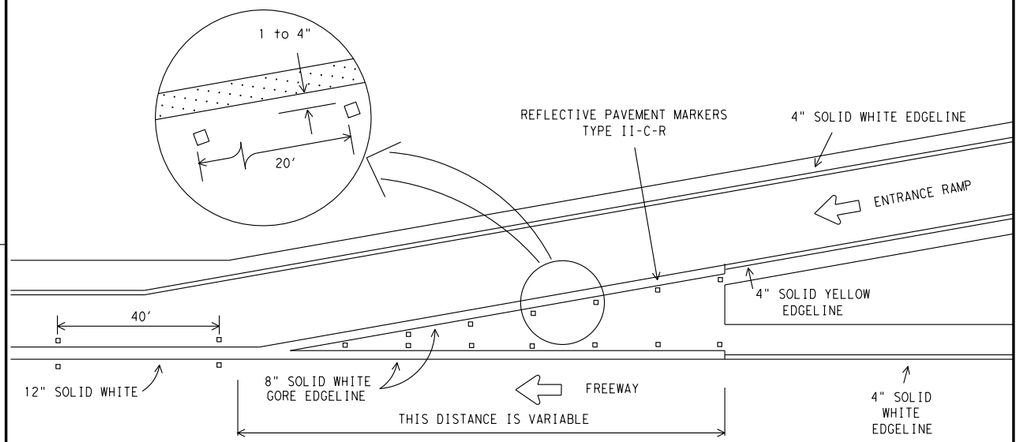
WRONG WAY ARROW DETAIL



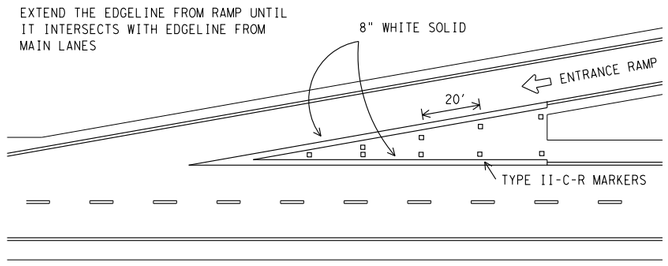
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



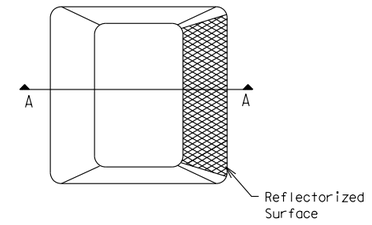
TYPICAL ENTRANCE RAMP GORE MARKING



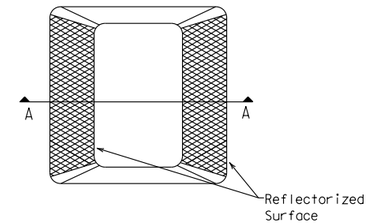
TAPERED ACCELERATION LANE

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

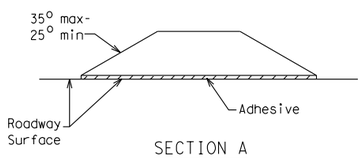
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

©TxDOT May 1974

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10	3487	01	001	TOLL 49
5-00	2-12	DIST	COUNTY		SHEET NO.
8-00		TYL	SMITH		108
2-08					

23A

DATE: $DATE$ 11:01:06 AM
FILE: $FILE$

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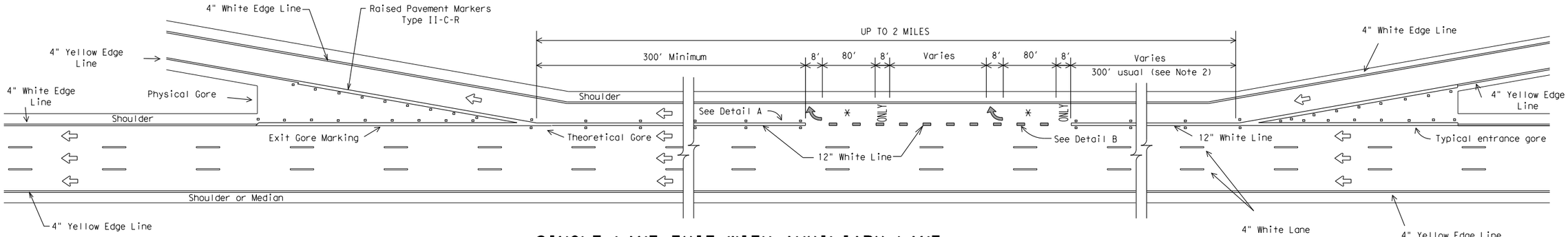
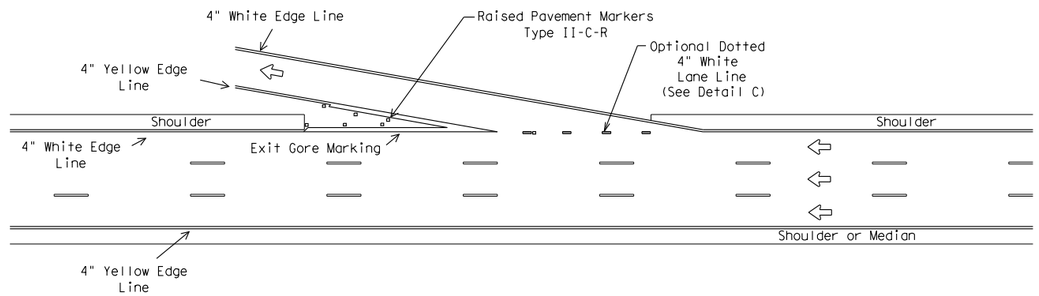
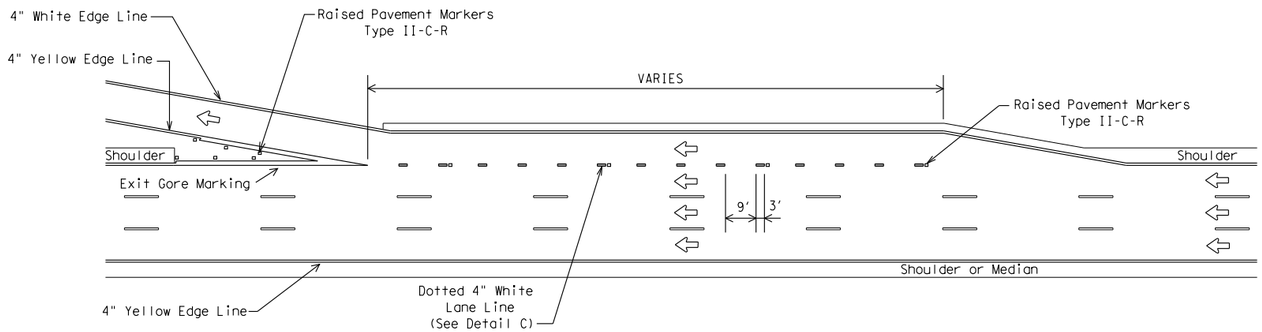


SINGLE LANE EXIT WITH AUXILIARY LANE

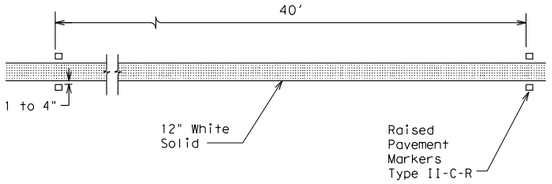
(See Note 2)



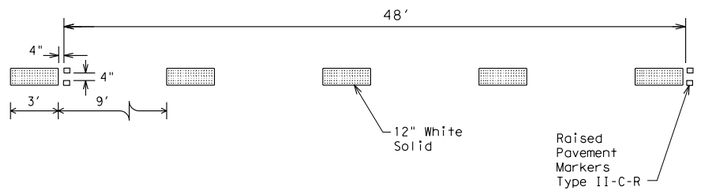
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

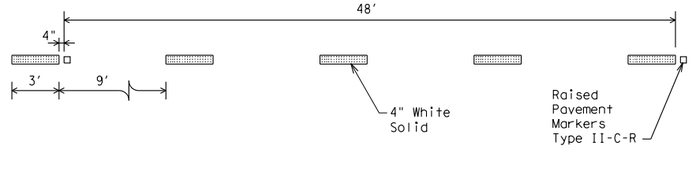


DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)



DETAIL C

Normal (4") Dotted Lane Line (See Note 4)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (4") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

LEGEND	
⇦	Denotes direction of traffic.
⬏	Pavement marking arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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 Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12

© TxDOT February 1977

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
4-92 2-10
8-95 2-12
5-00
8-00

CONT	SECT	JOB	HIGHWAY
3487	01	001	TOLL 49
DIST	COUNTY		SHEET NO.
TYL	SMITH		109

23B

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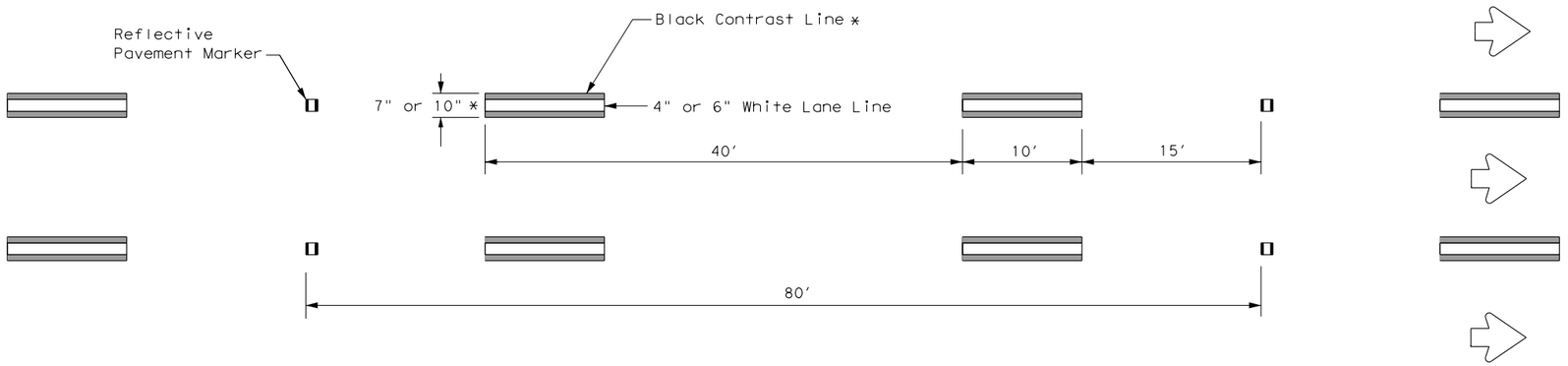


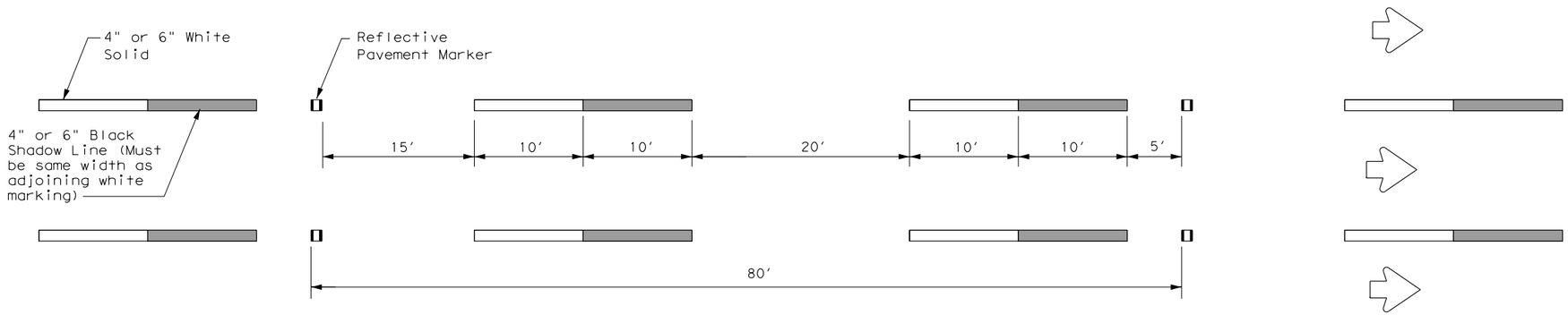
CONTRAST LANE LINE DESIGN

* See contrast line dimensions table for width of black line.

CONTRAST LINE DIMENSIONS		
White	Black (per side)	Total Width
4"	1.5"	7"
6"	2"	10"

GENERAL NOTES

1. Contrast and Shadow markings may only be used on concrete pavements.
2. Contrast and Shadow markings shall not be used on edge lines.
3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
6. See PM(2) for raised reflective pavement markings installation details.



SHADOW LANE LINE DESIGN

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 Operations Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-14

FILE: CPM(1)14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		110

22N

DATE: $DATE$ 11:01:07 AM
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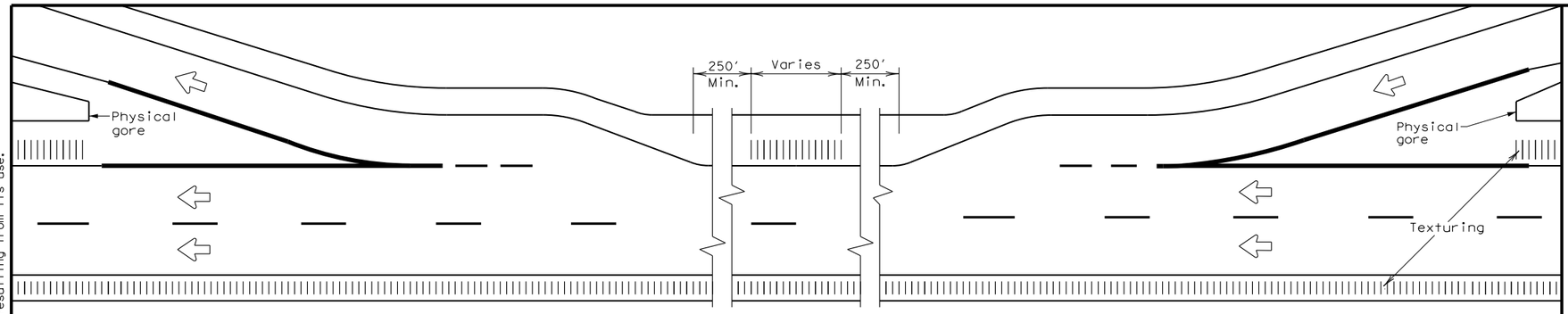
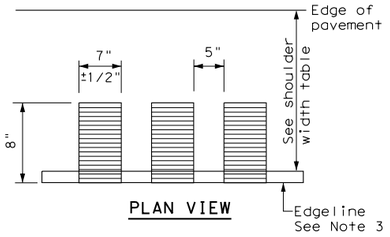
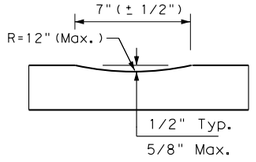


TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

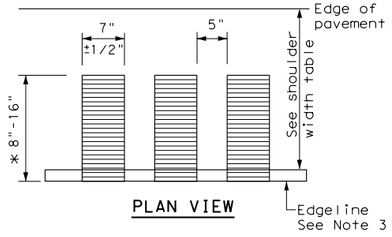


PLAN VIEW



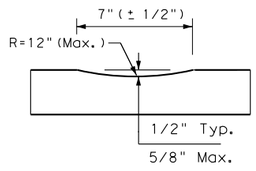
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



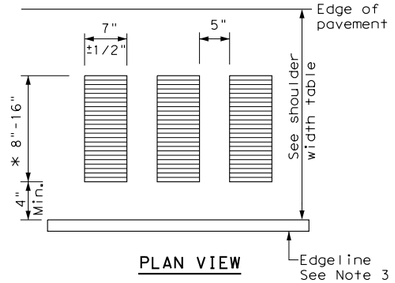
PLAN VIEW

* This distance may vary based on width of shoulder



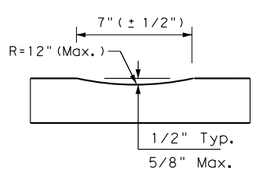
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



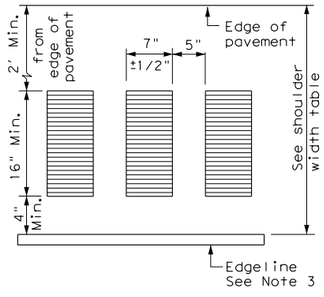
PLAN VIEW

* This distance may vary based on width of shoulder

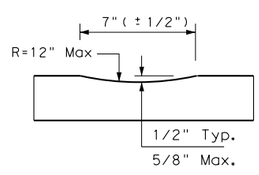


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

GENERAL NOTES

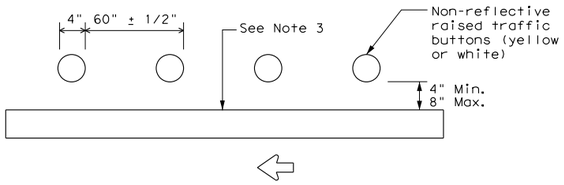
1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

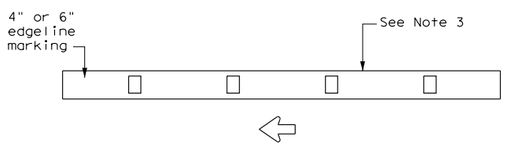
WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3, 5 or 6	Option 2, 4, 5 OR 6

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS
RS(1)-13

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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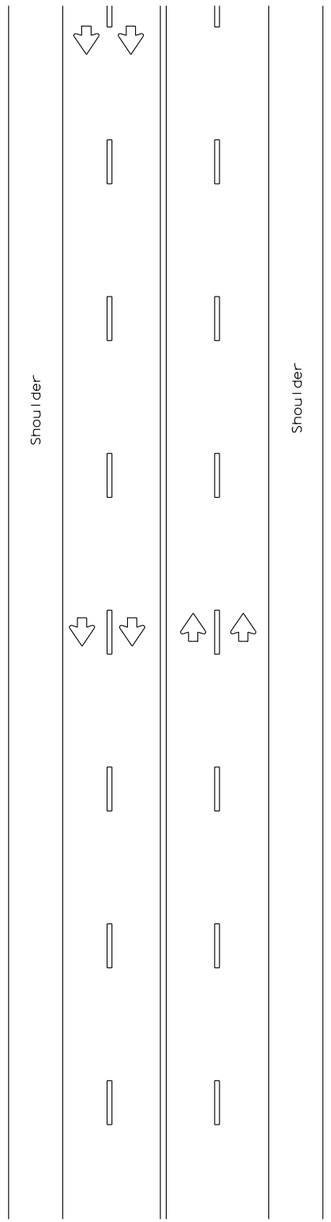
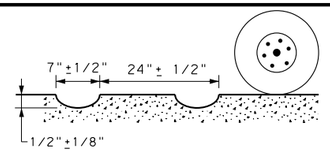
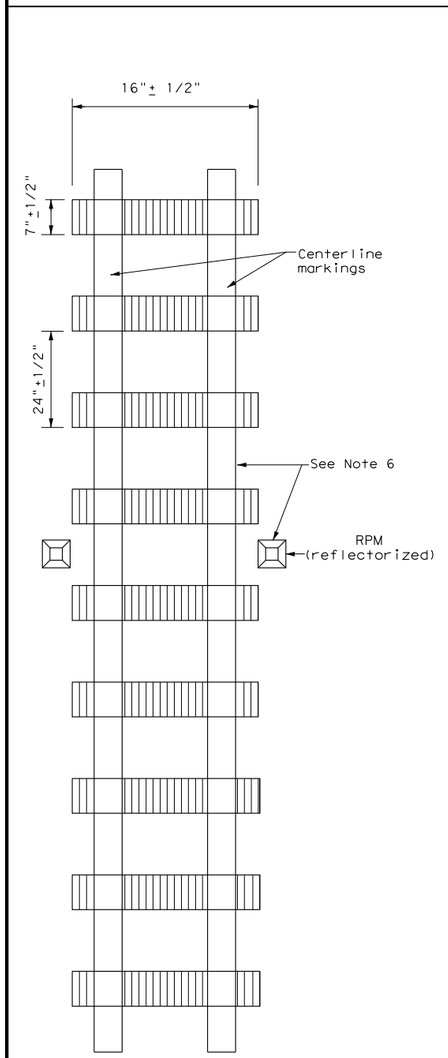
CENTERLINE RUMBLE STRIPS



MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

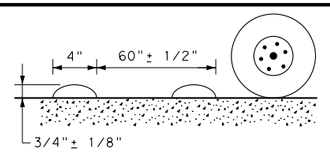


PROFILE VIEW

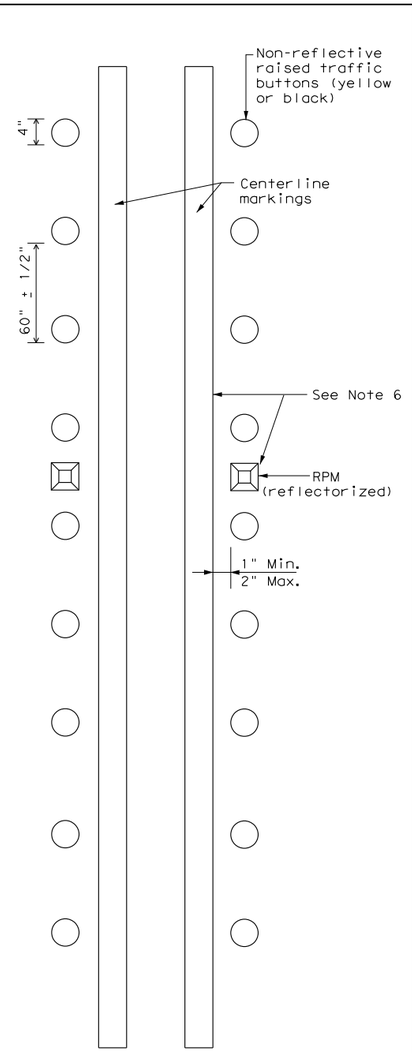


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

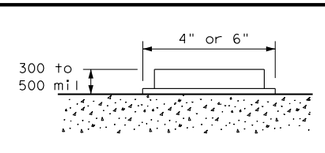


PROFILE VIEW

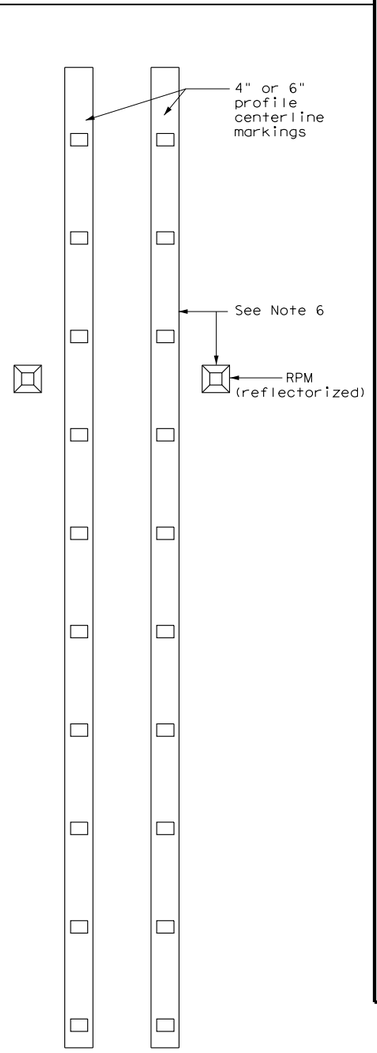


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 3

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.

WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

11. See standard sheet RS(4).

Texas Department of Transportation®

Traffic Operations Division Standard

CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS

RS(2)-13

FILE: rs(2)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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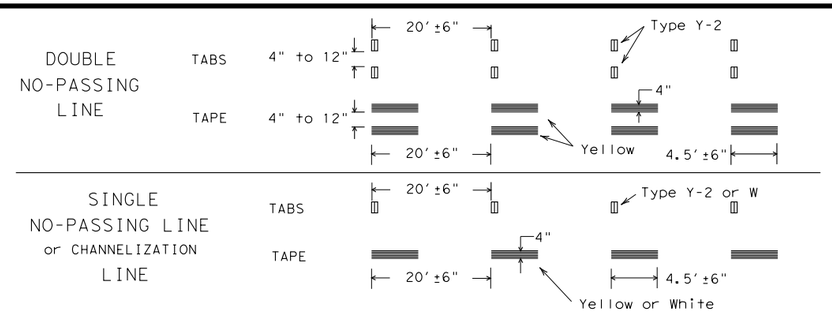
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



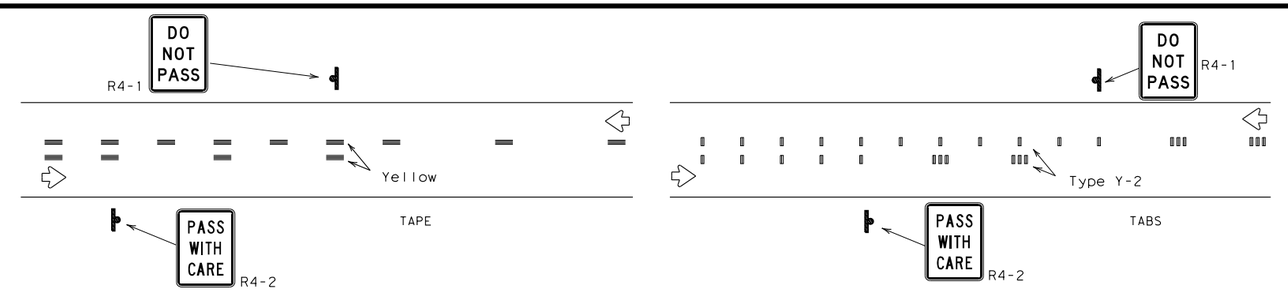
NOTES:

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.

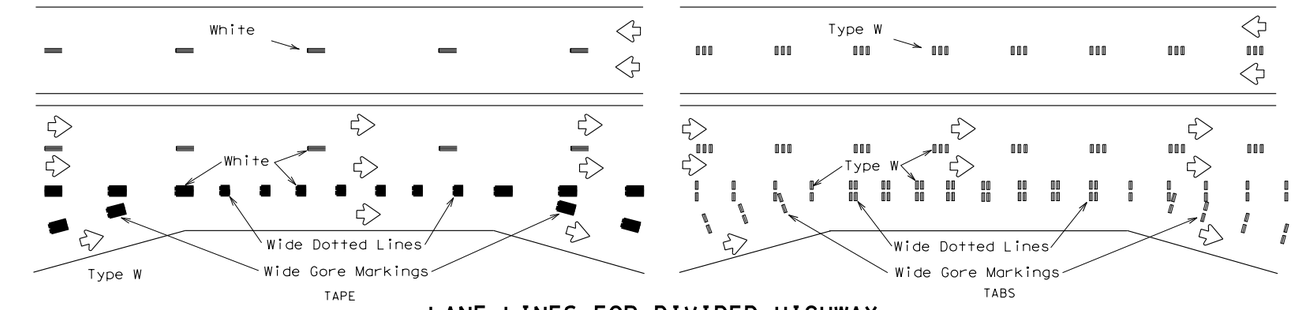
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

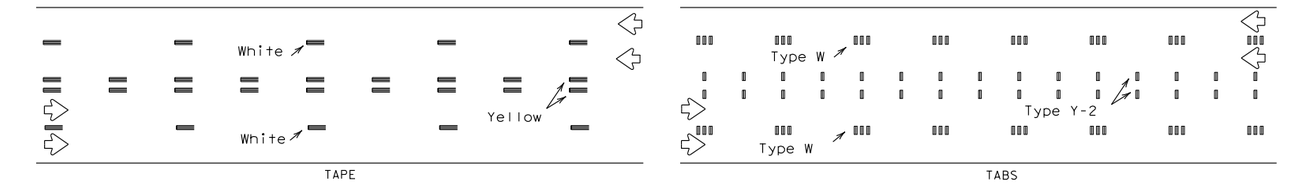
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



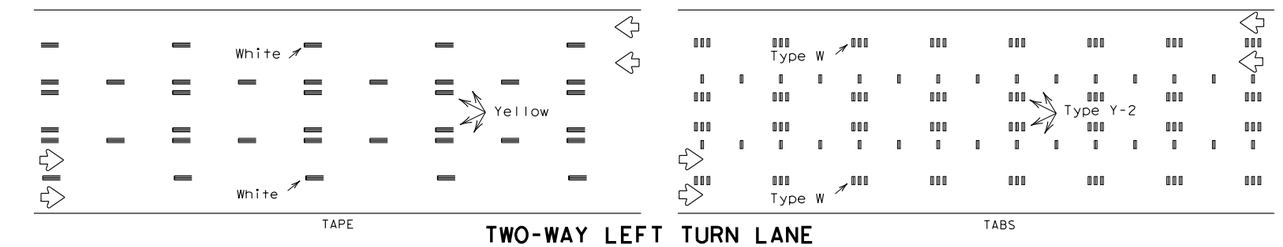
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



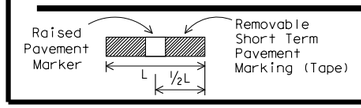
LANE LINES FOR DIVIDED HIGHWAY



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

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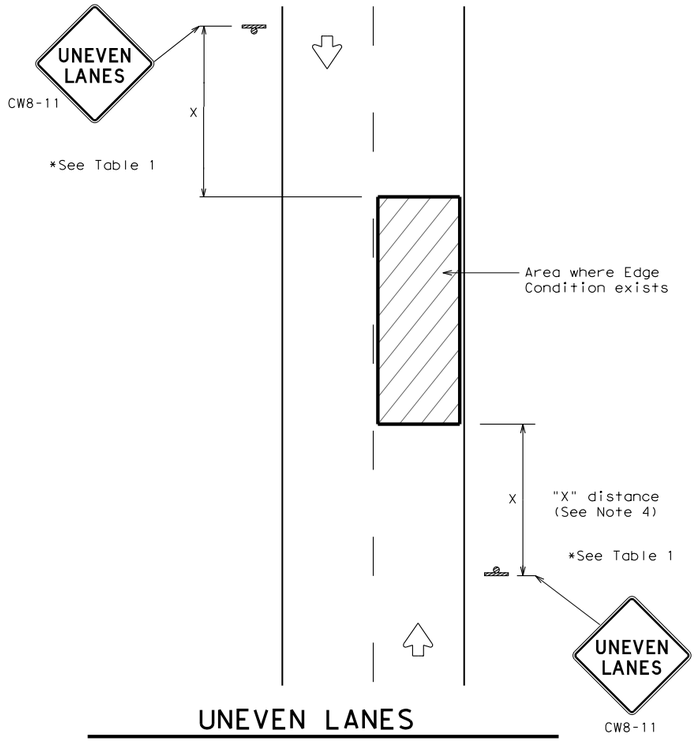
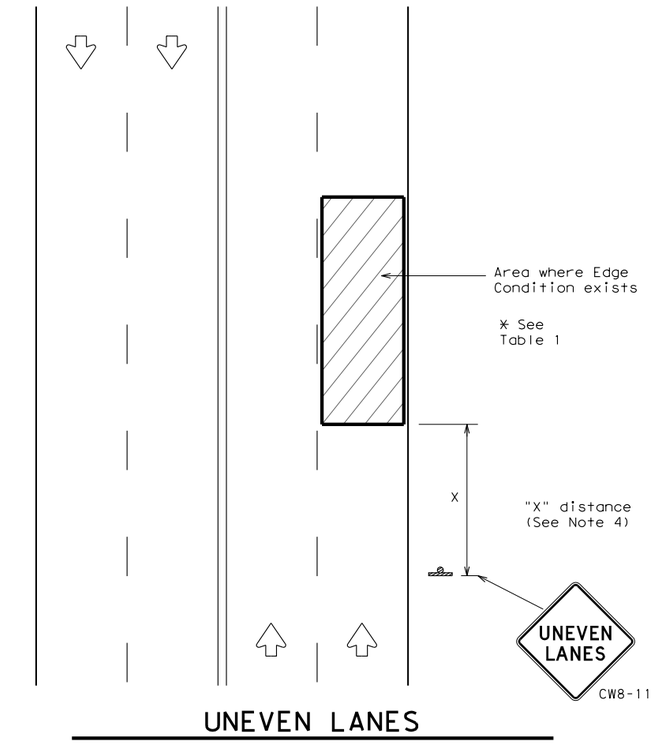
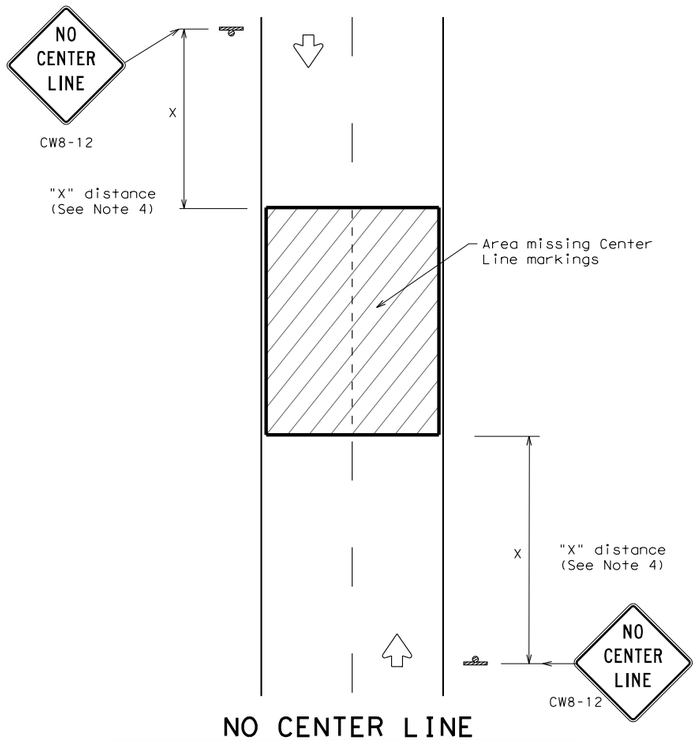


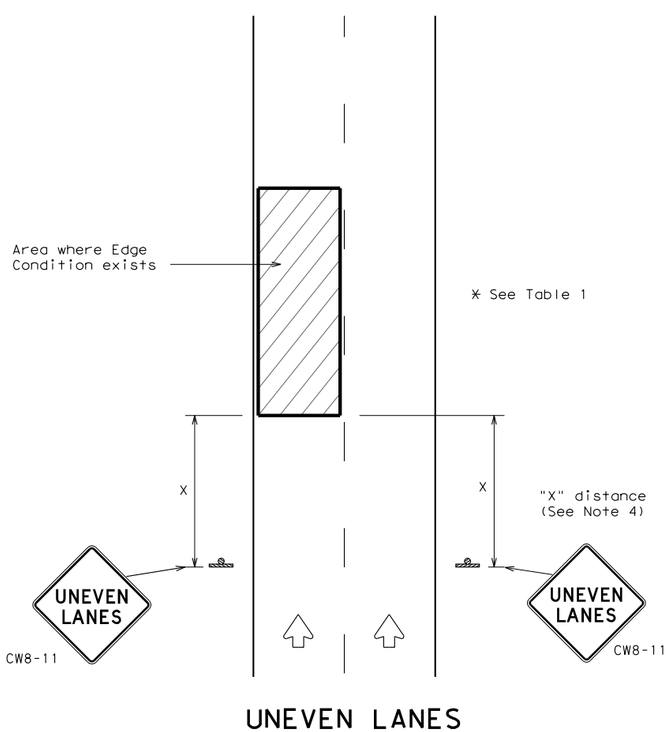
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

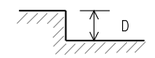
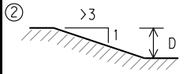
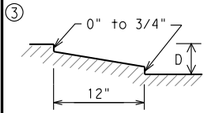
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

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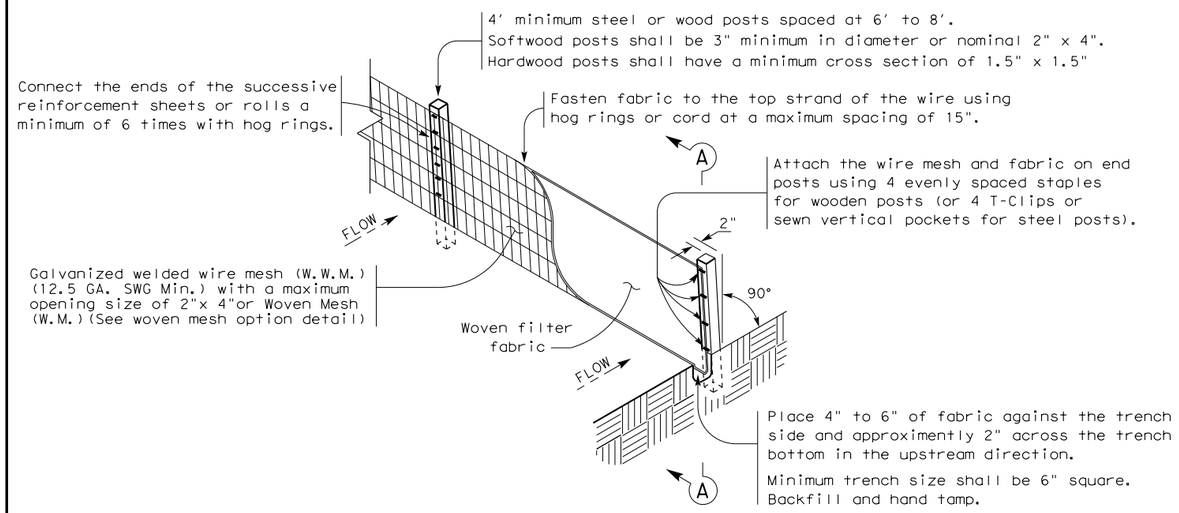
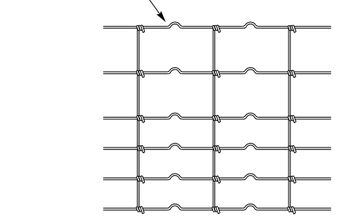
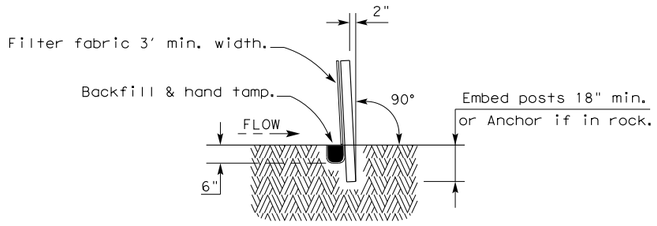


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

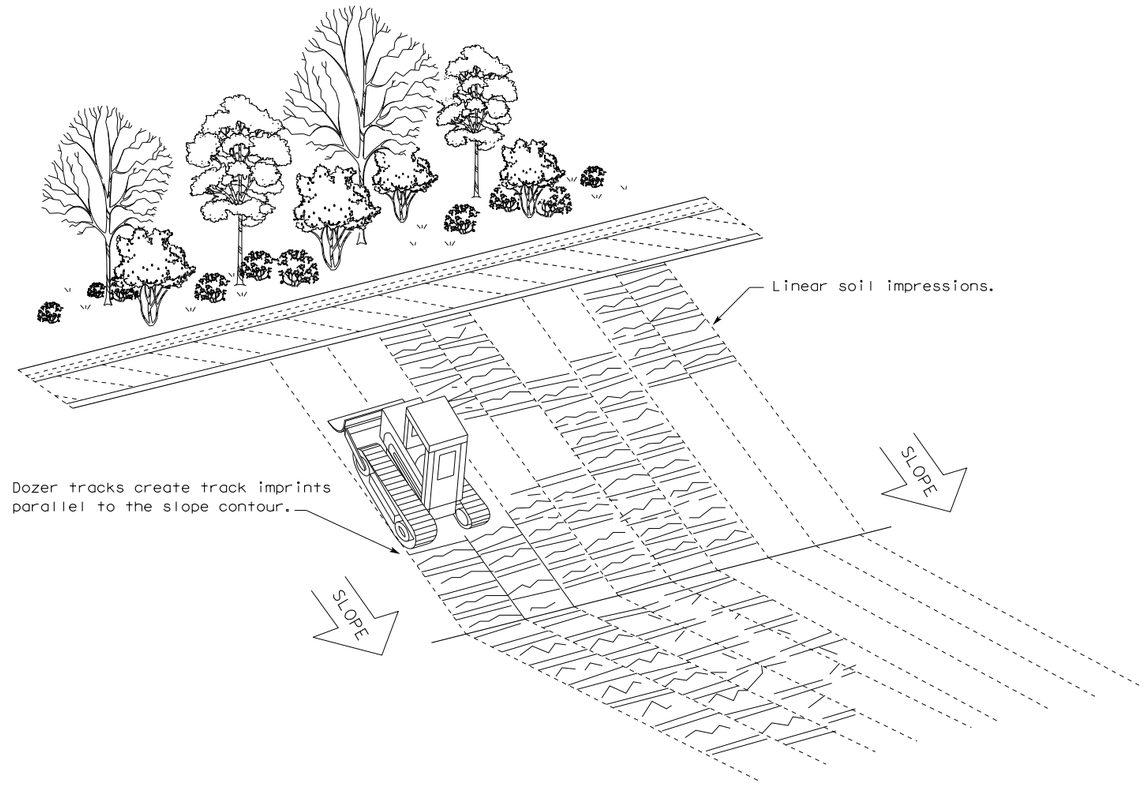
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
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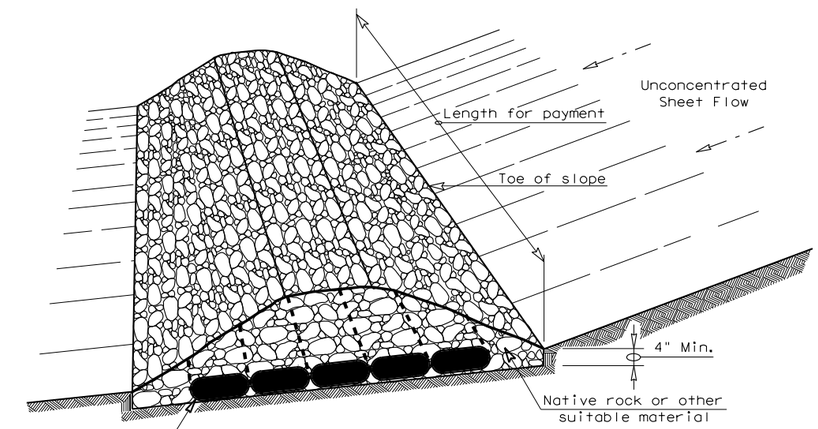
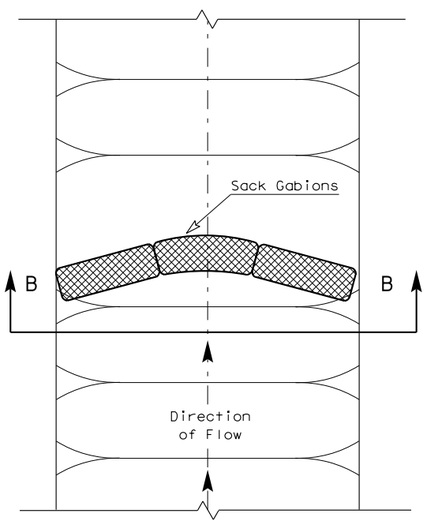
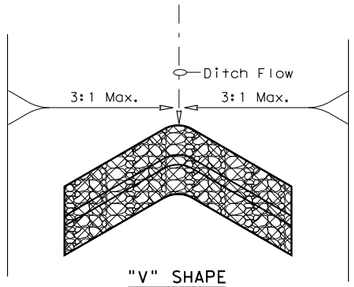


FILTER DAM AT TOE OF SLOPE

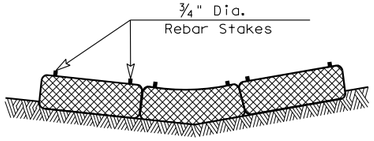
RFD1



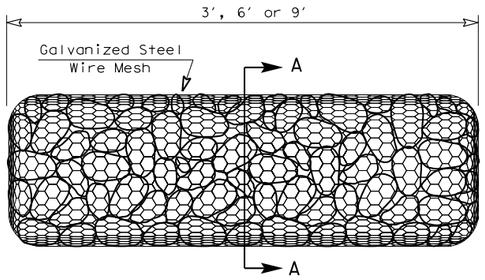
PLAN VIEW



"V" SHAPE
PLAN VIEW

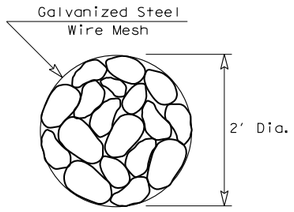


SECTION B-B

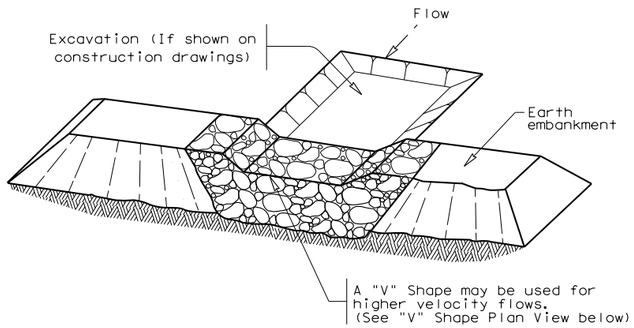


TYPE 4 (SACK GABIONS)

RFD4

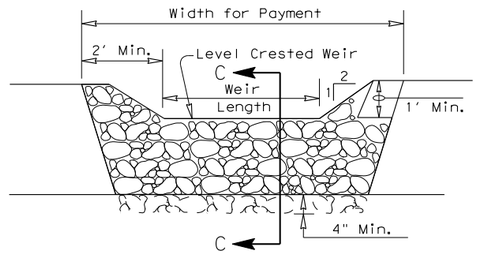


SECTION A-A

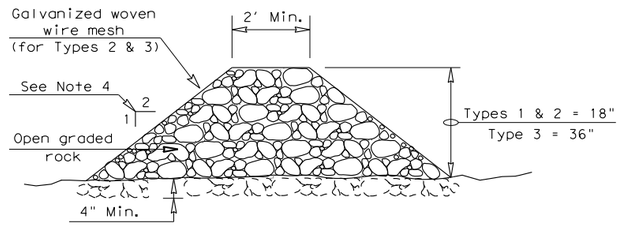


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

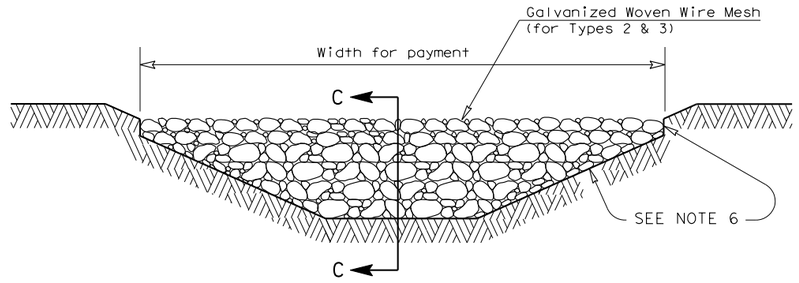
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3487	01	001	TOLL 49
	DIST	COUNTY		SHEET NO.
	TYL	SMITH		116

DATE: $DATE$
FILE: $FILE$

APPLICABLE MS4 OPERATORS:

1. SITE DESCRIPTION (CGP PART III SECTION F. 1.)

(a) DESCRIPTION OF THE NATURE OF THE CONSTRUCTION ACTIVITY:

DESCRIPTION OF CONSTRUCTION

ROUTINE MAINTNENANCE OF TOLL 49 FACILITY.

(b)

POTENTIAL POLLUTANTS AND SOURCES

POTENTIAL POLLUTANT	*SOURCE*
SOIL SEDIMENT	GRADING ACTIVITIES
OIL & GREASE	MACHINERY
TRASH	WORKERS
DRILLING FLUID	DRILLING SHAFT SUB-CONTRACTOR
CONCRETE	CONCRETE TRUCKS

(c) DESCRIPTION OF THE INTENDED SCHEDULE OR SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS FOR MAJOR PORTIONS OF THE SITE, INCLUDING ESTIMATED START DATES AND DURATION OF ACTIVITIES:

1. SET UP TRAFFIC CONTROL DEVICES.

2. PERFORM WORK ON TOLL 49 AS DIRECTED IN THE PLANS.

3.

4.

5.

6.

7.

8.

8.

8.

(d) TOTAL NUMBER OF ACRES OF ENTIRE PROJECT: 1090 ACRES
TOTAL NUMBER OF ACRES WHERE CONSTRUCTION ACTIVITIES WILL OCCUR:
(INCLUDING OFF-SITE MATERIAL STORAGE AREAS, OVERBURDEN, AND STOCKPILES OF DIRT AND BORROW AREAS) 20.0 ACRES

(e) DATA DESCRIBING THE SOIL OR THE QUALITY OF ANY DISCHARGE FROM THE SITE:
EXISTING CONDITION OF THE SOIL AND VEGETATIVE COVER:

EXISTING SOIL IS STABLE WITH GOOD VEGETATIVE COVER.

% OF EXISTING VEGETATIVE COVER: 85 %

(f) MAP SHOWING THE GENERAL LOCATION OF THE SITE: *SEE PROJECT TITLE SHEET*

(g) DETAILED SITE MAP(S) INDICATING THE FOLLOWING: (SEE PLANS)

*DRAINAGE PATTERNS AND APPROXIMATE SLOPES ANTICIPATED AFTER MAJOR GRADING ACTIVITIES
(SEE PLAN SHEET(S)) *[N/A]*

*AREAS WHERE SOIL DISTURBANCE WILL OCCUR
(SEE PLAN SHEET(S)) *[N/A]*

*LOCATION(S) OF ALL CONTROLS AND BUFFERS EITHER PLANNED OR IN PLACE
(SEE PLAN SHEET(S)) *[N/A]*

*LOCATIONS WHERE TEMPORARY OR PERMANENT STABILIZATION PRACTICES ARE EXPECTED TO BE USED:
(SEE PLAN SHEET(S)) *[N/A]*

*LOCATIONS OF CONSTRUCTION SUPPORT ACTIVITIES, INCLUDING OFF-SITE ACTIVITIES, THAT ARE AUTHORIZED, INCLUDING MATERIAL, WASTE, BORROW, FILL, OR EQUIPMENT OR CHEMICAL STORAGE AREAS
(SEE PLAN SHEET(S)) *[N/A]*

*SURFACE WATERS (INCLUDING WETLANDS) EITHER AT, ADJACENT, OR IN CLOSE PROXIMITY TO THE SITE, AND ALSO INDICATING THOSE THAT ARE IMPAIRED WATERS
(SEE PLAN SHEET(S)) *[N/A]*

*LOCATIONS WHERE STORM WATER DISCHARGES FROM THE SITE DIRECTLY TO A SURFACE WATER BODY OR MUNICIPAL SEPARATE STORM SEWER SYSTEM
(SEE PLAN SHEET(S)) *[N/A]*

*VEHICLE WASH AREAS
(SEE PLAN SHEET(S)) *[N/A]*

*DESIGNATED POINTS ON THE SITE WHERE VEHICLES WILL EXIT ONTO PAVED ROADS (FOR INSTANCE, THIS APPLIES TO CONSTRUCTION TRANSITION FROM UNSTABLE DIRT AREAS TO EXTERIOR PAVED ROADS)
(SEE PLAN SHEET(S)) *[N/A]*

(h) LOCATION AND DESCRIPTION OF SUPPORT ACTIVITIES, INCLUDING ASPHALT PLANTS, CONCRETE PLANTS, AND OTHER ACTIVITIES PROVIDING SUPPORT TO THE CONSTRUCTION SITE THAT IS AUTHORIZED UNDER THIS GENERAL PERMIT.

(NONE LISTED IN THE GENERAL PERMIT)

(i) NAME OF RECEIVING WATERS AT OR NEAR THE SITE THAT WILL BE DISTURBED OR THAT MAY RECEIVE DISCHARGES FROM DISTURBED AREAS OF THE PROJECT.

CONTRIBUTARIES OF THE TRINITY RIVER AND THE SABINE RIVER.

(j) COPY OF THE TPDES GENERAL PERMIT. (SEE THE PROJECT SWP3 FOLDER)

(k) THE NOTICE OF INTENT (N.O.I.), SITE NOTICE AND ACKNOWLEDGEMENT CERTIFICATE FOR PRIMARY OPERATORS OF LARGE CONSTRUCTION SITES, AND THE SITE NOTICE FOR SMALL CONSTRUCTION SITES. (SEE PROJECT SWP3 FOLDER)

(l) STORMWATER AND ALLOWABLE NON-STORMWATER DISCHARGE LOCATIONS, INCLUDING STORM DRAIN INLETS ON SITE AND IN THE IMMEDIATE VICINITY OF THE CONSTRUCTION SITE; AND

(m) LOCATIONS OF ALL POLLUTANT-GENERATING ACTIVITIES, SUCH AS: PAVING OPERATIONS; CONCRETE, PAINT, AND STUCCO WASHOUT AREAS AND WATER; DISPOSAL; SOLID WASTE STORAGE AND DISPOSAL; AND DEWATERING OPERATIONS

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Texas Department of Transportation

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SHEET 1 OF 3 SWP3-FY18.dgn

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
			117
STATE	DIST.	COUNTY	
TEXAS	TYL	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
3487	01	001	TOLL 49

TxDOT STORM WATER POLLUTION PREVENTION PLAN (SWP3)

2. BEST MANAGEMENT PRACTICES (CGP PART III. F. 2.)

(a) EROSION AND SEDIMENT CONTROLS

EROSION AND SEDIMENT CONTROLS MUST BE DESIGNED TO RETAIN SEDIMENT ON-SITE TO THE EXTENT PRACTICABLE WITH CONSIDERATION FOR LOCAL TOPOGRAPHY, SOIL TYPE AND RAINFALL. CONTROL MEASURES MUST BE SELECTED, INSTALLED, AND MAINTAINED ACCORDING TO THE MANUFACTURER'S OR DESIGNER'S SPECIFICATIONS. CONTROLS ARE DEVELOPED TO MINIMIZE OFF-SITE TRANSPORT OF LITTER, CONSTRUCTION DEBRIS, AND CONSTRUCTION MATERIALS. CONTROLS MUST BE DESIGNED AND UTILIZED TO REDUCE THE OFF-SITE TRANSPORT OF SUSPENDED SEDIMENTS AND OTHER POLLUTANTS IF NECESSARY TO PUMP OR CHANNEL STANDING WATER FROM THE SITE.

(b) EROSION CONTROLS AND STABILIZATION PRACTICES

(SELECT T=TEMPORARY OR P=PERMANENT, AS APPLICABLE)
(SEE SECTION 1.(C) OF THIS SWP3 FOR THE SCHEDULE OF IMPLEMENTATION)

P	TOPSOIL	T	PRESERVATION OF NATURAL RESOURCES
P	TEMPORARY SEEDING	____	VEGETATIVE BUFFER STRIPS
P	MULCHING (HAY OR STRAW)	____	FLEXIBLE CHANNEL LINER
____	BUFFER ZONES	____	RIGID CHAN
____	PLANTING	____	SOIL RETENTION BLANKET
____	SEEDING	____	COMPOST MANUFACTURED TOPSOIL
____	SODDING	____	OTHER: (SPECIFY PRACTICE)

(i) - (iii) THE FOLLOWING RECORDS MUST BE MAINTAINED AND REFERENCED IN THE SWP3 FOLDER: DATES WHEN MAJOR GRADING ACTIVITIES OCCUR; DATES WHEN CONSTRUCTION ACTIVITIES TEMPORARILY OR PERMANENTLY CEASE ON A PORTION OF THE SITE; AND DATES WHEN STABILIZATION MEASURES ARE INITIATED. EROSION CONTROL AND STABILIZATION MEASURES MUST BE INITIATED IMMEDIATELY IN PORTIONS OF THE SITE WHERE CONSTRUCTION OPERATIONS HAVE TEMPORARILY CEASED AND WILL NOT REUME FOR A PERIOD EXCEEDING 14 CALENDAR DAYS. STABILIZATION MEASURES THAT PROVIDE PROTECTIVE COVER MUST BE INITIATED IMMEDIATELY IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED. THE TERM "IMMEDIATELY" IS USED TO DEFINE THE DEADLINE FOR INITIATING STABILIZATION MEASURES. IN THE CONTEXT OF THIS REQUIREMENT, "IMMEDIATELY" MEANS AS SOON AS PRACTICABLE, BUT NO LATER THAN THE END OF THE NEXT WORK DAY, FOLLOWING THE DAY WHEN THE EARTH-DISTURBING ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED.

(c) SEDIMENT CONTROL PRACTICES

(SELECT T=TEMPORARY OR P=PERMANENT, AS APPLICABLE)
(SEE SECTION 1. (B) OF THIS SWP3 FOR THE SCHEDULE OF IMPLEMENTATION)

T	SILT FENCES	____	BIODEGRADABLE EROSION CONTROL LOGS
____	HAY BALES	____	SEDIMENT BASINS*
P	ROCK FILTER DAMS	____	STORM INLET SEDIMENT TRAP
____	DIVERSION, INTERCEPTOR, OR PERIMETER DIKES	____	STONE OUTLET STRUCTURES
____	DIVERSION, INTERCEPTOR, OR PERIMETER SWALES	____	CURBS AND GUTTERS
____	DIVERSION DIKE AND SWALE COMBINATIONS	____	STORM SEWERS
____	PIPE SLOPE DRAINS	____	RIPRAP (CONC)
____	ROCK BEDDING AT CONSTRUCTION EXIT	____	RIPRAP (ROCK)
____	TIMBER MATTING AT CONSTRUCTION EXIT	____	VELOCITY CONTROL DEVICES
____	CHANNEL LINERS	____	SOIL RETENTION BLANKET
____	SEDIMENT TRAPS	____	OTHER (PLEASE SPECIFY)
____	SPRINKLING (DUST CONTROL)	____	HAZARDOUS MATERIAL TRAP
		____	SAND BAGS

A SEDIMENTATION BASIN IS REQUIRED, WHERE FEASIBLE, FOR A COMMON DRAINAGE LOCATION THAT SERVES AN AREA WITH TEN (10) OR MORE ACRES DISTURBED AT ONE TIME, AND SHOULD BE CONSTRUCTED TO CONTAIN A 2-YEAR, 24-HOUR STORM EVENT OR PROVIDE 3,600 CUBIC FEET OF STORAGE PER ACRE DRAINED. CALCULATIONS ARE SHOWN ON PLAN SHEET NO. .

3. PERMANENT STORM WATER CONTROLS (CGP PART III. F. 3.)

(SEE SECTION 2 OF THIS SWP3 FOR DESCRIPTION OF PERMANENT STORM WATER CONTROLS)

4. OTHER CONTROLS (CGP PART III. F. 4.) *(ADD OTHERS AS NECESSARY)*

(a) OFF-SITE VEHICLE TRACKING AND GENERATION OF DUST

THE CONTRACTOR SHALL BE REQUIRED, ON A REGULAR BASIS OR AS MAY BE DIRECTED BY THE ENGINEER, TO DAMPEN HAUL ROADS FOR DUST CONTROL, STABILIZE CONSTRUCTION ENTRANCES AND TO REMOVE EXCESS DIRT FROM THE ROADWAY.

(b) DESCRIPTION OF CONSTRUCTION AND WASTE MATERIALS TO BE STORED ON-SITE AND A DESCRIPTION OF CONTROLS TO REDUCE POLLUTANTS:

POTENTIAL WASTE MATERIALS	*CONTROLS*
TRASH	COLLECTED IN A METAL DUMPSTER WITH A SECURE COVER MEETING ALL STATE AND LOCAL CITY SOLID WASTE MANAGEMENT REGULATIONS. THE DUMPSTER SHALL BE EMPTIED AND HAULED TO A LOCAL APPROVED LAND FILL SITE.THE BURYING OF CONSTRUCTION WASTE ON SITE WILL NOT BE PERMITTED.
SANITARY WASTE	ALL SANITARY WASTE SHALL BE COLLECTED FROM THE PORTABLE UNITS, AS NECESSARY, OR AS REQUIRED BY LOCAL REGULATION, BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.
HAZARDOUS WASTES (INCLUDING PAINTS, ACIDS, SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, AND CONCRETE CURING COMPOUNDS OR ADDITIVES)	MATERIAL SHALL BE STORED IN ACCORDANCE WITH APPLICABLE REGULATIONS. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR SHALL BE CONTACTED IMMEDIATELY.

(c) THE SWP3 MUST INCLUDE A DESCRIPTION OF POTENTIAL POLLUTANT SOURCES FROM AREAS OTHER THAN CONSTRUCTION (SUCH AS STORM WATER DISCHARGES FROM DEDICATED ASPHALT PLANTS AND DEDICATED CONCRETE BATCH PLANTS), AND A DESCRIPTION OF CONTROLS AND MEASURES THAT WILL BE IMPLEMENTED AT THOSE SITES TO MINIMIZE POLLUTANT DISCHARGES.

(d) PERMITTEES SHALL PLACE VELOCITY DISSIPATION DEVICES AT DISCHARGE LOCATIONS AND ALONG THE LENGTH OF ANY OUTFALL CHANNEL (I.E. RUNOFF CONVEYANCE) TO PROVIDE A NON-EROSIVE FLOW VELOCITY FROM THE STRUCTURE TO A WATER COURSE, SO THAT THE NATURAL PHYSICAL AND BIOLOGICAL CHARACTERISTICS AND FUNCTIONS ARE MAINTAINED AND PROTECTED.

(e) VELOCITY DISSIPATION DEVICES PLACED AT DISCHARGE LOCATIONS AND ALONG THE LENGTH OF ANY OUTFALL CHANNEL.

LOCATIONS:

5. APPROVED STATE AND LOCAL PLANS (CGP PART III. F. 5.)

(a) THIS PLAN WAS DEVELOPED UNDER TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) GENERAL PERMIT NO. TXR 150000 ISSUED PURSUANT TO SECTION 26.040 OF THE TEXAS WATER CODE AND SECTION 402 OF THE CLEAN WATER ACT.

(b) SWP3s MUST BE UPDATED AS NECESSARY TO REMAIN CONSISTENT WITH ANY CHANGES APPLICABLE TO PROTECTING SURFACE WATER RESOURCES IN SEDIMENT EROSION SITE PLANS OR SITE PERMITS, OR STORM WATER MANAGEMENT SITE PLANS OR SITE PERMITS APPROVED BY STATE OR LOCAL OFFICIAL FOR WHICH THE PERMITTEE RECEIVES WRITTEN NOTICE.

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TxDOT STORM WATER POLLUTION PREVENTION PLAN (SWP3)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
			118
STATE	DIST.	COUNTY	
TEXAS	TYL	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
3487	01	001	TOLL 49

6. MAINTENANCE REQUIREMENTS (CGP PART III. F. 6.)

(a) ALL PROTECTIVE MEASURES IDENTIFIED IN THE SWP3 MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION. IF, THROUGH INSPECTIONS OR OTHER MEANS, THE PERMITTEE DETERMINES THAT BMPs ARE NOT OPERATING EFFECTIVELY, THEN THE PERMITTEE SHALL PERFORM MAINTENANCE AS NECESSARY TO MAINTAIN THE CONTINUED EFFECTIVENESS OF STORM WATER CONTROLS, AND PRIOR TO THE NEXT RAIN EVENT IF POSSIBLE. IF MAINTENANCE PRIOR TO THE NEXT ANTICIPATED STORM EVENT IS IMPRACTICABLE, THE REASON SHALL BE DOCUMENTED IN THE SWP3 AND MAINTENANCE MUST BE SCHEDULED AND ACCOMPLISHED AS SOON AS PRACTICABLE. EROSION AND SEDIMENT CONTROLS THAT HAVE BEEN INTENTIONALLY DISABLED, RUN-OVER, REMOVED, OR OTHERWISE RENDERED INEFFECTIVE MUST BE REPLACED OR CORRECTED IMMEDIATELY UPON DISCOVERY.

(b) IF PERIODIC INSPECTIONS OR OTHER INFORMATION INDICATES A CONTROL HAS BEEN USED INCORRECTLY, IS PERFORMING INADEQUATELY, OR IS DAMAGED, THEN THE OPERATOR MUST REPLACE OR MODIFY THE CONTROL AS SOON AS PRACTICABLE AFTER MAKING THE DISCOVERY.

(c) SEDIMENT MUST BE REMOVED FROM SEDIMENT TRAPS AND SEDIMENTATION PONDS NO LATER THAN THE TIME THAT DESIGN CAPACITY HAS BEEN REDUCED BY 50%. FOR PERIMETER CONTROLS SUCH AS SILT FENCES, BERMS, ETC., THE TRAPPED SEDIMENT MUST BE REMOVED BEFORE IT REACHES 50% OF THE ABOVE-GROUND HEIGHT.

(d) IF SEDIMENT ESCAPES THE SITE, ACCUMULATIONS MUST BE REMOVED AT A FREQUENCY THAT MINIMIZES OFF-SITE IMPACTS, AND PRIOR TO THE NEXT RAIN EVENT IF FEASIBLE. IF THE PERMITTEE DOES NOT OWN OR OPERATE THE OFF-SITE CONVEYANCE, THEN THE PERMITTEE MUST WORK WITH THE OWNER OR OPERATOR OF THE THE PROPERTY TO REMOVE THE SEDIMENT.

7. INSPECTIONS OF CONTROLS (CGP PART III. F. 7.)

(a) PERSONNEL PROVIDED BY THE PERMITTEE MUST INSPECT DISTURBED AREAS OF THE CONSTRUCTION SITE THAT HAVE NOT BEEN FINALLY STABILIZED, AREAS USED FOR STORAGE OF MATERIALS THAT ARE EXPOSED TO PRECIPITATION, DISCHARGE LOCATIONS, AND STRUCTURAL CONTROLS FOR EVIDENCE OF, OR THE POTENTIAL FOR, POLLUTANTS ENTERING THE DRAINAGE SYSTEM. PERSONNEL CONDUCTING THESE INSPECTIONS MUST BE KNOWLEDGEABLE OF THIS GENERAL PERMIT, FAMILIAR WITH THE CONSTRUCTION SITE, AND KNOWLEDGEABLE OF THE SWP3 FOR THE SITE. SEDIMENT AND EROSION CONTROL MEASURES IDENTIFIED IN THE SWP3 MUST BE INSPECTED TO ENSURE THAT THEY ARE OPERATING CORRECTLY. LOCATIONS WHERE VEHICLES ENTER OR EXIT THE SITE MUST BE INSPECTED FOR EVIDENCE OF OFF-SITE SEDIMENT TRACKING.

(b) - (c) INSPECTIONS WILL OCCUR ONCE EVERY SEVEN (7) CALENDAR DAYS BEGINNING WITH THE DATE OF THE N.O.I. THRU THE DATE OF THE N.O.T.:
THE DAY SELECTED FOR INSPECTION IS _____ **(AS OF)**

(d) THE SWP3 MUST BE MODIFIED BASED ON THE RESULTS OF INSPECTIONS, AS NECESSARY, TO BETTER CONTROL POLLUTANTS IN RUNOFF. REVISIONS TO THE SWP3 MUST BE COMPLETED WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE INSPECTION. IF EXISTING BMPs ARE MODIFIED OR IF ADDITIONAL BMPs ARE NECESSARY, AN IMPLEMENTATION SCHEDULE MUST BE DESCRIBED IN THE SWP3 AND WHEREVER POSSIBLE, THOSE CHANGES IMPLEMENTED BEFORE THE NEXT STORM EVENT. IF IMPLEMENTATION BEFORE THE NEXT ANTICIPATED STORM EVENT IS IMPRACTICABLE, THESE CHANGES MUST BE IMPLEMENTED AS SOON AS PRACTICABLE.

(e) A REPORT SUMMARIZING THE SCOPE OF THE INSPECTION, THE DATE(S) OF THE INSPECTION, AND MAJOR OBSERVATIONS RELATING TO THE IMPLEMENTATION OF THE SWP3 MUST BE MADE AND RETAINED AS PART OF THE SWP3. MAJOR OBSERVATIONS SHOULD INCLUDE: **THE LOCATIONS OF DISCHARGES OF SEDIMENT OR POLLUTANTS FROM THE SITE; LOCATIONS OF BMPs THAT NEED TO BE MAINTAINED; LOCATIONS OF BMPs THAT FAILED TO OPERATE AS DESIGNED OR PROVED INADEQUATE FOR A PARTICULAR LOCATION; AND LOCATIONS WHERE ADDITIONAL BMPs ARE NEEDED.**

ACTIONS TAKEN AS A RESULT OF INSPECTIONS MUST BE DESCRIBED WITHIN, AND RETAINED AS A PART OF, THE SWP3. REPORTS MUST IDENTIFY ANY INCIDENTS OF NON-COMPLIANCE. WHERE A REPORT DOES NOT IDENTIFY ANY INCIDENTS OF NON-COMPLIANCE, THE REPORT MUST CONTAIN A CERTIFICATION THAT THE FACILITY OR SITE IS IN COMPLIANCE WITH THE SWP3 AND THIS PERMIT. THE REPORT MUST BE SIGNED BY THE PERSON AND IN THE MANNER REQUIRED BY 30 TAC § 305.128(RELATING TO SIGNATORIES OF REPORTS).

8. NON-STORM WATER DISCHARGES (CGP PART III. F. 8.)

POTENTIAL DISCHARGE	*POLLUTION PREVENTION MEASURES*
WATER USED FOR DUST CONTROL	WATER SHOULD BE FILTERED OR HELD IN RETENTION BASIN BEFORE BEING DISCHARGED
PAVEMENT WASHING	WATER SHOULD BE FILTERED OR HELD IN RETENTION BASIN BEFORE BEING DISCHARGED
ROUTINE EXTERNAL VEHICLE WASHING	PERFORM WORK IN SPECIFIED LOCATION WITH CONTROLS IN PLACE (I.E. SILT FENCE)
PUMPED WATER FROM CREEK TO CONSTRUCT CULVERT/BRIDGE	WATER SHOULD BE FILTERED OR HELD IN RETENTION BASIN BEFORE BEING DISCHARGED

9. CONCRETE TRUCK WASH OUT REQUIREMENTS (CGP PART V.)

THIS GENERAL PERMIT AUTHORIZES THE WASH OUT OF CONCRETE TRUCKS AT CONSTRUCTION SITES REGULATED UNDER SECTIONS II.E.1., 2., AND 3. OF THIS GENERAL PERMIT, PROVIDED THE FOLLOWING REQUIREMENTS ARE MET. AUTHORIZATION IS LIMITED TO THE LAND DISPOSAL OF WASH OUT WATER FROM CONCRETE TRUCKS. ANY OTHER DIRECT DISCHARGE OF CONCRETE PRODUCTION WASTE WATER MUST BE AUTHORIZED UNDER A SEPARATE TCEQ GENERAL PERMIT OR INDIVIDUAL PERMIT.

(1) DIRECT DISCHARGE OF CONCRETE TRUCK WASH OUT WATER TO SURFACE WATER IN THE STATE, INCLUDING DISCHARGE TO STORM SEWERS, IS PROHIBITED BY THIS GENERAL PERMIT.

(2) CONCRETE TRUCK WASH OUT WATER SHALL BE DISCHARGED TO AREAS AT THE CONSTRUCTION SITE WHERE STRUCTURAL CONTROLS HAVE BEEN ESTABLISHED TO PREVENT DIRECT DISCHARGE TO SURFACE WATERS, OR TO AREAS THAT HAVE A MINIMAL SLOPE THAT ALLOW INFILTRATION AND FILTERING OF WASH OUT WATER TO PREVENT DIRECT DISCHARGE TO SURFACE WATERS. STRUCTURAL CONTROLS MAY CONSIST OF TEMPORARY BERMS, TEMPORARY SHALLOW PITS, TEMPORARY STORAGE TANKS WITH SLOW RATE RELEASE, OR OTHER REASONABLE MEASURES TO PREVENT RUNOFF FROM THE CONSTRUCTION SITE.

(3) WASH OUT OF OF CONCRETE TRUCKS DURING RAINFALL EVENTS SHALL BE MINIMIZED. THE DIRECT DISCHARGE OF CONCRETE TRUCK WASH OUT WATER IS PROHIBITED AT ALL TIMES, AND THE OPERATOR SHALL INSURE THAT ITS BMPs ARE SUFFICIENT TO PREVENT THE DISCHARGE OF CONCRETE TRUCK WASH OUT AS THE RESULT OF RAIN OR STORMWATER RUNOFF.

(4) THE DISCHARGE OF WASH OUT WATER MUST NOT CAUSE OR CONTRIBUTE TO GROUNDWATER CONTAMINATION.

(5) IF A SWP3 IS REQUIRED TO BE IMPLEMENTED, THE SWP3 SHALL INCLUDE CONCRETE WASH OUT AREAS ON THE ASSOCIATED SITE MAP.

10. CGP PART III. G. 1.

EXCEPT AS PROVIDED IN CFR SECTIONS 125.30-125.32, ANY DISCHARGE REGULATED UNDER THIS GENERAL PERMIT, WITH THE EXCEPTION OF SITES THAT OBTAINED WAIVERS BASED ON LOW RAINFALL EROSIVITY, MUST ACHIVE AT A MINIMUM, THE FOLLOWING EFFLUENT LIMITATIONS REPRESENTING THE DEGREE OF EFFLUENT REDUCTION OBTAINABLE BY APPLICATION OF THE BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE (BPT).

1. EROSION AN SEDIMENT CONTROLS.
DESIGN, INSTALL, AND MAINTAIN EFFECTIVE EROSION CONTROLS AND SEDIMENT CONTROLS TO MINIMIZE THE DISCHARGE OF POLLUTANTS. AT A MINIMUM, SUCH CONTROLS MUST BE DESIGNED, INSTALLED, AND MAINTAINED TO:

(a) CONTROL STORMWATER VOLUME AND VELOCITY WITHIN THE SITE TO MINIMIZE SOIL EROSION;

(b) IF ANY STORMWATER FLOW WILL BE CHANNELIZED AT THE SITE, STORMWATER CONTROLS MUST BE DESIGNED TO CONTROL BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME TO MINIMIZE EROSION AT OUTLETS AND TO MINIMIZE DOWNSTREAN CHANNEL AND STREAMBANK EROSION;

(c) MINIMIZE THE AMOUNT OF SOIL EXPOSED DURING CONTRUCTION ACTIVITY;

(d) MINIMIZE THE DISTURBANCE OF STEEP SLOPES;

(e) MINIMIZE SEDIMENT DISCHARGES FROM THE SITE. THE DESIGN, INSTALLATION, AND MAINTENANCE OF EROSION AND SEDIMENT CONTROLS MUST ADDRESS FACTORS SUCH AS THE AMOUNT, FREQUENCY, INTENSITY AND DURATION OF PRECIPITAION, THE NATURE OF RESULTING STORMWATER RUNOFF, AND SOIL CHARACTERISTICS, INCLUDING THE RANGE OF SOIL PARTICLE SIZES EXPECTED TO BE PRESENT ON THE SITE;

(f) IF EARTH DISTURBANCE ACTIVITIES ARE LOCATED IN CLOSE PROXIMITY TO A SURFACE WATER, PROVIDE AND MAINTAIN APPROPRIATE NATURAL BUFFERS IF FEASIBLEAND AS NECESSARY, AROUND SURFACE WATERS, DEPENDING ON SITE-SPECIFIC TOPOGRAPHY, SENSITIVITY, AND PROXIMITY TO WATER BODIES. DIRECT STORMWATER TO VEGETATED AREAS TO INCREASE SEDIMENT REMOVAL AND MAXIMIZE STORMWATER INFILTRATION. IF PROVIDING BUFFERS IS INFEASIBLE, THE PERMITTEE SHALL DOCUMENT THE REASON THAT NATURAL BUFFERS ARE NOT FEASIBLE, AND SHALL IMPLEMENT ADDTIONAL EROSION AND SEDIMENT CONTROLS TO REDUCE SEDIMENT LOAD;

(g) PRESERVE NATIVE TOPSOIL AT THE SITE.

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Texas Department of Transportation

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TxDOT STORM WATER POLLUTION PREVENTION PLAN (SWP3)

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
			119
STATE	DIST.	COUNTY	
TEXAS	TYL	SMITH	
CONT.	SECT.	JOB	HIGHWAY NO.
3487	01	001	TOLL 49

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DATE: $DATE$ 11:01:12 AM
FILE: $FILE$

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☒ No Action Required ☐ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

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):

☐ No Permit Required
☒ 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)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

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The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☒ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☒ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

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.

☒ No Action Required ☐ Required Action

Action No.

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IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
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.

☒ No Action Required ☐ Required Action

Action No.

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V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☒ No Action Required ☐ Required Action

Action No.

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If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may 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.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) 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 Material Safety Data Sheets (MSDS) 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 bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. 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.

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

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☐ Required Action

Action No.

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VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

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DESIGNER:_____

DATE:_____

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	3487	01	001	TOLL 49
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	TYL	SMITH		120