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SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FHWA TEXAS DIVISION	PROJECT NO. RMC 6442-72-001	SHEET NO. 1
STATE TEXAS	DISTRICT LFK	COUNTY ANGELINA
CONTROL 6442	SECTION 72	JOB 001 HIGHWAY NO. US 59, ETC.

PLANS OF PROPOSED
STATE HIGHWAY ROUTINE MAINTENANCE CONTRACT
TYPE OF WORK:

**REPAIR AND MAINTENANCE OF
METAL BEAM GUARD FENCE**

RMC 6442-72-001

US 59, ETC.

ANGELINA COUNTY

LIMITS: VARIOUS LOCATIONS IN THE ANGELINA COUNTY MAINTENANCE SECTION

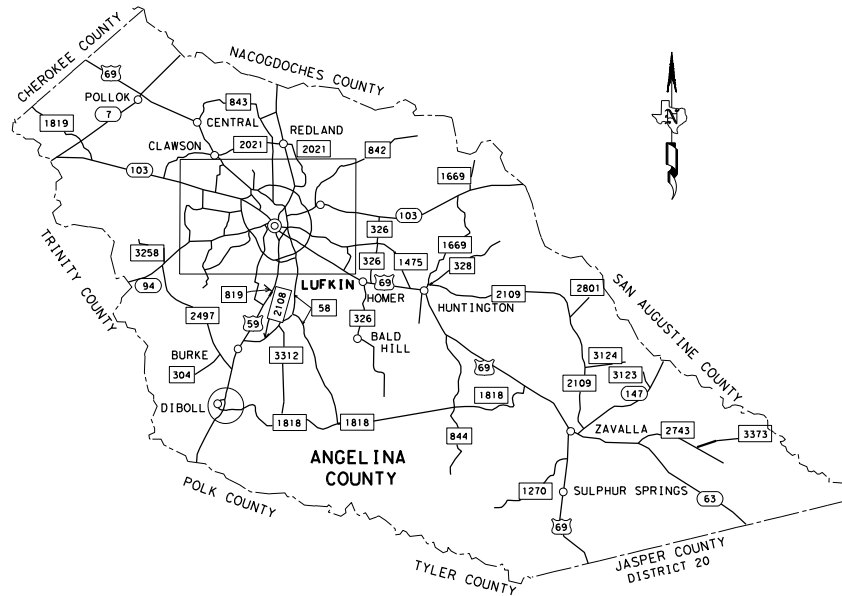
BARRICADES AND WARNING SIGNS

PROJECT LIMIT BARRICADES WILL NOT BE REQUIRED.
THE CONTRACTOR SHALL PROVIDE AND ERECT WARNING SIGNS IN ACCORDANCE WITH THE BARRICADE & CONSTRUCTION STANDARDS, TCP STANDARDS, THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" AND AS DIRECTED.

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RECOMMENDED FOR LETTING:



NOT TO SCALE

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

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DocuSigned by:
Jeremy King, P.E.
DISTRICT MAINTENANCE ENGINEER
5135292FE4184A4...

7/19/2023

DATE

DocuSigned by:
[Signature]
DIRECTOR OF OPERATIONS

7/19/2023

DATE

Project Number: RMC 6422-72-001**Control: 6442-72-001****County: Angelina****Highway: US 59, ETC.****GENERAL NOTES:**

Project Description: This project consists of performing repair/upgrading metal beam guard fence, crash attenuator systems and bridge rail in the Angelina County Maintenance Section on a call out basis.

TXDOT PROJECT SUPERVISOR: All work on this contract will be scheduled and directed by the Maintenance Section Supervisor(s) listed below. Payment will be made monthly for work completed and accepted according to specifications. All payment requests should be directed to the Maintenance Section Supervisor(s) listed below.

<u>COUNTY</u>	<u>SUPERVISOR</u>	<u>ADDRESS</u>	<u>CONTACT #</u>
Angelina	Steven Harris	1410 Kurth Drive. Lufkin, TX	(936) 634-3414

CONTRACT PROSECUTION: Each contract awarded by the Department stands on its own and, as such, is separate from other contracts. A Contractor awarded multiple contracts must be capable and sufficiently staffed to concurrently process any or all contracts at the same time.

Existing regulatory, warning and guide signs within project limits are to always remain visible to the traveling public. If a sign must be repositioned during construction operations, move, and install the sign to an approved location. Use care when working near existing signs and repair or replace signs damaged by work operations. All work involved repositioning existing signs will be subsidiary to various bid items.

Furnish materials and make repairs to the existing roadway and right-of-way at any location damaged by construction operations. This work shall be done in an approved manner and will be subsidiary to various bid items.

Minimize vehicles and equipment in construction areas to lessen the impact on existing vegetation. The intent of the plans is to prepare only that portion of the right-of-way necessary for construction.

Always provide suitable access to adjacent businesses, private property, and side roads.

Remove dirt, silt, rocks, debris, and other foreign matter that accumulates in structures due to the Contractor's operations as directed. Keep stream channels always open. This work will not be paid for directly but will be subsidiary to pertinent items.

All workers on TxDOT right-of-way shall wear reflective clothing meeting ANSI Class II requirements during the day and ANSI Class III requirements during the night. Non-compliance with any of these requirements shall be grounds for suspension of work.

Contractor questions on this project are to be addressed to the following individual(s):

Jeremy King Jeremy.King@TxDOT.gov
 Tamara Gibson Tamara.Gibson@TxDOT.gov

General Notes

Sheet 3

Project Number: RMC 6422-72-001**Control: 6442-72-001****County: Angelina****Highway: US 59, ETC.**

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page. The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

In case of emergency, the contractor shall begin work within 48 hours after verbal notification.

All workers on TxDOT right-of-way shall wear reflective clothing meeting ANSI Class II requirements during the day and ANSI Class III requirements during the night. Non-compliance with any of these requirements shall be grounds for suspension of work.

The following standard detail sheets have been modified; T202TR & T2/T201TR.

Item 2: Instructions to Bidders

View plans on-line or download from the web at:

<https://www.txdot.gov/business/letting-bids/plans-online.html>

Order plans from any of the plan reproduction companies shown on the web at:

https://www.dot.state.tx.us/business/contractors_consultants/repro_companies.htm

Item 4: Scope of Work

The contract may be extended if in the judgment of the Engineer, the contractor has satisfactorily fulfilled the terms and conditions of the contract. The extension must be agreed upon in writing by both parties to the contract and may be extended for an additional period not to exceed the original contract time period. The extended contract may be for additional quantities up to the original bid quantities plus any quantities added by an approved change order. The extensions shall meet the terms and conditions of the original contract or any mutually agreed modifications to the said terms and conditions by one or more cumulative change orders. The Engineer will set a deadline for completing the agreements. This deadline will be based in the time needed to re-let and award a new contract if no extension is agreed upon.

Item 7: Legal Relations and Responsibilities

The proposed work of this project is to repair damaged guard fence, attenuator, and metal rail within the Angelina County Maintenance Section on State right-of-way that may affect the safety of the traveling public.

General Notes

Sheet 3

Project Number: RMC 6422-72-001**Control: 6442-72-001****County: Angelina****Highway: US 59, ETC.**

This activity maintains the original line and grade, hydraulic capacity, and original purpose of the site. Therefore, this project meets the definition of a routine maintenance activity as defined in the TPDES General Permit No. TXR150000 issued March 5, 2023, and TCEQ's TPDES CGP does not apply.

Dispose of all vegetative matter and any other materials removed from State Right of Way in accordance with applicable environmental laws, rules, regulations, and requirements.

Red-cockaded Woodpecker (federally listed endangered species) habitat is present adjacent to the ROW along SH 63 and FM 2743. Conservation measures have been agreed upon by the United States Fish and Wildlife Service and TxDOT to ensure that the proposed action will not adversely affect the red-cockaded woodpecker. The conservation measures below must be followed to be in compliance with the Endangered Species Act.

- NO WORK shall be performed at the below roadway limits from April 1 to July 31.
- Work shall begin one hour after sunrise and cease one hour before sunset.
- NO STOCKPILES or EQUIPMENT STORAGE shall be allowed along the below roadway limits: On SH 63 from 2.75 miles East of SH 147 to 5.30 miles East of SH 147 On FM 2743 from CR 345 to 1 mile East of CR 345

Louisiana Pine Snake (federally listed endangered species) critical habitat is present within the ROW along SH 63. The conservation measure below must be followed to be in compliance with the Endangered Species Act:

- NO STOCKPILES or EQUIPMENT STORAGE shall be allowed within the ROW along SH 63 at the below roadway limits: SH 63 from 5.70 miles NW of Jasper County Line to Jasper County Line.

Portions of US Highway (US) 69 South of Huntington, State Highway (SH) 147, SH 63, Farm-to-Market (FM) 3124, FM 2109, and FM 2743 in Angelina County pass through compartments of the Angelina National Forest. The following actions are required.

- Maintenance Supervisor shall notify Angelina National Forest (USFS) prior to commencing work on the above listed roadways within USFS boundaries.
- NO stockpiling or storage of materials and equipment within USFS boundaries.

Contractor to repair or replace in kind, at their own expense, any historic materials damaged (buildings, historical markers, etc.) while executing the work. Contractor is responsible for locating replacement source for historical materials damaged in the course of the work. TxDOT Environmental Affairs Division is to be informed of the proposed repairs to facilitate consultation with Texas Historical Commission prior to the execution of repairs.

General Notes**Sheet 3A****Project Number: RMC 6422-72-001****Control: 6442-72-001****County: Angelina****Highway: US 59, ETC.****Item 8: Prosecution and Progress**

Contract Time: This project shall be 365 days or 1 year after the execution of this contract.

For this project, working days will be computed and charged in accordance with Item 8, Section 3.1.5, "Calendar Day".

This contract includes callout work; the number of working days will be established in each work order.

The Engineer will specify the number of working days granted for each work order based on a percentage of the dollar amount of the work order versus the total dollar amount of the contract or based on typical production rates for the work ordered.

The Contractor shall be on site within 48 hours for emergency work orders or within five business days for regular work orders.

Verbal notification may be given for the work orders above, however, written notification will be delivered electronically following the verbal notification. Written notification will state the date of verbal approval to begin work.

Notify the Engineer at least 24 hours before proceeding with planned work activities to the requesting Maintenance Section or appropriate contact person. Any work performed without proper notification will not be eligible for payment.

Perform work only as directed by a work order. Any work performed at locations not covered by a work order will not be paid for, unless directly authorized.

In accordance with Article 8.6 "Failure to Complete the Work on Time", liquidated damages will be charged for failure to complete each work order in the specified number of days.

The Liquidated Damage amount to be assessed per day, until the work is completed will be 1% of the estimated cost of the Work Order, but not less than \$50 per day and not to exceed \$200 per day.

Item 9: Measurement and Payment

This Contract includes callout work. In accordance with Article 9.2., "Plans Quantity Measurement", plans quantity measurement requirements are not applicable. The quantities shown are for estimates only and payment will be based on the actual quantities placed.

Item 502: Barricades, Signs and Traffic Handling

Traffic Control Plan (TCP):

General Notes**Sheet 3A**

Project Number: RMC 6422-72-001**Control: 6442-72-001****County: Angelina****Highway: US 59, ETC.**

Furnish and maintain all warning signs, flaggers, channelizing devices, etc. required for traffic control on this contract in accordance with Item 502.1 & 502.2. This work will not be paid for directly but will be considered subsidiary to the various bid items.

For protection of the traveling public, direct traffic through the work area using signs, flaggers, and other devices. Required signs are shown in the plans on the Barricade and Construction Standards and Traffic Control Plan Sheets. The latest edition of the "Texas Manual on Uniform Traffic Control Devices" shall also be used as a guide for handling traffic on this project.

Texas Transportation Code 547.105 authorizes the use of warning lights to promote safety and provides an effective means of gaining the travelling public's attention as they drive in areas where construction crews are present.

To influence the public to move over when high risk construction activities are taking place, minimize the utilization of blue warning lights. These lights must be used only while performing work on or near the travel lanes or shoulder where the travelling public encounters construction crews that are not protected by a standard work zone set up such as a lane closure, shoulder closure, or one-way traffic control. Refrain from leaving the warning lights engaged while travelling from one work location to another or while parked on the right-of-way away from the pavement or a work zone.

No lane closures on US 59 and SL 287 will be allowed after noon on Fridays or on days preceding major holidays unless otherwise approved. Extra time has been added to the total number of working days allocated for this. Work shall be planned such that this is not a limiting factor in the schedule.

Restrict construction work to single lane widths with only minor disruptions in traffic flow. Lane closures shall conform to the traffic control plan for lane closures as shown in the plans. No overnight closures will be permitted.

Provide temporary Rumble Strips as shown on Work Zone Standard when lane closures are necessary.

Provide a flashing arrow panel and a truck-mounted attenuator to supplement required signs and devices for each lane closure.

Provide adequate flaggers to protect the traveling public when working on or near a roadway carrying traffic. All flaggers shall wear hardhats and ANSI approved reflective safety vests. Vests shall be clean and worn fully fastened.

Install "Be Prepared to Stop" (CW20-7B) and "Flagger Ahead" (CW22-7D) signs when flaggers are present. Position the signs where good visibility and traffic control can be maintained.

Provide one high-intensity yellow, rotating dome-light on all equipment such as distributors, spreader boxes, lay-down machines, rollers, backhoes, road graders, loaders, etc. Mount lights high enough to be visible from all directions and operating when the equipment is within 30 feet of the travel way. On all other equipment, such as trucks, trailers, automobiles, etc., use emergency flashers while within the work zone.

General Notes**Sheet 3B****Project Number: RMC 6422-72-001****Control: 6442-72-001****County: Angelina****Highway: US 59, ETC.****Item 540: Metal Beam Guard Fence & Item 770: Guard Fence Repair**

For existing non-mow strip to remain in place, backfill top 4" in an existing abandoned post hole with HMA and backfill below 4" with suitable earth material. This work will be subsidiary to Item 540.

GF(31)-19, GF(31)DAT-19, GF(31)LS-19, GF(31)T101-19, GF(31)TRTL2-19, SGT (10S)31-16, SGT(11S)31-18, SGT(12S)31-18, & BED-14 standards shall be used on upgrades unless otherwise directed by the Engineer.

All materials furnished by the Contractor shall be new.

Contractor is responsible for all materials to do the work being performed, including nose cones and hardware.

Contractor is to replace any damaged delineation or object markers to any damaged or new guardrail system.

Existing concrete that will conflict with installing the new system shall be completely removed and disposed of by the Contractor. This work will not be paid for directly but will be considered subsidiary to removal of the existing guardrail terminal.

Timber posts shall be domed. When posts are placed, new posts shall match the existing post such that each is uniform in height.

At the close of work each day, if repairs are not complete, the Contractor shall protect the ends of metal beam guard fence in an approved manner, so that no blunt ends are exposed to approaching traffic. Plastic drums will be required at these locations.

Completely clean the area of all debris including debris left from reconstruction of the Guardrail or Bridge Rail assembly as well as any litter created by the crew. Remove or spread surplus soil and material that has collected under the rail to the natural grade of the surrounding. This work will not be paid for directly but will be considered subsidiary to various items.

Item 770: Guard Fence Repair

Do not mix parts on SGT's. Use only manufacture parts for each.

Item 774: Attenuator Repair

The contractor shall furnish details on the method proposed to "Retrofit" the new systems at the existing crash cushion locations, prior to beginning this work.

Item 6185: Truck Mounted Attenuator (TMA)

Truck Mounted Attenuators (TMA's) shall meet the requirements of this item and the Department's Compliant Work Zone Traffic Control Device List.

Truck Mounted Attenuators TMA's as shown on the TCP's shall be used. Whether shown on the TCP's or added by the Department, TMAs shall be paid for under Item 6185, "Truck Mounted Attenuator" for the type of operation being performed.

General Notes**Sheet 3B**



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6442-72-001

DISTRICT Lufkin
HIGHWAY US0059

COUNTY Angelina

CONTROL SECTION JOB				6442-72-001		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00196601			
COUNTY				Angelina			
HIGHWAY				US0059			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	20.000		20.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	50.000		50.000	
	500-6033	MOBILIZATION (CALLOUT)	EA	12.000		12.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	500.000		500.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	450.000		450.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	18.000		18.000	
	770-6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	50.000		50.000	
	770-6010	REM / REPL TIMBER/STL POST W/O CONC FND	EA	50.000		50.000	
	770-6011	REM / REPL TIMBER / STL POST W/CONC FND	EA	20.000		20.000	
	770-6019	REMOVE & REPLACE BLOCKOUT	EA	10.000		10.000	
	770-6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	25.000		25.000	
	770-6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	2.000		2.000	
	770-6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA	7.000		7.000	
	770-6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	20.000		20.000	
	770-6029	REM & RESET SGT IMPACT HEAD	EA	1.000		1.000	
	770-6060	REMOVE AND REPLACE DAT	EA	5.000		5.000	
	774-6001	REMOVE AND REPLACE (TRACC)	EA	1.000		1.000	
	774-6028	REPAIR (QUAD) (N) (BAY)	EA	15.000		15.000	
	774-6059	REPAIR (TRACC) (BAY)	EA	26.000		26.000	
	776-6020	REPAIR (TY T101RC)	LF	50.000		50.000	
	778-6001	CONCRETE RAIL REPAIR (IN-KIND)	LF	50.000		50.000	
	6185-6002	TMA (STATIONARY)	DAY	7.000		7.000	

DISTRICT	COUNTY	CCSJ	SHEET
Lufkin	Angelina	6442-72-001	

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SUMMARY OF GUARD FENCE, ATTENUATOR & RAIL REPAIR ITEMS			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	20
0429 6009	CONC STR REPAIR (STANDARD)	SF	50
0500 6033	MOBILIZATION (CALLOUT)	EA	12
0540 6001	MTL W-BEAM GD FEN (TIM POST)	LF	500
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4
0542 6001	REMOVE METAL BEAM GUARD FENCE	LF	450
0542 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4
0658 6062	INSTL DEL ASSM (D-SW) SZ 1 (BRF)GF2 (BI)	EA	18
0770 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	50
0770 6010	REM / REPL TIMBER/STL POST W/O CONC FND	EA	50
0770 6011	REM / REPL TIMBER / STL POST W/CONC FND	EA	20
0770 6019	REMOVE & REPLACE BLOCKOUT	EA	10
0770 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	25
0770 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	2
0770 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA	7
0770 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	20
0770 6029	REM & RESET SGT IMPACT HEAD	EA	1
0770 6060	REMOVE AND REPLACE DAT	EA	5
0774 6001	REMOVE AND REPLACE (TRACC)	EA	1
0774 6028	REPAIR (QUAD) (N) (BAY)	EA	15
0774 6059	REPAIR (TRACC) (BAY)	EA	26
0776 6020	REPAIR (TY T101RC)	LF	50
0778 6001	CONCRETE RAIL REPAIR (IN-KIND)	LF	50

SUMMARY OF TRAFFIC CONTROL ITEMS	
ITEM NO.	6185 6002
LOCATION	TMA (STATIONARY)
	DAY
VARIOUS	7

* USE TMA WHEN REQUIRED TO DO SO AS OUTLINED BY TCP STANDARDS.

NOTE: ALL QUANTITIES ARE AN ESTIMATE AND SHALL BE VERIFIED IN THE FIELD PRIOR TO BEGINNING OF WORK. NO GUARANTEES ARE MADE AS TO THE AMOUNT OF WORK WHICH WILL BE PERFORMED AT EACH LOCATION.

QUANTITY SUMMARIES

2023 			
CONT	SECT	JOB	HIGHWAY
6442	72	001	US 59, ETC.
DIST	COUNTY		SHEET NO.
LFK	ANGELINA		5

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Texas Department of Transportation or its employees for the use of this standard for any purpose other than that intended. For more information, contact the Texas Department of Transportation, 1700 North Loop West, P.O. Box 210687, Dallas, Texas 75221-0687. DATE: 4/14/2023 7:34:18 AM FILE: T:\LKDD\MA\Int\ Contracts\0_RMC - Routine Maintenance Contracts\1223\1223-001-ANG-MBEP\RMC-6429-1223001-ANG\ETNA-MBEP\WORKS\1223\1223-001-ANG\ETNA-MBEP\WORKS\1223\1223-001-ANG.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
12. The Engineer has the final decision on the location of all traffic control devices.
13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:



1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.
2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

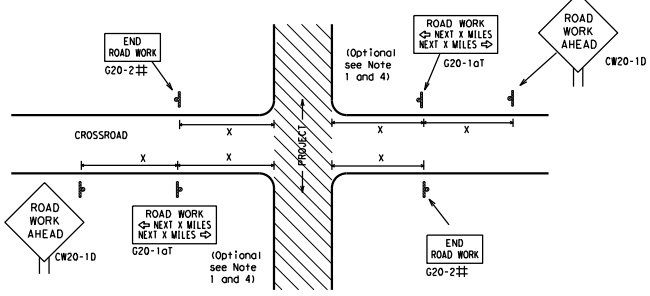
1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

<p>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov</p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12

			
<p>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</p> <p>BC(1) - 21</p>			
FILE:	bc-21.dgn	DN:	TxDOT
		CR:	TxDOT
		DN:	TxDOT
		CR:	TxDOT
REV	DATE	BY	DESCRIPTION
4-03	7-13	6442	72 001 US 59, ETC.
9-07	8-14		DIST COUNTY SHEET NO.
5-10	5-21	LFK	ANGELINA 6

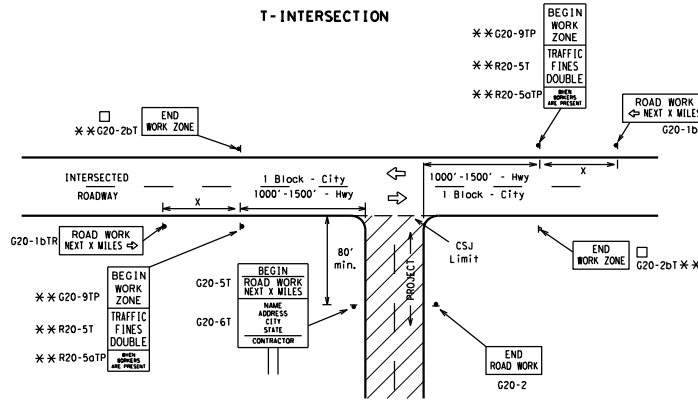
TYPICAL LOCATION OF CROSSROAD SIGNS



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").
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs.
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.
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

Table with columns: Sign Number or Series, Conventional Road, Expressway/Freeway, Posted Speed, Sign Spacing. Lists various sign series like CW20, CW21, CW22, CW23, CW25, CW1, CW2, CW7, CW9, CW11, CW14, CW3, CW4, CW5, CW6, CW8-3, CW10, CW12 with their respective sizes and spacings.

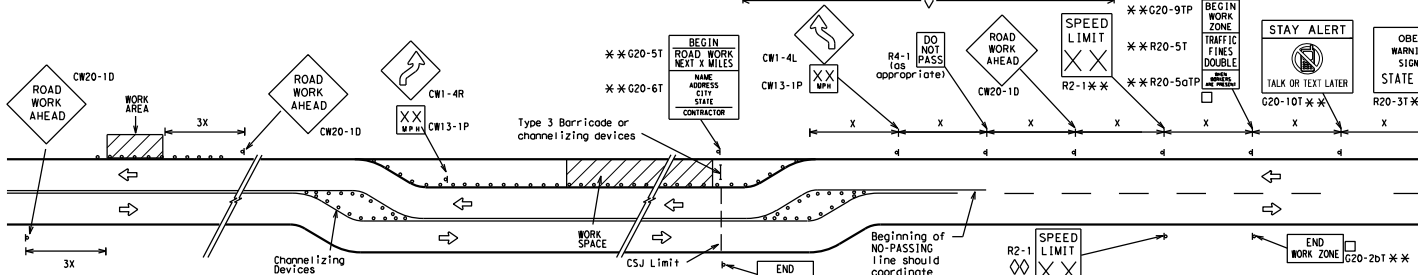
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

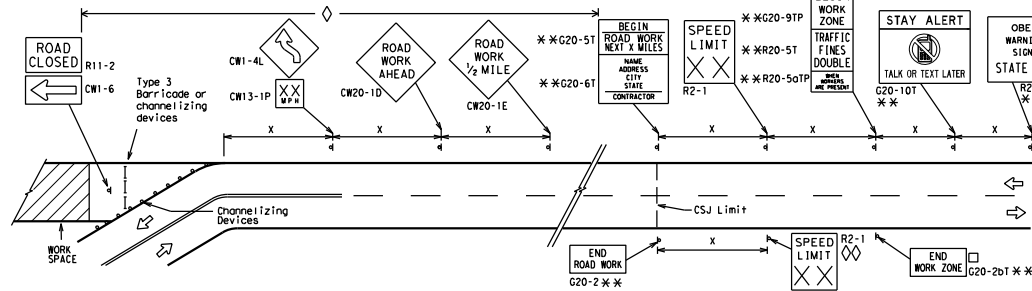
- 1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

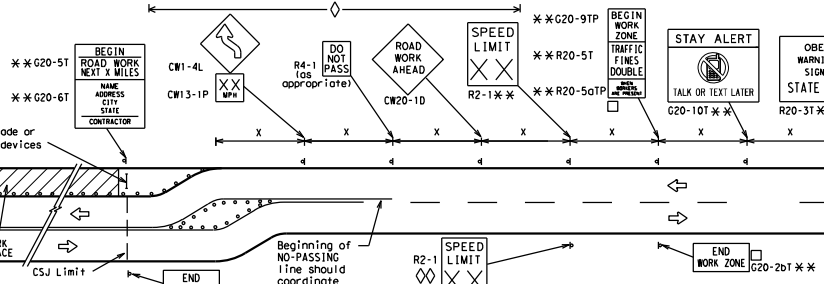


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



LEGEND

Legend table defining symbols: Type 3 Barricade (represented by a rectangle with a diagonal line), Channelizing Devices (represented by three circles), Sign (represented by a diamond), and a note: See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

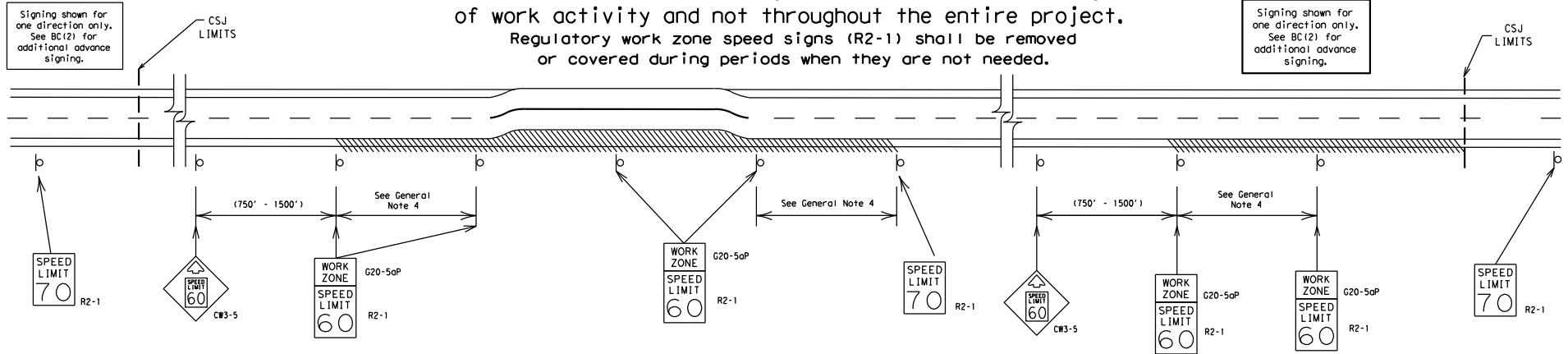
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

- a) rough road or damaged pavement surface
- b) substantial alteration of roadway geometrics (diversions)
- c) construction detours
- d) grade
- e) width
- f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered. (See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
 - 40 mph and greater 0.2 to 2 miles
 - 35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
 - A. Low enforcement.
 - B. Flagger stationed next to sign.
 - C. Portable changeable message sign (PCMS).
 - D. Low-power (drone) radar transmitter.
 - E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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SHEET 3 OF 12



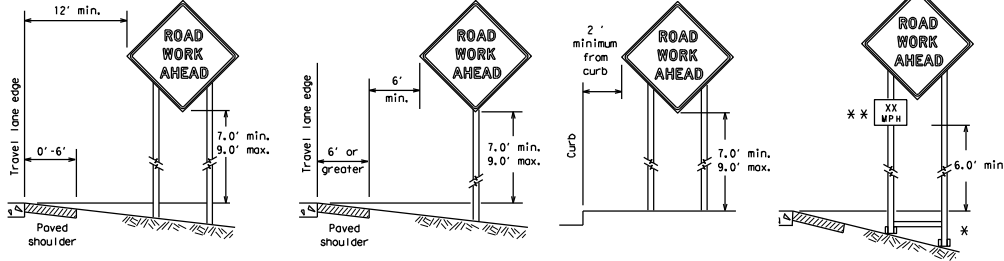
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	LFK	ANGELINA	8	

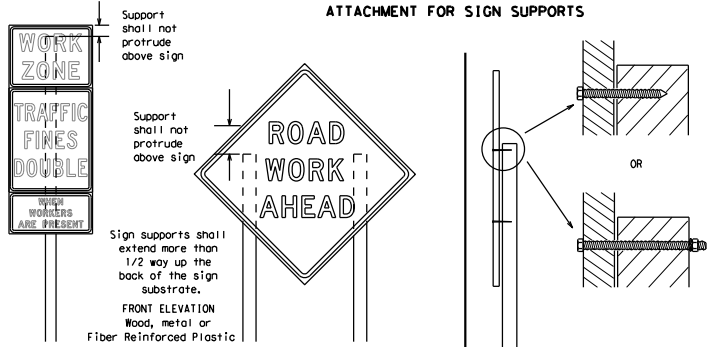
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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 nearest sign.

ATTACHMENT FOR SIGN SUPPORTS



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.

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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 changes 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 Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIGN SIZES

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B_L or Type C_L, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor studs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

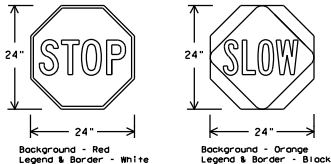
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, coarseness sand shall be used and shall be tied shut to keep the sand from spilling and to maintain a constant weight.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign supports.
- 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 fire inner tubes) shall NOT be used.
- Rubber ballast used 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

- 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.

STOP/SLOW PADDLES

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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.



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B _L OR C _L SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (L000), 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.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- 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.



BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

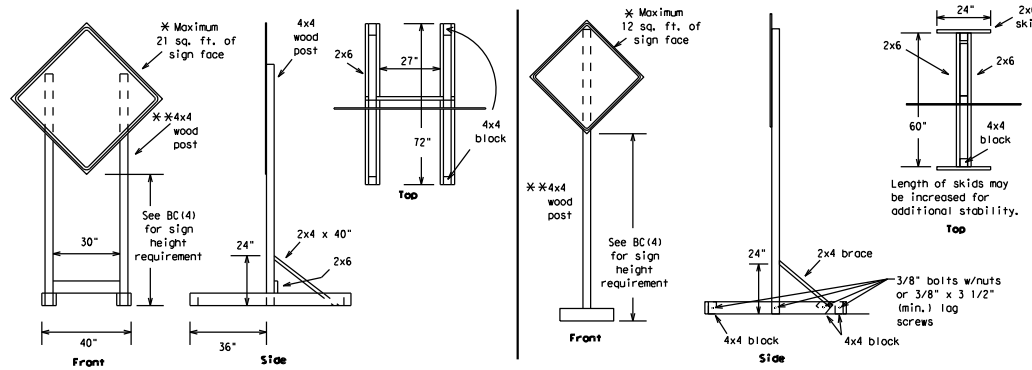
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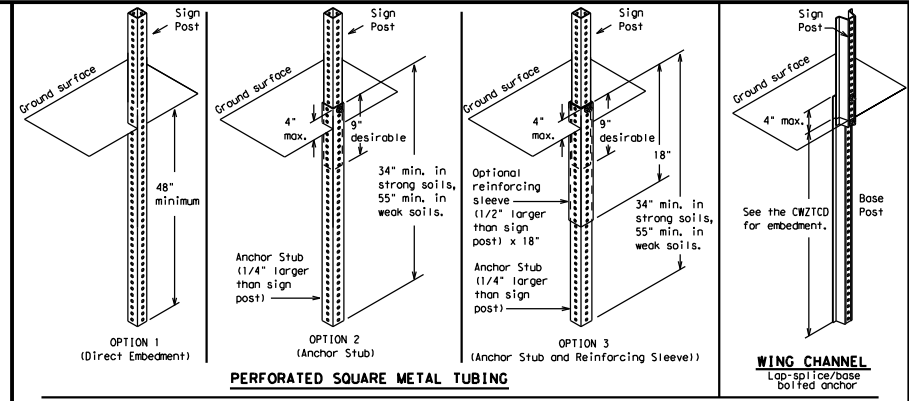
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SKID MOUNTED WOOD SIGN SUPPORTS

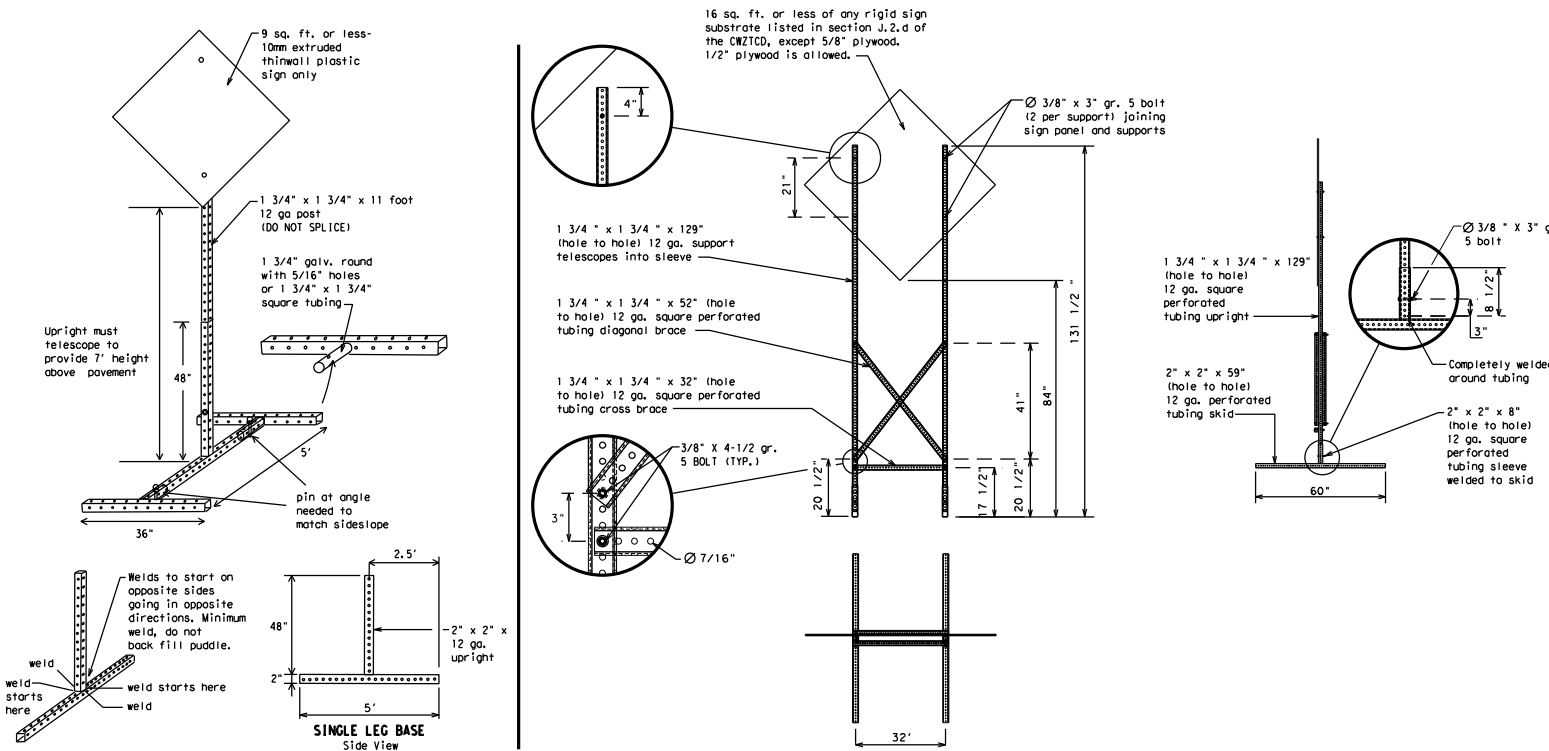
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support. The maximum sign square footage shall adhere to the manufacturer's recommendation. Two post installations can be used for larger signs.



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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 BC11).

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
- 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.
 - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
 - When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

- * See BC(4) for definition of "Work Duration."
- * * Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12
 Texas Department of Transportation
 Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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REV:	01	8-14	DIST:	LFK	COUNTY:				SHEET NO.:	10
REV:	02	5-21			COUNTY:	ANGELINA			SHEET NO.:	10

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

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS shall contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible. 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.
- 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. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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 table.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

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 CLOSED 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
XXXXXXXX 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 - 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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWN TN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLRS
High Occupancy	HOV	Tuesday	TUES
Vehicle Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHs
ITS	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

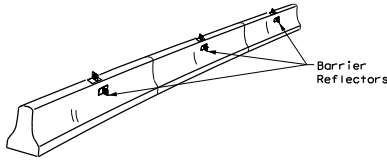
Roadway designation = IH-number, US-number, SH-number, FM-number

<p>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</p> <p>BC (6) - 21</p>			
FILE#	DC-21.dgn	DATE	TxDOT
REV#	November 2002	COUNT	SECT
REV#	6442	JOB	001
REV#	8-14	US	59, ETC.
REV#	7-13	DIST	COUNTY
		STATE	SHEET NO.
		FLK	ANGELINA

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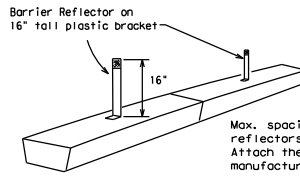
DATE: 4/14/2023 7:34:24 AM
 FILE: T:\LFK\DMW\mnt\contracts\0-RMC - Routine Maintenance Contracts\123 Plans\6442-72-001 ANG MEGF\ANG 6442-72-001 ANGE\INA MBG\DON\STD\TRAFF IC\BC-21.dgn

- 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).
- 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)

- 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 cap 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.
- 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.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- Maximum spacing of Barrier Reflectors is forty (40) feet.
- Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
- Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
- Single slope barriers shall be delineated as shown on the above detail.

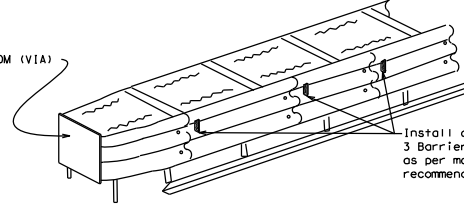


LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.



DELINEATION OF END TREATMENTS

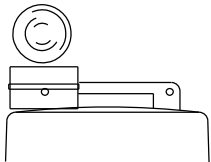
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTC List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

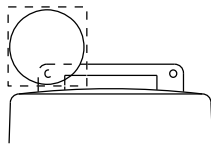
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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_{1C} or C_{1C} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.



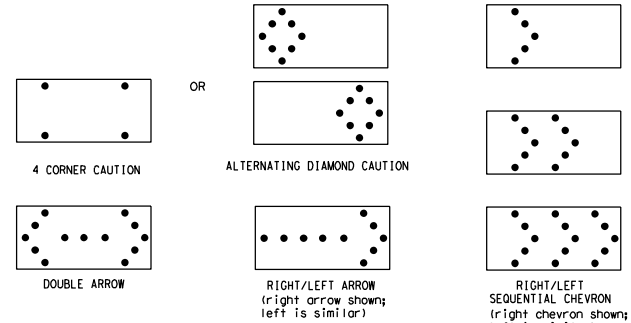
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

- 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.
- 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 CWZTC.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- 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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- A full matrix PMS 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.
- 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

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTC for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTC for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- 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.



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

BC (7) - 21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
REVISED: November 2002	CONT: 6442	SECT: 72	JOB: 001	HIGHWAY: US 59, ETC.
9-07 8-14	DIST: LFK	COUNTY: ANGELINA	SHEET NO. 12	
7-13 5-21				

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GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

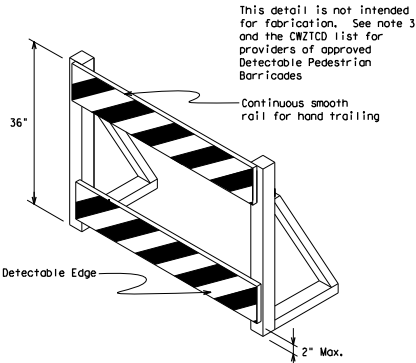
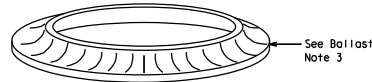
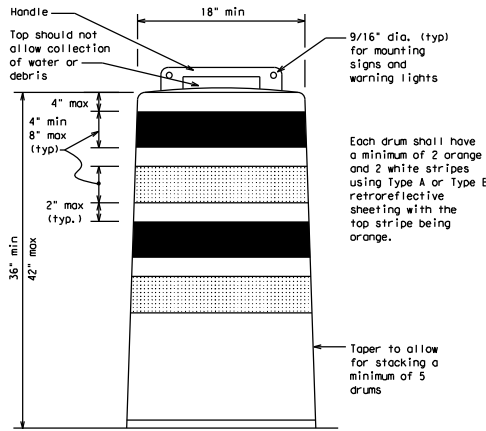
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall "lock" together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelizing devices or sign supports.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- 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.

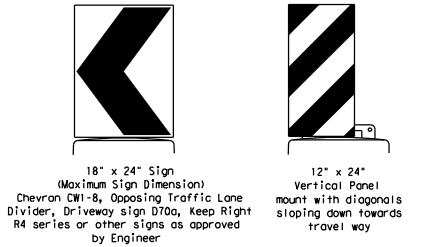
BALLAST

- 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



DETECTABLE PEDESTRIAN BARRICADES

- When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to M2(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
- Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- 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.
- Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- Detectable pedestrian barricades should use 8" nominal barricade rolls as shown on BC(10) provided that the top roll provides a smooth continuous roll suitable for hand trailing with no splinters, burrs, or sharp edges.



Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 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.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- 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.



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	DR:	TxDOT	EX:	TxDOT
REV:	NOVEMBER 2002	CONT:	SECT:	JOB:	HIGHWAY:				
REVISIONS:	6442	72	001	US 59, ETC.					
4-03	8-14	DIST:	COUNTY:	SHEET NO.:					
9-07	5-21	7-13	LFK	ANGELINA	13				
702									

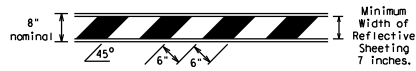
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DATE: 4/14/2023 7:34:27 AM
 FILE: T:\LFK\DM\W\mnt\contracts\0-RMC - Routine Maintenance Contracts\123 Plans\6442-72-001 ANG MBGF\ANG 6442-72-001 ANG\ELINA MBGF\ANG TRAFFIC\BC-21.dgn

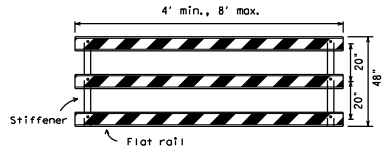
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTD) 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 fire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.

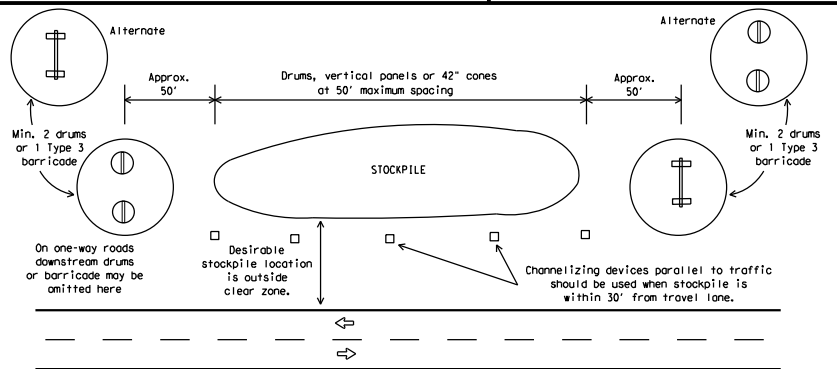


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



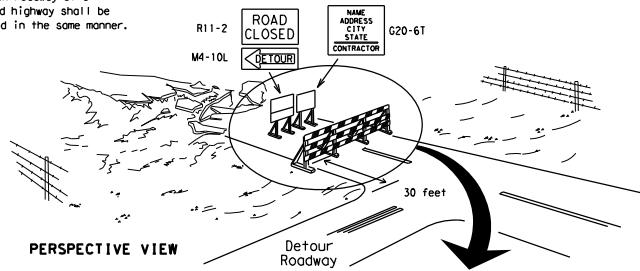
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



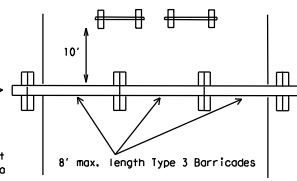
TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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.

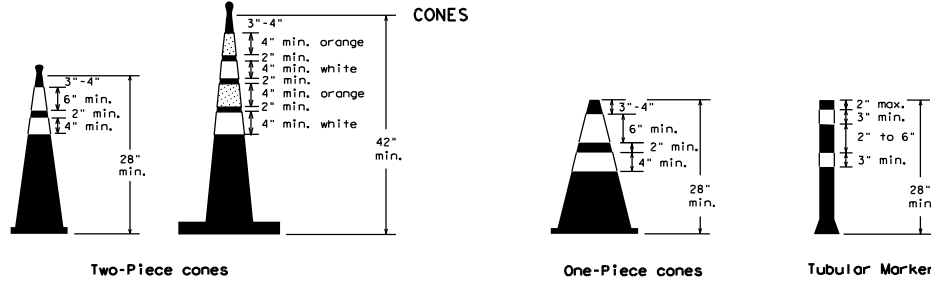


PLAN VIEW

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.

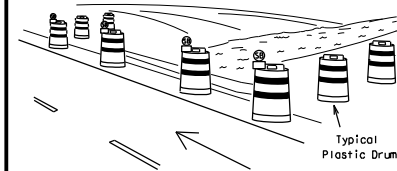
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

CONES



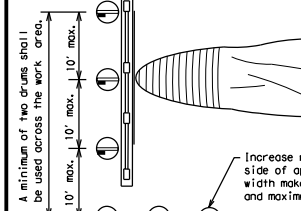
28" Cones shall have a minimum weight of 9 1/2 lbs.
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



PERSPECTIVE VIEW

These drums are not required on one-way roadway



PLAN VIEW

Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)

1. Where positive redirection capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.

LEGEND

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

Texas Department of Transportation
 Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 21

FILE: dc-21.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
9-07 8-14 REVISIONS	6442	72	001	US 59, ETC.
7-13 5-21	DIST	COUNTY	SHEET NO.	
	LFK	ANGELINA		15

The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by the Department of Transportation for the use of this standard for purposes other than those intended. This standard is not to be construed as a contract, and its use is limited to the use of this standard for the purposes stated. For more information, contact the Department of Transportation, Construction Division, at (512) 461-2100.

WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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(SIPM).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(1)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

- Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
- Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

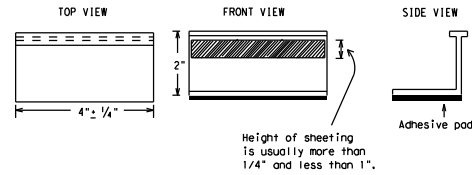
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- See Standard Sheet WZ(SIPM) 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
 YELLOW - (two amber reflective surfaces with yellow body).
 WHITE - (one silver reflective surface with white body).

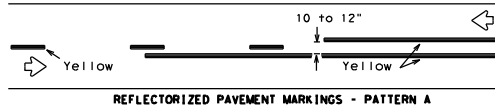
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

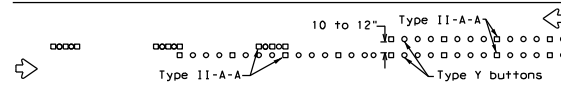
SHEET 11 OF 12

	Traffic Safety Division Standard
<h1 style="margin: 0;">BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS</h1> <h2 style="margin: 0;">BC(1) - 21</h2>	
FILE: bc-21.dgn © TxDOT February 1998	DW: TxDOT CK: TxDOT DW: TxDOT CK: TxDOT CONT SECT JOB HIGHWAY 6442 72 001 US 59, ETC.
REVISIONS 2-98 9-07 5-21 1-02 7-13 11-02 8-14	DIST COUNTY SHEET NO. LFK ANGELINA 16

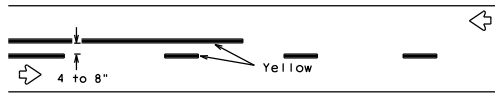
PAVEMENT MARKING PATTERNS



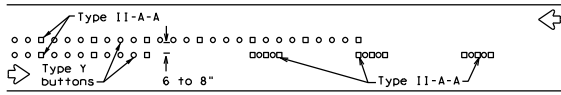
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



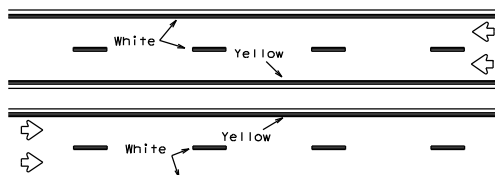
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



RAISED PAVEMENT MARKERS - PATTERN B

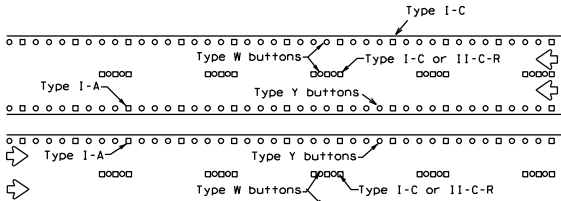
Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



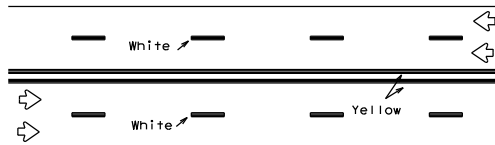
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



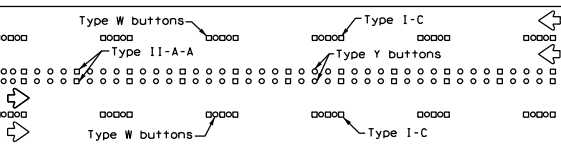
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



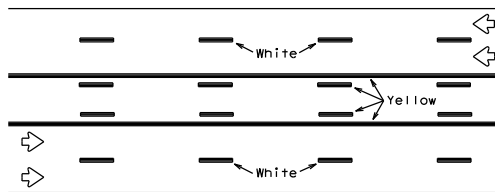
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



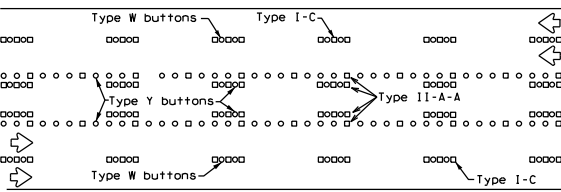
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

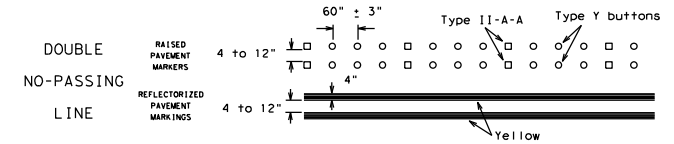
Prefabricated markings may be substituted for reflectorized pavement markings.



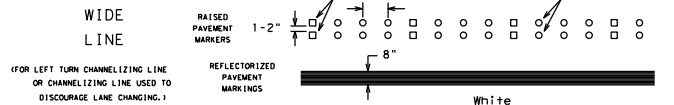
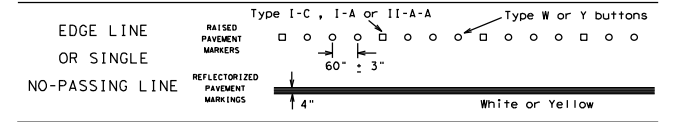
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

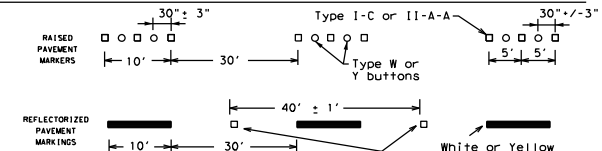


SOLID LINES

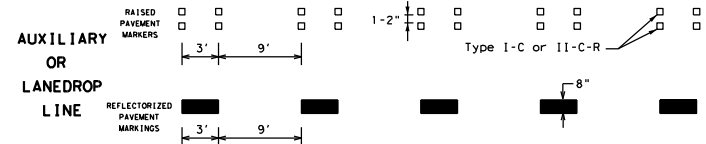


(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

CENTER LINE OR LANE LINE

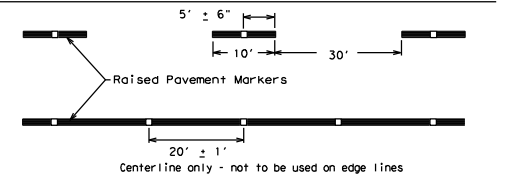


BROKEN LINES



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.



SHEET 12 OF 12



Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC (12) - 21

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."

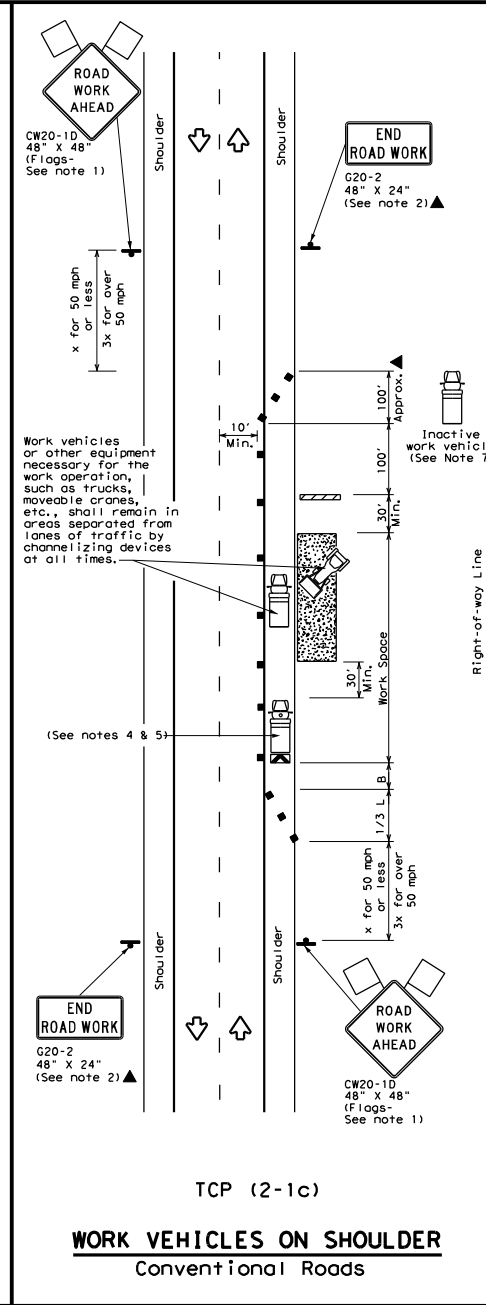
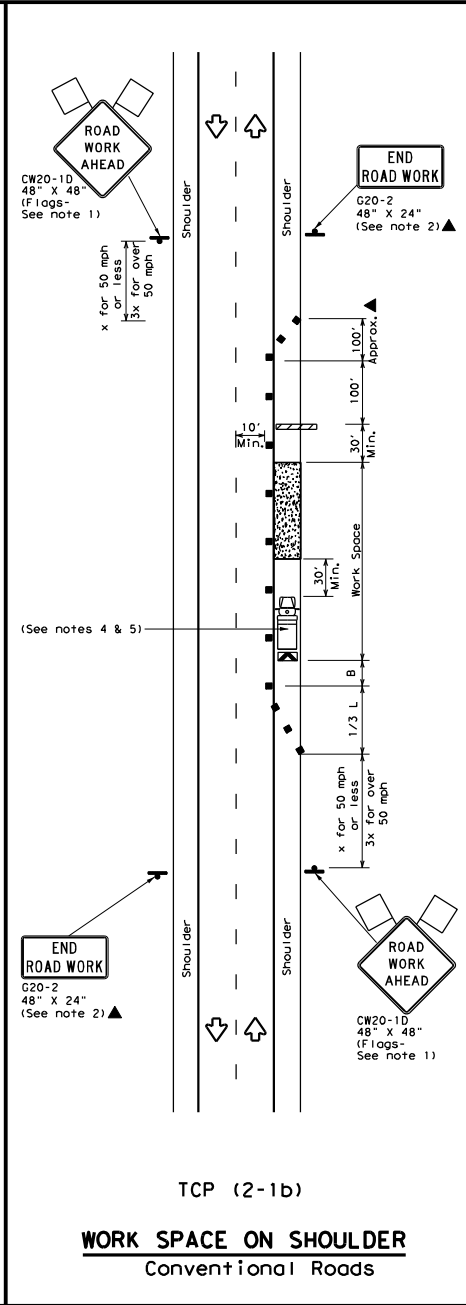
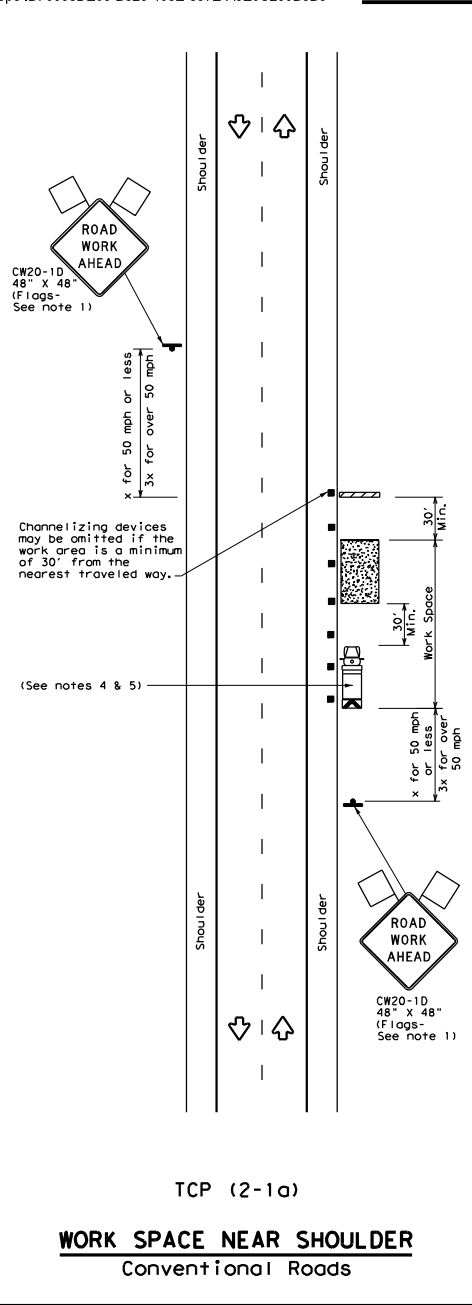
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© TXDOT February 1998	CONT	SECT	JOB	HIGHWAY
1-97	6442	72	001	US 59, ETC.
2-98				COUNTY
11-02				SHEET NO.
8-14	LFK	ANGELINA		17

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DATE: 4/14/2023 7:34:29 AM
FILE: T:\LFK\DM\WgInt Contracts\0-RMC - Routine Maintenance Contracts\123 Plans\6442-72-001 ANG MBG\TRM 6442-72-001 ANGE\LINE MBG\CONTRACTS\TRAFFIC\BC-21.dgn

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DATE: 4/14/2023 7:34:30 AM
FILE: T:\LFK\DM\Main\Contract\030.RMC - Routine Maintenance\Contract\030.RMC - Routine Maintenance.dgn



LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed * *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing * Distance	Suggested Longitudinal Buffer Space * B'
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = $\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40	L = WS	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L = WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60	L = WS	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	L = WS	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**
- Flags attached to signs where shown, are REQUIRED.
 - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
 - Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
 - Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
 - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
 - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
 - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation
Traffic Operations Division Standard

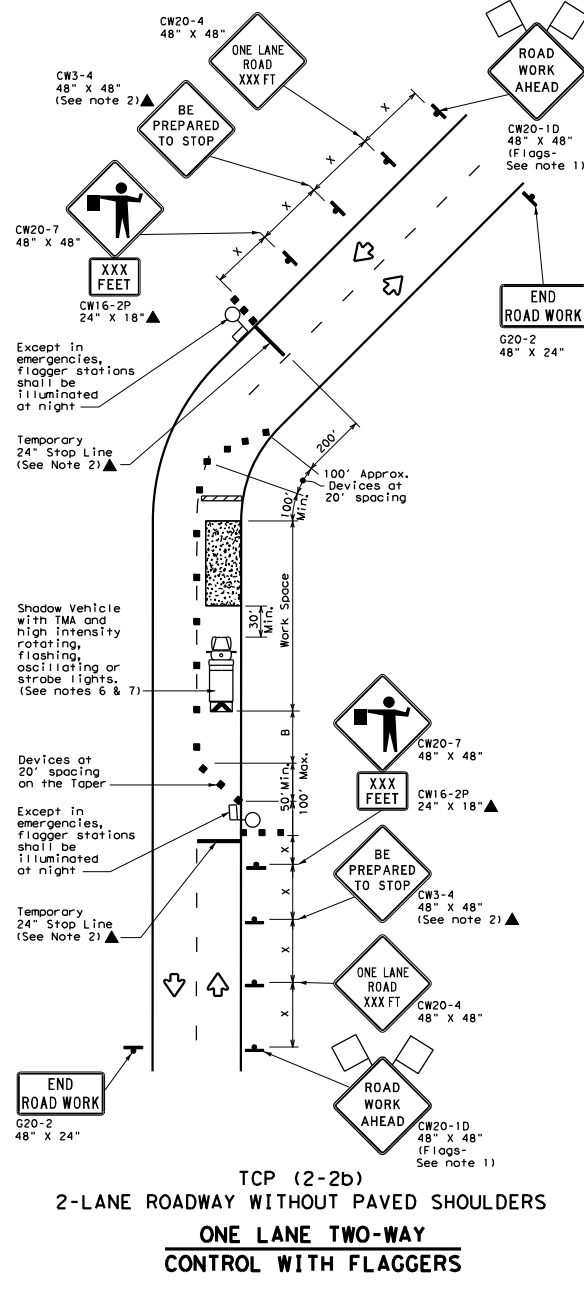
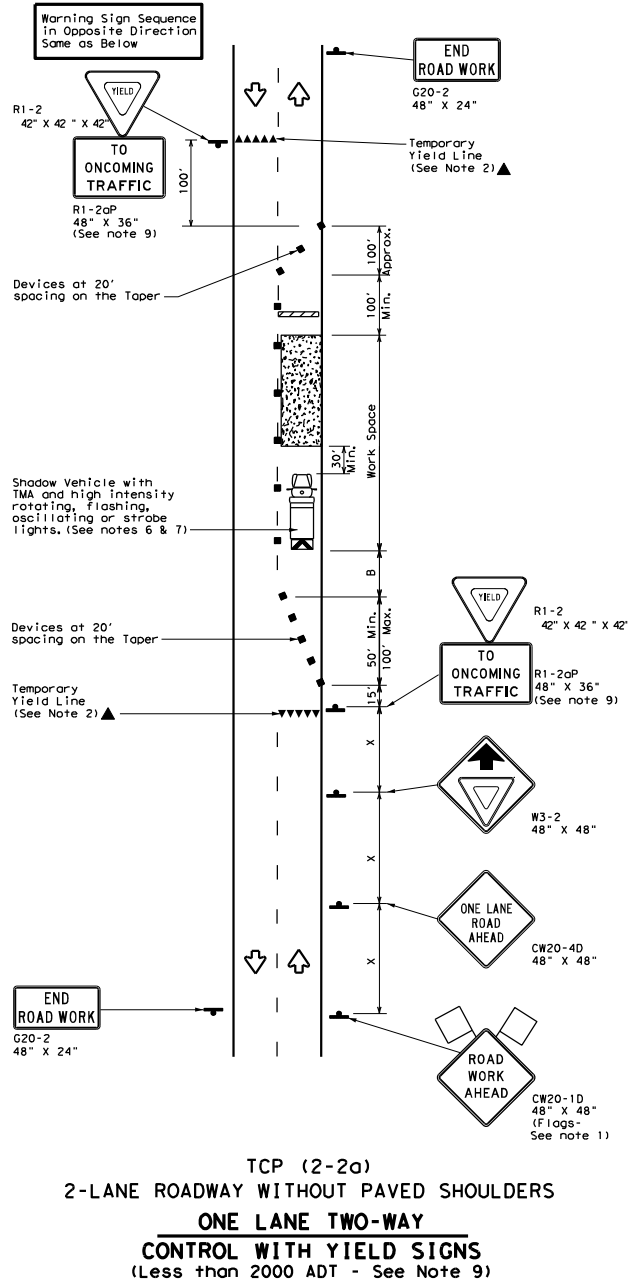
**TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK**

TCP (2-1) - 18

FILE: tcp2-1-18.dgn	DN:	CK:	DE:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
2-94 4-98 REVISIONS	6442	72	001	US 59, ETC.
8-95 2-12	DIST	COUNTY	CITY	SHEET NO.
1-97 2-18	LFK	ANGELINA		18

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DATE: 4/14/2023 7:34:32 AM
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LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed * *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "b"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40	L = WS	265'	295'	320'	40'	80'	240'	155'	305'
45		450'	495'	540'	45'	90'	320'	195'	360'
50	L = WS	500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60	L = WS	600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70	L = WS	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	LONG TERM STATIONARY
	✓	✓	✓

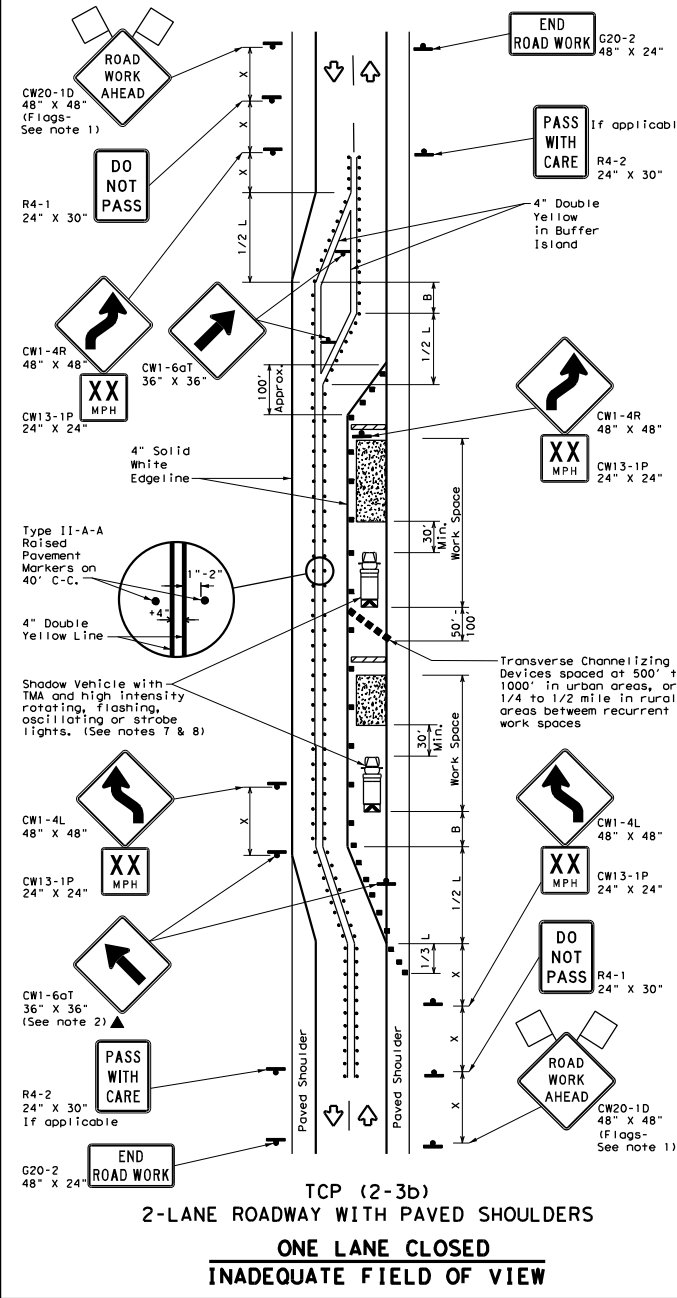
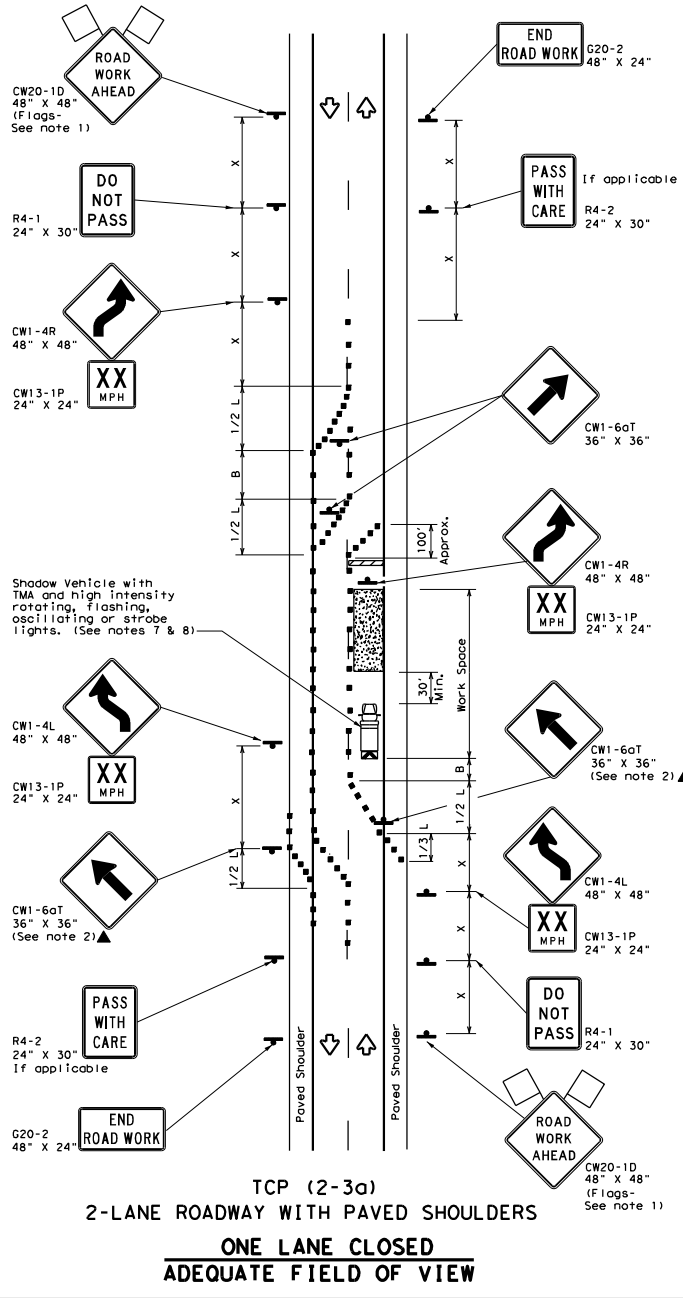
GENERAL NOTES

- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
 - Flaggers should use two-way radios or other methods of communication to control traffic.
 - Length of work space should be based on the ability of flaggers to communicate.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-2a)**
- The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
 - The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support of a 7 foot minimum mounting height.
- TCP (2-2b)**
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
 - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above)
 - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL TCP (2-2) - 18			
FILE:	tcp2-2-18.dgn	DATE:	December 1985
REVISED:	8-95 3-03	COUNTY:	ANGELINA
REVISIONS:	6442 72	JOB:	US 59, ETC.
DATE:	1-97 2-12	COUNTY:	
FILE:	LFK	DATE:	4-98 2-18
		SHEET NO. 19	

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DATE: 4/14/2023 7:34:33 AM
 FILE: T:\LKFD\Main\Contract\03-RMC - Routine Maintenance Contracts\123 of 123\Traffic Control Plans\TCP(2-3a).dgn



LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed "S"	Formula	Minimum Desirable Taper Lengths "X"			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "Y"	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40	L = WS	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L = WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60	L = WS	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	L = WS	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)

MOBILE	TYPICAL USAGE			
	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
			✓	✓
				TCP (2-3b) ONLY

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
 - Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
 - The R4-1 "DO NOT PASS," R4-2 "PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
 - Conflicting pavement marking shall be removed for long term projects.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

- Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Traffic Operations Division Standard

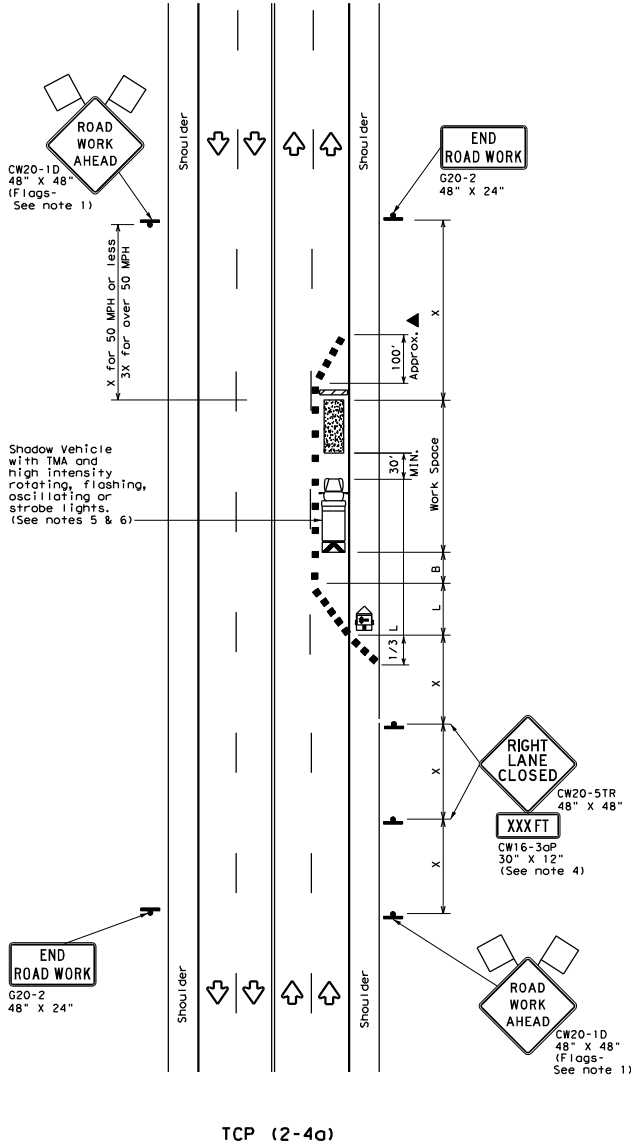
TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON
TWO-LANE ROADS

TCP (2-3)-18

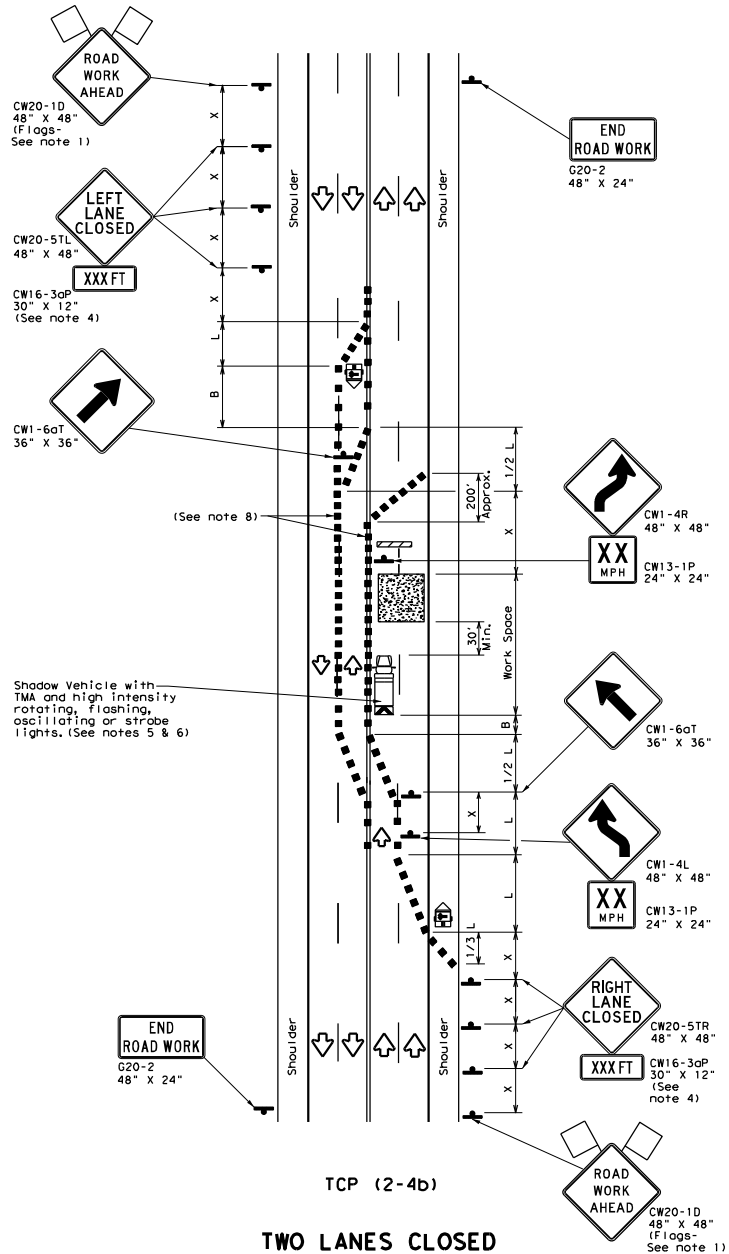
FILE: tcp(2-3)-18.dgn	DATE: 12/28/18	BY: [initials]	JOB: 6442	COUNTY: [blank]	SHEET NO.: 20
© TxDOT December 1985		REV: 72	US 59, ETC.		
8-95 3-01		DIST: [blank]		[blank]	
1-97 2-12		COUNTY: [blank]		[blank]	
4-98 2-18		COUNTY: [blank]		[blank]	
[blank]		COUNTY: [blank]		[blank]	

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DATE: 4/14/2023 7:34:35 AM
FILE: T:\LKFD\MAINT\Contracts\0-RMC - Routine Maintenance Contracts\123 of 123\Traffic Control Plans\TCP (2-4).dgn



TCP (2-4a)
ONE LANE CLOSED



TCP (2-4b)
TWO LANES CLOSED

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths * X			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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		330'	365'	395'	45'	90'	320'	195'
50	L = WS	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
* X 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**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
 - For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3AP supplemental plaque.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-4a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.
- TCP (2-4b)**
- For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(15) where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings, not the entire work zone.

Traffic Operations Division Standard

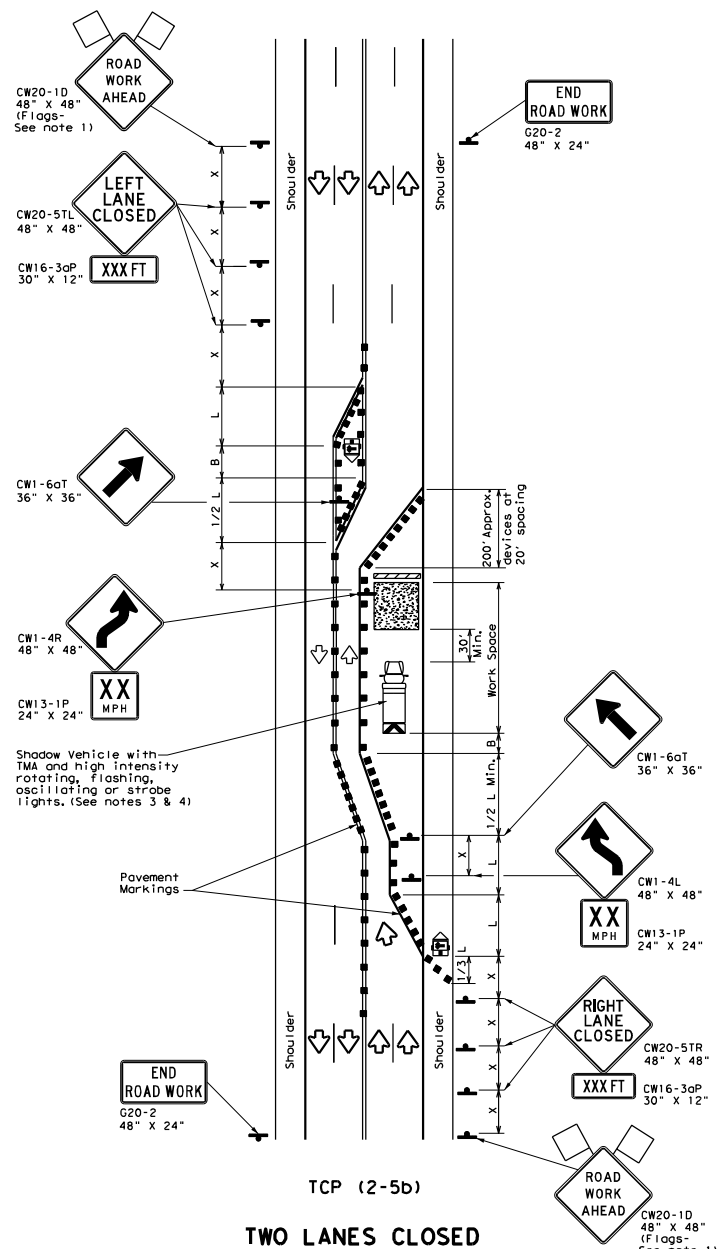
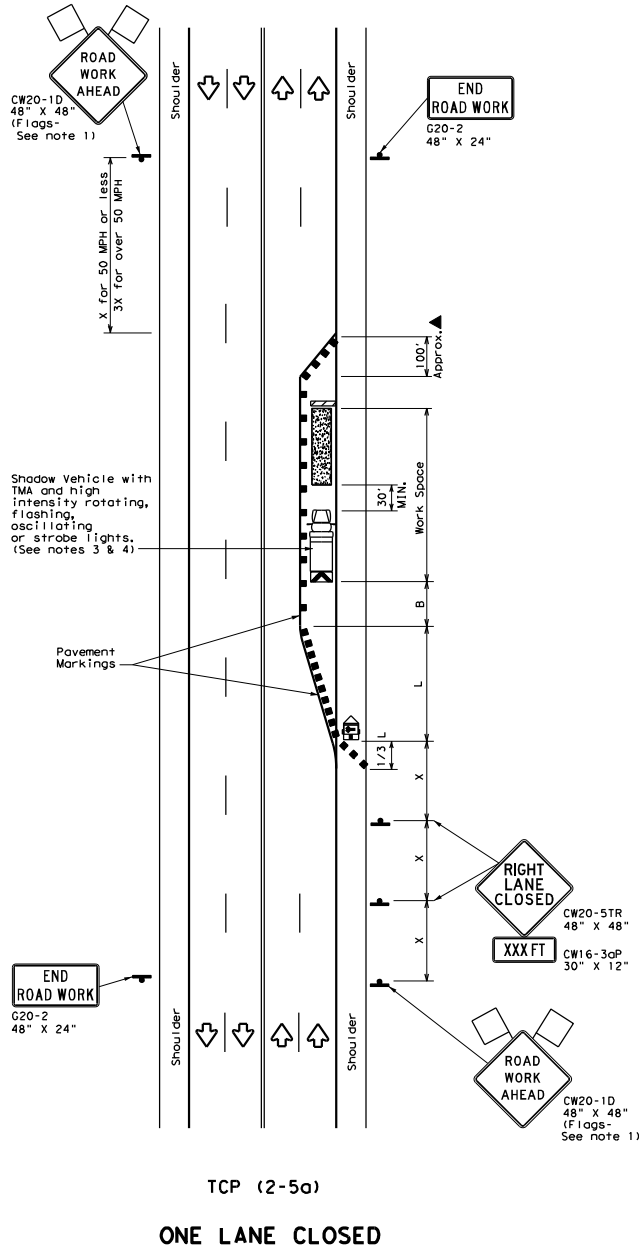
**TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE
CONVENTIONAL ROADS**

TCP (2-4) - 18

FILE: tcp2-4-18.dgn	DATE: December 1985	CONTRACT NO: 6442	SECTION: 72	JOB NO: 001	US 59, ETC.
REVISED: 8-95 3-01	REVISED: 1-97 2-12	DIST: LFK	COUNTY: ANGELINA	SHEET NO: 21	

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DATE: 4/14/2023 7:34:36 AM
FILE: T:\LKFD\Main\Main\Contract\030.RMC - Routine Maintenance\Contract\030.RMC - Routine Maintenance\Traffic Control Plan\TCP (2-5)-18.dgn



LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed * X	Formula L = WS ² 60	Minimum Desirable Taper Lengths			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30		150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45		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

- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
 - The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.
- TCP (2-5a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.
- TCP (2-5b)**
- Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN
LONG TERM LANE CLOSURES
MULTILANE CONVENTIONAL RDS.

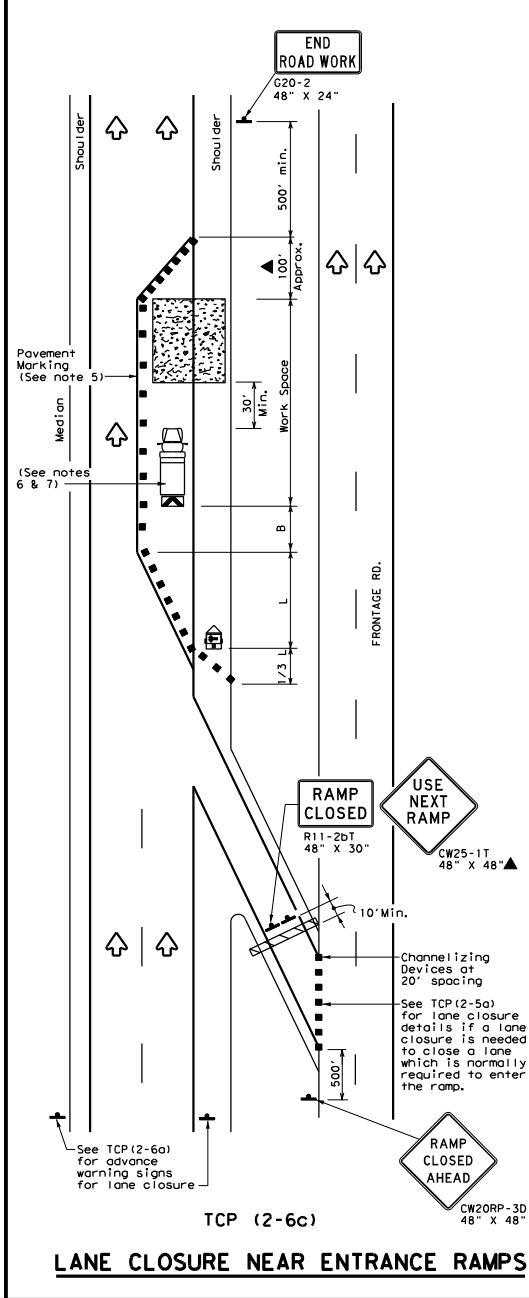
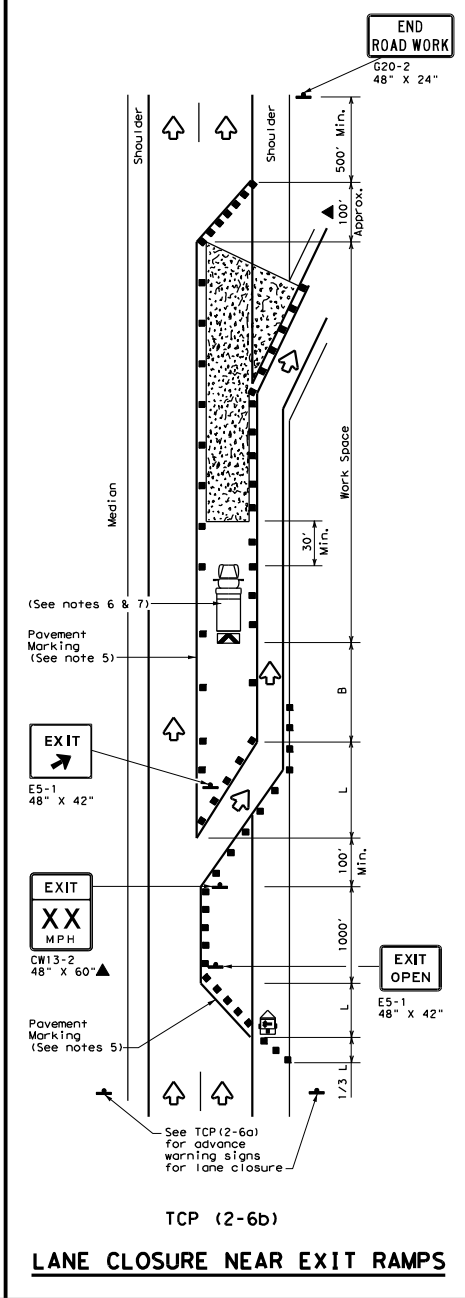
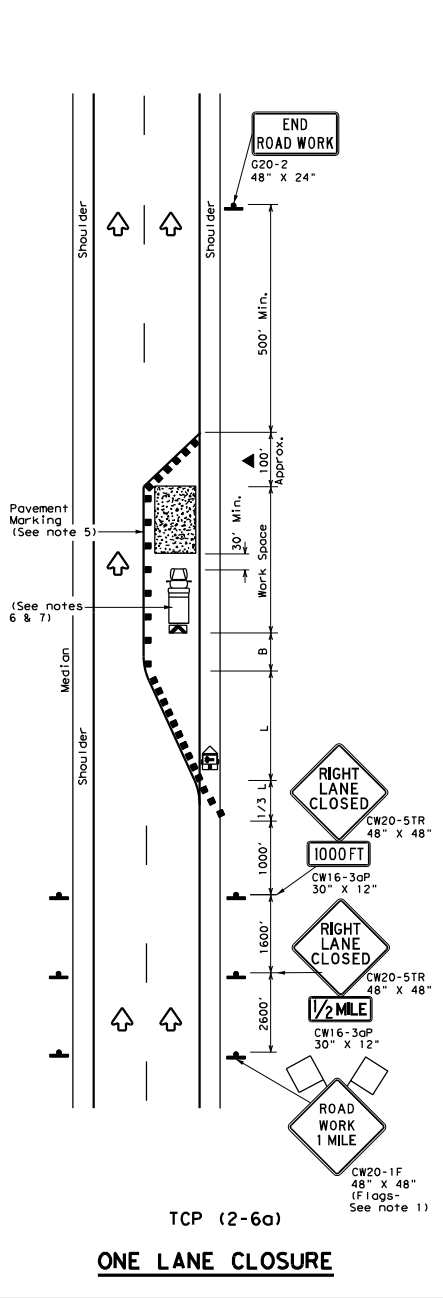
TCP (2-5) - 18

FILE: tcp2-5-18.dgn	DN:	CR:	DR:	CR:
© TxDOT	REVISIONS	DATE	BY	JOB
8-95	2-12	6442	72	001 US 59, ETC.
1-97	3-03			COUNTY SHEET NO.
4-98	2-18			LFK ANGELINA 22

1165

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DATE: 4/14/2023 7:34:37 AM
 FILE: T:\LKFDOM\Main\Contract\0-RMC - Routine Maintenance\Contract\0-RMC - Routine Maintenance\02-259B8B3.dgn



LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing ** Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS / 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	LONG TERM STATIONARY

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
 - Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on every other channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
 - The placement of pavement markings may be omitted on intermediate-term stationary work zones with the approval of the Engineer.
 - Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TRAFFIC CONTROL PLAN
LANE CLOSURES ON
DIVIDED HIGHWAYS
TCP (2-6) - 18

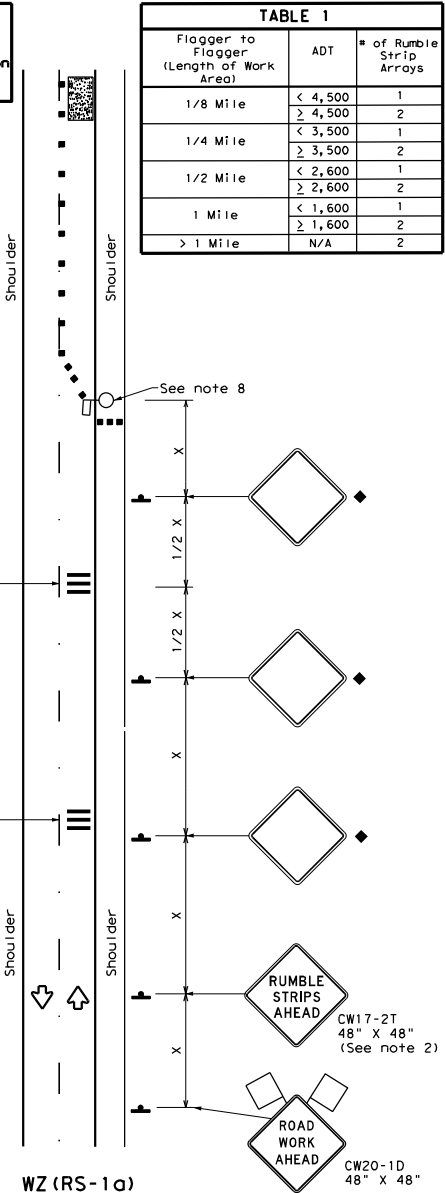
FILE:	tcp2-6-18.dgn	DN:	CK:	DB:	CK:
© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY
2-94	4-98	6442	72	001	US 59, ETC.
8-95	2-12			DIST	COUNTY
1-97	2-18			LFK	ANGELINA
					SHEET NO. 23

166

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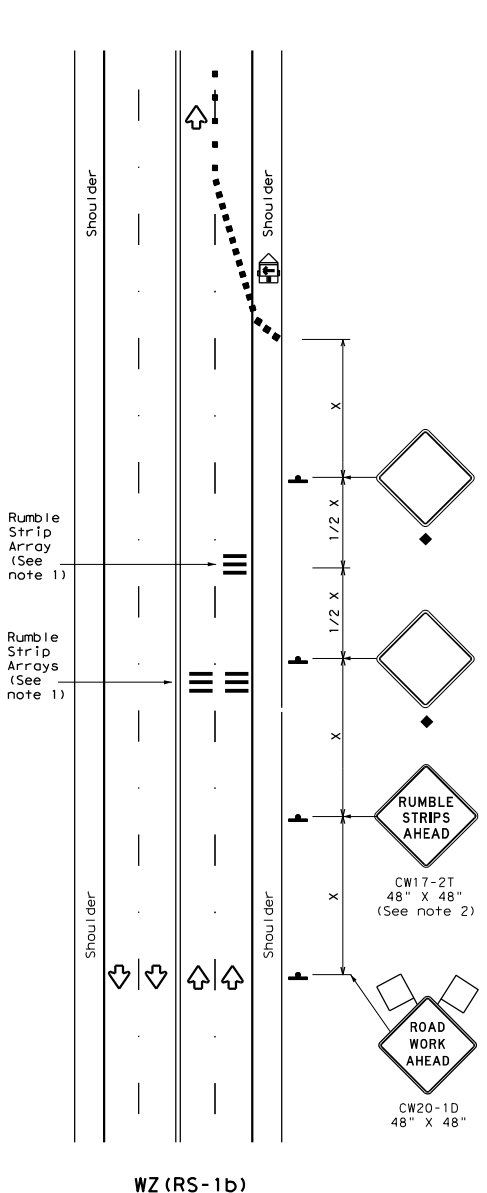
DATE: 4/14/2023 7:34:47 AM
 FILE: T:\LFK\DM\mnt\contracts\0-RMC - Routine Maintenance Contracts\123 of 123\signage\signage\wzrs22.dgn

Warning sign and rumble strip sequence in opposite direction is same as below.



RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

Flagger to Flagger (Length of Work Area)	ADT	# of Rumble Strip Arrays
1/8 Mile	< 4,500	1
	> 4,500	2
1/4 Mile	< 3,500	1
	> 3,500	2
1/2 Mile	< 2,600	1
	> 2,600	2
1 Mile	< 1,600	1
	> 1,600	2
> 1 Mile	N/A	2



RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

- Each Rumble Strip Array should consist of three rumble strips spaced center to center at the spacing shown in Table 2, placed transverse across the lane at locations shown.
- The CW17-2T "RUMBLE STRIPS AHEAD" sign should be located after the CW20-1D "ROAD WORK AHEAD" sign and spaced as shown. If traffic is observed to be queuing, or is expected to queue beyond the Rumble Strips, the CW17-2T sign and the first Rumble Strip Array may be located upstream of the CW20-1D sign as necessary to provide needed warning.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing Distance	Suggested Longitudinal Buffer Space ^b
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² /60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40	L = WS	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50	L = WS	500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60	L = WS	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	L = WS	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)

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD typical application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

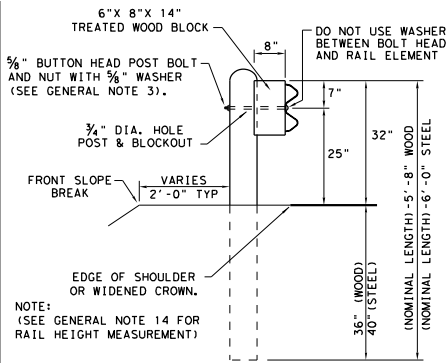
Texas Department of Transportation
Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

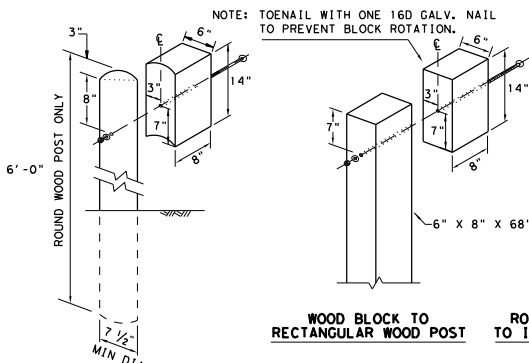
WZ (RS) - 22

FILE: wzrs22.dgn	DATE: TxDOT November 2012	CONT: 6442	SECT: 72	JOB: 001	HIGHWAY: US 59, ETC.
REVISIONS: 2-14 4-16	1-22	DIST: LFK	COUNTY: ANGELINA	SHEET NO.: 24	

DATE: 4/14/2023
 FILE: T:\L\FKDM\WgInt Contracts\0-RMC - Routine Maintenance Contracts\1923 Plans\6442-72-001 ANG MBEF\RMC 6442-72-001 ANGELINA MBEF\CON-STDS-STANDARDS\NEW MBEF & SGT STANDARDS\



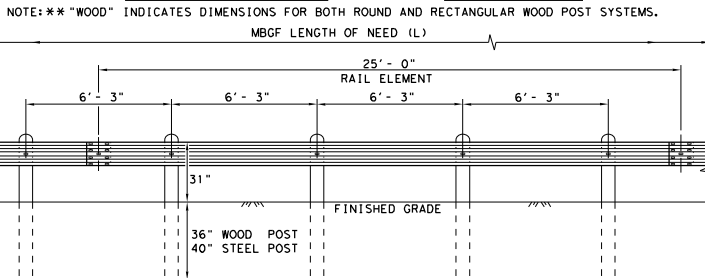
TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

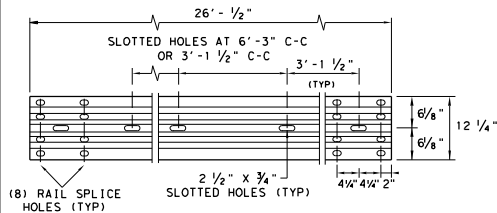
GENERAL NOTES

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 MBEF 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 ELEMENTS 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'-1 1/2" 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 & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
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. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 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 COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR 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 BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.



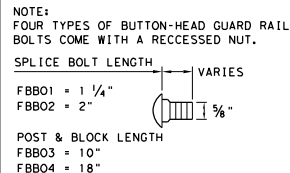
ELEVATION MID-SPAN RAIL SPLICE

SHOWING A 25'-0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



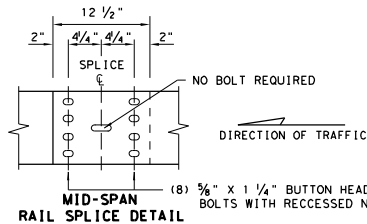
ELEVATION 25'-0" (NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES. SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.



BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



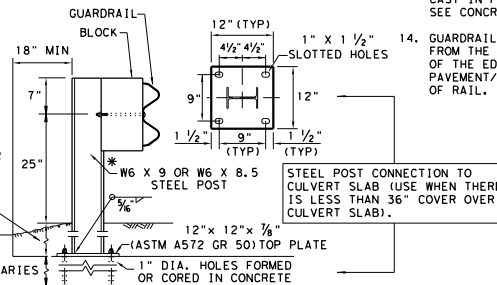
MID-SPAN RAIL SPLICE DETAIL

NOTE: GF (31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

12" x 12" x 1/4" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST



NOTE: TRANSITIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS. SEE GF (31) TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS. SEE GF (31) TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

NOTE: TWO INSTALLATION OPTIONS.

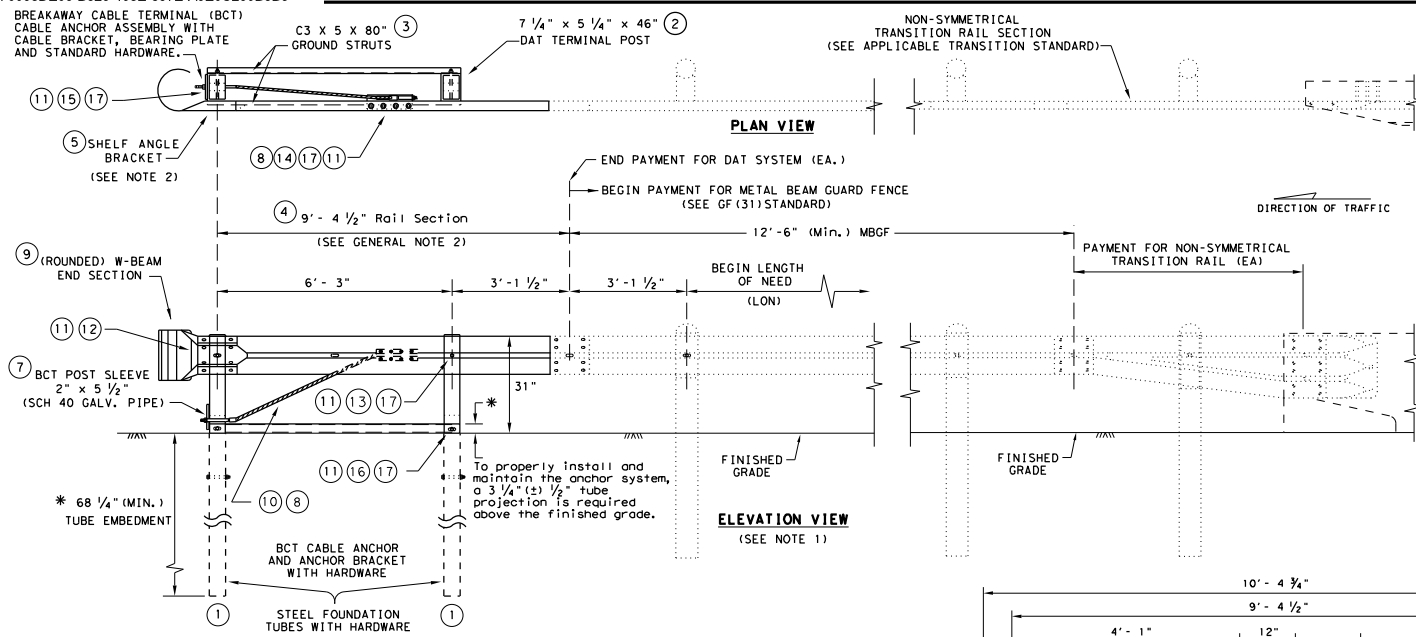
1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" 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 1/4" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF (31) LS STANDARD FOR "LONG SPAN" OPTION.

		Design Division Standard	
METAL BEAM GUARD FENCE TL-3 MASH COMPLIANT GF (31)-19			
FILE: gf3119.dgn	DN: TXDOT	CR: KM	DR: VP
© TXDOT: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	6442 72	001	US 59, ETC.
	DIST	COUNTY	SHEET NO.
	LFK	ANGELINA	25

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DATE: 4/14/2023
 FILE: T:\LK\KDM\mnt\ Contracts\0-RMC - Routine Maintenance Contracts\1923 Plans\6442-72-001 ANG MBGF\ANG-MBGF-DON-STD-STANDARDS\NEW MBGF & SGT STANDARDS\

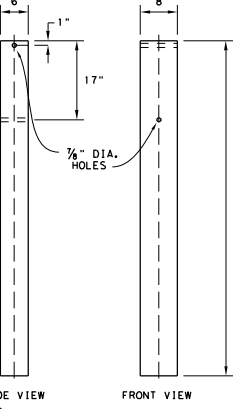
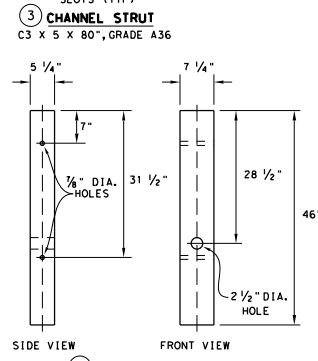
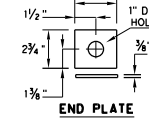
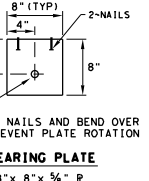
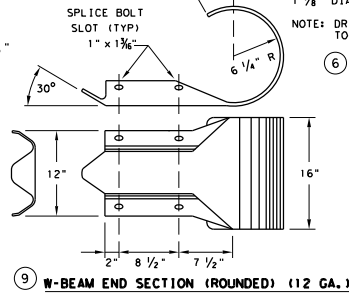
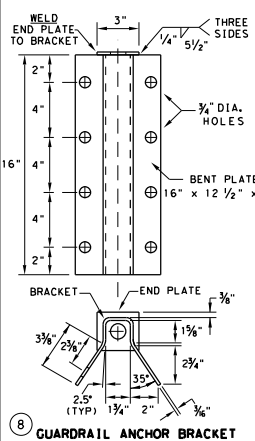


DOWNSTREAM ANCHOR TERMINAL (DAT)
 NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

- GENERAL NOTES**
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (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



Design Division Standard

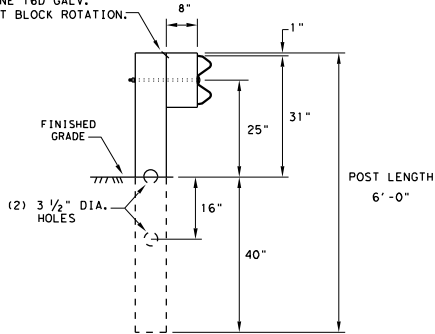
METAL BEAM GUARD FENCE
 (DOWNSTREAM ANCHOR TERMINAL)
 TL-3 MASH COMPLIANT
 GF (31) DAT-19

FILE: gf31dat19.dgn	DW: TxDOT	CK: KM	DR: VP	CK: CGL/AG
© TxDOT: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY	
REVISIONS	6442 72	001	US 59, ETC.	
	DIST	COUNTY	SHEET NO.	
	LFK	ANGELINA	26	

2 TERMINAL POST
 7 1/4" x 5 1/4" x 46" WOOD POST

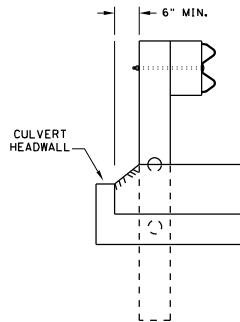
1 STEEL FOUNDATION TUBE
 6" x 8" x 1/8" x 72" STEEL TUBE

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



**RECTANGULAR CRT POST
(6' X 8' X 6' LONG)**

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



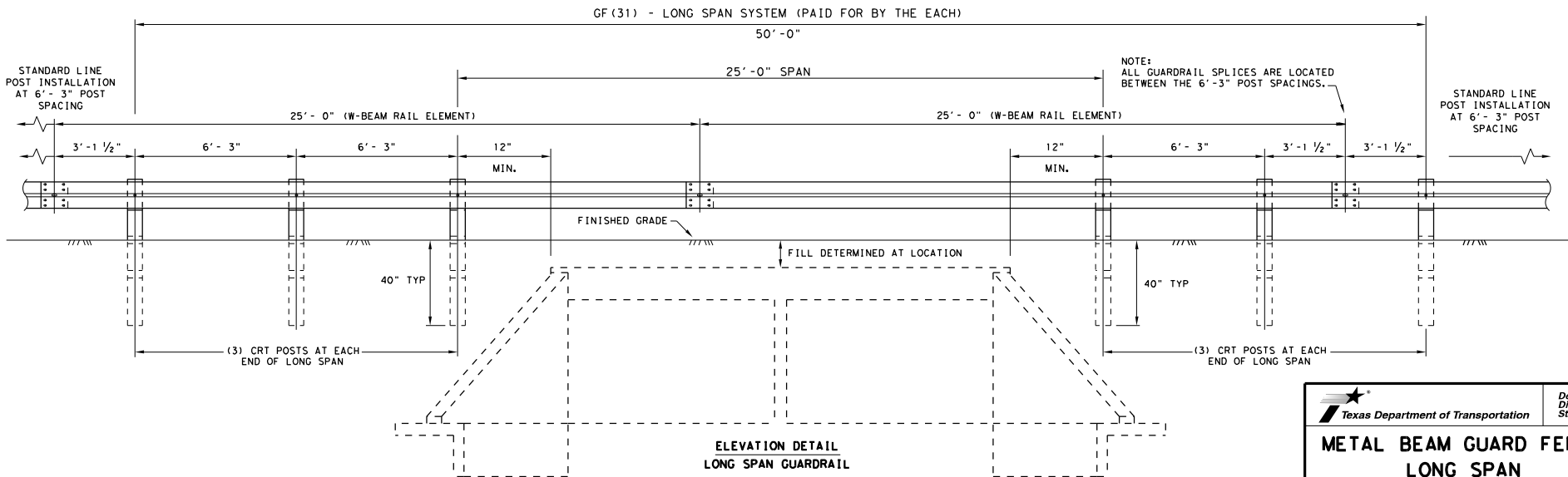
**LATERAL OFFSET BETWEEN THE
GUARDRAIL AND THE CULVERT HEADWALL**

GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS 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 ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'-6" OR 25'-0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'-1 1/2" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FNC16g) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF (31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC



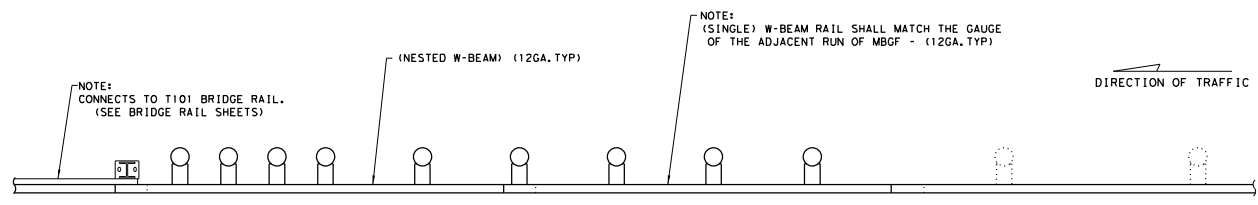
**ELEVATION DETAIL
LONG SPAN GUARDRAIL**

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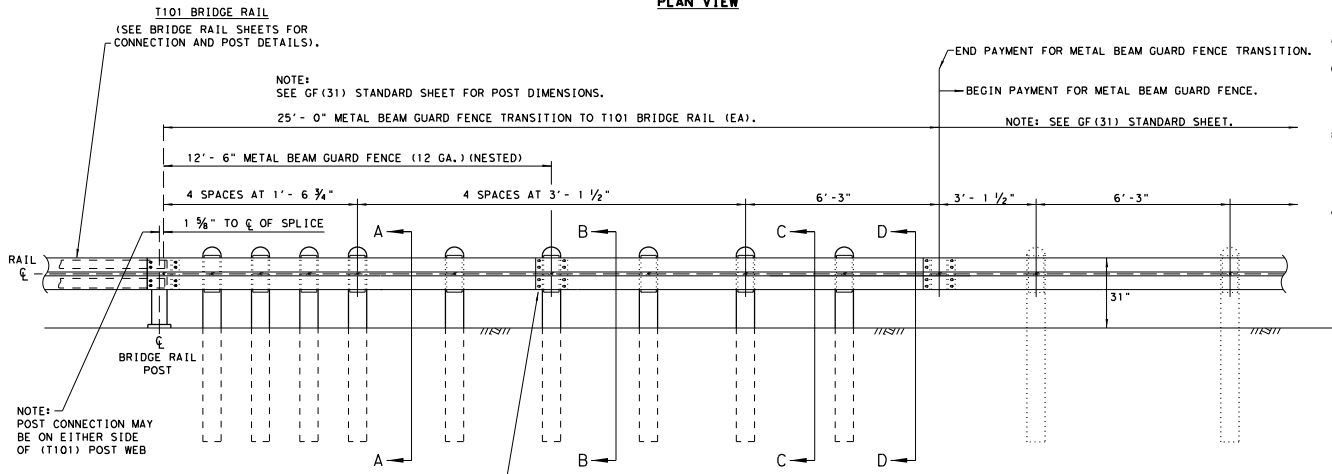
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		Design Division Standard	
METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT GF(31)LS-19			
FILE: gf31ls19.dgn	DN: TxDOT	CR: KM	DR: VP
© TxDOT: NOVEMBER 2019	CONT: 6442	SECT: 72	JOB: US 59, ETC.
REVISIONS	DIST: LFK	COUNTY: ANGELINA	SHEET NO.: 27

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 DATE: 4/14/2023
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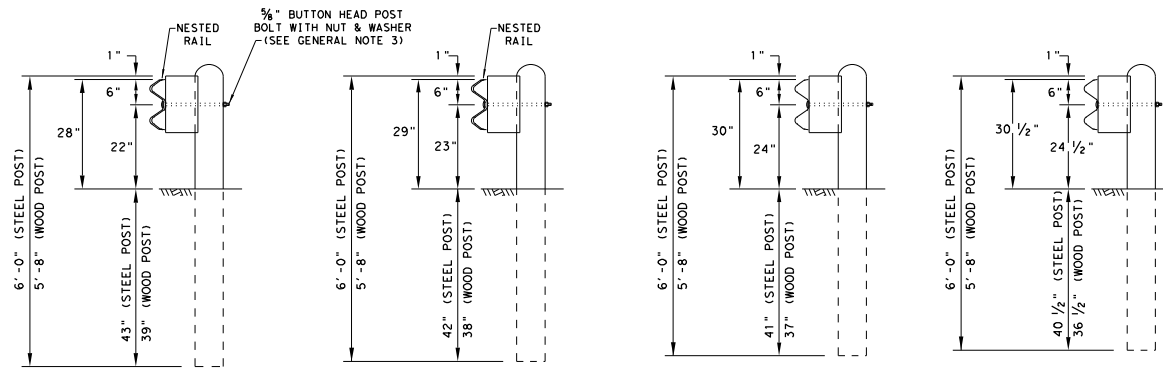


PLAN VIEW



ELEVATION VIEW

* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



SECTION A-A

SECTION B-B

SECTION C-C

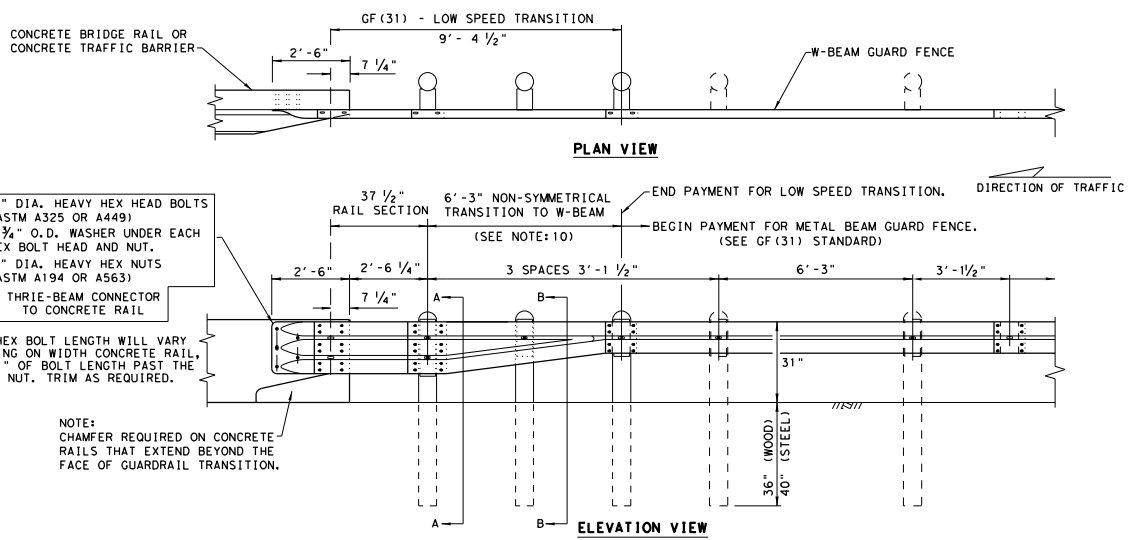
SECTION D-D

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'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR. A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1-1/4" WITH 5/8" 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 SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR 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 BLOCKS.
9. REFER TO STANDARD GF (31) AND APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T101)			
GF (31) T101-19			
FILE: gf31t10119	DW: TxDOT	CK: KM	DR: VP
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REVISIONS	6442 72	001	US 59, ETC.
DIST	COUNTY		SHEET NO.
LFK	ANGELINA		28

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 DATE: 4/14/2023 7:34:53 AM
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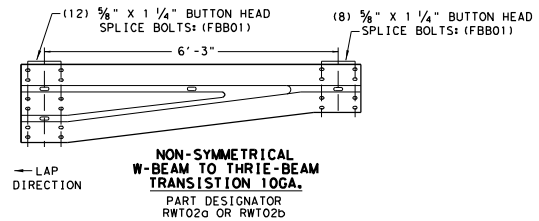
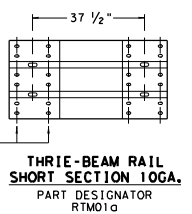
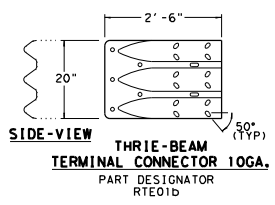


- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
 - (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
 - (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)
- NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL. LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.

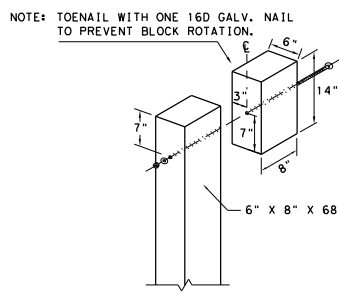
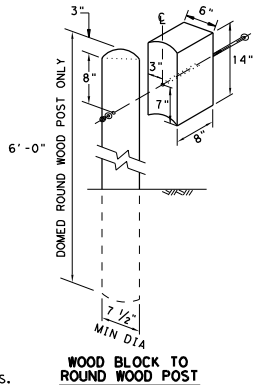
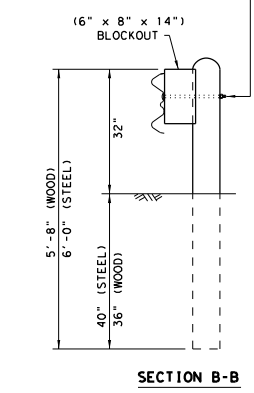
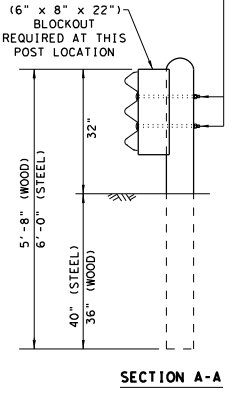
GENERAL NOTES

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 TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF (31) STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
3. 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.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 7/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
5. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
7. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR 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 BLOCKS.
9. REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
10. FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

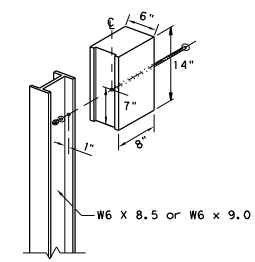


- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 3/8" FLAT WASHER: (FWC14g) UNDER EACH NUT

BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
 BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.



NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



NOTE: * "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.

WOOD BLOCK TO ROUND WOOD POST

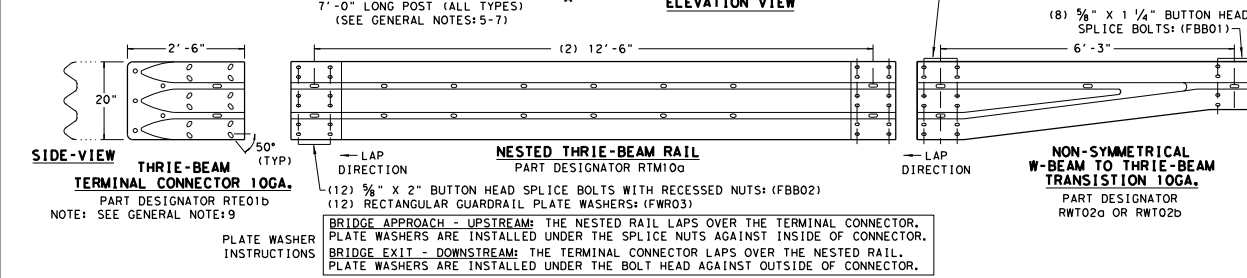
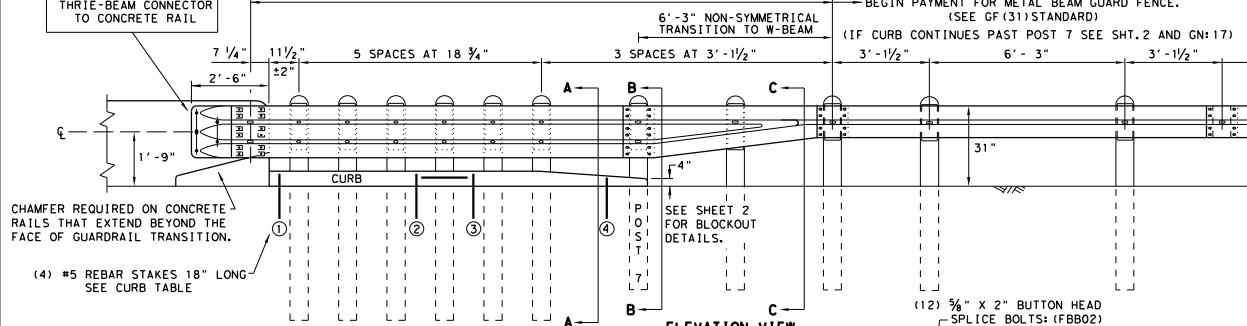
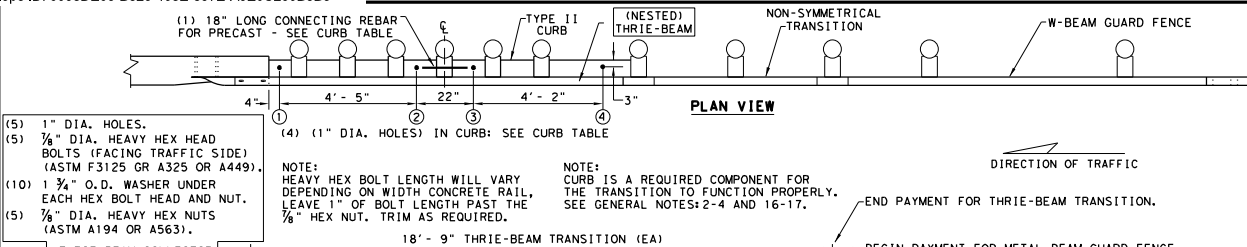
WOOD BLOCK TO RECTANGULAR WOOD POST

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

LOW-SPEED TRANSITION

		Design Division Standard	
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT GF (31) TR TL2-19			
FILE: gf31trtl219.dgn	DN: TXDOT	CK: KM	DR: VP
© TXDOT: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	6442 72	001	US 59, ETC.
DIST	COUNTY		SHEET NO.
LFK	ANGELINA		29

DATE: 4/14/2023
 FILE: T:\NFKOM\mnt\contracts\0-RMC - Routine Maintenance Contracts\1723 Plots\6442-72-001 ANG MBE\NMC 6442-72-001 ANGELINA MBE\CONSTD\STANDARDS\NEW MBE & SGT STANDARDS\



THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'-2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'-8"

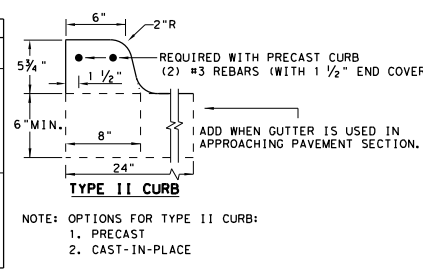
CURB (2) LENGTH 6'-6"

TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2): FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR. 60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE "s": FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR. 60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.

* NOTES: NOT NEEDED FOR CAST-IN-PLACE. SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS. PERCUSSION DRILLING IS NOT PERMITTED WITH TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.



- GENERAL NOTES**
- CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
 - CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5'-8" HEIGHT); SEE CURRENT CCG STANDARD SHEET FOR FURTHER DETAILS. 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 UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTIGUES PAST POST 7.
 - CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
 - UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
 - FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
 - THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF (31) STANDARD SHEET.
 - 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 3/4" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
 - POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
 - RAIL ELEMENTS 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.
 - BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
 - FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
 - WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
 - UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
 - REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
 - THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
 - IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION. (SEE SHT. 2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT. 2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

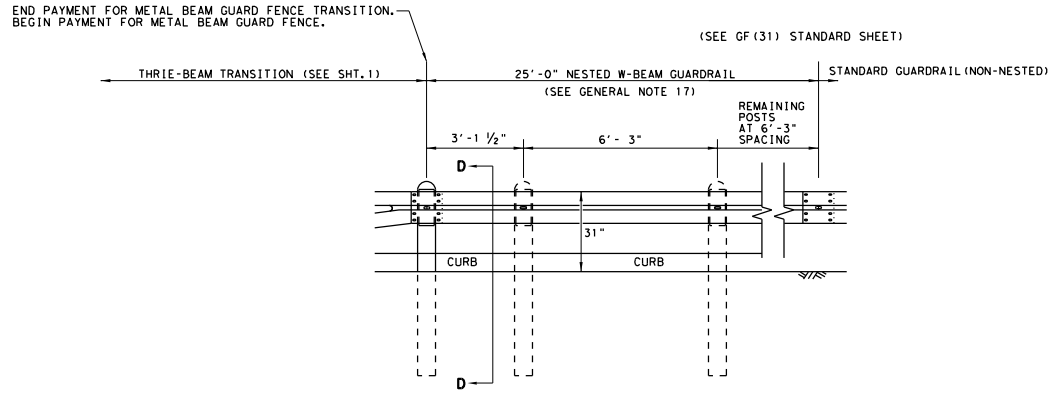
SHEET 1 OF 2

METAL BEAM GUARD FENCE
THRIE-BEAM TRANSITION
TL-3 MASH COMPLIANT
GF (31) TR TL3-20

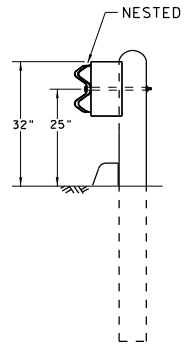
FILE: gf31tr+1320.dgn	DN: TXDOT	CR: KM	DR: VP	CR: CGL/AG
© TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	6442	72	001	US 59, ETC.
	DIST	COUNTY		SHEET NO.
	LFK	ANGELINA		30

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 DATE: 4/14/2023
 FILE: T:\LFK\DM\Gint Contracts\0.RMC - Routine Maintenance Contracts\123 Plots\6442-72-001 ANG MBEF.RMC 6442-72-001 ANGELINA MBEF.DGN\STD-STANDARDS\NEW MBEF & SGT STANDARDS

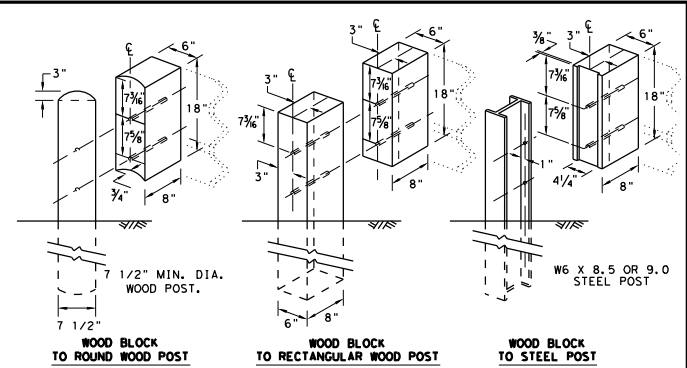
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

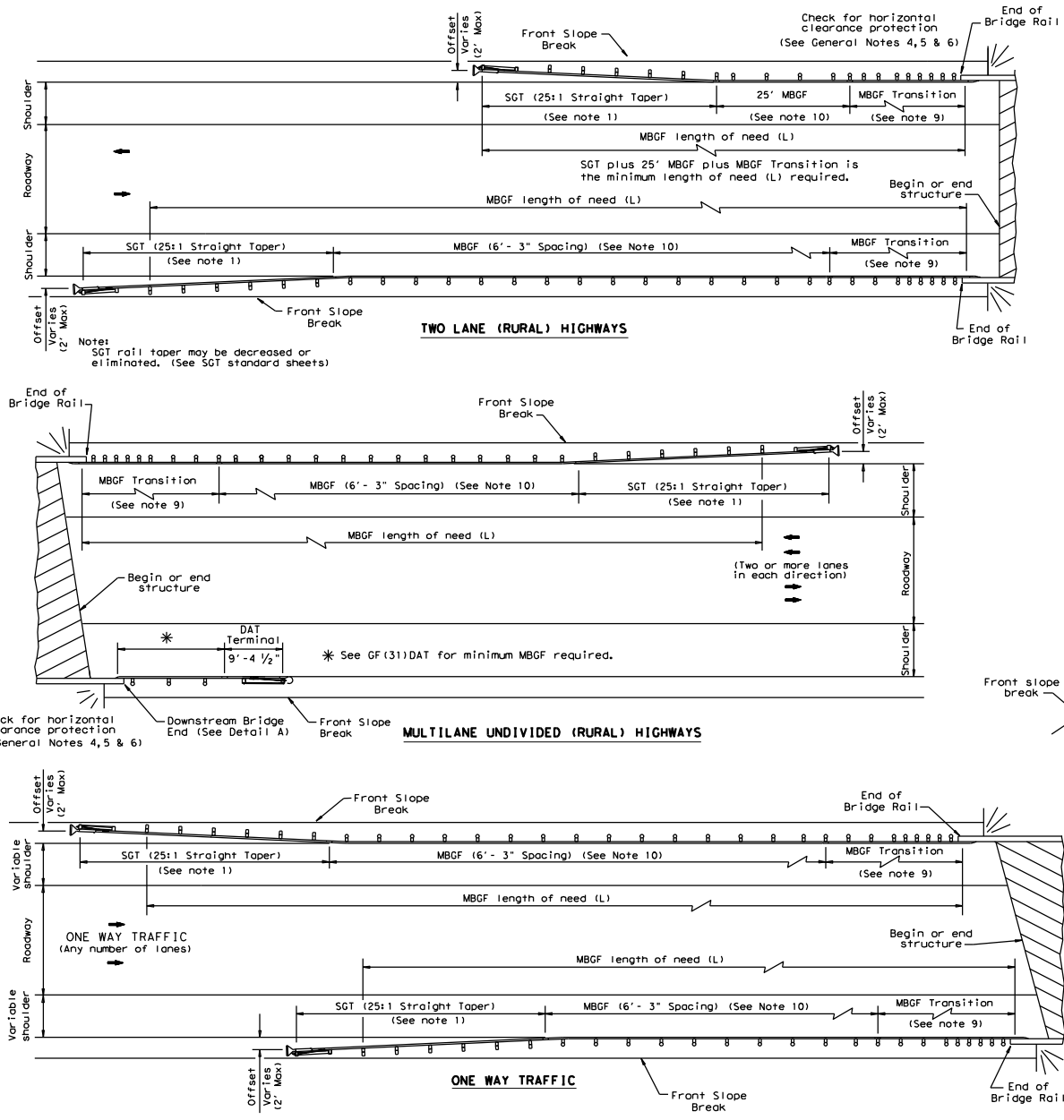
HIGH-SPEED TRANSITION

SHEET 2 OF 2

		Design Division Standard	
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT GF (31) TR TL3-20			
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DR: KM
© TxDOT: NOVEMBER 2020	CONT: 6442	SECT: 72	JOB: 001
REVISIONS	DIST: LFK		COUNTY: ANGELINA
	HIGHWAY: US 59, ETC.		SHEET NO.: 31

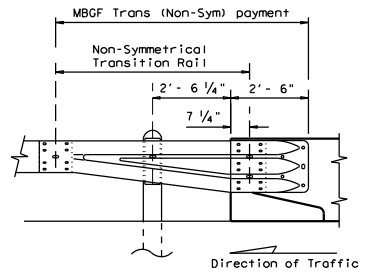
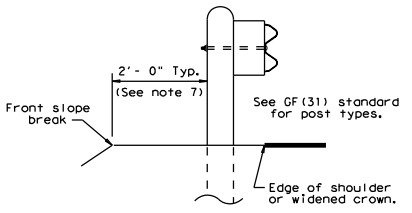
DISCLAIMER: This standard is covered by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 4/14/2023 7:34:56 AM
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GENERAL NOTES

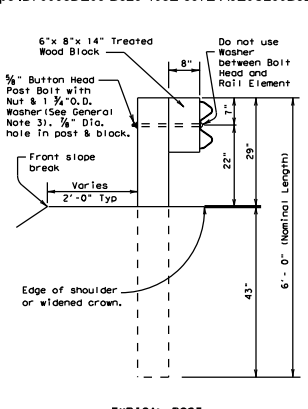
- For more detail: See GF (31), SGT (31), GF (31)TR, and GF (31)TL2 standard sheets.
- Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
- Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway 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.
- 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.
- Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
- 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)
- 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 of MBGF).
- 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.
- Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
- A minimum 25' length of MBGF will be required.



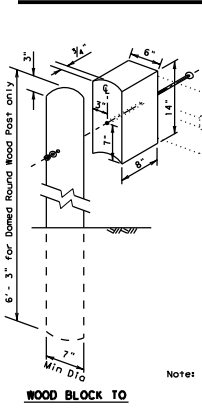
Note: All rail elements shall be lapped in the direction of adjacent traffic.

				Design Division Standard	
BRIDGE END DETAILS (METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS) BED-14					
FILE: bed14.dgn	DN: TxDOT	CR: AM	DN: BD/VP	CR: CGL	
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY	
REVISED APRIL 2018 REVISIONS	6442	72	001	US 59, ETC.	
REL: NEW 04/18	DIST	COUNTY	SHEET NO.		
	LFK	ANGELINA			32

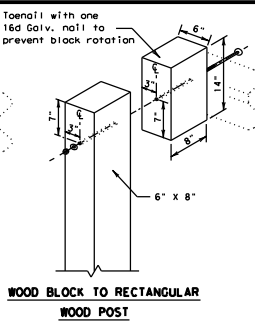
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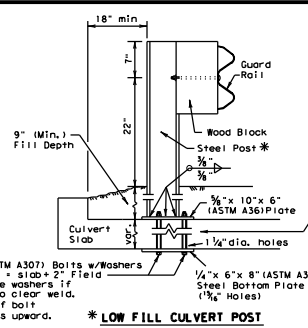
TYPICAL POST



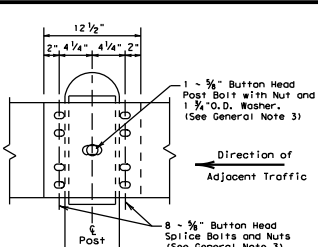
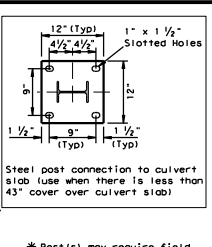
WOOD BLOCK TO RECTANGULAR WOOD POST



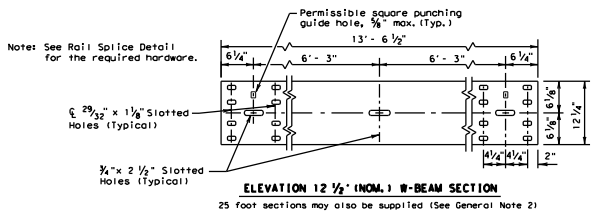
WOOD BLOCK TO STEEL POST



LOW FILL CULVERT POST FOR USE ON NON-BRIDGE CLASS CULVERTS ONLY



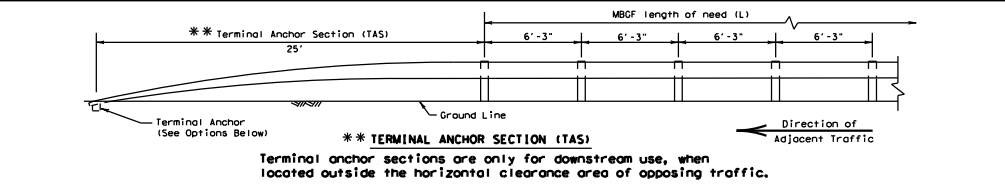
RAIL SPLICE DETAIL



ELEVATION 12 1/2" (NOM.) W-BEAM SECTION

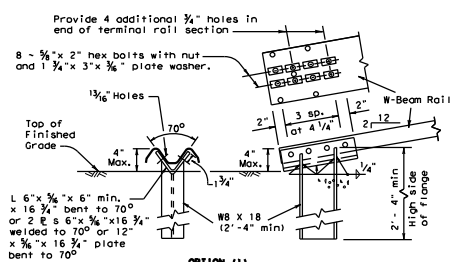
GENERAL NOTES

- 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."
- 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 1/2 or 25 foot nominal lengths.
- 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 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/4" x 1 1/4" (or 2" long of triple rail splices) with a 3/8" double recessed nut (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
- 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.
- 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.
- Posts shall not be set in concrete, of any depth.
- Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
- 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."
- 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.



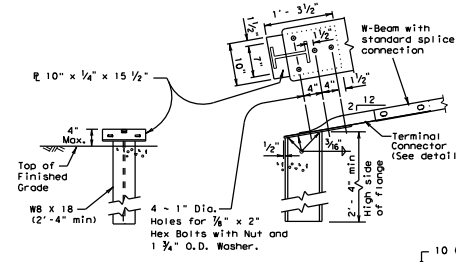
TERMINAL ANCHOR SECTION (TAS)

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



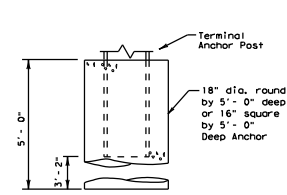
OPTION 111

Note: This anchor post requires four additional 3/4" holes (shop or field) in the rail member with eight 3/8" hex bolts with nut and plate washer.



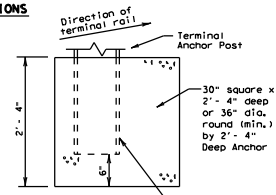
OPTION 121

Note: This anchor post requires the use of the 10 ga. terminal connector with four 7/8" hex bolts with nut and washer.



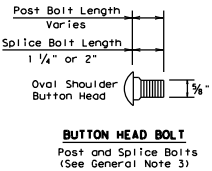
TERMINAL CONCRETE ANCHOR OPTIONS

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 CONNECTOR

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

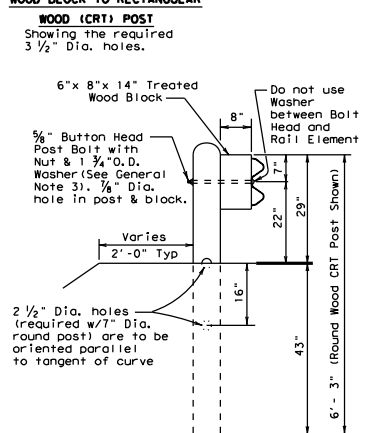
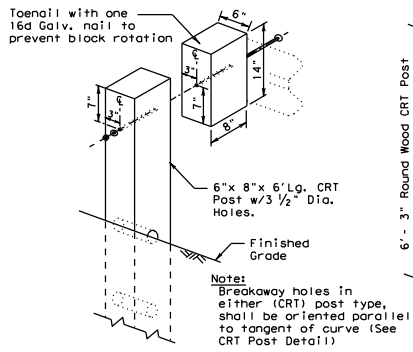


BUTTON HEAD BOLT
 Post and Splice Bolts
 (See General Note 3)

ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

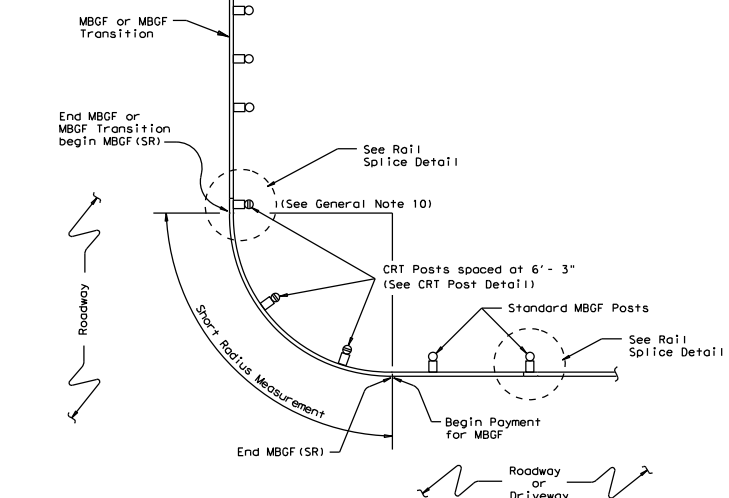
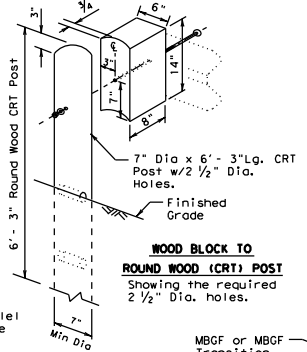
		Design Division Standard	
METAL BEAM GUARD FENCE			
MBGF - 19			
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REVISIONS	CONT: 6442	SECT: 72	JOB: 001
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			SHEET NO. 33

DISCUSS MBGF WITH DESIGNER. THIS STANDARD IS COVERED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.
 DATE: 4/14/2023
 FILE: T:\LFK\DM\Main\Contracts\0-RMC - Routine Maintenance Contracts\1923 Plans\6442-72-001 ANG MBGF\N.C. 6442-72-001 ANGELINA MBGF\CONV-STD-STANDARDS\NEW MBGF & SGT STANDARDS.rvt



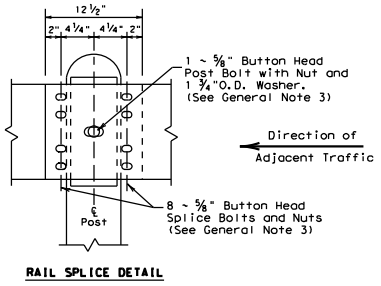
(CRT) POST DETAIL CONTROLLED RELEASE TERMINAL POST

Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



PLAN VIEW SHOWING TYPICAL RADIUS

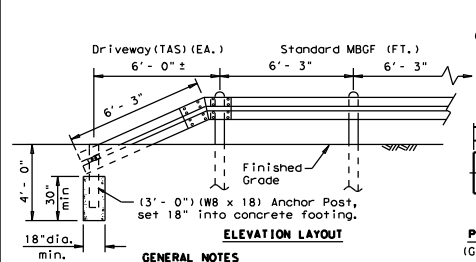
The required radius is shown elsewhere on the plans.



RAIL SPLICE DETAIL

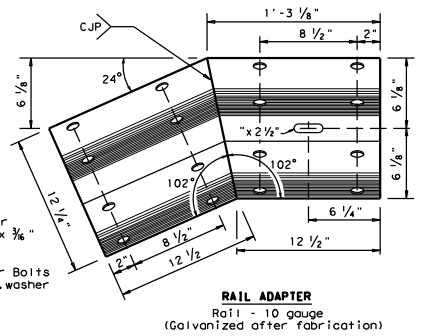
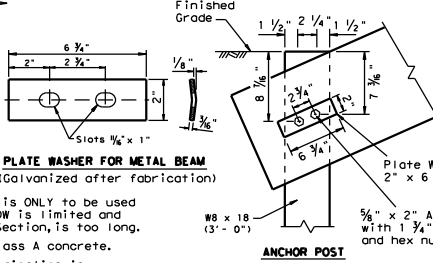
GENERAL NOTES

- The type of (CRT) post (round wood post, or rectangular wood 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 are not permitted at CRT post positions.
- 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 1/2 or 25 foot nominal lengths.
- 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 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 3/8" x 1 1/4" (or 2" long at triple rail splices) with a 3/8" double recessed nut (ASTM A563).
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
- 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.
- 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.
- Guardrail posts shall not be set in concrete, of any depth.
- Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
- 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."
- 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.



"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.



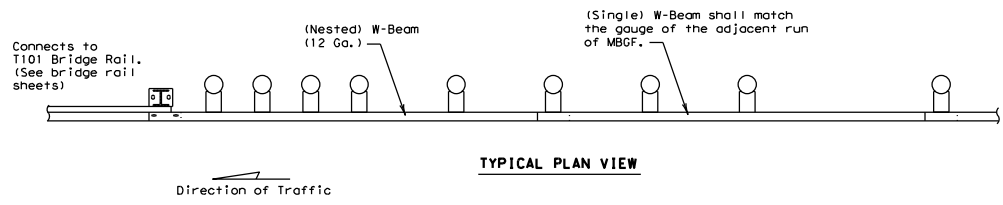
ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

Texas Department of Transportation Design Division Standard

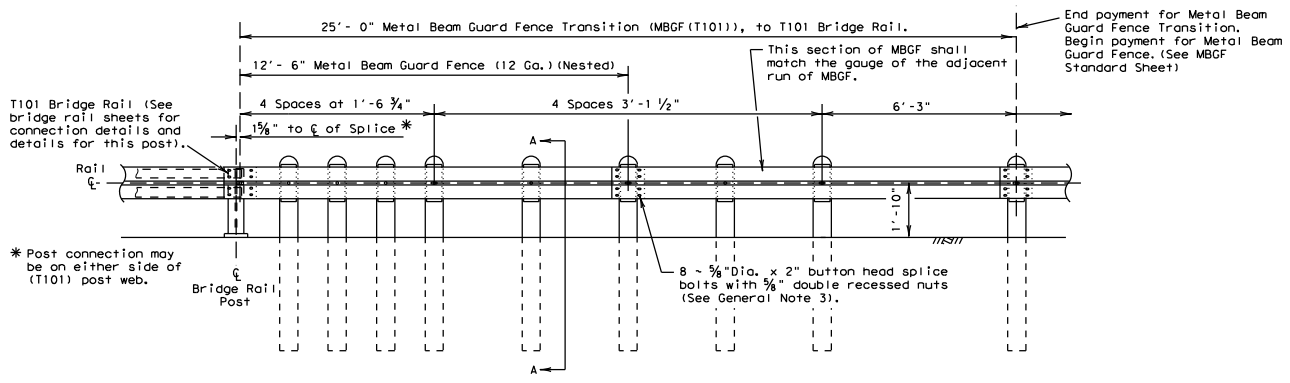
METAL BEAM GUARD FENCE (SHORT RADIUS) MBGF (SR) - 19

FILE: mbgfr19.dgn	DN: TxDOT	CR: KM	DR: BD	CR: VP
© TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6442	72	001	US 59, ETC.
	DIST	COUNTY	SHEET NO.	
	LFK	ANGELINA	34	

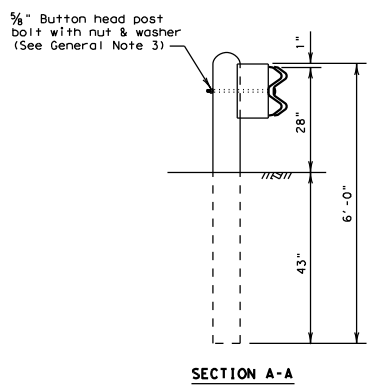
DISCUSS IFCR. THIS STANDARD IS COVERED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.
 DATE: 4/14/2023
 FILE: T:\LFK\DM\Main\Contract\0-RMC - Routine Maintenance Contracts\123 Plans\1642-72-001 ANG MBGF\11-MBGF\11-STD\STANDARDS\NEW MBGF & SGT STANDARDS.dgn



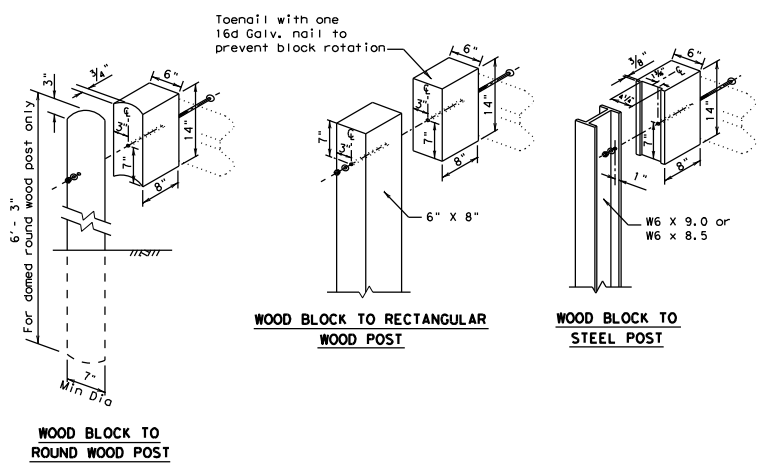
TYPICAL PLAN VIEW



TYPICAL ELEVATION VIEW



SECTION A-A



WOOD BLOCK TO RECTANGULAR WOOD POST

WOOD BLOCK TO STEEL POST

WOOD BLOCK TO ROUND WOOD POST

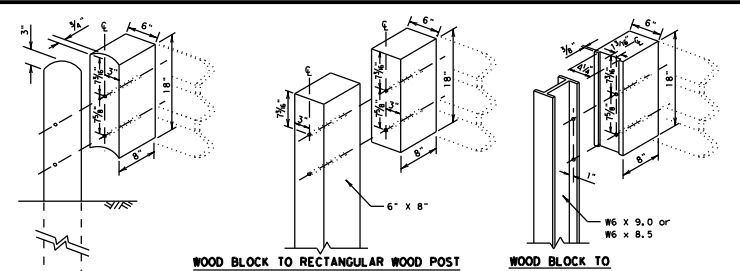
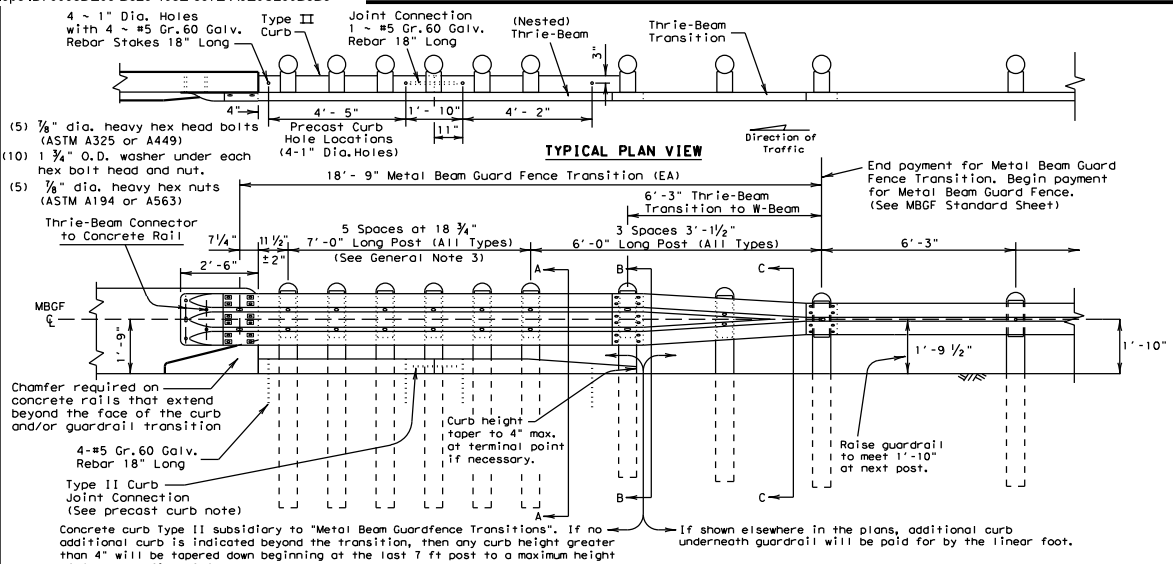
GENERAL NOTES

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 (ASTM A563) and the Type A 1 1/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 2" (at triple rail splices) with a 3/8" 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 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.
8. Refer to MBGF Standard Sheet for additional details.

ONLY FOR USE IN MAINTENANCE REPAIRS.

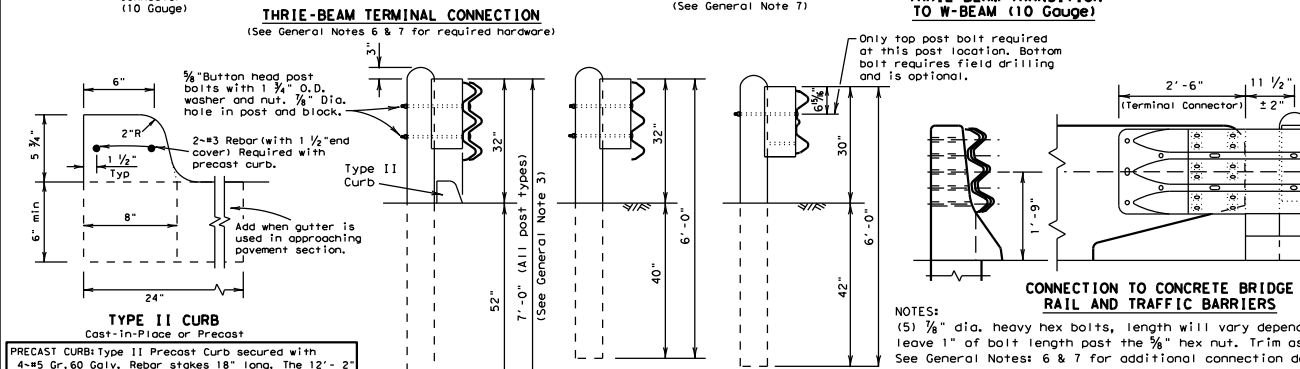
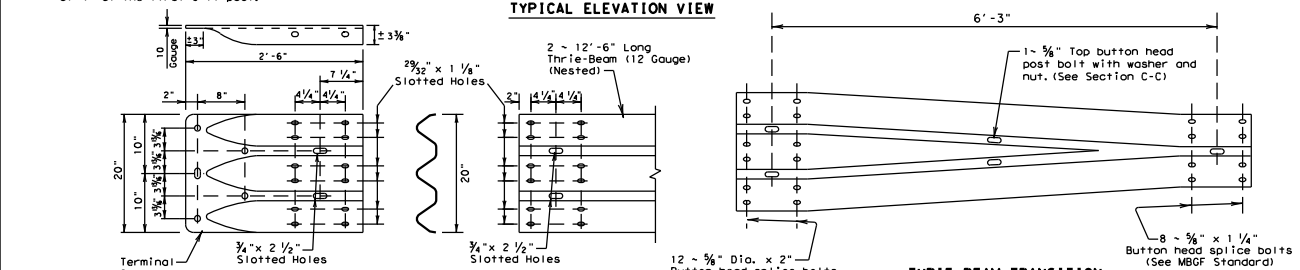
		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T101) (T101 BRIDGE RAIL) MBGF (T101)-19			
FILE: mbgf110119.dgn	DN: TxDOT	CR: KM	DR: BD
© TxDOT NOVEMBER 2019	CONT: 6442	SECT: 72	JOB: 001
REVISIONS		HIGHWAY: US 59, ETC.	
DIST: LFK	COUNTY: ANGELINA	SHEET NO. 35	

DATE: 4/14/2023
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 DISCUSS MBEF THIS STANDARD IS COVERED BY THE "TEXAS ENGINEERING PRACTICE ACT" - NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



GENERAL NOTES

- 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 CCCC standard sheet) unless otherwise shown in the plans. If other curb heights are shown in the plans in conjunction with the transition, the concrete curb shall 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.
- The type of post (round wood, rectangular wood or steel) will be shown elsewhere in the plans.
- 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 3/8" in height, and visible after installation. Wooden posts shall be marked with a brand, and steel posts with a stencil before galvanizing.
- 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.
- Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.
- Install terminal connector with (12) rectangular guardrail plate washers (FWR03) and (12) 3/8" x 2" button head splice bolts with recessed nuts.
- Button head "post bolts & nuts" shall meet the requirements of (ASTM A307), and shall be of sufficient length to extend through the full thickness of the nut and 3/8" washer (FWC160) and not more than 1" beyond it. Trim remaining bolt length to meet required length.
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing". Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate transitions.
- If solid rock is encountered. See the MBEF standard sheet for the proper installation guidance.
- Posts shall not be set in concrete.
- 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.



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 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.

NOTES:
 (5) 3/8" dia. heavy hex bolts, length will vary depending on width of concrete rail, leave 1" of bolt length past the 3/8" hex nut. Trim as required. See General Notes 6 & 7 for additional connection details.

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

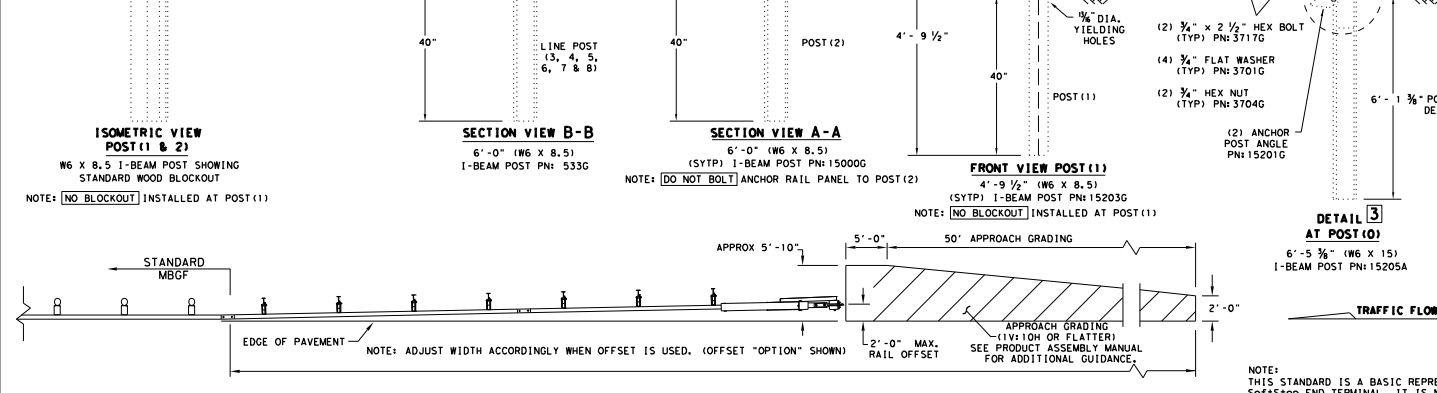
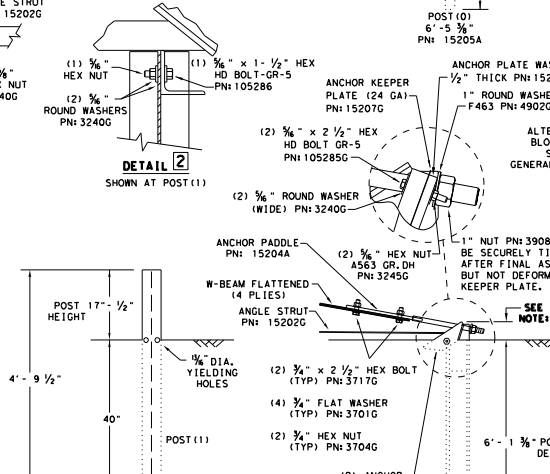
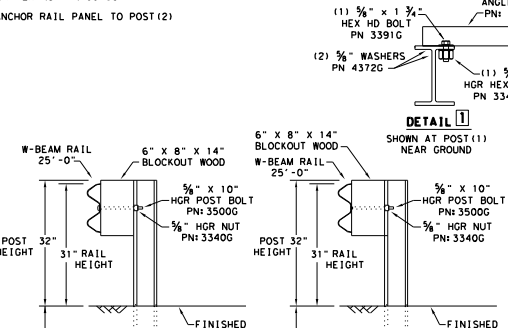
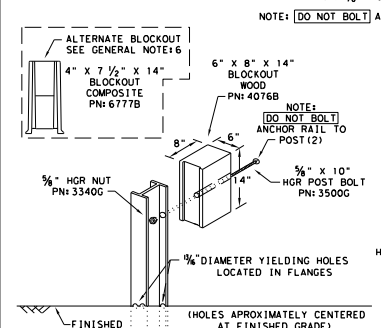
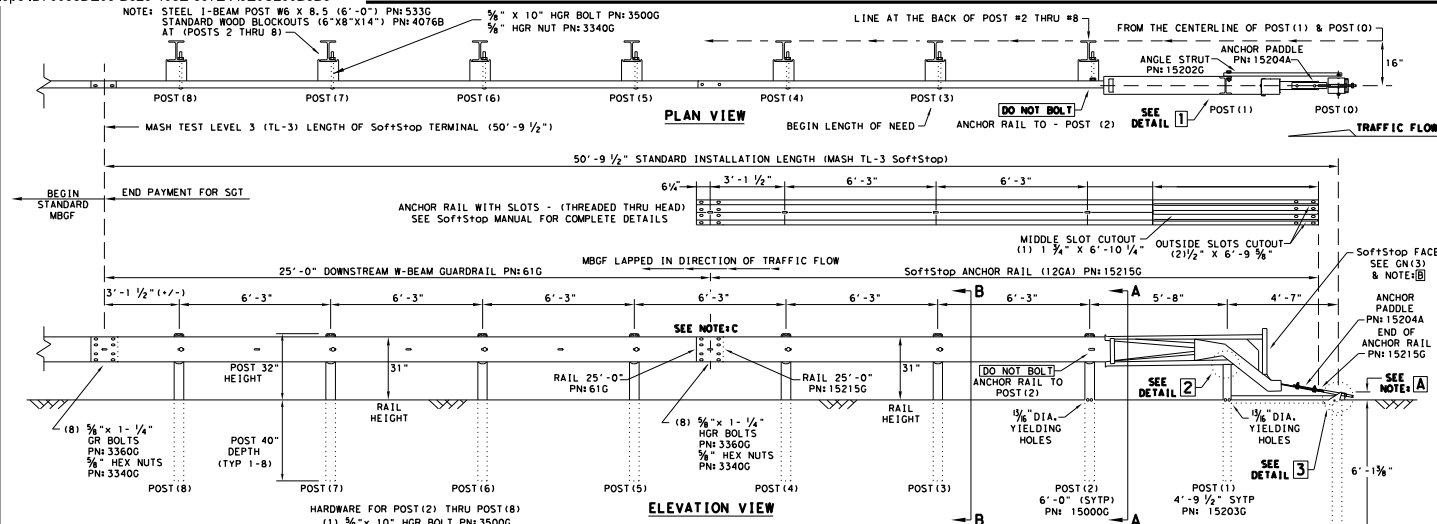
ONLY FOR USE IN MAINTENANCE REPAIRS.

Texas Department of Transportation
 Design Division Standard

METAL BEAM GUARD FENCE TRANSITION (THRIE-BEAM TRANSITION) MBEF (TR) - 19

FILE: mbftr19.dgn	DN: TxDOT	CR: KM	DN: BD	CR: VP
© TxDOT NOVEMBER 2019	CON: SECT	JOB: HIGHWAY		
REVISIONS	6442	72	001	US 59, ETC.
DIST	COUNTY		SHEET NO.	
LFK	ANGELINA		36	

DATE: 4/14/2023
 FILE: T:\LFKDM\mnt\contracts\02\23\PI\01042-72-001 ANG MEG\NMC 6442-72-001 ANGELINA MBGF\CONSTD\STANDARDS\NEW MBGF & SGT STANDARDS



- GENERAL NOTES**
- 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
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING. OBJECT MARKERS ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
 - DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRUISING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

- NOTE A** THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3'-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
- NOTE B** PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
- NOTE C** W-BEAM SPLICE LOCATED BETWEEN LINE POST (4) AND LINE POST (5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'-0")
15205A	1	POST #0 - ANCHOR POST (6'-5 3/4")
15203G	1	POST #1 - (SYTP) (4'-9 1/2")
15000G	1	POST #2 - (SYTP) (6'-0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 X 8.5) (6'-0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" X 8" X 14")
6777B	7	BLOCKOUT - COMPOSITE (14" X 7 1/2" X 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
HARDWARE		
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR, DH
3717G	2	3/4" X 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR, DH
3360G	16	3/8" X 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	3/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	3/8" X 10" HGR POST BOLT A307
3391G	1	3/8" X 1 1/2" HEX HD BOLT A325
4489G	1	3/8" X 9" HEX HD BOLT A325
4372G	4	3/4" WASHER F436
105285G	2	3/4" X 2 1/2" HEX HD BOLT GR-5
105286G	1	3/4" X 1 1/2" HEX HD BOLT GR-5
3240G	6	3/4" ROUND WASHER (WIDE)
3245G	3	3/4" HEX NUT A563 GR, DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

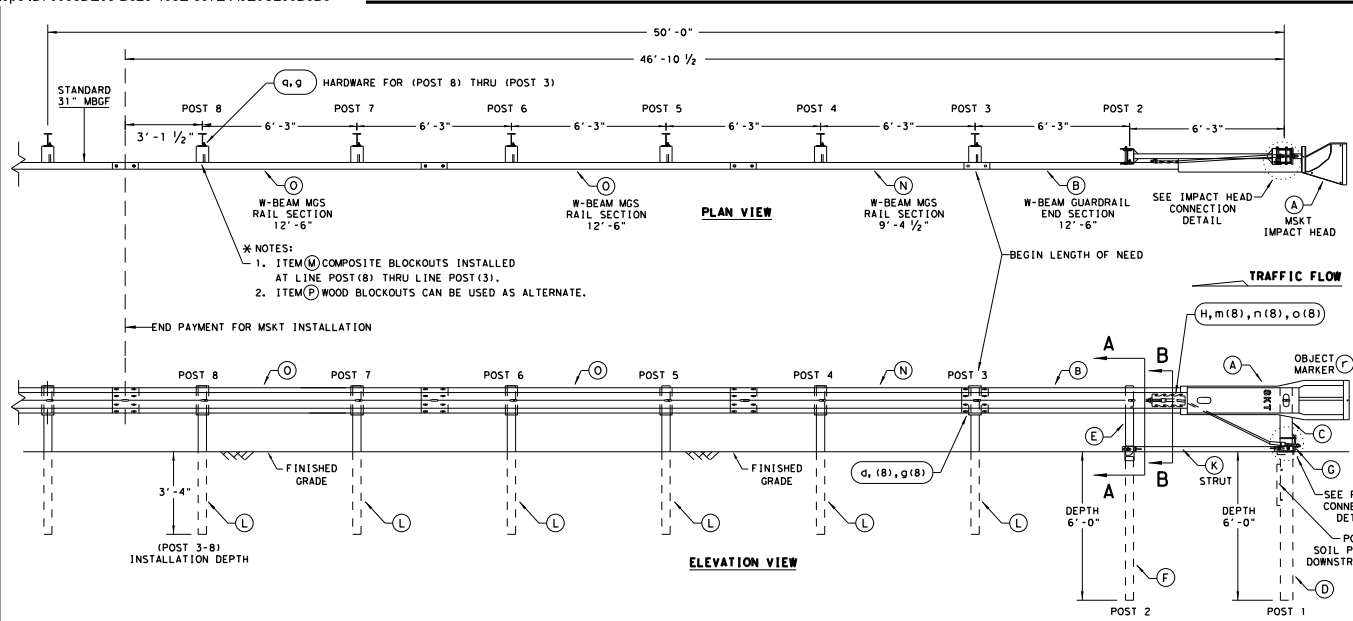
Texas Department of Transportation Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT (10S) 31-16

FILE: sgt10s3116	DN: TXDOT	CR: KM	DN: VP	CR: MB/VP
REVISIONS	CONT	SECT	JOB	HIGHWAY
6442	72	001	US 59	ETC.
DIST	COUNTY	SHEET NO.		
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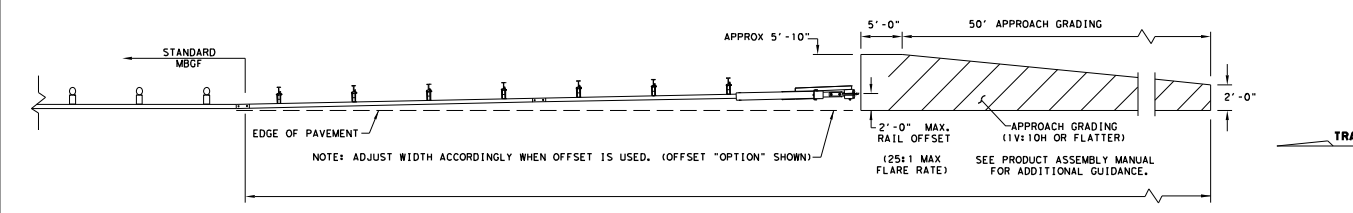
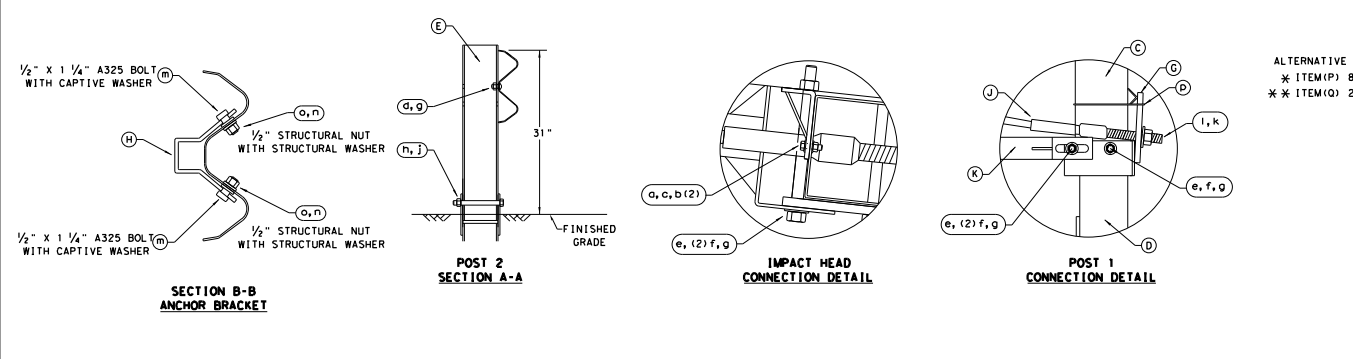
NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SoftStop END TERMINAL. IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE. FILE: T:\LFDKDM\mnt\Contract\03\0-RMC - Routine Maintenance Contracts\1223 Plots\6442-72-001 ANG MBGF\ANG 6442-72-001 ANGLE\INA MBGF\CON\STD\STANDARDS\NEW MBGF & SGT STANDARDS.dgn DATE: 4/14/2023



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435, 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
 - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
 - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
 - A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
 - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
 - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRANCHING ON THE SHOULDER, THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
 - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
 - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Gg.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/4" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6" W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6" W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	CP21
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
o	2	3/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	3/8" WASHER	W0516
c	2	3/8" HEX NUT	N0516
d	25	3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" Dia. H.G.R. NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	NO12A
o	8	1 1/4" O.D. x 3/8" I.D. STRUCTURAL WASHERS	WO12A
d	1	BEARING PLATE RETAINER TIE	CT-1005T
q	6	3/4" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Design Division Standard

SINGLE GUARDRAIL TERMINAL

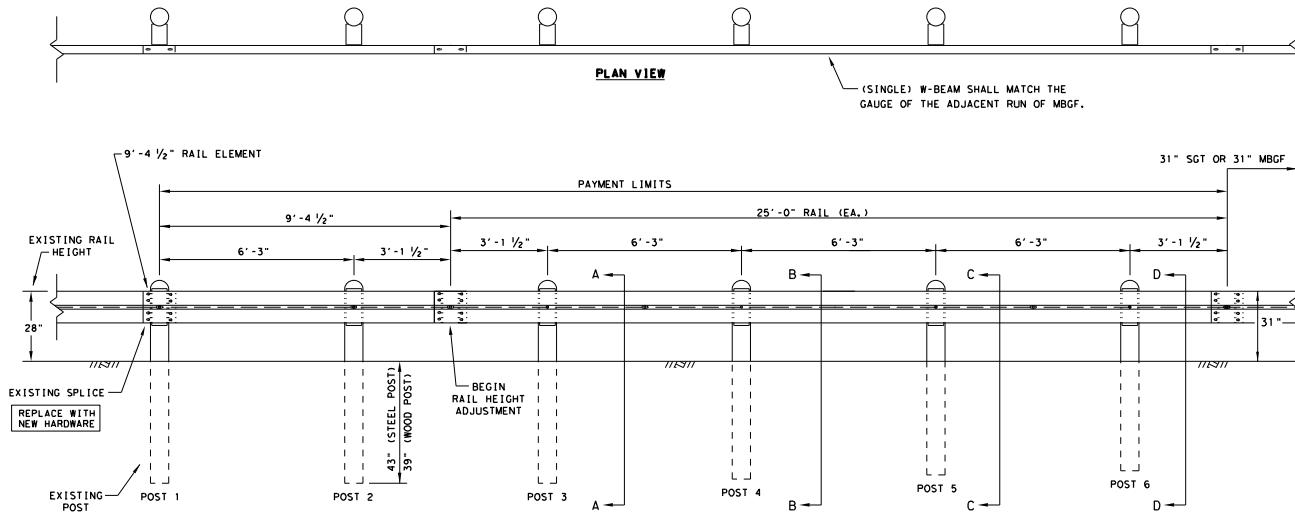
MSKT-MASH-TL-3

SGT (12S) 31-18

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© TXDOT: APRIL 2018	CONT: 5442	SECT: 72	JOB: 001	HIGHWAY: US 59, ETC.
REVISIONS	DIST: LFK	COUNTY: ANGEL	SHEET NO.: 39	

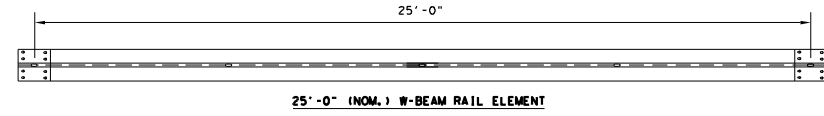
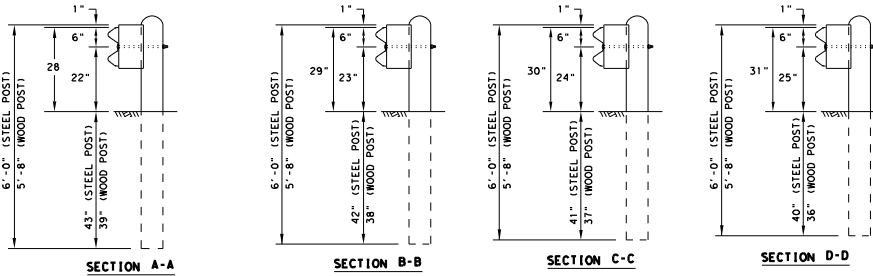
GENERAL NOTES

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 AS 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'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE 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 3/4" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 3/4" X 1-1/4" WITH 3/4" 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 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. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF (31) STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR 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 BLOCKS.
11. REFER TO STANDARD GF (31) FOR ADDITIONAL DETAILS.
12. RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

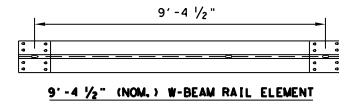


ELEVATION VIEW

* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



25'-0" (NOM.) W-BEAM RAIL ELEMENT



9'-4 1/2" (NOM.) W-BEAM RAIL ELEMENT

HARDWARE LIST

QTY	DESCRIPTION
1	9'-4 1/2" W-BEAM RAIL ELEMENT 12GA.
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
6	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
6	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
6	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
6	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
6	3/4" X 18" GUARDRAIL BOLTS WITH NUTS (FBB04)
6	3/8" ROUND WASHERS (ASTM F436) (FWC160)
6	3/4" X 10" GUARDRAIL BOLTS WITH NUTS (FBB03)
24	3/8" X 1-1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

POST AND BLOCK-OUT TYPES AVAILABLE

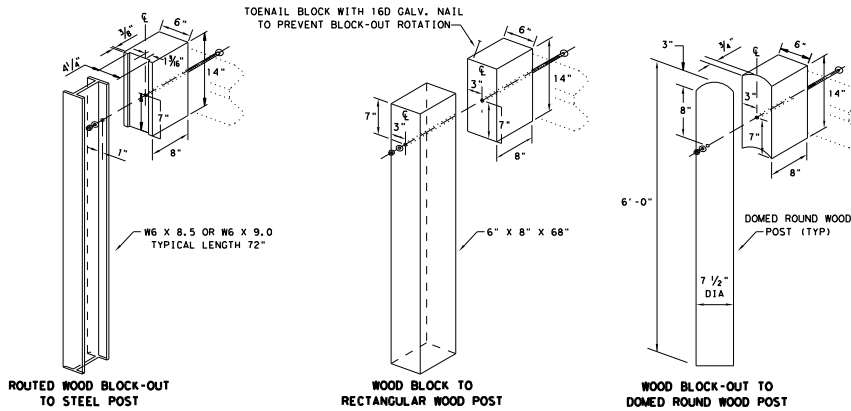
FOR WOOD POST

FOR STEEL POST

NOTE: HARDWARE SHALL MEET THE FOLLOWING REQUIREMENTS.

- GUARDRAIL POST BOLTS (ASTM A307 GR. A)
- GUARDRAIL ROUND WASHERS (ASTM F436)
- GUARDRAIL DOUBLE RECESSED NUTS (ASTM A563)
- GUARDRAIL SPLICE BOLTS (ASTM A307 GR. A)
- GUARDRAIL SPLICE NUTS (ASTM A563)

TOENAIL BLOCK WITH 16D GALV. NAIL TO PREVENT BLOCK-OUT ROTATION

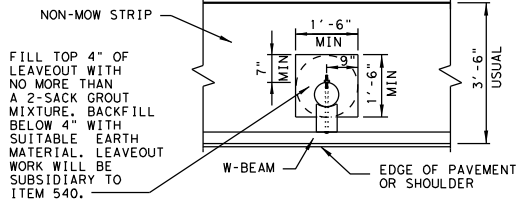
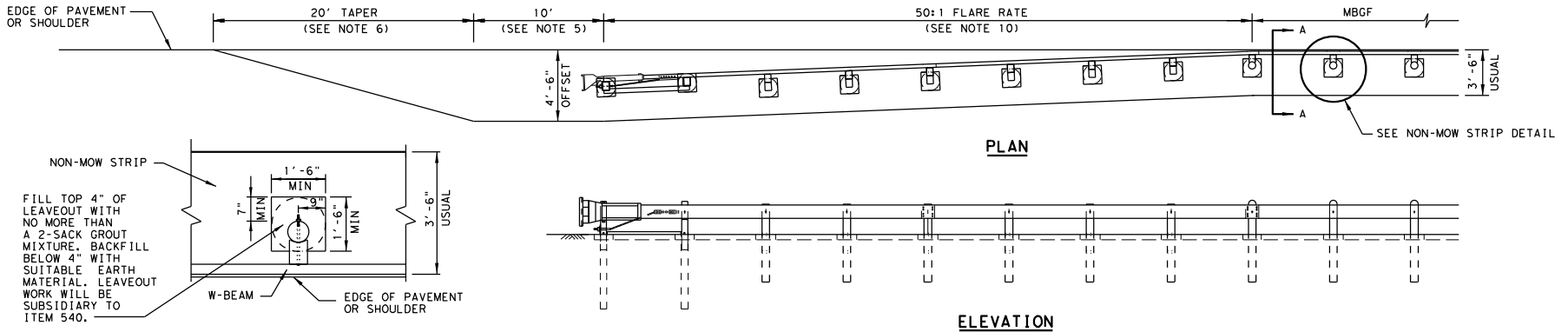


Texas Department of Transportation
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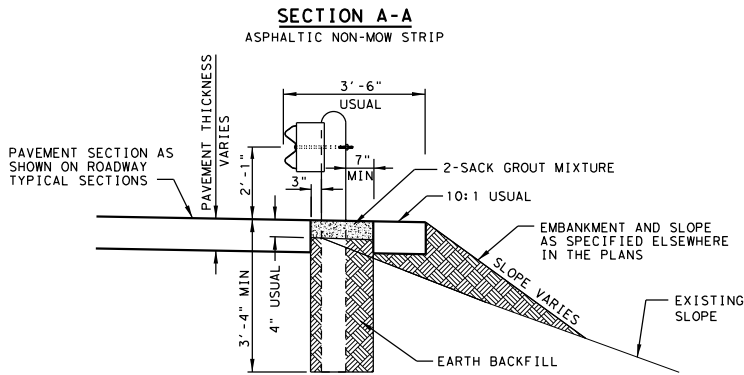
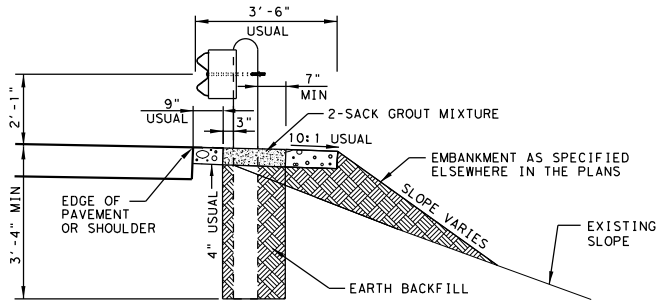
**METAL BEAM GUARD FENCE
RAIL HEIGHT ADJUSTMENT
(28" TO 31")
TL-3 MASH COMPLIANT
RAIL-ADJ(A)-19**

FILE: r01ad019	DN:TXDOT	CK:KM	DR:VP	CK:CGJ/AG
REVISIONS	CONT	SECT	JOB	HIGHWAY
6442	72	001	US 59, ETC.	
DIST	COUNTY	CITY	SHEET NO.	
LFK	ANGELINA		40	

6442-72-001 ANG MBEF.VMC 6442-72-001 ANGE.LINA MBEF.DON.STD.STANDARDS.NEW.MBGF & SGT. STANDARDS.NON.MOW.S1



NON-MOW STRIP DETAIL
HOT MIX ASPHALTIC PAVEMENT NON-MOW STRIP WITH 18" X 18" OR 18" DIA. MINIMUM LEAVEOUT



GENERAL NOTES

- NON-MOW STRIPS SHALL BE HOT MIX ASPHALTIC PAVEMENT UNLESS OTHERWISE SHOWN ON THE PLANS. HOT MIX ASPHALTIC PAVEMENT SHALL MEET THE REQUIREMENTS OF AND BE PLACED IN ACCORDANCE WITH THE PERTINENT BID ITEM AS SHOWN ON THE PLANS. OTHER MATERIALS MAY BE USED AS INDICATED ELSEWHERE IN THE PLANS. MATERIALS FOR THE OPTIONAL WIDENED PAVEMENT SECTION SHALL BE AS SHOWN IN THE ROADWAY TYPICAL SECTIONS.
- THE TYPE OF APPROVED POST WILL BE SHOWN ELSEWHERE IN THE PLANS. SEE THE APPLICABLE STANDARD SHEETS FOR ADDITIONAL DETAILS AND INFORMATION.
- THE LIMITS OF PAYMENT FOR HOT MIX ASPHALTIC PAVEMENT WILL INCLUDE LEAVEOUTS TO POST.
- THE LEAVEOUTS SHALL BE FILLED WITH NO MORE THAN A 2-SACK GROUT MIXTURE AND PLACED IN ACCORDANCE WITH SECTION 421.2.7, "MORTAR AND GROUT". PAYMENT FOR FURNISHING AND PLACING THE GROUT MIXTURE WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- THE NON-MOW STRIP SHALL BE EXTENDED FULL WIDTH FOR 10' IN ADVANCE OF THE GUARDRAIL END TREATMENT UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- A 20' TAPER WILL BE USED IN ADVANCE OF GUARDRAIL UNLESS OTHERWISE SHOWN IN THE PLANS, OR DIRECTED BY THE ENGINEER.
- EXACT LOCATION OF MBGF PLACEMENT WILL BE SHOWN ELSEWHERE IN THE PLANS TO MEET APPROPRIATE CLEAR ROADWAY WIDTH AND CLEAR ZONE REQUIREMENTS.
- EXCAVATION REQUIRED TO CONSTRUCT NON-MOW STRIP WILL NOT BE MEASURED OR PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO PERTINENT ITEMS.
- THE FLARE RATE MAY BE DECREASED OR ELIMINATED IF DIRECTED BY THE ENGINEER.
- WHEN THE EXISTING NON-MOW STRIP IS TO REMAIN IN PLACE, FILLING THE EXISTING POST HOLES WITH GROUT AND DIGGING NEW POST HOLES WILL BE SUBSIDIARY. THE TOP 4 INCHES OF A POST HOLE WITHIN AN EXISTING NON-MOW STRIP SHALL BE BACKFILLED WITH HMA. THIS WORK WILL NOT BE PAID FOR BUT WILL BE SUBSIDIARY TO ITEM 542.

NOT TO SCALE

LUFKIN DISTRICT STANDARD

NON-MOW STRIP DETAILS

REVISED: 2-19-09
 ADDED EDGE OF PAVEMENT OR SHOULDER LINE TO PLAN VIEW AND DETAIL.
 REVISED: 7-16-10
 CHANGED DEPTH OF NON-MOW STRIP FROM 5" TO 4".
 REVISED: 12-30-11
 REVISED HEIGHT OF W-BEAM ABOVE PAVEMENT SURFACE
 REVISED: 9-29-16
 REVISED SLOPE BEHIND POSTS; REMOVED SLOPE GENERAL NOTE
 REVISED: 10-20-2016
 MODIFIED TITLE BLOCK
 REVISED: 04-07-2017
 ADDED NOTE 10
 REVISED: 07-10-2017
 REVISED SLOPE BEHIND MBGF
 REVISED: 02-02-2018
 REVISED SPECIFICATION REFERENCE IN NOTE 4

TEXAS DEPARTMENT OF TRANSPORTATION ©2009				
CONT	SECT	JOB	HIGHWAY	
6442	72	001	US	5011 ETC.
DIST	COUNTY	CITY	SHEET NO.	
DS1	ANGELYNA		41	

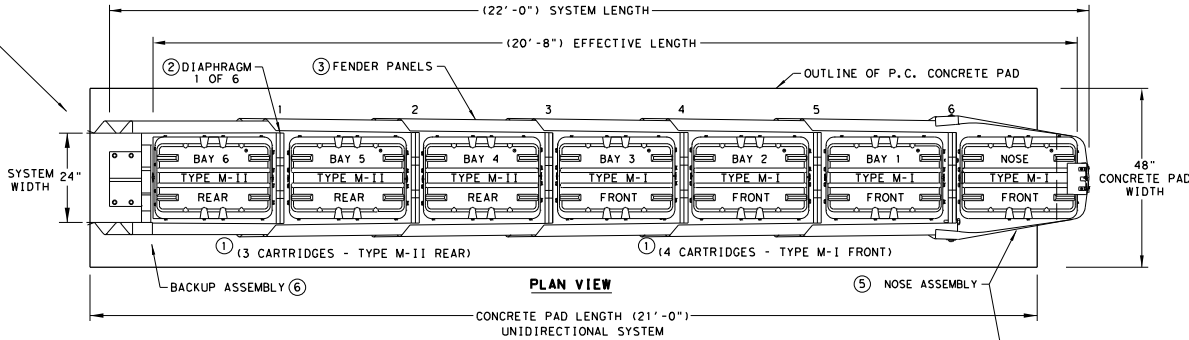
DISCLAIMER: THE USE OF THIS DETAIL IS GOVERNED BY THE TEXAS ENGINEERING PRACTICE ACT. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS DETAIL TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE. 4/17/2023 7:35:09 AM

DISCUSS THIS STANDARD IS COVERED BY THE "TEXAS ENGINEERING PRACTICE ACT" - NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 4/14/2023
 FILE: T:\LFKDM\mnt\ Contracts\0-RMC - Routine Maintenance Contracts\123 Plots\6442-72-001 ANG MEG\RM 6442-72-001 ANGELINA MEG\CONVID\sguar\dm\020.dgn

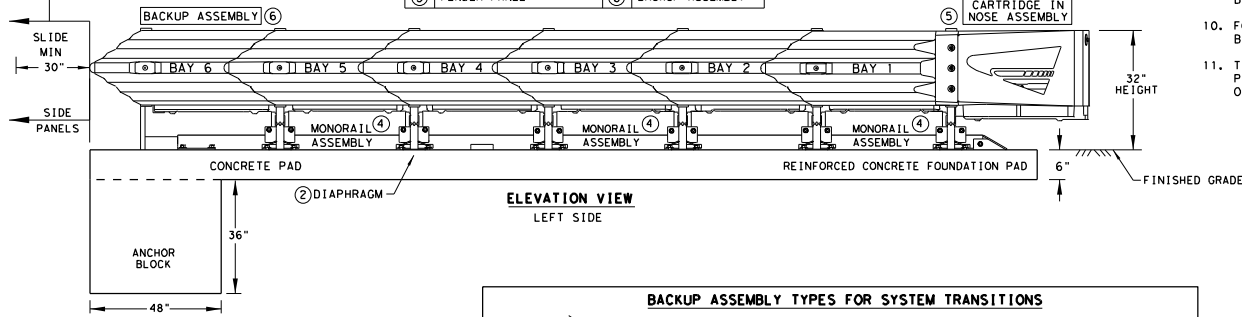
NOTE:
 A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD M10 TO THE OBJECT BEING SHIELDED.

QUADGUARD M10 24" WIDE 6-BAY SYSTEM



KEY	KEY
① QUADGUARD CARTRIDGE	④ MONORAILS
② DIAPHRAGM	⑤ NOSE ASSEMBLY
③ FENDER PANEL	⑥ BACKUP ASSEMBLY

NOTE:
 PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.



NOTES:
 CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD M10 (N) INSTALLATION AND DETAILED INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY FOR THE REQUIRED TRANSITION WILL BE PROVIDED TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

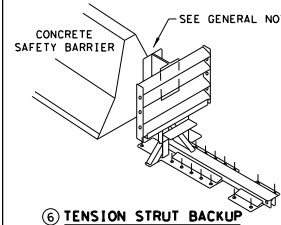
CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
 THE QUADGUARD M10 24" WIDE 6-BAY - NARROW SYSTEM HAS BEEN TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10024	CARTRIDGE TYPES IN BAYS			
BAYS	6	TYPE-MII	TYPE-MI	TYPE-MI	
DIAPHRAGMS	6	3	3	1	
WIDTH	24"	REAR	FRONT	NOSE	

TL-2 MODEL #	QM7024	CARTRIDGE TYPES IN BAYS			
BAYS	3	TYPE-MII	TYPE-MI	TYPE-MI	
DIAPHRAGMS	3	1	2	1	
WIDTH	24"	REAR	FRONT	NOSE	

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO CONCRETE END SHOE
4	QUAD-BEAM TO THRIE-BEAM RAIL
5	QUAD-BEAM TO W-BEAM RAIL

NOTE:
 TRANSITION ASSEMBLIES FOR THE QUADGUARD M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:
 ALL POSTS W6x8, 5/9 I-BEAMS (78" LONG).

NOTES:
 CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
 THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD M10 SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
- SEE THE RECENT QUADGUARD M10 PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE NARROW 24" SYSTEM BEFORE INSTALLING THE QUADGUARD M10 SYSTEM AT ANY GIVEN LOCATION.
- FOR BI-DIRECTIONAL TRAFFIC: THE PLACEMENT OF THE QUADGUARD M10 IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M10 THE CRASH CUSHION MUST BE PLACED SUCH THAT THE TRAFFIC SIDE OF CRASH CUSHION IS AT LEAST AS FAR FROM ADJACENT TRAVEL LANE LINE AS THE TRAFFIC SIDE OF BARRIER/OBJECT BEING SHIELDED.
- SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
- COMPONENTS FOR THE QUADGUARD M10 BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M10 PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
- CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa (4,000 PSI) (P.C.) OR 8" MIN. NON-REINFORCED 28MPa (4,000 PSI) CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
- 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%.
- THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE QUADGUARD M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
- FOR THE TENSION STRUT BACKUP THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
- TxDOT HAS ONLY APPROVED THE 24" WIDE QUADGUARD M10 SYSTEM. THE QUADGUARD M10 PRODUCT DESCRIPTION AND ASSEMBLY MANUAL INCLUDES SYSTEM WIDTH OF 24". ONLY THE 24" SYSTEM IS ALLOWED TO BE INSTALLED ON TEXAS ROADWAYS.

**FOUNDATION & ANCHORING REQUIREMENTS
 FOUNDATION TYPES: A, B, C, & D**

FOUNDATION TYPE:A	REINFORCED CONCRETE PAD OR ROADWAY FOUNDATION: 6" MINIMUM DEPTH (P.C.C.) ANCHORAGE: 7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE:B	ASPHALT OVER P.C.C. FOUNDATION: 3" MIN. (A.C.) OVER 3" MIN. (P.C.C.) ANCHORAGE: 18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE:C	ASPHALT OVER SUBBASE FOUNDATION: 6" MIN. (A.C.) OVER 6" MIN. (C.S.) ANCHORAGE: 18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE:D	ASPHALT ONLY FOUNDATION: 8" MIN. (A.C.) ANCHORAGE: 18" THREADED ROD EMBEDDED 16 1/2" - APPROVED ADHESIVE

KEY:
 ASPHALT CONCRETE (A.C.)
 COMPACTED SUBBASE (C.S.)
 PORTLAND CEMENT CONCRETE (P.C.C.)
 NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

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.

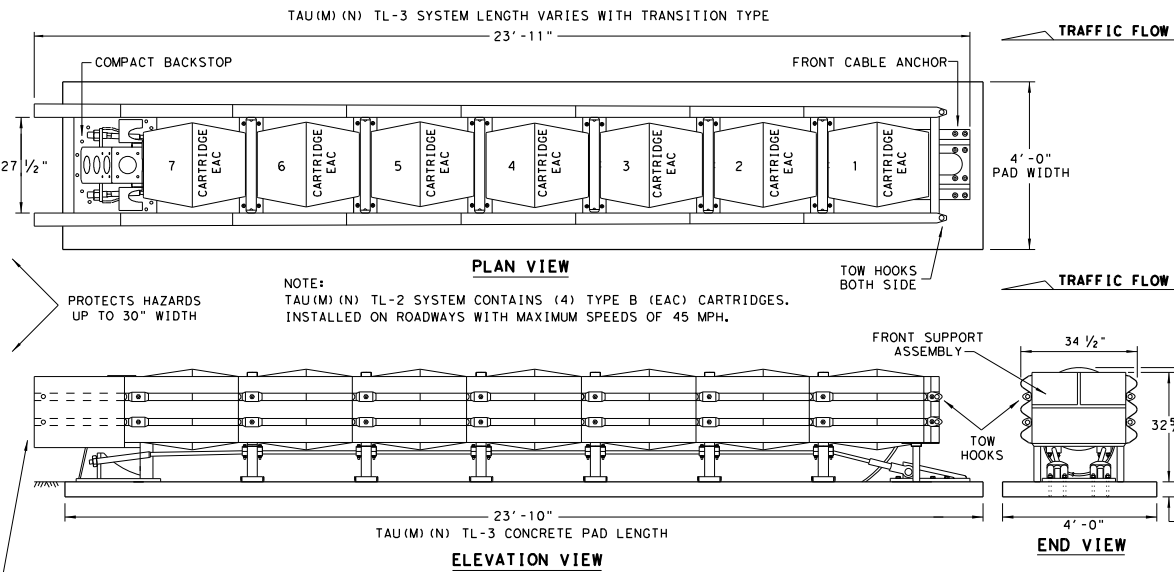
TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

REUSABLE

Texas Department of Transportation				Design Division Standard	
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M10 (MASH TL-3 & TL-2 NARROW-24" ONLY)					
QUAD (M10) (N) - 20					
FILE: qguar\m10n20.dgn	DN:TxDOT	CK:KRM	DR:JVP	CK:JAG	
© TxDOT: NOVEMBER 2020	CONT SECT	JOB	HIGHWAY		
REVISIONS	6442 72	001	US 59, ETC.		
	DIST	COUNTY	SHEET NO.		
	LFK	ANGELINA	42		

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DATE: 4/14/2023
 FILE: T:\LFDK\W\mnt\ Contracts\0-RMC - Routine Maintenance Contracts\1923 Plans\6442-72-001 ANG MBEF\ANG 6442-72-001 ANGELINA MBEF\CON-STANDARD\NEW MBEF & SGT STANDARDS\



GENERAL NOTES

- FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
- REFER TO THE LATEST (LTS) INSTALLATION INSTRUCTION MANUAL FOR IMPORTANT SAFETY MESSAGES, COMPLETE SYSTEM ASSEMBLY, AND ANCHOR INSTALLATION REQUIREMENTS FOR THE NINE (9) DIFFERENT SITE TRANSITIONS.
- INSTALLATION DETAILS FOR THE COMPACT BACKSTOP, FRONT CABLE ANCHOR AND FOUNDATION OPTIONS ARE SHOWN ON THE INSTALLATION INSTRUCTION MANUAL FURNISHED TO THE ENGINEER.
- CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 P.S.I.
- IF THE CROSS-SLOPES VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%
- THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
- THE TAU(M) (N) SYSTEM SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR CENTER LINE OF MERGING BARRIERS.
- THIS DRAWING REPRESENTS THE UNIVERSAL TAU(M) (N) TL-3 SYSTEM, A RE-DIRECTIVE NON-GATING CRASH CUSHION THAT CAN PROTECT HAZARDS UP TO 30-INCHES IN WIDTH. ALSO AVAILABLE IN TL-2 CONFIGURATION.

PLAN VIEW

NOTE:
 TAU(M) (N) TL-2 SYSTEM CONTAINS (4) TYPE B (EAC) CARTRIDGES, INSTALLED ON ROADWAYS WITH MAXIMUM SPEEDS OF 45 MPH.

PROTECTS HAZARDS UP TO 30" WIDTH

NOTES:
 TRANSITIONS AND ATTACHMENTS TO VARIOUS BARRIER SHAPES, RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL FOR ADDITIONAL TRANSITION DETAILS.

NOTE:
 CONCRETE FOUNDATION PAD LENGTH VARIES WITH TL-3 AND TL-2 SYSTEMS, SEE SYSTEM & FOUNDATION LENGTH TABLE.

NOTE:
 PAD THICKNESS VARIES - SEE FOUNDATION OPTIONS

FOUNDATION OPTIONS	
6" REINFORCED CONCRETE	
8" UNREINFORCED CONCRETE	
ASPHALT OVER CONCRETE WITH MINIMUM 6" EMBEDMENT IN CONCRETE	
6" ASPHALT OVER 6" COMPACT SUBBASE	
8" MINIMUM ASPHALT	

SYSTEM & FOUNDATION LENGTH TABLE		
SYSTEM LENGTH	FOUNDATION LENGTH	
TL-2 = 15'-5"	TL-2 = 15'-4"	
TL-3 = 23'-11"	TL-3 = 23'-10"	

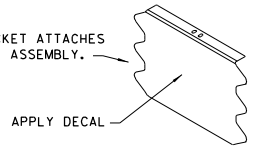
* NOTE:
 REQUIRES AN ASPHALT ANCHORAGE PACKAGE: INCLUDES ADDITIONAL BRACES FOR THE FRONT CABLE ANCHOR AND THE COMPACT BACKSTOP, AND ASPHALT HARDWARE KIT. THE TL-3 ASPHALT CONFIGURATION ALSO REQUIRES NESTED SLIDER PANELS AND SHIMS AT THE LAST TWO BAYS. SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR DETAILS.

NOTE:
 SEE MANUFACTURER'S INSTALLATION INSTRUCTION MANUAL FOR FOUNDATION SPECIFICATIONS THAT INCLUDE, STONE AGGREGATE MIX, COMPRESSION STRENGTH, STEEL SIZE, ANCHOR SIZE, AND EMBEDMENT DEPTH.

** NOTE:
 ENGINEER OR CONTRACTOR SHALL COORDINATE WITH THE MANUFACTURER FOR THE CORRECT DECAL PER TRAFFIC FLOW, LEFT, RIGHT OR BOTH-SIDES.

**

TRANSITION OPTIONS	
USE THE COMPACT BACKSTOP	VERTICAL WALL
	CONCRETE TRAFFIC BARRIERS
	W-BEAM GUARDRAIL
	THRIE BEAM GUARDRAIL



NOTE:
 APPLY A HIGH REFLECTIVE DECAL TO THE DELINEATION BRACKET. DELINEATION DECAL ORIENTATION IS SHOWN ON THE CONSTRUCTION PLAN SET AND SHALL BE IN ACCORDANCE WITH THE TEXAS MUTCD FOR (TRAFFIC CONTROL DEVICES). DECALS ARE AVAILABLE FOR TRAFFIC FLOW ON THE LEFT-SIDE, BOTH -SIDES AND RIGHT-SIDE.

NOTE:
 FOR BI-DIRECTIONAL TRANSITION PANELS AND BRIDGE RAIL END SHOE DETAILS. SEE MANUFACTURER'S INSTALLATION INSTRUCTIONS MANUAL.

NOTES:
 UPGRADE KITS ARE AVAILABLE TO RETROFIT EXISTING NCHRP 350 TAU-II SYSTEMS TO MASH COMPLIANT SYSTEMS. SEE MANUFACTURER'S PRODUCT INFORMATION.

THE TAU(M) (N) UNIDIRECTIONAL SYSTEM IS FREE STANDING AND IS NOT REQUIRED TO BE CONNECTED TO THE HAZARD.

TRANSITIONS TO GUARD FENCE, BRIDGE RAILS AND ROADSIDE BARRIERS SHALL BE IN ACCORDANCE WITH TxDOT'S POLICY.

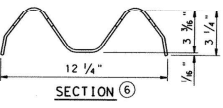
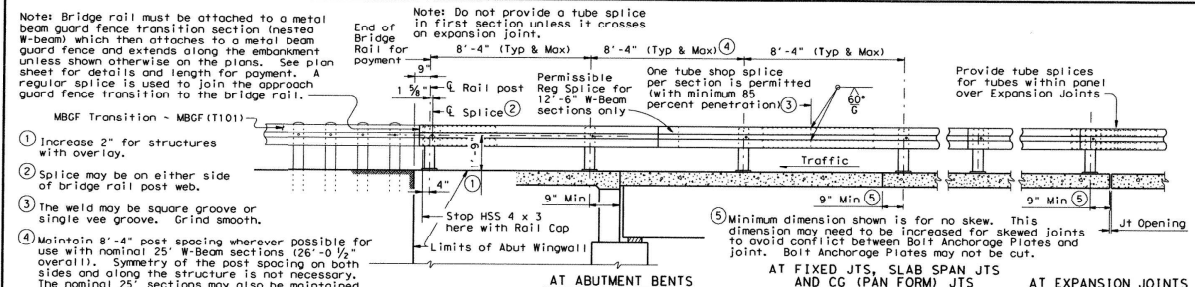
NOTE:
 THIS STANDARD IS A BASIC REPRESENTATION OF THE UNIVERSAL TAU(M) (N) SYSTEM, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTION MANUAL.

BILL OF MATERIALS FOR TAU(M) (N) TL-3 & TL-2 SYSTEMS			
PART NUMBER	PART DESCRIPTION	QUANTITIES	
		TL-3 SYSTEM	
		TL-2 SYSTEM	
BSI-1708019-00	SLIDING PANEL GALVANIZED TAU(M) (N)	14	8
BSI-1708030-00	END PANEL, THRIE BEAM, GALV, TAU(M) (N)	2	2
BSI-1706001-00	CABLE ASSEMBLY, 7 BAY, TAU(M) (N)	2	-
BSI-1805036-00	CABLE ASSEMBLY, 4 BAY, TAU(M) (N)	-	2
BSI-1708018-00	FRONT CABLE ANCHOR	1	1
BSI-1707034-00	COMPACT BACKSTOP	1	1
B030703	MIDDLE SUPPORT ASSEMBLY	6	3
B030704	FRONT SUPPORT	1	1
B010722	ENERGY ABSORBING CARTRIDGE, TYPE B	7	4
K001005	TAU-II FRONT SUPPORT LEG KIT	1	1
BSI-1709083-KT	TETHER KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1809041-KT	SLIDER KIT (INCLUDES ALL HARDWARE)	7	4
BSI-1808033-KT	CABLE GUIDE KIT (INCLUDES ALL HARDWARE)	6	3
BSI-1809040-KT	TOW HOOK KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808034-KT	DELINEATION BRACKET KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808035-KT	END PANEL MOUNT KIT (INCLUDES ALL HARDWARE)	1	1
BSI-1808036-KT	CONCRETE ANCHORING KIT	1	1
** SEE NOTE	HIGH REFLECTIVE DECAL	1	1
ECN 3883	INSTALLATION AND INSTRUCTIONS MANUAL	1	1

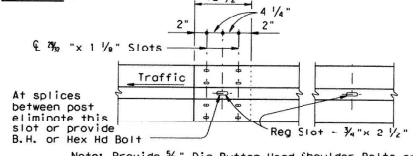
		Design Division Standard	
LINDSAY TRANSPORTATION SOLUTIONS UNIVERSAL CRASH CUSHION (MASH TL-3 & TL-2) TAU(M) (N) - 19			
FILE: t0um19.dgn	DN: TxDOT	CR: KM	DN: VP
© TxDOT: APRIL 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	6442 72	001	US 59, ETC.
DIST	COUNTY		SHEET NO.
LFK	ANGELINA		43

REUSABLE

1/14/2023 8:46:40 AM
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⑥ Members are 12 Gage Steel Nom thickness = 0.1046" exclusive of protective coating. Actual section may vary slightly with the manufacturer and conforms to AISI10 M-180.



CONSTRUCTION NOTES:

Attach section lengths of HSS 4 x 3 members continuously to a minimum of three posts (except at abutments with expansion joints).

Face of rail and posts must be vertical transversely unless otherwise approved by the Engineer. Posts must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/8" exist.

At expansion joints in W-beam rail, fabricate the tubes and pipes when the radius is 600' or less and fabricate the W-beam to the radius when the radius is less than 150'. Submit shop drawings for approval when tubes are required to be fabricated to a radius.

MATERIAL NOTES:

Galvanize all steel components unless otherwise shown on plans.

Anchor bolts are 3/4" Dia ASTM-A325 bolts or A449 heavy hex bolts (or A449 threaded rods with one tack welded heavy hex nut each) with one heavy hex nut and one 2" O.D. washer (0.153" Min thick) plus one 1 1/2" O.D. hardened washer (0.122" Min thick) at each bolt. Optionally use rectangular 3/8" x 2 x 0'-3" ASTM-A36 plate with 3/8" Dia hole.

GENERAL NOTES:

This rail was evaluated based on the results of previous crash tests and approved for a NCHRP Report 350 TL-3 rating. The Metal Beam Guard Fence, (T101) transition standard must be used regardless of the design speed.

This railing cannot be used on bridges with expansion joints providing more than 4" movement.

This rail requires a Min slab thickness of 8" and is not recommended for use with Box Beam or Double-T Structures with asphalt overlay.

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

This rail is not recommended for use with more than 3 posts mounted on any of the following structures: cast-in-place retaining walls, Traffic Railing Foundations (TRF), or bridge abutment wingwalls.

This standard, used in conjunction with the Rail Anchorage Curb (RAC) standard or the Rail Anchorage Curb Retrofit (RAC-R) standard, allows this rail to be mounted on box culverts.

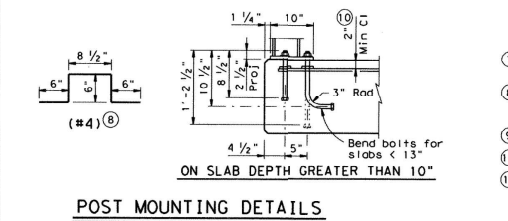
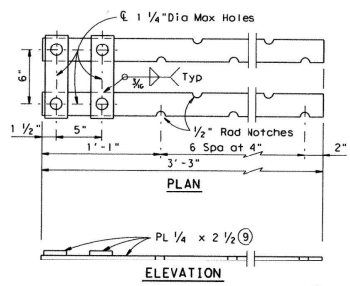
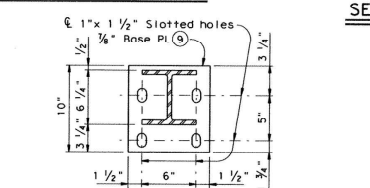
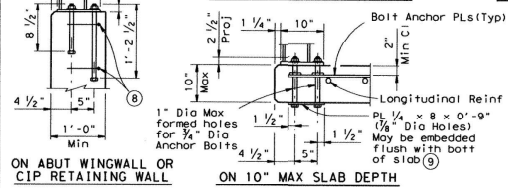
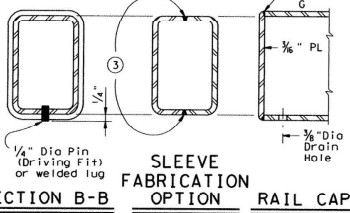
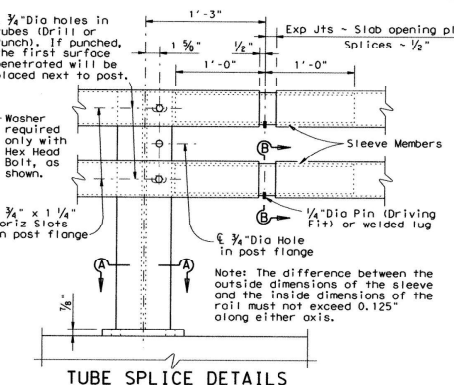
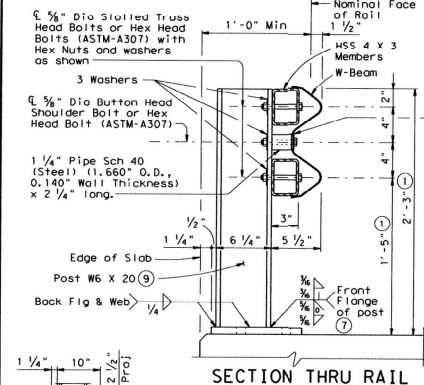
For all rails, erection drawings showing section lengths, splice locations, rail post spacing and anchor bolt setting must be submitted to the Engineer for approval.

Average weight of railing with no overlay and with 0.25" tubes is 39 pft.

TUBE & SLEEVE MEMBERS

Material	Thickness	Sleeve Thickness	Material - A36
A 500 Grade C	0.188"	0.188"	
A 500 Grade B	0.250"	0.250"	
A 500 Grade A or A 501	0.313"	0.250"	

Note: Other sections of equal or greater strength are acceptable for sleeves.



- In lieu of front flg weld shown, a 3/8" fillet weld all around including edges of flange may be used.
- Adjust horizontal reinforcing as necessary and provide two #4 bars around anchor bolts. These bars are to be considered subsidiary to rail.
- All steel posts and plates are (ASTM-A36).
- Set plates under longitudinal reinforcing if necessary.
- Install one anchorage plate assembly in slab at each rail post. Do not galvanize or oil this assembly. Bolt Anchorage Plates may not be cut.

Texas Department of Transportation
Bridge Division

TRAFFIC RAIL

TYPE T101

FILE: r1st003.dgn DW: TXDOT CW: TXDOT DW: JTR CK: JMR

© TXDOT April 2009 DISTRICT: PROJECT NO.: SHEET

REVISIONS: LFK RMC 6253-82-001 4E

COUNTY: CONTROL SECT JOB HIGHWAY

MACCOSHIES 6253 82 001 58 1, ETC

"AS BUILT" TYPE T101

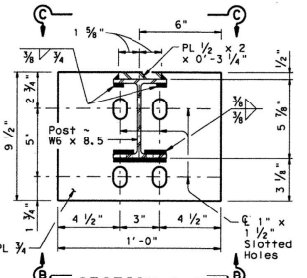
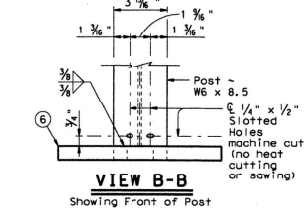
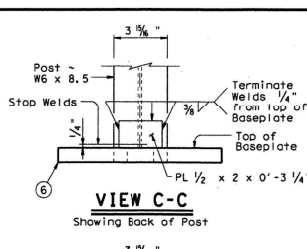
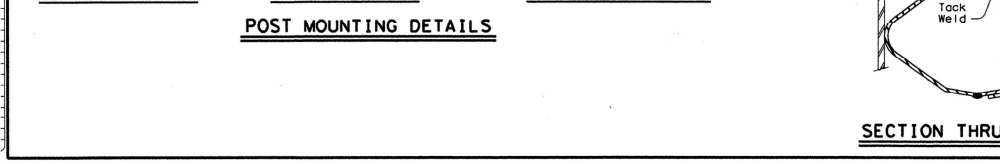
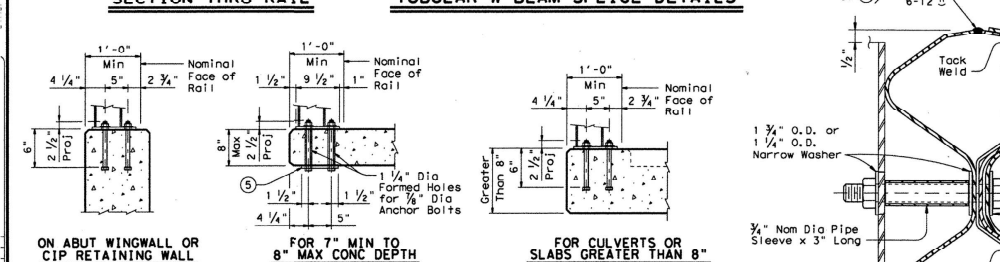
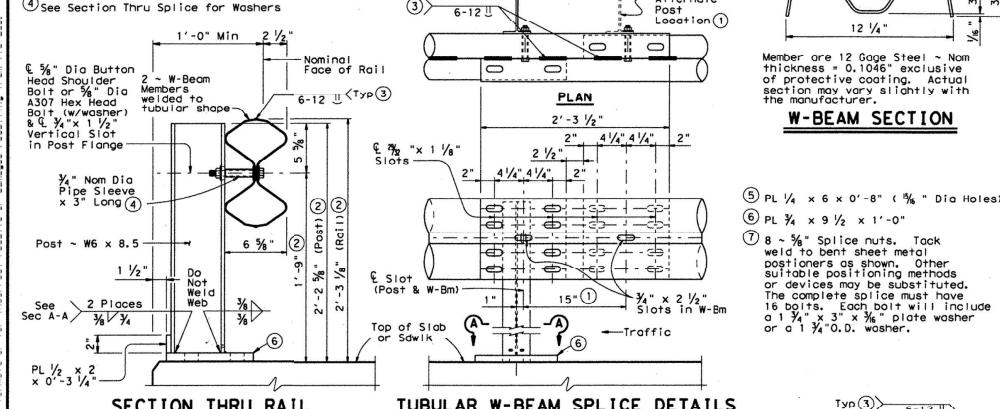
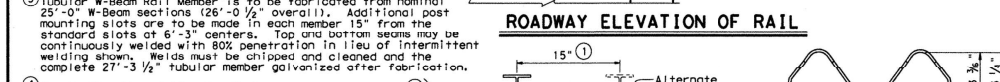
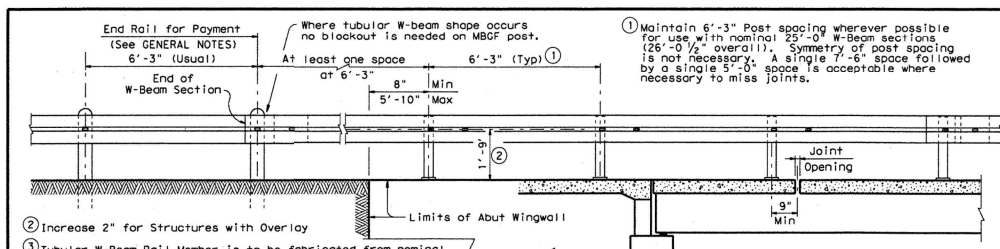
TEXAS DEPARTMENT OF TRANSPORTATION ©2023

PROJECT NO. 6442-72-001 SHEET NO. 44

STATE: TEXAS DIST.: LFK COUNTY: ANGELINA

CONT.: 6442 SECT.: 72 JOB: 001 HIGHWAY NO.: US 59, ETC

FOR INFORMATIONAL PURPOSES ONLY



CONSTRUCTION NOTES:
 Tubular Rail Member must be extended and connected to at least the first soil embedded post at each end of the structure. More such posts must be used to utilize 25' standard sections. Approach guard fence posts must be spaced at 6'-3" adjacent to the Tubular Rail since its flexibility is similar to standard metal beam guard fence. Do not install additional posts at 3'-1 1/2" centers.
 Rail must be extended across all fixed armor joints, slab span joints, or pan form joints with no change in post spacing or continuity. At expansion armor joints of 1/4" or less, the splice bolts nearest the joint and post mounting bolts at intervening post must be snugly tightened to allow for rail expansion. At expansion armor joints over 1/4", suitably larger splice holes must be provided.
 Face of rail and posts must be vertical transversely unless otherwise approved by the Engineer. Posts must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/4" exist.

MATERIAL NOTES:
 All steel components except reinforcing must be galvanized unless otherwise shown in plans.
 Anchor bolts must be 3/4" Dia ASTM A307 Grade A bolts (or #36 threaded rods with one lock welded hex nut each) with one hex nut and one hardened steel washer at each bolt (1 1/4" O.D. or 2" O.D. as directed by the Engineer). Clipped washers may be used as necessary. Threaded rods may be 0.787" minimum diameter with rolled threads. Nuts must conform to A563 requirements.

GENERAL NOTES:
 This rail was evaluated based on the results of previous crash tests and approved for a NCHRP Report 350 TL-2 rating. The T6 rail is only approved for low speed use, design speeds of 45 mph and less.
 This railing cannot be used on bridges with expansion joints providing more than 4" movement.
 Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere for these modifications.
 Payment for this rail must be in increments of 25'. Shop drawings to be submitted to the Engineer for approval are required only for the proposed rail splices at expansion joints greater than 1/4". For rails not requiring shop drawings, erection drawings showing splice locations must be submitted to the Engineer for approval.
 Average weight of railing (6'-3" Post spacing and no Overlay) = 23 plf.

DESIGN/REPAIR CRITERIA
 The posts of this rail are designed to break away on impact from an errant vehicle. The rail is designed to deflect approx. two to three feet as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade.
 Fully anchored guardfence must be attached to each end of rail.
 Repairs to impact-damaged post/baseplate units are not permitted. All impact-damaged posts must be replaced with a new post/baseplate unit.
 This railing is especially suitable for use on bridge width box culverts. The detail sheet titled "Box Culvert Mounting Details For Type 16 Rail, T6-CM" is then required, showing culvert curbs and wingwall modifications and additional reinforcing steel to be included as part of the railing for payment.

The use of this railing is restricted to design speeds of 45 mph or less and to horizontal curves with radius greater than 1000 feet.

Texas Department of Transportation
 Bridge Division

TRAFFIC RAIL

TYPE T6

FILE #	DATE	BY	CHK	APP	REV	DATE
171610011.000	09/11/07	CAJ	TX001	FM	JTR	CAJ TX001
TXDOT	APR11 09					SHEET
REVISIONS		LFK	RMC	6233-29-001	33	
COUNTY	CONTROL	SECT	JOB	HIGHWAY		
POI K	6233	29	US 59			

"AS BUILT" TYPE T6

TEXAS DEPARTMENT OF TRANSPORTATION			
©2023			
PROJECT NO.	SHEET NO.		TOTAL SHEETS
6 RMC 6442-72-001	45	45	
STATE	DIST.	COUNTY	
TEXAS	LFK	ANGELINA	
CONT.	SECT.	JOB	HIGHWAY NO.
6442	72	001	US 59, ETC.

FOR INFORMATIONAL PURPOSES ONLY

DISCLOSE: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this information into a digital format.

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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.

No Action Required Required Action

1. The proposed work of this project is to repair damaged guard fence, attenuator, and metal rail within the Angelina County Maintenance Section on State right-of-way that may affect the safety of the traveling public. This activity maintains the original line and grade, hydraulic capacity and original purpose of the site. Therefore, this project meets the definition of a routine maintenance activity as defined in the TPDES General Permit No. TXR150000 issued March 5, 2023 and TCEQ's TPDES CGP does not apply.

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.

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
<input type="checkbox"/> Temporary Vegetation	<input type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> 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

1. Contractor to repair or replace in kind, at their own expense, any historic materials damaged (buildings, historical markers, etc.) in the course of executing the work. Contractor is responsible for locating replacement source for historical materials damaged in the course of the work. TxDOT-Environmental Affairs Division is to be informed of the proposed repairs to facilitate consultation with Texas Historical Commission prior to the execution of repairs.

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.

1. N/A

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

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.

No Action Required Required Action

1. Red-cockaded Woodpecker (federally listed endangered species) habitat is present adjacent to the ROW along SH 63 and FM 2743. Conservation measures have been agreed upon by the United States Fish and Wildlife Service and TxDOT to ensure that the proposed action will not adversely affect the red-cockaded woodpecker. The conservation measures below must be followed in order to be in compliance with the Endangered Species Act.

- A. NO WORK shall be performed at the below roadway limits from April 1 to July 31.
- B. Work shall begin one hour after sunrise and cease one hour before sunset.
- C. NO STOCKPILES or EQUIPMENT STORAGE shall be allowed along the below roadway limits.

- On SH 63 from 2.75 miles East of SH 147 to 5.30 miles East of SH 147
 - On FM 2743 from CR 345 to 1 mile East of CR 345

2. Louisiana Pine Snake (federally listed endangered species) critical habitat is present within the ROW along SH 63. The conservation measure below must be followed in order to be in compliance with the Endangered Species Act:

- A. NO STOCKPILES or EQUIPMENT STORAGE shall be allowed within the ROW along SH 63 at the below roadway limits.

- SH 63 from 5.70 miles NW of Jasper County Line to Jasper County Line.

LIST OF ABBREVIATIONS

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SWP3: 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	TDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPND: 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.

1. N/A

VII. OTHER ENVIRONMENTAL ISSUES


Portions of US Highway (US) 69 South of Huntington, State Highway (SH) 147, SH 63, Farm-to-Market (FM) 3124, FM 2109, and FM 2743 in Angelina County pass through compartments of the Angelina National Forest. The following actions are required.

No Action Required Required Action

Action No.

1. Maintenance Supervisor shall notify Angelina National Forest (USFS) prior to commencing work on the above listed roadways within USFS boundaries.

2. NO stockpiling or storage of materials and equipment within USFS boundaries.

 Texas Department of Transportation				Design Division Standard	
EPIC					
(ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS)					
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© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	6442	72	001	US 59, ETC.	
12-12-2011 025					
05-07-14 ADDED NOTE SECTION 11.	DIST	COUNTY	SHEET NO.		
01-22-2015 SECTION 1 (OWNER ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LFK	ANGELINA	46		