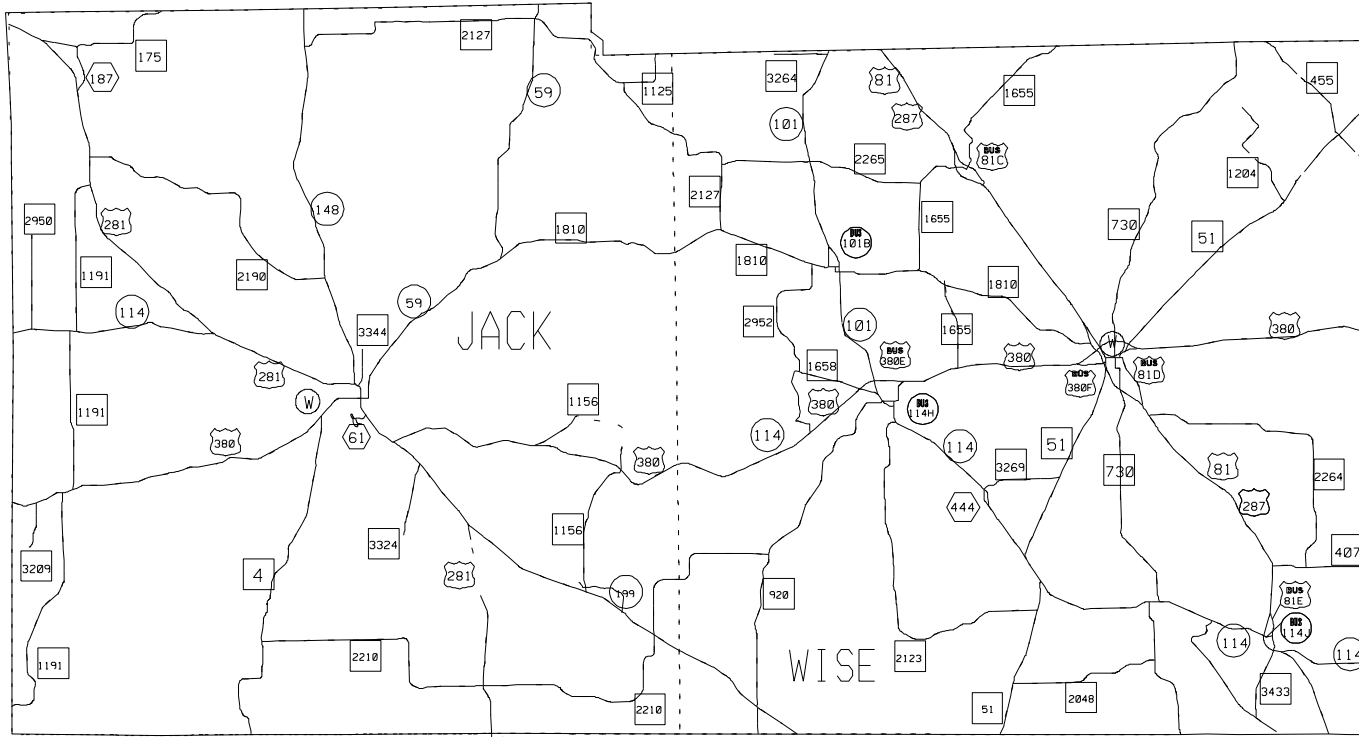


STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC (11)-21 THRU BC (12)-21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

STATE PROJECT NO.			
RMC 6434-66-001			
CONT	SECT	JOB	HIGHWAY
6434	66	001	US 380, ETC.
DIST	COUNTY		SHEET NO.
FTW	WISE, ETC.		1

PLANS OF PROPOSED
HIGHWAY ROUTINE MAINTENANCE CONTRACT
GUARDRAIL INSTALLATION AND REPAIR
STATE PROJECT NO. RMC 6434-66-001
HIGHWAY: US 380, ETC.
WISE, ETC
LIMITS OF WORK: JACK AND WISE COUNTIES



SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT.

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

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SUBMITTED FOR LETTING: 3/30/2023
Matthew L. Evans
AREA ENGINEER

RECOMMENDED FOR LETTING: 3/30/2023
Danny M. Henderson
DISTRICT MAINTENANCE ENGINEER

RECOMMENDED FOR LETTING: 4/2/2023
Matthew L. Evans
DIRECTOR OF MAINTENANCE

GENERAL

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	INDEX SHEET
3A-3J	GENERAL NOTES
4A-4B	ESTIMATE AND QUANTITIES
5	PROJECT LOCATION MAP
6A-6E	PAY ITEM DETAILS
7A-7G	PAY ITEM DETAILS
8	PAY ITEM DETAILS
9	PAY ITEM DETAILS

GUARDRAIL END TREATMENTS

SHEET NO.	DESCRIPTION
10	SGT (10S) 31-16*
11	SGT (11S) 31-18*
12	SGT (12S) 31-18*
13	SGT (15) 31-20*

ATTENUATORS

SHEET NO.	DESCRIPTION
14	TRACC (W) -16*

CABLE BARRIER SYSTEMS

SHEET NO.	DESCRIPTION
15	CASS (TL4) -14*

BARRIER (FLEXIBLE)

SHEET NO.	DESCRIPTION
16	GF (31) DAT-19*
17	GF (31) LS-19*
18	GF (31) T6-19*
19	GF (31) T101-19*
20	GF (31) TR TL2-19*
21, 22	GF (31) TR TL3-20*
23	GF (31) -19*
24	RAIL-ADJ(A)-19*
25	RAIL-ADJ(B)-19*
26	BED-14

(28 INCH) SPECIAL APPLICATIONS

SHEET NO.	DESCRIPTION
27	MBFG-19
28	MBFG(T101)-19*
29	MBFG(TL2)-19*
30	MBFG(TR)-19*
31	MBFG(SR)-19*
32	BED(28)-19*

"(MOD)"

SHEET NO.	DESCRIPTION
33	T2/T201TR" (MOD) "
34	T202TR" (MOD) "
35	T5/T501/T502TR" (MOD) "

DELINATOR STANDARDS

SHEET NO.	DESCRIPTION
36	D&OM(1)-20*
37	D&OM(2)-20*
38	D&OM(3)-20*
39	D&OM(4)-20*
40	D&OM(5)-20*
41	D&OM(6)-20*
42	D&OM(VIA)-20*

MISCELLANEOUS

SHEET NO.	DESCRIPTION
43	PCF-05*
44	CLF-10*
45	CCCG-22*

TCP STANDARDS

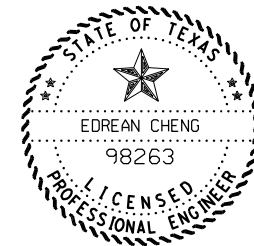
SHEET NO.	DESCRIPTION
46	TCP (1-1)-18*
47	TCP (1-2)-18*
48	TCP (1-3)-18*
49	TCP (1-4)-18*
50	TCP (1-5)-18*
51	TCP (1-6)-18*
52	TCP (2-1)-18*
53	TCP (2-2)-18*
54	TCP (2-3)-18*
55	TCP (2-4)-18*
56	TCP (2-5)-18*
57	TCP (2-6)-18*
58	TCP (5-1)-18*
59	TCP (6-1)-12*
60	TCP (6-2)-12*
61	TCP (6-3)-12*
62	TCP (6-4)-12*
63	TCP (6-5)-12*
64	TCP (6-6)-12*
65	TCP (6-7)-12*
66	TCP (6-8)-14*
67	TCP (6-9)-14*

BC STANDARDS

SHEET NO.	DESCRIPTION
68	BC (1)-21*
69	BC (2)-21*
70	BC (3)-21*
71	BC (4)-21*
72	BC (5)-21*
73	BC (6)-21*
74	BC (7)-21*
75	BC (8)-21*
76	BC (9)-21*
77	BC (10)-21*
78	BC (11)-21*
79	BC (12)-21*

WORK ZONE STANDARDS

SHEET NO.	DESCRIPTION
80	WZ (RS)-22*



*THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

DocuSigned by: PE DATE 3/29/2023
1C2CA4EE8B847B...



INDEX SHEET

REVISIONS	FED. RD. DIV. NO.	STATE PROJECT NO.		SHEET NO.
		6	RMC 6434-66-001	
	STATE	DISTRICT	COUNTY	
	TEXAS	FTW	WISE, ETC.	
	CONTROL SECTION	JOB	HIGHWAY NO.	
	6434	66	001	US 380, ETC

Project Number: RMC 6434-66-001

Sheet 3A

County: WISE, ETC.

Control: 6434-66-001

Highway: US 380, ETC.

**FORT WORTH DISTRICT MAINTENANCE GENERAL NOTES
2014 SPECIFICATIONS**

Special Notes:

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

Area Engineer: Edrean Cheng Edrean.Cheng@txdot.gov
 Asst. Area Engineer: Oscar Chavez Oscar.Chavez@txdot.gov
 Design Manager: Jana Robinson Jana.Robinson@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. The 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.

General Notes:

Plans are required for this project. Plans may be obtained from one of the plan companies listed in the “Special Notice to Contractors”, or viewed at Texas Department of Transportation’s (TxDOT’s) Internet site at <https://www.txdot.gov/business/letting-bids/plans-online.html>.

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 and/or execute all contracts and work orders at the same time.

Furnish crew(s) and equipment capable of maintaining work in a continuous manner for the completion of the work listed on the work order.

Personnel will be experienced in items of work in the contract which they will be performing. Safety vests and hard hats will be pre-approved and worn at all times outside vehicles within the work area. Safety vests shall be Class III.

Provide and maintain a dedicated email address for receipt of work orders and correspondence throughout the term of this contract.

Project Number: RMC 6434-66-001

Sheet 3B

County: WISE, ETC.

Control: 6434-66-001

Highway: US 380, ETC.

Project Description - This project consists of Guardrail Installation and Repair on sections of highway within Jack and Wise Counties as shown in the contract and defined in these general notes and specifications. Coordinate all work through the Maintenance Office listed below:

Jack/Wise
1710 W. US 380 Decatur, Texas 76234 (940) 626-3400

Contractor will be responsible for notifying a “one call” center when necessary. It will also be the Contractor’s responsibility to notify the City and State for any utility and line locations. Telephone numbers are listed below:

TxDOT Traffic Operations Center (817)-370-3661
 City of Fort Worth (Illumination) – (817)-392-8100
 DIG TESS 1-(800)-344-8377

This is not to be considered a complete list of contacts. Contractor may need to contact additional agencies for utilities and line locations. Provide TxDOT with confirmation tickets of utility and line locates.

Item 4.4 Changes In The Work. This contract may be extended in accordance with Special Provision 004---002.

Item 7.2.4. Public Safety and Convenience. Personal vehicles will not be parked within the right-of-way at any time, including any section closed to the traveling public.

Operations will be curtailed or halted during special events that may result in delays or congestion to the traveling public.

No work that restricts or interferes with traffic shall be allowed from 3:00 pm on the day preceding the Holiday or Event to 9:00 am on the day after the Holiday or Event. The following Holiday/Event lane closure restriction requirements apply to this project:

Holiday Lane Closure Restrictions	
New Year’s Eve and New Year’s Day (December 31 through January 1)	3 PM December 30 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6

Project Number: RMC 6434-66-001

Sheet 3C

County: WISE, ETC.

Control: 6434-66-001

Highway: US 380, ETC.

Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

No lane closures within approximately 1 mile proximity (based on potential impact) of major retail traffic generators (i.e. malls) (Thanksgiving Day through January 2). This includes the events listed below:

Event Lane Closure Restrictions	
3 PM the day preceding Event to 9 AM the day after the Event	
NASCAR Nationwide and Sprint Cup Series (Held in late March/early April & Late October/early November)	Indy Series Racing and NASCAR Truck Series (Held in June)

The above list of events is not all inclusive and should be added to or adjusted as needed. When deemed necessary, the Engineer will modify the list of major events when new events develop, existing events are rescheduled, or when warranted.

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

Item 8.1. Prosecution of Work. Notification of work will be executed by work order on a callout basis. This contract has non-site-specific work. The locations shown in the plans are for contractor's information only.

Notify section supervisor twenty-four (24) hours in advance of the date and time the Contractor plans to commence work.

This contract will have multiple and concurrent work orders. No more than four (4) work orders will be issued to be performed at the same time.

Project Number: RMC 6434-66-001

Sheet 3D

County: WISE, ETC.

Control: 6434-66-001

Highway: US 380, ETC.

Upon issuance of initial work order all work orders thereafter shall begin operations within seventy-two (72) hours after verbal and/or written notification.

Upon verbal notification for emergency work, set up and maintain traffic control within 4 hours and begin operations within 6 hours.

Item 8.3. Computation of Contract Time for Completion. Time will be charged in accordance with Item 8.3.1.5 Calendar Day in the Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges.

Working days for work orders will be calculated by dividing quantities by production rate. A fraction of the day will be rounded up to the next whole number. If the total number of working days is not used during the completion of the work order the working days will not be carried forward to a subsequent work order. Each work order will define the total number of working days for that work order as defined in Section 8.3.1.4. Standard Work Week in the Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges.

Item 8.3.2. Restricted Work Hours. Perform work as shown below, unless otherwise approved:

<i>Daytime Work</i>
Sunrise to Sunset Monday – Friday Saturday-Optional
Excluding National Holidays

The contractor has the option of working on Saturdays or State holidays with forty-eight (48) hour advance notice. Work on Sundays or National holidays will not be permitted without written permission from the Engineer.

Working day charges for nighttime work will be charged against the night in which work begins.

Item 8.5. Project Schedules. Prepare the schedules as a Bar Chart. Schedules must be submitted by the twentieth (20th) day of every month.

Item 8.6. Failure to Complete Work on Time. The response time specified in the contract is an essential element. Liquidated damages will be assessed when the Contractor fails to begin work within the specified response times for any Item(s). The dollar amount specified in this contract will be deducted from any money due or to become due for any Items(s) and will continue to be deducted for each day until work begins. This amount will be assessed not as a penalty, but as liquidated damages. Failure to complete a project in the working days specified in the work order, time charges will continue for each working day until work is completed for that work order. The amount assessed for liquidated damages will be based on the total value of the original contract, in accordance with Special Provision 000-1243, not the estimated amount on individual work

Project Number: RMC 6434-66-001**Sheet 3E****County:** WISE, ETC.**Control:** 6434-66-001**Highway:** US 380, ETC.

orders.

Item 9.6. Payment for Material on Hand (MOH). Payment for MOH will only be made for materials by written approval of the Engineer.

Item 500. Mobilization.

Mobilization for callout work will be paid for each callout work request.

For Contracts with emergency mobilization, provide a person and method of contact available 24 hrs. a day, 7 days a week unless otherwise shown on the plans. The time of notice will be the transmission time of the written notice or notice provided orally by the Department's representative.

Item 502. Barricades, Signs, and Traffic Handling.

Provide equipment such as trucks, trailers, autos, etc., with highly visible omni-directional warning flashing lights. These lights will be used within the work zone at all times. Provide forward facing arrow panel on lead vehicles when working in a continuous turn lanes. The Engineer will approve all equipment and vehicles prior to use.

All traffic control, with the exception of Special Specification 6185 Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA), is subsidiary to the various bid items in accordance with Section 502.4.1.6 Contracts with Callout Work and Work Orders in the Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges.

Mount signs on their own stands. Attach two (2) brightly colored safety flags to each sign. Do not hang or lean signs on or against any other sign post or delineator post. Erect signs in such a manner that they will not obstruct the traveling public's view of normal roadway signing or obstruct sight distance at intersections or curves.

Shadow vehicles equipped with Truck-Mounted Attenuators (TMA's) are required as shown on all Traffic Control Plan (TCP) Standards. Striping will be required on the back panel of truck mounted attenuators, and will be 8 inches of red and white stripes placed on an inverted "V" design. Sheeting will conform to departmental material Specification D-9-8300, Type "C".

Provide signing and traffic control in compliance with the Texas Manual on Uniform Traffic Control Devices (TMUTCD), latest edition, and the appropriate traffic control method as outlined in the TMUTCD, and elsewhere in the plans.

Portable Changeable Message Signs (PCMS) shown on the Traffic Control Plan (TCP) Standards as "optional" will be required on this contract. Additional PCMS may be required and will be paid for under the appropriate bid item. PCMS shall be placed a minimum of 48 hours in advance of work on all roadways, and 7 days in advance of work on Tier 1 roadways.

Lane closures will be required on roadways as indicated in the plans and will be a maximum of two (2) miles from beginning of taper to end of closure. Lane closures will also be required on

General Notes

Sheet E

Project Number: RMC 6434-66-001**Sheet 3F****County:** WISE, ETC.**Control:** 6434-66-001**Highway:** US 380, ETC.

roadways allowing mobile operations in areas with inadequate field of view as determined by the Engineer.

Provide a Department Approved Truck Mounted Attenuator (TMA) behind all equipment overhanging roadway travel lanes. Trailer all slow moving vehicles (designed to operate 25mph or less) crossing freeway main lanes.

Dedicated personnel must be on duty to maintain barricades.

Equipment and materials will not be left within thirty feet (30') of the travel lane during non-working hours.

Submit a lighting plan for nighttime work for TxDOT review and approval.

Provide Multi-Directional Lighting Device (MDLD) for nighttime work with the following quality requirements:

- Provide a 2000 watt (minimum) SIROCCO lighting balloon, Airstar lighting or equivalent
- It is the intent of the MDLD lighting to supplement the Portable Road Light and Power Unit used to illuminate work areas during night work hours.
- Provide MDLD units which can self-inflate and are capable of illuminating approximately 15,000 sq. ft.
- Provide MDLD units of 1.1 meter horizontal diameter and capable of withstanding 60 mph winds when fully inflated and operating.
- Provide MDLD units with two (2) 1,000 watt halogen bulbs recommended by the manufacturer.

Item 502.4.2. Law Enforcement Personnel. If off-duty uniformed police officers are to be used during daytime hours, obtain prior approval from the Engineer. Nighttime closures will require off-duty uniformed police officer(s). All off-duty uniformed police officers will have marked police vehicle(s) with jurisdiction and full police power in the city or county where the work is being performed. Determine and agree upon the number of off-duty uniformed police officers in advance of the work. Off-duty police officers will be paid for through force account. Fill out Form 318 "Daily Report on Law Enforcement" to check against invoice for officers.

Item 540. Metal Beam Guard Fence

This bid item is to be used at locations where metal beam guard fence did not previously exist (or at locations where the metal beam guard fence is to be upgraded to current standard as directed).

General Notes

Sheet F

Project Number: RMC 6434-66-001**Sheet 3G****County:** WISE, ETC.**Control: 6434-66-001****Highway:** US 380, ETC.

Realignment of existing rail, which requires new post holes, will be paid under Item 540. Metal Beam Guard Fence Realignment in the Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges.

New metal beam guard fence at locations where it is repaired or replaced in like kind will be paid for under Item 770 "Guard Fence Repair".

Guardrail end treatments shall be defined as either SGT or GET.

For non-typical applications of Thrie-Beam connection to bridge ends, a Detailed Plan Sheet will be provided by TxDOT on an as needed basis.

TxDOT will supply bid items labeled (Furnished) if any, and the Contractor will supply all other materials. The contractor will return any salvageable material to the maintenance warehouse at the address above. Any unsalvageable material becomes property of the Contractor.

Item 542. Removing Metal Beam Guard Fence.

This bid item is to be used at locations where the metal beam guard fence is removed but not replaced as directed or at locations where the metal beam guard fence is removed and upgraded to current standards as directed.

Removal of metal beam guard fence to be repaired or replaced in like kind will be paid for under Item 770 "Guard Fence Repair".

Item 658. Delineator and Object Marker Assemblies.

Delineators and appropriate stickers will not be paid for directly but will be subsidiary to the various bid items.

Provide a flat mount delineator for guard fence attachment meeting the following requirements. 33 in. in length and be flattened and sealed on each end enabling mounting height to be consistent without the use of a tape measure. Post will be a minimum of 2-3/8 in. outside diameter composed of recycled tire rubber and post-consumer materials. Post will be permanently sealed at the top and be a minimum of 3 in. wide and capable of displaying a 3 in. wide by 12 in. long piece of reflective sheeting.

Item 770. Guard Fence Repair.

Repair, remove, and/or replace existing rail, posts, block outs, terminal anchor sections, and single guardrail terminals. The Engineer will determine whether damaged Guard Fence will be repaired or whether to upgrade the installation to current standards using other items of work.

When placing the components of the SGT, tightening of the cables will be subsidiary to the replacement of the SGT components.

General Notes

Sheet G

Project Number: RMC 6434-66-001**Sheet 3H****County:** WISE, ETC.**Control: 6434-66-001****Highway:** US 380, ETC.

Adjust the depth of each guardrail post as necessary to maintain the uniform top alignment of all posts in each line of guardrail. The contractor will also drill holes in the guardrail posts as necessary to maintain proper vertical alignment of the metal beam rail element.

Guard rail, terminal end treatments, and hardware must comply with the 2016 Edition of the AASHTO Manual for Assessing Safety Hardware (MASH).

Item 771. Repair Cable Barrier System.

Cable Barrier Systems from one (1) different manufacturers exist within the work limits. The Contractor shall not interchange materials, components, or recommendations from different manufacturers.

The Cass System TL-4 is on various locations (US 81, US 380, and SH 114).

Re-tensioning will be done in accordance with the manufacturer's recommendations.

Repair cable barrier systems in accordance with manufacturer's recommendations as shown on the standard sheets for each type of system.

Place or replace a reflective delineator on every 3rd post of the cable system. This will not be paid directly but will be subsidiary to this item.

Item 774. Attenuator Repair.

Remove and replace with a MASH compliant system as directed. Do not repair the attenuator within the right-of-way. Remove and take the attenuator to the warehouse yard. Once the damaged attenuator is at the warehouse yard, the Contractor has one week to make repairs and install the attenuator. The Contractor will be responsible for any equipment needed to load and unload attenuators.

Provide a copy of certification by Trinity Industries, Inc., to repair and/or install TRACC systems, for all employees.

If concrete is needed, furnish Class "A" Concrete in accordance with Item 421. This will not be paid directly but will be subsidiary to this item.

Item 6001. Portable Changeable Message Sign.

Provide electronic portable changeable message sign unit(s) as directed.

If more than one (1) crew works on the same day, but in different locations, each crew will use portable changeable message signs and arrow panels.

Each sign will have the following eighteen (18) messages programmed in its permanent memory:

1. Ramp Closed Ahead
2. Use Other Routes

General Notes

Sheet H

Project Number: RMC 6434-66-001

Sheet 3I

County: WISE, ETC.

Control: 6434-66-001

Highway: US 380, ETC.

3. Right Lane Closed
4. Left Lane Closed
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Be Prepared To Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed **MPH
13. Merge Right
14. Merge Left
15. No Exit Next ** Miles
16. Various Lanes Closed
17. Two Left Lanes Closed
18. Two right Lanes Closed

Item 6185. Truck Mounted Attenuators (TMA).

The total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 1 Series	Scenario	Required TMA
(1-1)-18		1
(1-2)-18		1
(1-3)-18	A	1
	B	2
(1-4)-18		1
(1-5)-18		1
(1-6)-18		1

TCP 2 Series	Scenario	Required TMA
(2-1)-18	All	1
(2-2)-18	All	1
(2-3)-18	A	1
	B	2
(2-4)-18	All	1
(2-5)-18	All	1
(2-6)-18	All	1

Project Number: RMC 6434-66-001

Sheet 3J

County: WISE, ETC.

Control: 6434-66-001

Highway: US 380, ETC.

TCP 5 Series	Scenario	Required TMA
(5-1)-18	A	1
	B	2

TCP 6 Series	Scenario	Required TMA
(6-1)-12	A	1
	B	2
(6-2)-12	All	1
(6-3)-12	All	1
(6-4)-12	A	1
	B	2
(6-5)-12	A	1
	B	2
(6-6)-12	All	1 Per Lane
(6-7)-12	All	1 Per Lane
(6-8)-14	All	1
(6-9)-14	All	1

Shadow vehicles equipped for truck mounted attenuators (TMA) for mobile and stationary operations must be available for use at any time as determined by the Engineer.

The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA needed for the project for those times per plan requirements. Additional TMAs used that are not specified in the plans in which the Contractor expects compensation will require prior approval from the Engineer.



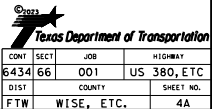
CONTROLLING PROJECT ID 6434-66-001

DISTRICT Fort Worth
HIGHWAY US0380

COUNTY Wise

Estimate & Quantity Sheet

CONTROL SECTION JOB				6434-66-001		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00194025			
COUNTY				Wise			
HIGHWAY				US0380			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	500-6003	MOBILIZATION (CALLOUT 1)	EA	26.000		26.000	
	500-6034	MOBILIZATION (EMERGENCY)	EA	2.000		2.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	32,000.000		32,000.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	70.000		70.000	
	540-6007	MTL BEAM GD FEN TRANS (TL2)	EA	8.000		8.000	
	540-6008	MTL BEAM GD FEN TRANS (T101)	EA	8.000		8.000	
	540-6009	MTL BEAM GD FEN TRANS (T6)	EA	4.000		4.000	
	540-6010	MTL W-BEAM GD FEN ADJUSTMENT	LF	500.000		500.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	40.000		40.000	
	540-6018	MTL BM GD FEN TRANS (NON - SYM)	EA	40.000		40.000	
	540-6035	MTL BM GD FEN TRANS (31"-28")	EA	4.000		4.000	
	540-6037	MTL BM GD FEN TRANS (ANCHOR PLATE)	EA	12.000		12.000	
	540-6039	MTL BM GD FEN TRANS (31"-28") (25')	EA	6.000		6.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	32,000.000		32,000.000	
	770-6001	REPAIR RAIL ELEMENT (W - BEAM)	LF	5,000.000		5,000.000	
	770-6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF	63.000		63.000	
	770-6003	REPAIR FIMNT(THRIE-BM TRANS TO W-BM)	LF	100.000		100.000	
	770-6004	REPAIR RAIL ELEMENT (CURVED RAIL)	LF	400.000		400.000	
	770-6006	RAISE RAIL ELEMENT	LF	300.000		300.000	
	770-6010	REM / REPL TIMBER/STL POST W/D CONC FND	EA	700.000		700.000	
	770-6017	REALIGN POSTS	EA	600.000		600.000	
	770-6019	REMOVE & REPLACE BLOCKOUT	EA	750.000		750.000	
	770-6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF	1,200.000		1,200.000	
	770-6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA	90.000		90.000	
	770-6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA	125.000		125.000	
	770-6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA	30.000		30.000	
	770-6029	REM & RESET SGT IMPACT HEAD	EA	15.000		15.000	
	770-6030	REPLACE SGT CABLE ASSEMBLY	EA	40.000		40.000	
	770-6031	REPLACE SGT CABLE ANCHOR	EA	35.000		35.000	
	770-6032	REPLACE SGT STRUT	EA	25.000		25.000	
	770-6060	REMOVE AND REPLACE DAT	EA	5.000		5.000	
	770-6061	REPAIR MTL BM GD FEN(LONG SPAN SYS)	LF	250.000		250.000	
	771-6002	REPLACE POSTS (TL-4)	EA	2,100.000		2,100.000	
	771-6004	CABLE SPLICE / TURNBUCKLE (TL-4)	EA	5.000		5.000	
	771-6006	REPAIR CONCRETE FOUNDATION (TL-4)	EA	5.000		5.000	
	771-6008	REPR OR REPLC CABLE BARR TERM SEC(TL-4)	EA	15.000		15.000	
	771-6010	REPLACE CABLE (TL-4)	LF	300.000		300.000	



ESTIMATE AND QUANTITY SHEET

DATE: FILE:



CONTROLLING PROJECT ID 6434-66-001

DISTRICT Fort Worth
HIGHWAY US0380

COUNTY Wise

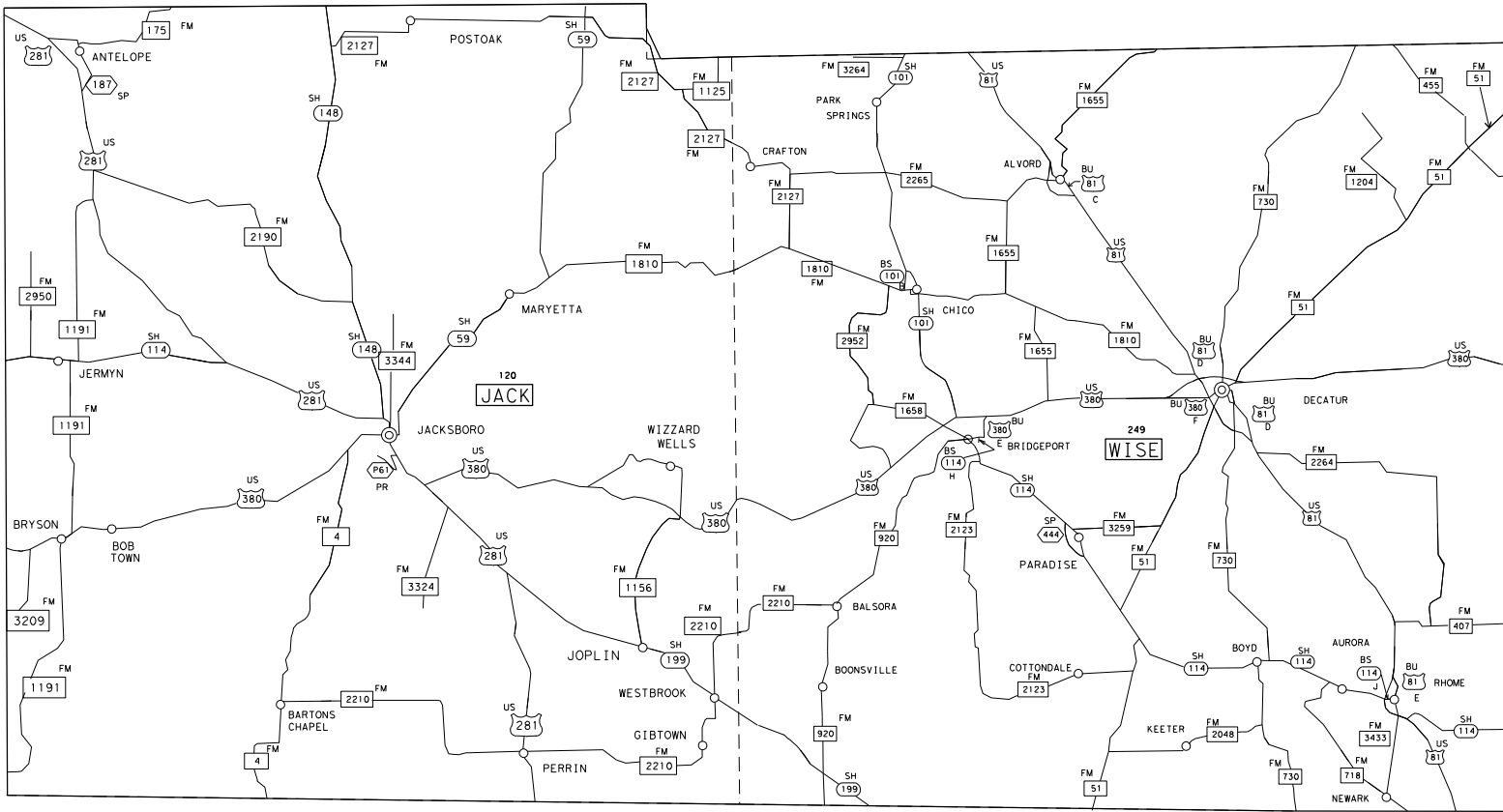
Estimate & Quantity Sheet

CONTROL SECTION JOB				6434-66-001		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00194025			
COUNTY				Wise			
HIGHWAY				US0380			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	771-6011	CHECK / RE-TENSION CABLE	EA	50.000		50.000	
	772-6003	POST AND CABLE FENCE (NEW INSTALLATION)	LF	300.000		300.000	
	772-6004	POST AND CABLE FENCE (NEW CONC ANCHOR)	EA	8.000		8.000	
	772-6005	POST AND CABLE FENCE (REMV / REPL POSTS)	EA	15.000		15.000	
	772-6007	POST AND CABLE FENCE (REMV/ REPL CABLE)	LF	700.000		700.000	
	774-6001	REMOVE AND REPLACE (TRACC)	EA	2.000		2.000	
	774-6059	REPAIR (TRACC) (BAY)	EA	5.000		5.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	40.000		40.000	
	6185-6002	TMA (STATIONARY)	DAY	300.000		300.000	

DATE:
FILE:

ESTIMATE AND QUANTITY SHEET

CONT	SECT	JOB	HIGHWAY
6434	66	001	US 380, ETC
DIST	COUNTY	SHEET NO.	
FTW	WISE, ETC.	4B	

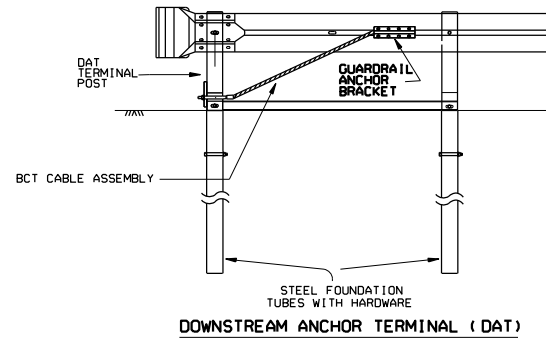
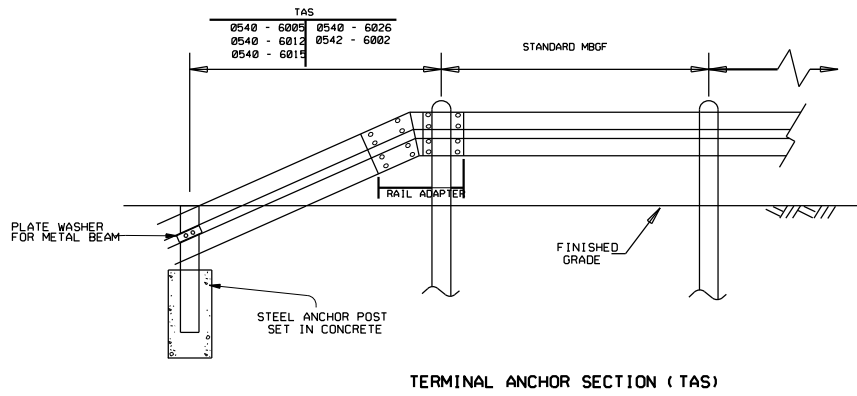
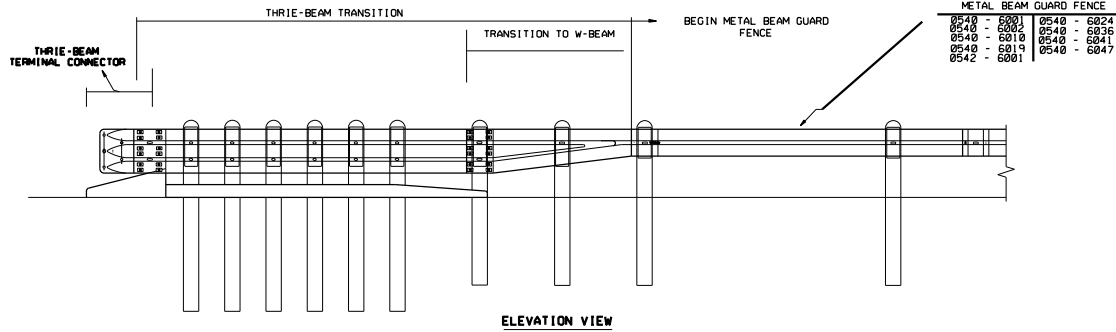


Maintenance Section 02 - Wise and Jack Counties
GUARDRAIL INSTALLATION AND REPAIR
 Texas Department of Transportation, Fort Worth District

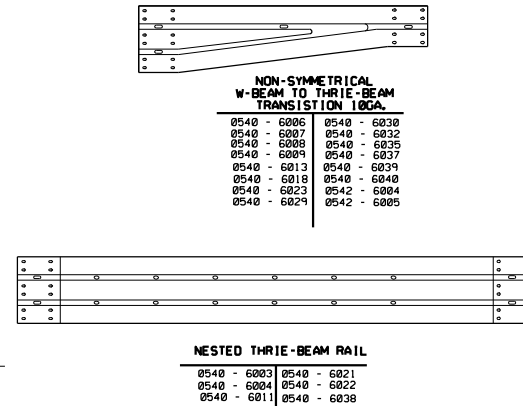
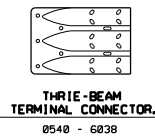
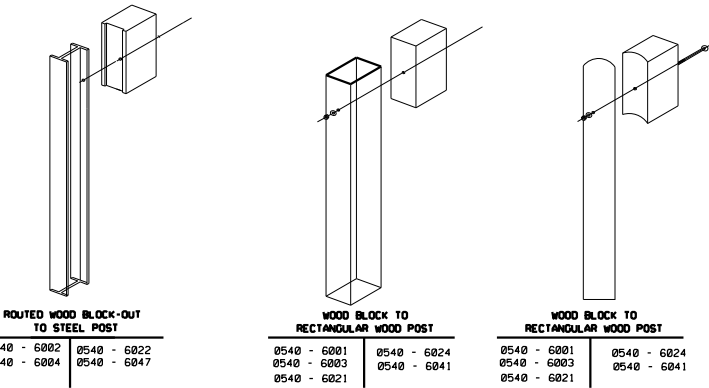
PROJECT LOCATION MAP

CONT	SECT	JOB	HIGHWAY
6434	66	001	US 380, ETC
DIST	COUNTY		SHEET NO.
FTW	WISE, ETC.		5

DATE:
FILE:



- 0540 - 6016
- 0540 - 6029
- 0540 - 6051
- 0542 - 6003

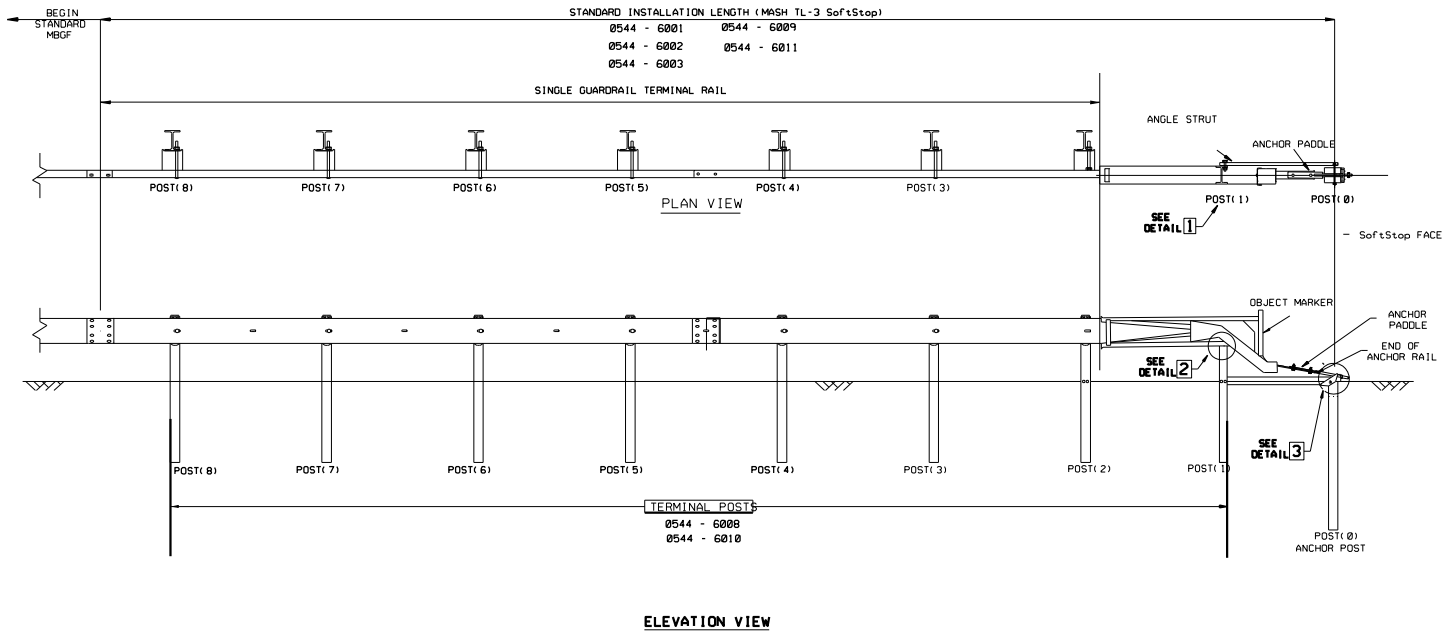


BID CODE	DESCRIPTION	UNIT
0540 - 6001	MTL W-BEAM GD FEN (TIM POST)	LF
0540 - 6002	MTL W-BEAM GD FEN (STEEL POST)	LF
0540 - 6003	MTL THRIE-BEAM GD FEN (TIM POST)	LF
0540 - 6004	MTL THRIE-BEAM GD FEN (STEEL POST)	LF
0540 - 6005	TERMINAL ANCHOR SECTION	EA
0540 - 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA
0540 - 6007	MTL BEAM GD FEN TRANS (TL2)	EA
0540 - 6008	MTL BEAM GD FEN TRANS (T101)	EA
0540 - 6009	MTL BEAM GD FEN TRANS (T6)	EA
0540 - 6010	MTL W-BEAM GD FEN ADJUSTMENT	LF
0540 - 6011	MTL THRIE-BEAM GD FEN ADJUSTMENT	LF
0540 - 6012	TERMINAL ANCHOR SECTION ADJUSTMENT	EA
0540 - 6013	TRANSITION ADJUSTMENT	EA
0540 - 6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA
0540 - 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA
0540 - 6018	MTL BM GD FEN TRANS (NON-SYM)	EA
0540 - 6019	MTL W-BEAM GD FEN (SPECIAL)	LF
0540 - 6021	MTL THRIE-BEAM GD FEN (TIM POST)	EA
0540 - 6022	MTL THRIE-BEAM GD FEN (STEEL POST)	EA
0540 - 6023	MTL BEAM GD FEN TRANS (THRIE BEAM) 28'	EA
0540 - 6024	MTL W-BEAM GD FEN (TIM POST) (TY IV)	LF
0540 - 6026	DRIVEWAY TERMINAL ANCHOR SECTION (TY IV)	EA
0540 - 6028	DOWNSTREAM ANCHOR TERMINAL SECT (TY IV)	EA
0540 - 6029	MTL BM GD FEN TRANS (THRIE-BEAM) (OPT 1)	EA
0540 - 6030	MTL BM GD FEN TRANS (THRIE-BEAM) (OPT 2)	EA
0540 - 6031	DOWNSTREAM ANCHOR TERMINAL ADJUSTMENT	EA
0540 - 6032	MTL BEAM GD FEN TRANS (TL2) 28'	EA
0540 - 6035	MTL BM GD FEN TRANS (31'-28')	EA
0540 - 6036	MTL W-BEAM GD FEN (NU-GUARD 31')	LF
0540 - 6037	MTL BM GD FEN TRANS (ANCHOR PLATE)	EA
0540 - 6038	CONNECTOR PLATE FOR THRIE BEAM	EA
0540 - 6039	MTL BM GD FEN TRANS (31' - 28') (25')	EA
0540 - 6040	MTL BM GD FEN TRANS (31' - 28') (50')	EA
0540 - 6041	MTL W-BEAM GD FEN (NESTED) (TIM POST)	LF
0540 - 6047	MTL W-BEAM GD FEN (NESTED) (STEEL POST)	LF
0542 - 6001	REMOVE METAL BEAM GUARD FENCE	EA
0542 - 6002	REMOVE TERMINAL ANCHOR SECTION	EA
0542 - 6003	REMOVE DOWNSTREAM TERMINAL ANCHOR	EA
0542 - 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA
0542 - 6005	RM MTL BM GD FEN TRANS (T101)	EA
0542 - 6006	MTL BM GD FEN (REMOVE & REINSTALL)	LF

NOTE
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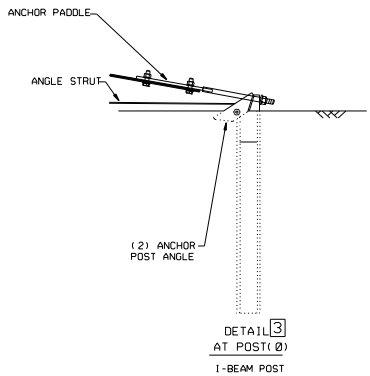
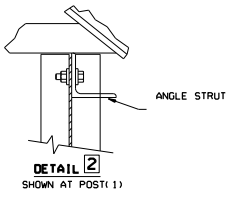
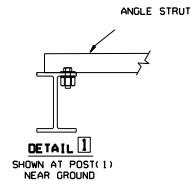
**PAY ITEM DETAILS
METAL BEAM GUARD FENCE**

FILE#	DW T+DOT	CHK T+DOT	DW T+DOT	CHK T+DOT
0540+ SEPTEMBER 2021	CONTR	SECT	JOB	HIGHWAY
REVISONS	B434	66	801	US 398, ETC.
	DIST	COUNTY		SHEET NO.
	FTW	WISE, ETC.		6A



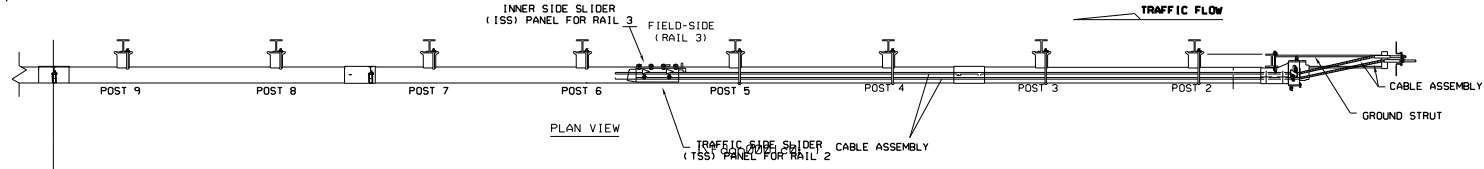
BID CODE	DESCRIPTION	UNIT
0544 - 6001	GUARDRAIL END TREATMENT (INSTALL)	EA
0544 - 6002	GUARDRAIL END TREATMENT (MOVE & RESET)	EA
0544 - 6003	GUARDRAIL END TREATMENT (REMOVE)	EA
0544 - 6008	GUARDRAIL END TRTMT (RETRO) STEEL POST	EA
0544 - 6009	GUARDRAIL END TRTMT (RETRO) WOOD POST	EA
0544 - 6010	GDRL END TRMT (RETRO W/O HEAD)(STL POST)	EA
0544 - 6011	GDRL END TRMT (RETRO W/O HEAD)(WD POST)	EA

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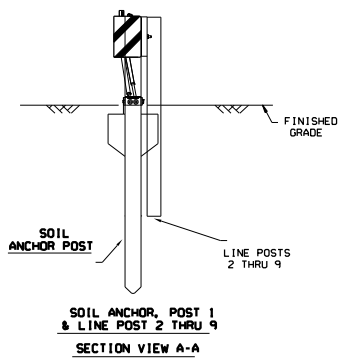
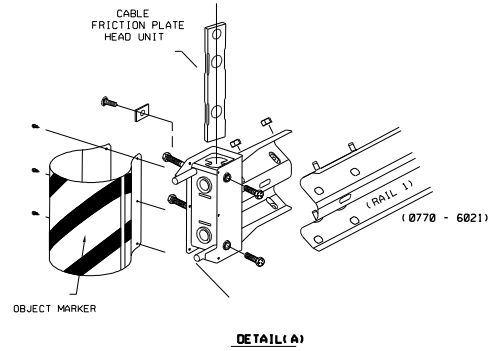
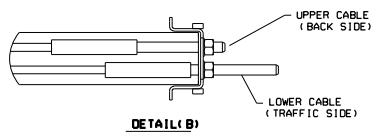
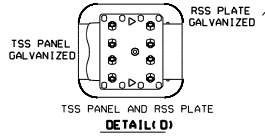
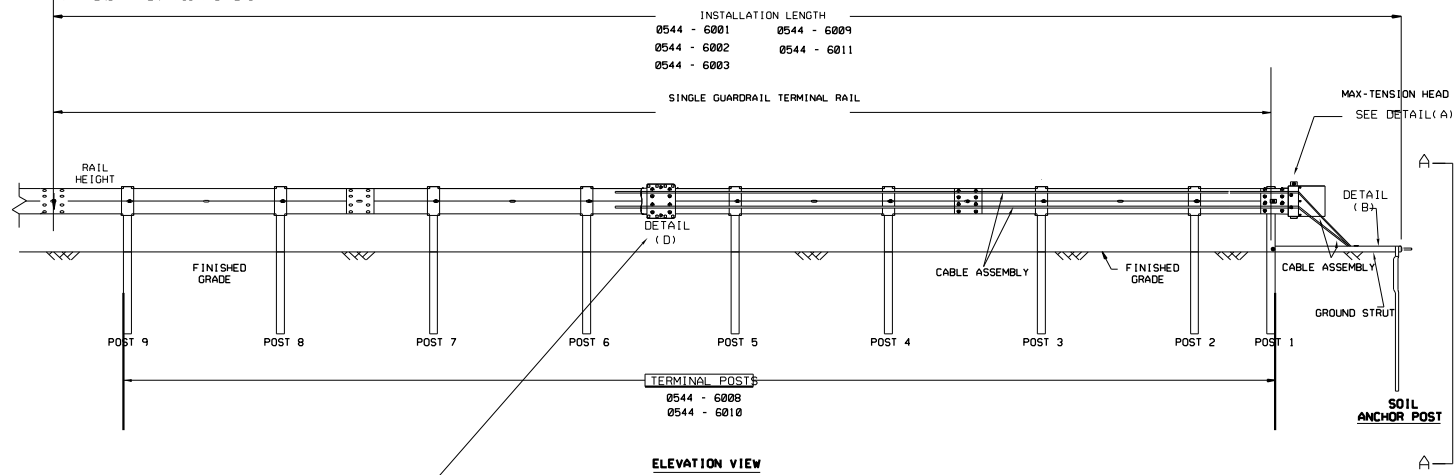
PAY ITEM DETAILS
 TRINITY HIGHWAY
 SOFTSTOP END TERMINAL
 MASH - TL-3

FILE#	DATE	BY	CHK'D BY	APP'D BY
1-001-SEPTEMBER 2021	09/01/21	66	001	WISSE, ETC.
REVISIONS	6434	66	001	US 380, ETC.
	FTW		WISE, ETC.	SHEET NO. 68



BID CODE	DESCRIPTION	UNIT
0544 - 6001	GUARDRAIL END TREATMENT (INSTALL)	EA
0544 - 6002	GUARDRAIL END TREATMENT (MOVE & RESET)	EA
0544 - 6003	GUARDRAIL END TREATMENT (REMOVE)	EA
0544 - 6008	GUARDRAIL END TRTMT (RETRO)(STEEL POST)	EA
0544 - 6009	GUARDRAIL END TRTMT (RETRO)(WOOD POST)	EA
0544 - 6010	GDRL END TRMT (RETRO W/O HEAD)(STL POST)	EA
0544 - 6011	GDRL END TRMT (RETRO W/O HEAD)(WO POST)	EA

NOTE
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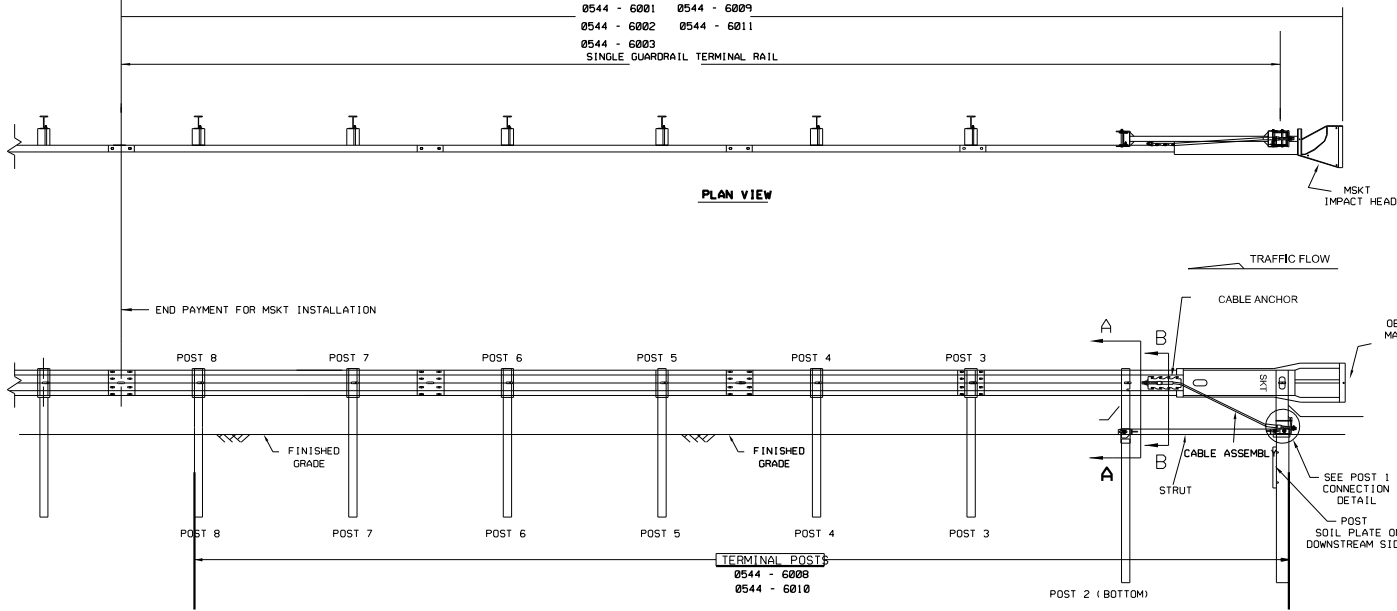
Texas Department of Transportation

**PAY ITEM DETAILS
 MAX-TENSION END TERMINAL
 MASH - TL-3**

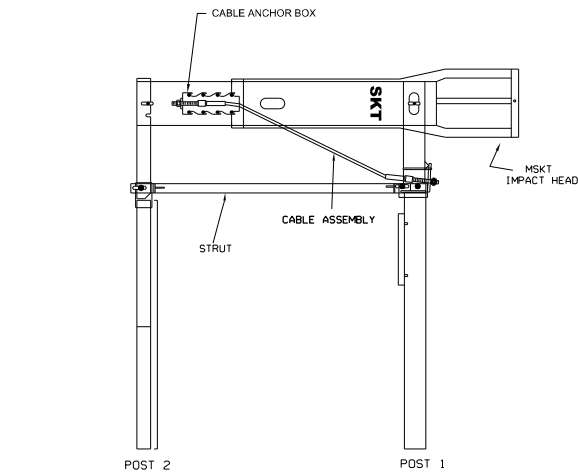
FILE#	Dw 1-001	Cx 1-001	Dw 1-001	Cx 1-001
© TxDOT-SEPTEMBER 2021	CONT SECT	JOB	HIGHWAY	
REVISIONS	6434	66	001	US 308, ETC.
	DIST	COUNTY	SHEET NO.	
	FTW	WISE, ETC.	6C	

DATE:
 FILE#

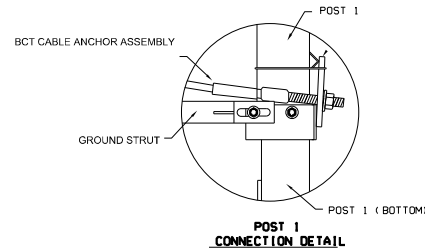
INSTALLATION LENGTH
 0544 - 6001 0544 - 6009
 0544 - 6002 0544 - 6011
 0544 - 6003
 SINGLE GUARDRAIL TERMINAL RAIL



PLAN VIEW



ELEVATION VIEW



POST 1 CONNECTION DETAIL

CONNECTION DETAIL A
 IMPACT HEAD (POST 1 & POST 2)

BID CODE	DESCRIPTION	UNIT
0544 - 6001	GUARDRAIL END TREATMENT (INSTALL)	EA
0544 - 6002	GUARDRAIL END TREATMENT (MOVE & RESET)	EA
0544 - 6003	GUARDRAIL END TREATMENT (REMOVE)	EA
0544 - 6008	GUARDRAIL END TRTMT (RETRO)(STEEL POST)	EA
0544 - 6009	GUARDRAIL END TRTMT (RETRO)(WOOD POST)	EA
0544 - 6010	GDRL END TRMT (RETRO W/O HEAD)(STL POST)	EA
0544 - 6011	GDRL END TRMT (RETRO W/O HEAD)(WD POST)	EA

NOTE

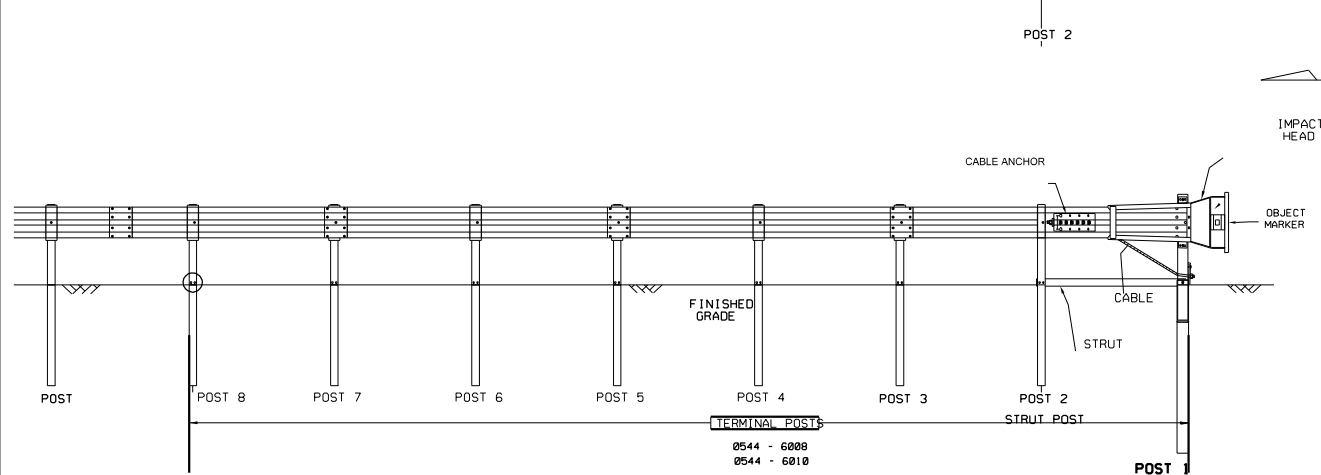
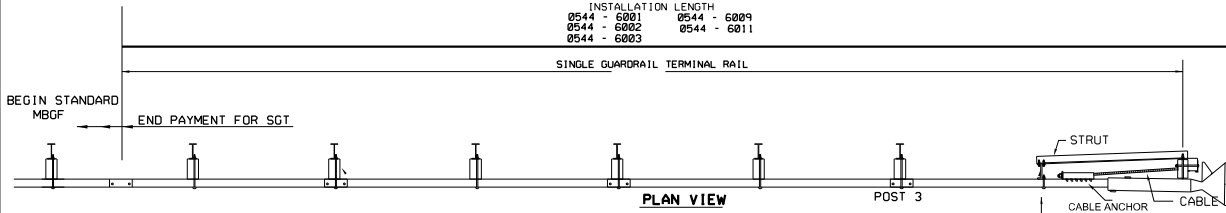
THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN NEW SECTION OF GUARDRAIL ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR MAINTENANCE WORK SUCH AS REPAIRING DAMAGED GUARDRAIL. THIS IS NOT A STANDARD SHEET FOR CLARIFYING FOR HOW WORK WILL BE PERFORMED.

PAY ITEM DETAILS
SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3

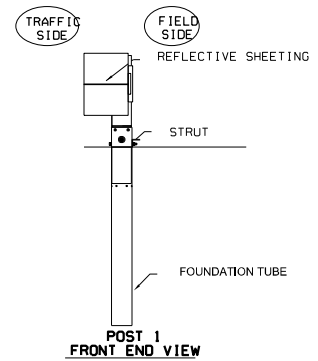
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CONTRACT SECT	JOB	HIGHWAY		
© T-001; SEPTEMBER 2021	6434	66	301	US 380, ETC.
REVISIONS	DET	COUNTY	SHEET NO.	
	FTW	WISE, ETC.	60	

DATE:
 FILE:

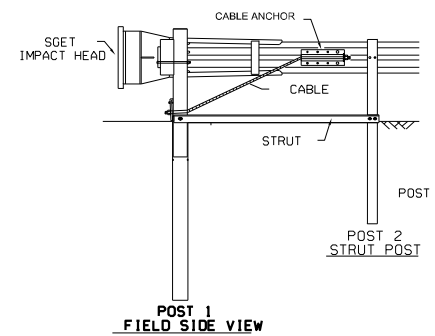
INSTALLATION LENGTH		
0544 - 6001	0544 - 6009	
0544 - 6002	0544 - 6011	
0544 - 6003		



ELEVATION VIEW



POST 1 FRONT END VIEW



POST 1 FIELD SIDE VIEW

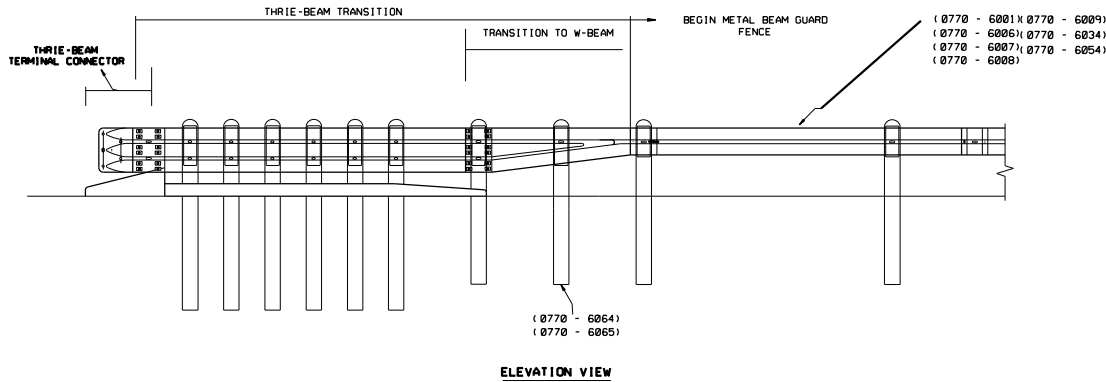
BID CODE	DESCRIPTION	UNIT
0544 - 6001	GUARDRAIL END TREATMENT (INSTALL)	EA
0544 - 6002	GUARDRAIL END TREATMENT (MOVE & RESET)	EA
0544 - 6003	GUARDRAIL END TREATMENT (REMOVE)	EA
0544 - 6008	GUARDRAIL END TRTMT (RETRO)(STEEL POST)	EA
0544 - 6009	GUARDRAIL END TRTMT (RETRO)(WOOD POST)	EA
0544 - 6010	GDRL END TRMT (RETRO W/O HEAD)(STL POST)	EA
0544 - 6011	GDRL END TRMT (RETRO W/O HEAD)(WD POST)	EA

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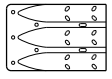
PAY ITEM DETAILS
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SCET - TL-3 - MASH

FILE:	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT: SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC.
	DIST	COUNTY	SHEET NO.	
	FWW	WISE, ETC.	66	

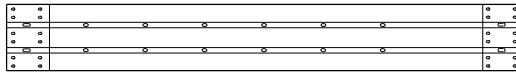
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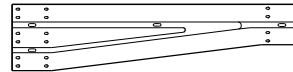
ELEVATION VIEW



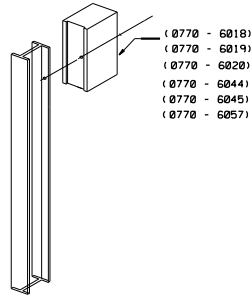
THRIE-BEAM TERMINAL CONNECTOR.



NESTED THRIE-BEAM RAIL

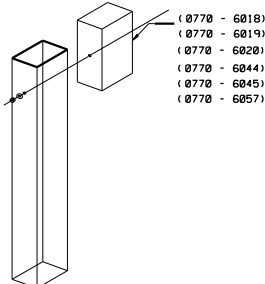


NON-SYMMETRICAL W-BEAM TO THRIE-BEAM TRANSITION LOGA.



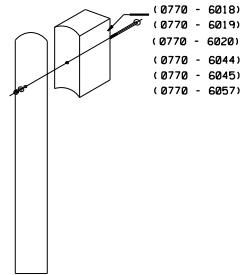
ROUTED WOOD BLOCK-OUT TO STEEL POST

- (0770 - 6018) (0770 - 6039)
- (0770 - 6011) (0770 - 6041)
- (0770 - 6013) (0770 - 6042)
- (0770 - 6015) (0770 - 6043)
- (0770 - 6016) (0770 - 6052)
- (0770 - 6017)



WOOD BLOCK TO RECTANGULAR WOOD POST

- (0770 - 6018) (0770 - 6038)
- (0770 - 6011) (0770 - 6040)
- (0770 - 6012) (0770 - 6042)
- (0770 - 6014) (0770 - 6043)
- (0770 - 6017) (0770 - 6056)



WOOD BLOCK TO RECTANGULAR WOOD POST

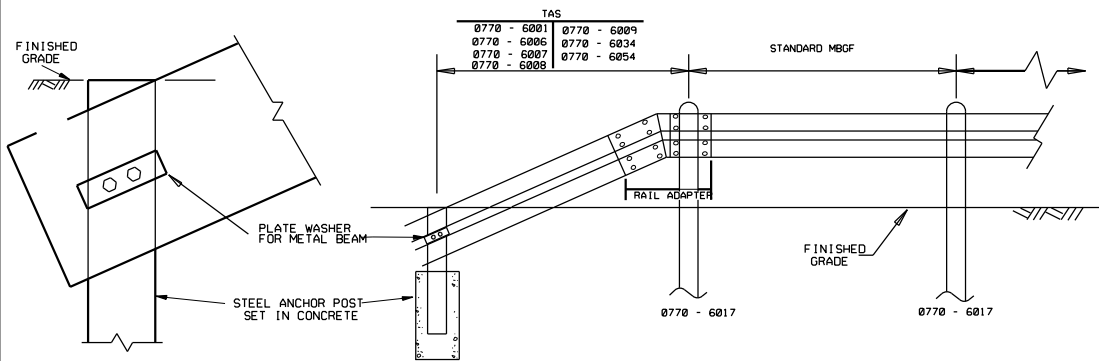
- (0770 - 6018) (0770 - 6038)
- (0770 - 6011) (0770 - 6040)
- (0770 - 6012) (0770 - 6042)
- (0770 - 6014) (0770 - 6043)
- (0770 - 6017) (0770 - 6056)

BID CODE	DESCRIPTION	UNIT
0770 - 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF
0770 - 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF
0770 - 6003	REPAIR RAIL ELMNT (THRIE - BM TO W-BM)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (T4S)	LF
0770 - 6010	REM/REPL TIMBER/STL POST W/O CONC FND	EA
0770 - 6011	REM / REPL TIMBER / STL POST W/CONC FND	EA
0770 - 6012	REM / REPL TIMBER POST W / O CONC FND	EA
0770 - 6013	REM / REPL STEEL POST W / O CONC FND	EA
0770 - 6014	REM / REPL TIMBER POST W / CONC FND	EA
0770 - 6015	REM / REPL STEEL POST W / CONC FND	EA
0770 - 6016	REPAIR STEEL POST WITH BASE PLATE	EA
0770 - 6017	REALIGN POSTS	EA
0770 - 6018	INSTALL BLOCKOUT (TYPE SPECIFIED)	EA
0770 - 6019	REMOVE & REPLACE BLOCKOUT	EA
0770 - 6020	REPLACE STL BLOCKOUTS W /WOOD BLOCKOUTS	EA
0770 - 6034	REPAIR RAIL ELEMENT(W - BEAM FURNISHED)	LF
0770 - 6035	REPAIR RAIL ELEMENT(THRIE - BEAM)(FURN)	LF
0770 - 6036	REP RAIL ELMNT (THRIE - BM TRANS)(FURN)	LF
0770 - 6038	REM / REPL TIM POST W/O CONC FND (FURN)	EA
0770 - 6039	REM / REPL STL POST W/O CONC FND (FURN)	EA
0770 - 6040	REM / REPL TIM POST W / CONC FND (FURN)	EA
0770 - 6042	REM/ REPL TIM/STL POST W CONC FND(FURN)	EA
0770 - 6043	REM/REP TIM/STL POST W/O CONC FND(FURN)	EA
0770 - 6044	INSTALL BLOCKOUTS (FURNISHED)	EA
0770 - 6045	REM & REPLACE BLOCKOUTS (FURNISHED)	EA
0770 - 6052	REPAIR STEEL POST WITH BASE PLATE	EA
0770 - 6054	REPAIR RAIL ELEMENT (W - BEAM) (LABOR)	LF
0770 - 6056	REMOVE TIMBER POST	EA
0770 - 6057	REMOVE & REPLACE STL BLOCKOUT	EA
0770 - 6058	REPAIR (SMT)(N)(BAY)	EA
0770 - 6064	REM/REPL B4" (THRIE-BM TR TO W-BM) POST	EA
0770 - 6065	REM/REPL 72" (THRIE-BM TR TO W-BM) POST	EA
0770 - 6066	REPLACE THRIE-BEAM TRANSITION	EA
0770 - 6067	REPLACE NON-SYMMETRICAL TRANSITION	EA

NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED, EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.

PAY ITEM DETAILS
METAL BEAM GUARD FENCE

FILE#	DMT x DOT	CONTRACT	DMF x DOT	CRIT x DOT
(077001) SEPTEMBER 2021	CONTRACT	JOB	HIGHWAY	
REVISONS	6434	66	001	US 380, ETC
	DIST	COUNTY		SHEET NO.
	FTW	WISE, ETC.		7A



ANCHOR POST

- 0770 - 6023
- 0770 - 6024

TERMINAL ANCHOR SECTION (TAS)

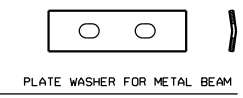
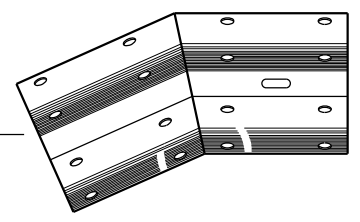


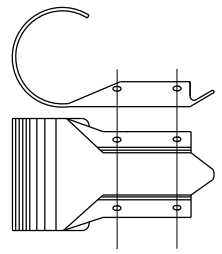
PLATE WASHER FOR METAL BEAM



RAIL ADAPTER

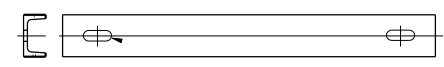
BID CODE	DESCRIPTION	UNIT
0770 - 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF
0770 - 6002	REPAIR RAIL ELEMENT (THRIE - BEAM)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (TAS)	LF
0770 - 6017	REALIGN POSTS	EA
0770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
0770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE RAIL STRUT	EA
0770 - 6034	REPAIR RAIL ELEMENT (W - BEAM FURNISHED)	LF
0770 - 6035	REPAIR RAIL ELEMENT (THRIE - BEAM) (FURN)	LF
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6054	REPAIR RAIL ELEMENT (W - BEAM) (LABOR)	LF
0770 - 6060	REMOVE AND REPLACE DAT	EA

NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED. EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.



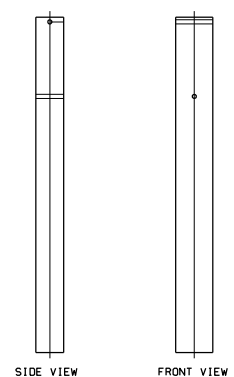
W-BEAM END SECTION (ROUNDED)

- 0770 - 6001
- 0770 - 6006
- 0770 - 6009
- 0770 - 6034
- 0770 - 6054



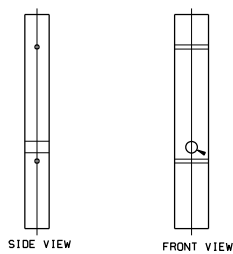
CHANNEL STRUT

- 0770 - 6032
- 0770 - 6051



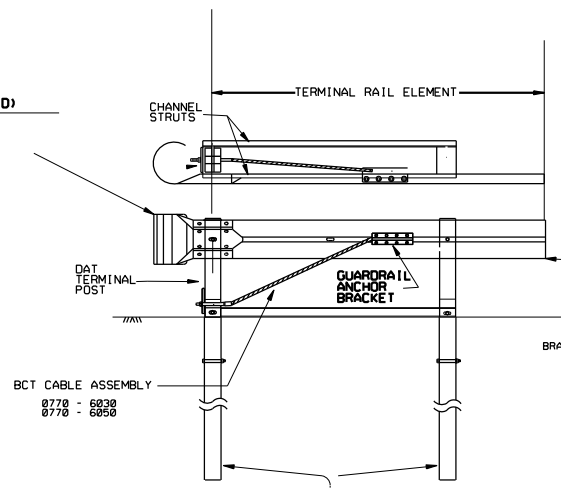
STEEL FOUNDATION TUBE

- 0770 - 6017
- 0770 - 6023
- 0770 - 6024



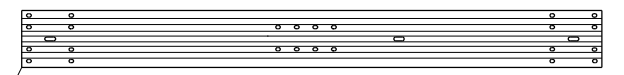
TERMINAL WOOD POST

- 0770 - 6017
- 0770 - 6023
- 0770 - 6024



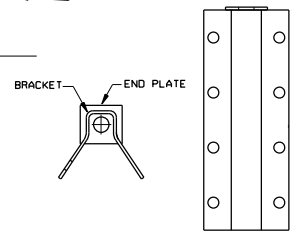
DOWNSTREAM ANCHOR TERMINAL (DAT)

- 0770 - 6030
- 0770 - 6050



TERMINAL RAIL ELEMENT FOR DAT

- 0770 - 6002
- 0770 - 6006
- 0770 - 6008
- 0770 - 6009
- 0770 - 6035



GUARDRAIL ANCHOR BRACKET

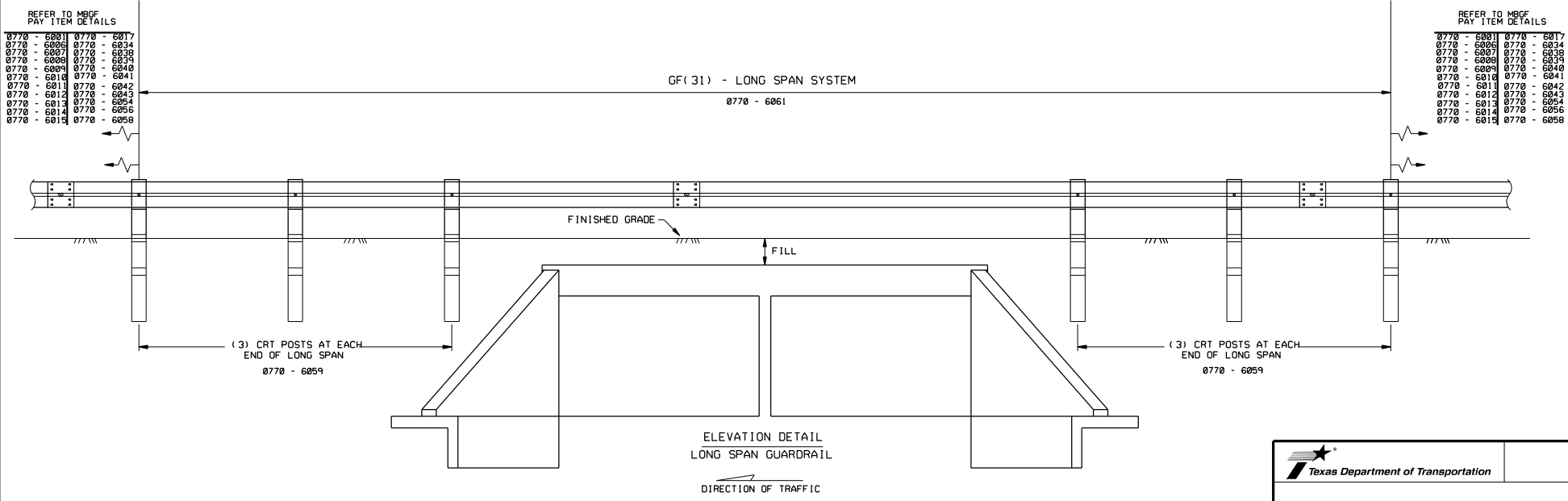
- 0770 - 6031
- 0770 - 6049

DATE: FILE:

PAY ITEM DETAILS
TERMINAL ANCHOR SECTION
&
DOWNSTREAM ANCHOR TERMINAL

FILE:	DW1 x DOT	CONT SECT	JOB	HIGHWAY
0770-001-SEPTEMBER 2021	6434	66	001	US 380, ETC.
REVISONS	DIST	COUNTY	SHEET NO.	
	FTW	WISE, ETC.	7B	

BID CODE	DESCRIPTION	UNIT
0770 - 6001	REPAIR RAIL ELEMENT (W - BEAM)	LF
0770 - 6006	RAISE RAIL ELEMENT	LF
0770 - 6007	RAISE RAIL (TYPE SPECIFIED)	LF
0770 - 6008	REALIGN EXISTING RAIL	LF
0770 - 6009	REPAIR RAIL ELEMENT (T4S)	LF
0770 - 6010	REM/REPL TIMBER/STL POST W/O CONC FND	EA
0770 - 6011	REM / REPL TIMBER / STL POST W/ CONC FND	EA
0770 - 6012	REM / REPL TIMBER POST W / O CONC FND	EA
0770 - 6013	REM / REPL STEEL POST W / O CONC FND	EA
0770 - 6014	REM / REPL TIMBER POST W / CONC FND	EA
0770 - 6015	REM / REPL STEEL POST W / CONC FND	EA
0770 - 6017	REALIGN POSTS	EA
0770 - 6034	REPAIR RAIL ELEMENT(W - BEAM FURNISHED)	LF
0770 - 6038	REM / REPL TIM POST W/O CONC FND (FURN)	EA
0770 - 6039	REM / REPL STL POST W/O CONC FND (FURN)	EA
0770 - 6040	REM / REPL TIM POST W / CONC FND (FURN)	EA
0770 - 6041	REM / REPL STL POST W / CONC FND (FURN)	EA
0770 - 6042	REM/REPL TIM/STL POST W CONC FND(FURN)	EA
0770 - 6043	REM/REP TIM/STL POST W/O CONC FND(FURN)	EA
0770 - 6054	REPAIR RAIL ELEMENT (W - BEAM) (LABOR)	LF
0770 - 6056	REMOVE TIMBER POST	EA
0770 - 6058	REPAIR (SMT)(N)(BAY)	EA
0770 - 6059	REMOVE AND REPLACE LONG SPAN CRT POST	EA
0770 - 6061	REPAIR MTL BM GD FENI LONG SPAN SYS)	LF

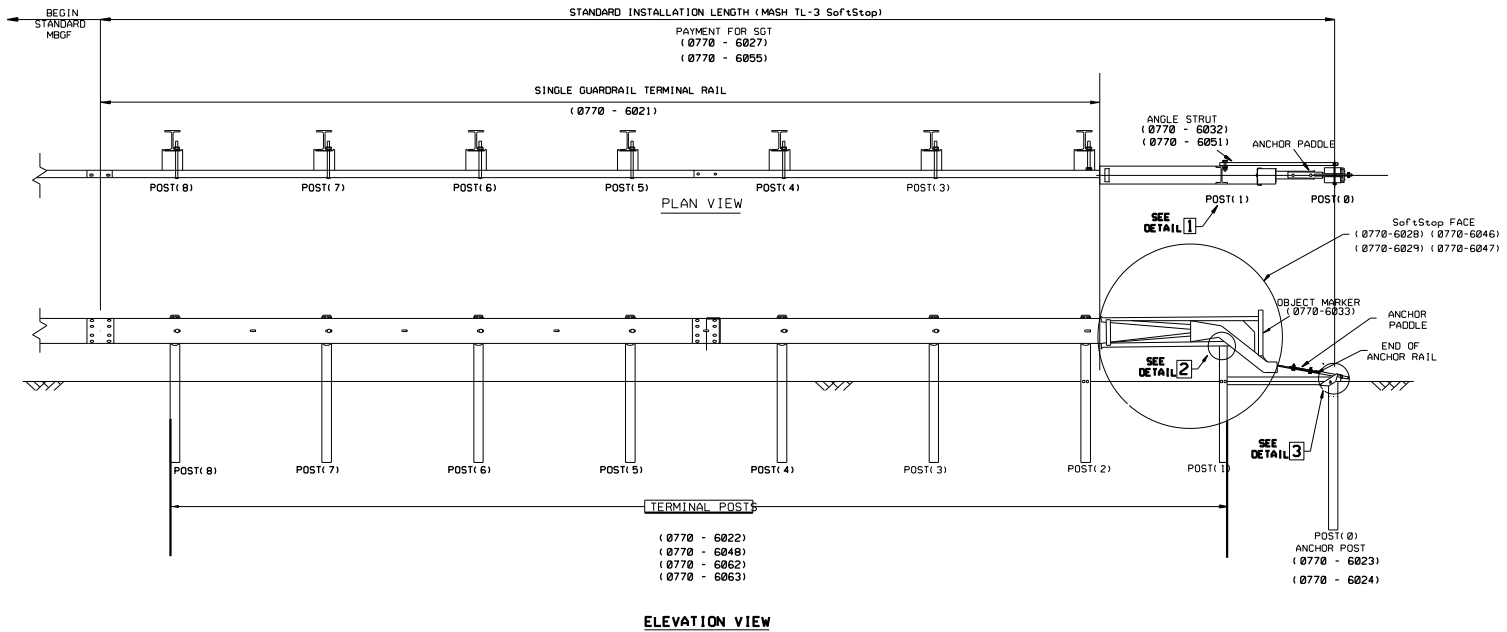


Texas Department of Transportation

**PAY ITEM DETAILS
METAL BEAM GUARDFENCE
LONG SPAN
TL-3 MASH COMPLIANT**

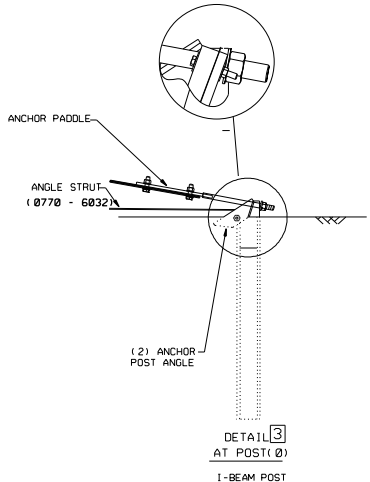
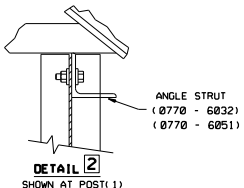
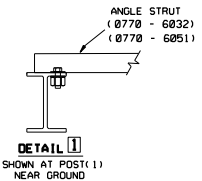
FILE#	DATE	BY	CHKD	APPD	DATE
© TxDOT SEPTEMBER 2021	6434	66	001	US 380	ETC
REVISIONS	DIST	COUNTY	SHEET NO.		
	FTW	WISE, ETC.	7C		

DATE: FILE:



BID CODE	DESCRIPTION	UNIT
0770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
0770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
0770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
0770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
0770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
0770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
0770 - 6029	REM & RESET SGT IMPACT HEAD	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6033	REPLACE SGT OBJECT MARKER	EA
0770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
0770 - 6063	REPLACE SINGLE GDRAIL TERM POST(STEEL)	EA

NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED GUARDRAIL COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF GUARDRAIL ARE INSTALLED. EXISTING SECTIONS ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MASH UPGRADES ARE INSTALLED.

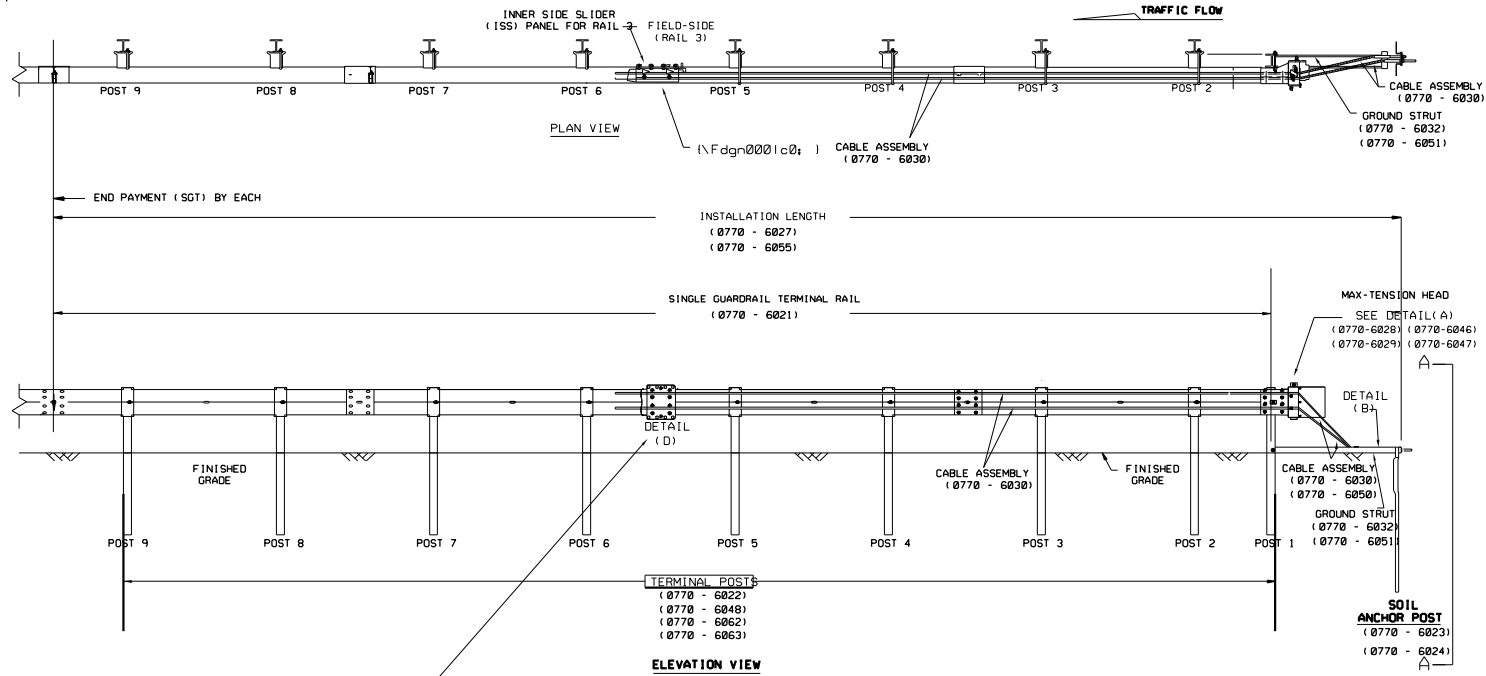


Texas Department of Transportation

**PAY ITEM DETAILS
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3**

FILE:	09-1-001	09-1-001	09-1-001	09-1-001
09-1-001-SEPTEMBER 2021	CONTRACT	SECTION	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC.
	DIST	COUNTY		SHEET NO.
	FTW	WISE, ETC.		70

DATE:
FILE:



BID CODE	DESCRIPTION	UNIT
0770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
0770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
0770 - 6023	REPAIR OF TERMINAL ANCHORS POSTS	EA
0770 - 6024	REPLACE TERMINAL ANCHOR POSTS	EA
0770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
0770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
0770 - 6029	REM & RESET SGT IMPACT HEAD	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6033	REPLACE SGT OBJECT MARKER	EA
0770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
0770 - 6062	REPLACE SINGLE GDRAIL TERM POST (WOOD)	EA
0770 - 6063	REPLACE SINGLE GDRAIL TERM POST (STEEL)	EA

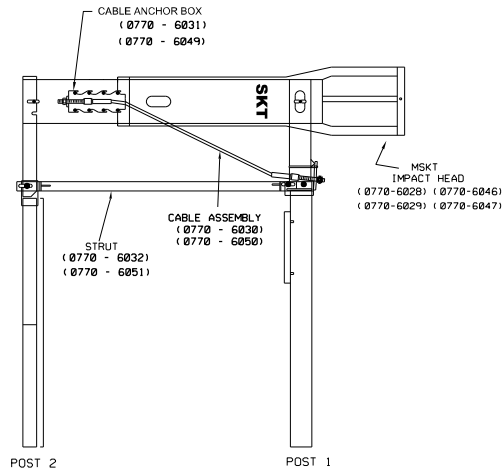
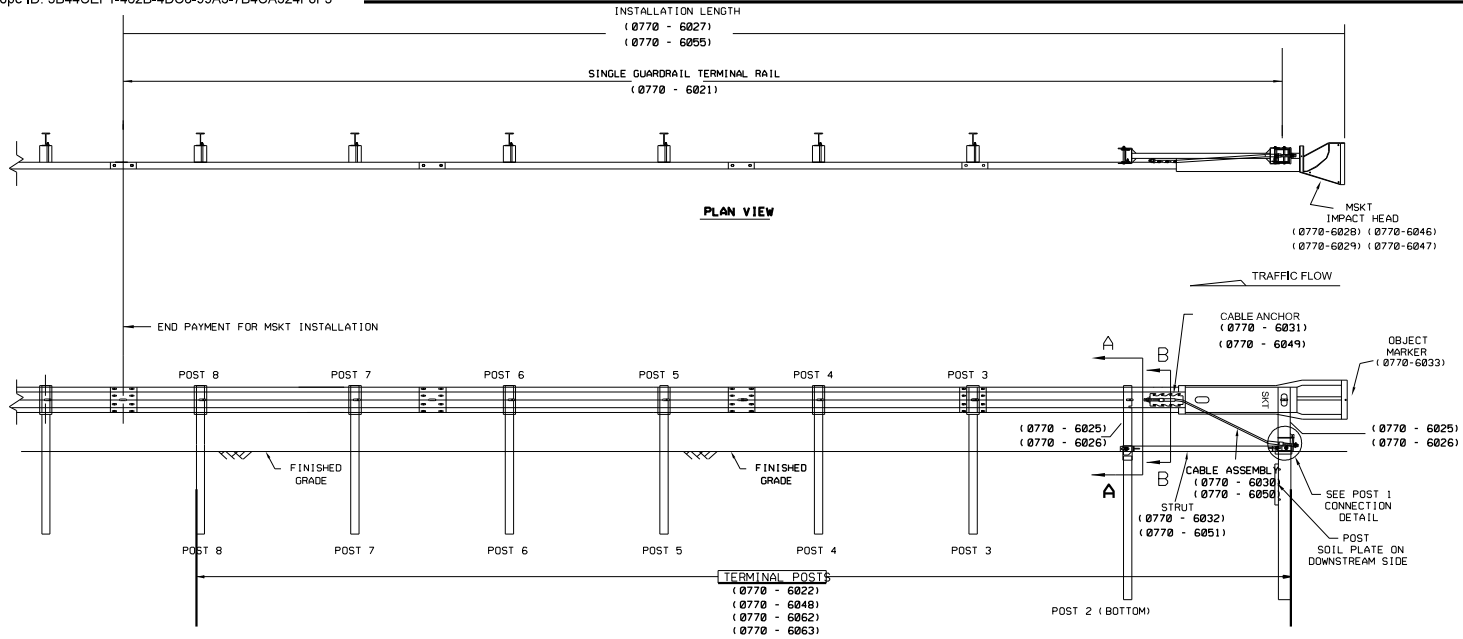
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Texas Department of Transportation

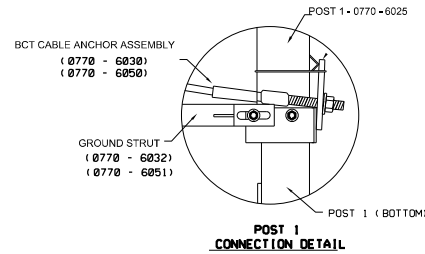
PAY ITEM DETAILS
MAX-TENSION END TERMINAL
MASH - TL-3

FILE#	Dw 1-001	Cx 1-001	Dw 1-001	Cx 1-001
© TxDOT SEPTEMBER 2021	CONT SECT	JOB	HIGHWAY	
REVISTIONS	6434	66	301	US 30B, ETC.
	DIST	COUNTY	SHEET NO.	
	FTW	WISE, ETC.	7E	

DATE: FILE:



**CONNECTION DETAIL A
IMPACT HEAD (POST 1 & POST 2)**

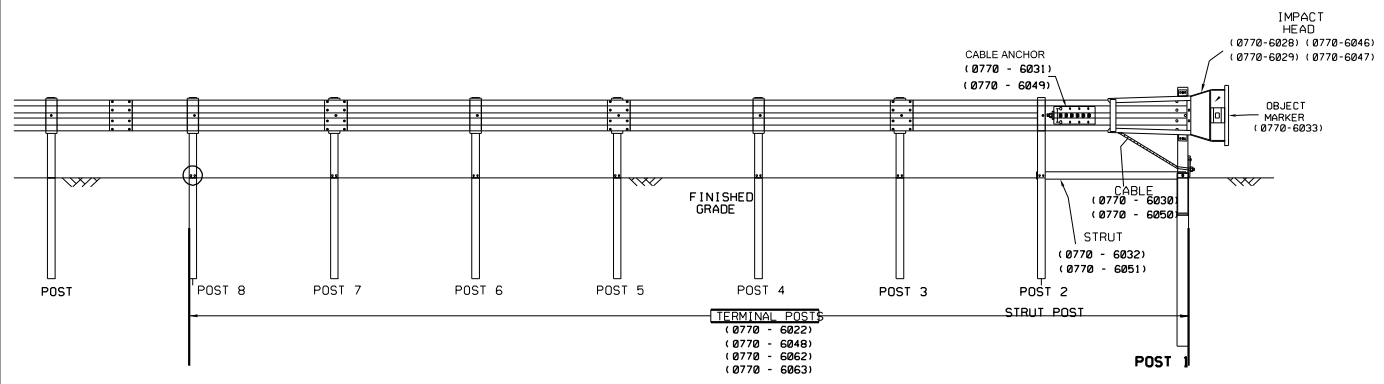
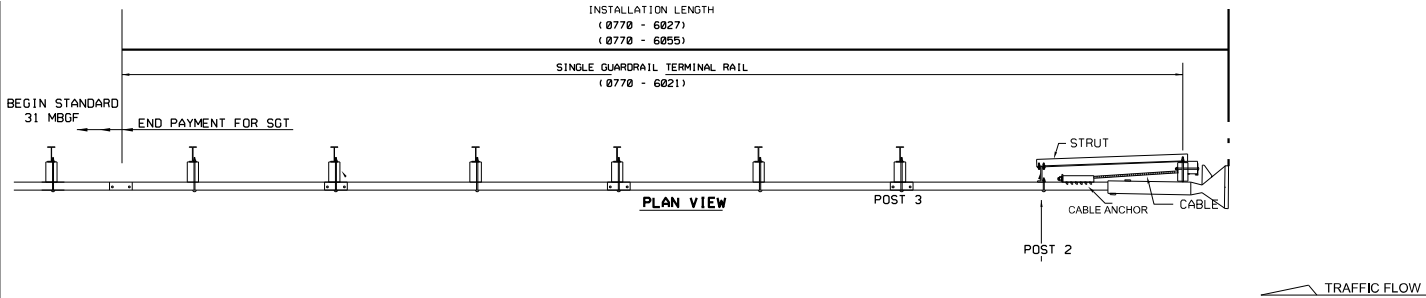


BID CODE	DESCRIPTION	UNIT
0770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
0770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
0770 - 6025	REPLACE HINGED TOP SGT STEEL POST	EA
0770 - 6026	RESET HINGED TOP SGT STL POST	EA
0770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
0770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
0770 - 6029	REM & RESET SGT IMPACT HEAD	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6033	REPLACE SGT OBJECT MARKER	EA
0770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
0770 - 6049	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
0770 - 6062	REPLACE SINGLE GDRAIL TERM POST(WOOD)	EA
0770 - 6063	REPLACE SINGLE GDRAIL TERM POST(STEEL)	EA

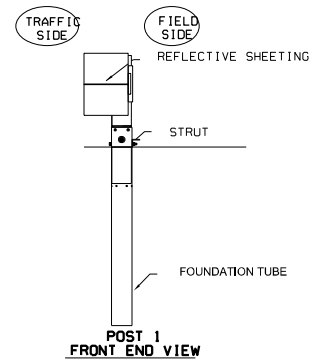
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**PAY ITEM DETAILS
SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3**

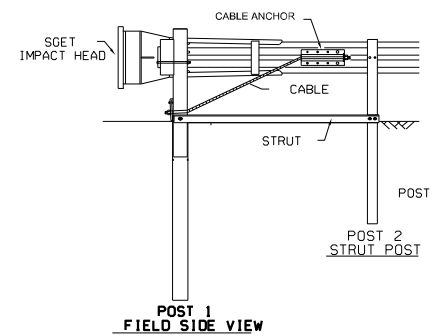
FILE:	DW1-DOT	CRKT-DOT	DW1-DOT	CRKT-DOT
© TxDOT, SEPTEMBER 2021	CONV SECT	JOB	HIGHWAY	
REVISIONS	6434	66	801	US 380, ETC.
	DET	COUNTY		SHEET NO.
	FTW	WISE, ETC.		77



ELEVATION VIEW



POST 1 FRONT END VIEW



POST 1 FIELD SIDE VIEW

BID CODE	DESCRIPTION	UNIT
0770 - 6021	REPLACE SINGLE GDRAIL TERMINAL RAIL	LF
0770 - 6022	REPLACE SINGLE GDRAIL TERMINAL POST	EA
0770 - 6027	REMOVE GDRAIL END TRT / REPL WITH SGT	EA
0770 - 6028	REPL SINGLE GDRAIL TERM IMPACT HEAD	EA
0770 - 6029	REM & RESET SGT IMPACT HEAD	EA
0770 - 6030	REPLACE SGT CABLE ASSEMBLY	EA
0770 - 6031	REPLACE SGT CABLE ANCHOR	EA
0770 - 6032	REPLACE SGT STRUT	EA
0770 - 6033	REPLACE SGT OBJECT MARKER	EA
0770 - 6046	REM & RESET SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6047	REPL SGT IMPACT HEAD (FURNISHED)	EA
0770 - 6048	REPLACE SINGLE GDRAIL TERM POST (FURN)	EA
0770 - 6049	REPLACE SGT CABLE ANCHOR (FURN)	EA
0770 - 6050	REPLACE SGT CABLE ASSEMBLY (FURN)	EA
0770 - 6051	REPLACE SGT STRUT (FURN)	EA
0770 - 6055	REPAIR SINGLE GUARDRAIL TERMINAL	EA
0770 - 6062	REPLACE SINGLE GDRAIL TERM POST (WOOD)	EA
0770 - 6063	REPLACE SINGLE GDRAIL TERM POST (STEEL)	EA

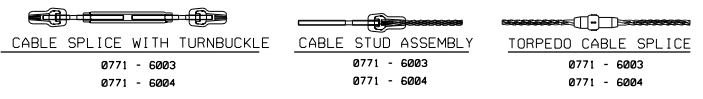
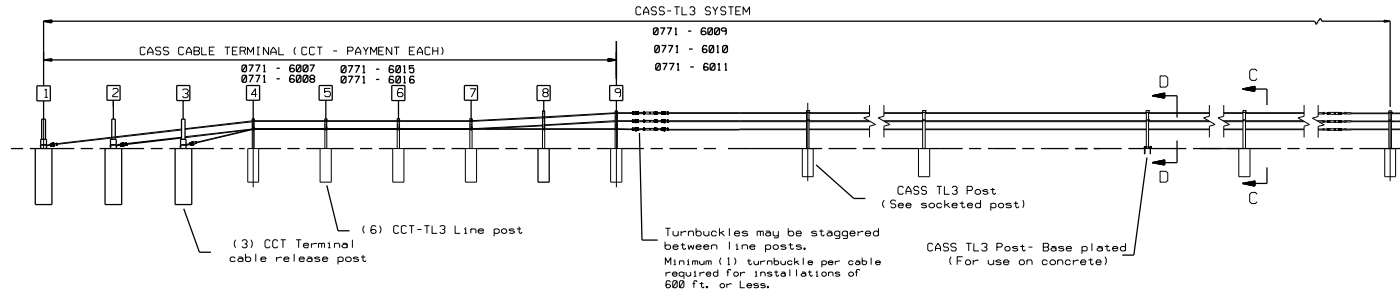
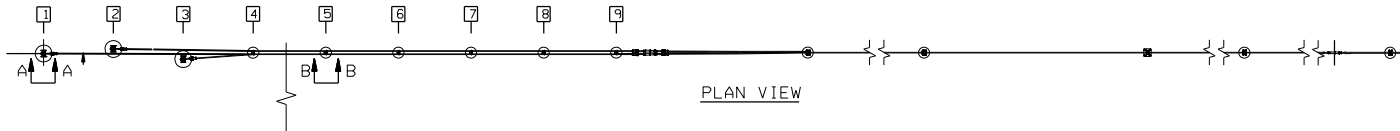
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**PAY ITEM DETAILS
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGT - TL-3 - MASH**

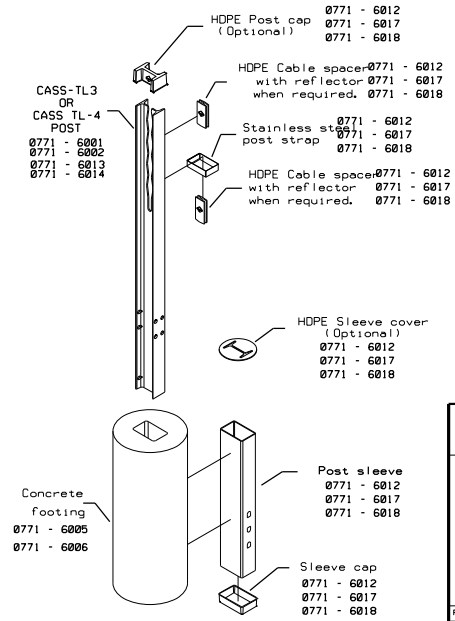
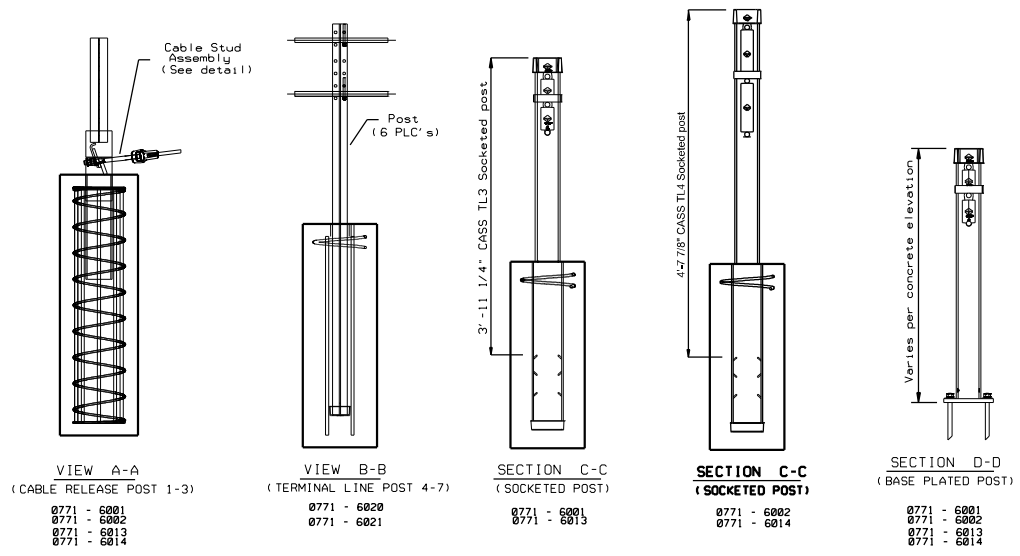
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
SEPTEMBER 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	88	001	US 380, ETC.
	DIST	COUNTY	SHEET NO.	
	FTW	WBE, ETC.	70	

DATE:
FILE:



BID CODE	DESCRIPTION	UNIT
0771 - 6001	REPLACE POSTS (TL-3)	EA
0771 - 6002	REPLACE POSTS (TL-4)	EA
0771 - 6003	CABLE SPLICE / TURNBUCKLE (TL-3)	EA
0771 - 6004	CABLE SPLICE / TURNBUCKLE (TL-4)	EA
0771 - 6005	REPAIR CONCRETE FOUNDATION (TL-3)	EA
0771 - 6006	REPAIR CONCRETE FOUNDATION (TL-4)	EA
0771 - 6007	REPR OR REPLC CABLE BARR TERM SECT (TL-3)	EA
0771 - 6008	REPR OR REPLC CABLE BARR TERM SECT (TL-4)	EA
0771 - 6009	REPLACE CABLE (TL-3)	LF
0771 - 6010	REPLACE CABLE (TL-4)	LF
0771 - 6011	CHECK / RE-TENSION CABLE	EA
0771 - 6012	REPLACE POST HARDWARE (TL-4)	EA
0771 - 6013	REPLACE POSTS (TL-3) (FURN)	EA
0771 - 6014	REPLACE POSTS (TL-4) (FURN)	EA
0771 - 6015	REP OR REPLC CAB BAR TM SEC TL-3 (FURN)	EA
0771 - 6016	REP OR REPLC CAB BAR TM SEC TL-4 (FURN)	EA
0771 - 6017	REP POST HARDWARE (TL-3) (TY SPECIFIED)	EA
0771 - 6018	REPLACE POST HARDWARE (TL-3)	EA
0771 - 6020	REPLACE CCT POST (5 FT 3 IN)	EA
0771 - 6021	REPLACE CCT POST (5 FT 11 IN)	EA

NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED CABLE BARRIER COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW SECTIONS OF CABLE BARRIER ARE INSTALLED, EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED, OR BLANKET MESH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

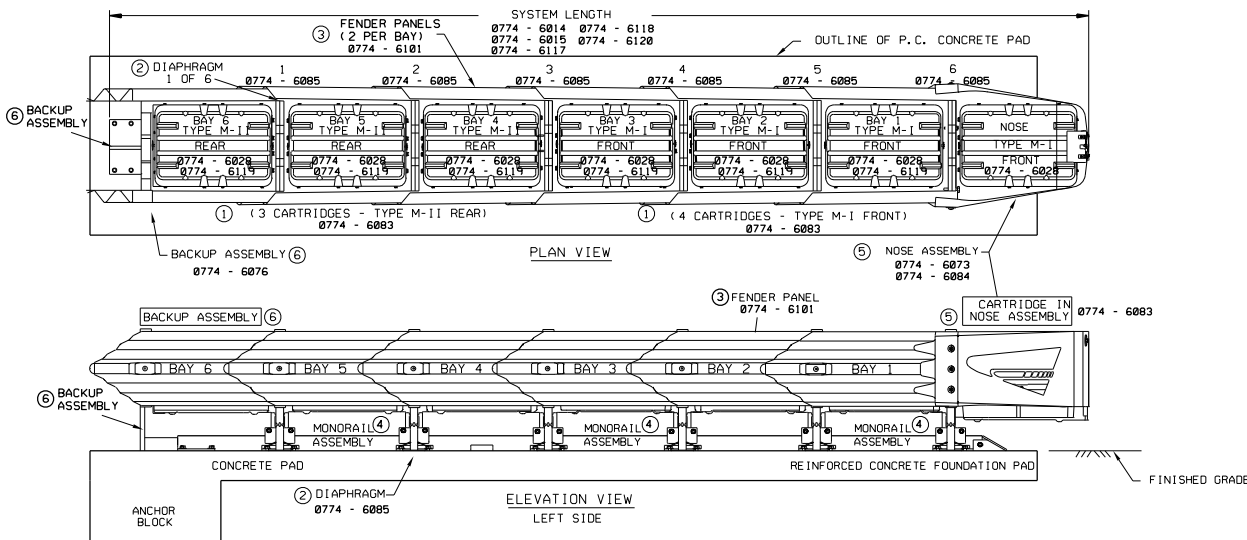


STANDARD POST & CONCRETE FOOTING (SOCKETED POST)

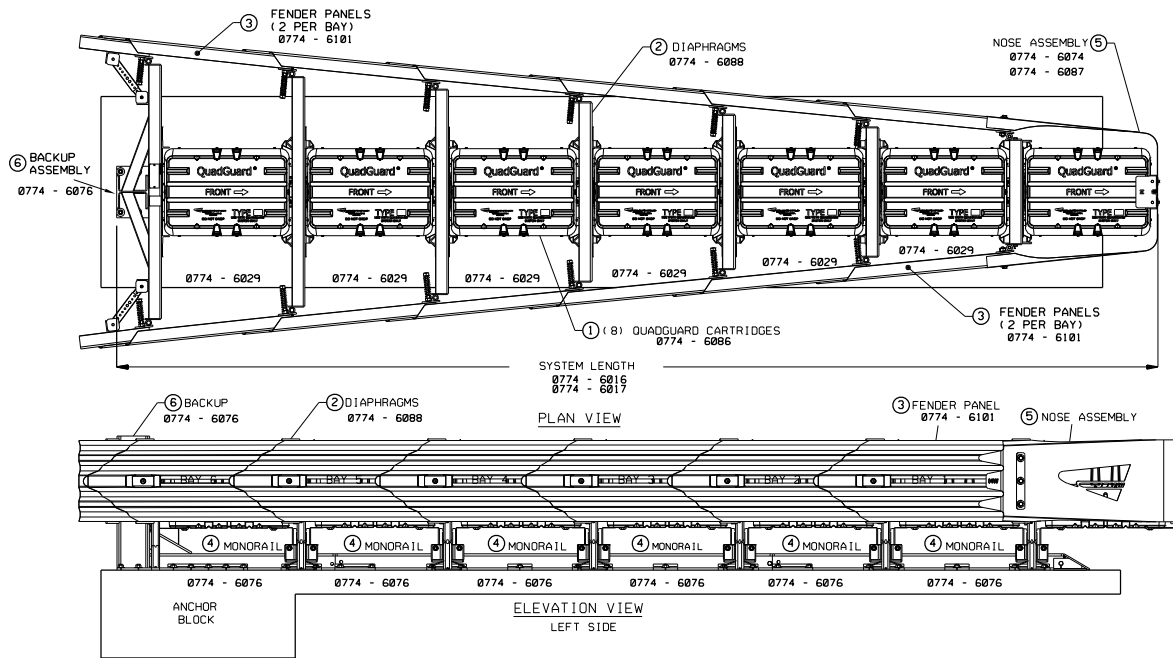
		PAY ITEM DETAILS TRINITY CABLE SAFETY SYSTEM (TL-3 & TL-4)	
FILE#	0771-001	DATE	SEPTEMBER 2021
REV	01	DATE	SEPTEMBER 2021
CONTRACT	E434	SECTION	66
JOB	001	COUNTY	WISE, ETC.
DIST		COUNTY	
FTW		WISE, ETC.	
DATE	0771 - 6001	DATE	0771 - 6002
DATE	0771 - 6002	DATE	0771 - 6013
DATE	0771 - 6013	DATE	0771 - 6014
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DATE	0771 - 6013	DATE	0771 - 6014

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QUADGUARD M10 NARROW 6-BAY SYSTEM



QUADGUARD M WIDE (6 BAY) SYSTEM



BID CODE	DESCRIPTION	UNIT
0774 - 6014	REMOVE AND REPLACE (NARROW QUAD)	EA
0774 - 6015	REPAIR (NARROW QUAD)	EA
0774 - 6016	REMOVE AND REPLACE (WIDE QUAD)	EA
0774 - 6017	REPAIR (WIDE QUAD)	EA
0774 - 6028	REPAIR (QUAD) (N) (BAY)	EA
0774 - 6029	REPAIR (QUAD) (W) (BAY)	EA
0774 - 6073	REPAIR (QUAD) (N) (NOSE)	EA
0774 - 6074	REPAIR (QUAD) (W) (NOSE)	EA
0774 - 6076	REPAIR (QUAD) (W) (MISC HARDWARE)	EA
0774 - 6083	(QUAD)(N)(BAY)CARTRIDGE(REMOVE & REPLACE)	EA
0774 - 6084	(QUAD)(N)(BAY)NOSE ASSEMBLY(REMOVE&REPLACE)	EA
0774 - 6085	(QUAD)(N)(BAY) DIAPHRAM (REMOVE & REPLACE)	EA
0774 - 6086	(QUAD)(W)(BAY)CARTRIDGE(REMOVE & REPLACE)	EA
0774 - 6087	(QUAD)(W)(BAY)NOSE ASSEMBLY(REMOVE&REPLACE)	EA
0774 - 6088	(QUAD)(W)(BAY) DIAPHRAM (REMOVE & REPLACE)	EA
0774 - 6101	QUAD FENDER PANEL	EA
0774 - 6117	REMOVE AND REPLACE (QUADGUARD)(MASH)(N)	EA
0774 - 6118	REPAIR (QUADGUARD)(MASH)(N)	EA
0774 - 6119	REPAIR (QUADGUARD)(MASH)(N)(BAY)	EA
0774 - 6120	REPAIR (QUADGUARD)(MASH)(N)	LF

NOTE: THE PAY ITEMS ON THIS SHEET ARE ONLY USED WHEN DAMAGED ATTENUATOR/CRASH CUSHION COMPONENTS ARE BEING REPAIRED OR ROUTINE MAINTENANCE WORK OCCURS. THE CALLOUTS ON THIS SHEET ARE FOR CLARIFICATION ON HOW WORK WILL BE PAID. THIS SHEET WILL NOT BE USED FOR DETERMINING HOW TO PAY FOR WHEN NEW ATTENUATOR/CRASH CUSHIONS ARE INSTALLED. EXISTING SECTION ARE REMOVED WITHOUT BEING REPLACED. OR BLANKET MASH UPGRADES ARE INSTALLED. THIS IS NOT A STANDARD SHEET FOR CLARIFYING HOW WORK WILL BE PERFORMED.

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

Texas Department of Transportation

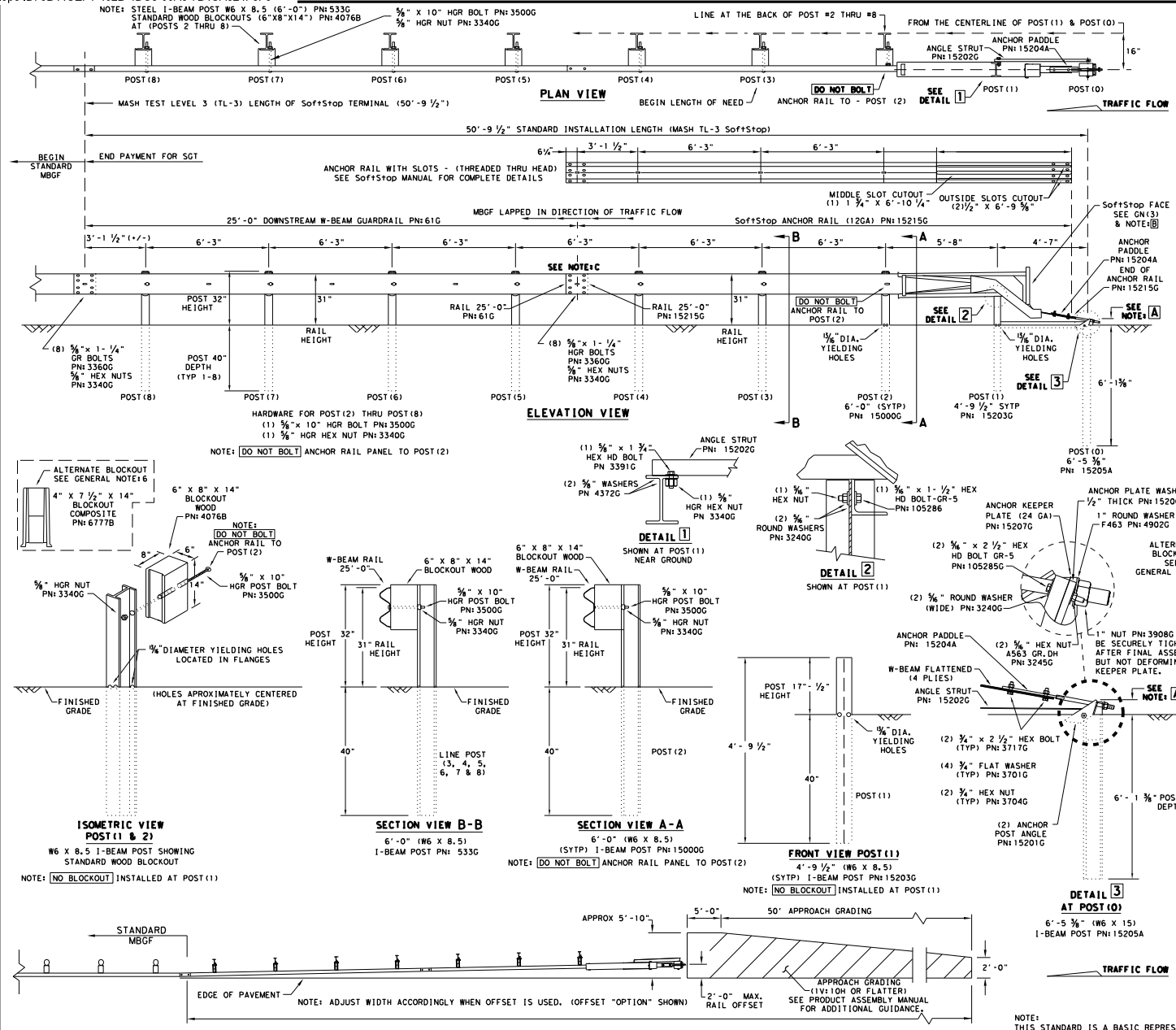
PAY ITEM DETAILS
TRINITY HIGHWAY
ENERGY ABSORPTION
QUADGUARD M & M10
WIDE & NARROW
(MASH TL-3)

FILE#	SEPTEMBER 2021	TxDOT	CHK	DN#	CK#
CONTRACT	6434 66	SECTION	001	JOB	US 380, ETC.
REVISIONS		DIST		COUNTY	SHEET NO.
		FTW	WISE, ETC.		9

REUSABLE

DATE:
FILE:

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- 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. PNI: 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% 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 PNI: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PNI: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)

NOTE(C) W-BEAM SPICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PNI: 61G ANCHOR RAIL 25'-0" PNI: 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 3/8")
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 (4" 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	3/4" 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	3/8" WASHER F436
105285G	2	3/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	3/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	3/8" ROUND WASHER (WIDE)
3245G	3	3/8" HEX NUT A563 GR, DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE(B)

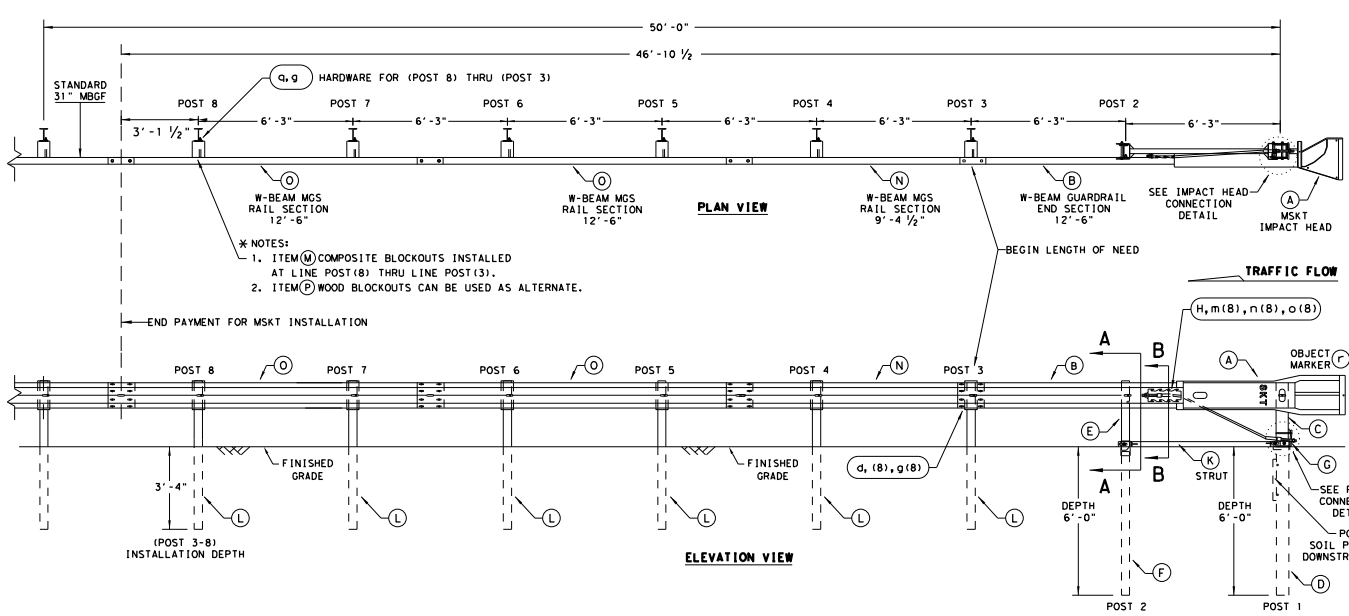
Texas Department of Transportation
 Design Division Standard

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

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© TxDOT: JULY 2016	CONF: 66	SECT: 001	US: 380, ETC	HIGHWAY: 10
REVISIONS	DATE	BY	DESCRIPTION	
DIST: FTW	WISE, ETC.			

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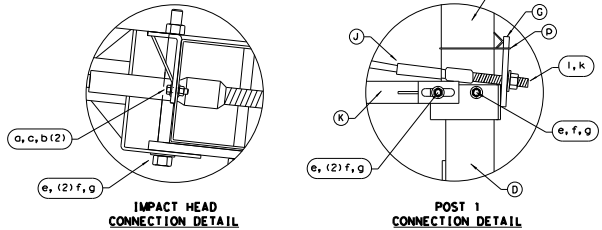
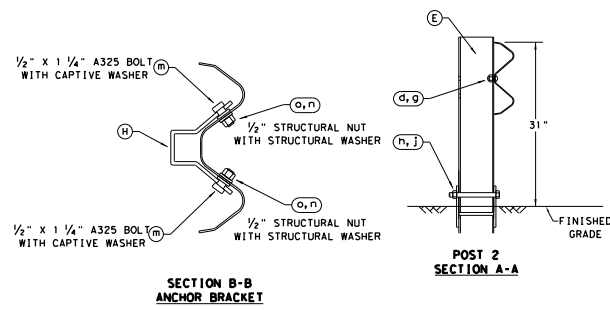
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



- 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	P621
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

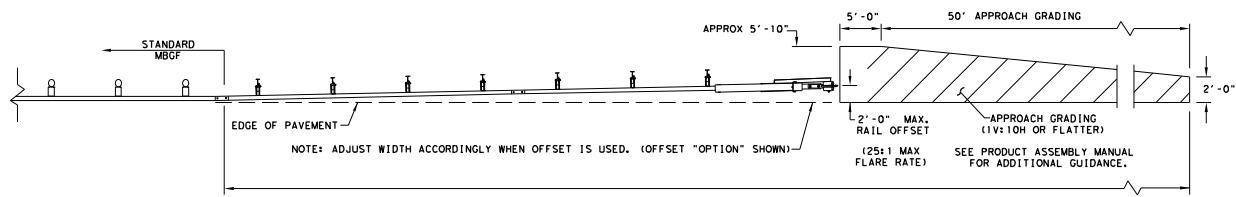
SMALL HARDWARE			
o	2	3/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	3/8" WASHER	W0516
c	2	3/8" HEX NUT	N0516
d	25	3/8" DIA. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" DIA. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" DIA. H.G.R. NUT	N050
n	1	3/4" DIA. x 8 1/2" HEX BOLT (GRD A449)	B340854A
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



ALTERNATIVE ITEMS NOT SHOWN. * ITEM (P) 8" WOOD-BLOCKOUT * ITEM (O) 25' GUARD FENCE PANEL

SEE NOTES: *

NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



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

FILE: sg112s3118.dgn DWT:DOT CR:KM DW:VP CK:CL

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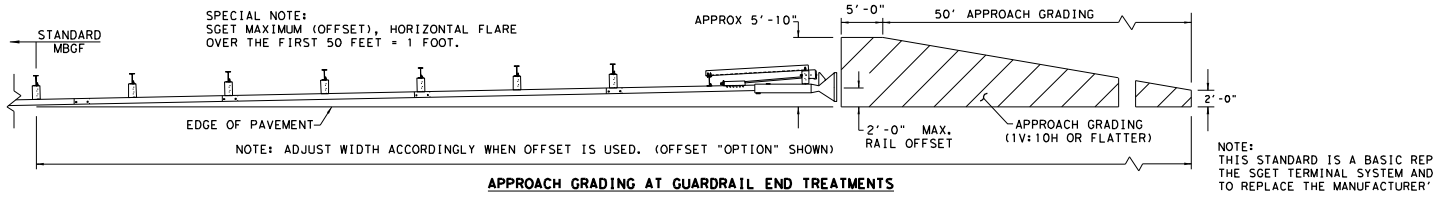
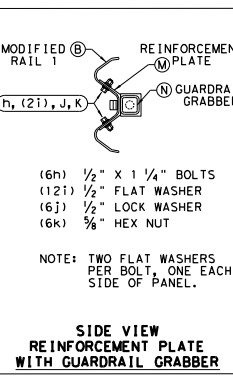
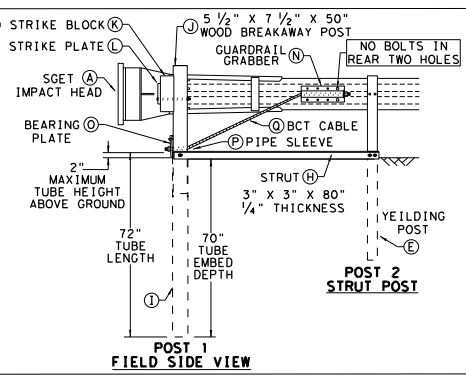
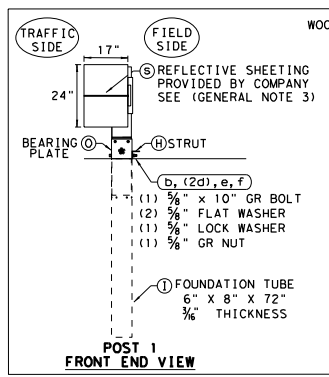
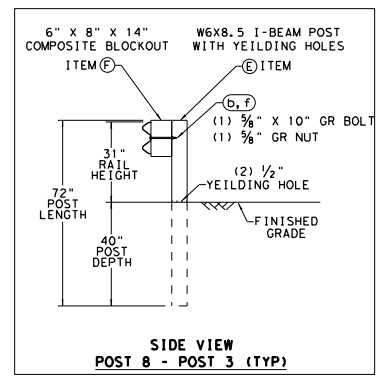
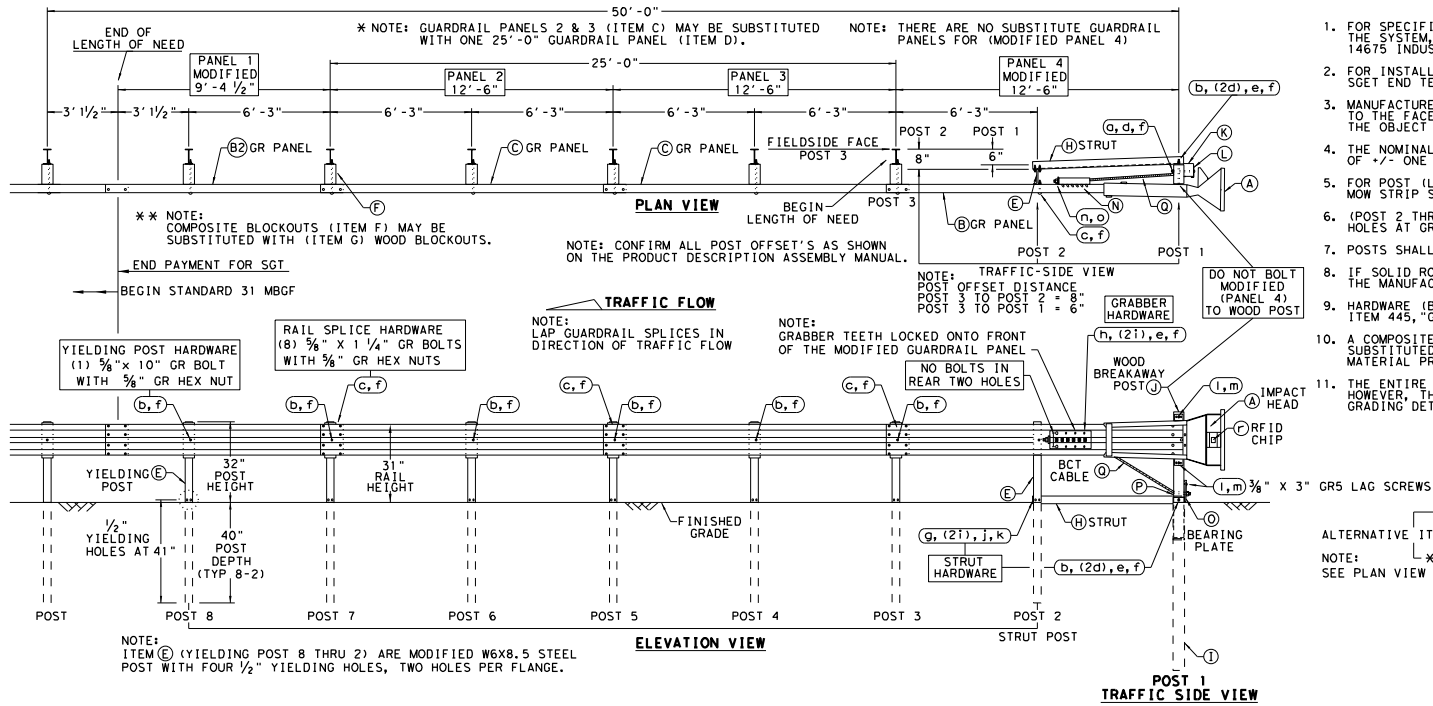
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DIST COUNTY SHEET NO.

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- ### GENERAL NOTES
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202.
 - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S SGT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
 - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCO.
 - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
 - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
 - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL, THERE ARE NO SUBSTITUTE POSTS.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
 - 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 OMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
 - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGT IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6"	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2"	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6"	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0"	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YPMOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CB08
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WB08
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/8"	FND16
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPL18
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPL117
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GR17
O	1	BEARING PLATE 8" X 6 3/8" X 3/8" A36	BPL18
P	1	PIPE SLEEVE 4 1/2" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/2" X 81" LENGTH	CB181

SMALL HARDWARE

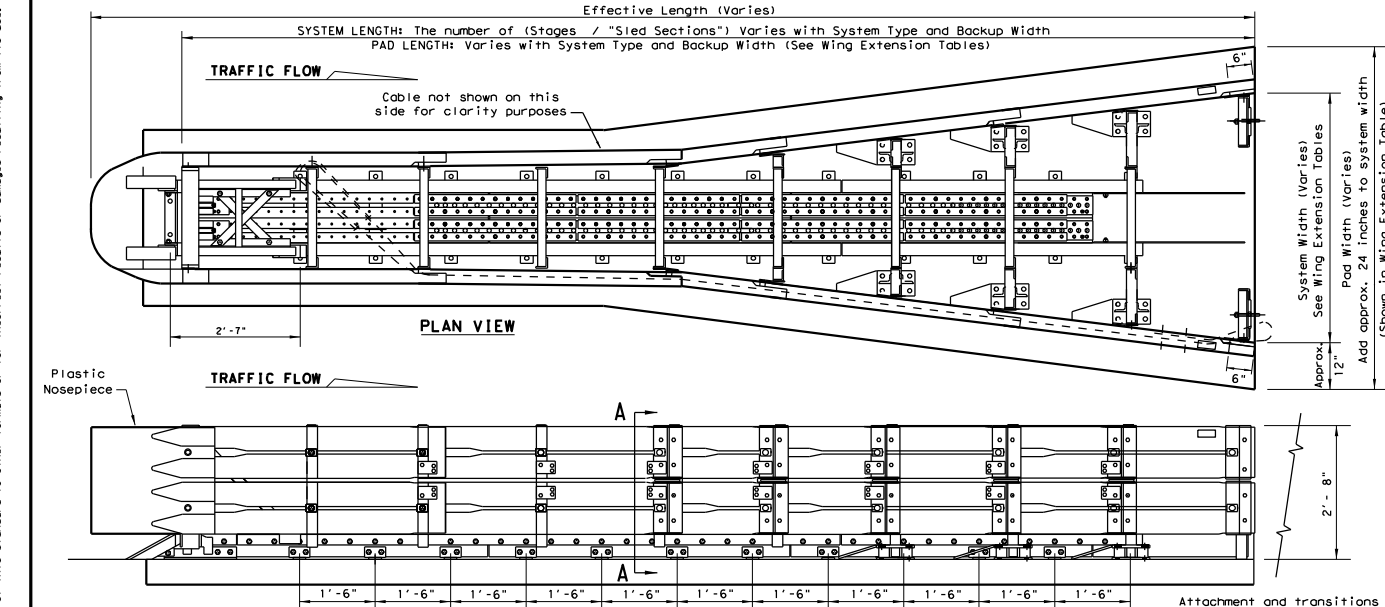
Q	1	3/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBL1
D	7	3/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBL1
C	33	3/8" X 1 1/2" GR SPLICE BOLTS 307A HDG	1GRBL1
D	3	3/8" FLAT WASHER F436 A325 HDG	58FW436
E	1	3/8" LOCK WASHER HDG	58LW
F	39	3/8" GUARDRAIL HEX NUT HDG	58HN563
Q	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
N	6	1/2" X 1 1/2" PLATE BOLT A325 HDG	125BLT
I	16	1/2" FLAT WASHER F436 A325 HDG	12FW436
J	8	1/2" LOCK WASHER HDG	12LW
K	8	1/2" HEX NUT A563 HDG	12HN563
I	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
M	4	3/8" FLAT WASHER F436 A325 HDG	38FW436
N	2	1" FLAT WASHER F436 A325 HDG	1FW436
O	2	1" HEX NUT A563HDG	1HN563
D	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
Q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
R	1	RFID CHIP RATED MIL-STD-810F	RFID810F
S	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGT - TL-3 - MASH
SGT (15) 31-20

FILE: g0153120.dgn	DN: TXDOT	CK: KM	DR: VP	CK: VP
© TXDOT: APRIL 2020	CONT: 66	SECT: 001	JOB: US 380, ETC	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
DIST	FTW	COUNTY	WISE, ETC.	SHEET NO. 13

DATE: FILE:

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GENERAL NOTES

- For specific information regarding installation and technical guidance of the system, contact: Trinity Highway at (888)323-6374, 2525 N. Stemmons Freeway - Dallas, TX 75207
- Contact the company for: Custom widths from 31" up to 57" wide, and transition panels for bi-directional traffic applications.
- Details of components for the WideTRACC, Backups and re-inforcing details will be shown on the manufacturer's shop drawings furnished to the Engineer.
- Concrete shall be class "5" with a min. compressive strength 4,000 p.s.i.
- If the cross-slope varies more than 2% over the length of the system, the concrete pad will require leveling. Maximum permissible cross-slope 8%.
- The installation area should be free from curbs, elevated objects, or depressions.
- The WideTRACC system should be approximately parallel with the barrier or \pm of merging barriers.
- The unit shown is flared on both sides, but can be flared on a single side either left or right. The flares will effect the length and width of the system. (See Wing Extension Tables)

Wide-TRACC - BILL OF MATERIAL				
PART #	FAST TRACC QTY	TRACC QTY	SHORT TRACC QTY	DESCRIPTION
25937A	1			WIDEFASTRACC UNIT ASSEMBLY
25939A		1		WIDE TRACC UNIT ASSEMBLY
25997A			1	WIDESHORTRACC UNIT ASSEMBLY
3310G	4	4	4	5/8" LOCKWASHER
4372C	4	4	4	5/8" FLATWASHER
4451G	4	4	4	5/8" DIA X 6" EXP. WEDGE ANCHOR
6531B	1	1	1	PLASTIC NOSEPIECE
6668B	4	4	4	REFLECTIVE SHEETING
ANCHOR HARDWARE (CONCRETE BASE)				
5204B	72	50	18	5/8" DIA X 7-1/2" THD ANCHOR STUD
4372G	72	50	18	5/8" FLATWASHER
3310G	72	50	18	5/8" LOCKWASHER
3361G	72	50	18	5/8" HEX NUT
5206B	6	4	2	Adhesive, HILTI HIT HY-150
ANCHOR HARDWARE (ASPHALT BASE)				
6380G	72	50	18	5/8" Dia x 18" Thd Anchor Stud
4372C	72	50	18	5/8" Flatwasher
3310G	72	50	18	5/8" Lockwasher
3361G	72	50	18	5/8" HEX NUT
5206B	15	11	4	ADHESIVE, HILTI HIT HY-150
ANCHOR HARDWARE (OPTIONAL ITEMS, AS NEEDED)				
5207B	A/R	A/R	A/R	NOZZLE, MIXER, HILTI HIT HY-150
5208B	A/R	A/R	A/R	EXT. TUBE, MIXER, HILTI HIT HY-150
5205B	A/R	A/R	A/R	DISPENSER GUN, HILTI HIT HY-150
5209B	A/R	A/R	A/R	DRILL BIT, 1/2", HILTI SDS

Attachment and transitions to other shapes, barriers railings and bi-directional traffic flows are available. (See manufacturer's product manual).

BACKUP SUPPORT OPTIONS
SQUARE CONCRETE BACKUP
CONCRETE BARRIER (CTB) BACKUP
SINGLE SLOPE CONCRETE BARRIER(SSCB)
GUARDRAIL BACKUP (BASE-PLATED POST)
GUARDRAIL BACKUP (DRIVEN POST)
TRANSITION OPTIONS
VERTICAL WALL
MODIFIED (CTB) TO VERTICAL WALL
CONCRETE BARRIER (CTB)
GUARDRAIL (W-BEAM)
GUARDRAIL (THRIE-BEAM)

FOR BI-DIRECTIONAL TRANSITION PANEL DETAILS (SEE MANUFACTURER'S PRODUCT MANUAL).
 BACKUP AND TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS, (I.E. ATTENUATOR LOCATION DETAILS) OR IN THE GENERAL NOTES).

FOUNDATION OPTIONS
6" REINFORCED CONCRETE
8" UNREINFORCED CONCRETE
3" MIN. ASPHALT OVER 3" MIN. CONCRETE
6" ASPHALT OVER 6" COMPACT SUBBASE
8" MINIMUM ASPHALT

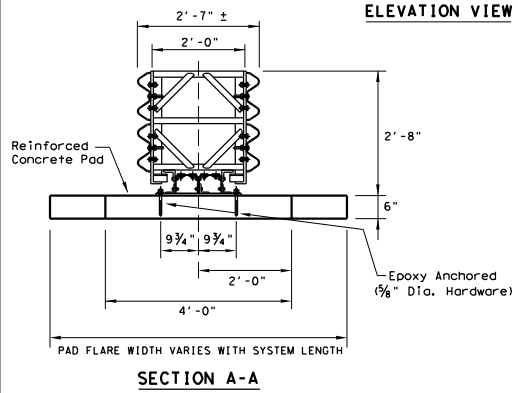
FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, (SEE MANUFACTURER'S PRODUCT MANUAL).

ELEVATION VIEW

Wide-FASTRACC WING EXTENSIONS				
NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-FASTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	71"	25'-11"	27'-11"	33940
1	78"	28'-3"	30'-3"	33941 / 33942
2	85"	30'-7"	32'-7"	33943 / 33944
3	92"	32'-11"	34'-11"	33945 / 33946
4	99"	35'-2"	37'-2"	33949 / 33950
5	106"	37'-6"	39'-6"	33951 / 33952
6	113"	39'-10"	41'-10"	33953 / 33954
7	120"	42'-2"	44'-2"	33955 / 33956
8	127"	44'-6"	46'-6"	33957 / 33958
9	134"	46'-9"	48'-9"	33957 / 33958
10	141"	49'-1"	51'-1"	33957 / 33958
CONSULT TRINITY SALES PERSON				

Wide-TRACC WING EXTENSIONS				
NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-TRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	58"	21'	23'	33940
1	65"	23'-4"	25'-4"	33941 / 33942
2	72"	25'-8"	27'-8"	33943 / 33944
3	79"	28'	30'	33945 / 33946
4	86"	30'-4"	32'-4"	33947 / 33948
5	92"	32'-8"	34'-8"	33949 / 33950
6	99"	35'	37'	33951 / 33952
7	106"	37'-4"	39'-4"	33953 / 33954
8	113"	39'-8"	41'-8"	33955 / 33956
9	120"	42'	44'	33957 / 33958
10	127"	44'-4"	46'-4"	33957 / 33958
CONSULT TRINITY SALES PERSON				

Wide-SHORTRACC WING EXTENSIONS				
NUMBER OF WING EXTENSIONS	WIDTH	SYSTEM LENGTH	EFFECTIVE LENGTH	Wide-SHORTRACC EXTENSION PART NUMBER (LEFT# / RIGHT#)
0 (BASE UNIT)	39"	15'	17'	33940
1	46"	17'-4"	19'-4"	33941 / 33942
2	53"	18'-9"	20'-9"	33943 / 33944
3	60"	21'-1"	23'-1"	33945 / 33946
4	66"	23'-5"	25'-5"	33947 / 33948
5	73"	25'-8"	27'-8"	33949 / 33950
6	80"	28'-1"	30'-1"	33951 / 33952
7	87"	30'-4"	32'-4"	33953 / 33954
8	94"	32'-7"	34'-7"	33955 / 33956
9	101"	34'-11"	36'-11"	33957 / 33958
10	108"	37'-3"	39'-3"	33957 / 33958
CONSULT TRINITY SALES PERSON				



TYPE (WIDE)	TEST LEVEL
FASTRACC (4 Stage System)	70
TRACC (3 Stage System)	TL-3
SHORTRACC (2 Stage System)	TL-2

NOTE: The Stage System refers to number of replaceable "sliced sections" that could be replaced independently.

REUSABLE

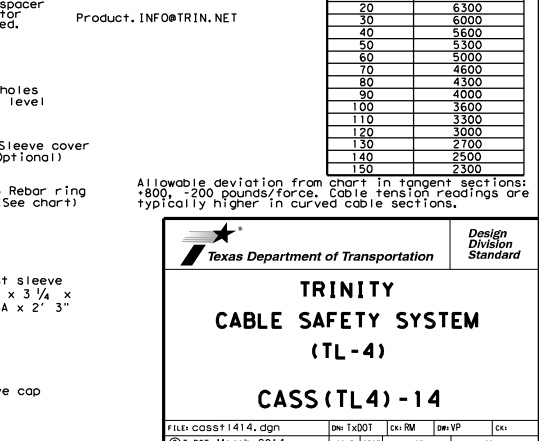
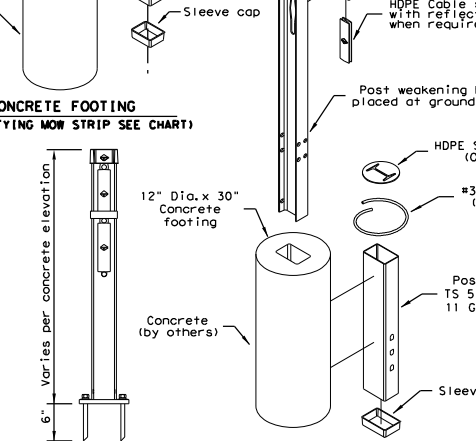
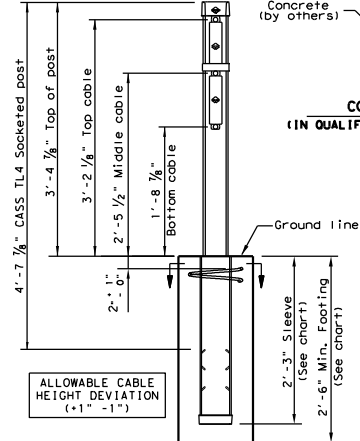
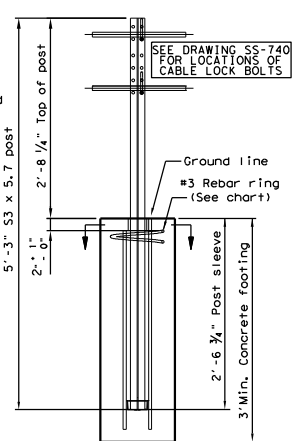
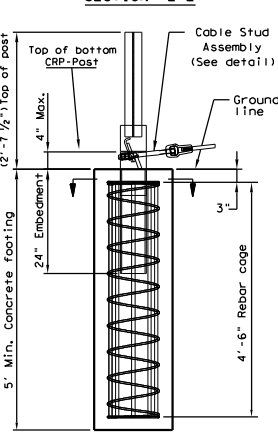
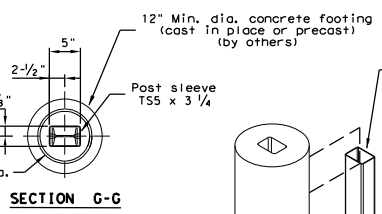
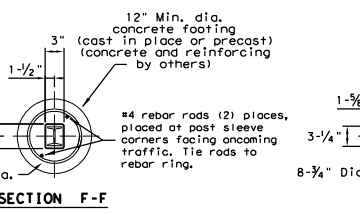
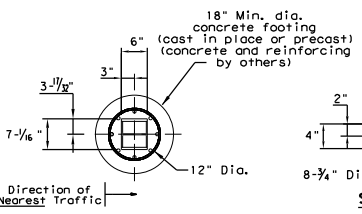
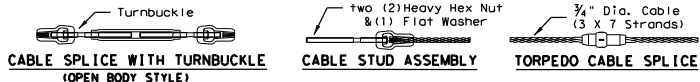
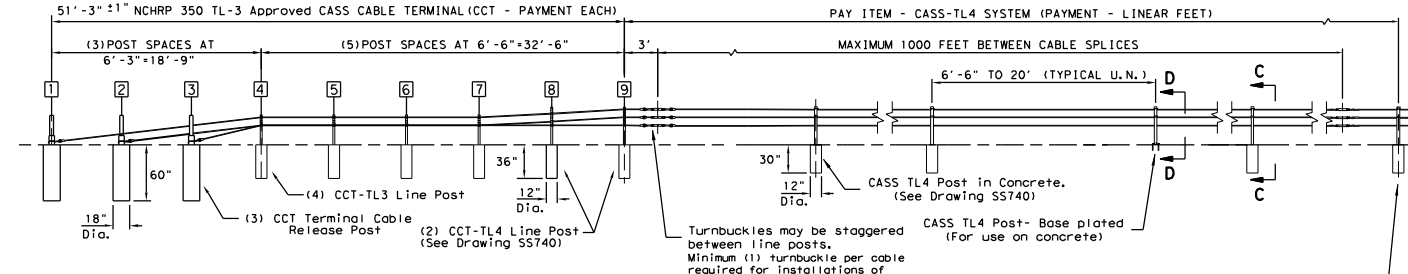
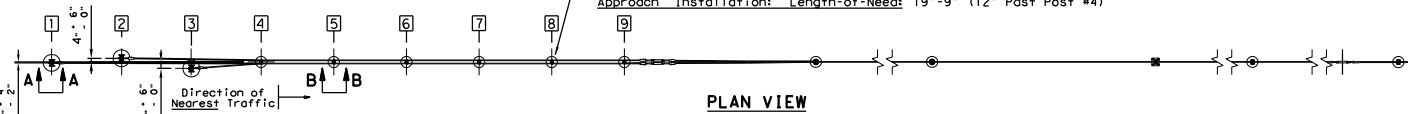
Design Division Standard

TRINITY HIGHWAY CRASH CUSHION (WIDE UNIT) TRACC (W) - 16

FILE: traccw16.dgn	DN: TxDOT	CR: KM	DN: VP	CR: VP
© TxDOT February 2006	CONF: SECT	JOB: 643466	US: 380, ETC	HIGHWAY: 001
REVISED 06, 2013 (VP)	REVISIONS: 643466	DIST: COUNTY	SHEET NO.	
REVISED 03, 2016 (VP)	DIST: COUNTY	TRACC WISE, ETC.		14

Preferred Installation: Locate post #2 away from nearest traffic.
System has been successfully tested with opposite installation.

Length-of-Need Cass Cable Terminal (CCT):
Departure Installation: Length-of-Need: 44'-9" (4' Post #8)
Approach Installation: Length-of-Need: 19'-9" (12" Post Post #4)



GENERAL NOTES

- This drawing is a general overview of CASS TL-4 Barrier System. See SS-740 (latest version) for specific details of CASS cable terminal (CCT) and cable safety system (CASS) requirements, proper installation, options and specification.
- CASS is designed for bi-directional traffic flows and can be installed on either side of the median; contact Trinity (800-521-6050) or consult the design, installation, or repair manual(s) for additional information.
- All concrete for CASS footings shall be TxDOT class A. If class A or stronger concrete is utilized for the mowstrip, please see chart below for allowable footing depth and sleeve deviations.
- All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
- For payment see Special Specification "Cable Barrier System".
- CASS-TL4 shall be installed on shoulders or medians with slopes of 6:1 or flatter without obstructions, depressions, etc. That may significantly affect the stability of an errant vehicle. Grading of site and/or appropriate fill materials may be required. The designer/installer shall "flatten or round" various topographical inconsistencies that could interfere with the ability of the installer to consistently maintain the design height (in relation to the terrain) of the cables. Please consult manual(s) and / or TxDOT Memo(s) for installations in "Ditch Sections".
- CASS TL-4 post spacing may be modified to avoid obstacles that conflict with the installation of class-114 line posts or to reduce deflection on radiuses. No post space can exceed the maximum post TxDOT space limit of 20'. Reducing or increasing post spacing affects deflection. CASS TL-4 may be laterally transferred at a rate not to exceed 30:1.
- Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
- For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably blind (approximately 1/8" per foot).
- CASS TL-4 shall be installed in well-drained, compacted, NCHRP Report 350 Standard Soil. If soil does not meet this classification, if solid rock/concrete is encountered below grade or if soil is susceptible to severe freeze/thaw cycles, please contact Trinity about alternate footing design(s). Trinity suggests the use of "Mow strips" for erosion prevention and ease of maintenance / installation.
- See the Texas MUTCD for proper "Barrier" Delineation.

MOW STRIP DETAIL		CONCRETE FOOTING CHART		
MOW STRIP	DEPTH	WIDTH	FOOTING TUBE	SLEEVE REBAR RING
NONE		30" Min.	27" Min.	YES
HMA	6" Min.	3' Min.	27" Min.	NO
HMA	8" Min.	3' Min.	24" Min.	15" Min.
RC	3" Min.	3' Min.	24" Min.	15" Min.

Chart does not apply to Terminal Posts 1 thru 9.
* Mow strip or pavement.
HMA = Hot Mix Asphalt (Not Recycled Asphalt Pavement).
RC = Reinforced Concrete TxDOT Class A Minimum.

CABLE TENSION CHART	
FAHRENHEIT DEGREES	PRE-STRETCHED LB 7 FORCE
-10	7300
0	7000
10	6600
20	6300
30	6000
40	5600
50	5300
60	5000
70	4600
80	4300
90	4000
100	3600
110	3300
120	3000
130	2700
140	2500
150	2300

Trinity Highway Products, LLC.
2525 Stemmons Freeway
Dallas, TX 75207
Phone: (800) 644-7976
Product.INFO@TRIN.NET

Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

TRINITY
CABLE SAFETY SYSTEM
(TL-4)
CASS (TL4) - 14

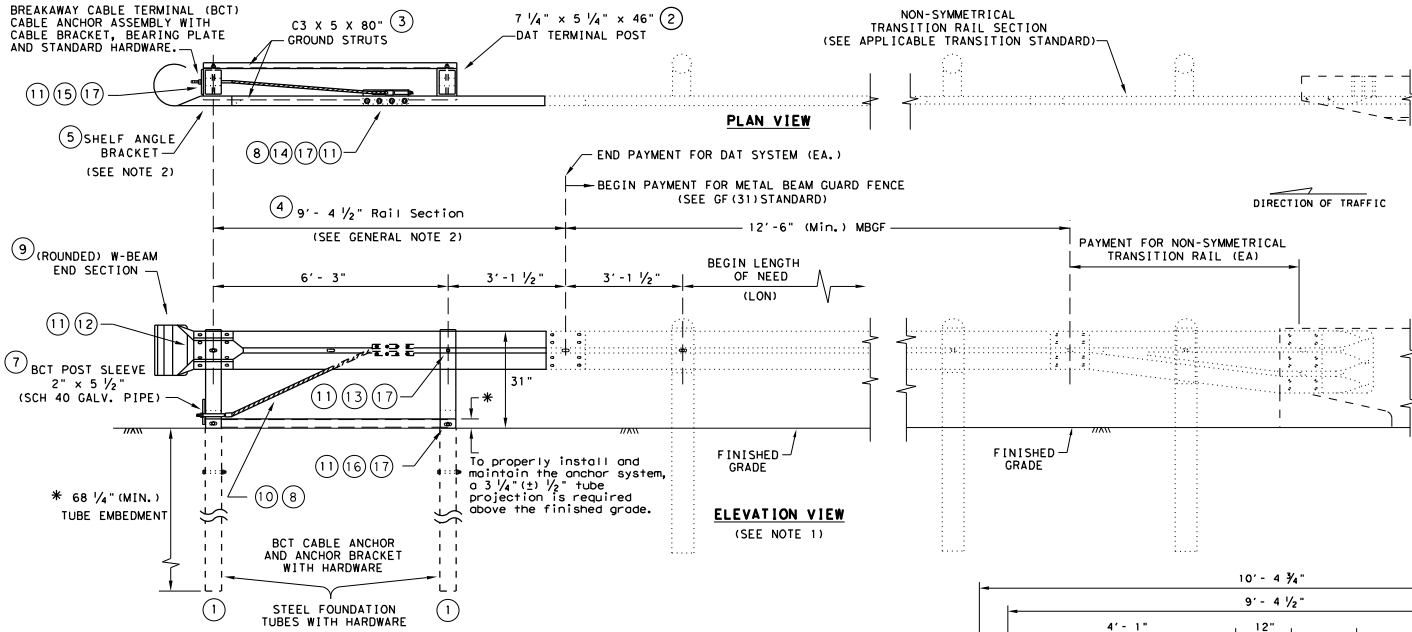
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DIST		COUNTY		SHEET NO.
FTW	WISE, ETC.			15

Design Division Standard

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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.

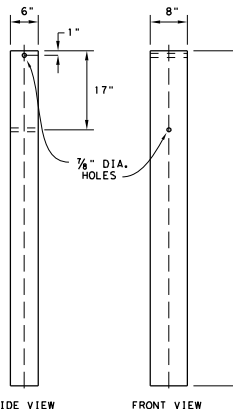
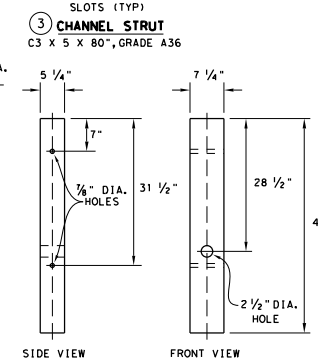
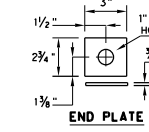
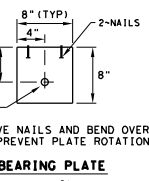
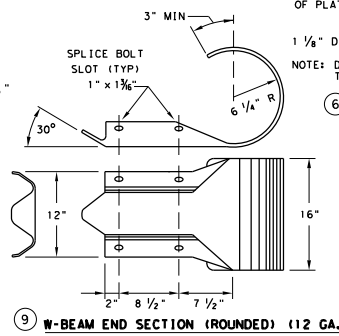
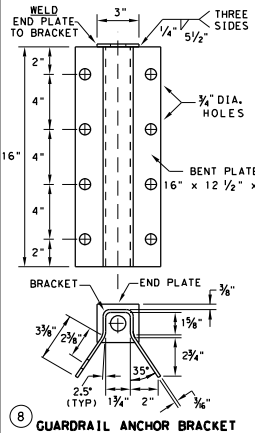
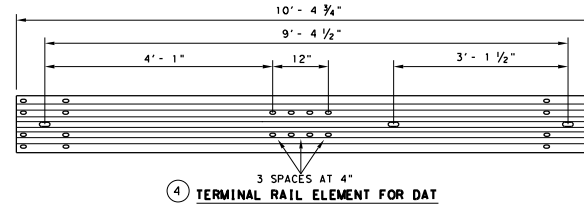
MOW STRIP INSTALLATION

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.

DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

#	(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



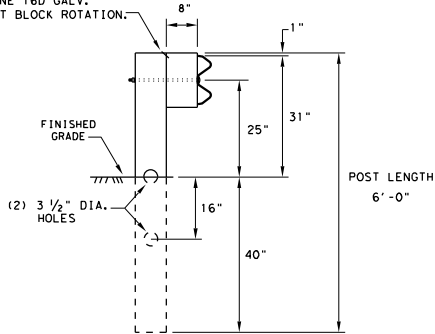
Design Division Standard

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

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© TxDOT: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY	
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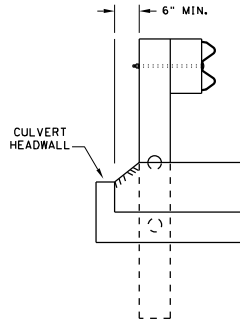
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NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



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

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



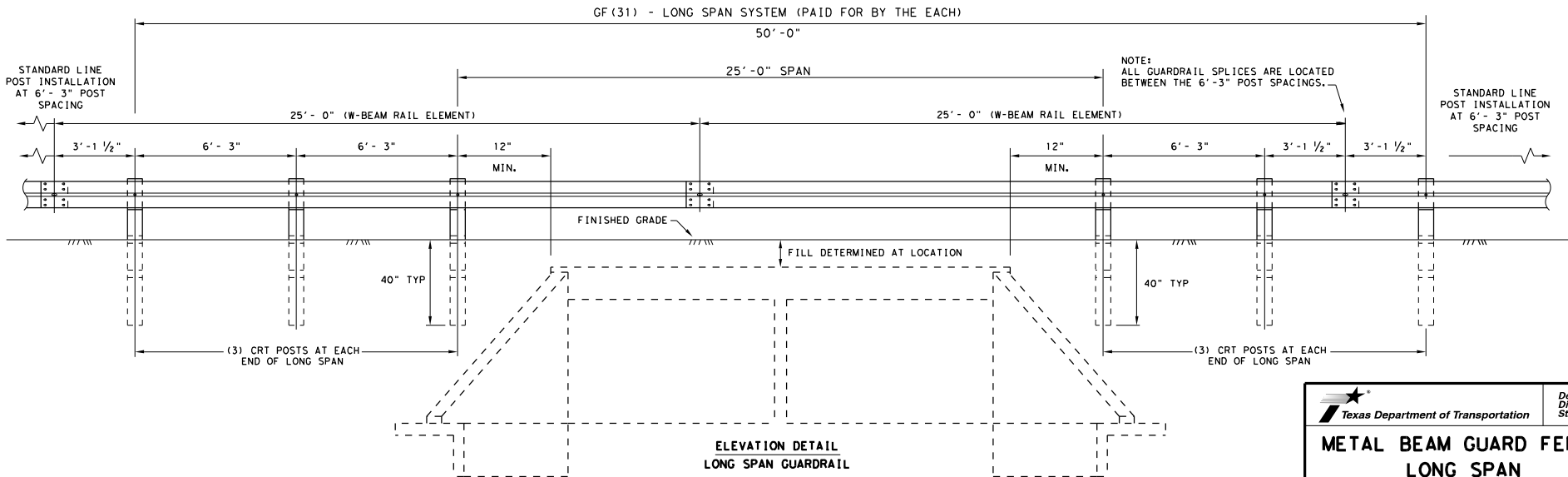
**LATERAL OFFSET BETWEEN THE
GUARDRAIL AND THE CULVERT HEADWALL**

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**



**METAL BEAM GUARD FENCE
LONG SPAN
TL-3 MASH COMPLIANT
GF(31)LS-19**

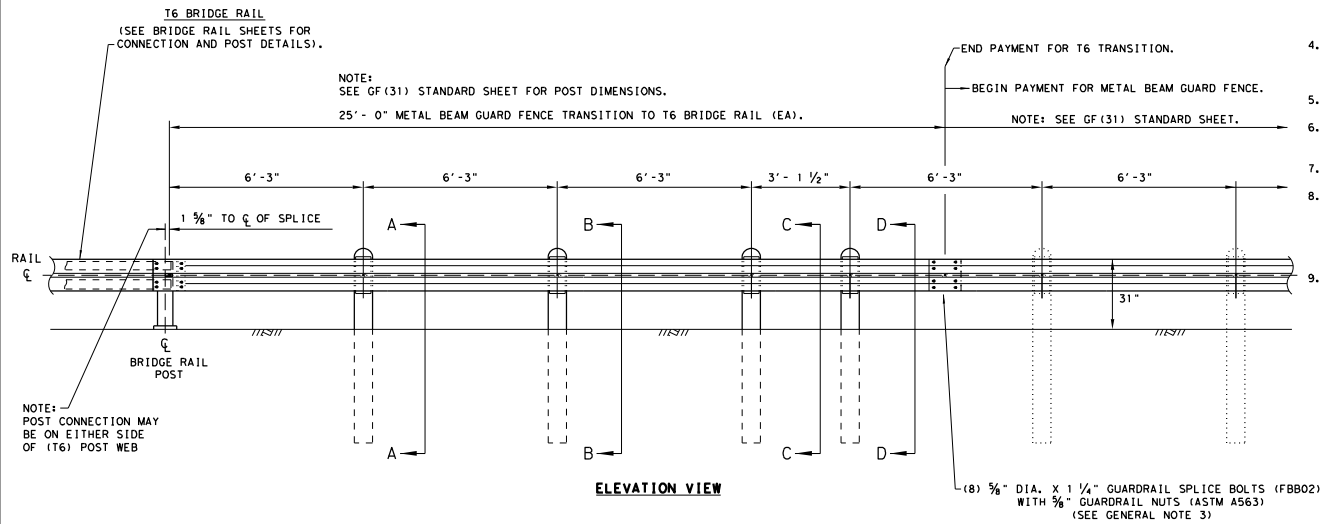
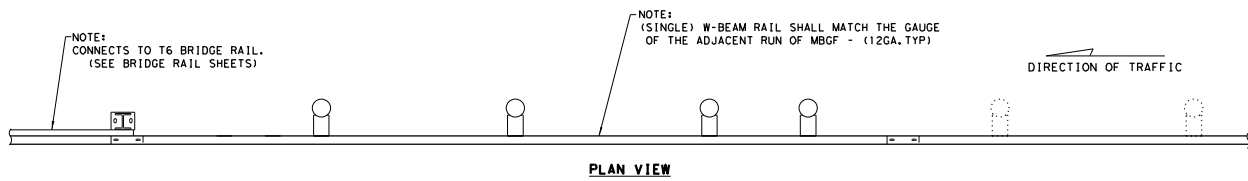
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DIST	COUNTY	SHEET NO.		
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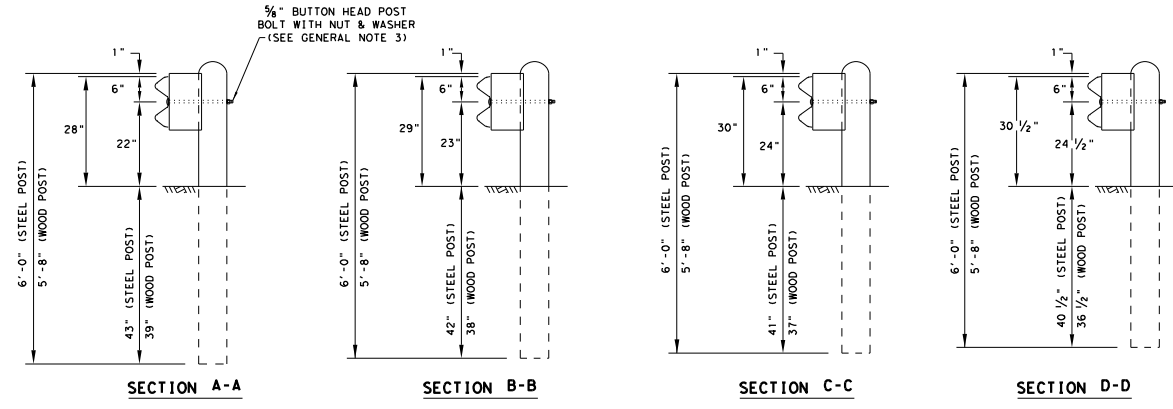
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GENERAL NOTES

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) & APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

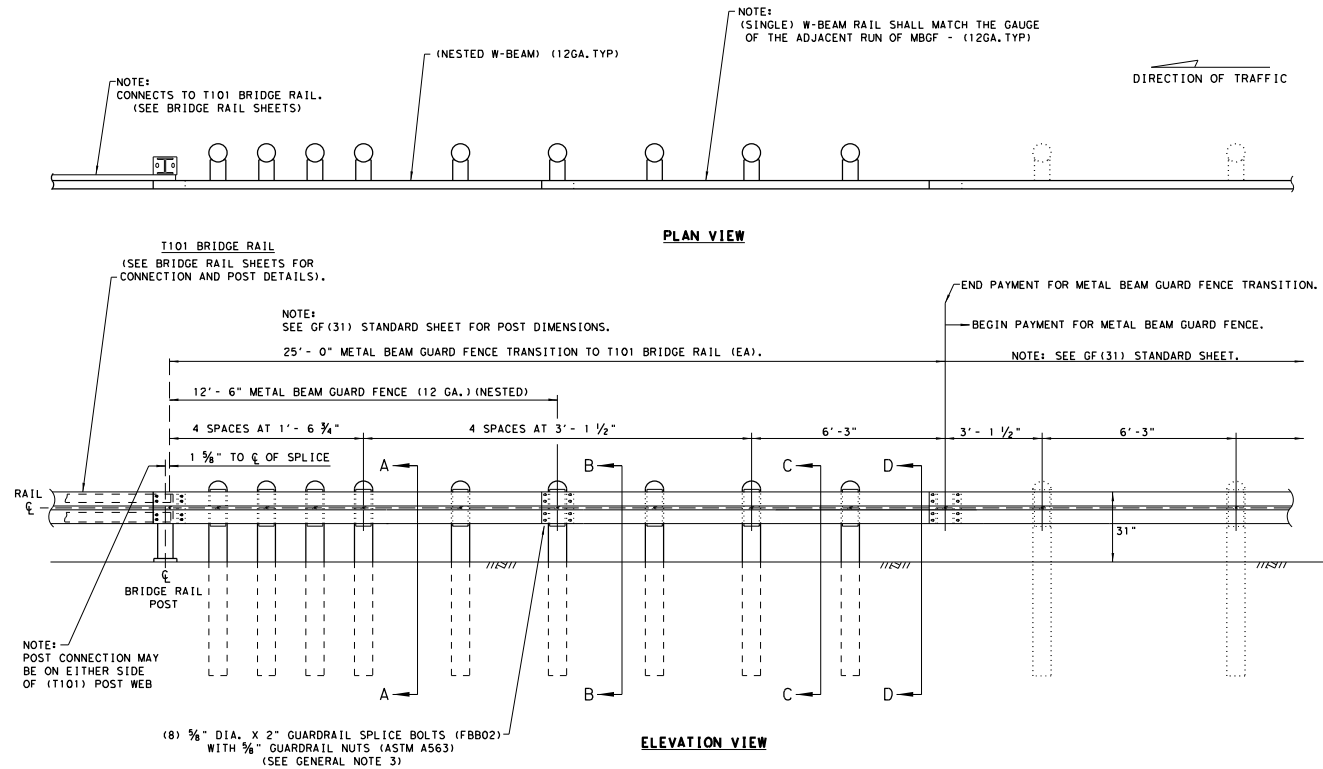
* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



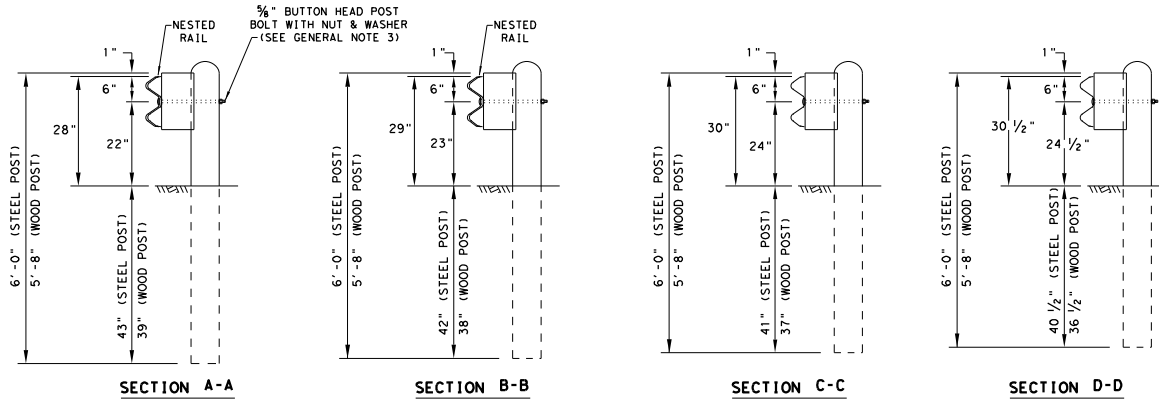
		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T6) GF (31) T6-19			
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REVISIONS	6434	66	001
	DIST	COUNTY	US 380, ETC
	FTW	WISE, ETC.	SHEET NO. 18

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DATE: _____
FILE: _____



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

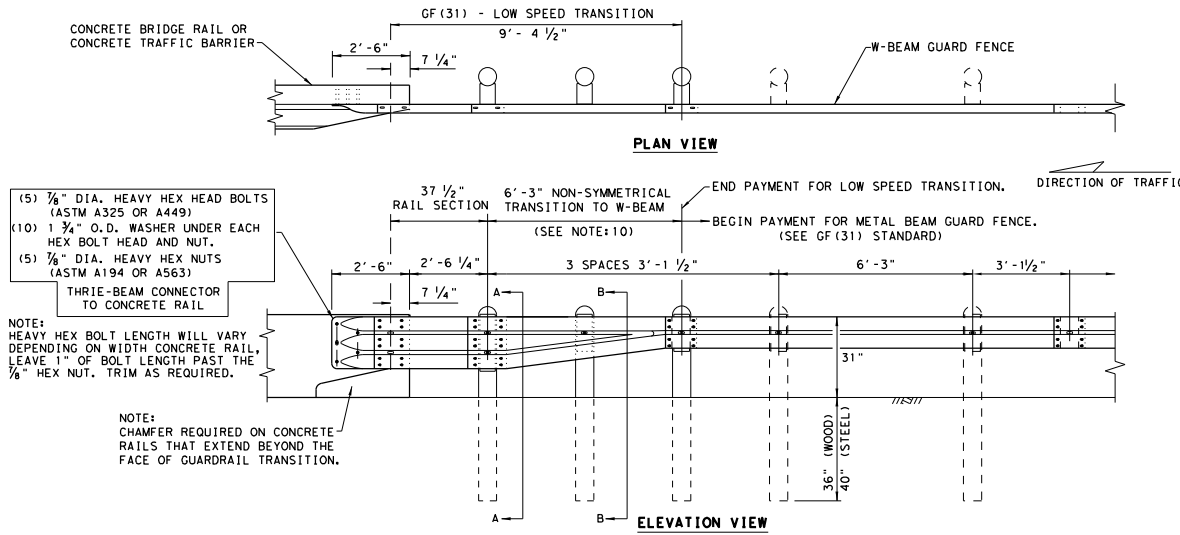


GENERAL NOTES

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 MBOG 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 3/8" 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 3/8" 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	DN: TXDOT	CK: KM	DR: VP
REV: NOVEMBER 2019	CONT SECT	JOB	HIGHWAY
6434	66	001	US 380, ETC
DIST	COUNTY	SHEET NO.	
FTW	WISE, ETC.	19	

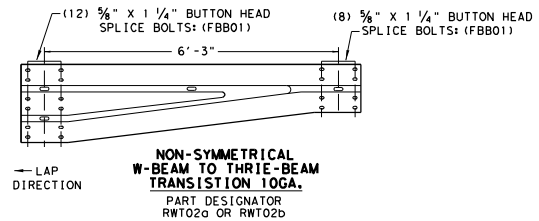
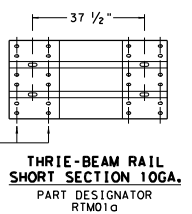
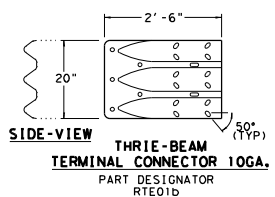
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



- (5) 5/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 5/8" 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 5/8" HEX NUT. TRIM AS REQUIRED.

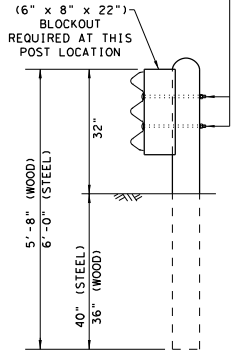
NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.



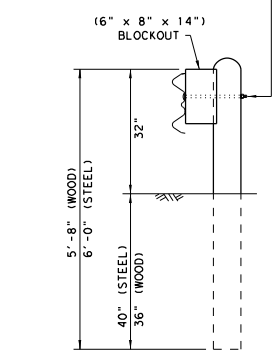
- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC14G) UNDER EACH NUT

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.

PLATE WASHER INSTRUCTIONS

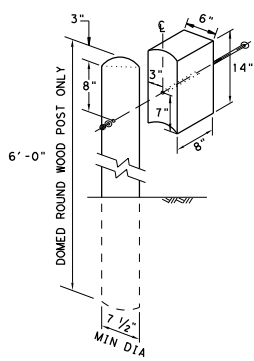


SECTION A-A

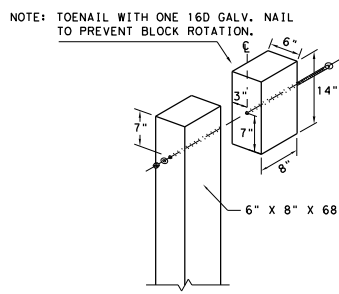


SECTION B-B

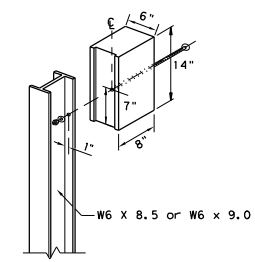
NOTE: * "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

GENERAL NOTES

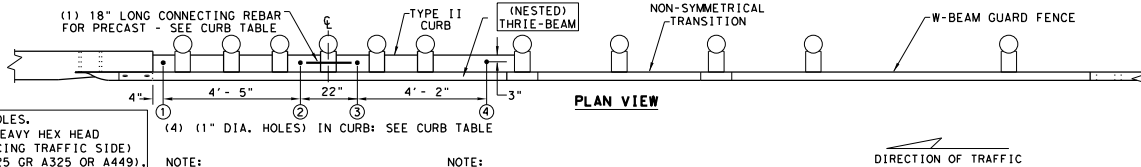
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31) STANDARD SHEET.
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM 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 5/8" 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.

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	6434	66	001 US 380, ETC
	DIST	COUNTY	SHEET NO.
	FTW	WISE, ETC.	20

DATE: FILE:

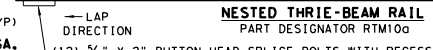
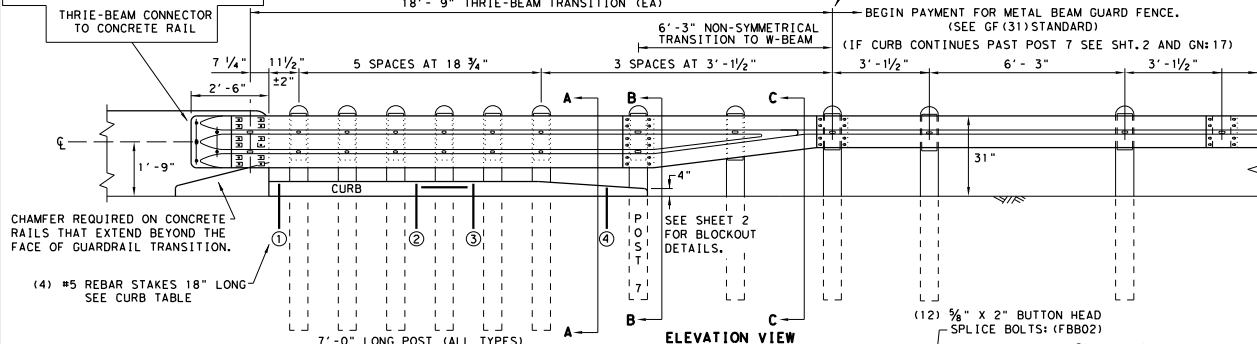
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. TxDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



- (5) 1" DIA. HOLES.
- (5) 3/4" DIA. HEAVY HEX HEAD BOLTS (ASTM F3125 GR A325 OR A449).
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 3/8" 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 3/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

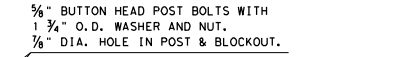


NOTE: SEE GENERAL NOTE: 9

PLATE WASHER INSTRUCTIONS

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.

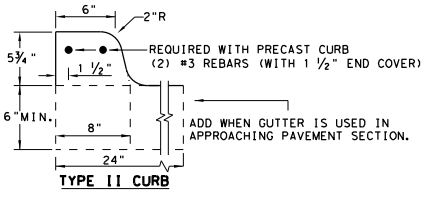


NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6

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

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"
CONNECTIONS AT POST 7	
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.



NOTE: OPTIONS FOR TYPE II CURB:

1. PRECAST
2. CAST-IN-PLACE

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 3/4" 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 CONTINUES 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 3/4" 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.

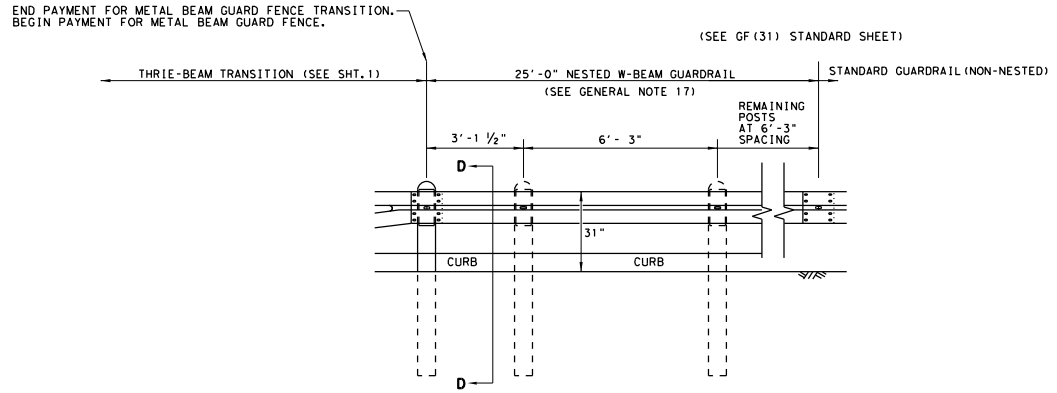
HIGH-SPEED TRANSITION
SHEET 1 OF 2

		Design Division Standard	
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT			
GF (31) TR TL3-20			
FILE: gf31tr+1320.dgn © TxDOT: NOVEMBER 2020 REVISIONS	DWT: TxDOT CONT: SECT 6434 66	CR: KM DR: VP JOB: 001 COUNTY:	CR: CGL/AG HIGHWAY: US 380, ETC SHEET NO.: 21

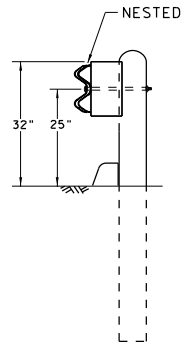
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TYPE II CURB DETAILS

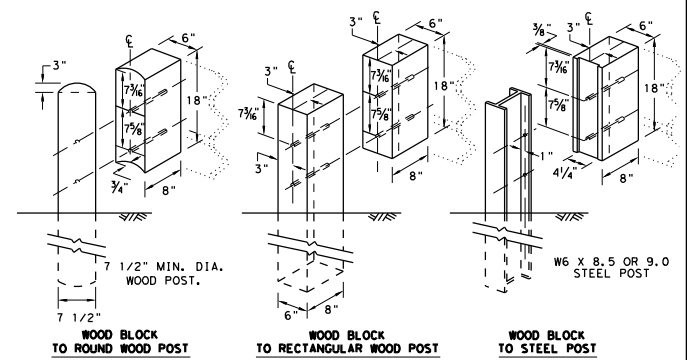
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

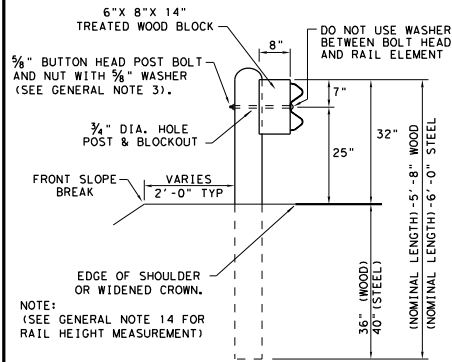
SHEET 2 OF 2

		Design Division Standard	
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT GF (31) TR TL3-20			
FILE: gf31tr+1320.dgn	DN: TXDOT	CK: KM	DR: KM
© TXDOT: NOVEMBER 2020	CONT	SECT	JOB
REVISIONS	6434	66	001 US 380, ETC
	DIST	COUNTY	SHEET NO.
	FTW	WISE, ETC.	22

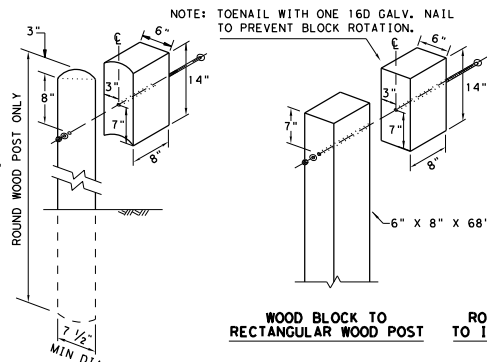
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DATE: FILE:

DISCUSS W/CR. 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.

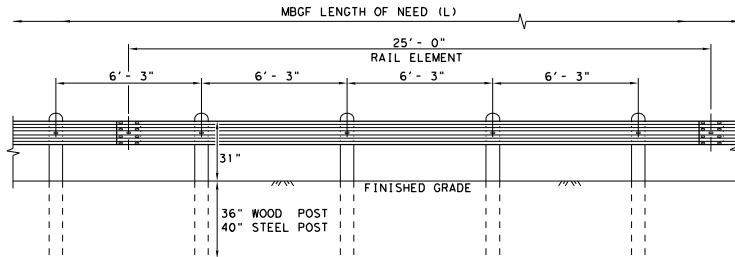


TYPICAL POST PLACEMENT



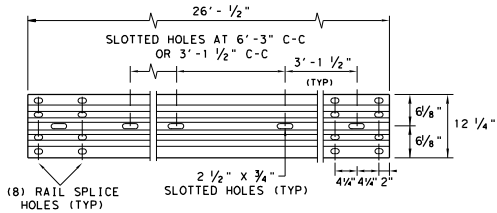
WOOD BLOCK TO RECTANGULAR WOOD POST
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



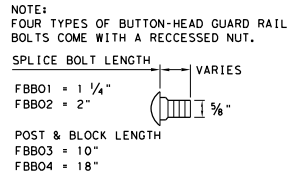
ELEVATION MID-SPAN RAIL SPLICE

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.

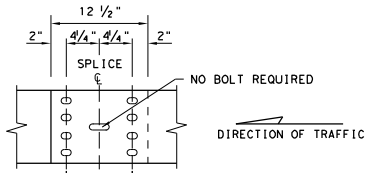


SPlice BOLT LENGTH

FBB01 = 1 1/4"
FBB02 = 2"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

POST & BLOCK LENGTH

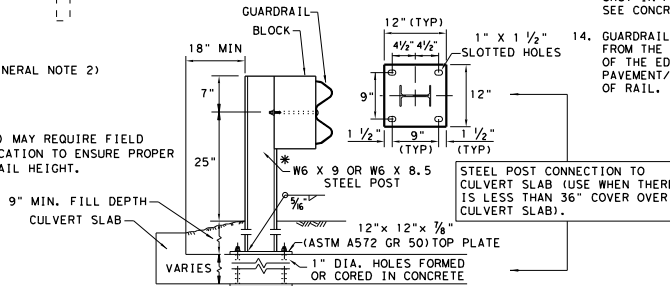


MID-SPAN RAIL SPLICE DETAIL

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

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.



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

- 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.
- 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.

GENERAL NOTES

- 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."
- 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.
- 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 3/4" 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 THE METAL BEAM GUARD FENCE.
- THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
- 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.
- 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.
- 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.
- POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
- SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
- 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.
- 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.
- 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.

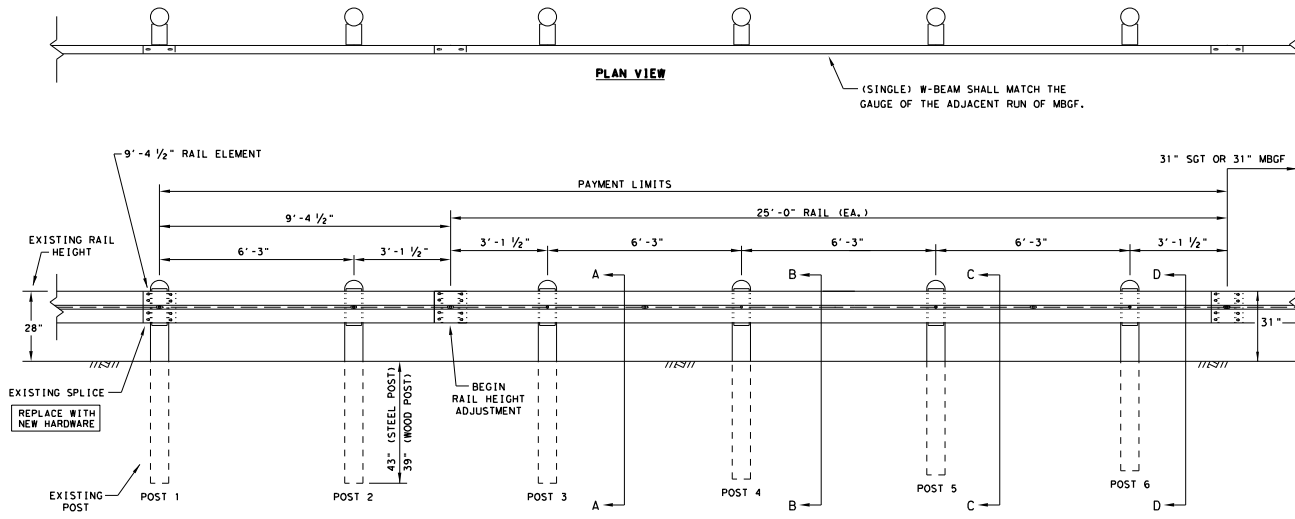
NOTE: TRANSITIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS. SEE GF (31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS. SEE GF (31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

		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	643466	001	US 380, ETC.
	DIST	COUNTY	SHEET NO.
	FTW	WISE, ETC.	23

DATE: FILE:

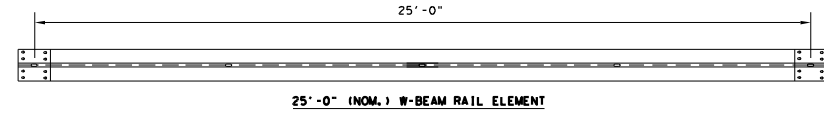
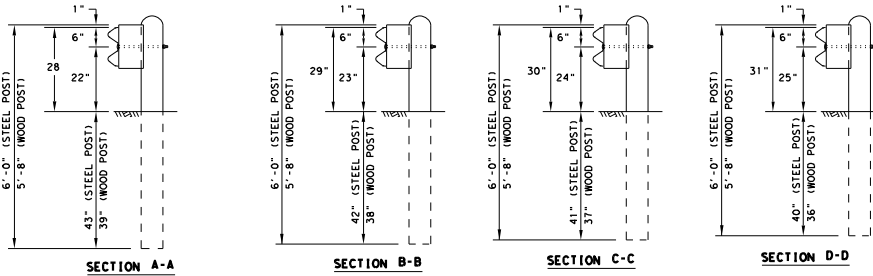
GENERAL NOTES

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.

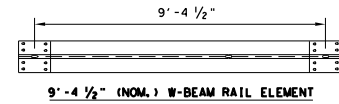


ELEVATION VIEW

* "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)

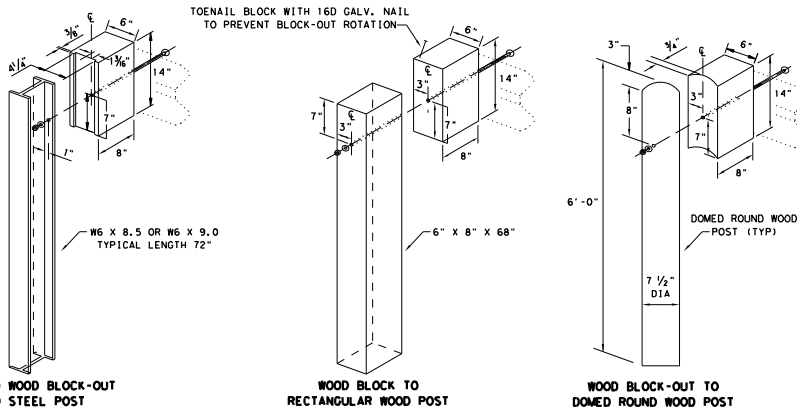
POST AND BLOCK-OUT TYPES AVAILABLE

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)



ROUTED WOOD BLOCK-OUT TO STEEL POST

WOOD BLOCK TO RECTANGULAR WOOD POST

WOOD BLOCK-OUT TO DOMED ROUND WOOD POST

Texas Department of Transportation
 Design Division Standard

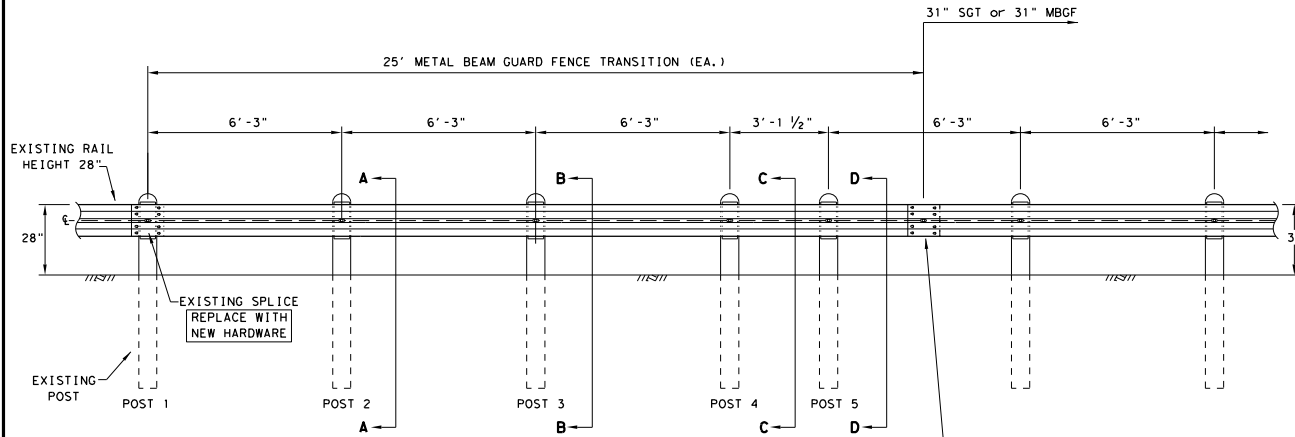
**METAL BEAM GUARD FENCE
 RAIL HEIGHT ADJUSTMENT
 (28" TO 31")
 TL-3 MASH COMPLIANT
 RAIL-ADJ(A)-19**

FILE: r01ad019	DN:TXDOT	CK:KM	DR:VP	CK:CGL/JAG
©TXDOT NOVEMBER 2019	CONT SECT	JOB	HIGHWAY	
REVISIONS	6434	66	001	US 380, ETC
	DIST	COUNTY		SHEET NO.
	FTW	WISE, ETC.		24

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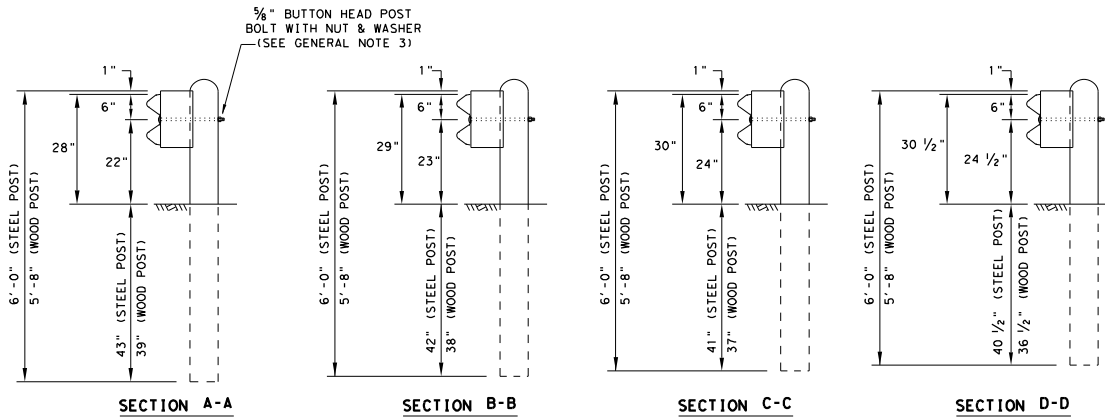


PLAN VIEW



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

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)

- GENERAL NOTES**
- 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."
 - 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.
 - BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 3/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 3/8" X 1-1/4" WITH 3/8" NUTS (ASTM A563).
 - 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.
 - CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
 - THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
 - 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.
 - APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. SEE GF(31) STANDARD FOR INSTALLATION GUIDANCE.
 - POSTS SHALL NOT BE SET IN CONCRETE.
 - 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.
 - REFER TO STANDARD GF(31) FOR ADDITIONAL DETAILS.
 - RAIL HEIGHT ADJUSTMENT IS ASSESSED AT TL-3 MASH COMPLIANT FOR STEEL POST HEIGHT TRANSITION TO 28" STEEL POST GUARDRAIL.

POST AND BLOCK-OUT TYPES AVAILABLE

HARDWARE LIST	
QTY	DESCRIPTION
1	25'-0" W-BEAM RAIL ELEMENT 12GA. (TYP)
5	7 1/2" DIA X 6'-0" DOMED ROUND WOOD POSTS (TYP)
5	6" X 8" X 68" RECTANGULAR WOOD POSTS (TYP)
5	W6 X 8.5 OR W6 X 9 X 72" STEEL POSTS (TYP)
5	6" X 8" X 14" WOOD BLOCKS OR COMPOSITE (TYP)
5	3/8" X 18" GUARDRAIL BOLTS AND NUTS (FBB04)
5	3/8" ROUND WASHERS (ASTM F436) (FWC16G)
5	3/8" X 10" GUARDRAIL BOLTS AND NUTS (FBB03)
16	3/8" X 1-1/4" GUARDRAIL SPLICE BOLTS WITH DOUBLE RECESSED NUTS (ASTM A563) (FBB01)

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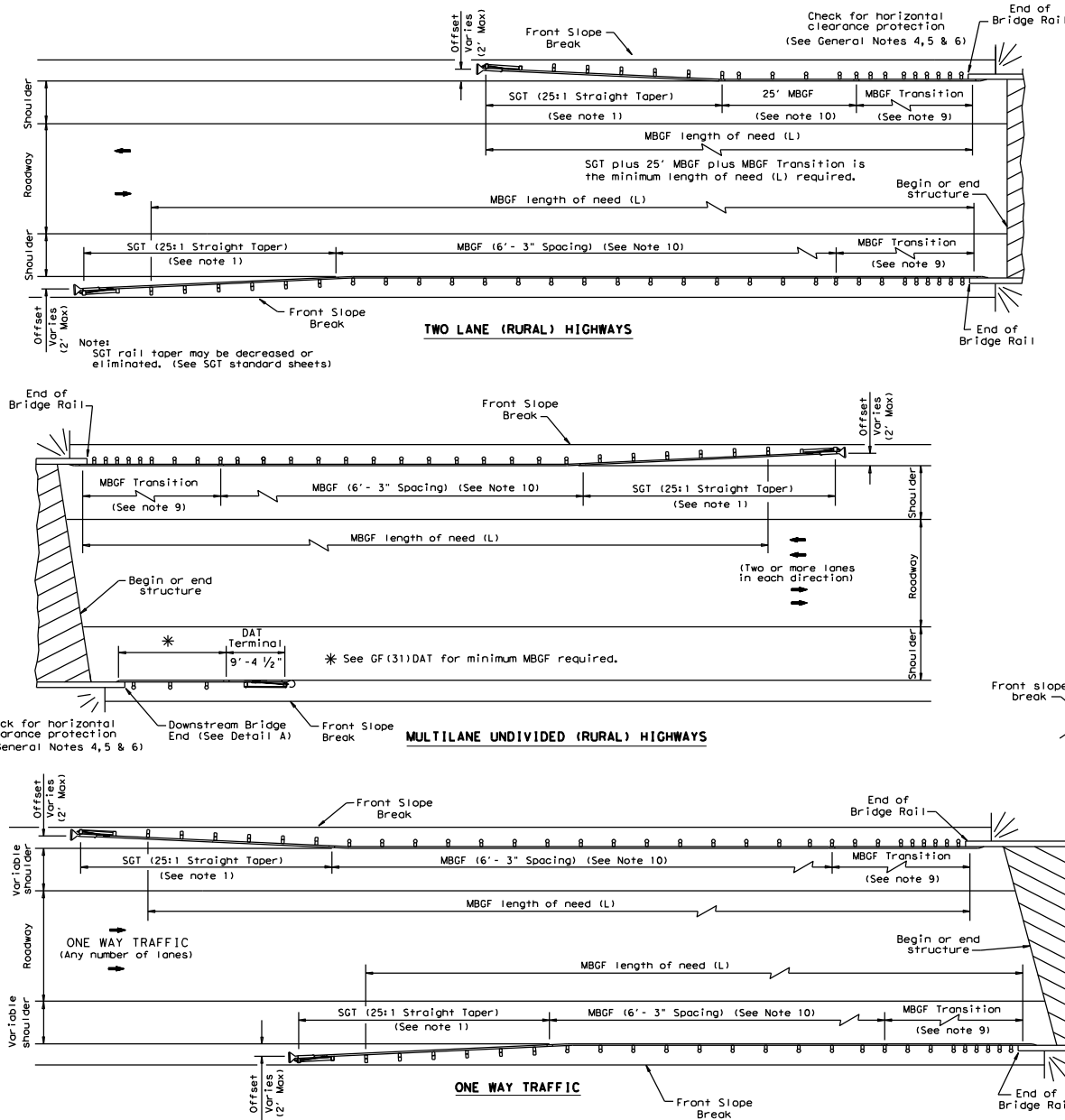
Design Division Standard

METAL BEAM GUARD FENCE RAIL HEIGHT ADJUSTMENT (28" TO 31") TL-3 MASH COMPLIANT RAIL-ADJ(B)-19

FILE: r010djb19	DIST	CONTRACT	SECTION	JOB	DATE	BY	CHECKED	APPROVED
NOVEMBER 2019	6434	66		001	US 380, ETC			
DIST		COUNTY		SHEET NO.				
FTW		WISE, ETC.				25		

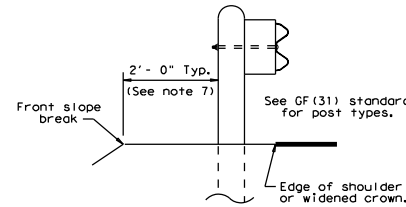
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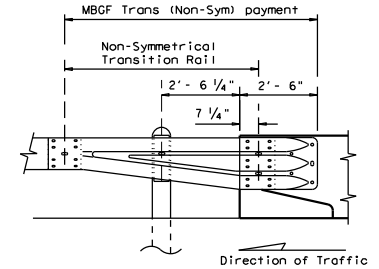


GENERAL NOTES

- For more detail: See GF (31), SGT (131), 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 MBBF 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 MBBF consideration.
- Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
- Direct connection of MBBF 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 MBBF. Typically the "front slope" break should be 2'-0" from the back of the MBBF 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 MBBF).
- For restrictive bridge widths: The MBBF should be properly transitioned from the existing bridge rail to the adjoining MBBF (See MBBF 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 MBBF will be required.



TYPICAL CROSS SECTION AT MBBF



DETAIL A
Showing Downstream Rail Attachment

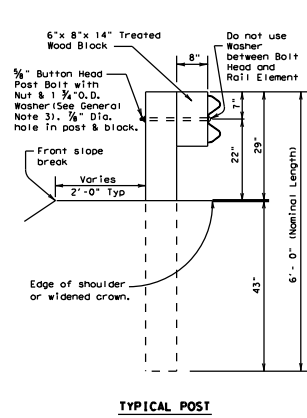


BRIDGE END DETAILS
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

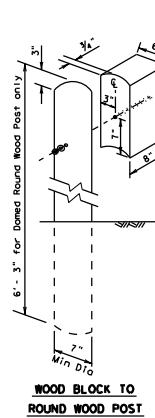
BED-14

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© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISED APRIL 2014 REL. NEW 04/14	6434	66	001	US 380, ETC
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	FTW	WISE, ETC.		26

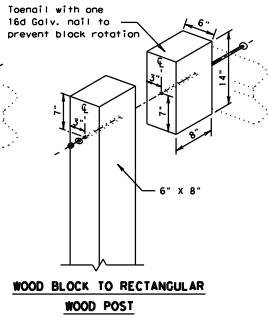
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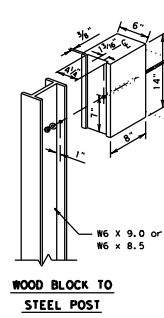
TYPICAL POST



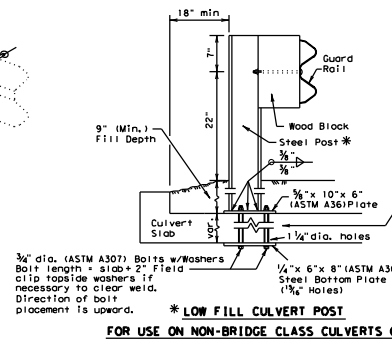
WOOD BLOCK TO RECTANGULAR WOOD POST



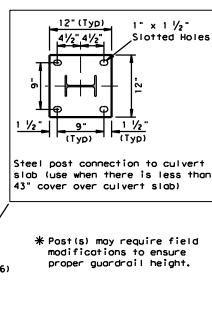
WOOD BLOCK TO RECTANGULAR WOOD POST



WOOD BLOCK TO STEEL POST



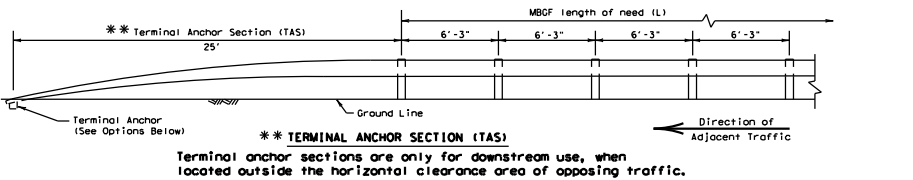
LOW FILL CULVERT POST FOR USE ON NON-BRIDGE CLASS CULVERTS ONLY



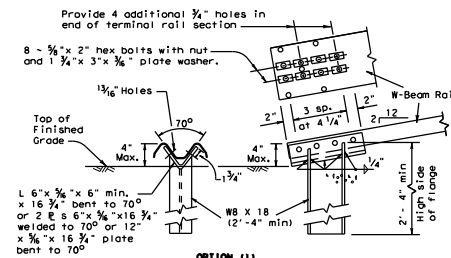
RAIL SPLICE DETAIL

GENERAL NOTES

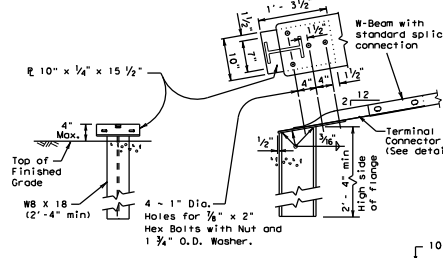
- The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
- Rail element shall 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. Rail head "splice" bolts (ASTM A307) are 7/8" 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.

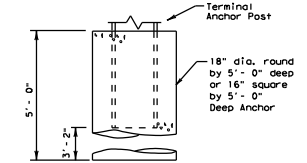


OPTION 11
Note: This anchor post requires four additional 3/4" holes (shop or field) in the rail member with eight 3/8" hex bolts with nut and plate washer.



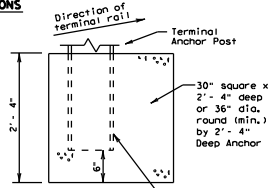
OPTION 12
Note: This anchor post requires the use of the 10 galv. terminal connector with four 7/8" hex bolts with nut and washer.

TERMINAL ANCHOR POST OPTIONS
(See General Note 11)



Notes:
 Either concrete anchor may be used with either post option above.
 No construction joint is allowed in the concrete anchor.
 Terminal rail may be bolted to post and in twist position prior to placing concrete anchor.
 If concrete anchor is precast, the area should be compacted as directed by the Engineer, when placed in the field.

TERMINAL CONCRETE ANCHOR OPTIONS
(See General Note 11)



TERMINAL CONNECTOR

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

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



METAL BEAM GUARD FENCE

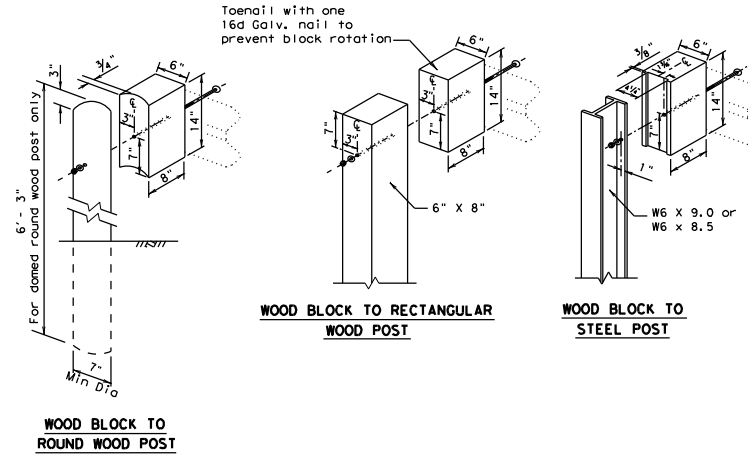
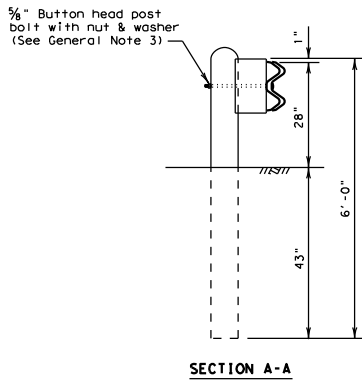
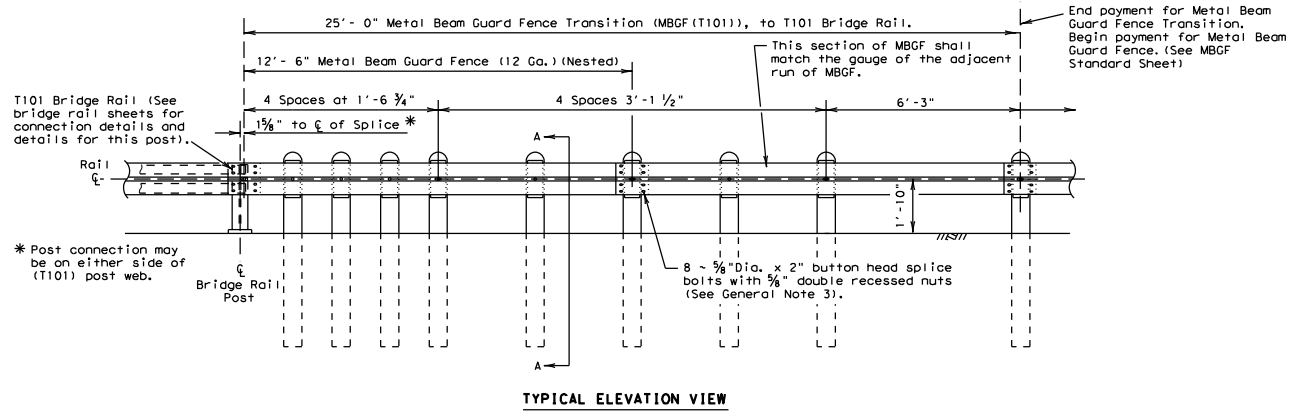
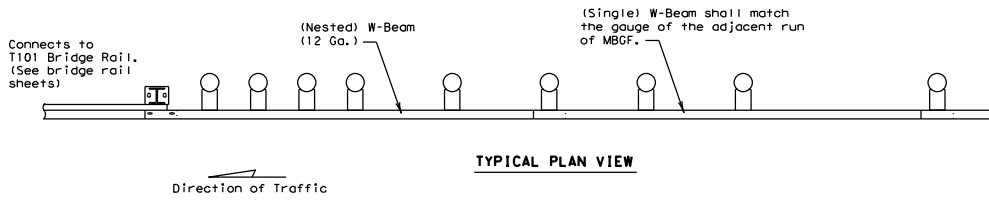
MBGF - 19

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		FTW	WISE, ETC.	27

DATE: FILE:

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DATE: FILE:



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 transitions shall be shown elsewhere in the plans or as directed by the Engineer.
- Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
- 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).
- 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.
- Crown will be widened to accommodate transitions.
- If solid rock is encountered. See the MBGF standard sheet for 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.
- Refer to MBGF Standard Sheet for additional details.

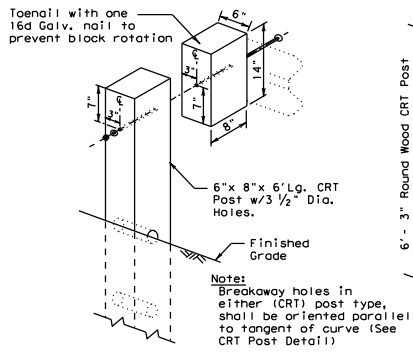
ONLY FOR USE IN MAINTENANCE REPAIRS.

Texas Department of Transportation
 Design Division Standard

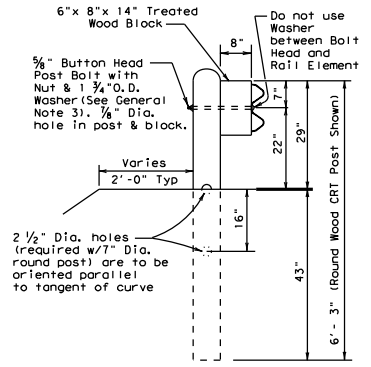
**METAL BEAM GUARD FENCE
 TRANSITION (T101)
 (T101 BRIDGE RAIL)
 MBGF (T101) -19**

FILE: mbgf110119.dgn	DN: TxDOT	CR: KM	DR: BD	CK: VP
© TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
	DIST	COUNTY	SHEET NO.	
	FTW	WISE, ETC.	28	

DISCUSS MBGF. 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.

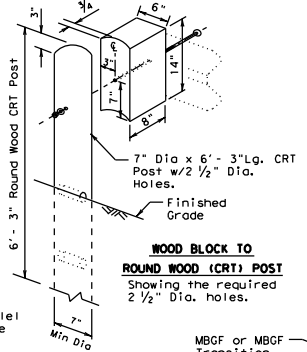


WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3/2" Dia. holes.

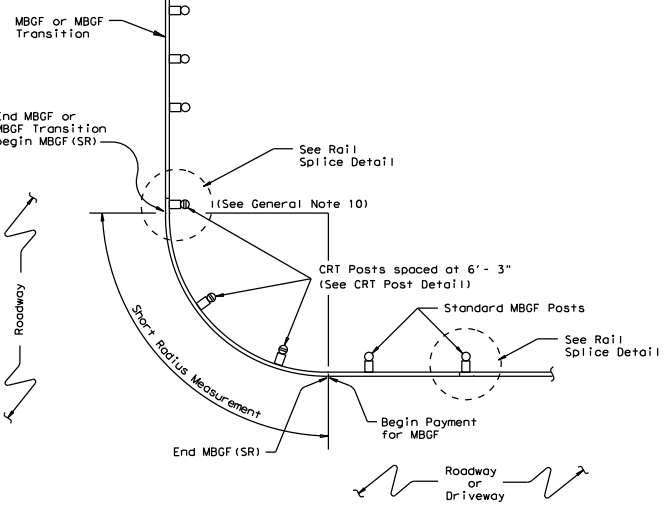


(CRT) POST DETAIL CONTROLLED RELEASE TERMINAL POST

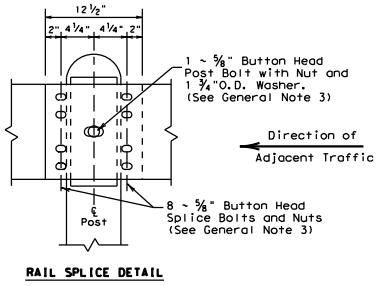
Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 1/2" Dia. holes.



PLAN VIEW SHOWING TYPICAL RADIUS
The required radius is shown elsewhere on the plans.



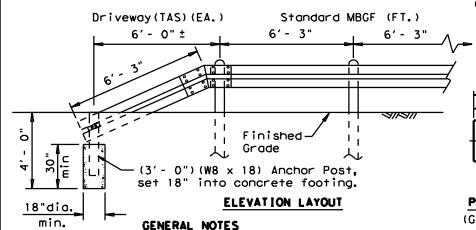
RAIL SPLICE DETAIL

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.



ELEVATION LAYOUT

GENERAL NOTES

- The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft. (TAS) Terminal Anchor Section, is too long.
- Terminal anchor post shall be set in Class A concrete.
- All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

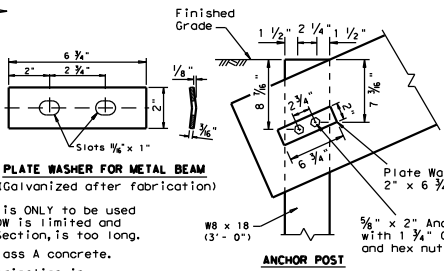
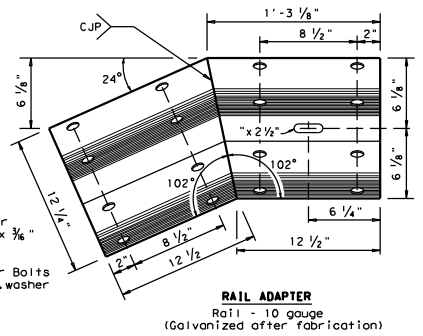


PLATE WASHER FOR METAL BEAM
(Galvanized after fabrication)

ANCHOR POST



RAIL ADAPTER

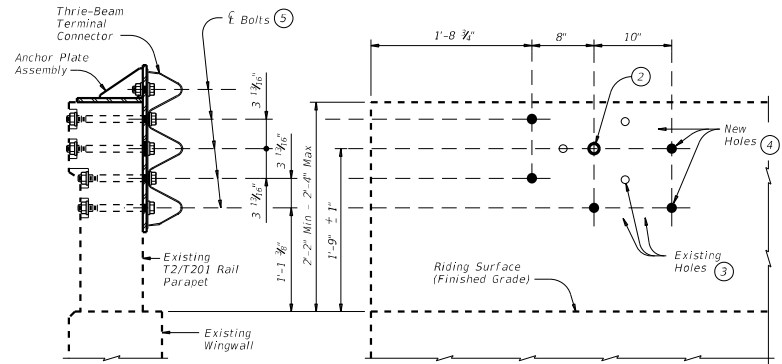
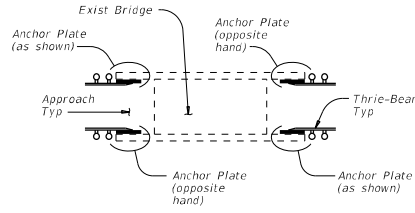
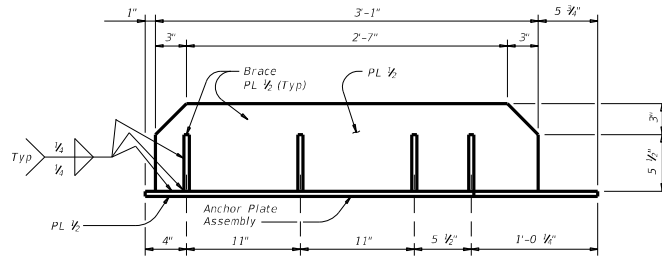
Rail - 10 gauge
(Galvanized after fabrication)

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

		Design Division Standard	
METAL BEAM GUARD FENCE (SHORT RADIUS) MBGF (SR) - 19			
FILE: mbgfr19.dgn	DATE: NOVEMBER 2019	CONTRACT: 643466	JOB: US 380, ETC
REVISIONS:		DIST: FTW	COUNTY: WISE, ETC.
			SHEET NO. 31

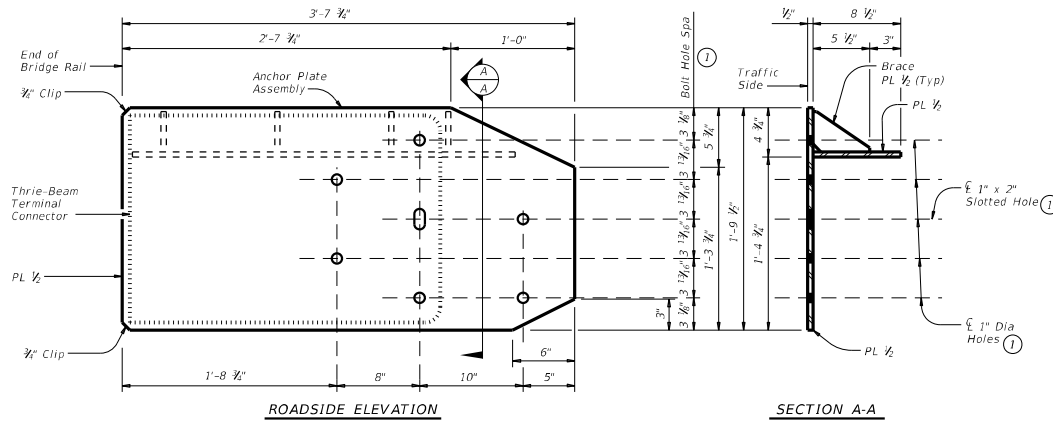
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SECTION
Showing completed installation

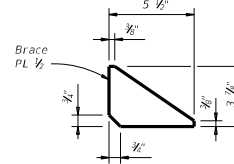
THRIE-BEAM TERMINAL CONNECTION DETAILS ①



ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only. For other side, Anchor Plate must be built opposite hand.

BRACE PLATE DETAIL



CONSTRUCTION NOTES:

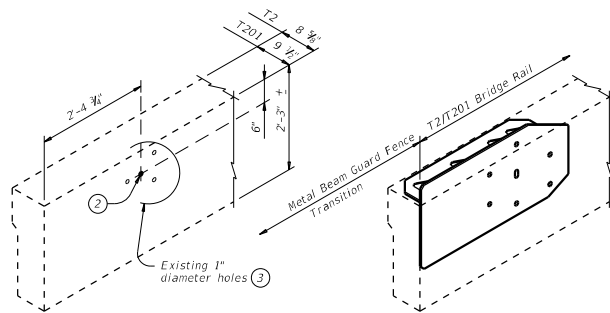
- Field verify dimensions before commencing work and ordering materials.
- On T2 rail remove any MBGF (W-beam) and attachment hardware from the face of rail if present, prior to installation of new MBGF Transition. Dispose of these materials as directed by the Engineer. Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.
- Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connector. Splice the Thrie-Beam Terminal Connection and Thrie-Beam with the normal I2 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:

Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld spatter. Grind edges and corners to a 1/8" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

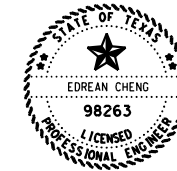
GENERAL NOTES:

- These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection.
- Shop drawings are not required for this installation.
- Payment for materials, fabrication, and installation of this assembly are to be included in unit price bid in accordance with Item 540 "Mtl Bm Gd Fen Trans (Anchor Plate)".
- Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 Lbs.



INSTALLATION DETAILS

- ① The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location, prior to fabrication of Anchor Plate assembly and prior to coring bolt holes in the existing T2/T201 parapet.
- ② If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.
- ③ If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.
- ④ Drill new 1" diameter holes, each with a 2 1/2" diameter x 1" deep recess, through existing railing parapet. Note that recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the Contractor's expense.
- ⑤ 7 - 7/8" diameter ASTM F3125 Gr A325 Hex Head Anchor Bolts each with 2 - 1 3/4" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of 1/2" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.

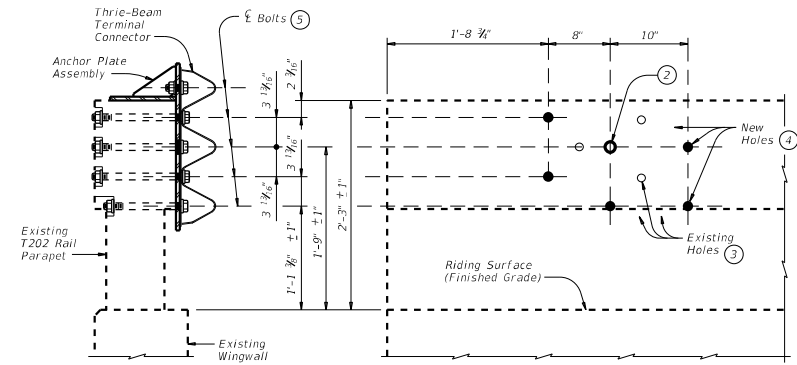
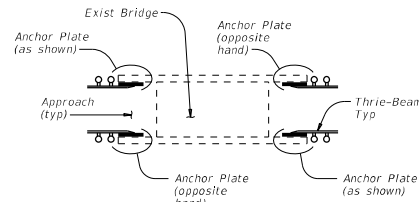
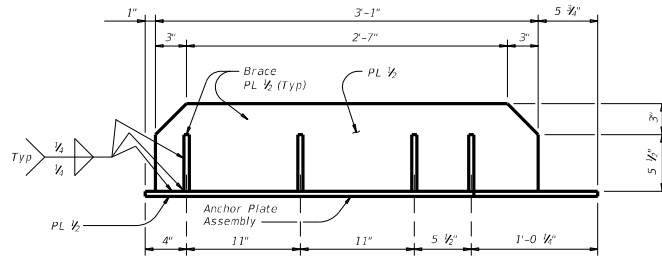


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Edrean Cheng
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		Bridge Division Standard	
T2/T201 TRANSITION RETROFIT GUIDE			
T2/T201TR "(MOD)"			
FILE: r1st:0225-19.dgn	REV: TxDOT	CHK: TxDOT	ENR: TxDOT
SEP 2019	6434	001	US 380, ETC
REVISONS	CONT	SECT	JOB
			COUNTY
			SHEET NO.
	FTW	WISE, ETC.	33

DATE: FILE:

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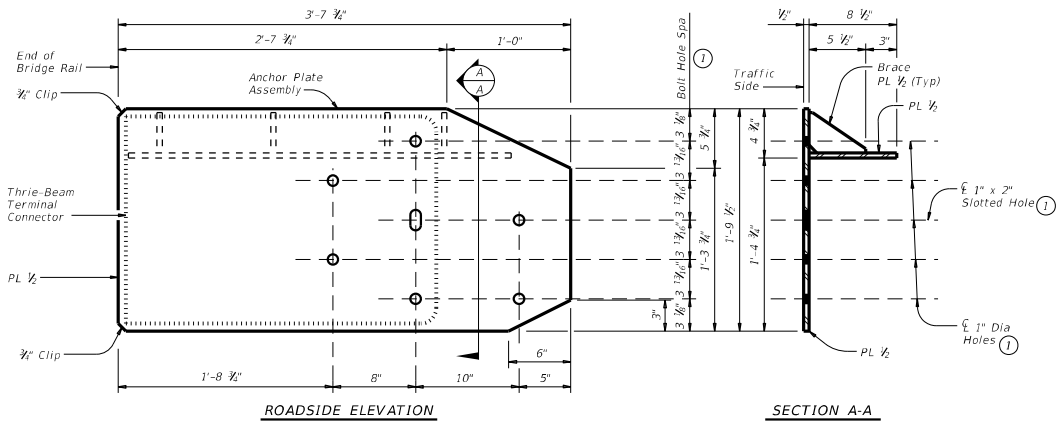
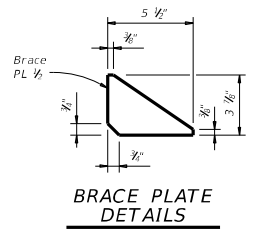


DETAILS OF BOLTS AND HOLES ①

CONSTRUCTION NOTES:
 Field verify dimensions before commencing work and ordering materials. Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.
 Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connection. Splice the Thrie-Beam Terminal Connection to the Thrie-Beam with the normal 12 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

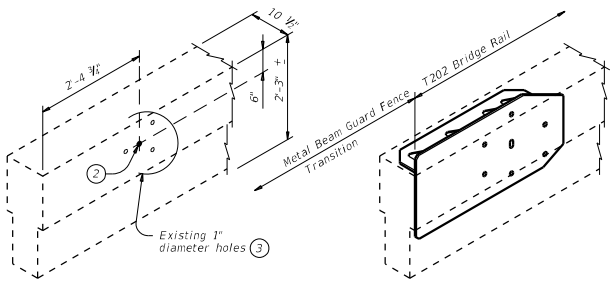
MATERIAL NOTES:
 Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld spatter. Grind edges and corners to a 1/4" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

GENERAL NOTES:
 These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection. Shop drawings are not required for this installation. Payment for materials, fabrication, and installation of this assembly are to be included in unit price bid in accordance with Item 540 "MI Bm Gd Fen Trans (Anchor Plate)". Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 lbs.



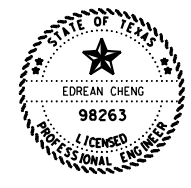
ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only. For other side, Anchor Plate must be built opposite hand.



INSTALLATION DETAILS

- ① The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location prior to fabrication of the Anchor Plate assembly and prior to coring bolt holes in the existing T202 parapet.
- ② If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.
- ③ If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.
- ④ Drill new 1" diameter holes, each with a 2 1/2" diameter x 1" deep recess, through existing railing parapet. Recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the contractor's expense.
- ⑤ 7 - 7/8" diameter ASTM F3125 Gr A325 Hex Head Anchor Bolts each with 2 - 1 3/4" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of 1/2" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.



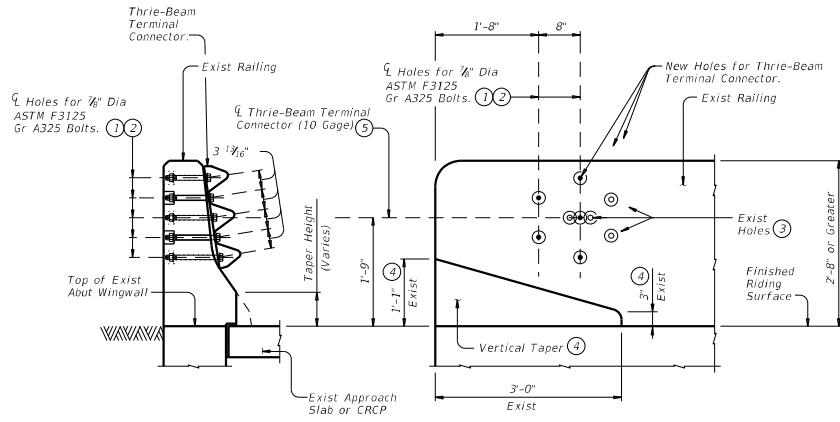
DocuSigned by:
 Edrean Cheng, PE.
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 3/29/2023

		Bridge Division Standard	
<h2>T202 TRANSITION RETROFIT GUIDE</h2>			
<h3>T202TR "(MOD)"</h3>			
FILE: r1st1026-19.dgn	REV: TxDOT	EX: TxDOT	ENR: TxDOT
SEPTEMBER 2019	6434	001	US 380, ETC
REVISIONS	DISC	COUNTY	SHEET NO.
	FTW	WISE, ETC.	34

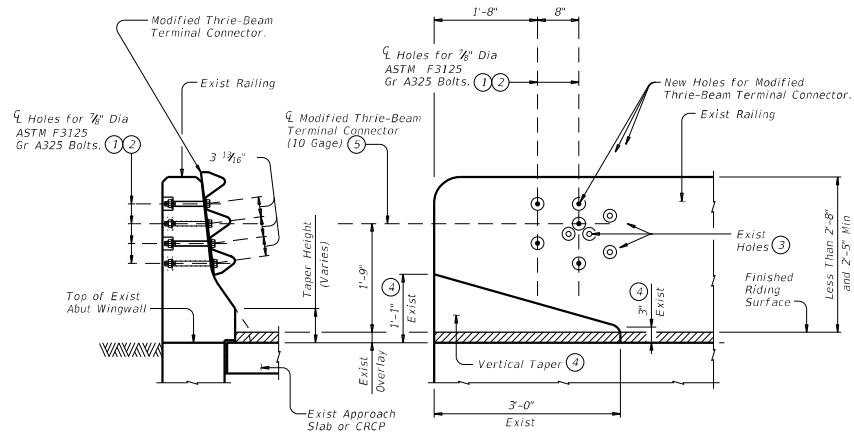
DATE: FILE:

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SECTION **ELEVATION**
TERMINAL CONNECTION ON EXISTING RAIL WITHOUT OVERLAY



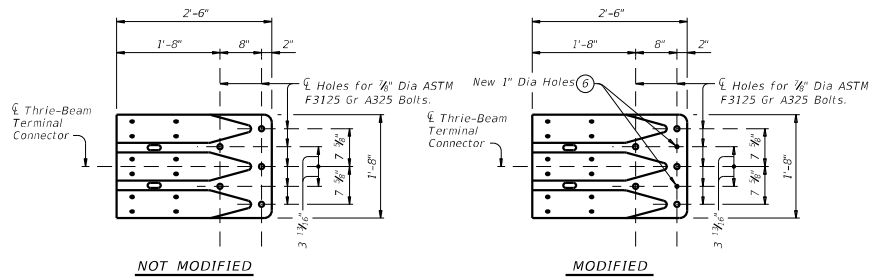
SECTION **ELEVATION**
TERMINAL CONNECTION ON EXISTING RAIL WITH OVERLAY

- 1 5 - 1" Dia holes and 2 1/2" Dia x 2" deep recesses. Holes and recesses must be core drilled. Percussion drilling is not permitted. Concrete spalls in rail exceeding 1/2" from edge of holes will be patched in accordance with Item 429, "Concrete Structure Repair" at the contractor's expense. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.
- 2 5 - 3/4" Dia F3125 Gr A325 Bolts with two 1 3/4" O.D. washers. Place washer under each head and nut. The 5 Terminal Connection Bolts must be tightened in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Bolts must be cut off after installation so as to extend no more than 1/4" beyond nut. End of cut-off bolt must be painted with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- 3 Existing anchor bolt holes in rail that can not be utilized and are within 3" of a new bolt hole must be filled with an epoxy grout prior to coring new holes.
- 4 If vertical taper is not present, then a vertical taper must be field cut to limits shown when the existing rail measurement is 2'-8". Rail measurement should be taken from behind rail as to not include overlay if present. If existing rail measurement is 2'-10" and existing rail does not have vertical taper, then add 2" to vertical dimensions and field cut vertical taper. Any exposed reinforcing steel from field cut taper must be ground flush and painted with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- 5 10 Gage Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Metal Beam Guard Fence Transitions must be attached to the bridge rail and extended along the embankment unless otherwise shown in the plans.
- 6 Terminal Connector must be modified for the Terminal Connection on Existing Rail with Overlay with two new 1" Dia holes as shown. Top new 1" Dia hole is used in lieu of existing top hole in terminal connector. All other existing holes in terminal connector must be used. Additional hole on bottom of terminal connector is used for other side for opposite hand. Damage to galvanization caused by this modification must be painted with two coats of zinc-rich paint conforming to the Item "Galvanizing".

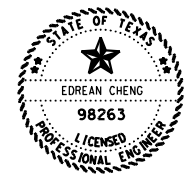
CONSTRUCTION NOTES:
 Field verify dimensions before commencing work and ordering materials.
 Remove any MBGF (W-beam) and attachment hardware, from the face of rail if present, prior to installation of new MBGF Transition. Dispose of these materials as directed by the Engineer. Plugging of exposed existing bolt holes is not necessary except as stated herein or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.
 If vertical taper is not present, then a vertical taper must be field cut to limits shown and debris removed.
 Attach the MBGF Transition to the existing rail and extend along the embankment using the Thrie-Beam Terminal Connection unless shown otherwise on the plans. Splice the Approach Guard Rail and the Terminal Connection with the normal 12 connection bolts. Refer to Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:
 Galvanize all steel components unless otherwise noted.

GENERAL NOTES:
 These details are shown for retrofitting MBGF transitions to existing rails only and not used for new construction.
 Shop drawings are not required for this installation.
 Materials, fabrication and installation of this assembly are to be included in the price bid for "Metal Beam Guard Fence".



NOT MODIFIED **MODIFIED**
THRIE-BEAM TERMINAL CONNECTORS



DocuSigned by:
 3/29/2023
 102CAEE88A847B...

		Bridge Division Standard	
T5/T501/T502 TRANSITION RETROFIT GUIDE			
T5/T501/T502TR "(MOD)"			
FILE: r1st:1039-19.dgn	REV: TxDOT	EX: APK	ENR: JTR
DATE: September 2019	CONF: 6434	SECT: 66	JOB: 001
REVISIONS	DISP: FTW	COUNTY: WISE	US 380, ETC
			SHEET NO: 35

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DATE: FILE:

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

DELINEATORS

D & OM DESCRIPTIVE CODES

DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE		DOUBLE	
SHEETING	Yellow, White or Red Type B or C reflective sheeting				SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX (XX)

1 or 2

NUMBER OF REFLECTORS
 S = Single
 D = Double

COLOR OF REFLECTORS
 W = White
 Y = Yellow
 R = Red

REFLECTOR UNIT SIZE

TYPE OF POST OR DELINEATOR
 WC = Wing Channel Post
 YFLX = Yellow Flexible Post
 WFLX = White Flexible Post
 BRF = Barrier Reflector

TYPE OF MOUNT
 GND = Embedded (drivable or set in concrete)
 CTB = Concrete Barrier Mount
 GF1 or GF2 = Guard Fence Attachment
 SRF = Surface Mount

DIRECTION
 If Required
 BI = Bi-Directional
 BR = Bi-Directional with red on back

OBJECT MARKERS

DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
SHEETING	Yellow-Type B _{FL} or C _{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			Red -Type B _{FL} or C _{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

INSTL OM ASSM (OM-XX) (XXXX)XXX (XX)

1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
 X = 3-Size 2 reflector units (Type 2 only)
 Y = 1-Size 3 reflector unit (Type 2 only)
 Z = 3-Size 1 or 1-Size 4 reflector unit (Type 2 only)
 L = Left Side (Type 3 Object Marker only)
 R = Right Side (Type 3 Object Marker only)
 C = Center (Type 3 Object Marker only)

TYPE OF POST
 WC = Wing Channel Post
 WFLX = White Flexible Post
 TWT = Thin Walled Tubing

TYPE OF MOUNT
 GND = Embedded (drivable)
 SRF = Surface Mount
 WAS = Wedge Anchor Steel
 WAP = Wedge Anchor Plastic

DIRECTION
 If Required
 BI = Bi-Directional

DEPARTMENTAL MATERIAL SPECIFICATIONS	
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

CHEVRONS

ONE DIRECTION LARGE ARROW

NOTE:

DEVICE	GF1	GF2	CTB	DEVICE	W1-8				DEVICE	W1-6	
NOTE	1. Barrier reflectors shall meet the requirements of DMS 8600.				1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).				2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).		
SHEETING	Yellow, White, Red										
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.										
SIZE (W x L)	18" x 24" (Conventional)		24" x 30" (Conventional Oversize)		30" x 36" (Expressway)		36" x 48" (Freeway)		48" x 24" (Conventional) 60" x 30" (Expressway & Freeway)		
MOUNTING HEIGHT	4'-0" or 7'-0"				7'-0" Only				7'-0"		

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.



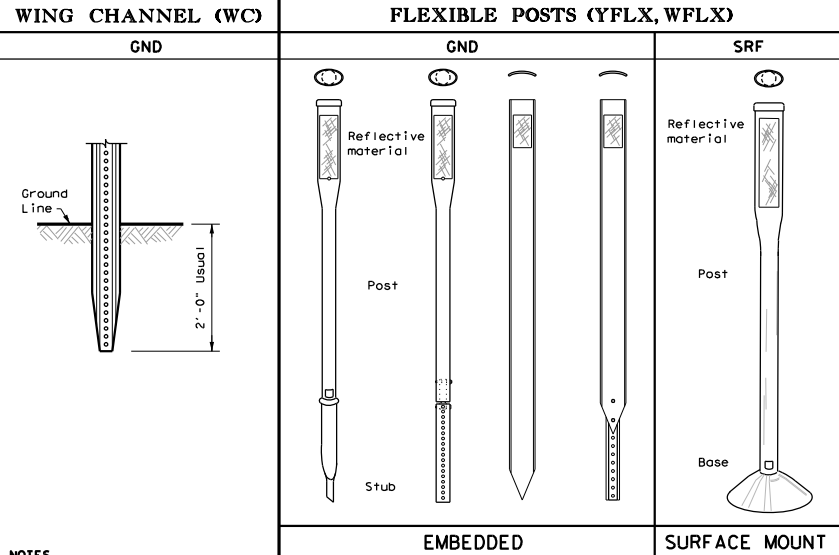
DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION D & OM(1)-20

FILE: ddm1-20.dgn	DN: TXDOT	CR: TXDOT	DN: TXDOT	CR: TXDOT
TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	FTW	WISE, ETC.	36	

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DATE: FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

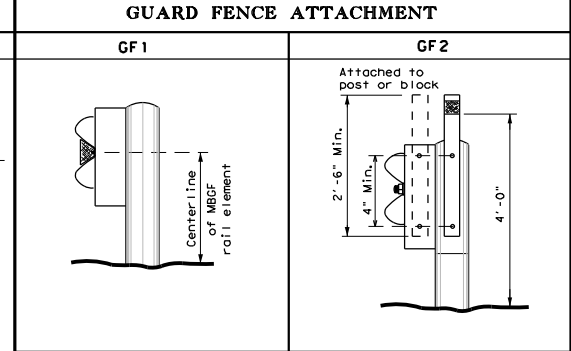


- NOTES**
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

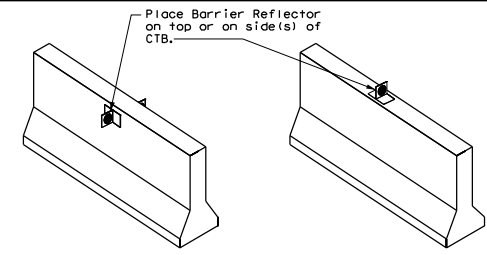
- NOTES**
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
 2. Install per manufacturer's recommendations.
 3. Post length may vary to meet field conditions.
 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

- NOTE**
1. Install per manufacturer's recommendations.

TYPE OF BARRIER MOUNTS

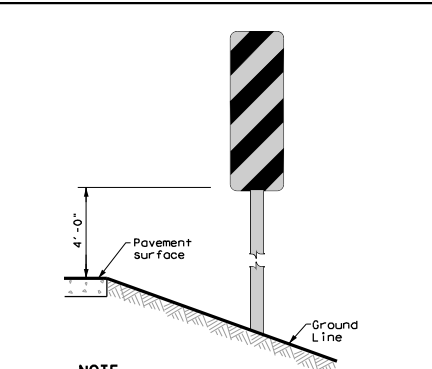


CONCRETE TRAFFIC BARRIER (CTB)



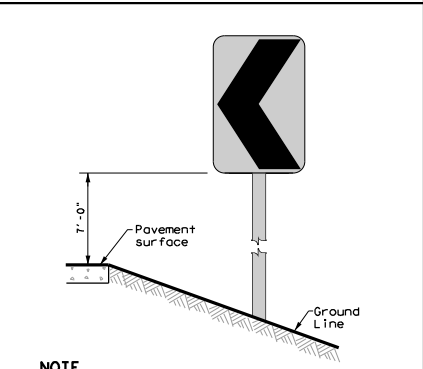
- GENERAL NOTES**
1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



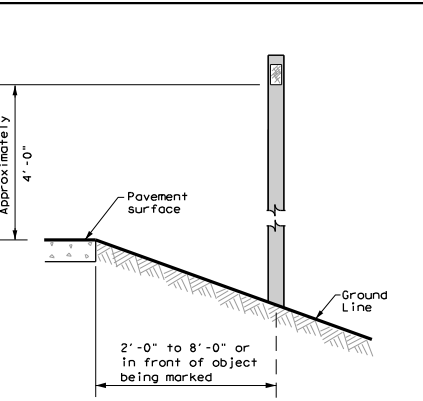
NOTE
 Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller).

CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE
 Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.



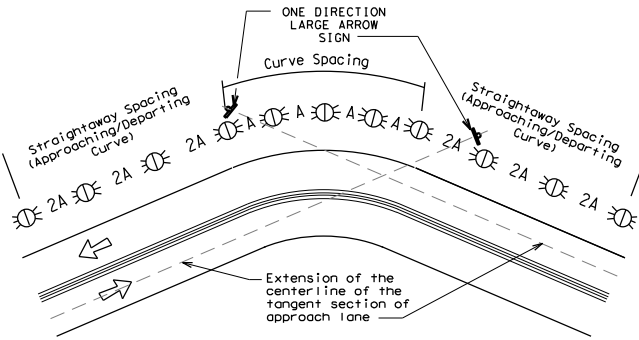
DELINEATOR & OBJECT MARKER INSTALLATION
D & OM(2) - 20

FILE: ddm2-20.dgn	DN: TXDOT	CR: TXDOT	DN: TXDOT	CR: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 1-20	FTW	WISE, ETC.	37	

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

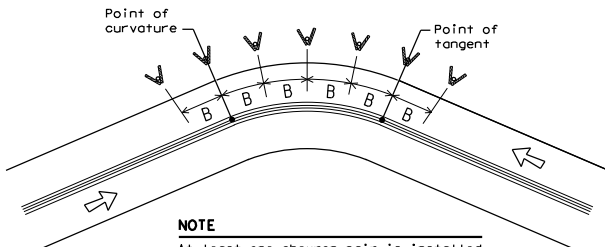
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightway	
			A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightway	
		A	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy./Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE#	dam3-20.dgn	DATE	TXDOT	REV	BY	CHK	TXDOT	DATE	TXDOT	DATE	TXDOT
© TXDOT	August 2004	CONT	SECT	JOB	HIGHWAY						
REVISIONS		6434	66	001	US 380, ETC						
3-15 9-15		DIST		COUNTY	SHEET NO.						
8-15 7-20		FTW		WISE, ETC.	37						

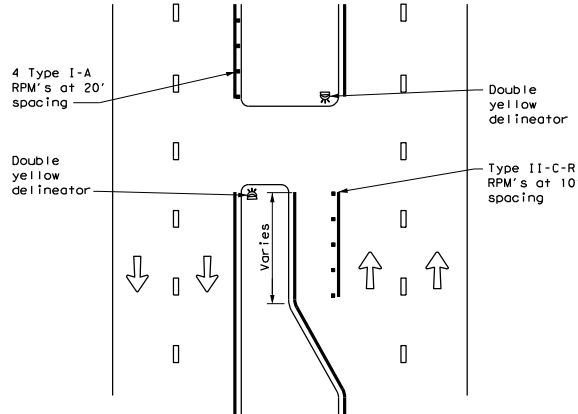
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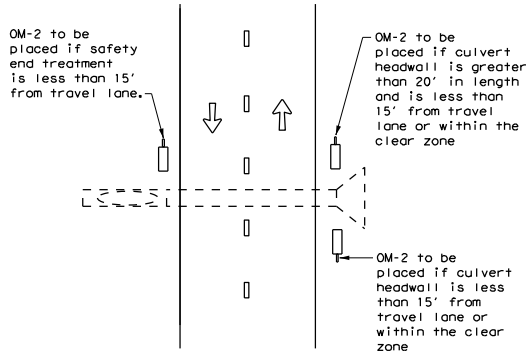
DATE: FILE:

CROSSOVERS



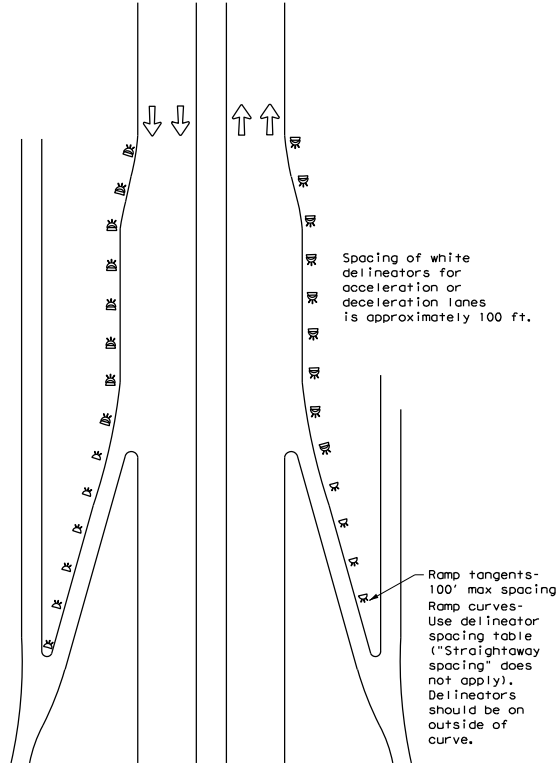
DETAIL 1

FOR CULVERTS WITHOUT MBGF



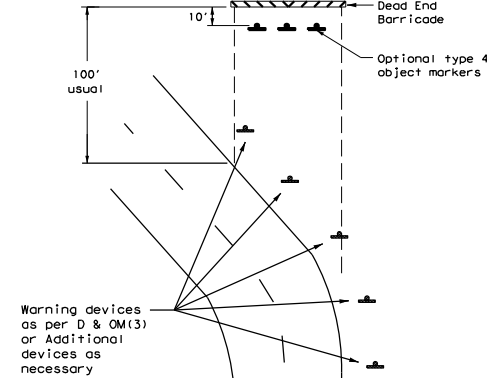
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



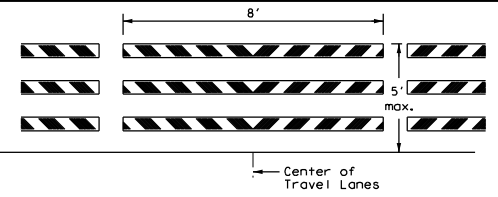
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator



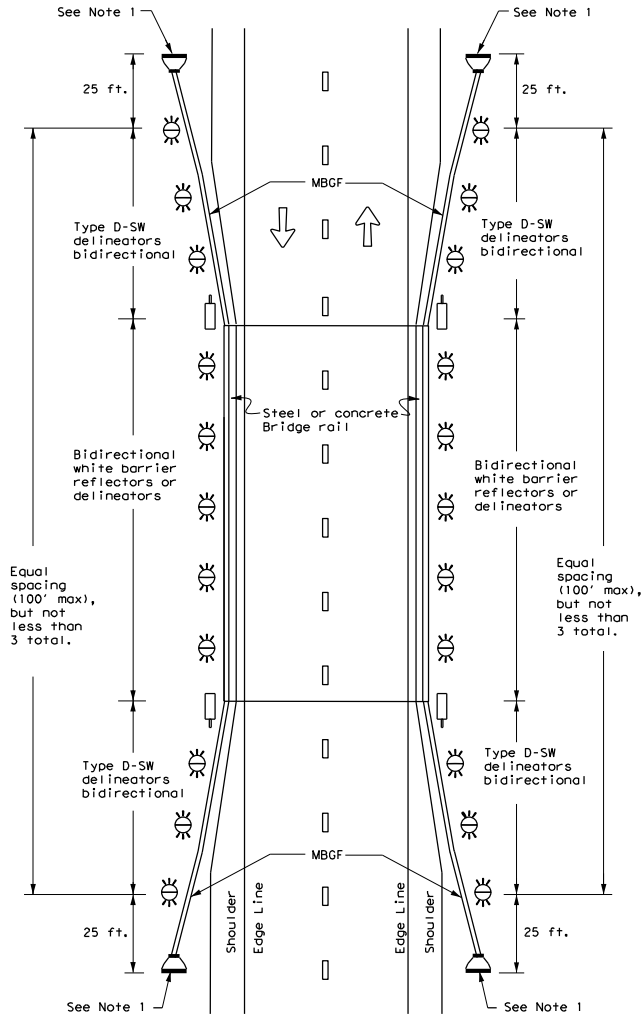
Texas
Safety
Division
Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4) - 20

FILE: ddm4-20.dgn	DN: TXDOT	CR: TXDOT	DR: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
3-15 REVISIONS	6434	66	001	US 380, ETC
7-20	DIST	COUNTY	SHEET NO.	
	FTW	WISE, ETC.		39

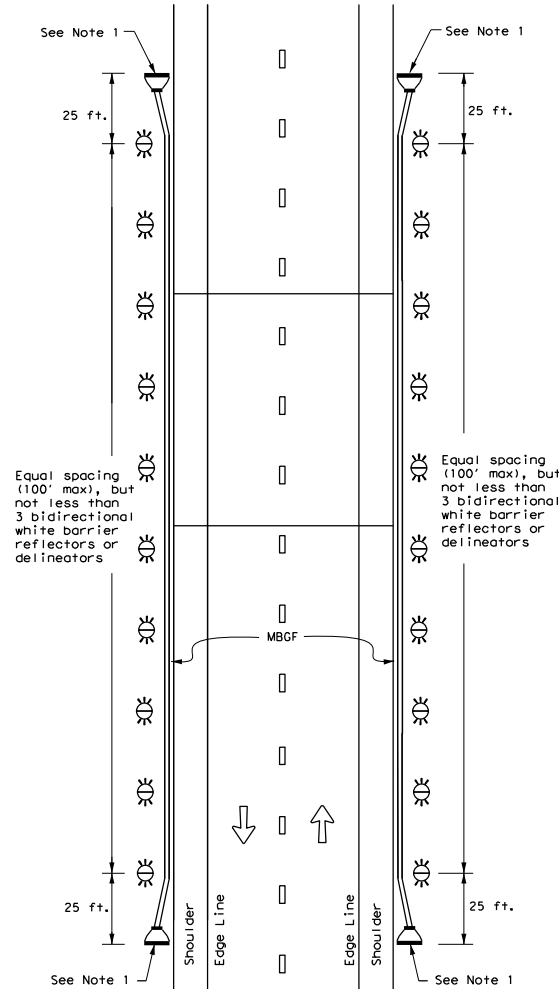
**TWO-WAY, TWO LANE ROADWAY
WITH REDUCED WIDTH APPROACH RAIL**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

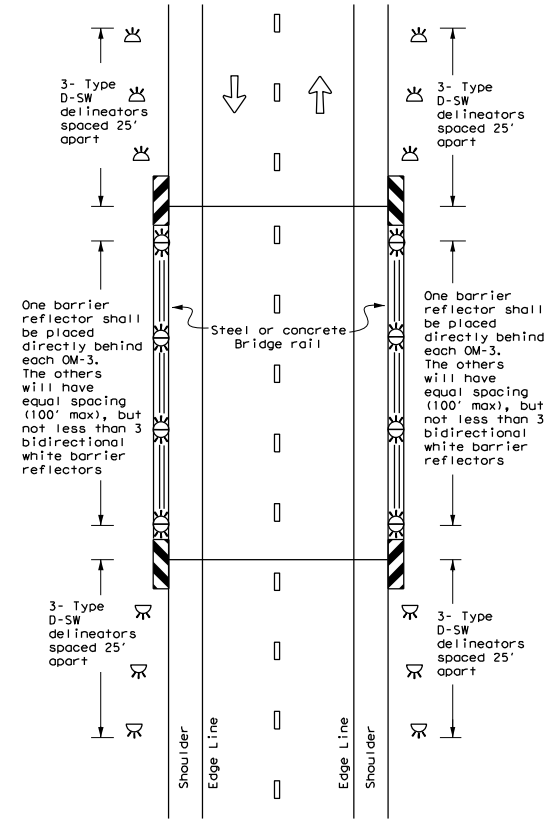
**TWO-WAY, TWO LANE ROADWAY
WITH METAL BEAM GUARD FENCE (MBGF)**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY
BRIDGE WITH NO APPROACH RAIL**



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation
Traffic Safety Division Standard

**DELINEATOR &
OBJECT MARKER
PLACEMENT DETAILS**

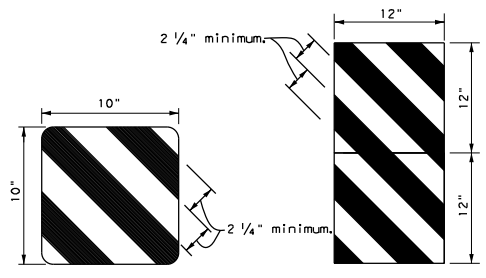
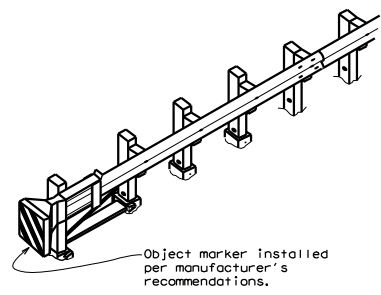
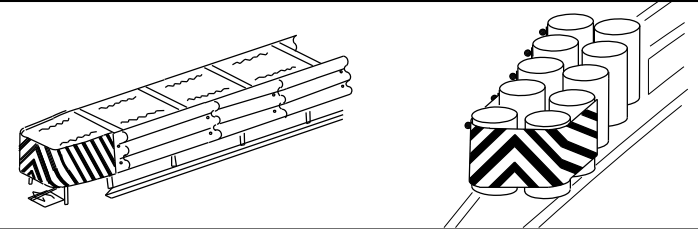
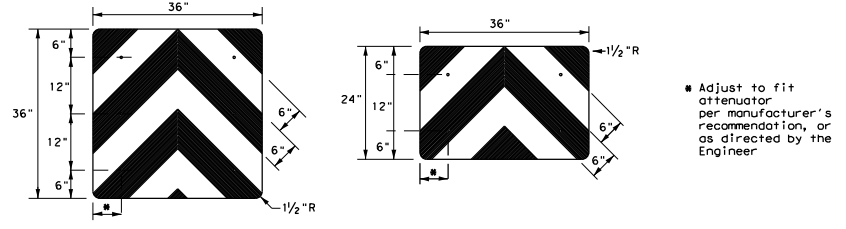
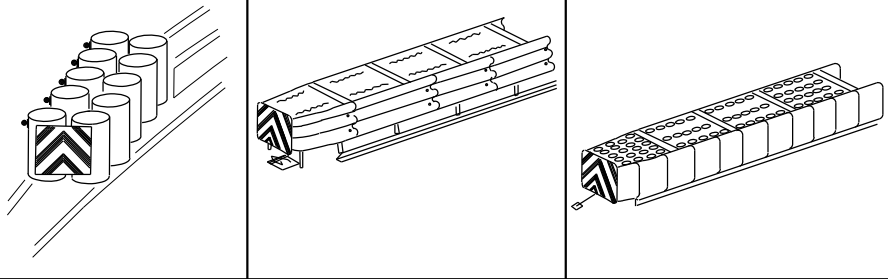
D & OM(5)-20

FILE: dam-20.dgn	ON: TxDOT	CHK: TxDOT	APP: TxDOT	CHK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
7-20	6434	66	001	US 380, ETC
REVISIONS	DIST	COUNTY	SHEET NO.	
	FTW	WISE, ETC.	40	

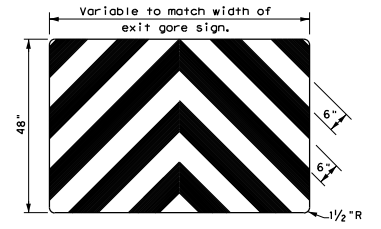
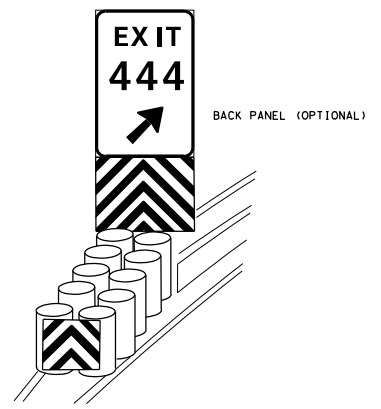
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DATE:
FILE:

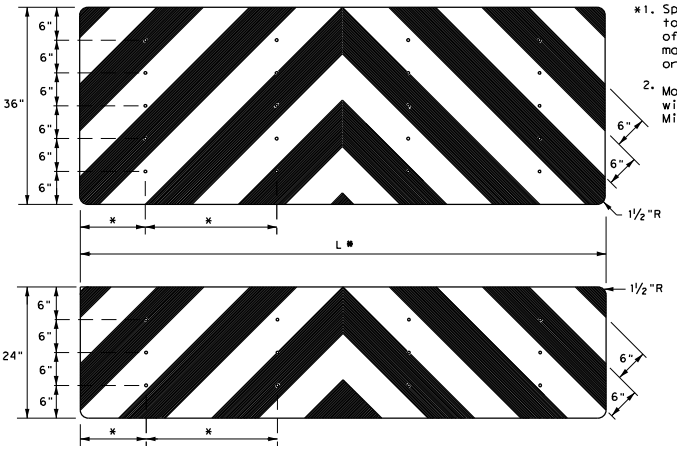
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OBJECT MARKERS SMALLER THAN 3 FT²



NOTES



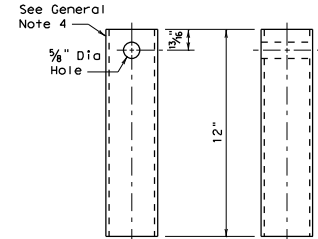
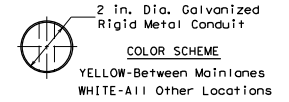
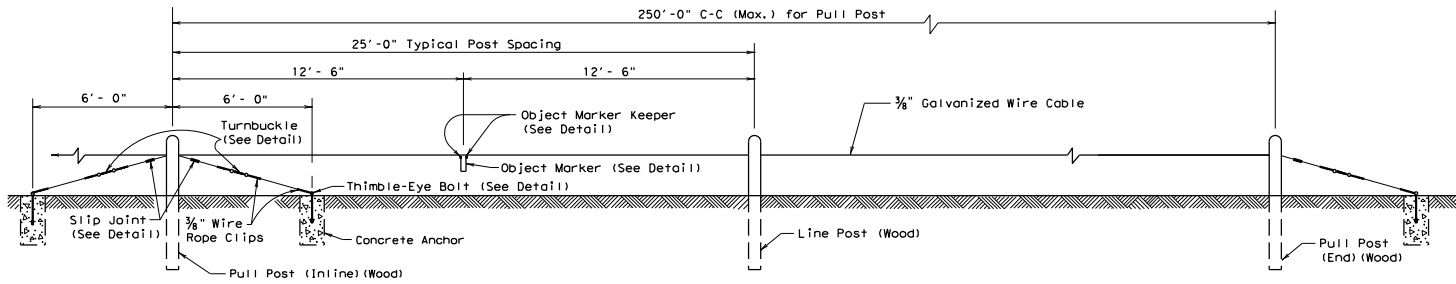
- *1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
- 2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
5. Object Marker at nose of attenuator is subsidiary to the attenuator.
6. See D & OM (1-4) for required barrier reflectors.

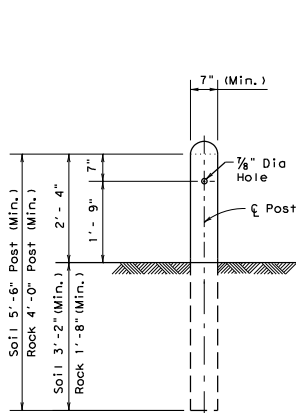
		Traffic Safety Division Standard	
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS D & OM(VIA)-20			
FILE: ddmvia20.dgn	DN: TXDOT	CR: TXDOT	OR: TXDOT
© TXDOT December 1989	CONT SECT	JOB	HIGHWAY
4-92 8-04 REVISIONS	6434 66	001	US 380, ETC
8-95 3-15	DIST	COUNTY	SHEET NO.
4-98 7-20	FTW	WISE, ETC.	42
206			

DATE: FILE:

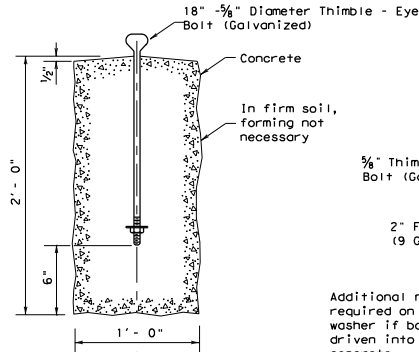


OBJECT MARKER (Reflector Detail)

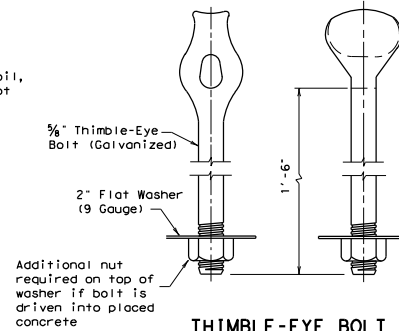
WOOD POST & CABLE UNIT



WOOD POST DETAIL

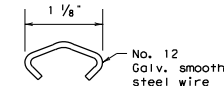


CONCRETE ANCHOR DETAILS



THIMBLE-EYE BOLT DETAILS

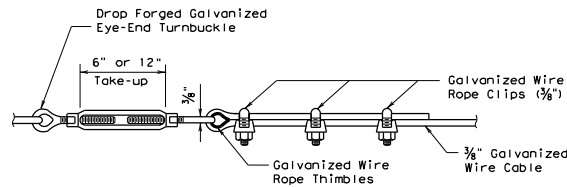
Clamp keepers on both sides of Reflector as shown above.



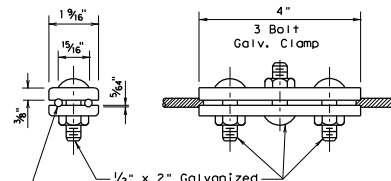
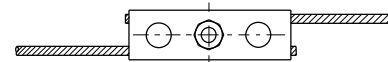
OBJECT MARKER KEEPER DETAIL

GENERAL NOTES

1. Furnish Class "B" or better concrete in accordance with Item 421, "Hydraulic Cement Concrete". Cure concrete anchors at least five (5) days before attaching the cable.
2. Furnish galvanized cable fittings in accordance with the Item 445, Galvanizing.
3. Furnish posts meeting the requirements of DMS 7200, "Timber Posts and Blocks for Metal Beam Guard Fence." Do not use painted timber posts.
4. Cover the entire surface of object marker (reflector) with a reflectorized sheeting material conforming to Departmental Material Specification DMS 8300, "Sign Face Materials", Type C.
5. Furnish cable conforming to ASTM designation A475.



WIRE CABLE CONNECTION (at turnbuckles & eyebolts) DETAIL



SLIP JOINT DETAIL



POST & CABLE FENCE

PCF-05

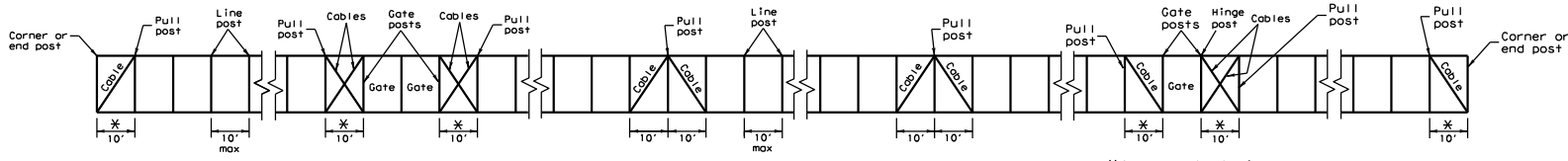
FILE#	pcf05.dgn	DN#	CK#	DM#	LJB	CK#	JG	NEG#
©	TxDOT FEB, 2005	DIST	FED REC	FEDERAL AID PROJECT				SHEET
REVISIONS		FTW						43
2/02	Rev. Design Div., PCF-99	COUNTY	CONTROL	SECT	JOB	HIGHWAY		
		WISE, KTC	6434	66	001	US 385 ETC		

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LEVELS DISPLAYED

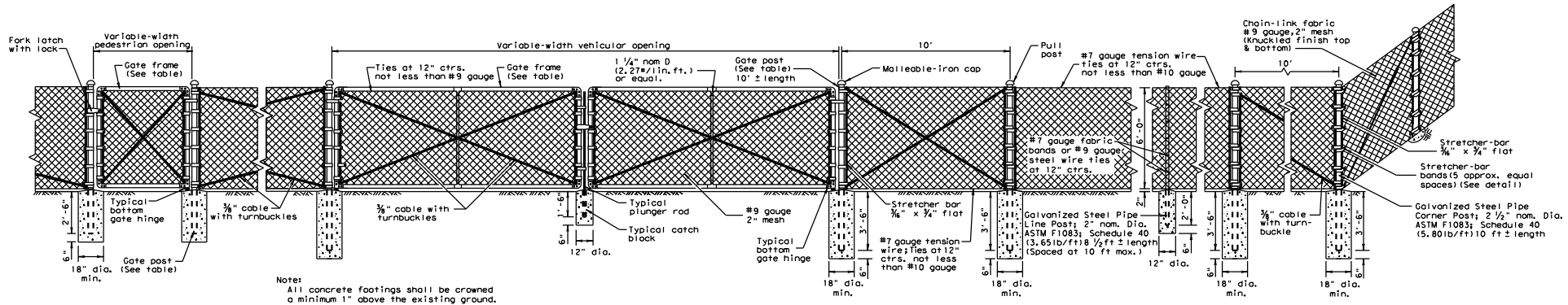
11	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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TYPICAL CABLE AND POST ARRANGEMENT

* Slack span for fabric



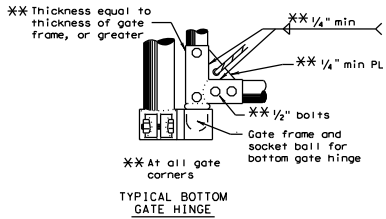
Note:
All concrete footings shall be crowned a minimum 1" above the existing ground.

CHAIN-LINK BARRIER FENCE (6 FT.)

Foundation designs shown are "minimums" for a 6 ft. fence. Taller fences may require larger foundation designs.

GENERAL NOTES

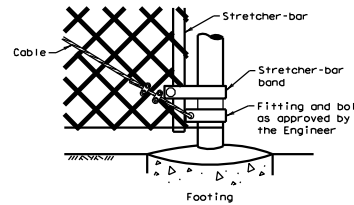
1. Items herein shall conform to Item 550, "Chain Link Fence."
2. Typical installation plan may vary as shown elsewhere on the plans or as directed by the Engineer. Location of gates shown elsewhere on plans.
3. Gate-frame members shall be bolted, at frame corners, to joint fittings with four 1/2" bolts per joint.
4. All cable connections are to be made with two 3/8" cable clamps.
5. All pull posts and end posts and their foundations shall have the same respective dimensions as those shown for corner post.
6. All pull post shall be furnished with two stretcher bars.
7. One end of each turnbuckle may be attached directly to fittings with a clevis.
8. Concrete footings are to be crowned at the top to shed water.



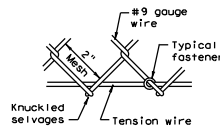
TYPICAL BOTTOM GATE HINGE



TYPICAL STRETCHER-BAR BAND



TERMINAL POST DETAIL



FABRIC & TENSION WIRE DETAIL, TOP & BOTTOM

"OPTIONAL" 3 WIRE 45° BARBED WIRE ARM

Barbed wire arm related items shall conform to Item 550, "Chain Link Fence."

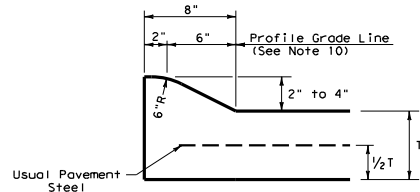
GATE (TYPES AND SIZES)	
Single Inclusive	Double Inclusive
Up to 6'	Up to 12'
Over 6' to 12'	Over 12' to 26'
Over 12' to 18'	Over 26' to 36'
Over 18'	Over 36'

GATE FRAME (WEIGHT)		GATE POST (WEIGHT)	
SIZE	WT./LIN. FT.	SIZE	WT./LIN. FT.
1 1/2" nom dia.	2.72 Lbs. or equal	2 1/2" nom dia.	5.79 Lbs. or equal
		3 1/2" nom dia.	9.11 Lbs. or equal
		6" nom dia.	18.97 Lbs.
		8" nom dia.	24.70 Lbs.

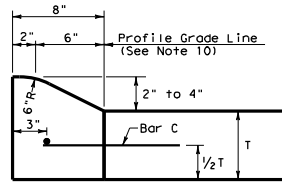
		Design Division Standard		
<h2>CHAIN LINK FENCE</h2> <h3>CLF-10</h3>				
FILE: c1f10.dgn	DN: TXDOT	CR: AM	DN: BD	CR: VP
© TXDOT 1996	CONT SECT	JOB	HIGHWAY	
REVISIONS	643466	001	US 380, ETC	
DIST	COUNTY	SHEET NO.		
FTW	WISE, ETC.	44		

DATE: FILE:

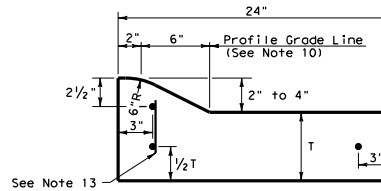
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



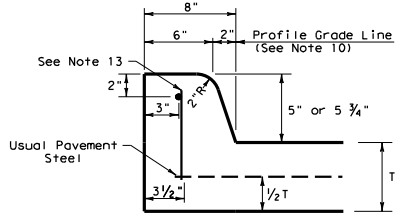
**TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT**



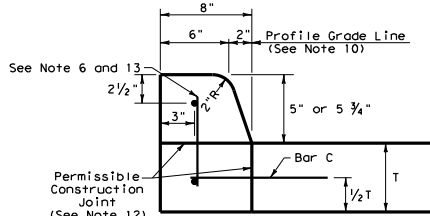
**TYPE I CURB
2" - 4" HEIGHT**



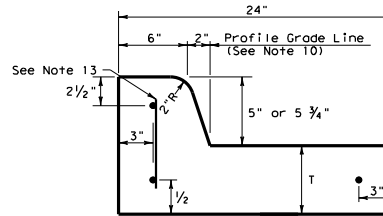
**TYPE I CURB AND GUTTER
2" - 4" HEIGHT**



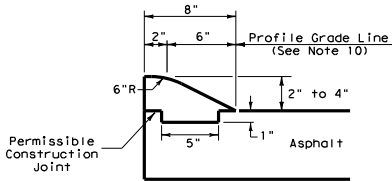
**TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT**



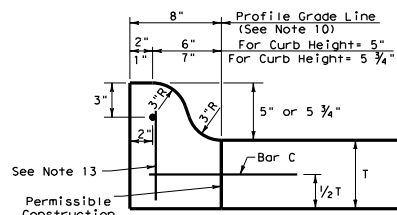
**TYPE II CURB
5" - 5 3/4" HEIGHT**



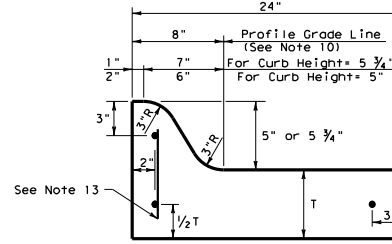
**TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT**



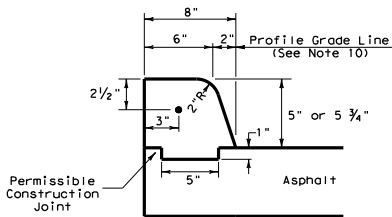
**TYPE III CURB (KEYED)
2" - 4" HEIGHT**



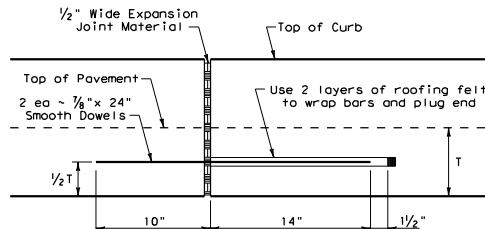
**TYPE IIa CURB
5" - 5 3/4" HEIGHT**



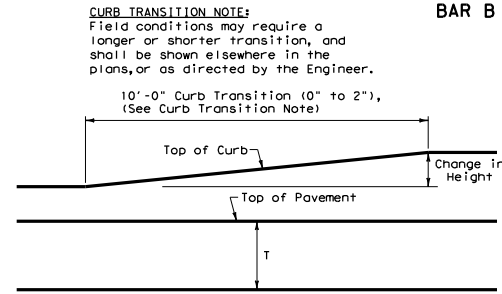
**TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT**



**TYPE IV CURB (KEYED)
5" - 5 3/4" HEIGHT**



EXPANSION JOINT DETAIL

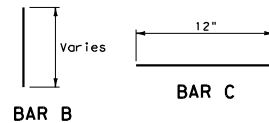


CURB TRANSITION

Note: To be paid for as Highest Curb

GENERAL NOTES

- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

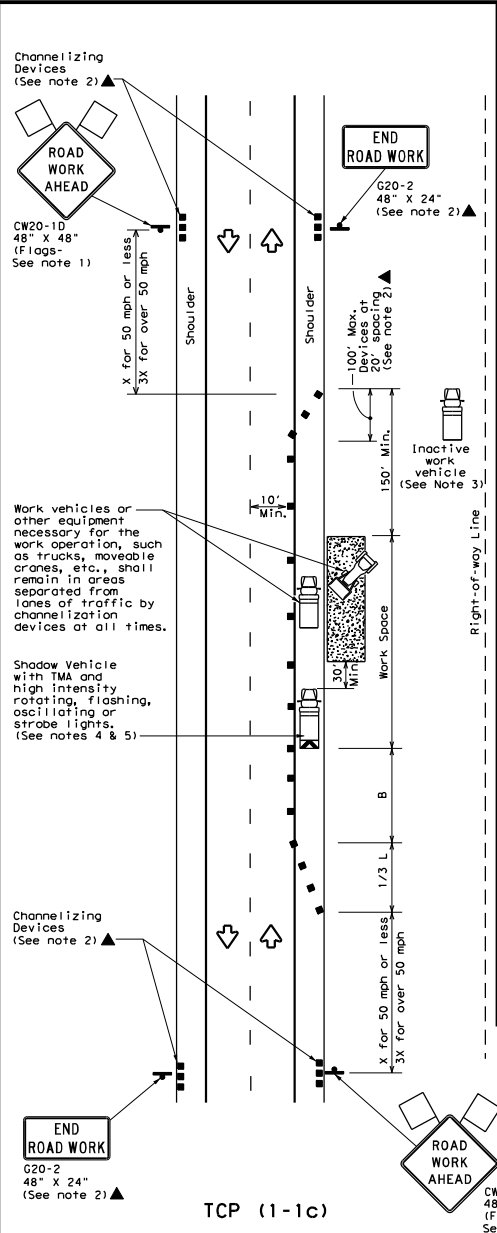
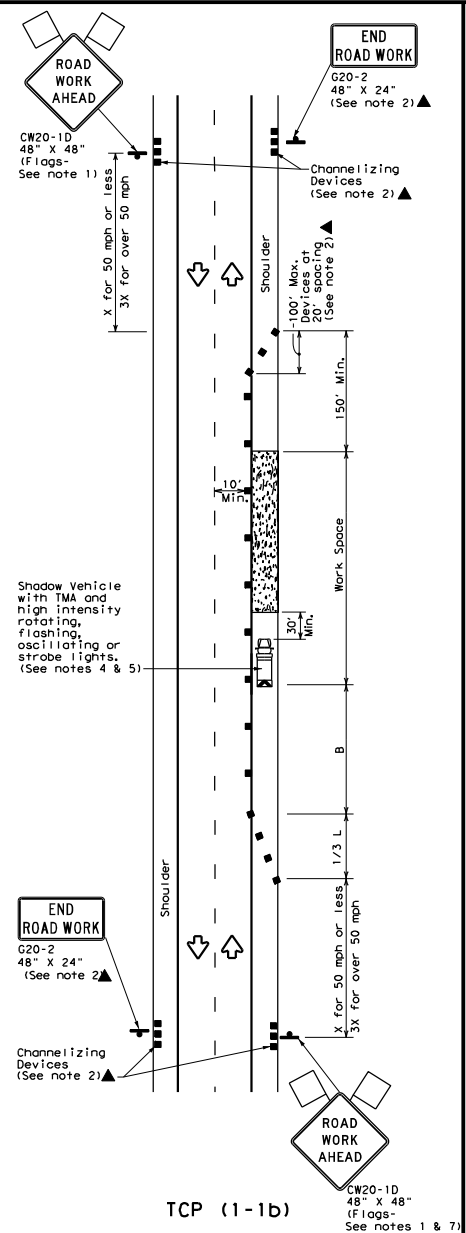
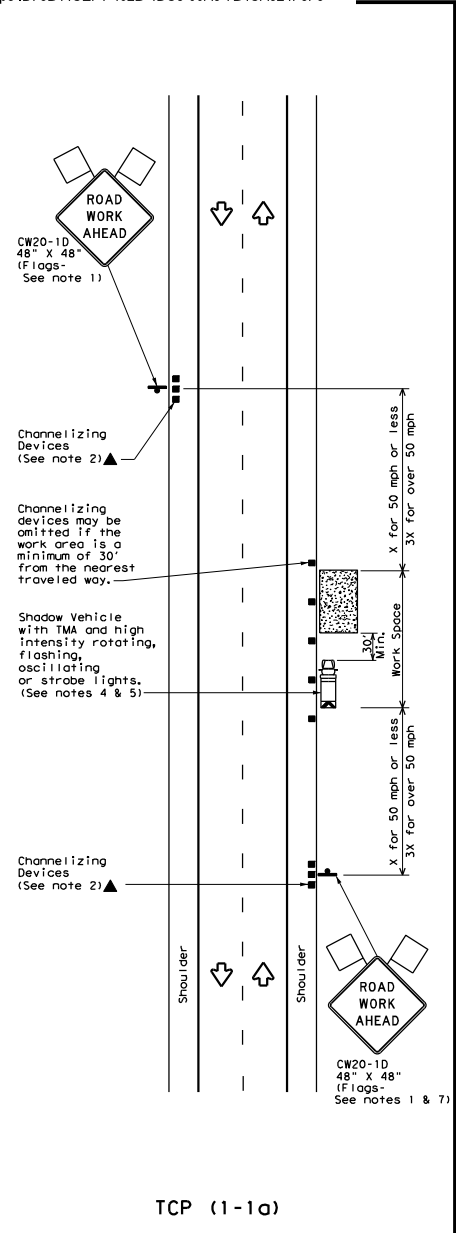
10'-0" Curb Transition (0" to 2"),
(See Curb Transition Note)

Texas Department of Transportation Design Division Standard			
CONCRETE CURB AND CURB AND GUTTER			
CCCC-22			
FILE: cccg21.dgn	DN: TXDOT	CR: AN	DR: CS
© TXDOT: JUNE 2022	CONT SECT	JOB	HIGHWAY
REVISIONS	6434	66	001
	DIST	COUNTY	US 380, ETC
	FTW	WISE, ETC.	SHEET NO. 45

DATE: FILE:

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DATE: FILE:



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 ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
 ** Taper Lengths have been rounded off.
 L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

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

- GENERAL NOTES**
- 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.
 - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
 - 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 wider work spaces.
 - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
 - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation
 Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

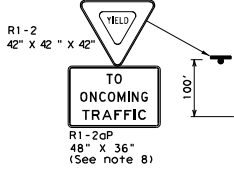
TCP (1-1) - 18

FILE: tcp1-1-18.dgn	DATE: December 1985	CONT: 6434	SECT: 66	JOB: 001	HIGHWAY: US 380, ETC
REVISONS		DATE	BY	COUNTY	SHEET NO.
2-94	4-98	8-95	2-12	FTW	WISE, ETC.
1-97	2-18				46

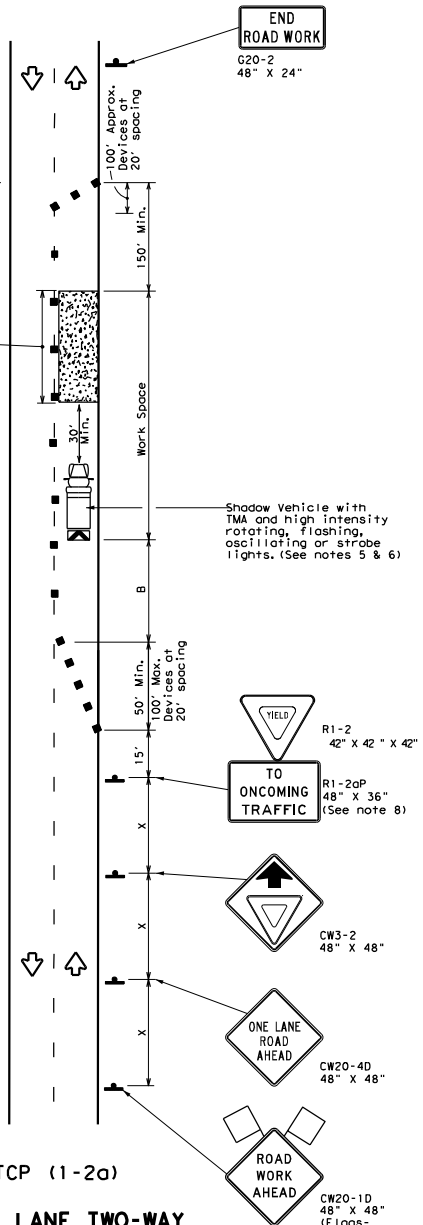
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DATE: FILE:

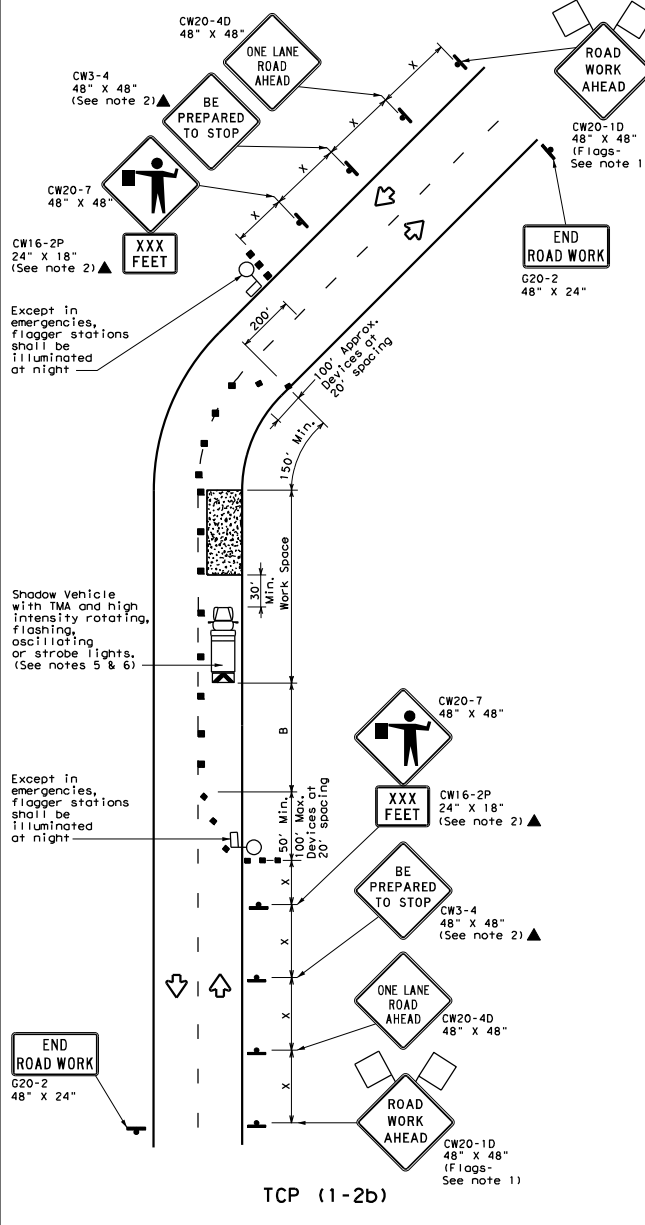
Warning Sign Sequence in Opposite Direction Same as Below



Channelizing devices separate work space from traveled way



TCP (1-2a)
ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See note 7)



TCP (1-2b)
ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths * X			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space "B"	Stopping 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		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		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
** Taper lengths have been rounded off.
L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

TYPICAL USAGE			
MOBILE 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 CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
- Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
- 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 wider work spaces.

TCP (1-2a)

- R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
- R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

- 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.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
- Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
- Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Traffic Operations Division Standard

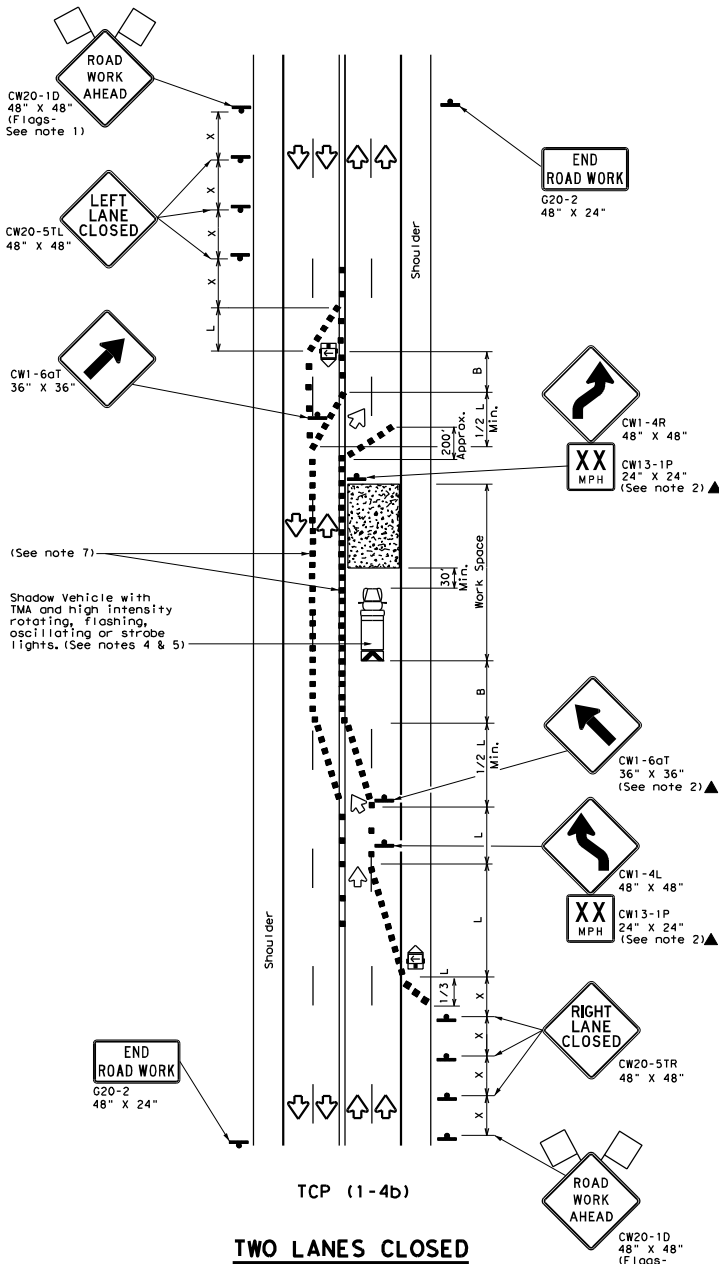
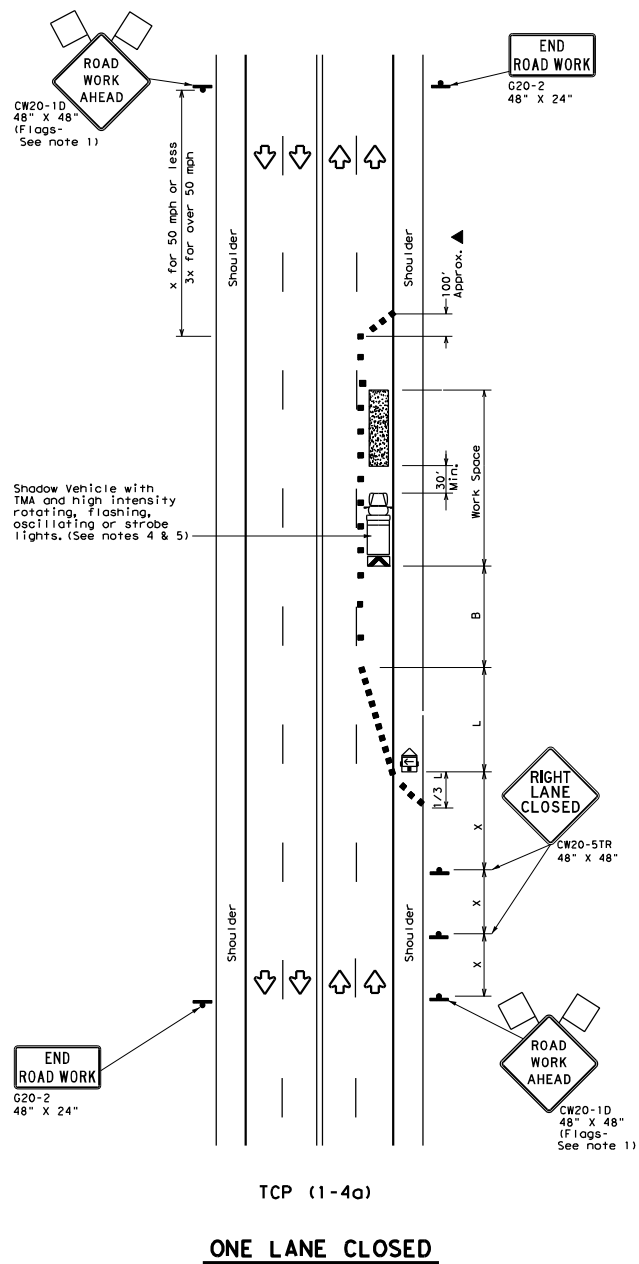
TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP (1-2)-18

FILE: tcp1-2-18.dgn	DATE: 12/18/95	CONTRACT NO: 643466	SECTION: 001	JOB: US 380, ETC
REVISED: 4-90	REVISED: 2-94	DIST: FTW	COUNTY: WISE, ETC.	SHEET NO: 47

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DATE: FILE:



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 = WS ² 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	700'	770'	840'	70'	140'	800'	475'	
75	750'	825'	900'	75'	150'	900'	540'	

* Conventional Roads Only
 ** Taper lengths have been rounded off.
 L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

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

- GENERAL NOTES**
- 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 CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
 - 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 wider work spaces.
- TCP (1-4a)**
- 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 where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.
- TCP (1-4b)**
- Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
 LANE CLOSURES ON MULTILANE
 CONVENTIONAL ROADS

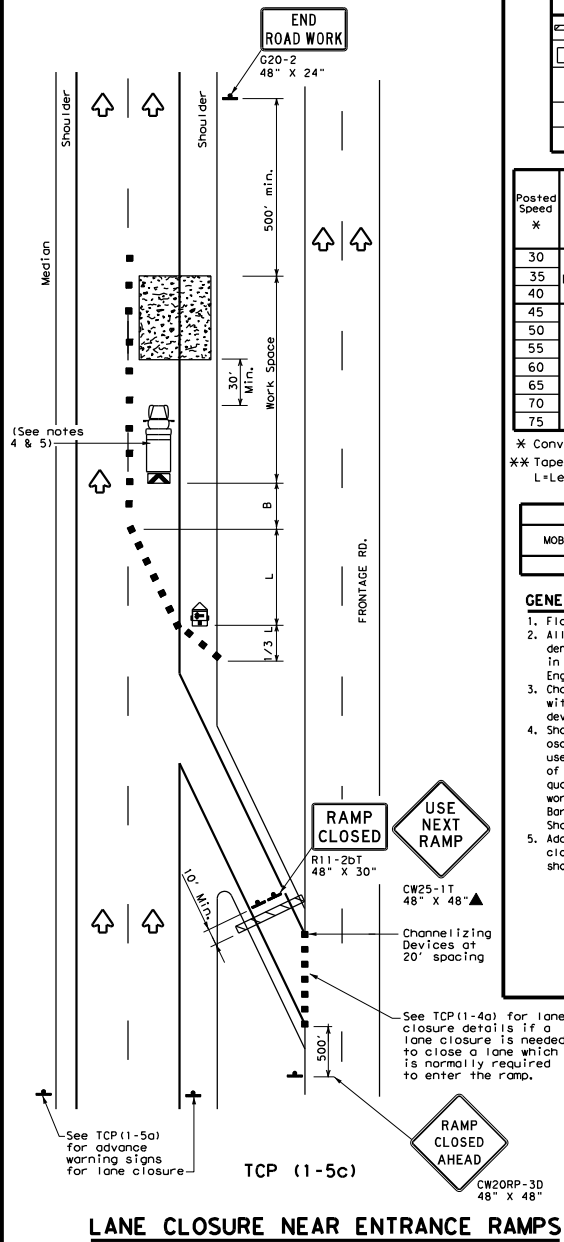
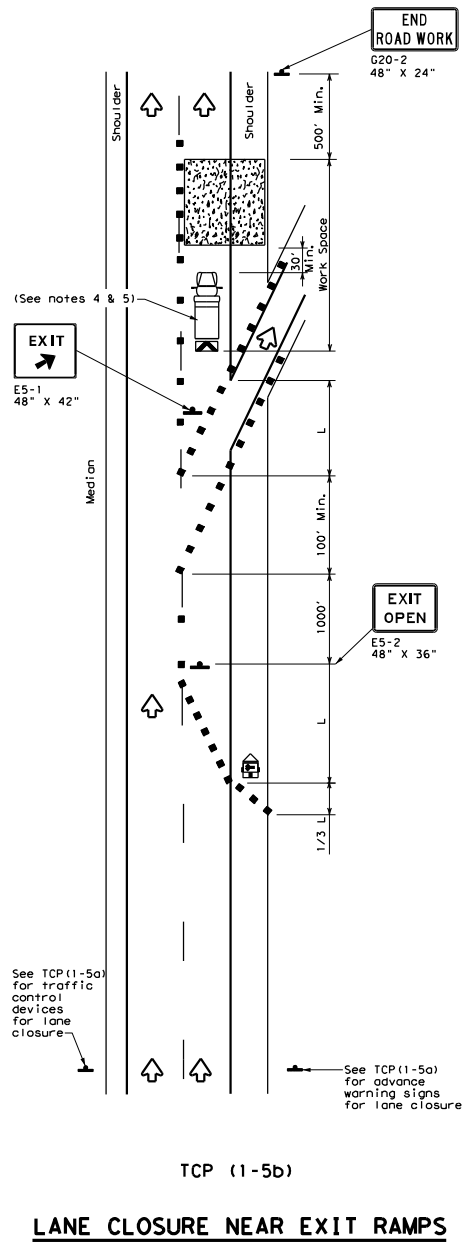
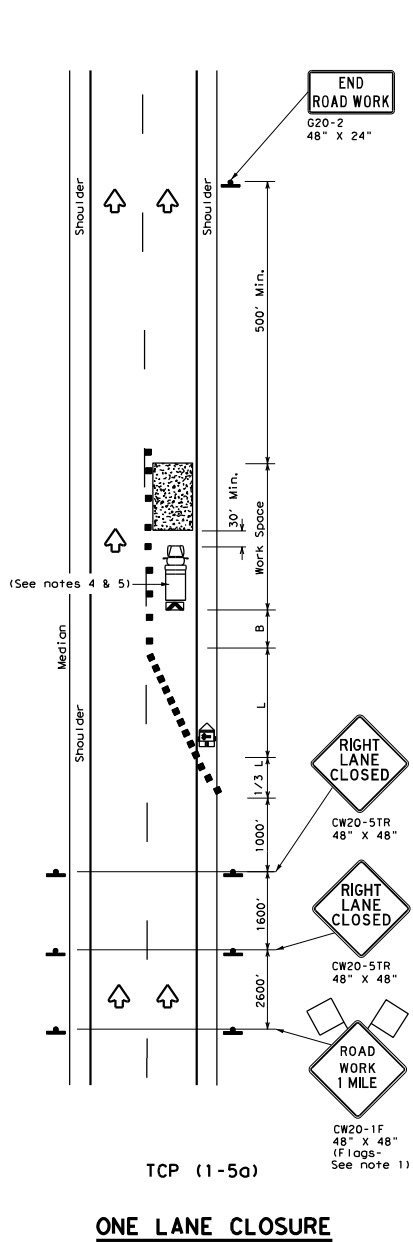
TCP (1-4) - 18

FILE: tcp1-4-18.dgn	DATE: 12/18/95	BY: G66	CHK: 001	JOB: US 380, ETC	HSYWAY
© TxDOT December 1985		REV: 6434	SECT: 66	COUNTY: WISE, ETC.	SHEET NO. 49
2-94	4-95	REVISIONS			
8-95	2-12	DIST			
1-97	2-18	FTW			

TSD

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DATE: FILE:



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"
		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		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

* Conventional Roads Only
 ** Taper lengths have been rounded off.
 L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

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

- GENERAL NOTES**
- 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.
 - 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.

Texas Department of Transportation
 Traffic Operations Division Standard

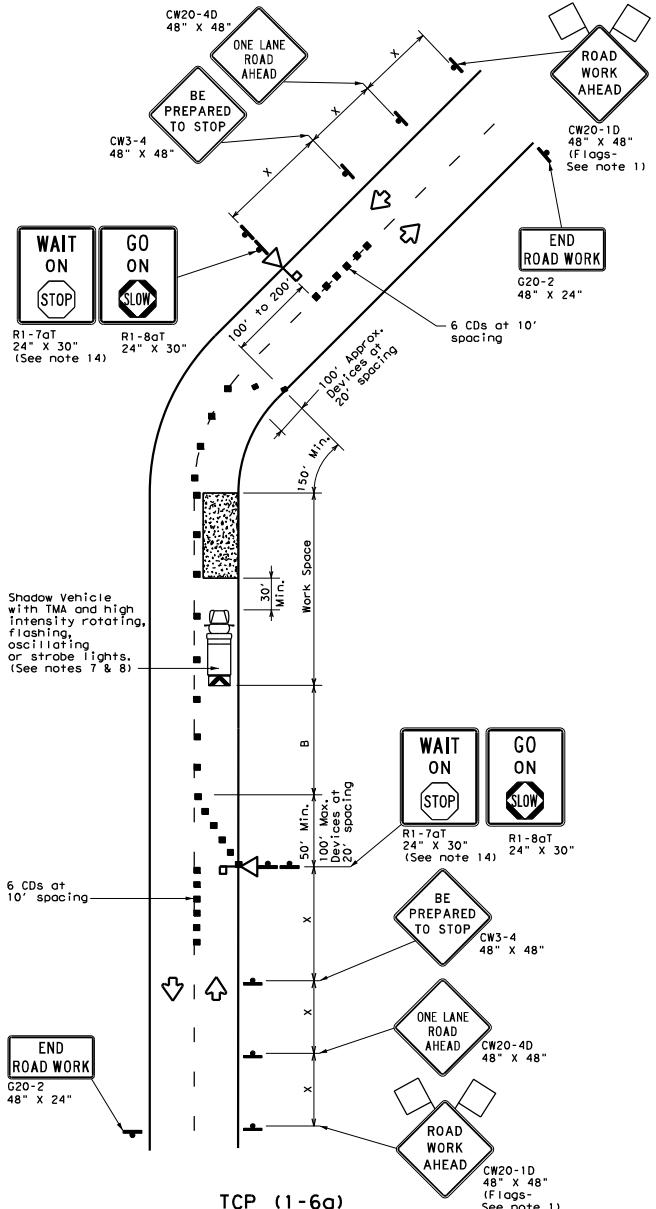
TRAFFIC CONTROL PLAN
LANE CLOSURES FOR
DIVIDED HIGHWAYS
TCP (1-5)-18

FILE: tcp1-5-18.dgn	DN:	CR:	DR:	CR:
© TxDOT February 2012	CONT SECT:	JOB:	HIGHWAY:	
2-18 REVISIONS	643466	001	US 380, ETC	
	DIST:	COUNTY:	SHEET NO.:	
	FTW	WISE, ETC.	50	

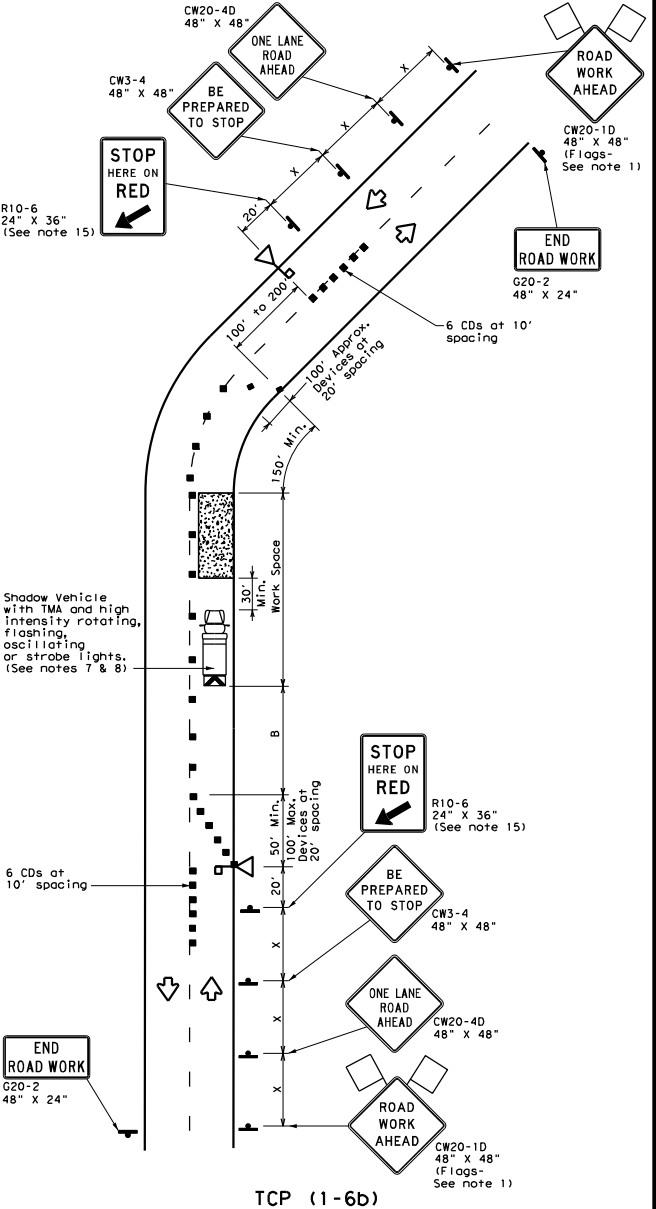
[155]

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DATE: FILE:



TCP (1-6a)
ONE LANE TWO-WAY CONTROL WITH STOP/SLOW AFADs



TCP (1-6b)
ONE LANE TWO-WAY CONTROL WITH RED/YELLOW LENS AFADs

LEGEND	
	Type 3 Barricade
	Heavy Work Vehicle
	Automated Flagger Assistance Device (AFAD)
	Sign
	Flag
	Channelizing Devices (CDs)
	Truck Mounted Attenuator (TMA)
	Portable Changeable Message Sign (PCMS)
	Traffic Flow
	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	$L = \frac{W \cdot S^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45		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		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
 ** Taper lengths have been rounded off.
 L=Length of Taper (FT) W=Width of Offset (FT) S=Posted Speed (MPH)

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

GENERAL NOTES

- Flags attached to signs where shown are REQUIRED.
- AFADs shall only be used in situations where there is one lane of approaching traffic in the direction to be controlled.
- Adequate stopping sight distance must be provided to each AFAD location for approaching traffic. (See table above).
- Each AFAD shall be operated by a qualified/certified flagger. Flaggers operating AFADs shall not leave them unattended while they are in use.
- One flagger may operate two AFADs only when the flagger has an unobstructed view of both AFADs and of the approaching traffic in both directions.
- When pilot cars are used, a flagger controlling traffic shall be located on each approach. AFADs shall not be operated by the pilot car operator.
- All AFADs shall be equipped with gate arms with an orange or fluorescent red-orange flag attached to the end of the gate arm. The flag shall be a minimum of 16" square.
- 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 wider work spaces.
- 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.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the AFAD.
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
- The R1-7aT "WAIT ON STOP" sign and the R1-8aT "GO ON SLOW" sign shall be installed at the AFAD location on separate supports or they may be fabricated as one 48" x 30" sign. They shall not obscure the face of the STOP/SLOW AFAD.
- The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the AFAD.

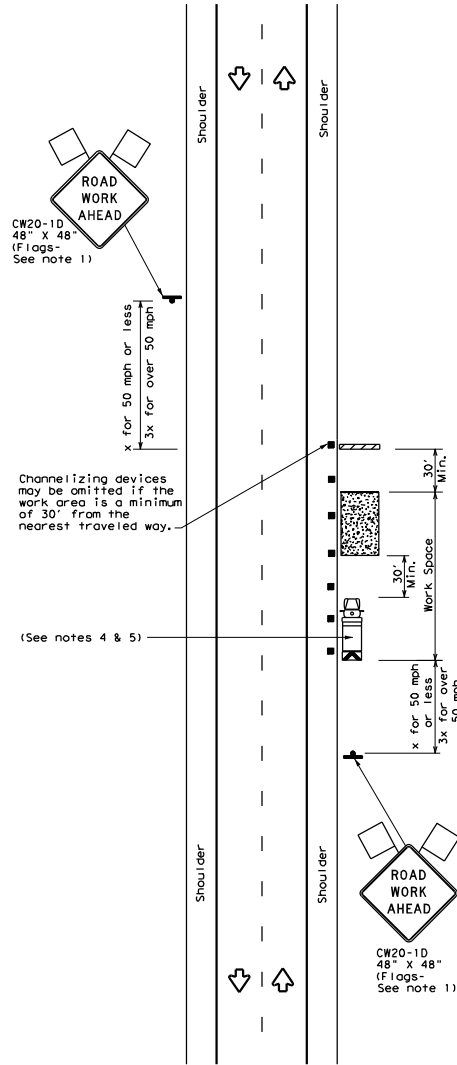
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
 AUTOMATED FLAGGER ASSISTANCE DEVICES (AFADs)
 TCP (1-6)-18

FILE: tcp1-6-18.dgn	DATE: February 2012	CONTRACT: 643466	SECTION: 001	JOB: US 380, ETC
REVISIONS:		DIST: FTW	COUNTY: WISE, ETC.	SHEET NO: 51

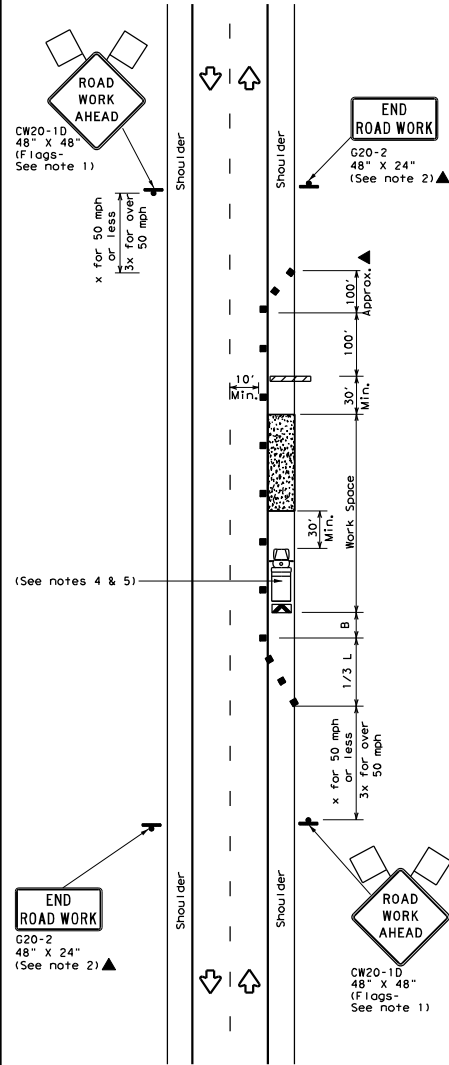
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DATE: FILE:



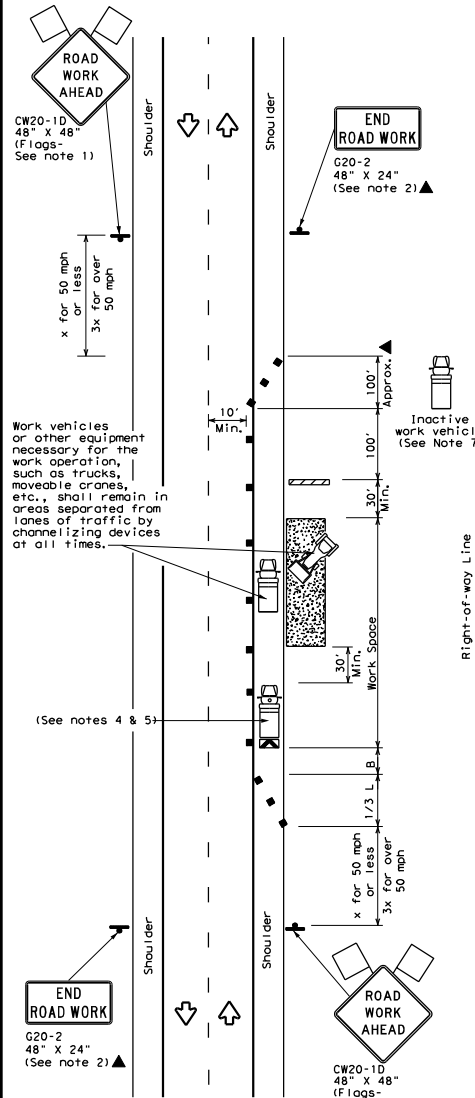
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

Posted Speed * *	Formula	Minimum Desirable Taper Lengths **			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.

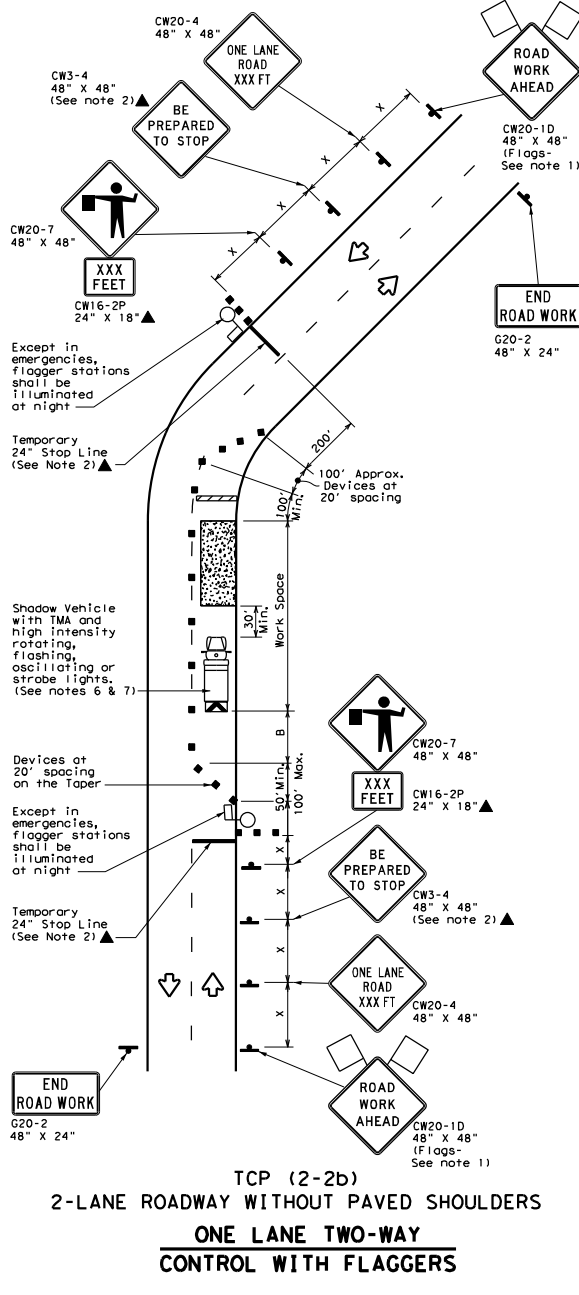
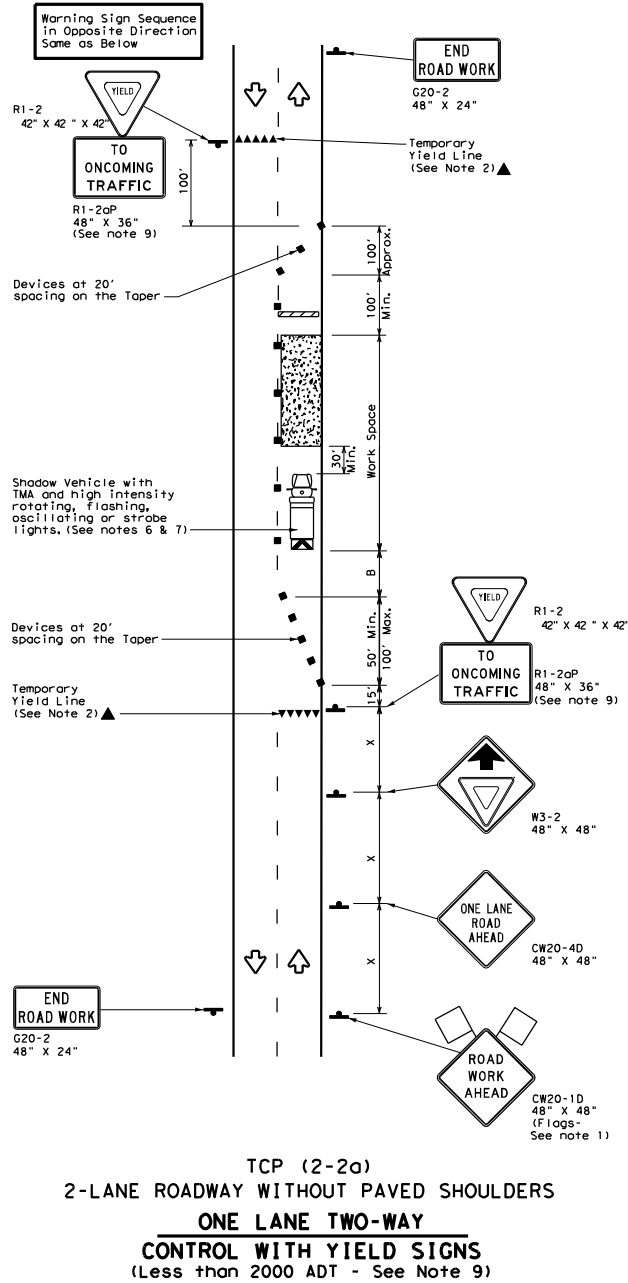
Texas Department of Transportation
Traffic Division Standard

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP (2-1) - 18

FILE#	tcp2-1-18.dgn	DATE	08/11/95	DESIGNED BY	CK1	CHECKED BY	CK1
© TxDOT	December 1985	CONT	SECT	JOB	NO.	HIGHWAY	
2-94	4-98	6434	66	001	US 380, ETC		
8-95	2-12				COUNTY		SHEET NO.
1-97	2-18				FTW	WISE, ETC.	52

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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		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		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* Conventional Roads Only
 ** Taper lengths have been rounded off.
 L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

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

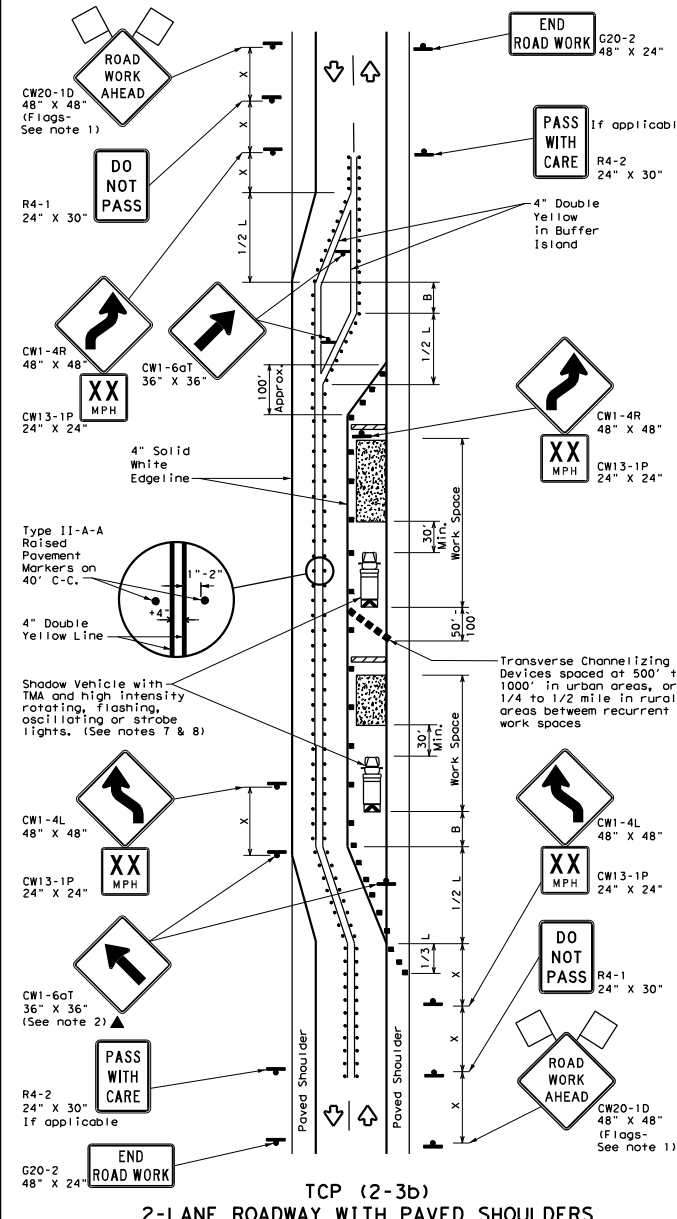
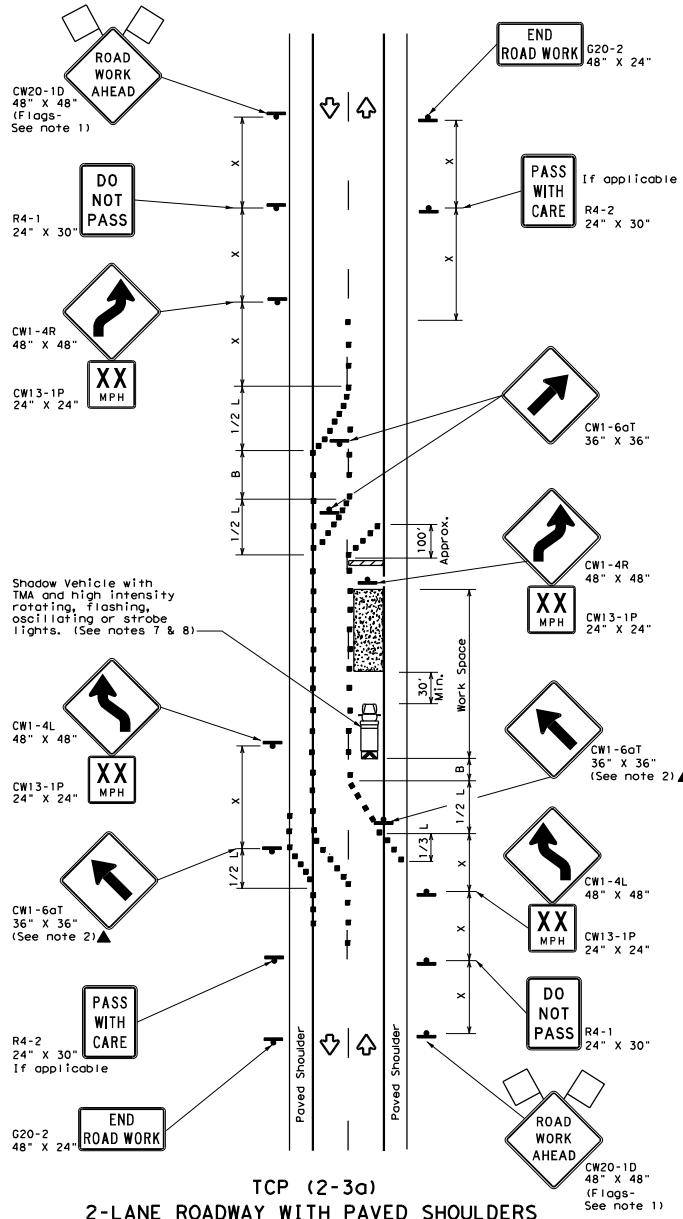
GENERAL NOTES

- 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	01/12/18
REVISIONS	643466	COUNTY	001
8-95 3-03		HIGHWAY	US 380, ETC
1-97 2-12		DIST	
4-98 2-18		FTW	WISE, ETC.
		SHEET NO.	53

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DATE: FILE:



LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers by 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
			✓	✓

- 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.

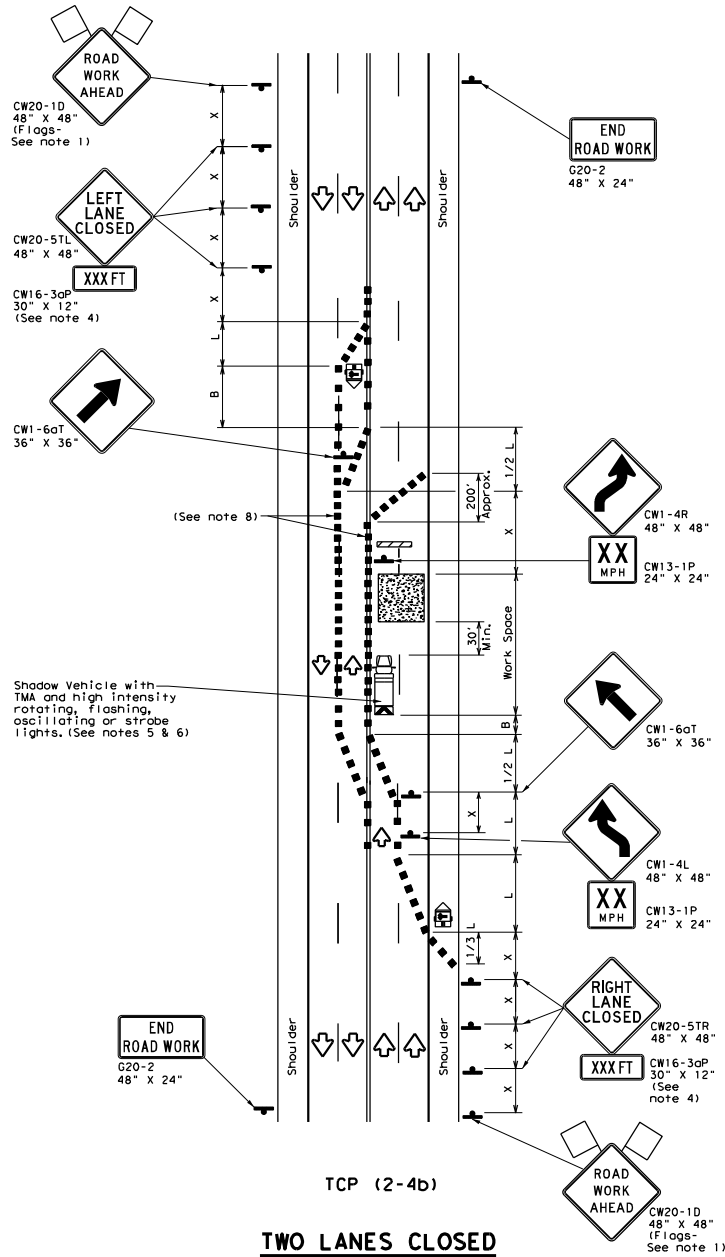
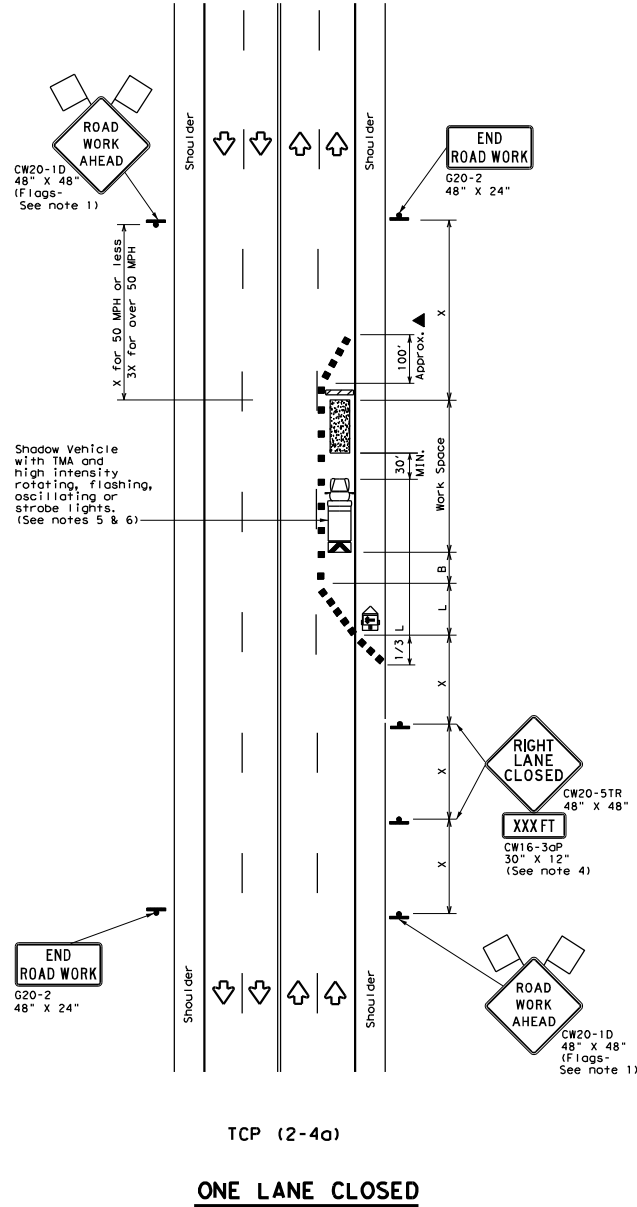
TCP (2-3a)

- 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:	
REVISED:	December 1985	COM:	SECT:
8-95	3-01	6434	66
1-97	2-12		001
4-98	2-18	FTW	WISE, ETC.
		SHEET NO. 54	

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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 * 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
 ** 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
		✓	✓	

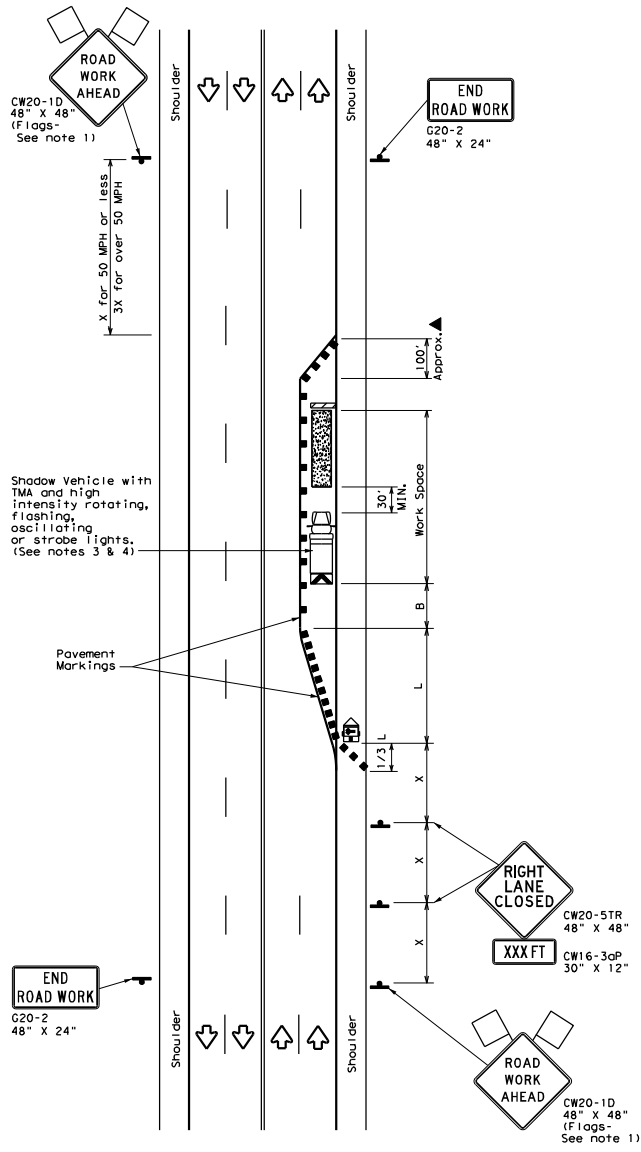
GENERAL NOTES

- 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 CW16-30P 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(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

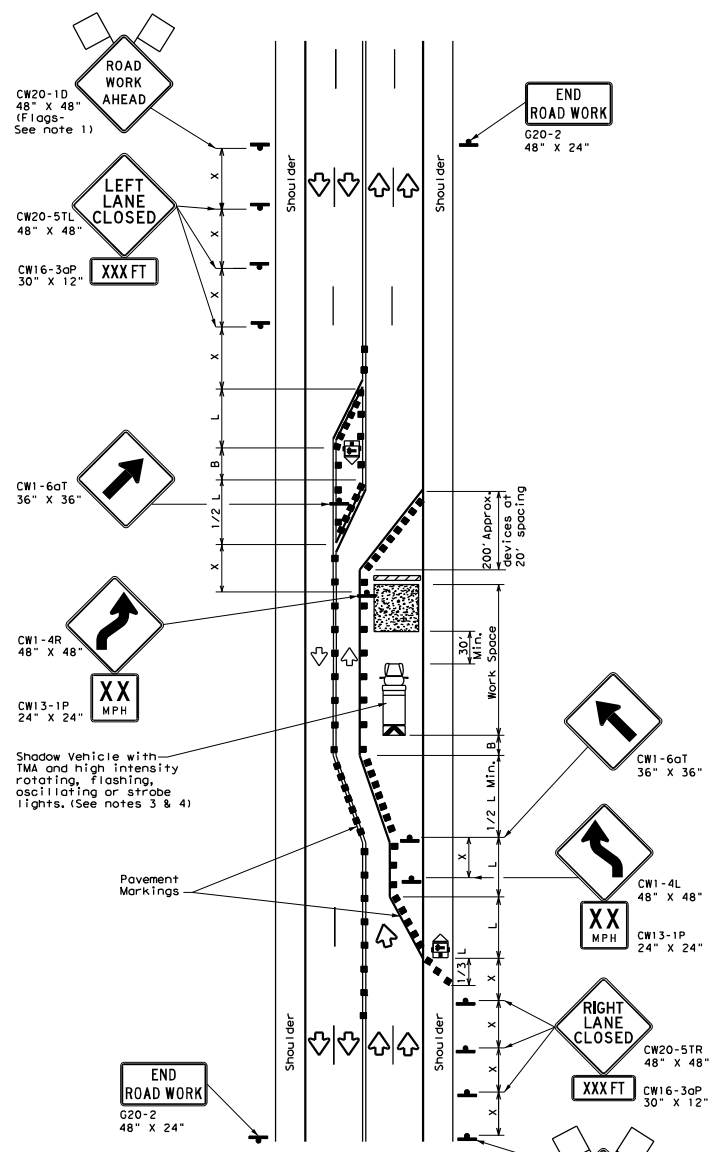
		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS			
TCP (2-4) - 18			
FILE: tcp2-4-18.dgn	DATE: December 1985	CONTRACT NO: 6434	SECTION: 66
REVISIONS		DATE: 8-95	BY: 3-01
		JOB NO: 001	US 380, ETC
		COUNTY: DIST	SHEET NO.
		DATE: 1-97	2-12
		DATE: 4-98	2-18
		FTW	WISE, ETC.
55			

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DATE: FILE:



TCP (2-5a)
ONE LANE CLOSED



TCP (2-5b)
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 x	Formula	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	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'

x 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
			✓	✓

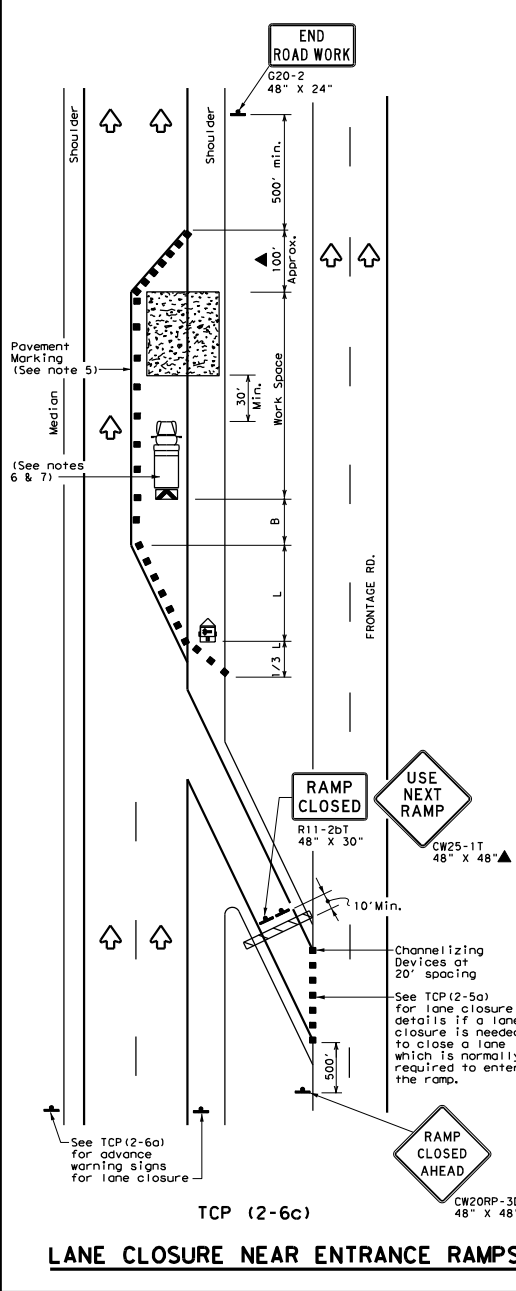
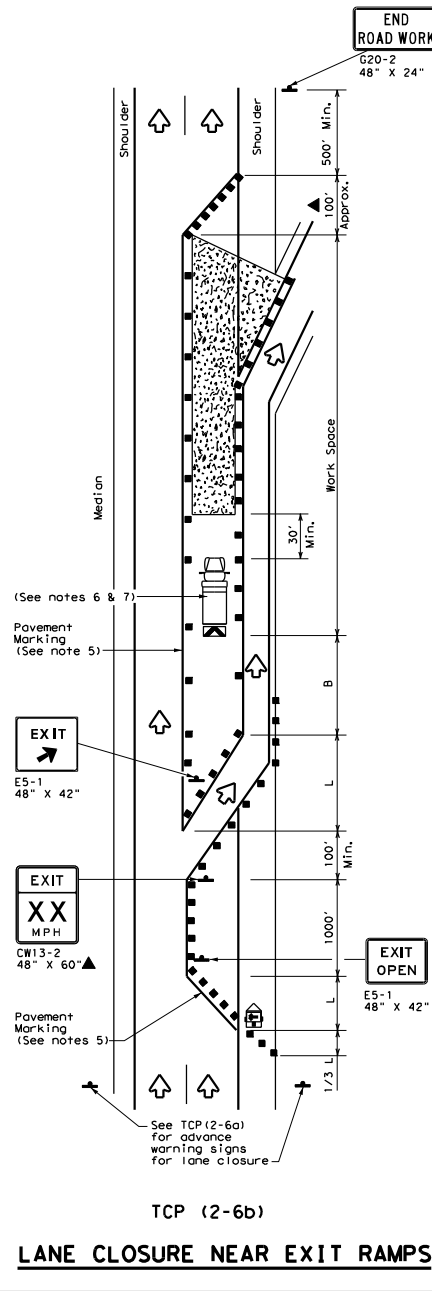
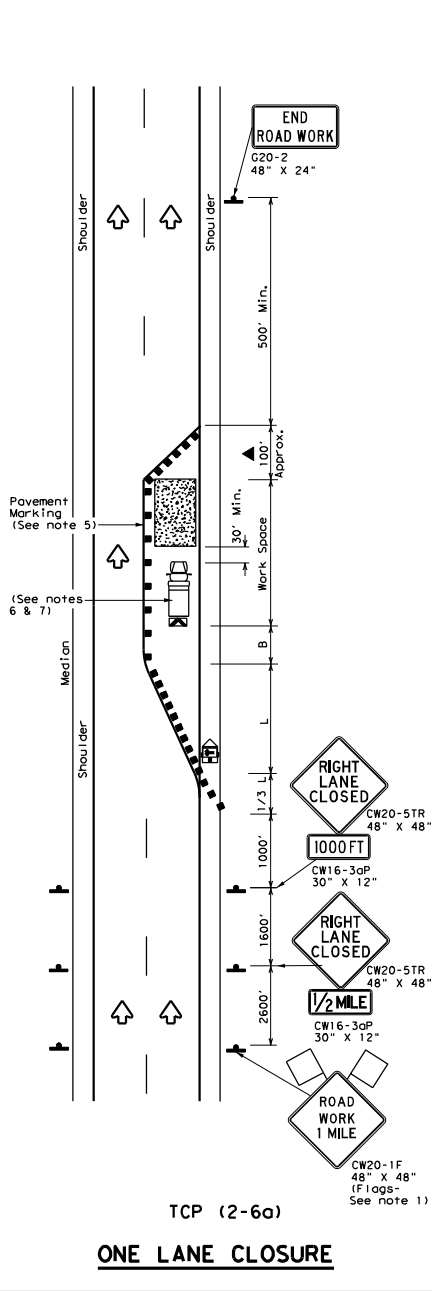
- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
 - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
 - A Shadow 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.

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN			
LONG TERM LANE CLOSURES			
MULTILANE CONVENTIONAL RDS.			
TCP (2-5) - 18			
FILE: tcp2-5-18.dgn	DATE: 12/19/95	BY: 6434	CHECKED: 001
PROJECT: 8-95 2-12	REVISIONS:	SECTION: 66	JOB: 001
DATE: 1-97 3-03		COUNTY:	SHEET NO.:
DATE: 4-98 2-18		FTW	WISE, ETC.
		56	

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DATE: FILE:



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. 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.

Texas Department of Transportation
 Traffic Operations Division Standard

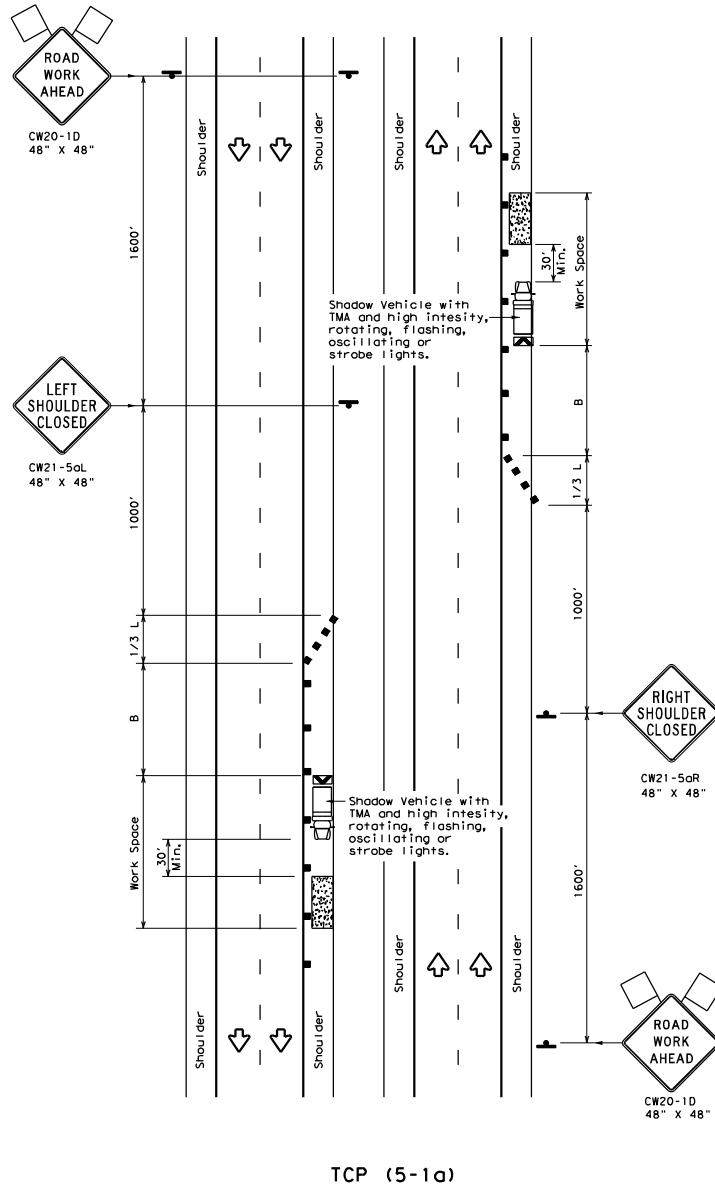
TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP (2-6) - 18

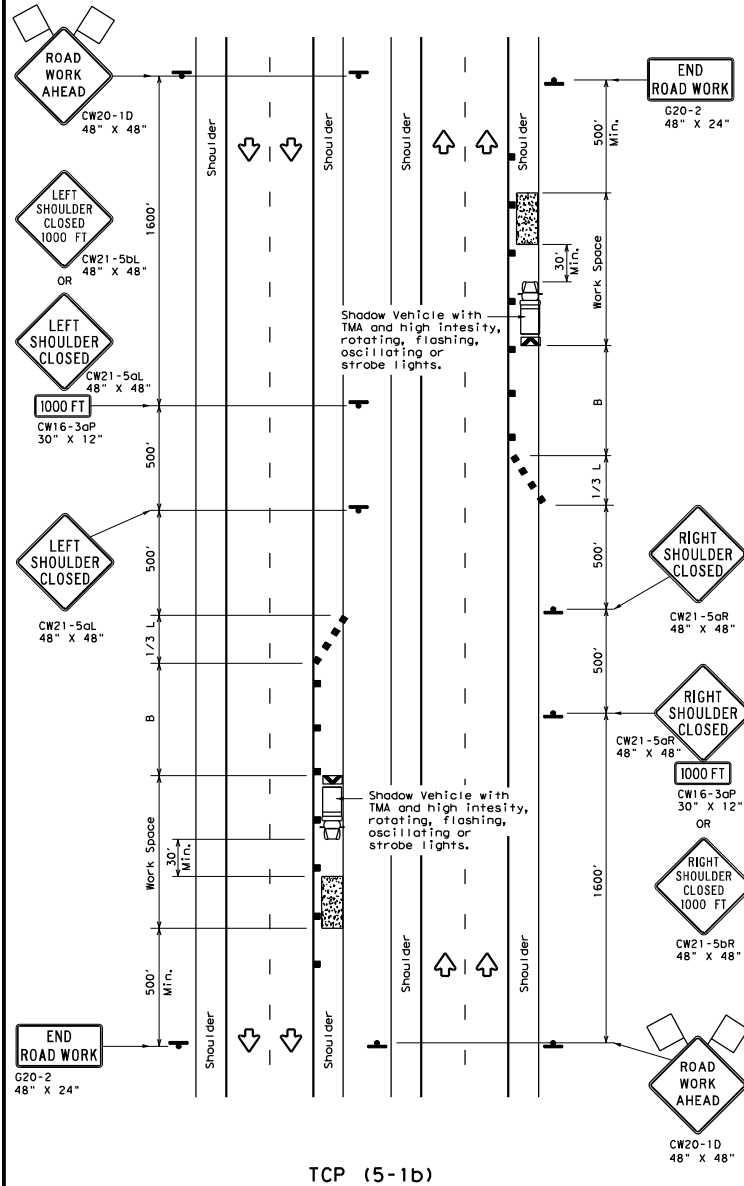
FILE:	tcp2-6-18.dgn	DATE:	08/11/97	BY:	CK1	DATE:	08/11/97	BY:	CK1
© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY				
2-94	4-98	6434	66	001	US 380, ETC				
8-95	2-12				COUNTY				
1-97	2-18				FTW WISE, ETC.				
						SHEET NO.	57		

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DATE: FILE:



TCP (5-1a)
WORK AREA ON SHOULDER



TCP (5-1b)
WORK AREA ON SHOULDER

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 * L = WS ² 60	Formula	Minimum Desirable Taper Lengths			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30		150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
45		450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

* 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
	TCP (5-1a)	TCP (5-1b)	TCP (5-1b)	

- GENERAL NOTES**
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
 - 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.



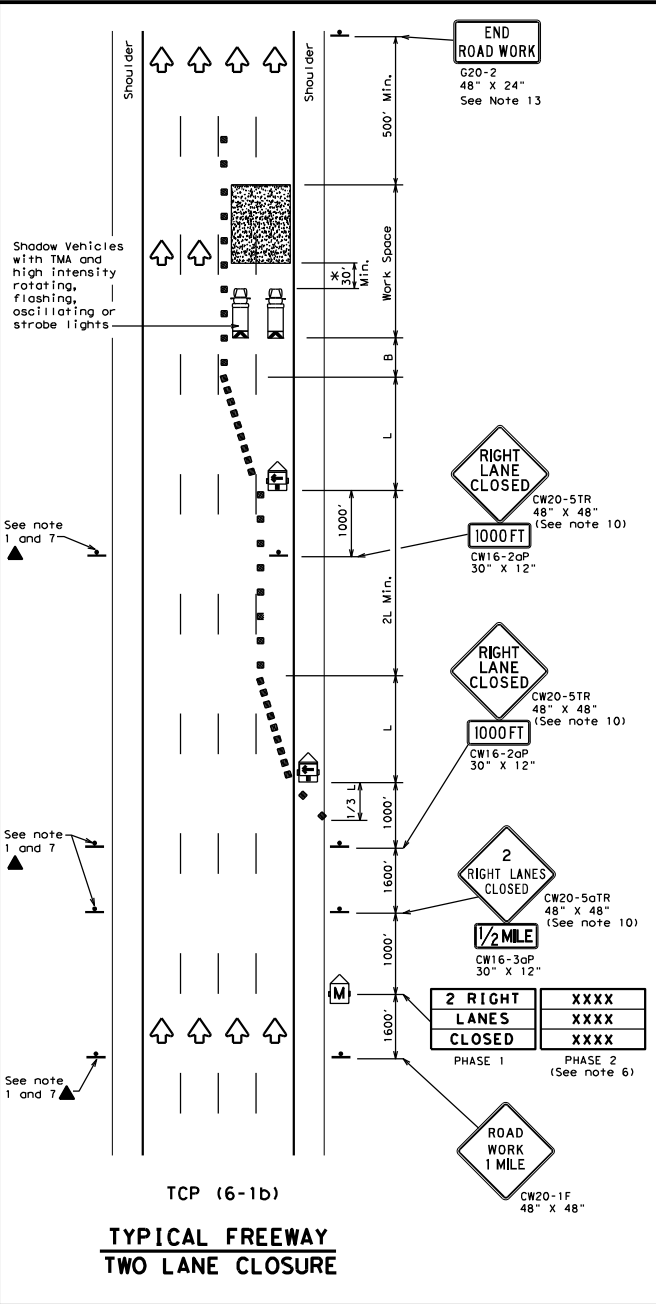
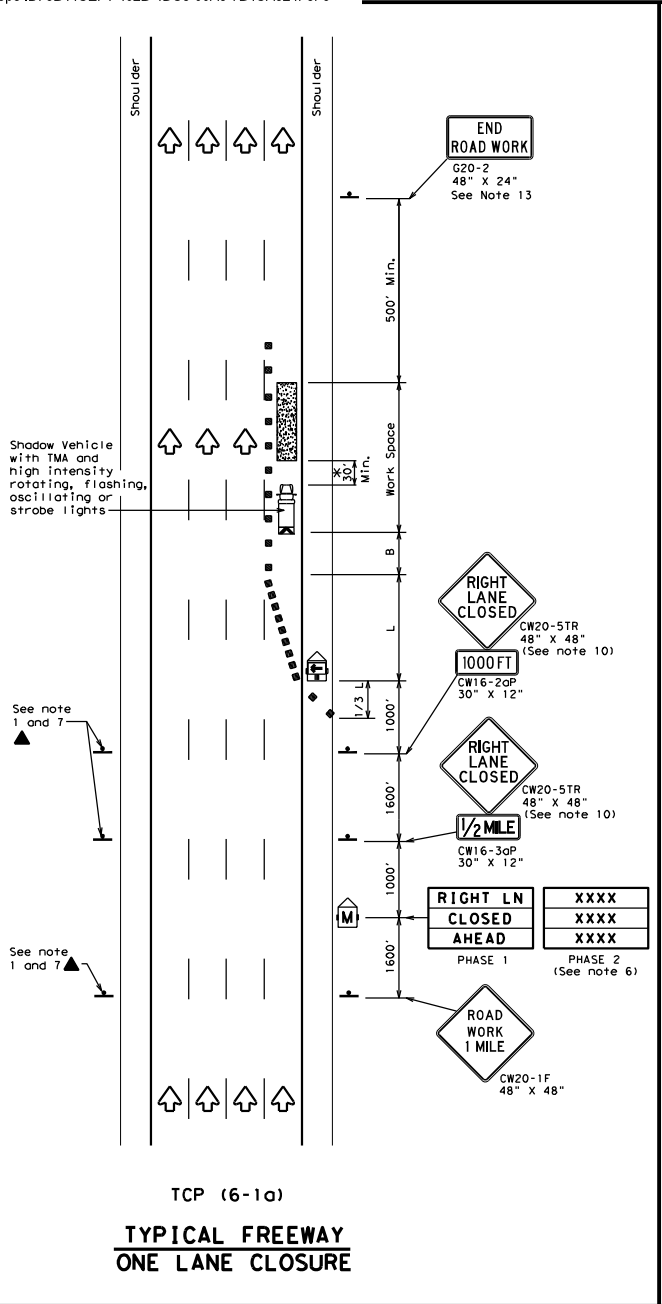
**TRAFFIC CONTROL PLAN
SHOULDER WORK FOR
FREEWAYS / EXPRESSWAYS**

TCP (5-1) - 18

FILE: tcp5-1-18.dgn	DATE: February 2012	CONTRACT: 643466	SECTION: 001	JOB: US 380, ETC	DATE: 2-18	COUNTY: FTW	SHEET NO.: 58
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DATE: FILE:



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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- Drums or 42" cones are the typical channelizing devices. For Intermediate Term Stationary work, drums shall be used on tapers with drums or 42" cones used on tangent sections. Other channelizing devices may be used as directed by the Engineer.
- All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
- The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
- Static message boards or changeable message signs stating the date and duration of ramp or freeway lane closures shall be placed a minimum of seven (7) calendar days in advance of the actual closure.
- Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE LEFT," recommended advisory speed, delay information, or other specific warnings.
- Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
- The number of closed lanes may be increased provided the spacing of traffic control devices, taper lengths and tangent lengths meet the requirements of the MUTCD.
- Warning signs for intermediate term stationary work should be mounted at 7' to the bottom of the sign.
- Warning signs shown shall be appropriately altered for left lane closures. When signs are mounted at 1' height for short term stationary or short duration work, sign versions shown in the SHSD for Texas with distances on the sign face rather than mounted on a plaque below the sign may be used.
- When possible, PCMS units should be located in advance of the last available exit ramp prior to the lane closure to allow motorists an alternate route. They may also be relocated to improve advance warning in case of unanticipated queuing or congestion.
- For intermediate Term Stationary work at night, floodlights should be used to illuminate the work area and equipment crossings. Floodlights shall not produce a disabling glare condition for road users or workers.
- The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA should be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES

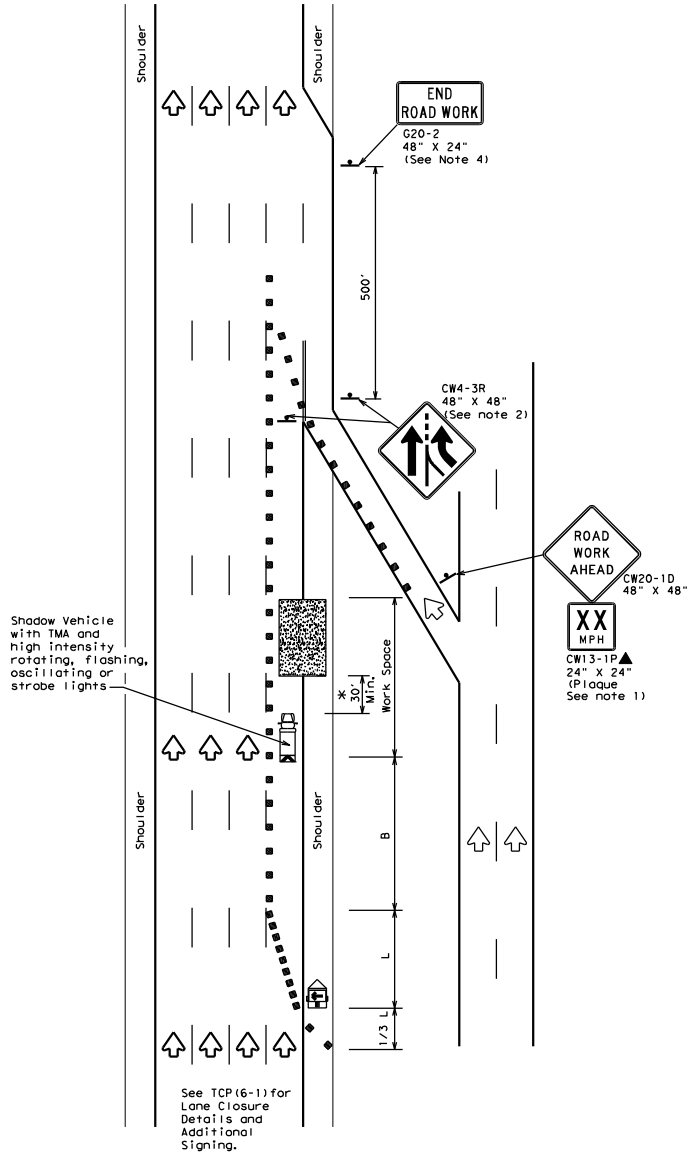
TCP (6-1) - 12

FILE: tcp6-1.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
8-12 REVISIONS	6434	66	001	US 380, ETC
	DIST	COUNTY		SHEET NO.
	FTW	WISE, ETC.		59

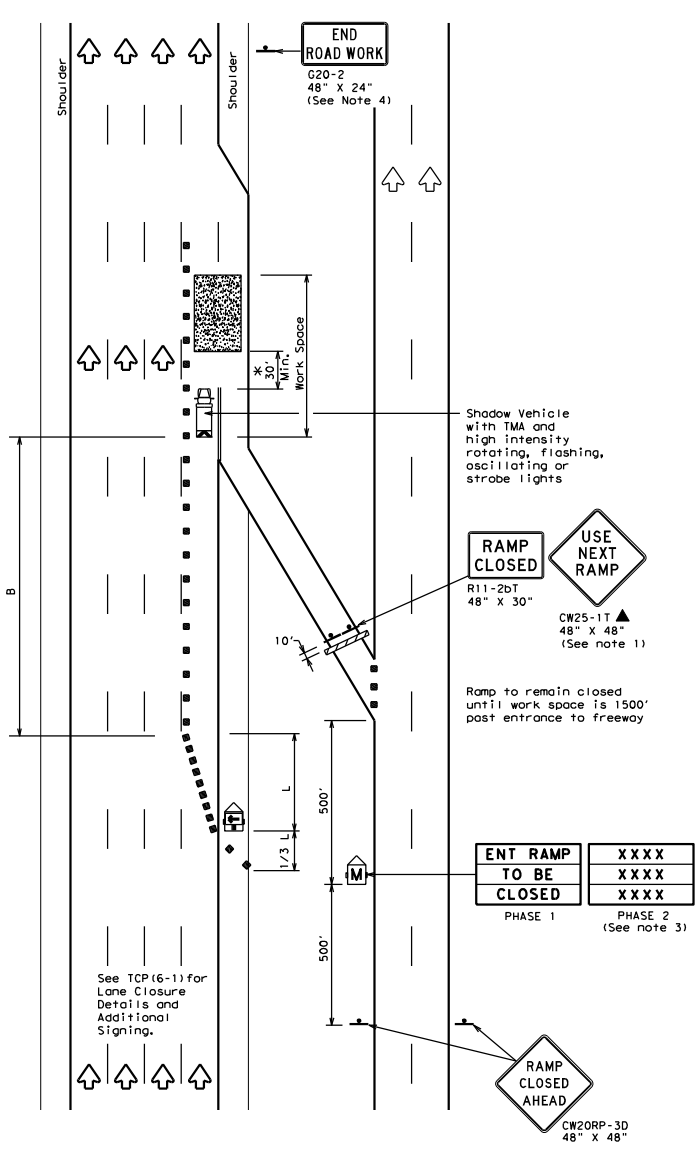
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DATE: FILE:



TCP (6-2a)
ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)
ENTRANCE RAMP 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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

**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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- ADDED LANE SYMBOL (CW4-3) sign may be omitted when sign between ramp and mainline can be seen from both roadways.
- See "Advance Notice List" on BC (6) for recommended date and time formatting options for PCMS Phase 2 message.
- The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

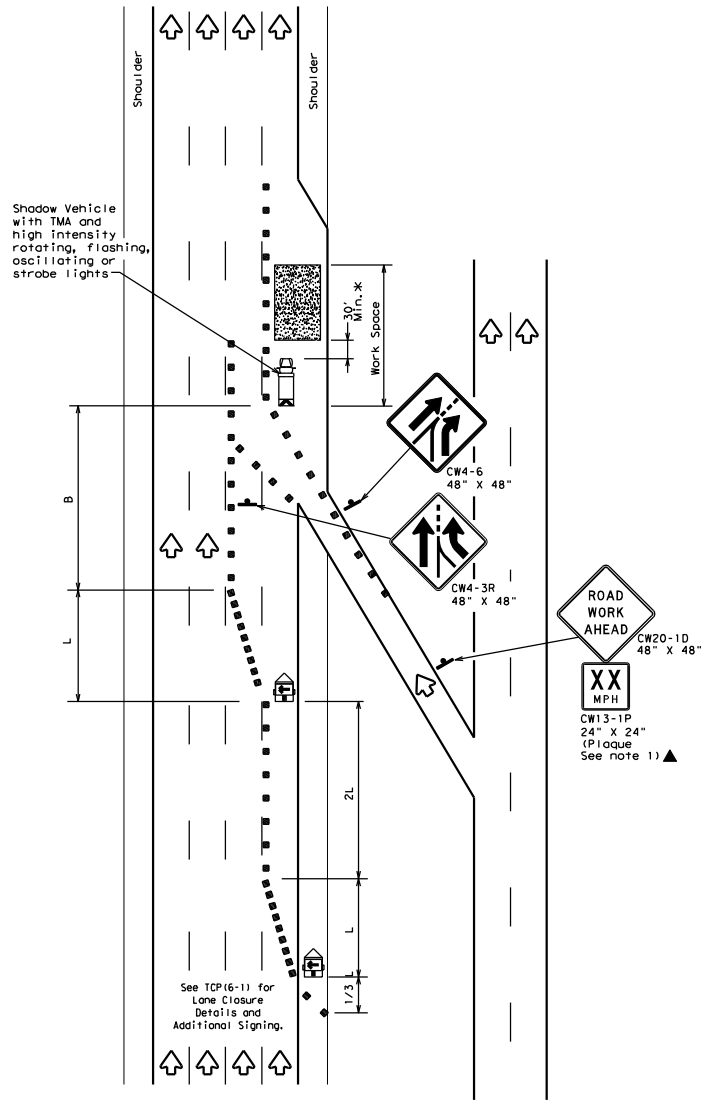


TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

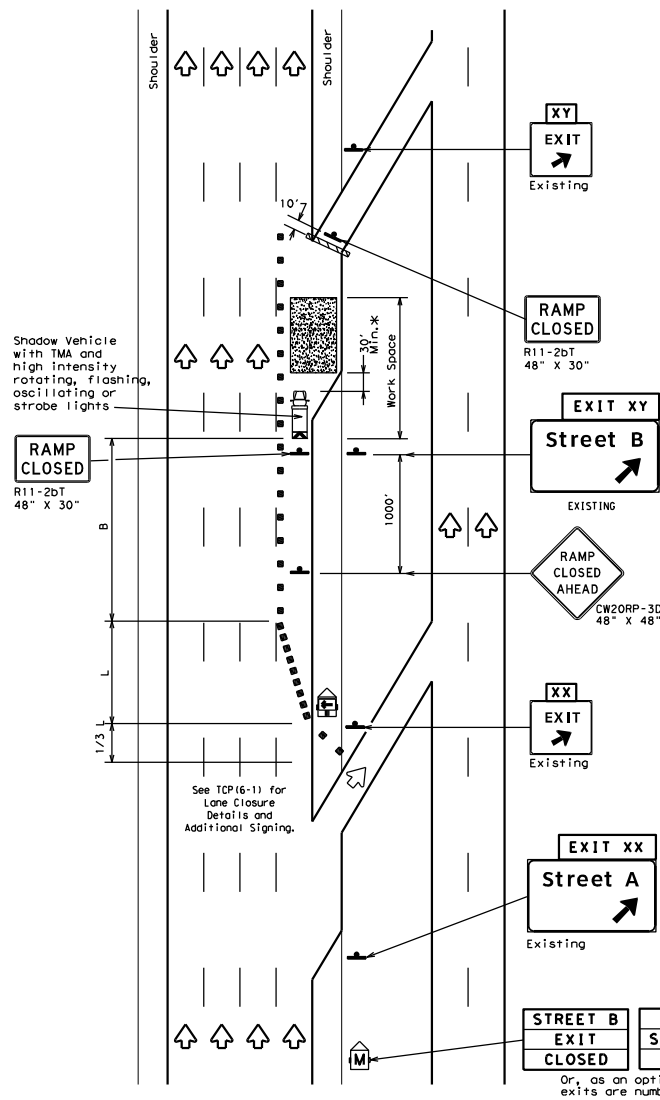
TCP (6-2) - 12

FILE: tcp6-2.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	FTW	WISE, ETC.	60	

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TCP (6-3a)
ENTRANCE RAMP OPEN



TCP (6-3b)
EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

Place 1 mile (approx.) in advance of Street A exit.

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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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:

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.



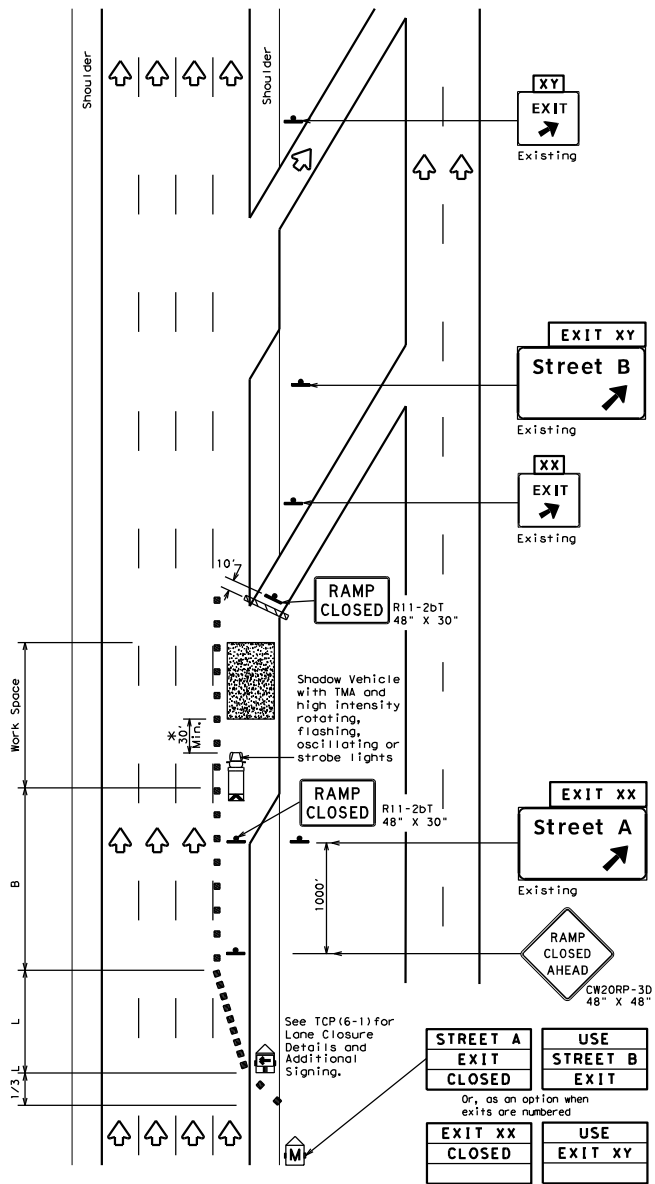
**TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP**

TCP (6-3) - 12

FILE: tcp6-3.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	CR: TxDOT
© TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	FTW	WISE, ETC.	61	

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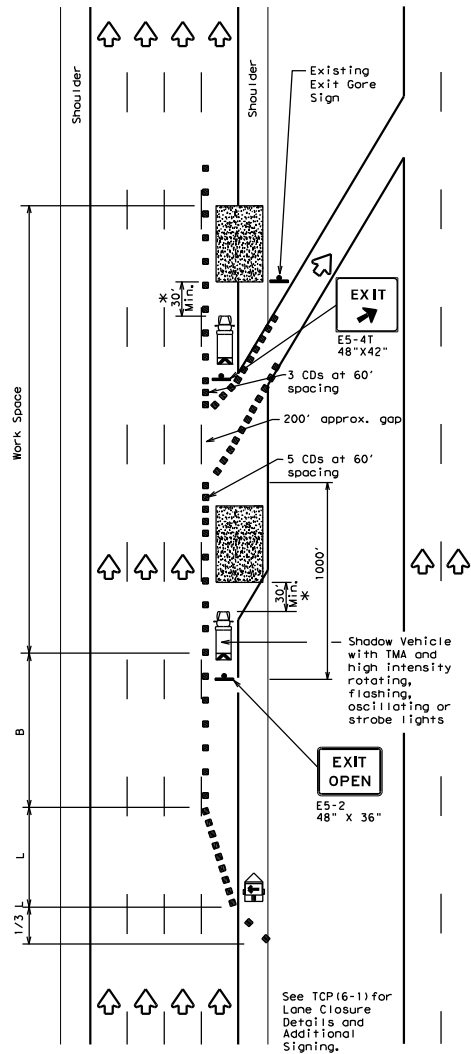
DATE: FILE:



TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP

Place 1 mile (approx.) in advance of closed ramp.



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

**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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- See BC Standards for sign details.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.



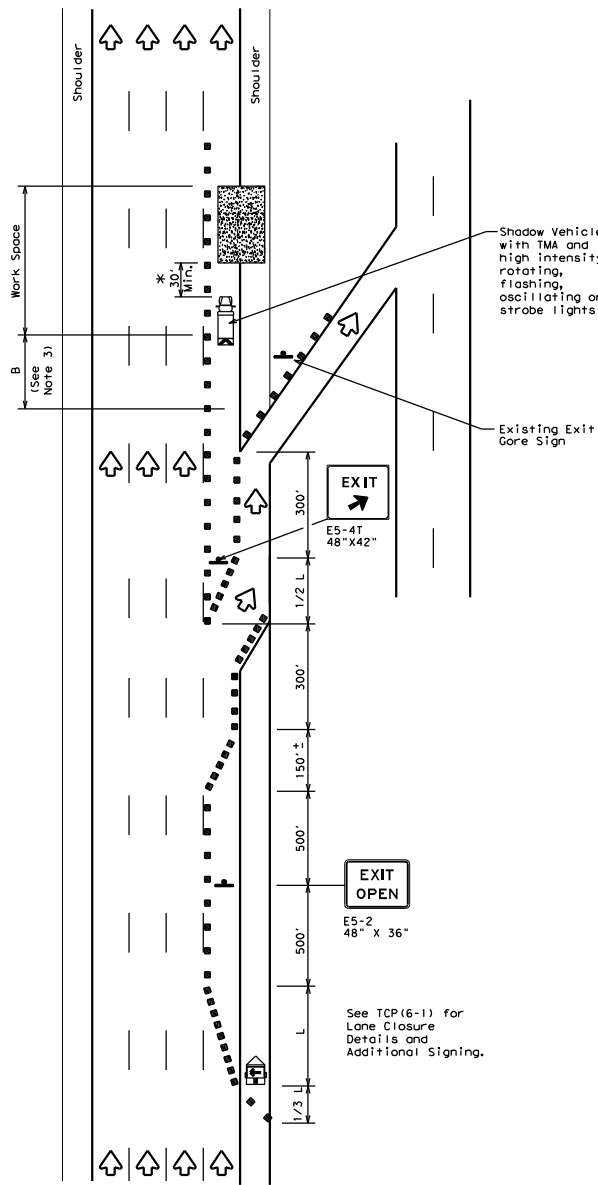
TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP (6-4) - 12

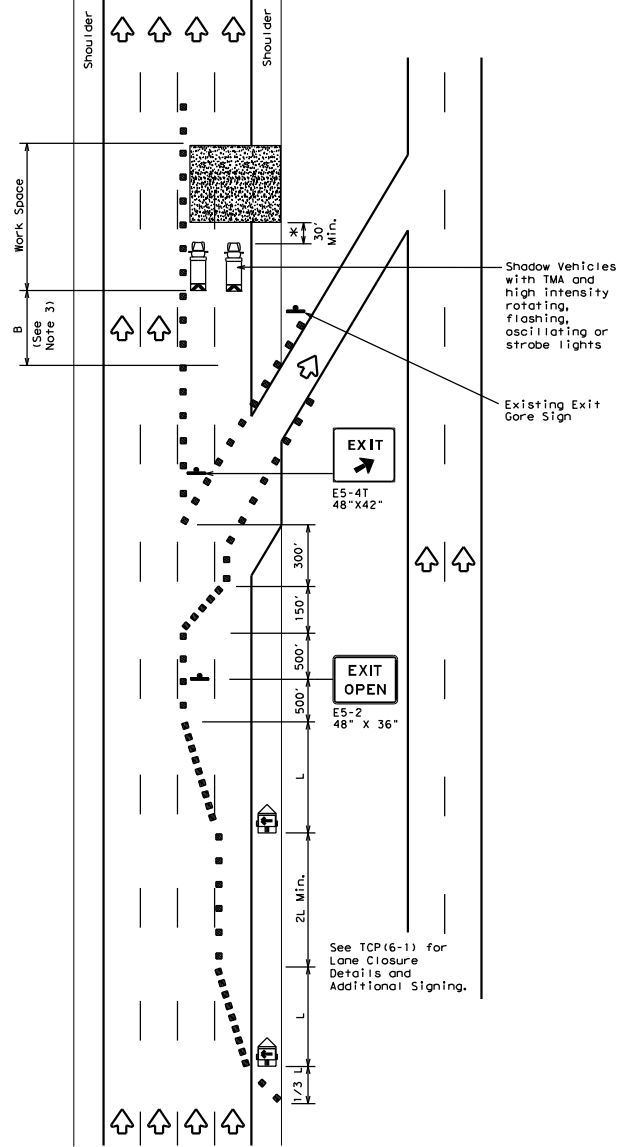
FILE: tcp6-4.dgn	DATE: February 1994	CONTRACT NO: 6434	SECTION: 66	JOB NO: 001	HIGHWAY: US 380, ETC
REVISIONS		DIST: FTW	COUNTY: WISE	SHEET NO: 62	

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DATE: FILE:



TCP (6-5a)
EXIT RAMP OPEN



TCP (6-5b)
EXIT RAMP OPEN
TWO LANE CLOSURE WITHIN
1500' PAST EXIT RAMP

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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- See BC standards for sign details.
- If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.



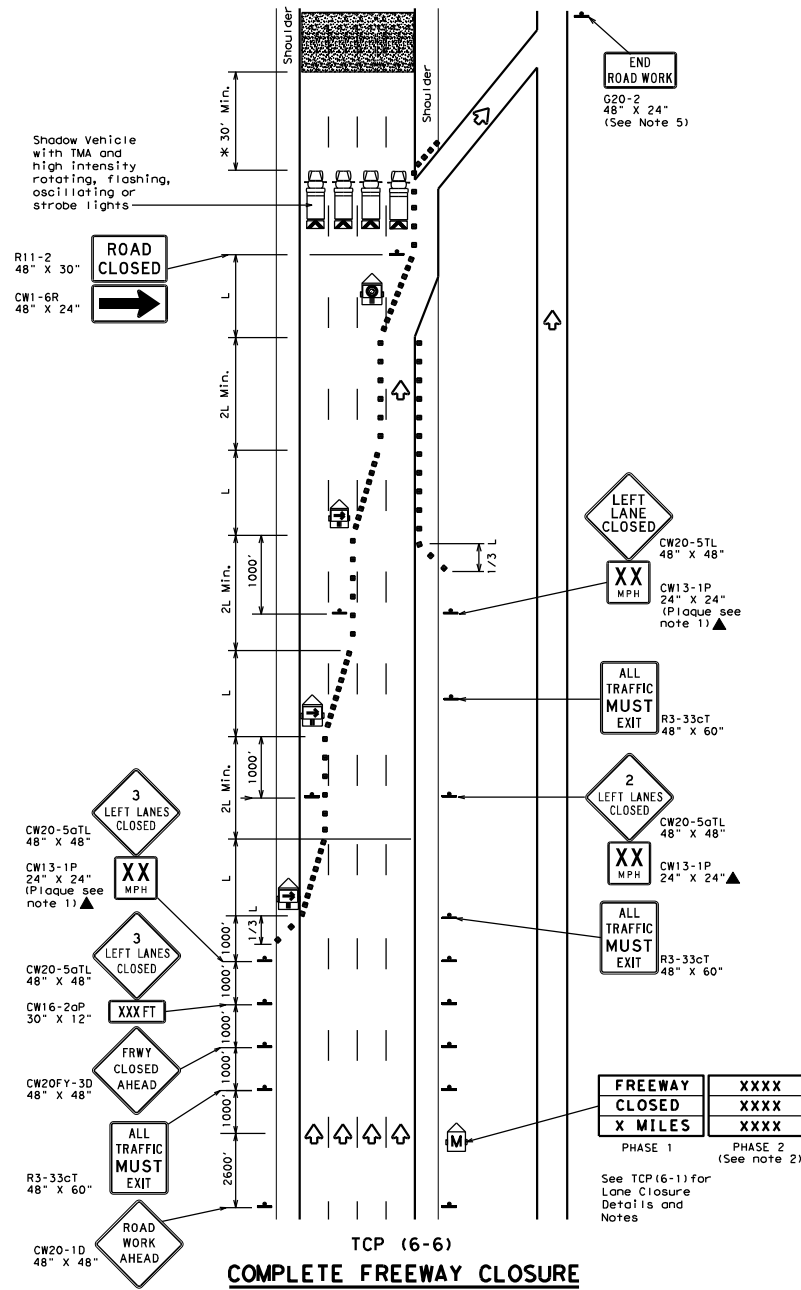
TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP (6-5) - 12

FILE: tcp6-5.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	FTW	WISE, ETC.	63	

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DATE: FILE:



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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

**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

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific warnings.
- Where queuing is anticipated beyond signing shown, additional PCMS signs, other warning signs, devices or Law Enforcement Officers should be available to warn approaching high speed traffic of the end of the queue, as directed by the Engineer.
- Entrance ramps located from the advance warning area to the exit ramp should be closed whenever possible.
- The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

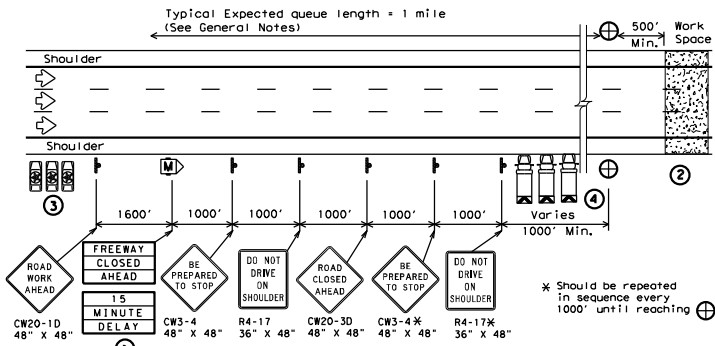


TRAFFIC CONTROL PLAN
FREEWAY CLOSURE

TCP (6-6) - 12

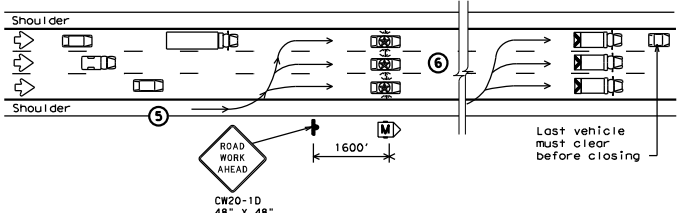
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REVISIONS:	1-97 8-98	DIST: FTW	COUNTY: WISE, ETC.	SHEET NO: 64

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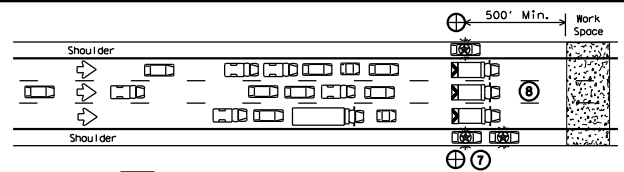
1 STARTING POSITION

- Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will be used by the WARNING LEOV, or where movement of the LEOVs or barrier vehicles will be impeded.
- Prior to beginning the roadway closure sequence, all equipment, materials, personnel, and other items necessary to complete the work should be gathered near the work area. Entrance ramps located in the area where a queue is expected to build should be closed.
- There should be one LEOV for every lane to be controlled, plus a minimum of one to warn traffic approaching a queue. An additional lead low enforcement officer is desirable to remain with the Engineer's or Contractor's point of contact (POC) during the operation in order to improve communication with all LEOVs involved.
- One barrier vehicle with a Truck Mounted Attenuator and amber or blue and amber high intensity flashing/oscillating/strobe lighting shall be used for each lane to be closed.



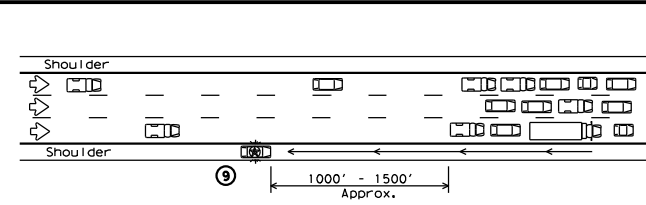
2 REDUCING SPEED OPERATION

- Starting position of the LEOVs should be in advance of the most distant warning signs.
- Once the LEOVs have achieved an abreast blocking formation while traveling toward the CP, emergency lights and headlights should be turned "ON". The LEOVs should maintain formation, not allow traffic to pass, and begin to decelerate. The LEOVs should continue to decelerate, giving the barrier vehicles opportunity to be staged upstream of the work space after traffic has cleared. The LEOVs should then continue to decelerate slowly until bringing traffic to a stop near the barrier vehicles.



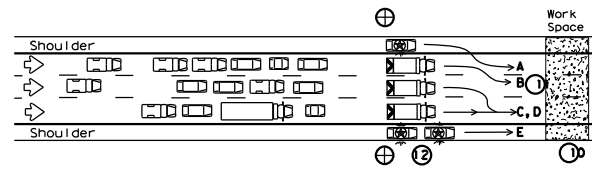
3 ALL TRAFFIC STOPPED AT CP

- Once traffic is stopped the LEOVs should park on the shoulders with emergency lighting "ON" in order to provide low enforcement presence at the closure and keep shoulders blocked ahead of the work space. They should stay in radio contact with the WARNING LEOV.
- The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



4 WARNING THE TRAFFIC QUEUE

- The WARNING LEOV should proceed to the right shoulder of the roadway, with emergency lights on approximately 1000' in advance of the traffic queue (stopped traffic) as the queue develops. When determined that limited sight distance situations (crest of hills, sharp roadway curvature, etc.) may occur to motorists approaching the queue, the WARNING LEOV may proceed 1/4 mile or more in advance of the queue.



5 RELEASING STOPPED TRAFFIC

- All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.
- When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically in the plan view.
- The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.
- LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

LEGEND			
■	Channelizing Devices	⊕	Control Position (CP)
Ⓔ	Portable Changeable Message Sign (PCMS)	Ⓜ	Barrier Vehicle with Truck Mounted Attenuator
Ⓛ	Law Enforcement Officer's Vehicle (LEOV)	↔	Traffic Flow

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

GENERAL NOTES

- All traffic control devices shall conform with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Additional guidelines for traffic control devices may be found in the TMUTCD. Signs conflicting with the roadway closure sequence should be completely removed or covered. Additional traffic control devices may be required for closure of access roads, cross streets, exit and entrance ramps as directed by the Engineer.
- Low enforcement officers and all workers involved should review and understand all procedures before the roadway closure sequence begins. Pre-work meetings may be held for this purpose. Local emergency services and media should have advance notification of roadway closure, expected dates and approximate times of closures.
- Low enforcement officers shall be in uniform and have jurisdiction in the locale of the work area. An additional WARNING Law Enforcement Officer's Vehicle (LEOV) may be used on the median side of the roadway where median shoulder width permits (See sequence #9).
- The roadway closure should be during off-peak hours, as shown in the plans, or as directed by the Engineer.
- Work should be limited to approximately 15 minutes maximum duration unless otherwise directed by the Engineer based on existing roadway conditions. If the work is not complete within 15 minutes, or if the end of the traffic queue extends past the most distant advance warning signs, the work area should be cleared of all equipment, materials, personnel, and other items, and the roadway reopened. When the queue has dissipated and the traffic flow appears normal the roadway closure sequence may be repeated.
- For traffic volumes greater than 1000 Passenger Cars Per Hour Per Lane (PCPHPL), or for roadway closures that exceed 15 minutes, see details elsewhere in the plan.
- If traffic queues beyond the advance warning signs during one road closure sequence, the advance warning should be extended prior to repeating the road closure sequence. When possible, PCMS signs should be located in advance of the last available exit prior to the closure to allow motorists the choice of an alternate route.

THIS PLAN IS INTENDED TO BE USED AT LOCATIONS/TIMES WHEN TRAFFIC VOLUMES ARE LESS THAN 1000 PASSENGER CARS PER HOUR PER LANE.



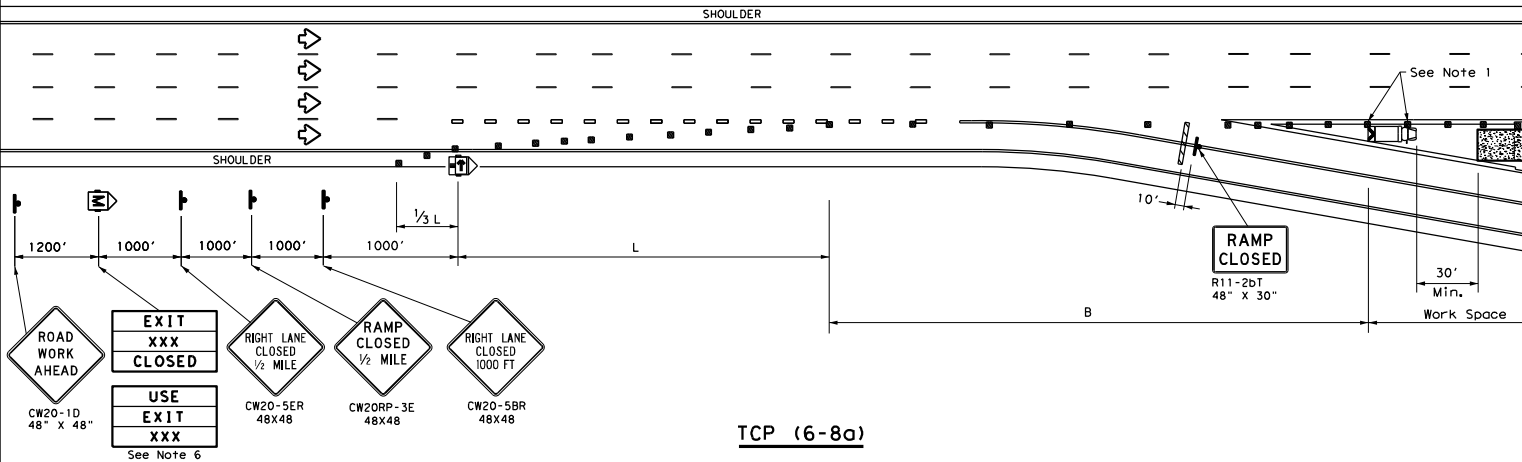
TRAFFIC CONTROL PLAN SHORT DURATION FREEWAY CLOSURE SEQUENCE

TCP (6-7) - 12

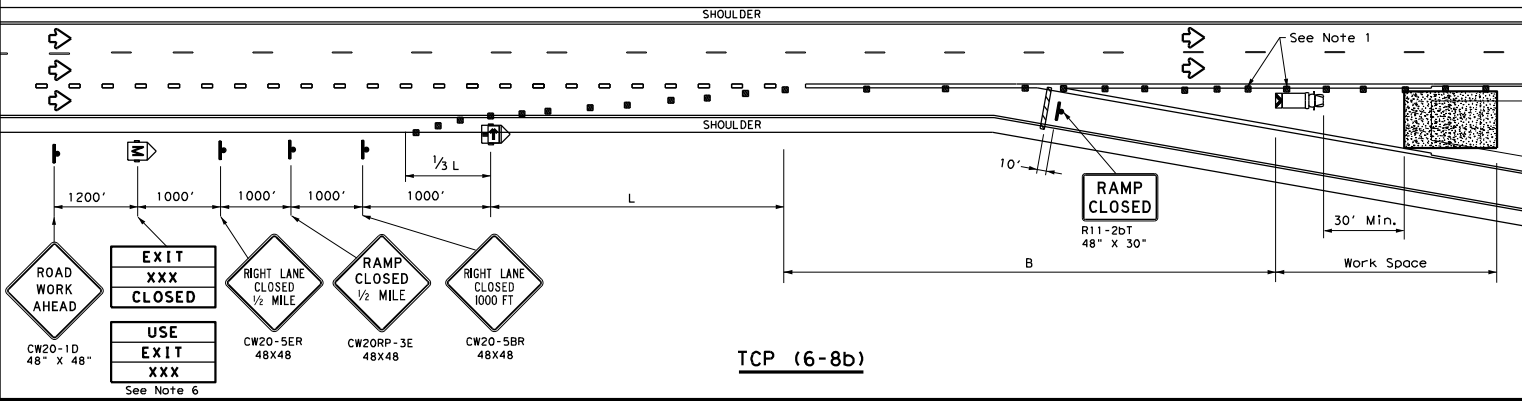
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REVISED	February 1998	CONT	SECT	6434	JOB	001	US 380, ETC	DIST	COUNTY
DATE	1-91 8-12 4-98	FTW	WISE, ETC.	65	SHEET NO.				

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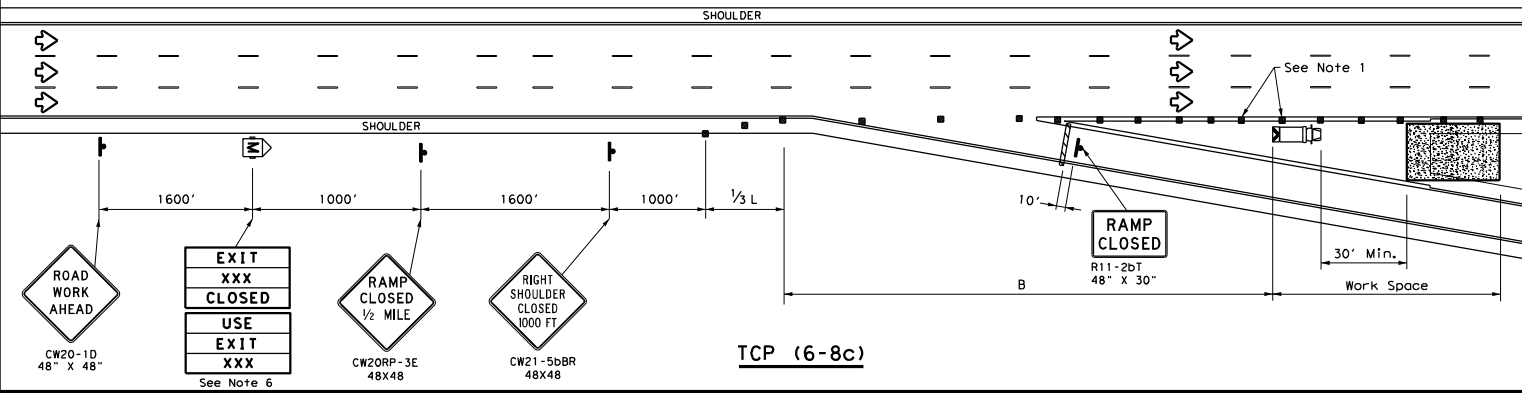
DATE: FILE:



TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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 "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "b"
		10' Offset	12' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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**
- Place channelizing devices in the gore at 20' spacing.
 - See the Standard Highway Sign Design for Texas (SHSD) for sign details.
 - The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
 - When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
 - Truck mounted attenuator is required.
 - The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW2ORP-3D) Sign.
 - Roadway ADT should be greater than 10,000.



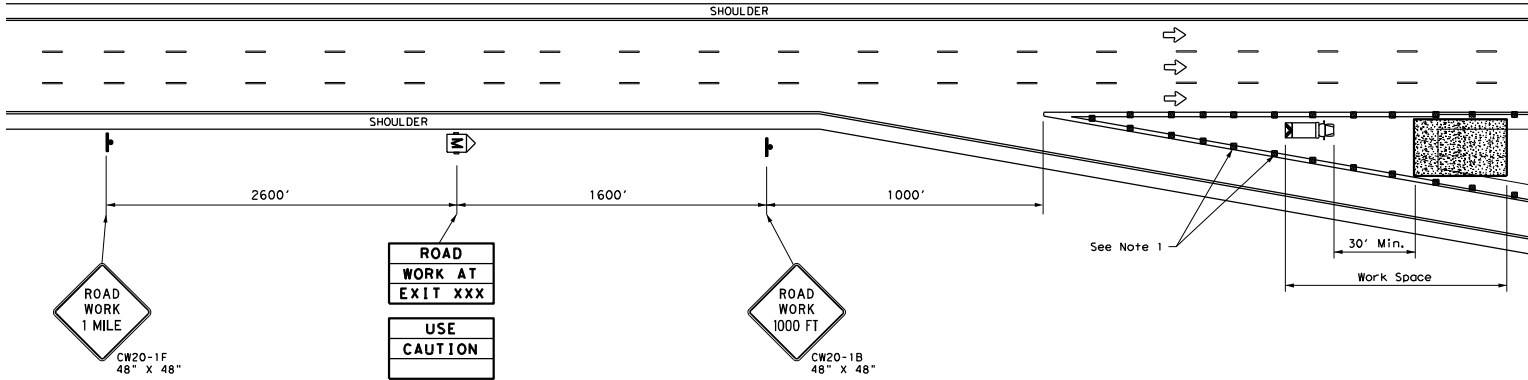
WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP (6-8) - 14

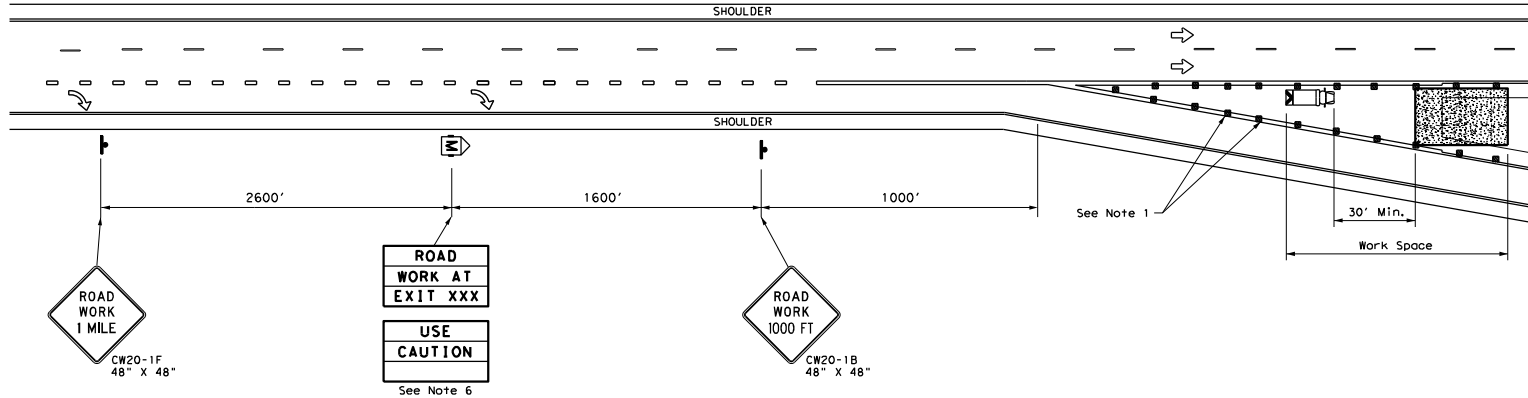
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REVISED:	February 2014	CONT:	SECT:	JOB:	HIGHWAY:				
		6434	66	001	US 380, ETC				
		DIST:	COUNTY:	SHEET NO.:					
		FTW	WISE, ETC.	66					

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TCP (6-9a)



TCP (6-9b)

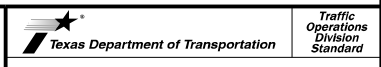
LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L"			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "b"
		10' Offset	12' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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**
- Place channelizing devices in the gore at 20' spacing.
 - See the Standard Highway Sign Design for Texas (SHSD) for sign details.
 - The PCMS may be omitted when a permanent DMS sign is available in an appropriate location to display a similar message as called for on the PCMS.
 - When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) and TCP(6-8) for traffic control details.
 - Truck mounted attenuators are required.
 - The PCMS may be omitted if replaced with a "ROAD WORK 1/2 MILE" (CW20-1E).
 - Roadway ADT should be less than 10,000.



WORK IN EXIT GORE FOR ADT LESS THAN 10,000

TCP (6-9) - 14

FILE: tcp6-9.dgn	DATE: TxDOT	CHK: TxDOT	DATE: TxDOT	CHK: TxDOT
© TxDOT February 2014	CONT: 6434	SECT: 66	JOB: 001	HIGHWAY: US 380, ETC
REVISIONS	DIST: FTW	COUNTY: WISE, ETC.	SHEET NO.:	67

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

WORKER SAFETY NOTES:


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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

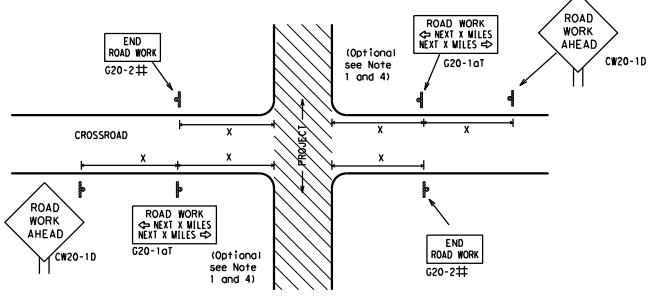
1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

SHEET 1 OF 12

 Texas Department of Transportation	Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS	
BC (1) - 21	
FILE: bc-21.dgn © TxDOT November 2002	DW: TxDOT CR: TxDOT DR: TxDOT CK: TxDOT
4-03 REVISIONS 7-13 9-07 8-14 5-10 5-21	CONT SECT JOB HIGHWAY 6434 66 001 US 380, ETC. DIST COUNTY SHEET NO. FTW WISE, ETC 68

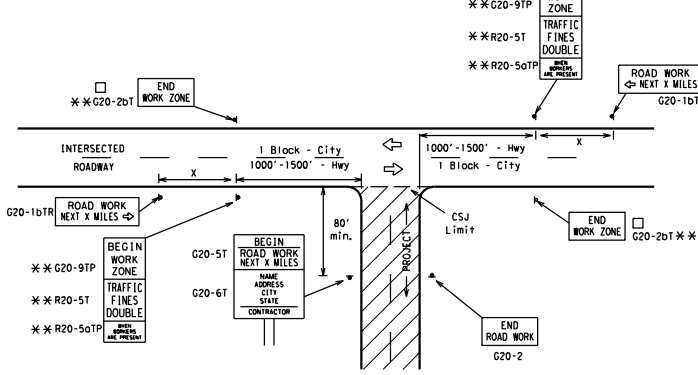
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)

- 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.
- The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMTUCD Part 5. This information shall be shown in the plans.
- Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
- The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
- Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
- 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

- 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.
- 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^{15.6}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed	Sign Δ Spacing "X"
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	48" x 48"	48" x 48"	55	500 ²
CW3, CW4, CW6, CW8-3, CW10, CW12			60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
	80	1000 ²		
	*	*	*	3

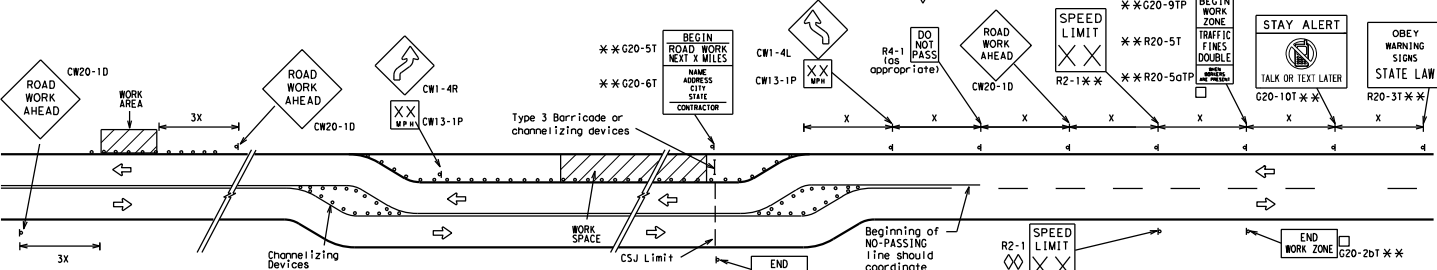
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMTUCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

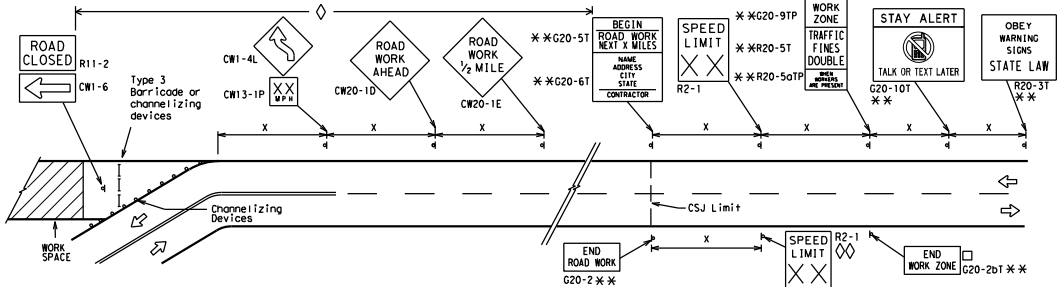
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

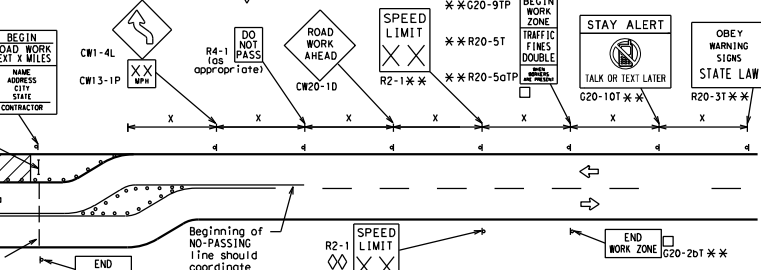


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
 - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
 - Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
	Type 3 Barricade
	Channelizing Devices
	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMTUCD for sign spacing requirements.

SHEET 2 OF 12

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TXDOT	CK: TXDOT	DP: TXDOT	EX: TXDOT
© TXDOT November 2002	CONF	SECT	JOB	HIGHWAY
REVISIONS	6434	66	001	US 380, ETC.
9-07	8-14	DIST	COUNTY	SHEET NO.
7-13	5-21	FTW	WISE, ETC	69

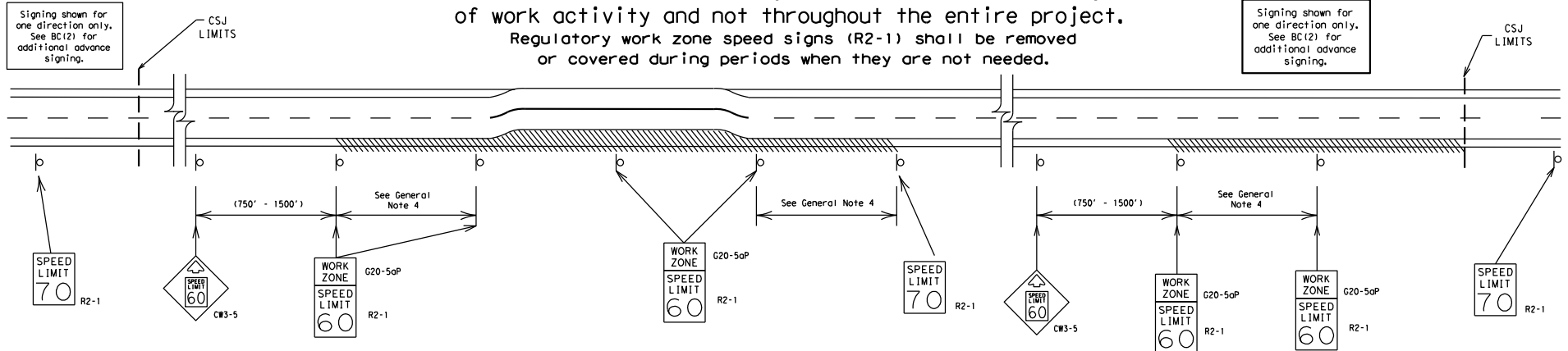
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DATE: FILE:

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

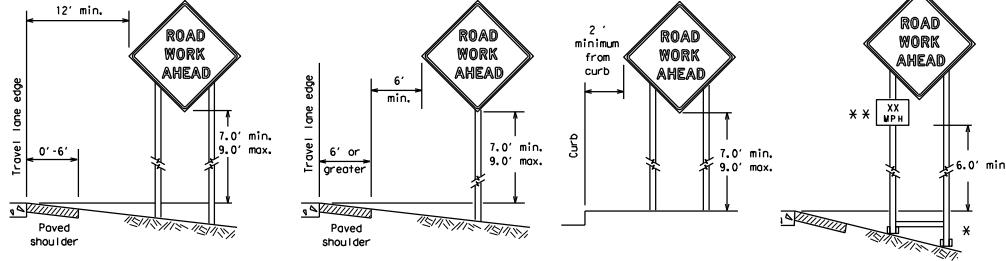


BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

FILE#	DC-21.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
9-07	8-14	6434	66	001	US 380, ETC
7-13	5-21	DIST	COUNTY	SHEET NO.	
		FTW	WISE, ETC	70	

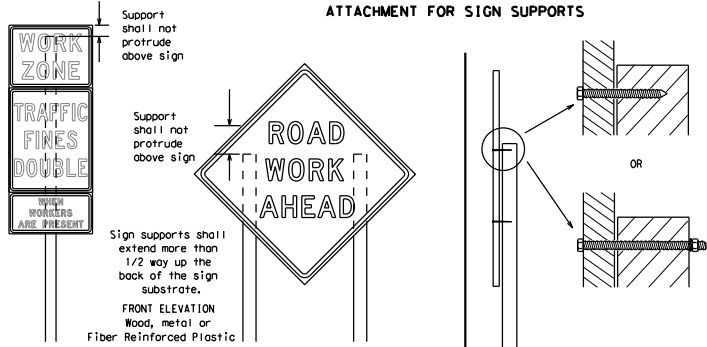
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



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

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the splice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

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 to 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.

SIZE OF SIGNS

- 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_{FL} 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

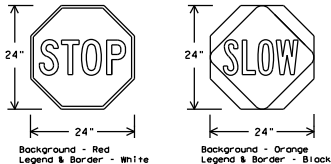
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, coarsely graded sand should be used and the sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall 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 ball used for channelizing devices shall 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

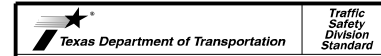
- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflective when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- Any lights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

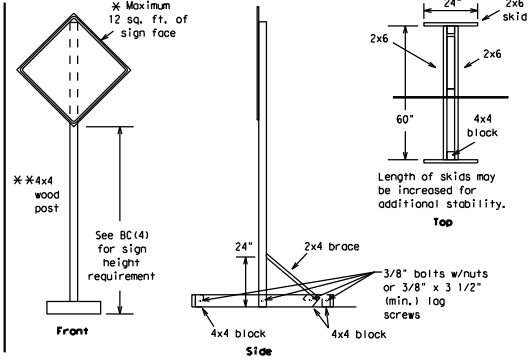
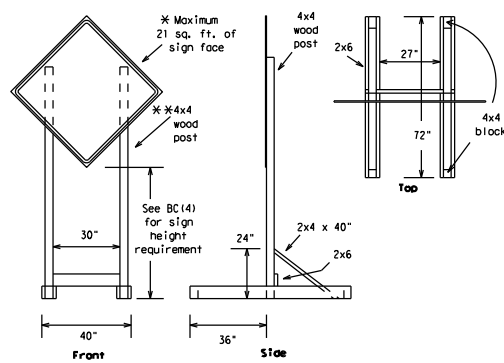


BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

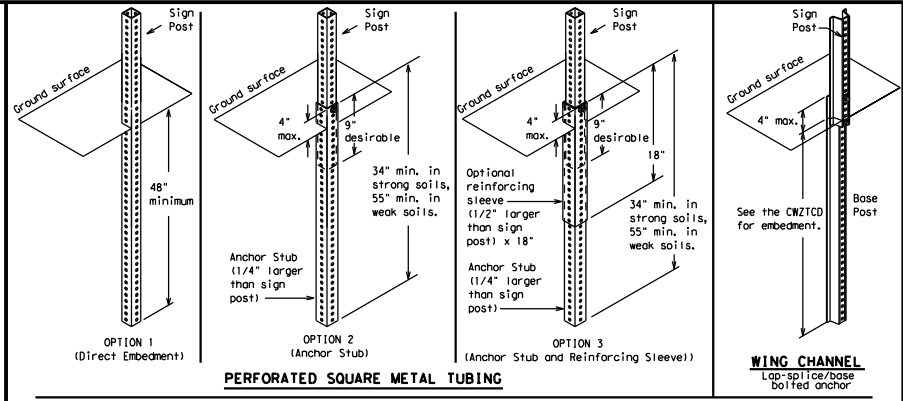
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DATE:		DATE:	FTW	DATE:	WISE, ETC	DATE:		DATE:	71

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SKID MOUNTED WOOD SIGN SUPPORTS

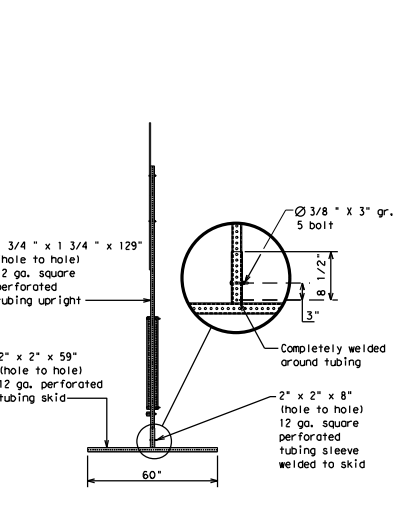
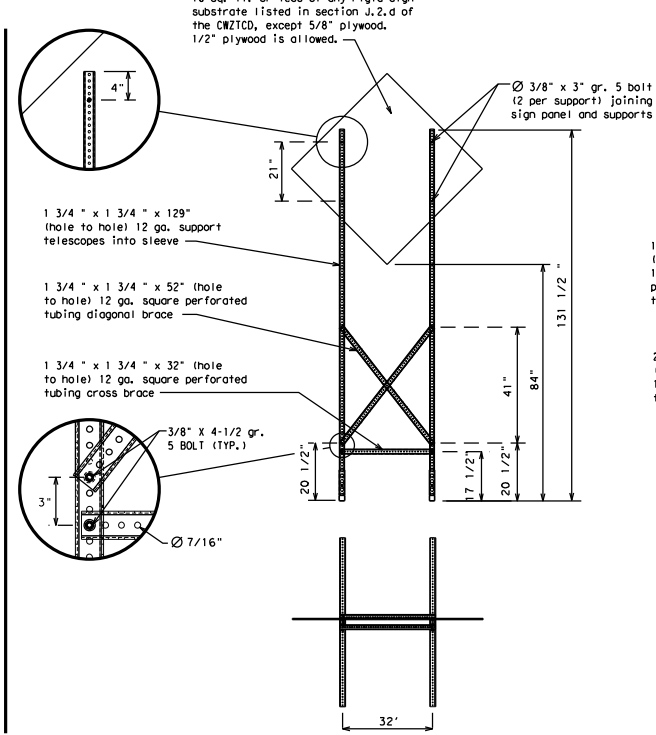
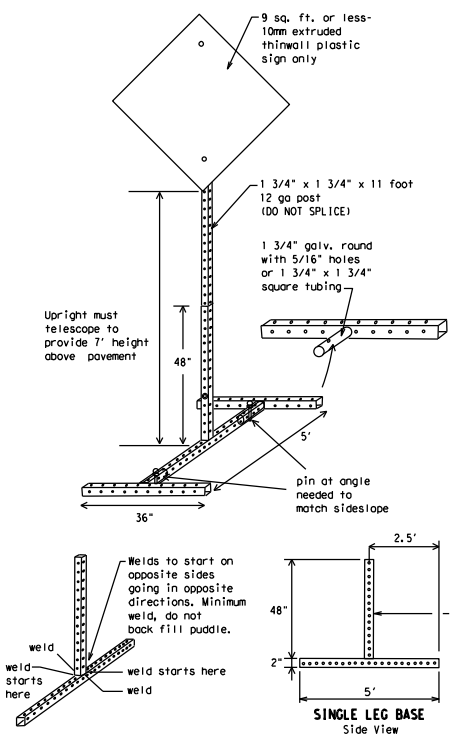
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



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 BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 1 1/2" lag screws must be used on every joint for final connection.
 2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
 3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
- * See BC(4) for definition of "Work Duration."
 ** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
 See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

FILE#	DC-21.dgn	DN#	TxDOT	CR#	TxDOT	DR#	TxDOT	CR#	TxDOT
REV#	1	DATE	NOVEMBER 2002	CONT	SECT	JOB	US 380, ETC	SHEET NO.	72
9-07	8-14	DIST	FTW	WISE, ETC					

DATE: FILE:

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 should 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	XXXXXXX TO XXXXXXX	US XXX TO FM XXXX
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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
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**** Advance Notice List**

TUE-FRI XX AM - X PM	APR XX - XX X PM-X AM	BEGINS MONDAY	BEGINS MAY XX	MAY X-X XX PM - XX AM	NEXT FRI-SUN	XX AM TO XX PM	NEXT TUE AUG XX	TONIGHT XX PM - XX AM
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** 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 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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DATE: FILE:

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 DOWNTN
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	UPPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHs
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



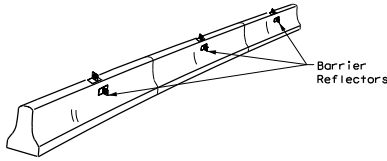
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

FILE#	DC-21.dgn	DATE	TxDOT	DATE	TxDOT	DATE	TxDOT	DATE	TxDOT
REV#	November 2002	DATE	6434	DATE	66	DATE	001	DATE	US 380, ETC
REV#	8-14	DATE	7-13	DATE	5-21	DATE	FTW	DATE	WISE, ETC
REV#	73	DATE		DATE		DATE		DATE	

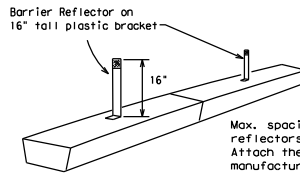
DISCLAIMER: This standard is approved by the Texas Engineering, Experimentation, and Surveying Board. No warranty, of any kind, is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

- 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 TMTUCD. 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 grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- 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 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.

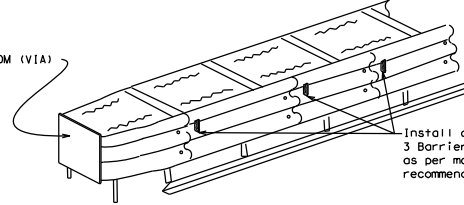


LOW PROFILE CONCRETE BARRIER (LPCB)

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.

Install a minimum of 3 Barrier Reflectors as per manufacturer's recommendations.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

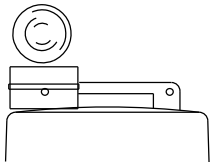
- Warning lights shall meet the requirements of the TMTUCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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 B₁ or C₁ 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.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

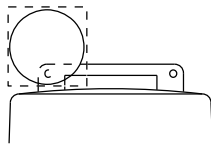
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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



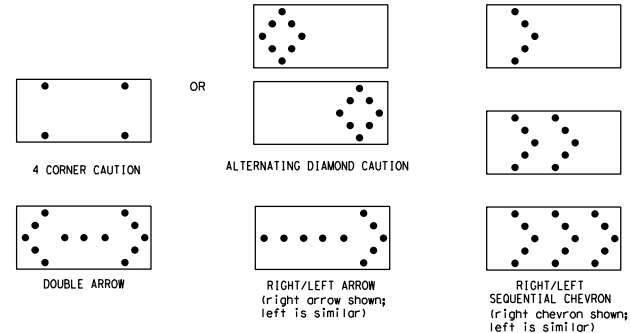
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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: dc-21.dgn	DATE: TxDOT	CHK: TxDOT	DATE: TxDOT	CHK: TxDOT
REVISED: November 2002	CONF: 6434	SECT: 66	JOB: 001	HIGHWAY: US 380, ETC
9-07	B-14	DIST:	COUNTY:	SHEET NO.:
7-13	5-21	FTW	WISE, ETC	74

DATE: FILE:

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DATE: FILE:

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:

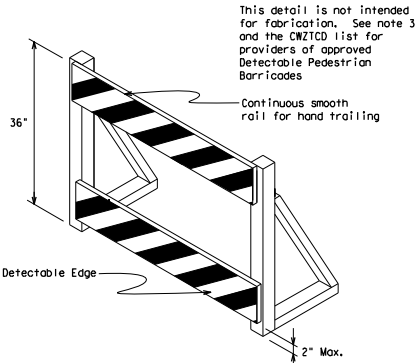
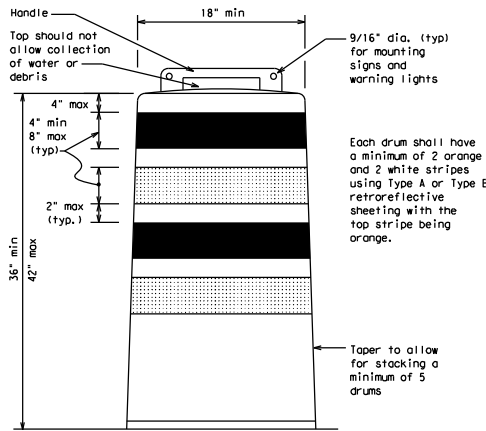
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall "lock" together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

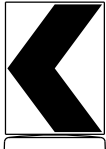
BALLAST

- 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.

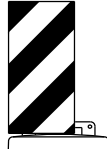


DETECTABLE PEDESTRIAN BARRICADES

- 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.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer




12" x 24" Vertical Panel
mount with diagonals sloping down towards travel way

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- 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.

SHEET 8 OF 12



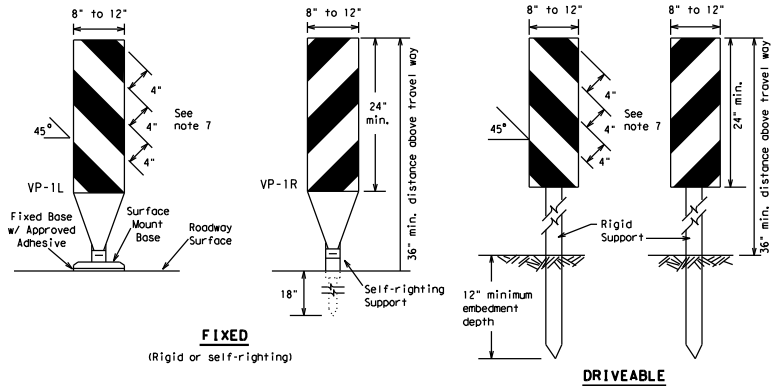
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

FILE#	bc-21.dgn	DN#	TxDOT	CK#	TxDOT	DR#	TxDOT	EX#	TxDOT
© TxDOT	November 2002	CONF	SECT	JOB	HIGHWAY				
REVISIONS		6434	66	001	US 380, ETC				
4-03	8-14	DIST	COUNTY	SHEET NO.					
9-07	5-21	FTW	WISE, ETC	75					
7-13									

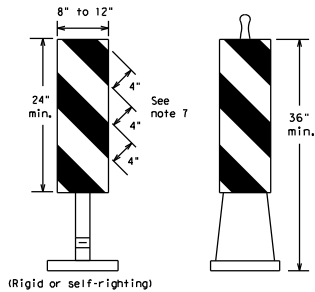
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FIXED
(Rigid or self-righting)

DRIVEABLE

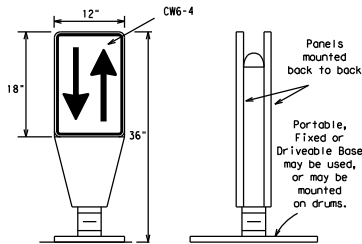
- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
- VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
- VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
- Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
- Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.



PORTABLE

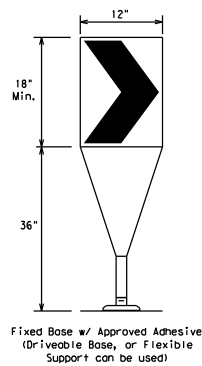
VERTICAL PANELS (VPs)

- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
- The OTLD may be used in combination with 42" cones or VPs.
- Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
- The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B₁ or Type C₁ conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

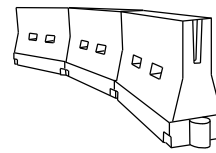
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Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
- To be effective, the chevron should be visible for at least 500 feet.
- Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B₁ or Type C₁ conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be designed together. They are not designed to contain or redirect a vehicle on impact.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- LCDs used as barricades perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
- Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

GENERAL NOTES

- Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
- Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS ² / 60	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40	L = WS	265'	295'	320'	40'	80'
45		450'	495'	540'	45'	90'
50	L = WS	500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60	L = WS	600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70	L = WS	700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80	L = WS	800'	880'	960'	80'	160'
85		850'	945'	1020'	85'	170'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

FILE#	DATE	BY	CHK	DATE	BY	CHK	DATE	BY	CHK
dc-21.dgn	November 2002	CONF	SECT	JOB	HIGHWAY				
9-07	8-11	6434	66	001	US 380, ETC				
7-13	5-21				COUNTY				
		FTW			WISE, ETC				76

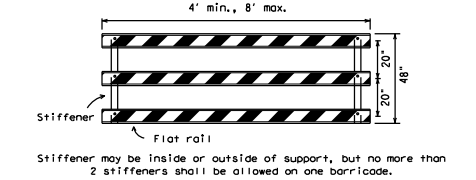
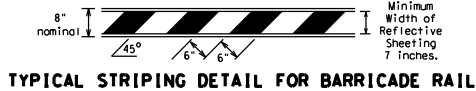
103

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TYPE 3 BARRICADES

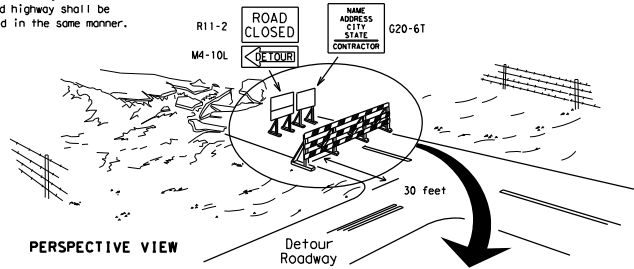
1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending 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.



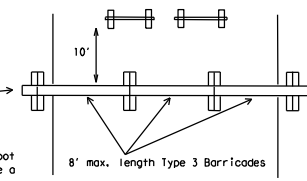
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

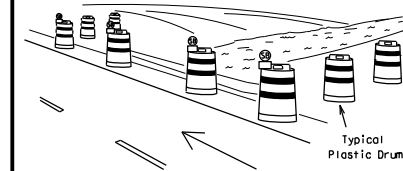
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



PLAN VIEW

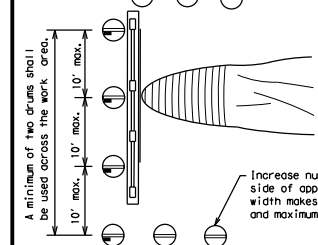
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

These drums are not required on one-way roadway



PLAN VIEW

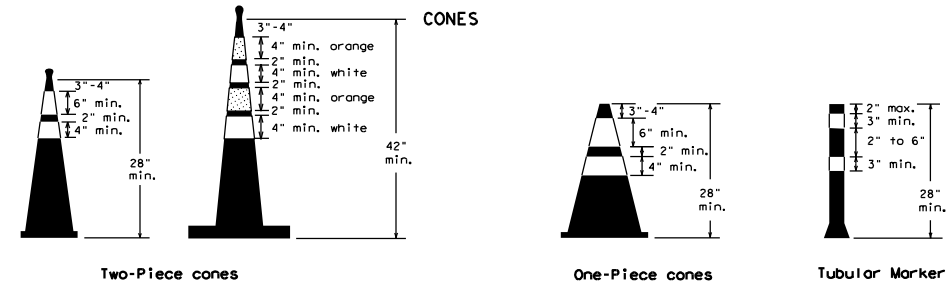
A minimum of two drums shall be used across the work area

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



CONES

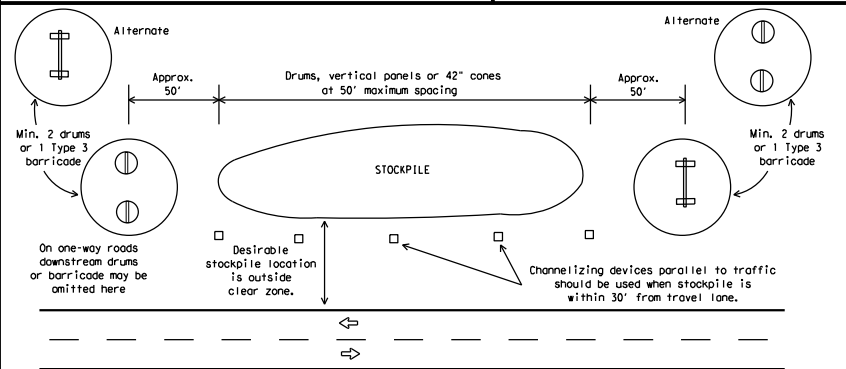
Two-Piece cones

One-Piece cones

Tubular Marker

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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers 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.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

		Traffic Safety Division Standard	
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES			
BC (10) - 21			
FILE: dc-21.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT
REV: November 2002	CONT: 66	SECT: 001	JOB: US 380, ETC
9-07 8-14	DIST: FTW	COUNTY: WISE, ETC	SHEET NO: 77
7-13 5-21			

DATE: FILE:

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DATE: FILE:

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 (STPM).
- 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.

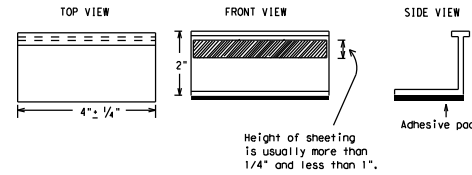
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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 (STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- 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



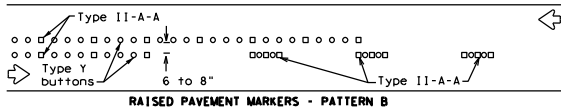
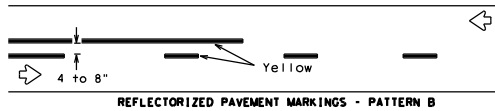
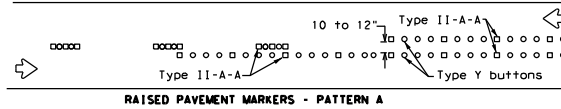
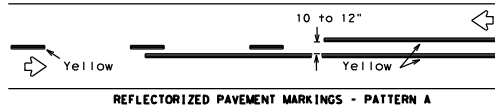
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(1) - 21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
2-98 9-07 5-21	6434	66	001	US 380, ETC.
1-02 7-13	DIST	COUNTY	SHEET NO.	
11-02 8-14	FTW	WISE, ETC	78	

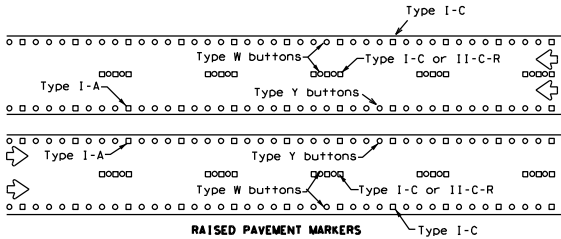
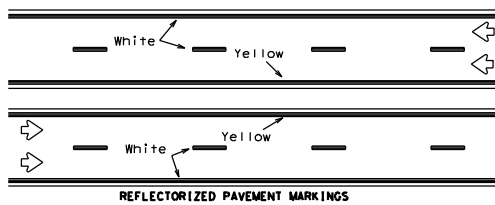
105

PAVEMENT MARKING PATTERNS



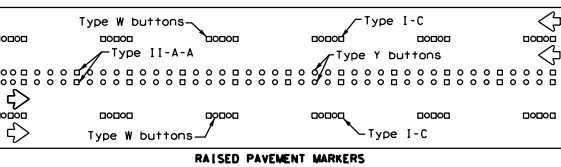
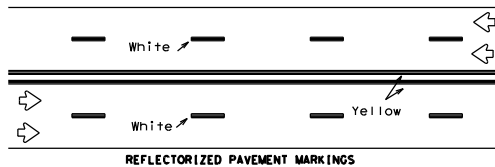
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectORIZED pavement markings.

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



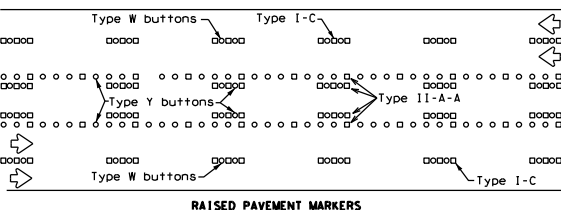
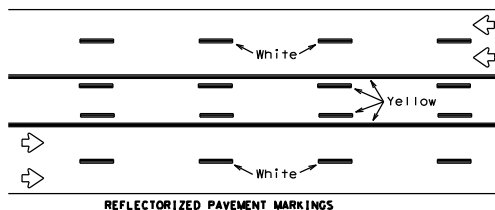
Prefabricated markings may be substituted for reflectORIZED pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectORIZED pavement markings.

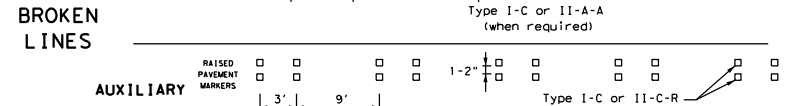
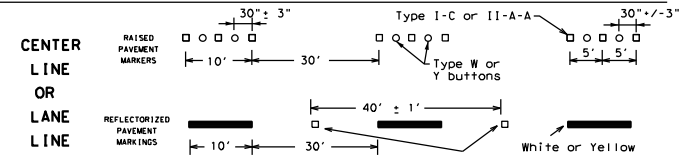
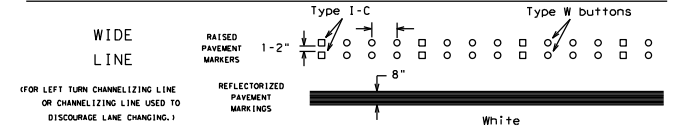
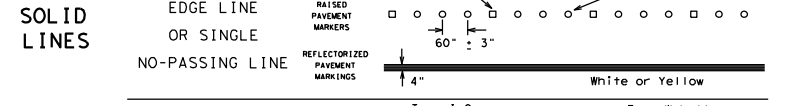
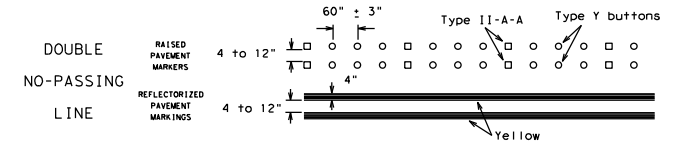
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



Prefabricated markings may be substituted for reflectORIZED pavement markings.

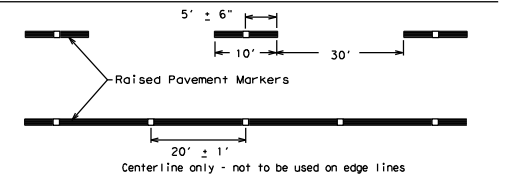
TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



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.



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DR: TxDOT	EX: TxDOT
© TxDOT February 1998	CONT SECT	JOB	HIGHWAY	
1-97 9-07 5-21	643466	001	US 380, ETC.	
2-98 7-13	DIST	COUNTY	SHEET NO.	
11-02 8-14	FTW	WISE, ETC	79	

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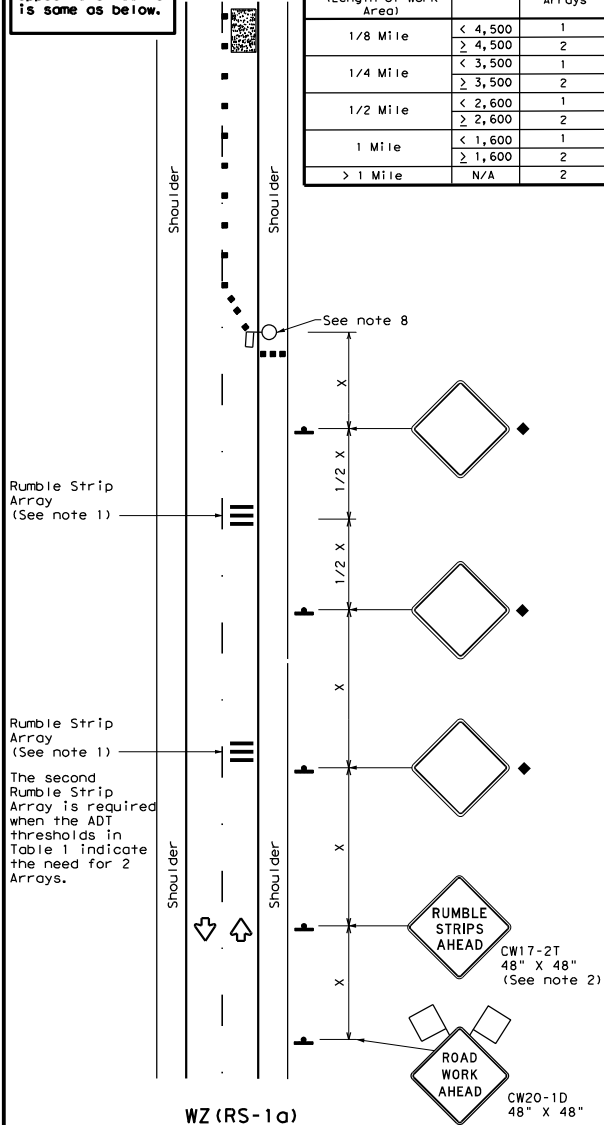
DATE: FILE:

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."

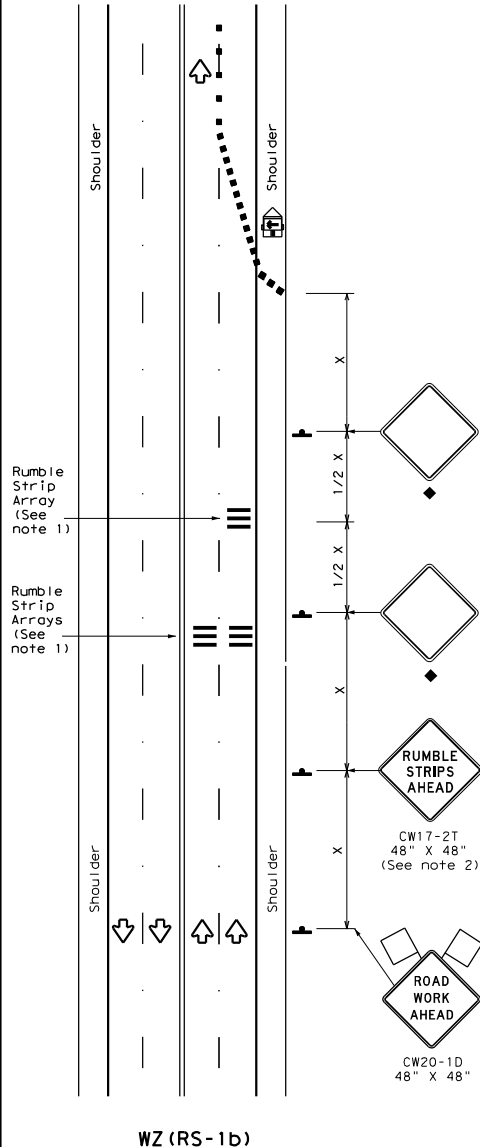
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Warning sign and rumble strip sequence in opposite direction is same as below.

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 ON ONE-LANE TWO-WAY APPLICATION



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		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)

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

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