INDEX OF SHEETS

TITLE SHEET

GENERAL NOTES SUMMARY SHEET

DESCRIPTION

ESTIMATE & QUANTITY SHEET

PM(1)-20 THRU PM(3)-20

BC(1)-14 THRU BC(12)-14

FPM(1)-12 THRU FPM(4)-12

SHEET

NO. 1

2A-2B

3A-3H

5 - 7

12-23

24

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

GRAPHICS FILE	7 4		MAINTENAN	NO.	SHEET NO.				
01-Title2017.dgn			RMC-636378001						
CHECKED	STATE		STATE DIST.	COUNTY					
DMH	TEXAS		DALLAS	DENTON					
CHECKED	CONT. 6363		SECT.	JOB	JOB HIGHWAY				
DMH			78	001	I HOO:	35W			

PLANS OF PROPOSED HIGHWAY ROUTINE MAINTENANCE CONTRACT

TYPE OF WORK:

ON-CALL REFLECTORIZED PAVEMENT MARKINGS

PROJECT NO. : RMC-636378001

IH0035W HIGHWAY :

LIMITS:

VARIOUS ROADWAYS IN THE DENTON COUNTY MAINTENANCE SECTION

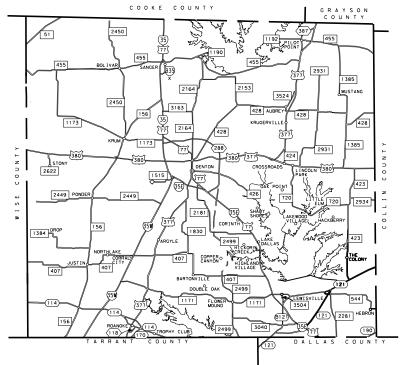
25-27 TCP(1-2)-18 THRU TCP(1-4)-18 TCP(3-1)-13 THRU TCP(3-2)-13

TCP (3-3)-14 30

WZ(RS)-16

31-36 TCP(6-1)-12 THRU TCP(6-6)-12

37 TWO-LANE HIGHWAY CURVE SIGNING & MARKING



Texas Department of Transportation

RECOMMENDED FOR LETTING

Tina Massey 1-8 __ 20 **21** AREA ENGINEER

RECOMMENDED FOR LETTING

David Morren, P.E.

2/9/2021

DISTRICT MAINTENANCE ENGINEER

RECOMMENDED FOR LETTING

2/11/2021

_ 20 __

-345B765EB03F406..

DIRECTOR OF OPERATIONS

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

Tina Massey

DALLAS DISTRICT

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

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QUANTITY SHEET

CONTROLLING PROJECT ID 6363-78-001

DISTRICT Dallas
HIGHWAY IH0035W

COUNTY Denton

		CONTROL SECTION	ои јов	6363-78	3-001		
		PRO	JECT ID	A02737	7661		
		c	OUNTY	Dent	on	TOTAL EST.	TOTAL FINAL
		ніс	GHWAY	IH003	5W	1	TINAL
LT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	1	
	500-6033	MOBILIZATION (CALLOUT)	EA	12.000		12.000	
	666-6006	REFL PAV MRK TY I (W)4"(DOT)(100MIL)	LF	500.000		500.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	2,500.000		2,500.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	250.000		250.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MJL)	EA	10.000		10.000	
	666-6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	10.000		10.000	
	666-6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)	EA	2.000		2.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	10.000		10.000	
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	200.000		200.000	
	666-6167	REFL PAV MRK TY II (W) 4" (BRK)	LF	20,000.000		20,000.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	100,000.000		100,000.000	
	666-6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	500.000		500.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	500.000		500.000	
	666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	5,000.000		5,000.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	100,000.000		100,000.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	100.000		100.000	
	666-6211	REFL PAV MRK TY II (Y) 8" (SLD)	LF	100.000		100.000	
	666-6260	RE PM TY I(W)8"(SLD)(100MIL)(CALLOUT)	LF	5,000.000		5,000.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	10,000.000		10,000.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	35,000.000		35,000.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	500.000		500,000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	500.000		500,000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	15,000.000		15,000,000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	500.000		500.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	60,500.000		60,500,000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	1,600.000		1,600,000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	7,600.000		7,600.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	200.000		200.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	250.000		250,000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	10.000		10.000	
	677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	10.000		10.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	10.000		10,000	
	677-6036	ELIM EXT PAV MRK & MRKS (UTURN ARROW)	EA	2.000		2.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	60,500.000		60,500.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	1,600.000		1,600.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	7,600.000		7,600.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	200,000		200,000	



DISTRICT	COUNTY	CCSJ	SHEE	
Dallas	Denton	6363-78-001	2A	



QUANTITY SHEET

CONTROLLING PROJECT ID 6363-78-001

DISTRICT Dallas
HIGHWAY IH0035W

COUNTY Denton

		CONTROL SECT	ю јов	6363-7	8-001			
		PRO	JECT ID	A0273	7661			
		1	COUNTY	Dent	ton	TOTAL EST.	TOTAL FINAL	
		н	GHWAY	IH003	35W			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		1	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	250.000		250.000		
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	10.000		10.000		
	678-6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	10.000		10.000		
	678-6012	PAV SURF PREP FOR MRK (UTURN ARR)	EA	2.000		2,000		
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	10.000		10.000		
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	2.000		2,000		
	6185-6002	TMA (STATIONARY)	DAY	100.000		100.000		
	6185-6003	TMA (MOBILE OPERATION)	HR	1,000.000		1,000.000		



DISTRICT	COUNTY	CCSJ	SHEET
Dallas	Denton	6363-78-001	2B

County: Denton Highway: IH0035W

GENERAL NOTES:

General:

This project consists of performing "On-Call Reflectorized Pavement Markings" on various roadways in the Denton County Maintenance Section.

The Department reserves the right to revise schedule as it deems necessary.

Provide and maintain a dedicated email address for receipt of work orders and correspondence throughout the term of this contract. Acknowledgement of emailed work order/callouts is required no more than 12 hr. from notification.

Contractor's attention is called to the fact that all adjoining pavement sections will be protected during all phases of construction and any damages incurred due to Contractor's operation will be repaired and replaced at the Contractor's expense.

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

Coordinate work through:

Billy Meador Denton County Maintenance Supervisor 2624 West Prairie Denton, Texas 76201 940-387-1324

Bids will be received at 4777 E. Hwy 80, Mesquite, Texas 75150-6643.

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

Tina Massey, P.E. Tina. Massey@txdot.gov
Christopher Rocha, P.E. Christopher.Rocha@txdot.gov

Contractor questions will only be accepted through email to the above individuals.

All Contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/

Project Number: RMC-636378001 **Control:** 6363-78-001

County: Denton Highway: IH0035W

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name

Attention is directed to the possible presence of underground utilities owned by the Texas Department of Transportation (irrigation, signal, illumination and surveillance, communication, and control) on the right of way. Call the Department for locates at 214-320-6682 and 214-320-6205 48 hr. in advance of excavation. Contact the appropriate department of the local city or town a minimum of 48 hr. in advance of excavation.

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Cost associated with de-energizing the power lines or other protective measures required are at no expense to the Department.

If working near power lines, comply with the appropriate sections of Texas State Law and Federal Regulations relating to the type of work involved.

Item 2 - Instruction to Bidders:

This project includes plan sheets that are not part of the bid proposal

Order plans from any Reproduction Company listed at:

http://www.dot.state.tx.us/business/contractors consultants/repro companies.htm

View or download plans at:

http://www.dot.state.tx.us/business/plansonline/plansonline.htm

Item 3 – Award and Execution of Contract:

This contract is Non-Site Specific.

After written notification, work request will be on a callout basis.

Each callout work request will be continuously prosecuted to completion.

Work site is defined as the locations presented on the written callout work request.

Minimal quantity is 1,000 LF per written callout work request.

Begin physical work within 48 hr. of each written callout work request.

General Notes Sheet 3A General Notes Sheet 3B

County: Denton Highway: IH0035W

All work locations will be marked by the Engineer.

Schedule and begin physical work in each written callout work request within 48 hr. or as directed.

<u>Item 7 – Legal Relations and Responsibilities:</u>

Pre-construction safety meeting will be conducted with Contractor's personnel prior to work beginning on a continuously prosecuted contract or before each callout work request.

Attendance of this meeting will not be paid directly but considered subsidiary to the various bid items

Holiday restrictions – the Engineer may decide that no lane closures or construction operations will be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these restricted closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

- New Year's Eve and Day (noon on December 31 thru 10 P.M. January 1)
- Easter Holiday weekend (noon on Friday thru 10 P.M. Sunday)
- Memorial Day weekend (noon on Friday thru 10 P.M. Monday)
- Independence Day (noon on July 3 thru 10 P.M. on July 5)
- Labor Day weekend (noon on Friday thru 10 P.M. Monday)
- Thanksgiving Holiday (noon on Wednesday thru 10 P.M. Sunday)
- Christmas Holiday (noon on December 23 thru 10 P.M. December 26)

Holiday restrictions for Independence Day, Thanksgiving Holiday, and the Christmas Holiday may be extended for the "week of" due to the nature of work being performed and the work location at the discretion of the Engineer for safety of the traveling public.

There are no significant traffic generators identified for this project.

<u>Item 8 – Prosecution and Progress:</u>

Working days will be charged in accordance with Section 8.3.1.5., "Calendar Day".

The response time specified in this contract is an essential element. Liquidated damages will be assessed when the Contractor fails to begin work within the specified response time and/or the Contractor does not have all of the personnel and pieces of equipment necessary to fulfill the requirement of the item(s). The dollar amount specified in this contract will be deducted from

Project Number: RMC-636378001 **Control:** 6363-78-001

County: Denton Highway: IH0035W

any money due or to become due for any Item(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.

The continuous prosecution of each callout work request is an essential element of the contract. Failure to respond to a callout work request in the time frame allowed or discontinuance of the prosecution of work on any callout work request without the Engineer's approval will result in liquidated damages being charged each working day that the callout work request remains incomplete. The dollar amount specified in the contract will be deducted from any money due or to become due the Contractor. This amount will be assessed not as a penalty but as liquidated damages.

The continuous prosecution to completion is an essential element of the contract. Failure to continuously prosecute the work without the Engineer's approval will result in liquidated damages being charged each working day until work commences. The dollar amount specified in the contract will be deducted from any money due or to become due to the Contractor. This amount will be assessed not as a penalty but as liquidated damages.

When a minimum production rate is shown in the plans, liquidated damages will be charged for each working day the minimum production rate is not met.

Notify the TxDOT office a minimum of 24 hr. before beginning striping operations.

<u>Item 500 – Mobilization:</u>

Mobilization is call-out.

<u>Item 502 – Barricades, Signs, and Traffic Handling:</u>

Provide traffic control in compliance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), the "Traffic Control Standard Sheets" (TCSS), and as directed.

Perform work Monday through Friday during daylight hours. Do not begin work until 30 minutes after sunrise and cease operations 30 minutes before sunset.

If closing a lane is necessary, closure times will be Monday through Friday, 9 A.M. to 3:30 P.M except for otherwise noted roadways within these plans. Close no more than one lane at a time, unless otherwise approved. Provide proposed lane closure information to the Engineer by 1 P.M. on the day prior to the proposed closures. Furnish information for Monday closures or closures following a national or state holiday on the last office workday prior to the closures. Do not close lanes if the above reporting requirements have not been met.

Nighttime and weekend work will be allowed with prior approval, except for emergency work.

General Notes Sheet 3C General Notes Sheet 3D

County: Denton Highway: IH0035W

Lane closures on IH35, IH35W, IH35E, US380 and SH114 main lanes, frontage roads, and ramps will be allowed only at night between 10 P.M. and 5 A.M.

Maximum length of lane closure will be 2 miles.

Traffic Control Plans with a lane closure causing backups of 20 minutes or greater in duration will be modified by the Engineer.

Erect barricades and signs in locations not obstructing the traveling public's view of the normal roadway signing or necessary sight distance.

Provide sufficient and qualified staff and equipment to revise the traffic control as directed.

Trailer all slow-moving vehicles (designed to operate 25 mph or less) crossing freeway main lanes.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.

Equipment and materials will not be left within 30 ft. of the travel lane during non-working hours.

The work performed, materials furnished and all labor, tools, and equipment necessary to complete the work for Non-Site Specific locations under this Item will not be measured or paid for directly but will be considered subsidiary to the various bid items of this contract.

The "Force Account – Safety Contingency" has been established for this project and is intended to be utilized for work zone enhancements to improve the effectiveness of the Traffic Control Plan that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 666 – Reflectorized Pavement Markings:

The minimum production rate for long line striping is equal to the Material Placement Requirements.

Pavement marking words and arrows details are contained in the Standard Highway Sign Designs for Texas (SHSD).

Placement of markings in proper alignment will be strictly enforced. Irregular lines placed on both sides of the existing markings will not be accepted.

Project Number: RMC-636378001 **Control:** 6363-78-001

County: Denton Highway: IH0035W

A gravity flow applicator will be used to funnel the beads onto the stripe. Truck speed will be slow enough to ensure that the beads drop onto the stripe and do not roll in the paint film.

All stripes will be applied in 1 coat.

Layout work will be required where markings have been obliterated, sealed, or overlayed

All equipment will be capable of maintaining a continuous work schedule to the satisfactory completion of the project. Equipment used for the contract will be equipped with footage counters capable of measuring the linear footage placed. Counters must be calibrated prior to the beginning of striping operations.

Dispose of all empty marking material containers in accordance with all federal, state, and local regulations.

<u>Item 677 – Eliminating Existing Pavement Markings and Markers:</u>

Surface Treatment Method will not be allowed for removal of pavement markings.

Grinding of pavement is not allowed to eliminate pavement markings.

Eliminate existing pavement markings on concrete surfaces before new pavement markings are applied.

A water blasting method approved by the Engineer will be the only method allowed for the removal of permanent and temporary pavement markings except on a seal coat surface. A 2 foot wide seal coat will be required on seal coat surfaces to eliminate permanent and temporary pavement markings.

Item 678 – Pavement Surface Preparation for Markings:

Per Item 9, plans quantity measurement requirements are not applicable.

<u>Item 6001 – Portable Changeable Message Sign:</u>

Provide Portable Changeable Message Signs (PCMS) units as approved.

PCMS will be placed 7 days or as directed prior to the ramp/lane closures.

County: Denton Highway: IH0035W

<u>Item 6148 - Inverted Profile Pavement Marking (Audible):</u>

Use a crew experienced in the application of the Audible Reflective Pavement Markings, capable of placing the marking in neat straight lines, and in a safe and timely manner. Place the reflective pavement markings in such a manner as to match the existing markings in location, spacing and length. Placement of markings in proper alignment will be strictly enforced. Irregular lines placed on both sides of the existing markings will not be accepted.

Ensure that all equipment will be capable of maintaining a continuous work schedule to the satisfactory completion of the project. Make certain that equipment used for the contract will be equipped with footage counters capable of measuring the linear footage placed. Calibrate counters prior to the beginning of striping operations.

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
(1-2)-18		1
(1.2) 10	A	1
(1-3)-18	В	2
(1-4)-18		1

TCP 3 Series	Scenario	Required TMA
(3-1)-13	All	2
(3-2)-13	All	3
	A	2
(2.2) 14	В	2
(3-3)-14	С	3
	D	2

TCP 6 Series	Scenario	Required TMA
((1) 12	A	1
(6-1)-12	В	2
(6-2)-12	All	1
(6-3)-12	All	1

Project Number: RMC-636378001 **Control:** 6363-78-001

County: Denton Highway: IH0035W

(6.4) 12	A	1
(6-4)-12	В	2
(6-5)-12	A	1
(0-3)-12	В	2
(6-6)-12	All	1 Per Lane

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.

General Notes Sheet 3G General Notes Sheet 3H

SUMMARY OF PAVEMENT MARKING ITEMS

	666	666	666	666	666	666	666	666	666	666	666	666	666
	6006	6036	6048	6054	6057	6063	6078	6141	6167	6170	6171	6174	6178
LOCATION	REFL PAV MRK TY I (W)4"(DOT)(10 OMIL)	TY I	TYI	TYI	REFL PAV MRK TY I(W)(DBL ARROW)(100MI L)	REFL PAV MIRK	TVI		REFL PAV MRK TY II (W) 4" (BRK)	REFL PAV MRK TY II (W) 4" (SLD)	REFL PAV MRK TY II (W) 6" (BRK)	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (W) 8" (SLD)
	LF	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF
NON-SITE SPECIFIC	500	2500	250	10	10	2	10	200	20000	100000	500	500	5000
PROJECT TOTALS	500	2500	250	10	10	2	10	200	20000	100000	500	500	5000

	666	666	666	666	666	666	666	666	666	666	677	677	677
	6207	6210	6211	6260	6300	6303	6306	6309	6315	6321	6001	6002	6003
LOCATION	REFL PAV MRK TY II (Y) 4" (SLD)		REFL PAV MRK TY II (Y) 8" (SLD)		RE PM W/RET REQ TY I (W)4"(BRK)(10 OMIL)	RE PM W/RET REQ TY I (W)4"(SLD)(10 OMIL)	RE PM W/RET REQ TY I (W)6"(BRK)(10 OMIL)	RE PM W/RET REQ TY I (W)6"(SLD)(10 OMIL)	RE PM W/RET REQ TY I (Y)4"(SLD)(100 MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100 MIL)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (6")	ELIM EXT PAV MRK & MRKS (8")
	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF
NON-SITE SPECIFIC	100000	100	100	5000	10000	35000	500	500	15000	500	60500	1600	7600
PROJECT TOTALS	100000	100	100	5000	10000	35000	500	500	15000	500	60500	1600	7600

	677	677	677	677	677	677	678	678	678	678	678	678	678
	6005	6007	6008	6009	6012	6036	6001	6002	6004	6006	6008	6009	6010
LOCATION	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (ARROW)	ELIM EXT PAV MRK & MRKS (DBL ARROW)	ELIM EXT PAV MRK & MRKS (WORD)	ELIM EXT PAV MRK & MRKS (UTURN ARROW)	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (DBL ARROW)
	LF	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA
NON-SITE SPECIFIC	200	250	10	10	10	2	60500	1600	7600	200	250	10	10
										, and the second			
PROJECT TOTALS	200	250	10	10	10	2	60500	1600	7600	200	250	10	10

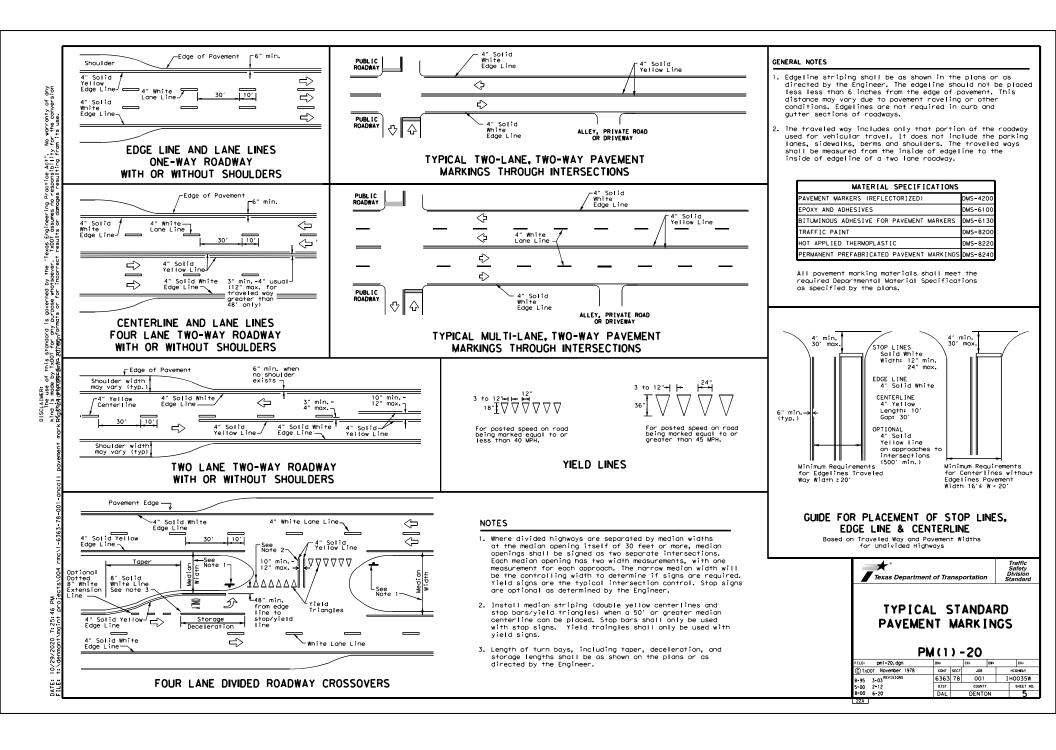
	678	678	6148	6148
	6012	6016	6005	6006
LOCATION	PAV SURF PREP FOR MRK (UTURN ARR)	PAV SURF PREP FOR MRK (WORD)	INV PROV PAV MRK (AUD) (Y) 4" (SLD)	INV PROV PAV MRK (AUD) (Y) 4" (BRK)
	EA	EA	LF	LF
NON-SITE SPECIFIC	2	10	8000	2000
PROJECT TOTALS	2	10	8000	2000

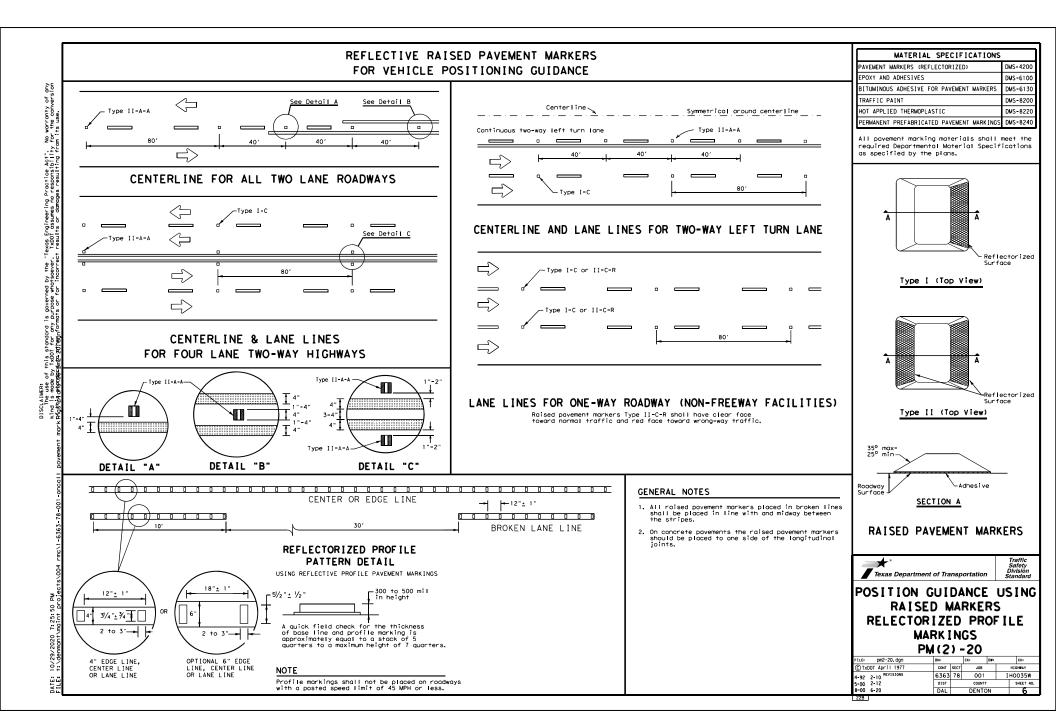
SHEET 1 OF 1

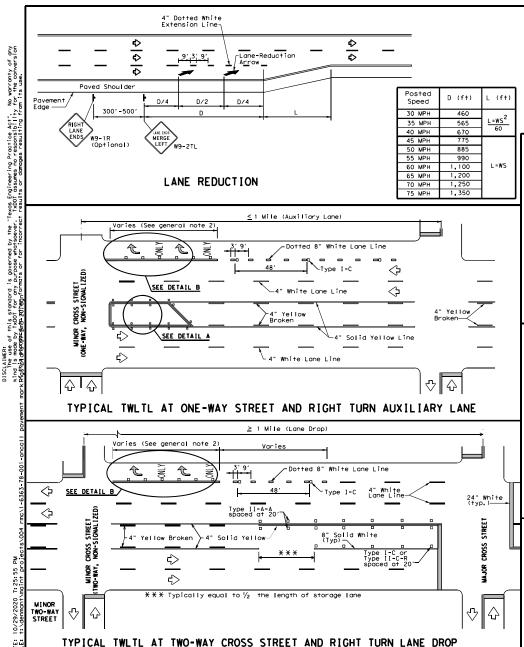


SUMMARY SHEET

SCALE:						
DESIGN DMH	FED. RD. DIV. NO.	MAII	MAINTENANCE PROJECT			
GRAPHICS	6	RM	RMC-636378001			
DMH	STATE	DISTRICT	COUNTY	SHEET NO.		
DMH	TEXAS	DALLAS	DENTON			
CHECK	CONTROL	SECTION	JOB	4		
DMH	6363	78	001			

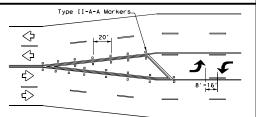






NOTES

- Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TSZ (PL) standard sheets.
- On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- 3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
- For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

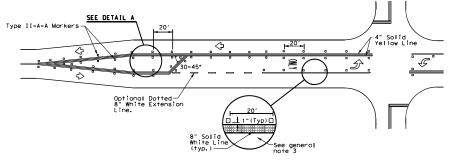
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

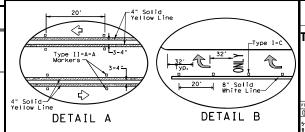
- I. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
- 2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the boy is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
- Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



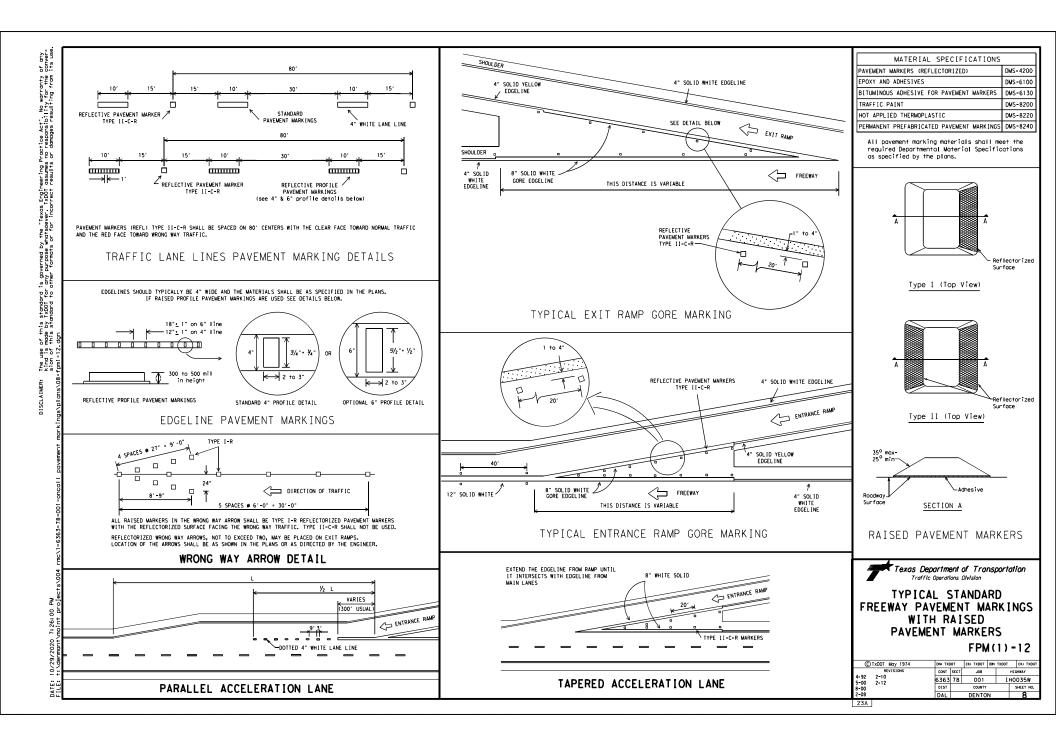
TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS

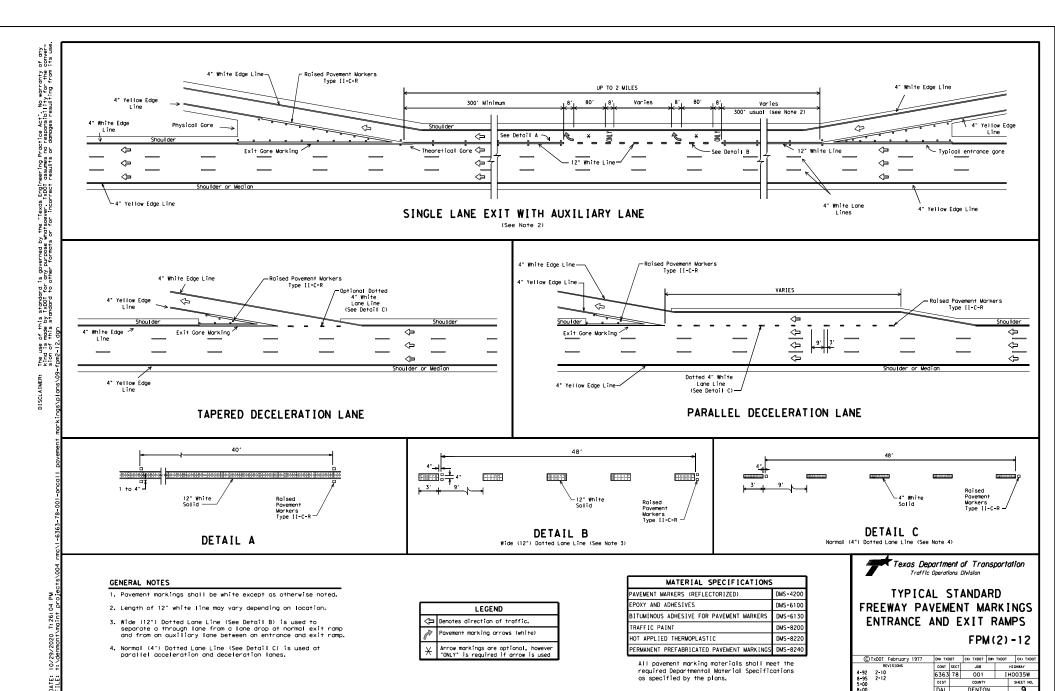




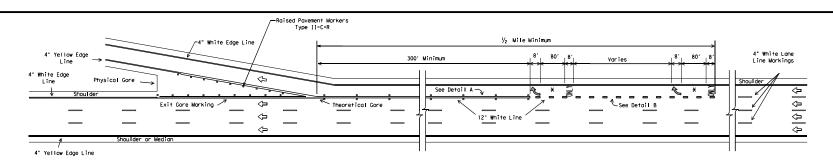
WO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

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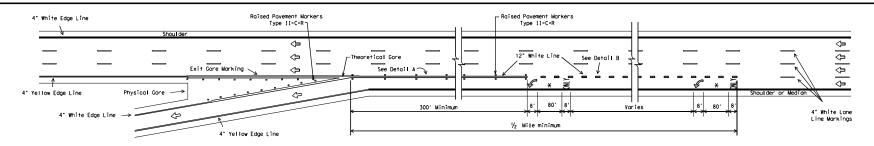




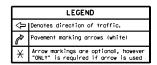
23B



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

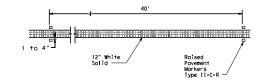


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFTHAND)

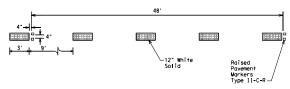


GENERAL NOTES

- 1. Pavement markings shall be white except as otherwise noted.
- 2. Length of 12" white line may vary depending on location.
- Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.



DETAIL A



DETAIL B
Wide (12") Dotted Lane Line (See Note 3)

MATERIAL SPECIFICATIONS					
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200				
EPOXY AND ADHESIVES	DMS-6100				
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130				
TRAFFIC PAINT	DMS-8200				
HOT APPLIED THERMOPLASTIC	DMS-8220				
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240				

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

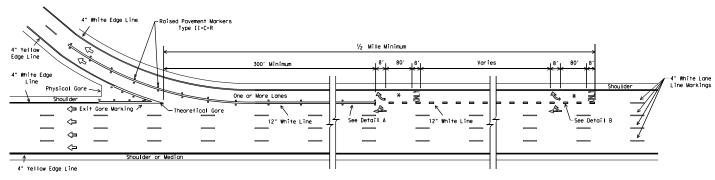


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS LANE DROP (EXIT ONLY) EXIT RAMPS

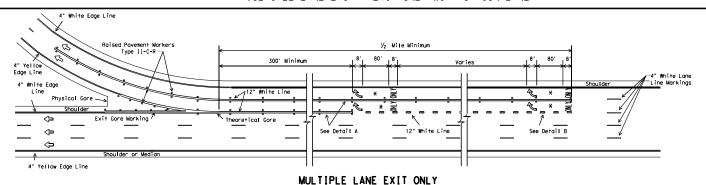
FPM(3)-12

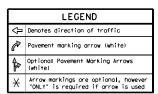
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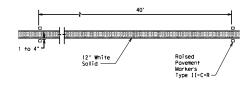
MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE



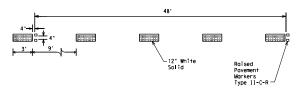


GENERAL NOTES

- 1. Pavement markings shall be white except as otherwise noted.
- 2. Length of 12" white line may vary depending on location.
- Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.



DETAIL A



DETAIL B
Wide (12") Dotted Lane Line (See Note 3)

MATERIAL SPECIFICATIONS					
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200				
EPOXY AND ADHESIVES	DMS-6100				
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130				
TRAFFIC PAINT	DMS-8200				
HOT APPLIED THERMOPLASTIC	DMS-8220				
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240				

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



TYPICAL STANDARD
FREEWAY PAVEMENT MARKINGS
LANE DROP (EXIT ONLY) DETAILS

FPM(4)-12

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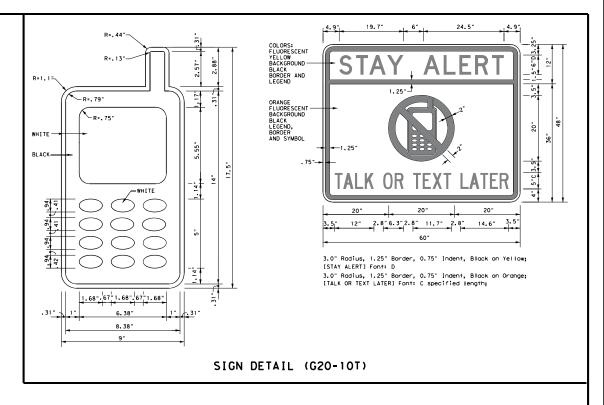
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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 Monual on Uniform Traffic Control Devices" (TMUTCD).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- 8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- 9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- 10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.
- 12. The Engineer has the final decision on the location of all traffic control devices.
- 13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

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



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

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

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

SHEET 1 OF 12

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1) - 14

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- 1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a
- with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown
- Rased on existing field conditions, the Engineer/Inspector may require additional signs such as ELAGGER 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 ROAD WORK NEXT X MILES ⇒ G20-1bTR ROAD WORK G20-1bTL INTERSECTED 1000'-1500' - Hwy 1 Block - City 1000'-1500' - Hwy 1 Block - City ROADWAY ➾ G20-5aP WORK ZONE Limit ZONE G20-5aF TRAFF I ROAD WORK R20-5T FINES R20-5T FINE R20-5oTP R20-5aTF BHEN BORKERS ARE PRESENT END ROAD WORK G20-2

CSJ LIMITS AT T-INTERSECTION

- 1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
- 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

...

SPACING

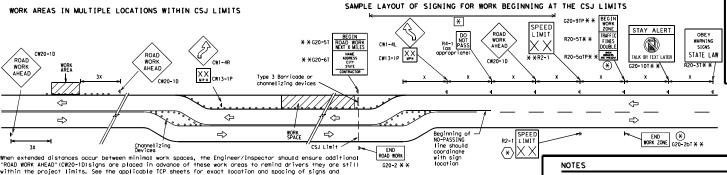
	SIZE	
Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20 ⁴ CW21 CW22 CW23 CW25	48" × 48"	48" × 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" × 36"	48" × 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" × 48"	48" × 48"

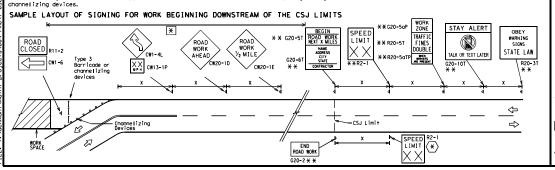
Posted Speed	Sign ^Δ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500 ²
60	600 ²
65	700 ²
70	800 ²
75	900 ²
80	1000 ²
*	* 3

- For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.
- 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.
- 2. Distance between signs should be increased as required to have 1500 feet advance warning.
- 3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical
- 5. Only diamond shaped warning sign sizes are indicated.
- See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design





The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-51) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer No decimals shall be used

- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- ** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.
- $\stackrel{\textstyle \times}{}$ Contractor will install a regulatory speed limit sign at the end of the work zone.

	LEGEND				
-	⊢ Type 3 Barricade				
00	0	Channelizing Devices			
_	Γ.	Sign			
x		See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.			

SHEET 2 OF 12

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	Texas Department of Tran	sportation

Traffic Operations Division Standard

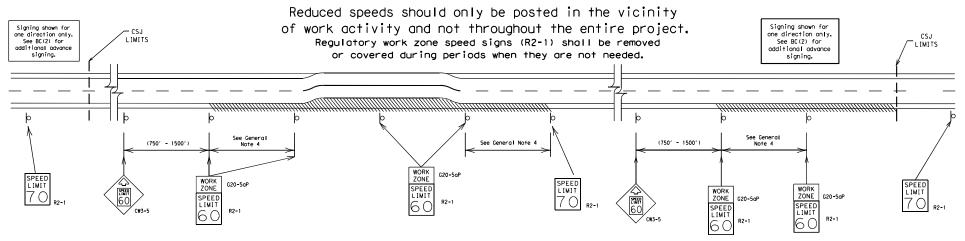
BARRICADE AND CONSTRUCTION PROJECT LIMIT

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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

- 1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- 2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- 3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 4. Frequency of work zone speed limit signs should be:

40 mph and greater 0.2 to 2 miles 35 mph and less

0.2 to 1 mile

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

SHEET 3 OF 12



Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

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TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS ROAD ROAD ROAD ROAD WORK minimum WORK WORK WORK from AHEAD AHEAD AHEAD curb AHEAD min. 7.0' min. 9.0' max. 7.0' min. 6' or 7.0' min. 9.0' max. 6.0' mir areate 9.0' max. 1 ATTITUTE Payed 115/18/

* 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.

shoul der

ROAD

:\work:

AHEAD

* * When plagues are placed on dual-lea supports, they should be attached to the upright negrest 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. Foch sion shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

STOP/SLOW PADDLES

shall not

protrude

above sign

Support shall not

protrude

above sign

Sign supports shall

extend more than

1/2 way up the

back of the sign

substrate. FRONT ELEVATION

Wood metal or

Splicing embedded perforated square metal tubing in order to extend post

height will only be allowed when the splice is made using four bolts, two

above and two below the spice point. Splice must be located entirely behind

the sign substrate, not near the base of the support. Splice insert lengths

should be at least 5 times nominal post size, centered on the splice and

of at least the same gauge material.

Fiber Reinforced Plastic

- 1. STOP/SLOW poddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
- When used at night, the STOP/SLOW paddle shall be retroreflectorized.
- 3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 4. Any lights incorporated into the STOP or SLOW paddle faces

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

SIDE ELEVATION

Wood

- 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 interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- 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
- 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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid
- for under the appropriate pay item for relocating existing signs.

 Any sign or traffic control device that is struck or damaged by the Contractor 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

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, worn, 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 amitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's
- Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's IXOD 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" (CWETCD). 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 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

 1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
- 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 in life of 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 CMZTCD lists each substrate that can be used on the different types and models of sign supports.

 "Mesh" type materials are NOI on approved sign substrate, regardless of the tightness of the weave.
 - Tween type materials are Nul on approved sign substrate, regardless of the fightness of the weave.
 All wooden individual sign panels faber laceted from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastered to the back of the sign and extending fully across the sign. The clear shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign ponel. The screws shall be placed on both side of the splice and spaced of 6" enters. 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_{FL} , 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
- he 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 roodway. 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 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 stubs 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, cohesionless sand should be used. 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 support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- 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.

SHEET 4 OF 12

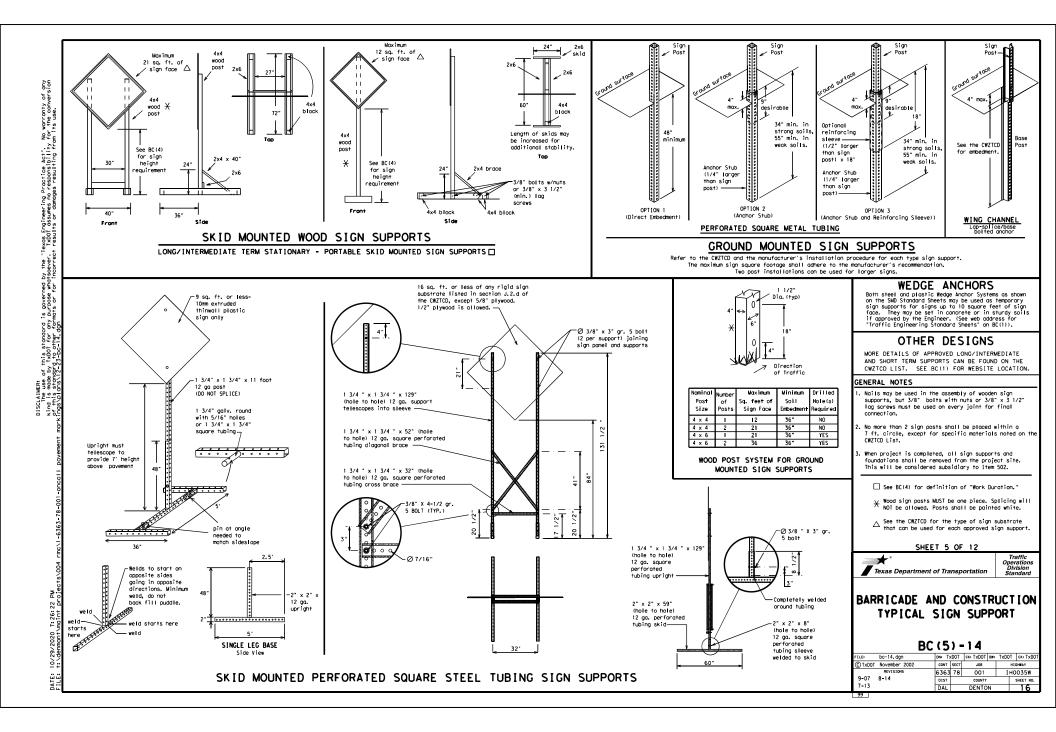
Traffic Operations Division Standard Texas Department of Transportation

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4) - 14

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

- 1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO,"
- 3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by
- 4. Use the word "EXII" to refer to an exit ramp on a freeway; i.e.,
- "EXIT CLOSED." Do not use the term "RAMP."

 5. Always use the route or interstate designation (IH, US, SH, FM)
- along with the number when referring to a roadway.

 When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.

 7. The message term "WEEKEND" should be used only if the work is to
- start on Saturday morning and end by Sunday evening at midnight.

 Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
 8. The Engineer/Inspector may select one of two options which are avail-
- able 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.
- 10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- 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.
- 13. Do not display messages that scroll horizontally or vertically across the face of the sign.
- 14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- 15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- 16. Each line of text should be centered on the message board rather than left or right justified.

 17. If disabled, the PCMS should default to an illegible display that will
- not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION	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
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PK ING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT RIE	Saturday	SAT
East	F	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER E	Slippery	SLIP
Emergency Vehicle		South	S
	ENT	Southbound	(route) S
Entrance, Enter Express Lane	EXP LN	Speed	SPD
	EXP LN	Street	ST
Expressway XXXX Feet	XXXX FT	Sunday	SUN
	FOG AHD	Telephone	PHONE
Fog Ahead		Temporary	TEMP
Freeway Freeway Blocked	FRWY, FWY	Thursday	THURS
	FRI DLKU	To Downtown	TO DWNTN
Friday		Traffic	TRAF
Hazardous Driving		Travelers	TRVLRS
Hozordous Material		Tuesday	TUES
High-Occupancy Vehicle	HOV	Time Minutes	TIME MIN
	HWY	Upper Level	UPR LEVEL
Highway Hour (s)	UD UDC	Vehicles (s)	VEH, VEHS
	HR, HRS	Warning	WARN
Information	INFO ITS	Wednesday	WED
It Is		Weight Limit	WT LIMIT
Junction	JCT	West	W
Left	LFT	Westbound	(route) W
Left Lane	LFT LN	Wet Povement	WET PVMT
Lane Closed	LN CLOSED	Will Not	WONT
Lower Level	LWR LEVEL		
Maintenance	MAINT		

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ram	p Closure List	Other Cond	ition List
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT

1. Only 1 or 2 phases are to be used on a PCMS.

APPLICATION GUIDELINES

The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

- 3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phose Lists".
- 4. 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.
- 6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

Phase 2: Possible Component Lists

	/Effect on Travel .ist	Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX- XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE	*	* * :	See Application Guidelines Not	e 6.

WORDING ALTERNATIVES

- 1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
 2. Roadway designations IH, US, SH, FM and LP can be interchanged as
- oppropriate. 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.
- 6. AHEAD may be used instead of distances if necessary.
- 7. FT and MI, MILE and MILES interchanged as appropriate. 8. AT, BEFORE and PAST interchanged as needed.
- 9. Distances or AHEAD can be eliminated from the message if a

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

XXXXXXXX BLVD

- 1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.

 2. When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Watrix PCWS sign and, with the approval of the Engineer, it
- shall maintain the legibility/visibility requirement listed above.

 3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute
- for, or replace that sign.

 4. A full matrix PCWS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the

SHEET 6 OF 12

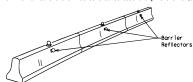


BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 14

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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of pregualified Barrier Reflectors can be found at the Material Producer List web address
- 2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The



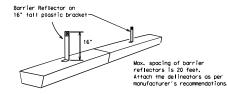
CONCRETE TRAFFIC BARRIER (CTB)

- 3. Where traffic is on one side of the CTB. two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB.

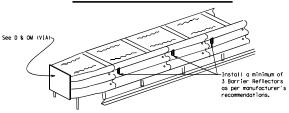
 An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.

 4. Where CTB separates two-way traffic, three barrier reflectors shall be
- mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one vellow reflective face, as shown in
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
 Barrier Reflector units shall be yellow or white in color to match
- the edgeline being supplemented.
- 7. Maximum spacing of Barrier Reflectors is forty (40) feet.
 8. Pavement markers or temporary flexible-reflective roadway marker tabs
- shall NOT be used as CTB delineation.

 9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's
- recommendations.
- 10. Missing or damaged Barrier Reflectors shall be replaced as directed
- by the Engineer.
 11. Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

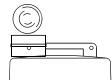


DELINEATION OF END TREATMENTS

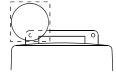
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

- 1. Warning lights shall meet the requirements of the TMUTCD.
- 2. Warning lights shall NOI be installed on barricades.
 3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous orea. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Morning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.

 4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control
- devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- 5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
 6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will
- certify the warning lights meet the requirements of the latest LTE Purchase Specifications for Flashing and Steady-Burn Warning Lights.

 7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- 8. The location of warning light's 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.
- 2. Type a videout intermining within a property of the sequential flashing worning lights placed on channelizing devices to form a merging toper may be used for delineation. If used, the successive flashing of the sequential worning lights should occur from the beginning of the taper to the end of the merging taper in
- order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.

 4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
- 5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- 6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing

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

- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the
 discretion of the Contractor unless otherwise noted in the plans.
- 2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed
- The worning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.

- 4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.

 5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.

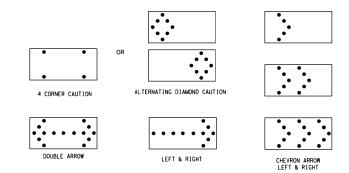
 7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.

- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
 The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

- The Flashing Arrow Board should be used for all lone closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lones.
 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, borricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
 The Engineer Arrow Board.

- 4. 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 Coution mode as shown. The straight line coution display is NOT ALLOWED. The straight line coution 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 thines' shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.

- intervals of 25 percent for each sequential phase of the flashing chevron.

 9. The sequential arrow display is NO ALLOWED.

 10. The flashing arrow display is the IXDOT standard, however, the sequential Chevron display may be used during daylight operations.

 11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.

 12. A Flashing Arrow Board SHALL NOT BE USED to Interally shift traffic.

 13. A full matrix PAUS may be used to simulate a Flashing Arrow Board rovided it meets visibility, flagh rate and dimming requirements on this sheet for the same size arrow.

 14. Minimum mounting helph of trailer mounted Arrow Board should be 7 feet from roadway to bottom of ponel.

REQUIREMENTS					
TYPE	MENIMUM Size	M[N]MUM NUMBER OF PANEL LAMPS	MINIMUM VIS[B[L]TY DISTANCE		
В	30 × 60	13	3/4 mile		
^	48 v 06	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 National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).

 Refer to the CMZTCD for the requirements of Level 2 or
- Level 3 TMAs. Refer to the CWZTCD for a list of approved TMAs.
- 4. TMAs are required on freeways unless otherwise noted
- in the plans. 5. A TMA should be used anytime that it can be positioned
- 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.

 6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

*	*
Texa	as Department of Transportation

Traffic Operations Division Standard

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

BC(7) - 14

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	8-14	DIST		COUNTY			SHEET NO.
7-13		DAL	DENTON				18

GENERAL NOTES

- 1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- 3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
- Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- 5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- 6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

- 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.
- 3. Plastic drums shall be constructed of Lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
- 4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- 5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
- 6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in
- 7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- 9. Drum body shall have a maximum unballasted weight of 11 lbs.
- 10. Drum and base shall be marked with manufacturer's name and model number.

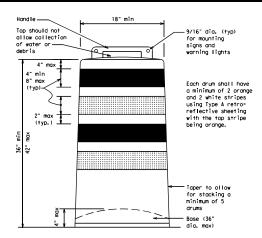
RETROREFLECTIVE SHEETING

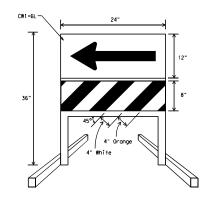
- 1. The stripes used on drums shall be constructed of sheeting meeting the ne simps used of dula shari be donificated or sweeting weeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
- 2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting

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 payement surface may not exceed 12 inches.

 2. Bases with built-in ballast shall weigh between 40 lbs, and 50 lbs.
- Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- 6. Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.

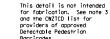


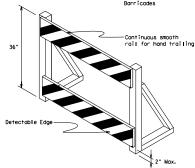


DIRECTION INDICATOR BARRICADE

- The Direction Indicator Barricade may be used in tapers, transitions, and other creas where specific directional guidance to drivers is necessary.

 If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into
- In series to direct the driver through the transition and into the intended frowel lone. Bornicode shall consist of One-Direction. The Direction Indicator Bornicode shall consist of One-Direction Lorge Arrow ((Wi-6) sign in the size shown with a black arrow on a background of Type $B_{\rm R}$ or Type $C_{\rm R}$ dronge retroreflective sheeting above a roll with Type A retroreflective sheeting in alternating 4". white and orange stripes slaping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300. Double arrows on the Direction Indicator Barricade will not be
- Approved manufacturers are shown on the CWZTCD List.
 Ballast shall be as approved by the manufacturers instructions.





DETECTABLE PEDESTRIAN BARRICADES

- 1. When existing pedestrian facilities are disrupted, closed, or relocated in a IIC zone, the temporary facilities about the men existing pecestrian tacilities are disrupted, closed, or relocated in ofTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
 Where pedestrians with visual disabilities normally use the
- closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cone shall be placed across the full width of the closed sidewalk.

 3. Detectable pedestrian barricades similar to the one platured
- above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian
- Tage, rone, or plastic chain strung between devices are not rope, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian
- 6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- 1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 2. Chevrons and other work zone signs with an orange background unerrons and other work zone signs with an orange background shall be manufactured with Type B_p. or Type C_p. Forange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- 3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- 4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- 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.
- 7. Chevrons may be placed on drums on the outside of curves. on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12

Texas Department of Transportation

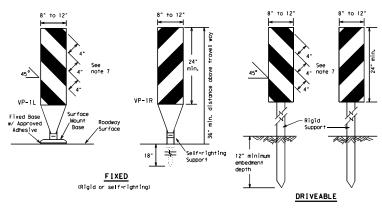
Traffic Operations Division Standard

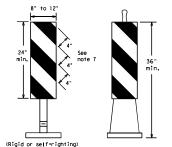
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8) = 14

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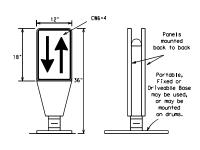


PORTABLE

Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.

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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



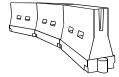
Fixed Base w/ Approved Adhesive (Driveoble Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be
- connected together. They are not designed to contain or redirect a vehicle on impact.

 2. LCDs may be used instead of a line of cones or drums.

 3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list,
- 4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- 6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

- 1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the
- work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.

 2. Mater ballasted systems used to channelize vehicular traffic shall be supplemented in retroreflective delination or channelizing devices to improve doytime/injettime visibility. They may also be supplemented with povement 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.
- 4. Water ballosted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPHI 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 bollosted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

Speed	Formula		esirob er Len * *		Spacing of Channelizing Devices		
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30	WS ²	150′	1651	180'	30′	60′	
35	L = WS	205′	2251	2451	35′	701	
40	80	2651	2951	3201	40′	801	
45		450′	495′	540'	45′	90'	
50		5001	550′	6001	50′	1001	
55	L=WS	5501	6051	6601	55′	110'	
60	" " "	600'	660'	720'	60′	120'	
65		650'	7151	7801	65′	130′	
70		7001	770'	8401	70′	140'	
75		750′	8251	9001	75′	1501	
80		800'	8801	960'	80'	1601	

** Taper Tenaths have been rounded off. L=Length of Taper (FT.) W=Width of Offset (FT.)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Traffic Operations Division Standard Texas Department of Transportation

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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TYPE 3 BARRICADES

- . Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
- 2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
- Borricades 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 borricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.

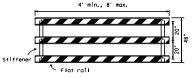
 Striping of rails, for the right side of the roadway, should slope
- downward to the left. For the left side of the roadway, striping should slope downward to the right.
- 5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos 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.
- 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. that covers any portion of a particose fails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sanabags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sanabags sholl be mode of a duroble material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sanabags. Sanabags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
- 9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



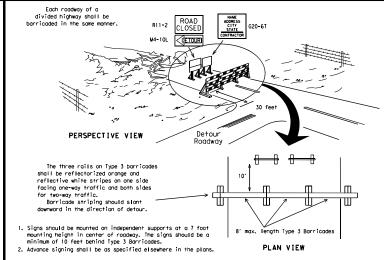
Minimum Width of

TYPICAL STRIPING DETAIL FOR BARRICADE RAIL

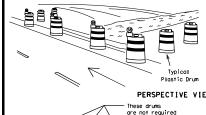


Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

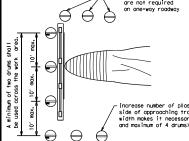
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

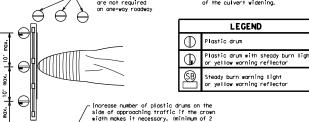


PERSPECTIVE VIEW



PLAN VIEW

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



CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

CONES 3"-4" 4" min, orange 2" min. white 2" min. white 2" min. orange 6" min. 2" max. 3" min. 2" min. 4" min. white **1**4" mi∩. 6" min. 2" to 6" ⊏ 2" min min. min. Two-Piece cones Tubular Marker One-Piece cones

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

Alternate \bigcirc Alternate ф Drums, vertical panels or 42" cones Approx. \bigcirc Approx. 501 at 50' maximum spacina 501 Min. 2 drums Min. 2 drums or 1 Type 3 Type : \bigcirc barricade barricade STOCKPILE On one-way roads Desirable downstream drums stockpile location Channelizing devices parallel to traffic or barricade may be should be used when stockpile is omitted here clear zone. within 30' from travel lane. ⇦ ➾

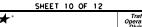
TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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 gid in retrieving the device.
- 4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
- 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
- 7. Cones or tubular markers used on each project should be of the same size

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014. **EDGELINE** CHANNEL IZER

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



Traffic Operations Division Standard Texas Department of Transportation

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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GENERAL 1. The Cont

- The Contractor shall be responsible for maintaining work zone and existing powement 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 INUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- 6. When standard powement 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(12).
- All raised pavement markers used for work zone morkings shall meet the requirements of Iren 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

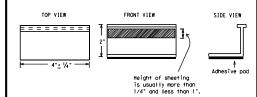
- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- The markings 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 I tem 662.

REMOVAL OF PAVEMENT MARKINGS

WORK ZONE PAVEMENT MARKINGS

- Povement markings that are no longer applicable, could create confusion or direct a material 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 channellzing devices are used in lieu of markings to autiline 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 TXDDT Specification I tem 677 for "Eliminating Existing Pavement Workings and Markers".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in 1tem 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.
- 7. 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.
- 10.Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAYEMENT SURFACE

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- Tobs 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 rondway.
 - A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Moterials and Povement Section to determine specification compliance.
 - B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic powement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- 3. Small design variances may be noted between tab manufacturers.
- 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

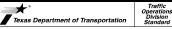
- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- Adhesive for guidemarks shall be bituminous material hot applied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



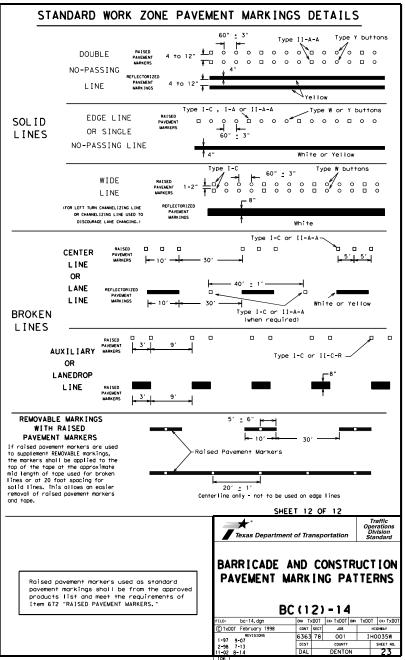
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

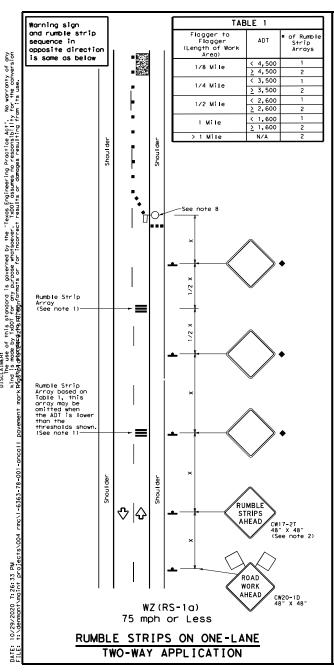
BC(11)-14

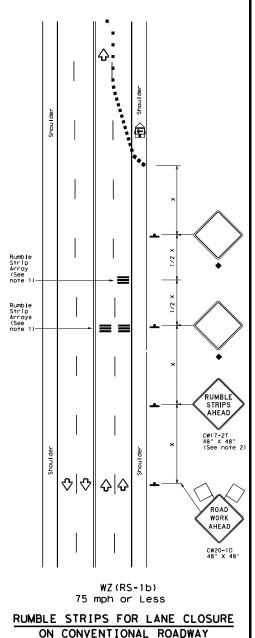
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©TxD0T February 1998	CONT	SECT	JOB		HI	GHWAY	
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1-02 7-13	DIST		COUNTY			SHEET NO.	
11-02 8-14	DAL	DENTON				22	

105

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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.
- 2. 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.
- Removal of the Temporary Rumble Strips should be accomplished before removing the advance 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 AFAD or a portable traffic signal.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment.

LEGEND									
	Type 3 Barricade		Channelizing Devices						
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)						
(1)	Trailer Mounted Flashing Arrow Panel	M	Portable Changeable Message Sign (PCMS)						
ŀ	Sign	Ŷ	Traffic Flow						
\Diamond	Flag	L)	Flagger						

Posted Formul Speed		**		Spacin Channe		Minimum Sign Spacing "x"	Suggested Longitudinal Buffer Space	
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"В"
30	. WS ²	150'	165'	1801	30′	60′	120'	90'
35	L = WS	2051	2251	2451	35′	701	160'	120′
40	80	2651	2951	3201	40'	80'	240'	155′
45		450'	495′	5401	45′	901	320'	1951
50		5001	550′	600′	50′	1001	4001	240'
55	L=WS	550'	6051	660'	55′	110'	5001	295′
60	" " "	600'	660'	7201	60′	1201	600,	350′
65	1	650'	715′	7801	65`	130'	7001	410'
70	l	700'	770'	8401	701	140′	800′	475′
75		750′	8251	9001	75′	150′	900'	540′

- * Conventional Roads Only
- XX 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					
	1	1							

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

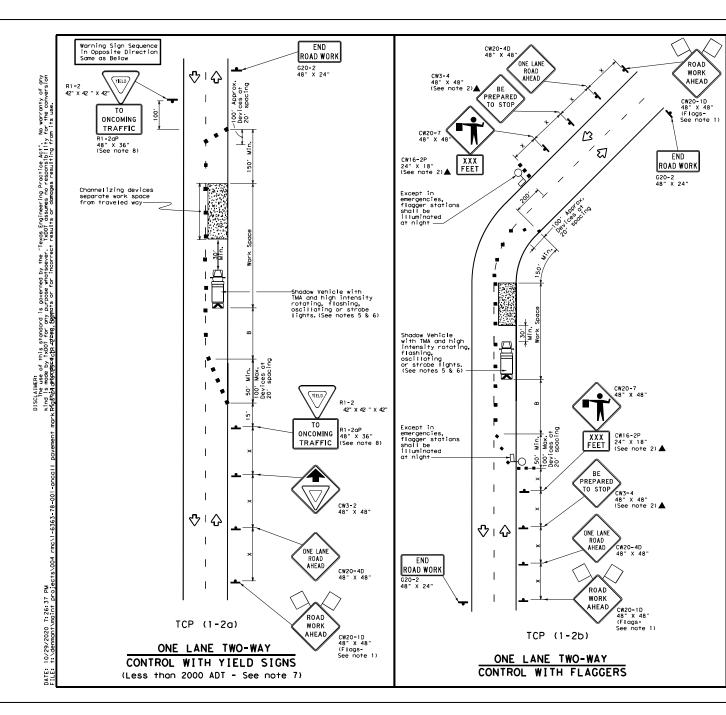
TABLE 2							
Speed	Approximate distance between strips in an Array						
< 40 MPH	10'						
> 40 MPH & < 55 MPH	15'						
> 55 MPH	20'						

*	l
Texas Department of Transportation	

TEMPORARY RUMBLE STRIPS

WZ(RS) = 16

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4-10		DAL	DENTON				24



	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						
\Diamond	Flag	4	Flagger						

Speed			Desirable			d Maximum ng of Lizing ices	Minimum Sign Spacing "x"	Suggested Longitudinal Buffer Space	Stopping Sight Distance
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"В"	
30	ws²	150′	165′	180'	30'	60'	120′	90′	200'
35	L = WS	2051	2251	2451	35′	701	1601	120'	250'
40	- 60	2651	2951	320′	40'	80′	240'	155′	305′
45		450'	4951	540'	45′	90'	3201	195′	360'
50		500′	5501	600'	50′	100'	4001	240′	425'
55	L=WS	550'	6051	660'	55′	110'	500′	295′	4951
60	L - # 3	600'	660'	720'	60'	120'	600'	350′	570'
65		650'	715′	780'	65′	1301	7001	410'	645'
70		700′	7701	840'	701	140'	800'	475′	730′
75		750′	8251	9001	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			
	1	1					

GENERAL NOTES

- 1. 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.

 3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE

- A The MR-4 Be THEFARCH of SIGN but proper sign specing shall be maintained unter the CH22-TO VALL LAND.

 4. Sign specing may be increased or an additional OR201D ROAD MORK AHEAD sign may be used if advance warning sheed of the flagger or R1-2 "YIELD" sign is less than 1500 feet.

 5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or
- quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices
- may be substituted for the Shadow Vehicle and TMA.

 6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

- 7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban greas, 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 R1-20" TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

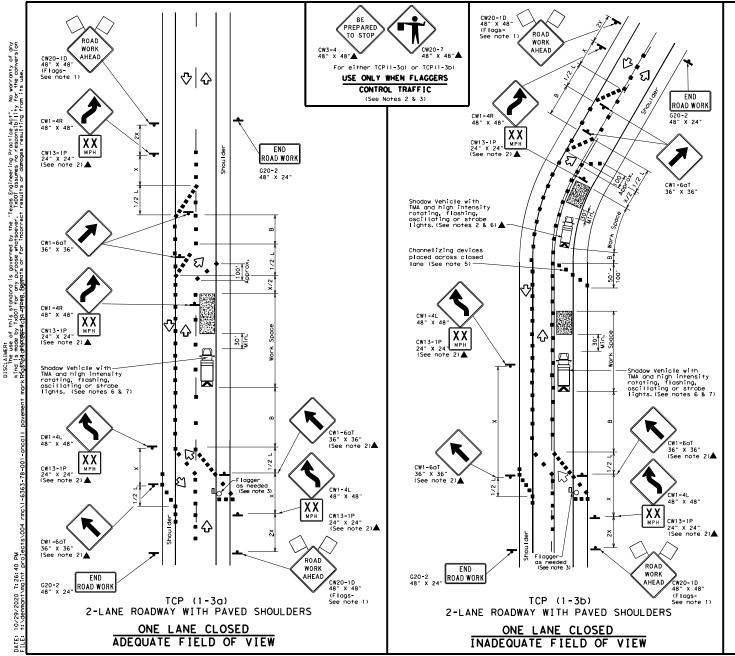
- 9. Flaggers should use two-way radios or other methods of communication to control traffic. 10. Length of work space should be based on the ability of flaggers to communicate. 11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger
- and a queue of stopped vehicles (see table above). Channelizing devices on the center-line may be amitted when a pilot car is leading traffic and approved by the Engineer.
- 13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Traffic Operations Division Standard Texas Department of Transportation

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

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4-90 4-98	6363	78	001		IH0035W		
2-94 2-12	DIST		COUNTY			HEET NO.	
1-97 2-18	DAL	DENTON				25	



	LEGEND								
~~~	Type 3 Barricade		Channelizing Devices						
	Heavy Work Vehicle	K	Truck Mounted Attenuator (TMA)						
<b>E</b>	Trailer Mounted Flashing Arrow Board	(M	Portable Changeable Message Sign (PCMS)						
-	Sign	♡	Traffic Flow						
$\Diamond$	Flag	3	Flagger						

Speed	Formula	Desirable Taper Lengths **			Spacir Channe		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space	
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"	
30		150′	1651	180′	301	60'	120′	90′	
35	L = WS	2051	225'	245'	35′	70′	160′	120'	
40	80	2651	295′	3201	40′	80′	240'	1551	
45		450'	4951	540'	45′	90′	320′	1951	
50		500'	550'	6001	50′	1001	4001	240'	
55	L=WS	550'	6051	660'	55′	110′	500′	295'	
60	- "3	600'	660′	7201	60′	120′	600'	350′	
65		650'	715′	780′	651	130′	700′	410′	
70		7001	770′	8401	70′	140′	800'	475′	
75		7501	8251	9001	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		
	1	1				

#### GENERAL NOTES

- Flags attached to signs where shown are REQUIRED.
   All traffic control devices illustrated are REQUIRED, except those denoted 2. All frontic control devices illustrated are neutricly, except mose denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  3. Flagger control should NOT be used unless roadway conditions or heavy traffic valume require additional emphasis to safely control traffic.
- Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
- DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
- zone signs may be installed downstream of the MUAL WORK AREAD signs.

  5. When the work zone is made up of several work spaces, channel lizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channel izing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.

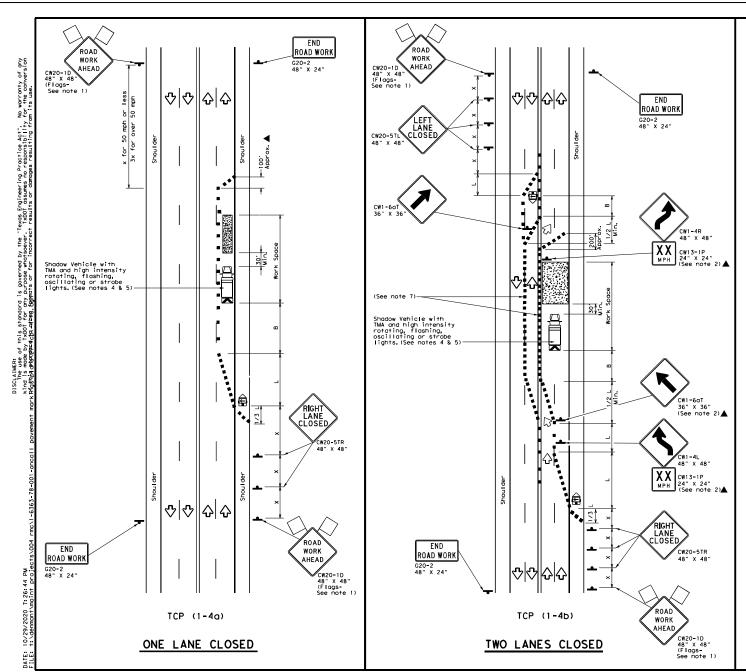
  6. A Shadow Pahicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without
- odversely offecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricodes 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.
- 8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/25 where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.



TRAFFIC SHIFTS ON TWO LANE ROADS

TCP (1-3)-18

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				DAL	DENTON				26



	LEGEND								
~~~	Type 3 Barricade		Channelizing Devices						
	Heavy Work Vehicle	A	Truck Mounted Attenuator (TMA)						
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)						
-	Sign	♦	Traffic Flow						
\Diamond	Flag	Ф	Flagger						

Posted Speed	Speed		Destrable Taper Lengths ***			d Maximum ng of Lizing ices	Minimum Sign Spacing "x"	Suggested Longitudinal Buffer Space
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"В"
30	ws²	1501	1651	180′	30′	60'	1201	90′
35	L = WS	2051	225'	245'	35′	70′	160′	120'
40	60	265'	2951	320'	40′	80'	240'	1551
45		450'	4951	540'	45′	90'	320'	195′
50	1	500'	550'	6001	50′	100'	400'	240'
55	L=WS	550′	6051	660'	55′	110'	500'	295′
60	1 - 113	600'	660'	720'	60′	120'	600′	350′
65]	650'	715′	780′	65′	1301	700′	410'
70	1	700′	770'	840'	70′	140'	800'	475′
75		7501	8251	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		
	1	1				

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.

- Flags artaced to signs where shown are incubited.
 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.

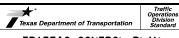
 4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.

 5. Additional Shadow Vehicles with TMAs may be positioned off the paved
- surface, next to those shown in order to protect wider work spaces.

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channellzing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

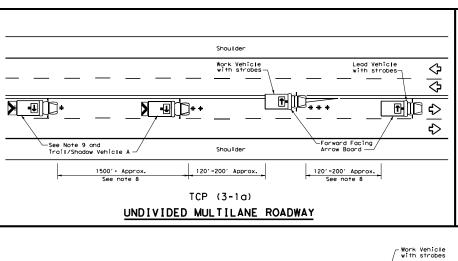
7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on topers at 20° or 15° if posted speeds are 35 mph or slower, and for tangent sections, at 1/25 where S is the speed in mph. This tiphter device spacing is intended for the areas of conflicting markings, not the entire work zone.



TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

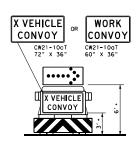
TCP(1-4)-18

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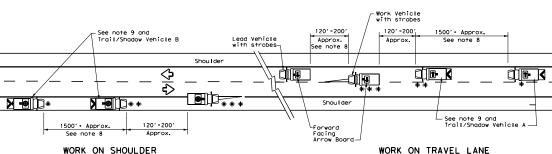
warranty of any the conversion

TxDOI assumes no responsibility



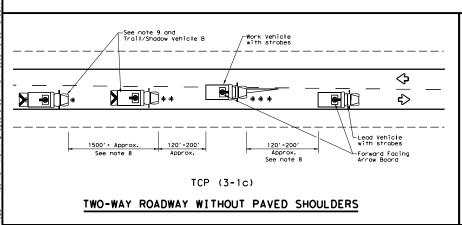
TRAIL/SHADOW VEHICLE A

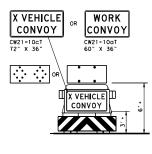
with RIGHT Directional display Flashing Arrow Board



TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS





TRAIL/SHADOW VEHICLE B

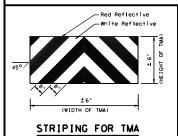
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



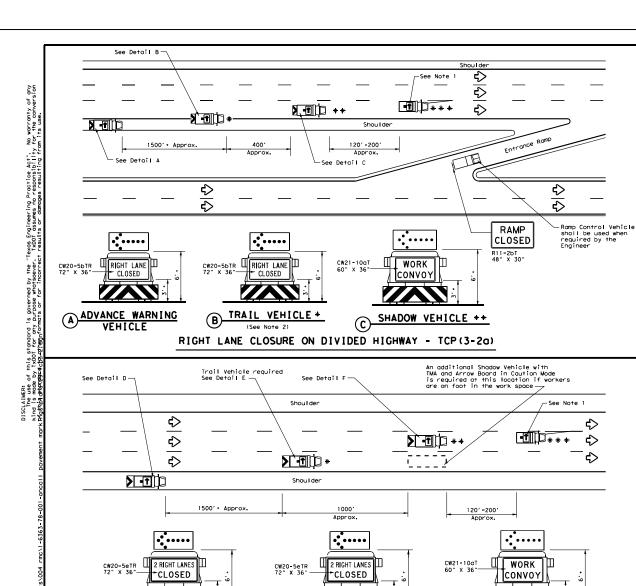
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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1-97		DAL	DENTON				28



ADVANCE WARNING

VEHICLE

INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

REQUIRED TRAIL

VEHICLE*

SHADOW VEHICLE **

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

TYPICAL USAGE						
MOBILE			INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY		
1						

GENERAL NOTES

- ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B
 or Type C flashing arrow boards as per the Barricade and Construction (BC)
 standards. Arrow boards on WORK vehicles will be optional based on the
 type of work being performed. The arrow boards shall be operated from
 inside the vehicle.
- For TCP(3-20) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-20) and TCP(3-2b) ore required.
- 3. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
- 6. Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- 8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and Vary according to terrain, work activity and other factors.
- Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
- 10. The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12°, and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legiblility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
- 11. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
- 13. Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
- 14. The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it



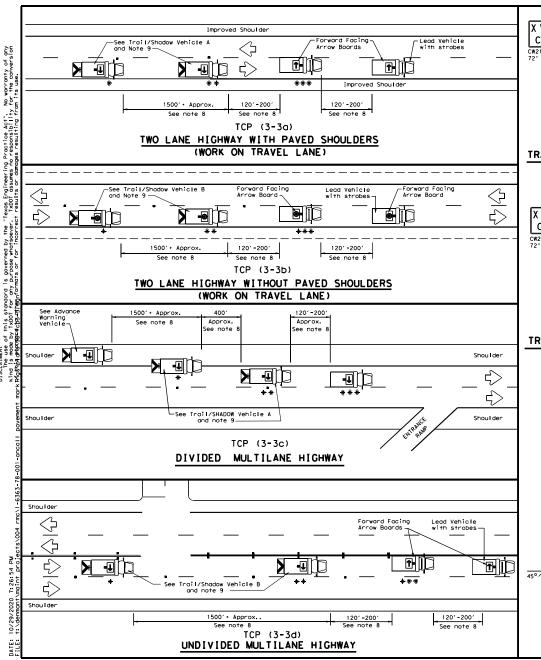
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

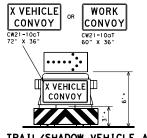
Texas Department of Transportation

TCP (3-2) -13

Traffic Operations Division Standard

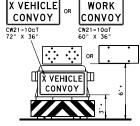
ILE: †cp3-2.dgn	ON: To	<dot< th=""><th>ck: TxDOT</th><th>DW:</th><th>TxDOT</th><th>ck: TxDQT</th></dot<>	ck: TxDOT	DW:	TxDOT	ck: TxDQT
DTxDOT December 1985	CONT	SECT	JOB		ніс	SHWAY
REVISIONS 2-94 4-98	6363	78	001		IHO	W350
3-95 7-13	DIST		COUNTY		SHEET NO.	
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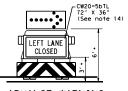
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

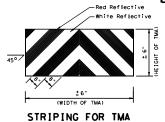


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



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

TYPICAL USAGE							
MOBILE			INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY			
1							

GENERAL NOTES

- 1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as . TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is portional bosed on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required bosed on prevailing roadway conditions, traffic volume, and sight distance restrictions. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

 The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.

 Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL SMECIFICATION.

- 4. Netlective sheeting on the red of the MA shall heet or exceed the retlection and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.

 5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the

- Construction (8C) standards. The board shall be controlled from inside the vehicle.

 6. Each vehicle shall have two-way radio communication capability.

 7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.

 8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending an sight distance restrictions. Motor lists approaching the convoy shadow of the SHADOW VEHICLE will vary depending on sight distance restrictions. Motor lists approaching the convoy shadow of the SHADOW VEHICLE and SHADOW VEHICLE on the spacing between WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.

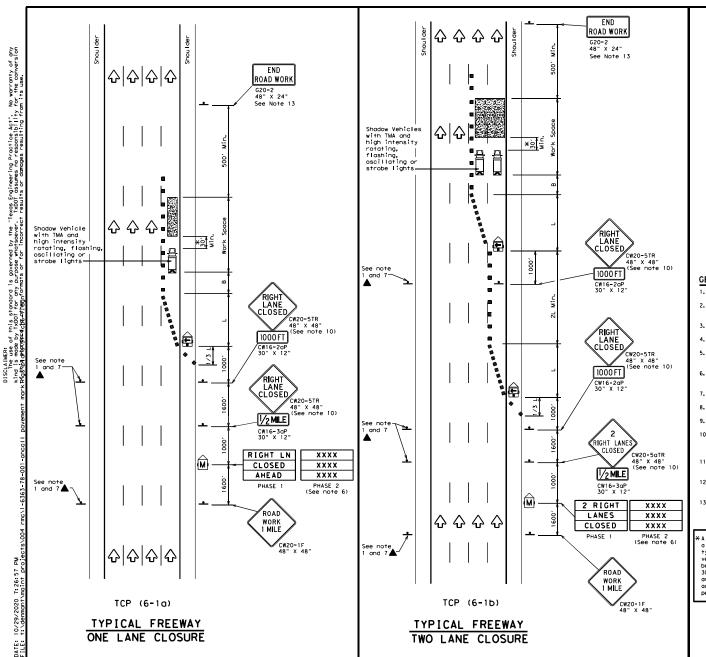
 9. X VEHICLE CONVOY (CW21-1061) or WORK CONVOY (CW21-1001) signs shall be used on TRAIL VEHICLE shadow of the SHADOW VEHICLE Shadow on the same shadow vehicles shadow of the same shadow vehicles of shadow vehicles displayed on the sign in the shadow vehicle shadow vehicles displayed on the sign in the shadow VEHICLE in TRAIL VEHICLE is also with the shadow VEHICLE in TRAIL VEHICLE shadow of the sign in the same land of the shadow VEHICLE in TRAIL VEHICLE is also with the shadow VEHICLE in TRAIL VEHICLE is also with the shadow VEHICLE in TRAIL VEHICLE is also with the shadow VEHICLE in TRAIL VEHICLE is also with the control of the convolved working the shadow VEHICLE in TRAIL VEHICLE is also with the control of the shadow vehicle was shadow vehicles of shadow vehicles and shadow vehicles of shadow vehicles o
- 11. A double arrow shall not be displayed on the arrow board on the Advance Warning
- venicle.
 12. For divided highways with three or four lanes in each direction, use TCP(3-2).
 13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
 14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes
- 14. The Advance maining vention may be accessed to the Advance and the Advance of the Control of the Advance of

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: To	<dot< th=""><th>ck: TxDOT</th><th>DW:</th><th>TxDQT</th><th>ck: TxDQT</th></dot<>	ck: TxDOT	DW:	TxDQT	ck: TxDQT
©TxDOT September 1987	CONT	SECT	JOB		HI	SHWAY
REVISIONS 2-94 4-98	6363	78	001		IH0035W	
8-95 7-13	DIST	COUNTY				SHEET NO.
1-97 7-14	DAL	DENTON				30



	LEGEND							
~~~	Type 3 Barricade	88	Channelizing Devices					
	Heavy Work Vehicle	Z	Truck Mounted Attenuator (TMA)					
	Trailer Mounted Flashing Arrow Board	(M	Portable Changeable Message Sign (PCMS)					
-	Sign	∿	Traffic Flow					
$\Diamond$	Flag	4	Flagger					

Posted Speed	Formula	Desirable Taper Lenaths "L"		Spacin Channe		Suggested Longitudinal Buffer Space	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	"B"
45		450'	4951	540'	45'	90'	195′
50		500'	5501	600'	50′	100'	240'
55	L=WS	550′	6051	660′	55′	110'	295′
60	L - W 3	600'	660'	7201	60′	120'	350′
65		650'	715′	780'	651	130'	410'
70		7001	770′	840'	70′	140′	475′
75		750'	8251	900'	75′	150′	540′
80		8001	8801	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 amitted 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.

  4. The Engineer may direct the Contractor to furnish additional signs and barricades as
- required to maintain traffic flow, detours and motorist safety during construction.

  5. 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.

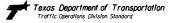
  The number of closed lanes may be increased provided the spacing of traffic control
- devices, taper lengths and tangent lengths meet the requirements of the TMUTCD.

  9. Warning signs for intermediate term stationary work should be mounted at 7' to the
- 10. 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.

  11. 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.
- 12. 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.

  13. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

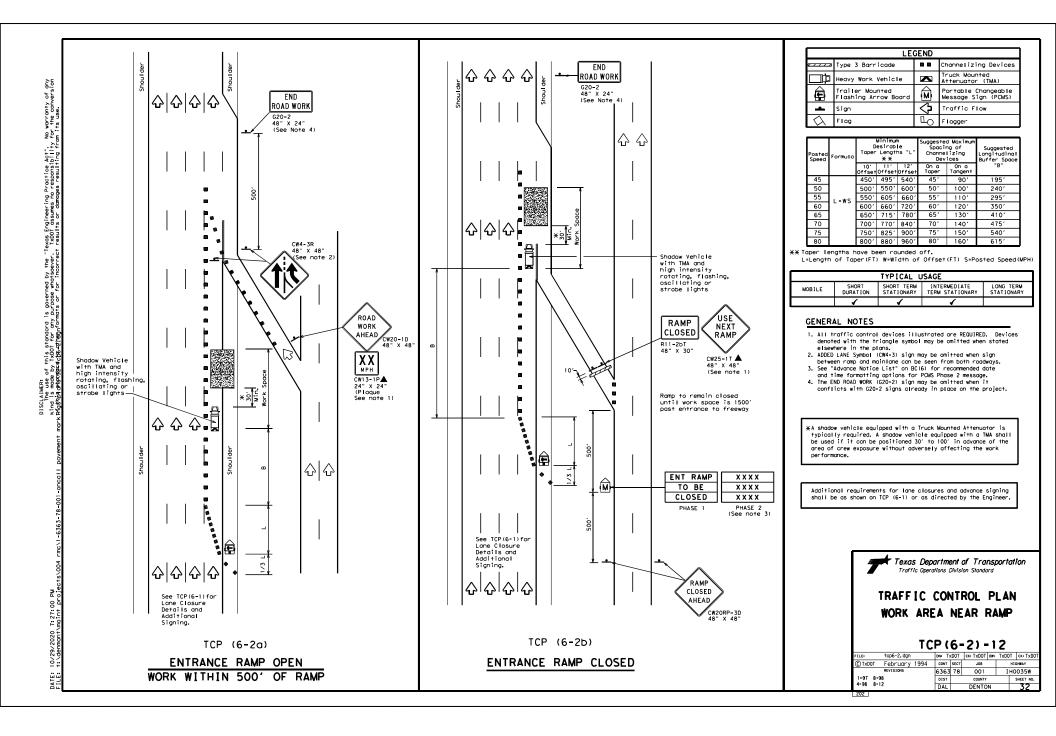
*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned to 100' in advance of the area of crew exposure without adversely affecting the work performance.

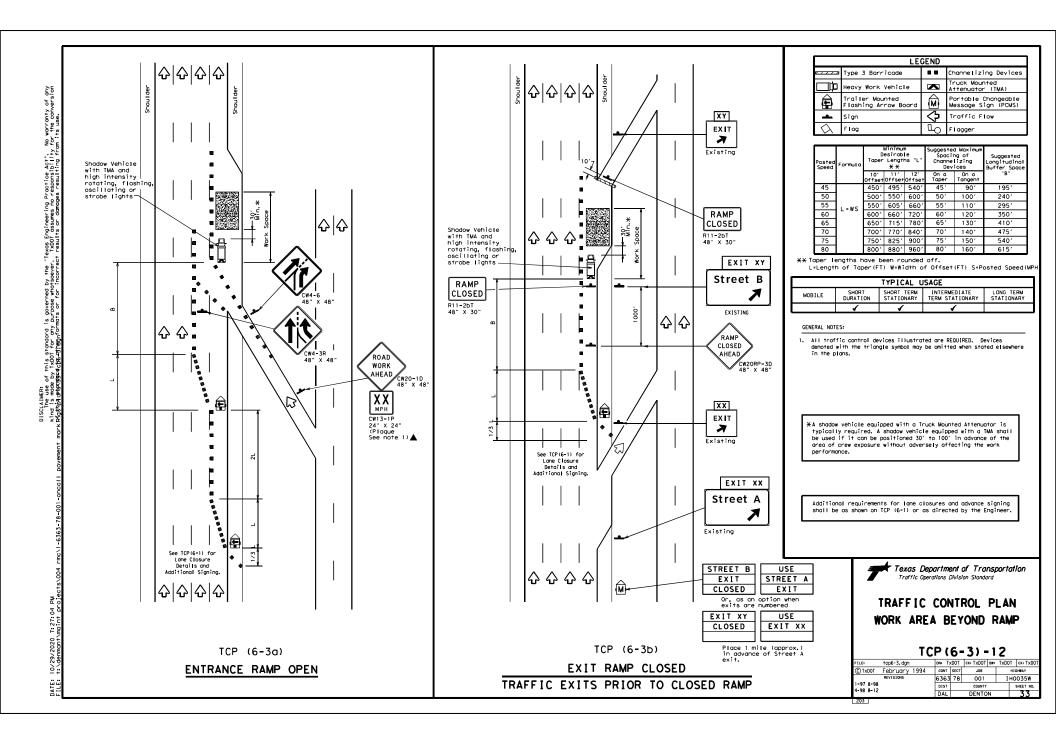


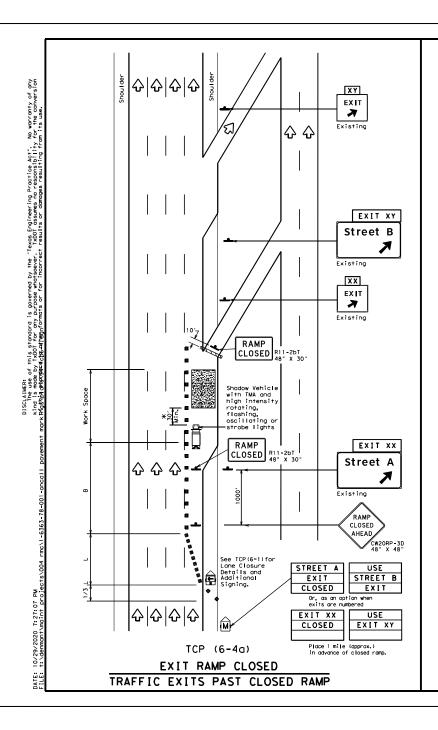
TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

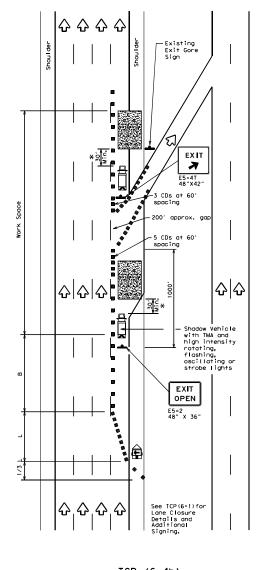
TCP (6-1) -12

LE:	tcp6-1.dgn	DN: T	<dot< th=""><th>ck: TxDOT</th><th>OW:</th><th>TxDOT</th><th>ck: TxDOT</th></dot<>	ck: TxDOT	OW:	TxDOT	ck: TxDOT
TXDOT	February 1998	CONT	SECT	JOB		HI	GHWAY
-12	REVISIONS	6363	78	001		IHO	035W
-12		DIST		COUNTY			SHEET NO.
		DAL		DENTO	N		31









TCP (6-4b)

EXIT RAMP OPEN

LEGEND								
•	Type 3 Barricade		Channelizing Devices (CDs)					
	Heavy Work Vehicle	Ŋ	Truck Mounted Attenuator (TMA)					
Ê	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)					
_	Sign	♦	Traffic Flow					
$\Diamond$	Flag	3	Flagger					

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			Spacit Channe		Suggested Longitudinal Buffer Space
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	"B"
45		450′	4951	540′	45′	90′	195′
50		500′	550'	600'	50′	1001	240'
55	L=WS	5501	6051	660'	55′	110'	295′
60	- "3	6001	6601	7201	60′	1201	350′
65		650'	715′	7801	651	130′	410'
70		7001	770'	8401	70′	140′	475′
75		750′	8251	900'	75′	150′	540′
80	l	8001	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		
	1	1	1			

#### GENERAL NOTES

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- 2. 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 dayonce of the area of crew exposure without adversely affecting the work performance.

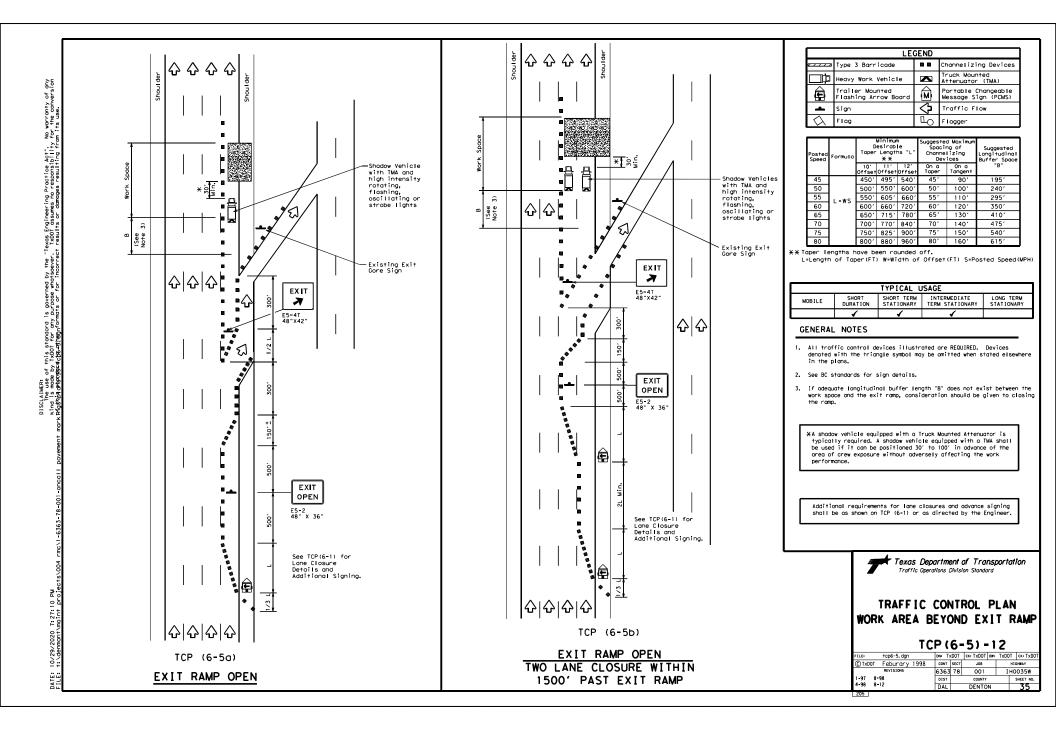
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

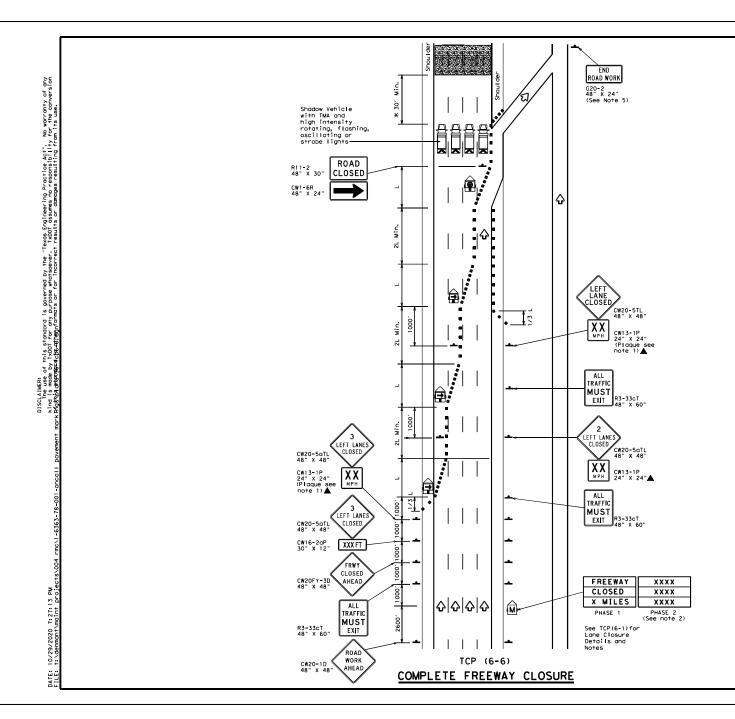


TRAFFIC CONTROL PLAN WORK AREA AT EXIT RAMP

TCP (6-4) -12

FILE: †cp6-4.dgn	DN: T:	xDQT	ck: TxDOT	OW:	TxDOT	ck: TxDOT
©TxD0T Feburary 1994	CONT	SECT	JOB		HI	GHWAY
REVISIONS	6363	78	001		IHO	035W
1-97 8-98	DIST		COUNTY			SHEET NO.
4-98 8-12	DAL		DENTO	N		34





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

Posted Speed Formula		_ ^ ^			Spacir Channe		Suggested Longitudinal Buffer Space
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	"B"
45		450′	495′	540′	45′	90'	195′
50		5001	5501	600'	50'	100'	240′
55	L=WS	5501	6051	660′	55′	110'	295′
60	L-W3	6001	660'	7201	60′	120'	350′
65		650'	7151	780′	65′	1301	410'
70		700′	770′	8401	70′	140′	475′
75		7501	825′	9001	75′	150'	540′
80		8001	880'	9601	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	
	1	1	1		

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 Bt(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific wornings.
- Where queuing is onticipated beyond signing shown, additional PCMS signs, other worning signs, devices or Low Enforcement Officers should be available to worn 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.

XA shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall le 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.

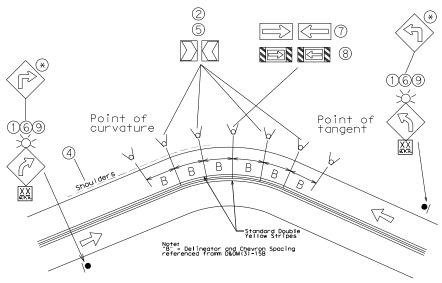
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY CLOSURE

TCP(6-6)-12

FILE:	top6-6. dgn	ON: To	<dot< th=""><th>ck: TxDOT</th><th>DW:</th><th>TxDOT</th><th>ck: TxDQT</th></dot<>	ck: TxDOT	DW:	TxDOT	ck: TxDQT
© TxD0T	February 1994	CONT	SECT	JOB		HI	SHWAY
REVISIONS			78	001		IHC	035W
1-97 8-9	DIST		COUNTY			SHEET NO.	
4-98 8-1	4	DAL		DENTON			36

Dallas District Standard for Two-Lane Highway Curve Signing/Markings



Curve Safety Sequence

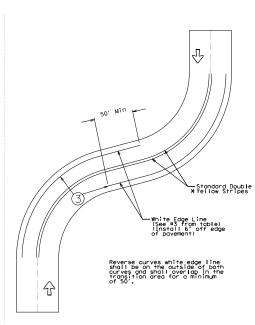
Applicable Mi	nimum Measur	es		
Advisory Speed 55 mph or higher	Advisory Speed 40-50 mph	Advisory speed 35 mph or less	Curv (lis	re signing, delineation and pavement morkings ited in order from minimum to maximum level of treatment as needed)
+	+	+	1	Advance warning and advisory mph (36" x 36")
+	+	+	2a	Delineators if advisory speed is 10 mph or less than posted speed
+	+	+	2Ь	Chevron alignment signs if advisory speed is 15 mph or greater than posted speed
	+	+	3	Edge lines
			3a	Pavement width 24' or greater 6" solid white edge line
			3b	Pavement width 20' - 24' 4" solid white edge line
			3c	Pavement width 20' or less no edge line
		Supplementa	I Me	osures
		#	4	Add shoulders and edge line (see #3a)
		#	5	Yellow high intensity flourescent chevron alignment signs - add
				reflective sheeting to sign support from bottom edge of sign
#	#	#	6	Large advance warning (48" x 48") and advisory mph (30" x 30")
#	#	#	7	Arrow sign (48" x 24")
		#	8	Large arrow sign with diagonals (96" x 48")
		#	9	Add flashers to advance warning signs
#	#	#		Surface treatment to improve friction
				The Wi-IR or L sign shall only be used when the advisory speed is
				30 mph or less

Notes:

- 1. Two methods will be used to determine the appropriate advisory speed for curves, the GPS Method(existing curves) and the Design Method (new curves).
- 2. Notify the Traffic Engineering Section for all requests on advisory speeds for existing curves.

1009 STOP 4 Standard Double *Yellow Stripes 3 Note: See curve safety sequence shown in table 75 169

Typical Curve Treatment with Intersection



Typical Reverse Curve Edge Line Treatment

* Standard Double Yellow Stripes shall be dropped through a non-signalized intersection within the city limit. Outside the city limit, the Standard Double Yellow Strip shall be carried through all non-signalized intersections.

> OCT-2014 ₹®Texas Department of Transportation UPDATED NOTES ©2013 JAN-2016

NOTE ADDED SEPT-2016 NOTE ADDED FOR STRIPING

IN CURVE

TWO-LANE HIGHWAY CURVE SIGNING & MARKINGS DALLAS DISTRICT STANDARD

SCALE: NTS SHEET 1 OF 1 BLS FEDERAL AID PROJECT NO. RMC-636378001 IH0035W STATE DISTRICT CHECK DENTON TEXAS DALLAS 37 CONTROL ARO 6363 78

+ = required # = optional

Applications 4 - 10 are additional supplemental applications which may be added as directed by the Area Engineer.