COUNTY GALVESTON PROJ. NO RMC 6432-02-001 HWY. NO SH146,EIQ ETTING DATE MAY 2023 DATE ACCEPTED

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

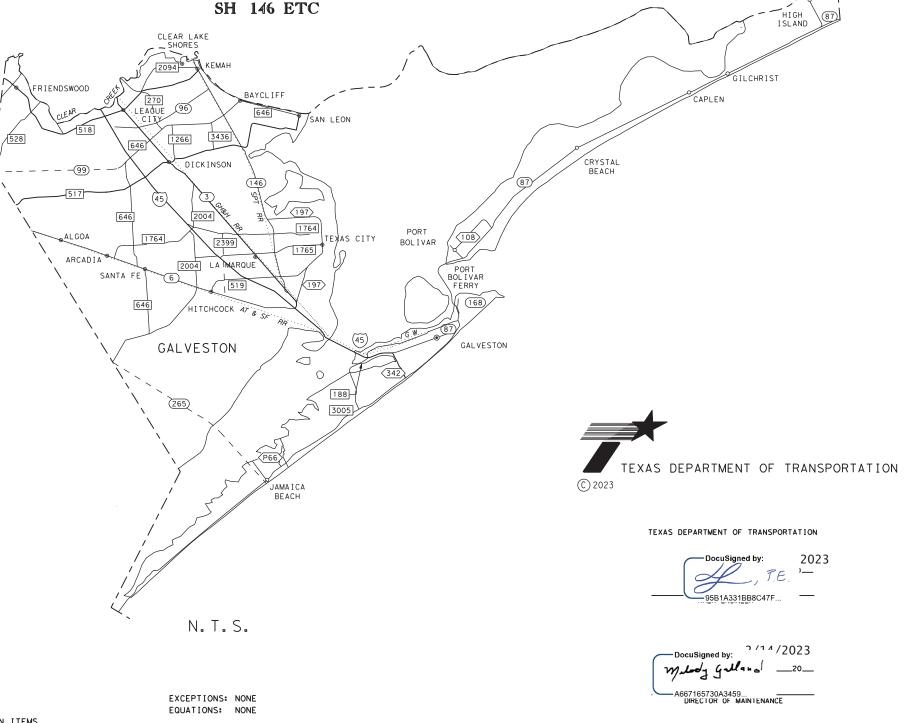
DIV. NO.	MAINTENANCE PROJECT NO.				NO.
6		6432	-02-0	01	- 1
STATE		STATE DIST.		COUNTY	
TEXA	S	HOU	G A	LVEST	NC
CONT.	SEC.	T. J	ОВ	H I GHWA	Y NO.
6432	02	2 0	01	SH146	,ETC

PLANS OF PROPOSED

STATE HIGHWAY IMPROVEMENT

ROUTINE MAINTENANCE CONTRACT
REFLECTIVE PAVEMENT MARKINGS (GRAPHICS)

GALVESTON COUNTY SH 146 ETC





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

95B1A331BB8C47F... , PE DATE

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

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County: GALVESTON Control: 6432-02-001

Highway: SH 146, etc.

GENERAL NOTES:

Supervision:

Plans are required. Refer questions to:

Mr. David R. Lazaro, P.E., Area Engineer Galveston Area Engineer's Office 5407 Gulf Freeway La Marque, Texas 77568 (409) 978-2500

All work will be scheduled and directed by, and requests for payments addressed to:

Mr. Jeffery Thomson Area Maintenance Supervisor 5407 Gulf Freeway La Marque, Texas 77568 (409) 978-2551

Area Engineer contact information for this project follows:

David R. Lazaro, P.E. David.Lazaro@txdot.gov

Joel Clarke, P.E. Joel.Clarke@txdot.gov

Submit any questions about this project via the Letting Pre-Bid Q&A web page, located at:

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

The Letting Pre-Bid Q&A web page for each project can be accessed by scrolling or filtering the dashboard using the controls on the left side to navigate to the project. Hover over the blue hyperlink of the project to view the Q&A and click on the link in the window that pops up.

This is a Routine Maintenance Non-Site-Specific Call-Out contract.

The Contractor will begin call out work within the required time for each work order. Work orders are expected to be completed per the contract plans within the number of days allowed for each work order. All call out work orders will have a begin date and number of working days. The Contractor will begin work within 48 hours of notification for routine call outs, unless otherwise approved by the Engineer. Work will be completed within the required number of working days. The Contractor will begin work within 4 hours of notification for emergency call outs and complete within 48 hours, unless otherwise approved by the Engineer. Failure to begin

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County: GALVESTON Control: 6432-02-001

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work within the required time and proceed to completion within the required time will result in the assessment of liquidated damages."

The Engineer will determine the location of the day's work. Notify the Area Office by 8:00 am, when scheduled work is canceled for any reason.

Work will not be permitted when impending bad or inclement weather may impair the quality of work.

Procure permits and licenses, which are to be issued by the City, County, or Municipal Utility District.

Tolls incurred by the Contractor are incidental to the various bid items.

This contract may be extended per SP 004-001, for an additional year as agreed upon by the Area Engineer and the Contractor.

General: Site Management

Personal vehicles of employees are not permitted to park within the right of way, including sections closed to public traffic. Employees may park on the right of way at the Contractor's office, equipment, and materials storage yard sites.

Do not mix or store materials, or store or repair equipment, on top of concrete pavement or bridge decks unless authorized by the Engineer. Permission will be granted to store materials on surfaces if no damage or discoloration will result.

Assume ownership of debris and dispose of at an approved location. Do not dispose of debris on private property unless approved in writing by the District Engineer.

Changes to the Traffic Control Plan will require two (2) weeks' notice in writing and written approval.

General: Traffic Control and Construction

When design details are not shown on the plans, provide signs and arrows conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Existing pavement markings removed or damaged by more than 20 ft. will be replaced with temporary striping. Temporary striping shall be paint based unless otherwise directed by the engineer. This work will be considered incidental to the item of work.

General: Utilities

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Consider the locations of underground utilities depicted in the plans as approximate and employ responsible care to avoid damaging utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities.

If the Contractor damages or causes damage (breaks, leaks, nicks, dents, gouges, etc.) to the utility, contact the utility facility owner or operator immediately.

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662, or by e-mailing the Department's Houston District Traffic Signal Operations Office at <a href="https://doi.org/10.1001/HOUSTONE HOUSTONE HOURS HOUSTONE HOUSTONE HOURS HOU

If overhead or underground power lines need to be de-energized, contact the electrical service provider to perform this work. Costs associated with de-energizing the power lines or other protective measures required are 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.

Be aware that an operational Computerized Transportation Management System (CTMS) exists within the limits of this project and that the system must remain operational throughout construction. If the Contractor damages or causes damage to this system, repair such damage within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify the Director of Traffic Management Systems at 713-881-3283 within one hour of occurrence. Failure of the Contractor to repair damage to the main fiber optic cable and CCTV cable trunk lines, which convey all corridor information to TranStar, will result in the Contractor being billed for the full cost of emergency repairs.

Item 7: Legal Relations and Responsibilities

If the work is on or in the vicinity of an at-grade railroad crossing, involves incidental work on railroad right of way, or involves construction of a railroad grade separation structure, notify the railroad company's Division Engineer and the Department's Project Engineer at least 30 days before performing any work on the railroad right of way and make arrangements for railroad flaggers unless otherwise shown in the contract. Obtain the required Railroad Right of Entry Permit from the railroad company. Payment of applicable permit fees is the responsibility of the Contractor. Acquiring the Railroad Right of Entry Permit is a lengthy process, allow sufficient time for this.

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing

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the permit application. Submit the permit application to the Department's District Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

During the hurricane season (June 1 through November 30), do not close any travel lanes except when the Contractor can demonstrate that he/she can provide labor, equipment, material, a work plan, and quality of work to satisfactorily return all lanes to an open, all-weather travel surface within 3 days of receiving written or verbal notice but no later than 3 days before the predicted hurricane landfall. Construction of temporary lanes to an all-weather surface will be paid for in accordance with Article 9.7, "Payment for Extra Work and Force Account Method."

In addition to lane closures, cease work 3 days before the predicted hurricane landfall on or near the roadway that adversely impacts the flow of traffic and reduces the capacity of the highway during an evacuation. Vehicles of the Contractor, subcontractors, or material suppliers will not be allowed to enter or exit the traffic stream, including those for the purpose of material hauling and delivery, and mobilization or demobilization of equipment. When directed, this prohibition will include a reasonable time period for the evacuees to return to their point of origin.

This project is on a hurricane evacuation route. Provide at the pre-construction meeting a written plan outlining procedures to suspend work, secure the job site, and safely handle traffic through and across the project in the event of a hurricane evacuation.

No significant traffic generator events have been identified.

Item 8: Prosecution and Progress

Working days will be computed and charged based on a calendar day workweek in accordance with Section 8.3.1.5

The Lane Closure Assessment Fee for each roadway is stated below. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling."

The time increment for the Lane Closure Assessment fee for this project is one hour.

Lane Closure Assessment Fee Table

Roadway	Lane Assessment Fee	Roadway	Lane Assessment Fee
FM 188	\$50	LP 108	\$0
FM 270	\$500	LP 197	\$400
FM 517	\$500	SH 3	\$400
FM 518	\$500	SH 6	\$300

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County: GALVESTON Control: 6432-02-001

Highway: SH 146, etc.

FM 519	\$200	SH 87	\$1,000
FM 528	\$1,000	SH 96	\$500
FM 646	\$500	SH 124	\$100
FM 1266	\$200	SH 146	\$500
FM 1764	\$1,000	SH 168	\$200
FM 1765	\$500	SH 275	\$300
FM 2004	\$300	SP 342	\$500
FM 2094	\$500		
FM 2351	\$500	Frontage RD	
FM 3005	\$500		
FM 3436	\$50	FM 1764	\$300

Add Item 500: Mobilization

This contract consists of Call-out Mobilization for routine work.

Item 502: Barricades, Signs and Traffic Handling

Use a traffic control plan for handling traffic through the various phases of construction. Follow the phasing sequence unless otherwise agreed upon by the Area Engineer and the Project Manager. Ensure this plan conforms to the latest "Texas Manual on Uniform Traffic Control Devices" and the latest Barricade and Construction (BC) Standard Sheets.

All lane closures are considered subsidiary to the various bid items.

Submit changes to the traffic control plan to the Area Engineer. Provide a layout showing the construction phasing, signs, striping, and signalizations for changes to the original traffic control plan.

Furnish and maintain the barricades and warning signs, including the necessary temporary and portable traffic control devices, during the various phases of construction. Place and construct these barricades and warning signs in accordance with the latest "Texas Manual on Uniform Traffic Control Devices" for typical construction layouts.

Cover work zone signs when work related to the signs is not in progress, or when any hazard related to the signs no longer exists.

Keep the delineation devices, signs, and pavement markings clean. This work is subsidiary to the Item, "Barricades, Signs, and Traffic Handling."

Erect temporary signs when exit ramps are closed or moved to new locations during construction.

Before detouring traffic onto the mainlane shoulders, remove dirt, debris, vegetation, and other deleterious material from the surface of the shoulders. Appropriately sign the detour in an approved manner. This work is subsidiary to the various bid items.

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Highway: SH 146, etc.

Coordinate and schedule the work with the appropriate Metro representative if requiring access to the High Occupancy Vehicle lanes.

Cover or remove the permanent signs and construction signs that are incorrect or that do not apply to the current situation for a particular phase.

Replace the overhead signs, informational signs, and exit signs to be removed, with temporary signs providing the correct information to the traveling public. Size the replacement signs and include them in the traffic control plan.

Do not mount signs on drums or barricades, except those listed in the latest Barricades and Construction standard sheets.

Place positive barriers to protect drop-off conditions greater than 2 ft. within the clear zone that remain overnight.

Use traffic cones for daytime work only. Replace the cones with plastic drums during nighttime hours.

Do not reduce the existing number of lanes open to traffic except as shown on the following time schedule:

One Lane Closure FM 188, FM 519, FM 3436, SH 124, SH 168, LP 108,

Day	Daytime Work	Nighttime Work	Restricted Hours Subject
	Hours	Hours	to Lane Assessment Fee
Monday Through Friday	No Restrictions	No Restrictions	No Restrictions

One Lane Closure FM 1266, FM 2094, SH96, SH 3, FM 270, FM 517, FM 518, FM 528, FM 646, FM 1764, FM 1765, FM 2004, FM 2351, FM 3005, LP 197, SH 6, SP 342, SH 146, SH 275 FM 1764 FRD

Day	Daytime Work	Nighttime Work	Restricted Hours Subject
	Hours	Hours	to Lane Assessment Fee
Monday		12:00 AM – 5:00 AM	5:00 AM – 9:00 AM
Through	9:00 AM -3:00 PM		
Friday		7:00 PM - 12:00 AM	3:00 PM - 7:00 PM

One Lane Closure SH 87

Day	Daytime Work	Nighttime Work	Restricted Hours Subject
	Hours	Hours	to Lane Assessment Fee
Monday		12:00AM – 5:00AM	5:00 AM – 7:00 PM
Through	None		
Friday		7:00PM – 12:00AM	

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County: GALVESTON Control: 6432-02-001

Highway: SH 146, etc.

Two Lane Closure FM 519

Day	Daytime Work Hours	Nighttime Work Hours	Restricted Hours Subject to Lane Assessment Fee
Monday Through	No Restrictions	No Restrictions	No Restrictions
Friday			

Two Lane Closure FM 518, FM 528, FM 1764, FM 1765, FM 3005, LP 197, SH 6, SH 3, SH96, FM 2094 SH 146, SH 275, SP 342, FM 1764 FRD

Day	Daytime Work	Nighttime Work	Restricted Hours Subject
	Hours	Hours	to Lane Assessment Fee
Monday		12:00 AM – 5:00 AM	
Through	None		5:00 AM - 9:00 PM
Friday		9:00 PM - 12:00 AM	

Weekend One/Two Lane Closure

FM 188, FM 270, FM 517, FM 518, FM 519, FM 528, FM 646, FM 1266, FM 1764, FM 1764 FRD, FM 1765, FM 2004, FM 2094, FM 2351, FM 3005, FM 3436, LP 197, SH 3, SH 6, SH 87, SH 96, SH 124, SH 146, SH 168, SH 275, SP 342

	511 0, 511 0, 511 12 1, 511 1 10, 511 1 00, 511 2 0, 51 0 12						
Day	Daytime Work Nighttime Work		Restricted Hours Subject				
	Hours	Hours	to Lane Assessment Fee				
Saturday		12:00 AM – 11:00 AM					
Through	None		11:00 AM - 8:00 PM				
Sunday		8:00 PM - 12:00 AM					

Full Closure of Highway Facility

FM 188, FM 270, FM 517, FM 518, FM 519, FM 528, FM 646, FM 1266, FM 1764, FM 1764 FRD, FM 1765, FM 2004, FM 2094, FM 2351, FM 3005, FM 3436, LP 197, SH 3, SH 6, SH 87, SH 96, SH 124, SH 146, SH 168, SH 275, SP 342

Day	Daytime Work	Nighttime Work	Restricted Hours Subject
	Hours	Hours	to Lane Assessment Fee
Saturday		12:00 AM – 5:00 AM	
Through	None		5:00 AM - 10:00 PM
Sunday		10:00 PM - 12:00 AM	

The above times are approved for the traffic control conditions listed. The Area Engineer may approve other closure times if traffic counts warrant. The Area Engineer may reduce the above times for special events.

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318),

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Highway: SH 146, etc.

provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

Provide full-time, off-duty, uniformed, certified peace officers, as part of traffic control operations. The peace officers must be able to show proof of certification by the Texas Commission on Law Enforcement Officers Standards. The cost of the officers is paid for on a force account basis.

A minimum of 7 days in advance of any total closure, notify the Houston District Public Information Office of which roadways, ramps, intersections, or lanes will be closed, the dates they will remain closed, and when they will be opened again to traffic.

A minimum of 7 days in advance of any total closure, place a portable changeable message (PCM) sign at the location of each total closure which informs the traveling public of the details of the closure. Alternately, if the Traffic Control Plan provides a positive barrier at the location, a non-trailer mounted static message board sign behind the positive barrier may be used in place of a PCM.

Use Uneven Lane Signs (CW 8-11) during resurfacing operations for elevation differences between adjacent lanes of greater than 1 in.

Maintain continuous access to public and private drives and side roads.

The Contractor Force Account "Safety Contingency" that has been established for this project 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.

All work and materials furnished with this item are subsidiary to the pertinent bid items except:

• Truck mounted attenuators payable under Item 6185

Item 506: Temporary Erosion, Sedimentation and Environmental Controls

The use of hay bales is not permitted as Storm Water Pollution Prevention Plan (SWP3) measures.

Due to the nature of the work involved, a Storm Water Pollution Prevention Plan (SWP3) is not required. However, if a SWP3 becomes necessary, it will be paid as extra work.

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra

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work on a force account basis per Articles 4.4 and 9.7. Since the disturbed area is less than 5 acres, a "Notice of Intent" (NOI) is not required.

Use appropriate measures to prevent, minimize, and control the spill of hazardous materials in the construction staging area. Remove and dispose of materials in compliance with State and Federal laws.

Before starting construction, review with the Engineer the SWP3 used for temporary erosion control as outlined on the plans. Before construction, place the temporary erosion and sedimentation control features as shown on the SWP3.

Before starting grading operations and during the project duration, place the temporary or permanent erosion control measures to prevent sediment from leaving the right of way.

Item 666: Reflective Pavement Markings

Use Type III glass beads for thermoplastic and multipolymer pavement markings.

Use a 0.100 in. (100 mil) thickness for thermoplastic pavement markings, measured to the top of the thermoplastic, not including the exposed glass beads.

Use a 0.022 in. (22 mil) thickness for multipolymer pavement markings, measured to the top of the multipolymer, not including the exposed glass beads.

For roadways with asphalt surfaces to be striped with work zone or permanent thermoplastic markings, the Contractor has the option to apply paint and beads markings for a maximum 30-day period until placing the thermoplastic markings, or until starting the succeeding phase of work on the striped area. Maintain the paint and beads markings, at no expense to the Department, until placing the thermoplastic markings or starting the succeeding phase of work on the striped area. The work zone markings, whether paint and beads or thermoplastic, are paid under the Item, "Work Zone Pavement Markings" and the markings are paid for only once for the given phase of construction.

If using paint and bead markings as described above, purchase the traffic paint from the open market.

If the Type II markings become dirty and require cleaning by washing, brushing, compressed air, or other approved methods before applying the Type I thermoplastic markings, this additional cleaning is subsidiary to the Item, "Reflectorized Pavement Markings."

Establish the alignment and layout for work zone striping and permanent striping.

Stripe all roadways before opening them to traffic.

Place pavement markings under these items in accordance with details shown on the plans, the latest "Texas Manual on Uniform Traffic Control Devices," or as directed.

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Highway: SH 146, etc.

When design details are not shown on the plans, provide pavement markings for arrows, words, and symbols conforming to the latest "Standard Highway Sign Designs for Texas" manual.

Words are paid by each word and number respectively and not by letter or digit.

Item 668: Prefabricated Pavement Markings

Words are paid by each word and number respectively and not by letter or digit.

Item 672: Raised Pavement Markers

If other operations are complete on the project and if the curing time period is not yet elapsed, the contract time will be suspended until the curing is done.

Before placing the raised pavement markers on concrete pavement, blast clean the surface using an abrasive-blasting medium. This work is subsidiary to the Item, "Raised Pavement Markers."

Provide epoxy adhesive that is machine-mixed or nozzle-mixed and dispensed. Equip the machine or nozzle with a mechanism to ensure positive mix measurement control.

Item 677: Eliminating Existing Pavement Markings and Markers

Remove existing pavement markings on concrete or asphalt surfaces by flail milling or as directed.

Item 678: Pavement Surface Preparation for Markings

Do not blast clean asphalt concrete pavement. Clean asphalt concrete pavement as required under the applicable specifications or as directed.

On new concrete pavement or on existing concrete pavement when placing a new stripe on a new location, remove the curing compounds and contamination from the pavement surface by flail milling or as directed. In addition, air-blast the surface with compressed air just before placing the new stripe.

On existing concrete pavement when placing a new stripe on an existing location, after removing the existing stripe under the Item, "Eliminating Existing Pavement Markings and Markers," airblast the surface with compressed air just before placing the new stripe.

Do not clean concrete pavement by grinding.

Item 6185: Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

A shadow vehicle with Truck Mounted Attenuators (TMAs) or Trailer Attenuators (TAs) is required as shown on the appropriate Traffic Control Plan (TCP) sheets. TMAs/TAs must meet the requirements of the Compliant Work Zone Traffic Control Device List.

Level 3 Compliant TMAs/TAs are required for this project.

General Notes Sheet I General Notes Sheet J

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Highway: SH 146, etc.

A total of one (1) shadow vehicle with a TMA/TA is required for the work with the exception of Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

A total of three (3) shadow vehicles with a TMA/TA are required for Pavement Marking Operations. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

In addition to the shadow vehicles with TMAs/TAs that are specified as being required on the TCP layout sheets for this project, provide additional shadow vehicles with TMAs/TAs as shown on the TCP Standard sheets. The Contractor is responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed on the project.

General Notes Sheet K



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6432-02-001

DISTRICT Houston HIGHWAY SH0146

COUNTY Galveston

		CONTROL SECTION	ON JOB	6432-02	2-001		
		PROJ	ECT ID	A00193	3112		
		C	OUNTY	Galves	ston	TOTAL EST.	TOTAL
		HIG	HWAY	SH0146			FINAL
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	500-6033	MOBILIZATION (CALLOUT)	EA	33.000		33.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	1,300.000		1,300.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	47,498.000		47,498.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	15,960.000		15,960.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	13,300.000		13,300.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	532.000		532.000	
	666-6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	80.000		80.000	
	666-6060	REFL PAV MRK TY I(W)(TPL ARRW)(100MIL)	EA	3.000		3.000	
	666-6063	REFL PAV MRK TY I(W)(UTURN ARW)(100MIL)	EA	7.000		7.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	299.000		299.000	
	666-6093	REFL PAV MRK TY I (W)(RR XING)(100MIL)	EA	7.000		7.000	
	666-6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF	2,660.000		2,660.000	
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	399.000		399.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	2,660.000		2,660.000	
	666-6156	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	33.250		33.250	
	666-6225	PAVEMENT SEALER 6"	LF	184,870.000		184,870.000	
	666-6226	PAVEMENT SEALER 8"	LF	42,560.000		42,560.000	
	666-6228	PAVEMENT SEALER 12"	LF	15,960.000		15,960.000	
	666-6230	PAVEMENT SEALER 24"	LF	13,300.000		13,300.000	
	666-6231	PAVEMENT SEALER (ARROW)	EA	532.000		532.000	
	666-6232	PAVEMENT SEALER (WORD)	EA	299.000		299.000	
	666-6233	PAVEMENT SEALER (MED NOSE)	EA	33.000		33.000	
	666-6234	PAVEMENT SEALER (DBL ARROW)	EA	86.000		86.000	
	666-6235	PAVEMENT SEALER (TPL ARROW)	EA	3.000		3.000	
	666-6236	PAVEMENT SEALER (UTURN ARROW)	EA	7.000		7.000	
	666-6241	PAVEMENT SEALER (SYMBOL)	EA	3.000		3.000	
	666-6242	PAVEMENT SEALER (RR XING)	EA	7.000		7.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	3,511.000		3,511.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	28,089.000		28,089.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	7,920.000		7,920.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	14,044.000		14,044.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	184,870.000		184,870.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	48,828.000		48,828.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	15,960.000		15,960.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	14,630.000		14,630.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	532.000		532.000	
	677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	80.000		80.000	



DISTRICT	COUNTY	CCSJ	SHEET
Houston	Galveston	6432-02-001	3



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6432-02-001

DISTRICT Houston HIGHWAY SH0146

COUNTY Galveston

Report Created On: Jan 23, 2023 1:34:39 PM

	CONTROL SECTION JOB		6432-02	2-001			
	PROJECT ID		A00193112				
	COUNTY		Galves	Galveston		TOTAL FINAL	
	HIGHWAY		SH0146				
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	300.000		300.000	
	677-6016	ELIM EXT PAV MRK & MRKS (RR XING)	EA	7.000		7.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	184,870.000		184,870.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	47,498.000		47,498.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	15,960.000		15,960.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	14,630.000		14,630.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	532.000		532.000	
	678-6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	80.000		80.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	300.000		300.000	
	678-6020	PAV SURF PREP FOR MRK (RR XING)	EA	7.000		7.000	
	678-6033	PAV SURF PREP FOR MRK (RPM)	EA	11,134.000		11,134.000	
	6185-6002	TMA (STATIONARY)	DAY	50.000		50.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	514.000		514.000	



DISTRICT	COUNTY	CCSJ	SHEET
Houston	Galveston	6432-02-001	3A

4" Solid White

Edge Line—

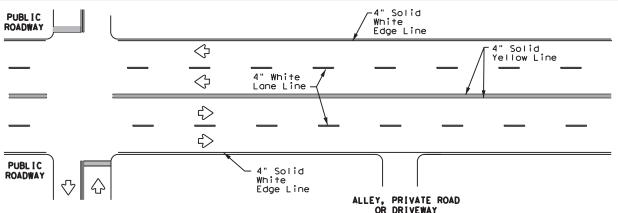
-Edge of Pavement PUBL IC Shou I der ROADWAY 4" Solid \Rightarrow Yellow Edge Line/ ── 4" White 万 Lane Line / 4" Solid White Edge Line-PUBL I C ROADWAY 96. EDGE LINE AND LANE LINES Act". ibility ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS -Edge of Pavement PUBL I C -6" min. ROADWAY Texas Engineering
TxDOT assumes no 4" Solid $\overline{}$ Edge Line-10′ \Diamond ird is governed by the " any purpose whatsoever, formats or for incorrec 4" Solid \dashv Yellow LineJ 4" Solid White 3" min. -4" usual-(12" max. for \Rightarrow Edge Linetraveled way greater than = 48' only) PUBL I C ROADWAY only) CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS √Edge of Pavement 6" min. when no shoulder Shoulder width may vary (typ. exists 10" min. -12" max. 7 4" Solid White Edge Line \Diamond 3" min. -Centerline 4" max.-30′ [10′ [4" Solid 4" Solid White 4" Solid — Yellow Line Yellow Line Edge Line Shoulder width may vary (typ) TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS Pavement Edge —_____ 4" White Lane Line. -4" Solid White Edge Line 4" Solid Yellow Edge Line [10'] 4" Solid Yellow Line See Note 2--See Note 1 10" min. 12" max. Taper Optional Dotted 8" White 8" Solid White Line See note 3 $\Delta\Delta\Delta\Delta\Delta\Delta$ Extension 48" min. Yield from edge Triangles line to stop/yield Storage 4" Solid Yellow-Edge Line line Deceleration

 \leq

FOUR LANE DIVIDED ROADWAY CROSSOVERS

PUBLIC ROADWAY PUBLIC ROADWAY A" Solid White Edge Line A" Solid Yellow Line A" Solid White Edge Line A" Solid White Edge Line ALLEY, PRIVATE ROAD OR DRIVEWAY

TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



YIELD LINES

NOTE:

 $\langle \neg$

-White Lane Line

- Irrespective of shoulder, use 6in width lines (edge lines).
- 2. Use 4 in. width lines (edge and lane lines) when lane width is 10 ft. or less; and 6 in. width lines when lane width is greater than 10 ft.

NOTES

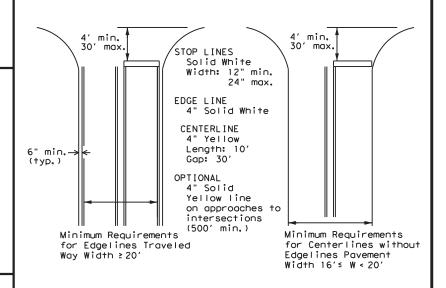
- 1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

- 1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
- 2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES. EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

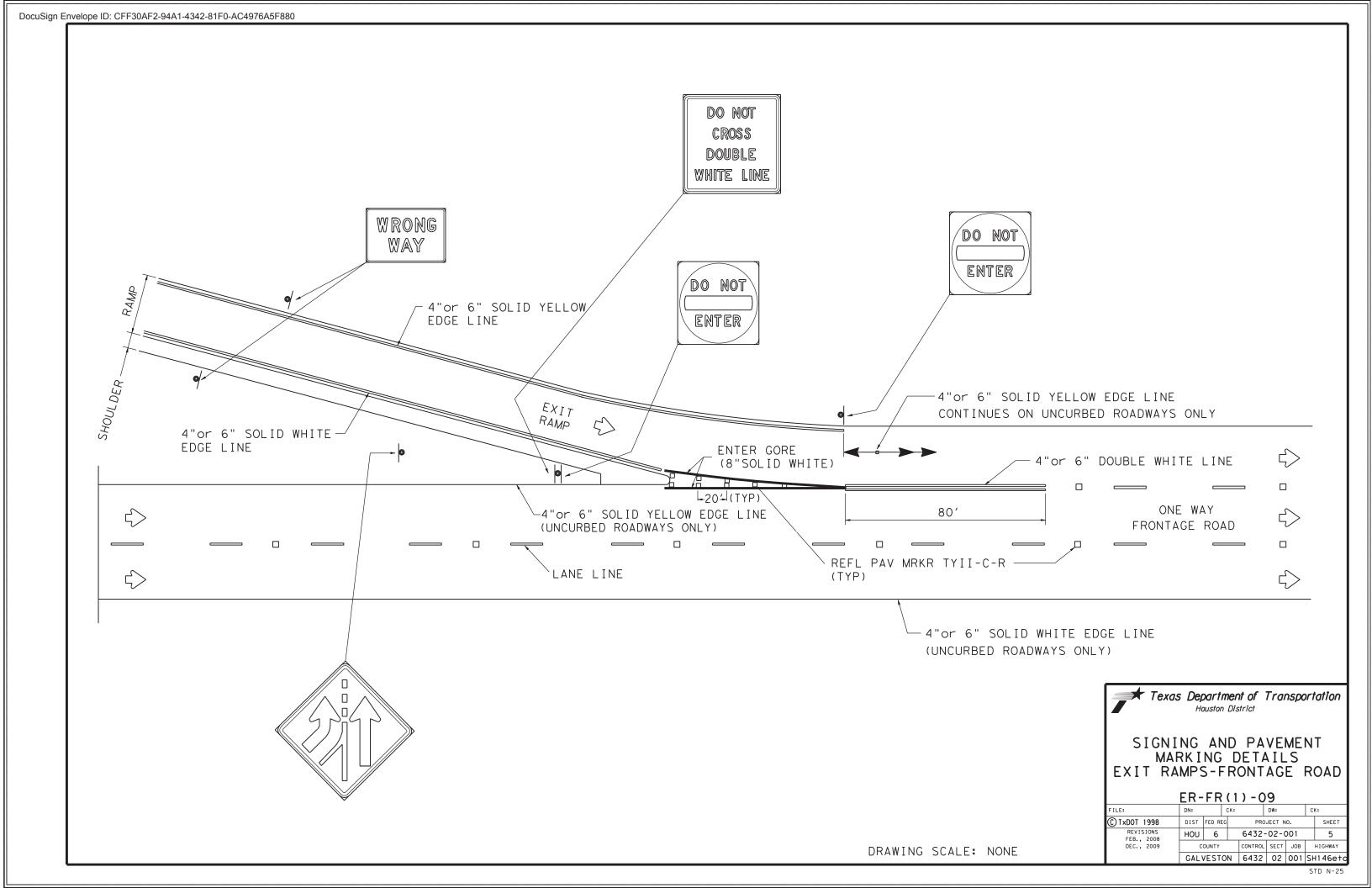


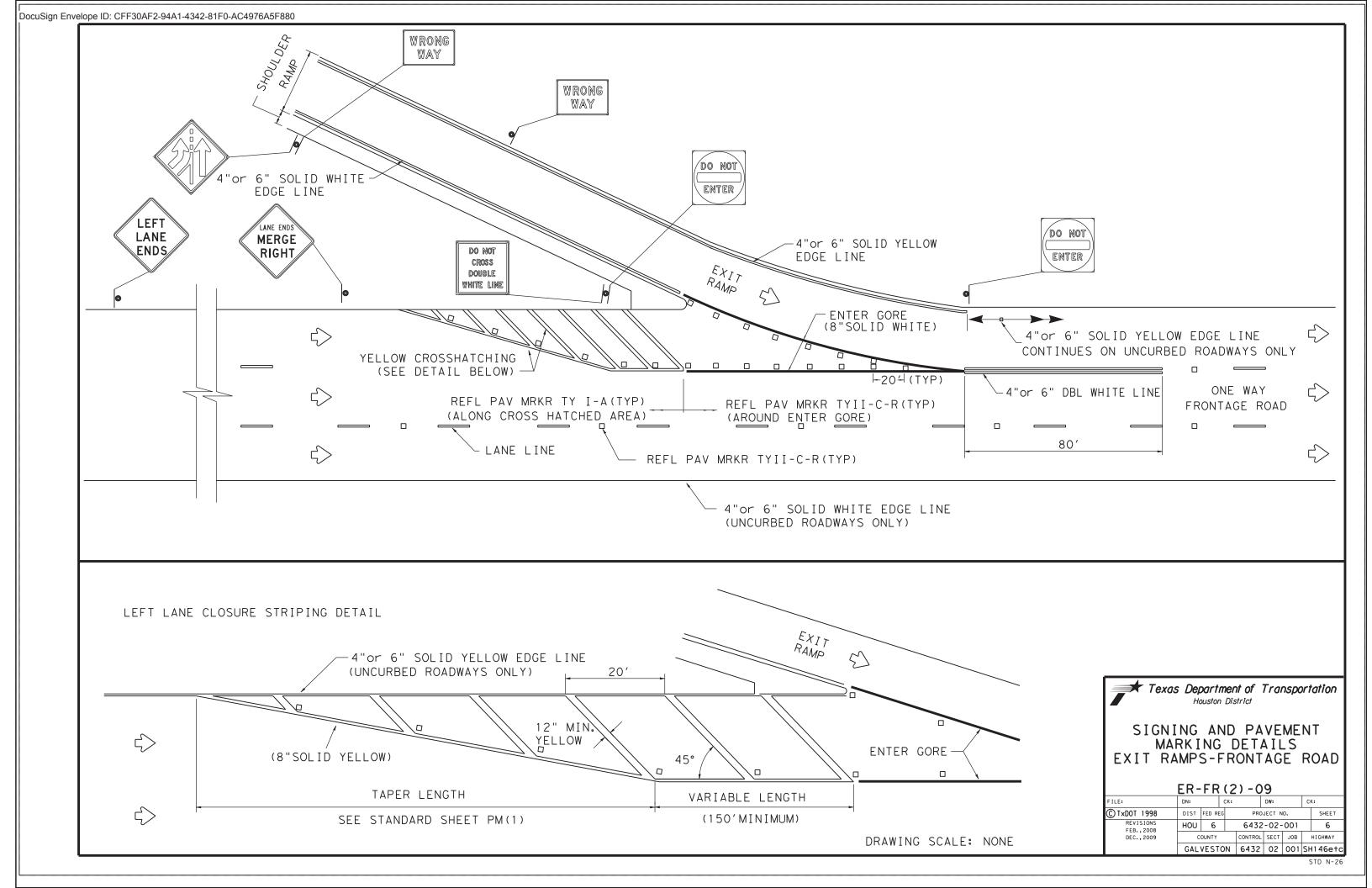
TYPICAL STANDARD
PAVEMENT MARKINGS

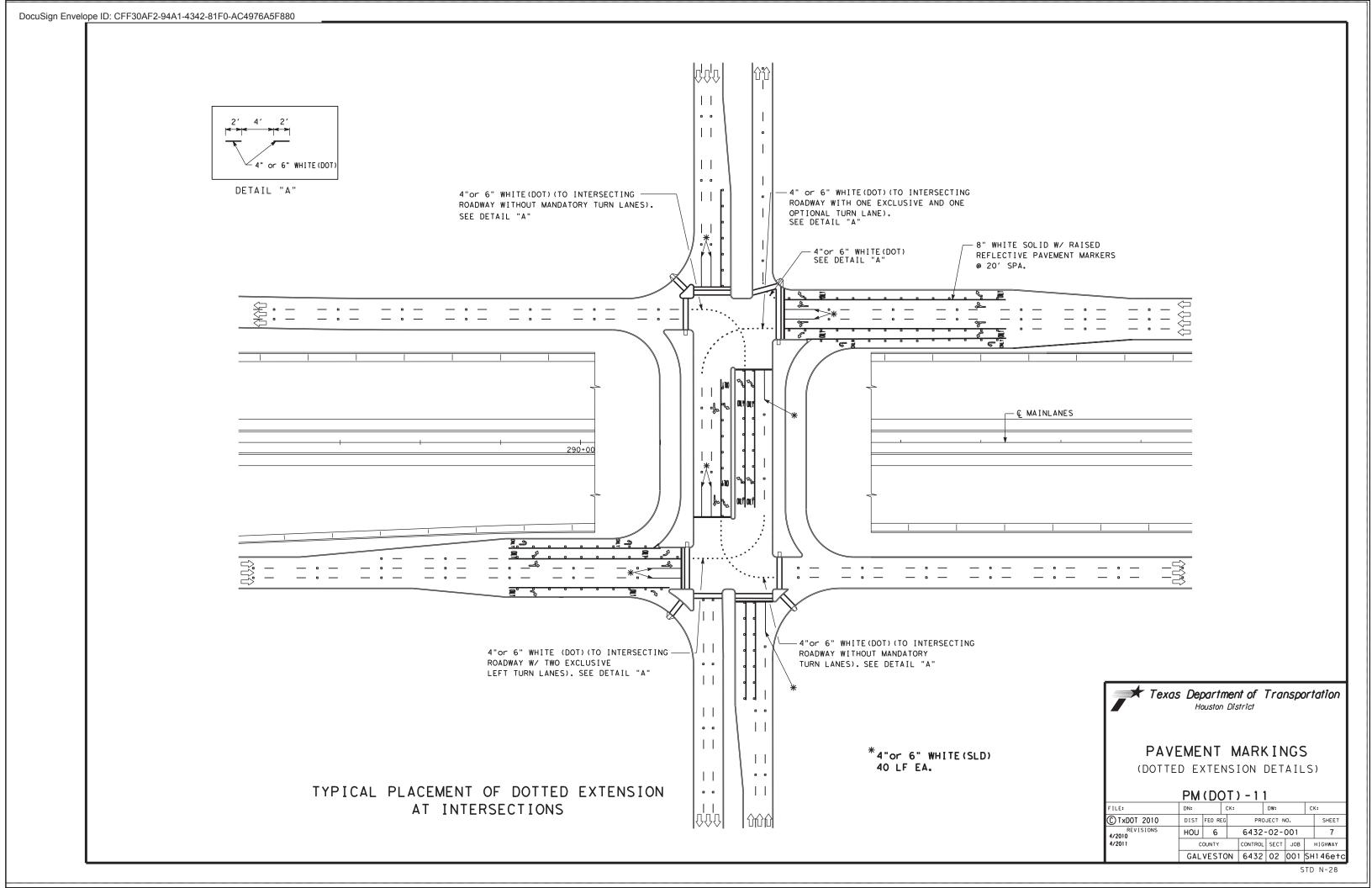
PM	-20	
	~ ~	

©	TxDOT NOVEMBER 1978	DN: TXE	тот	CK: TXDOT	DW: TXD	т	CK: TXDOT
8-95	2-12 REVISIONS	CONT	SECT	JOB		HIC	CHWAY
5-00 8-00	8-16	6432	02	001	SH	SH 146, etc.	
	7-20	DIST		COUNTY	,		SHEET NO.
3-03		HOU		GALVES	ron .		44

CTD N F.

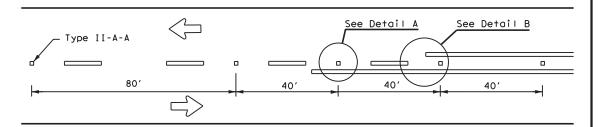




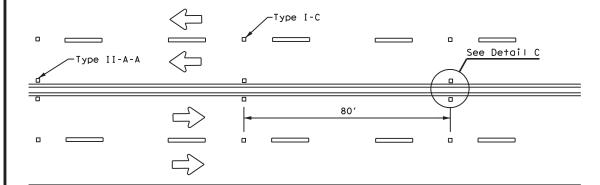


No warranty of for the conversom its use.

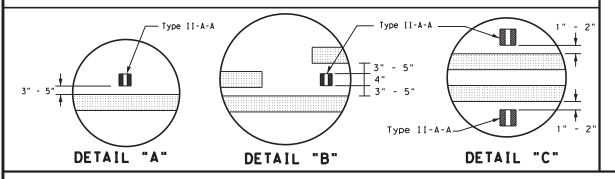
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



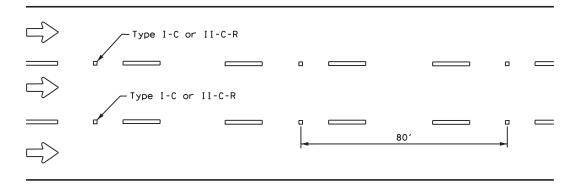
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

Centerline Symmetrical around centerline Type II-A-A 40' 40' Type I-C

CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

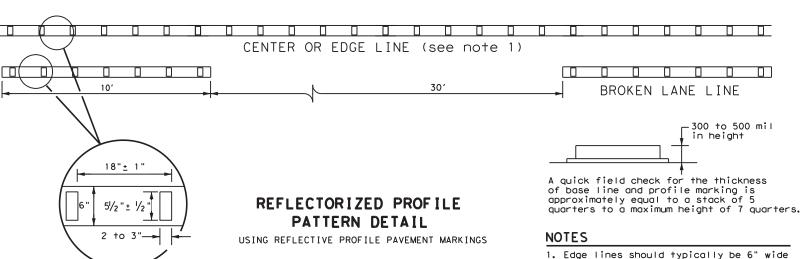


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic. See Note 3.

and the materials shall be specified in the plans.

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

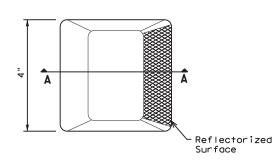


GENERAL NOTES

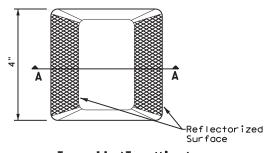
- All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
- On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
- Use raised povement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised povement marker Type II-C-R with divided highways and raised medians.

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

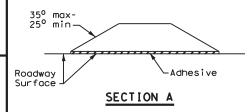
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



RAISED PAVEMENT MARKERS



Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

ILE: piliz - ZZ. Ugi i	DN:		CK:	DW:	CK:
TxDOT December 2022	CONT	SECT	JOB		HIGHWAY
REVISIONS 1-77 8-00 6-20	6432	02	001	SH	146, etc.
I-92 2-10 12-22	DIST		COUNTY		SHEET NO.
-00 2-12	HOU		GALVEST	DN	9
20 1					

TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP

ADVANCED WARNING SIGN DISTANCE (D) Posted D (ft) L (ft)

speed		
30 MPH	460	, _ ws ²
35 MPH	565	L = WS
40 MPH	670	00
45 MPH	775	
50 MPH	885	
55 MPH	990	
60 MPH	1,100	L=WS
65 MPH	1,200	

For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

₹>

1,250 70 MPH 75 MPH 1.350 Type II-A-A Markers \Diamond 20 \triangleleft ➪

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.

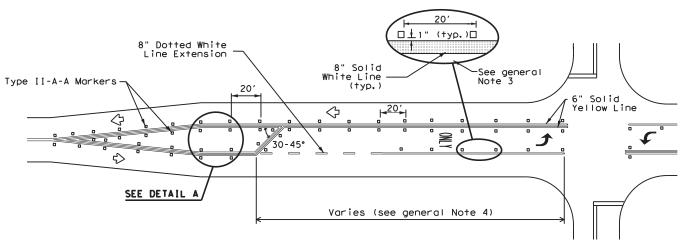
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

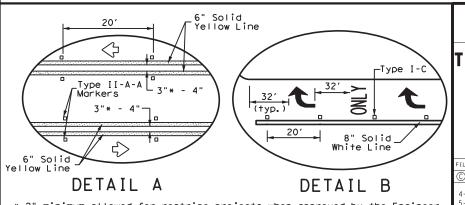
- Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
- 2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
- Use raised payement marker Type I-C with undivided highways, flush medians and two way left turn Use raised pavement marker Type II-C-R with divided highways and raised medians.
- 4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



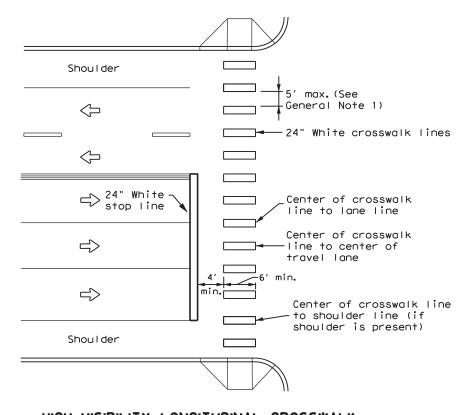
TWO-WAY LEFT TURN LANES. RURAL LEFT TURN BAYS. AND LANE REDUCTION PAVEMENT MARKINGS PM(3) - 22

Texas Department of Transportation

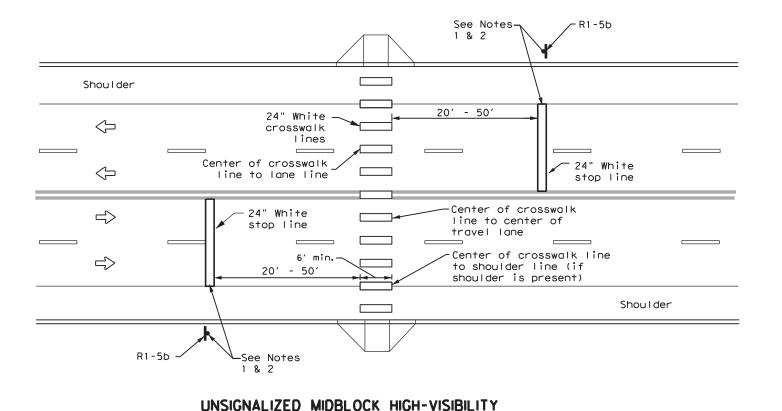
Traffic Safety Division Standard

LE: pm3-22, dan TxDOT December 2022 SH 146, etc. 6432 02 001 4-98 3-03 6-20 DIST COUNTY SHEET NO. 5-00 2-10 12-22

* 2" minimum allowed for restripe projects when approved by the Engineer.



HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH



LONGITUDINAL CROSSWALK

GENERAL NOTES

- Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
- A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
- For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
- 4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
- 5. Each crosswalk shall be a minimum of 6' wide.
- 6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on Stote Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
- Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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

NOTES:

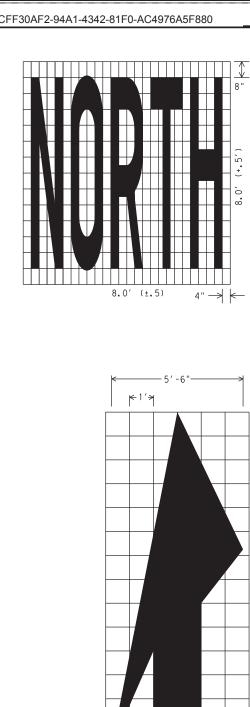
- Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
- Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.



CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.agn	DN:		CK:	DW:		CK:
CTxDOT December 2022	CONT	SECT	JOB		HIC	HWAY
REVISIONS 6-20	6432	02	001		SH 14	6, etc.
6-22	DIST		COUNTY		1	SHEET NO.
12-22	HOU		GALVESTO	N		11
22D						



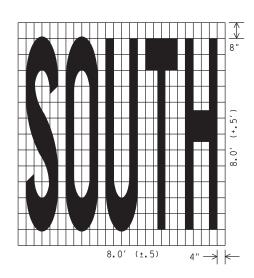
- DIRECTION OF VIEW

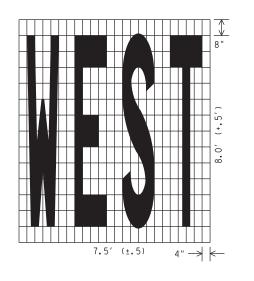
12 INCH GRID

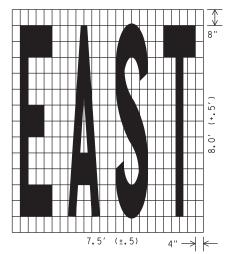
AREA = 42 SQ. FT.

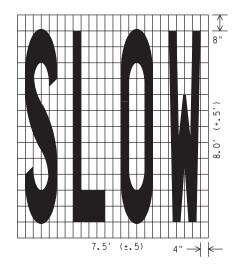
RIGHT LANE DROP ARROW

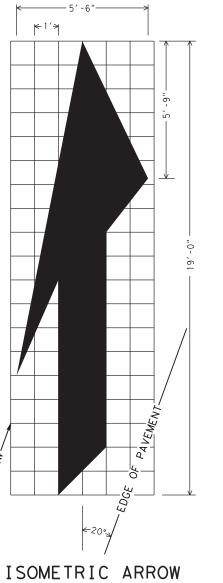
(FOR LEFT LANE, USE MIRROR IMAGE)

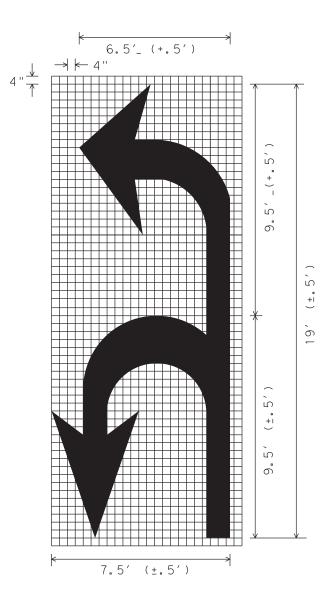




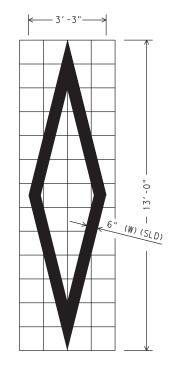




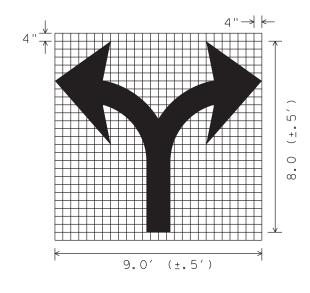




U-L ARROW



DIAMOND SYMBOL



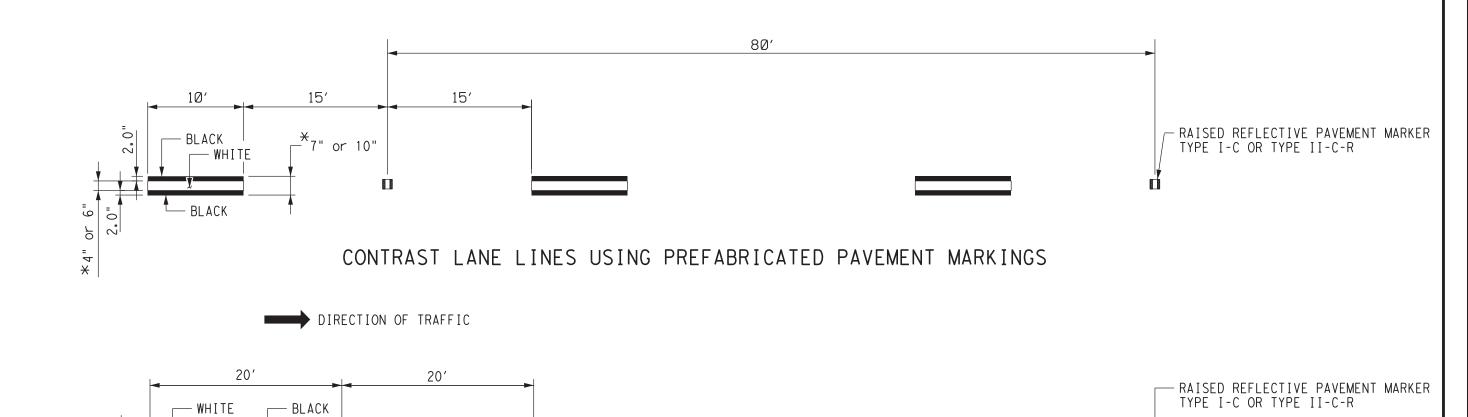
SCALE 1/4" = 1'



PAVEMENT MARKINGS (WORDS, ARROWS & SYMBOLS)

PM	(WA	S)	-07	,
				_

FILE:	DN:		CK:		DW:		CI	<:
○ TxDOT 2007	DIST	FED R	FED REG		PROJECT NO.			SHEET
REVISIONS 03-19-07	HOU	6		6432-02-001			12	
03-19-01	С	COUNTY		CONTROL	SECT	JOB		HIGHWAY
GALV		/EST	ON	6432	02	001	SH	1146e†c



80′

CONTRAST LANE LINES USING LIQUID APPLICATIONS (MULTIPOLYMER, THERMOPLASTIC, ETC.)

15′

10'



(CONTRAST LANE LINES)

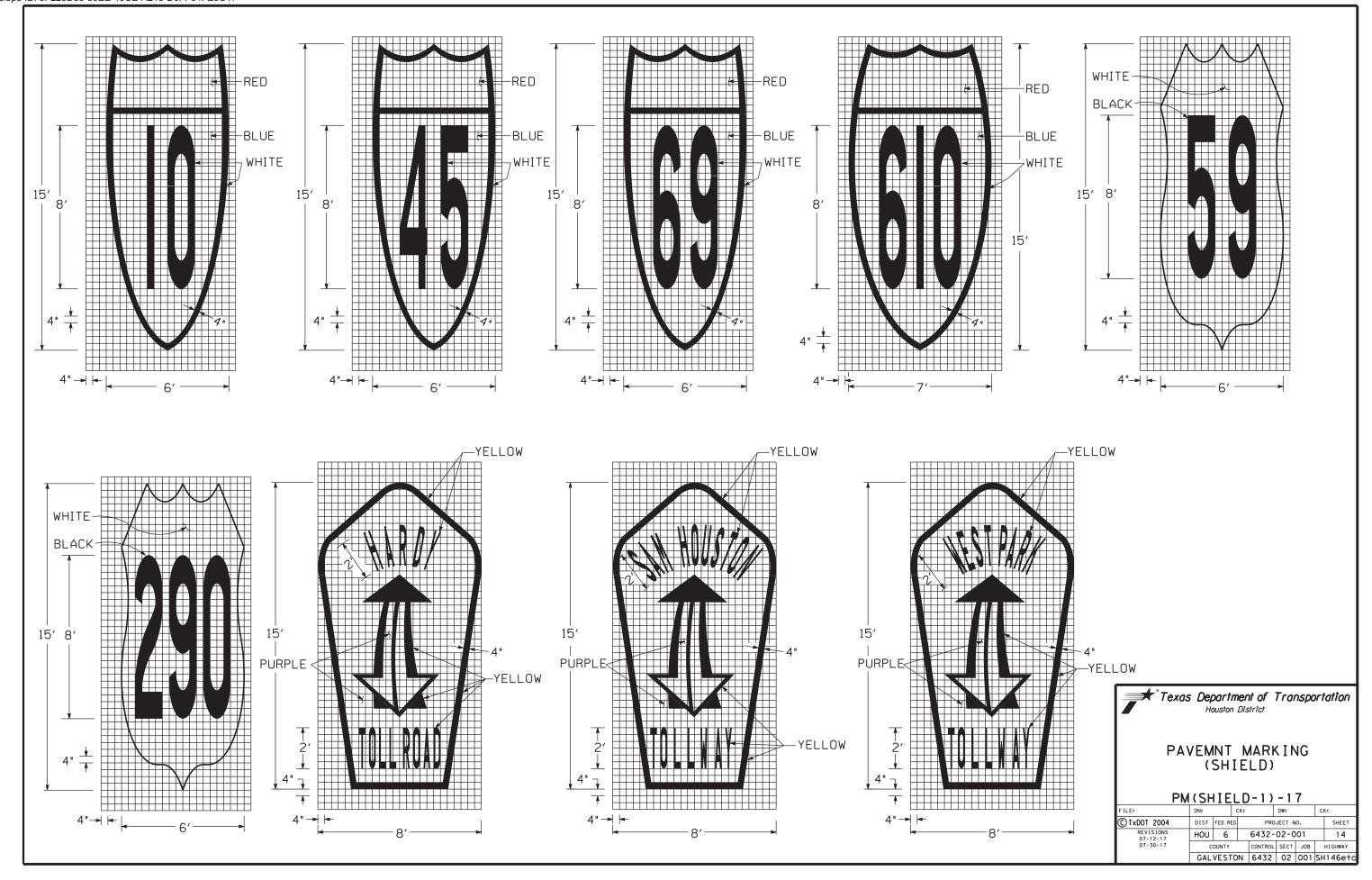
PM(CLL)-14										
FILE:	DN:		CK:		DW:			к:		
© TxDOT 2003	DIST	FED RE	EG	PRO	OJECT NO.			PROJECT NO. S		SHEET
REVISIONS 01-10-06	HOU	6	64	6432-02-00				13		
01-10-06 02-12-08 10-2019 9" +o 10"	COUNTY			CONTROL	SECT	JOB		HIGHWAY		
	GALVESTON			6432	02	001	SF	I 146,etc		

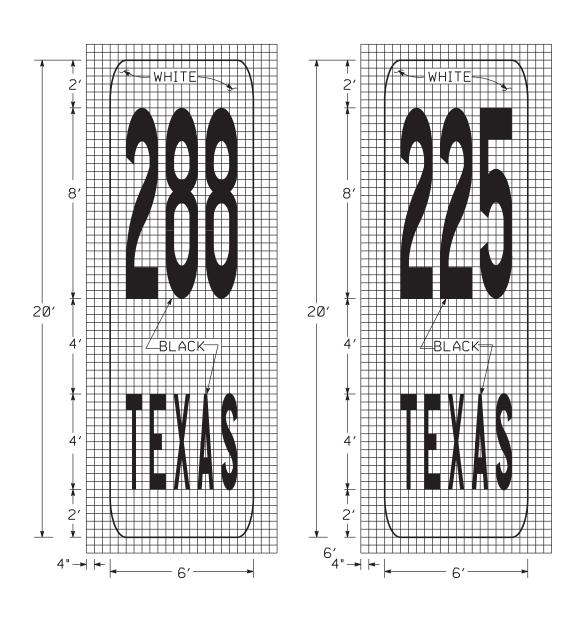
X AS SHOWN ON THE PLANS.

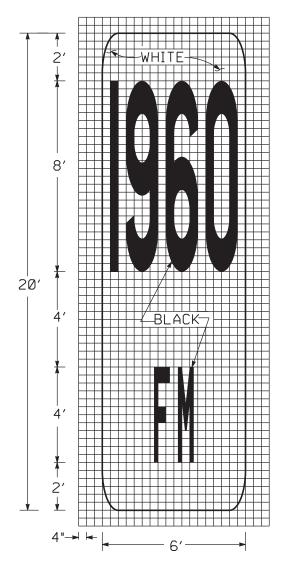
-9

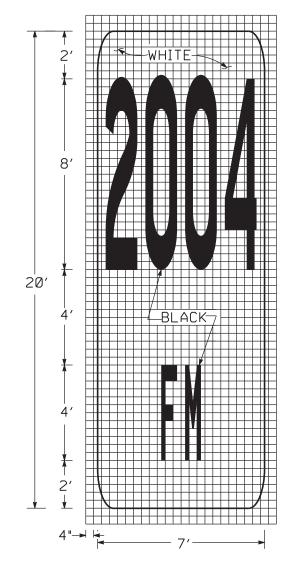
* 4" or

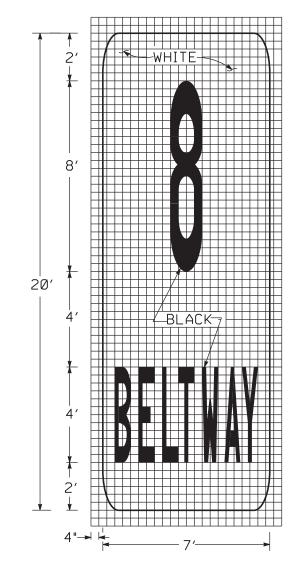
10'

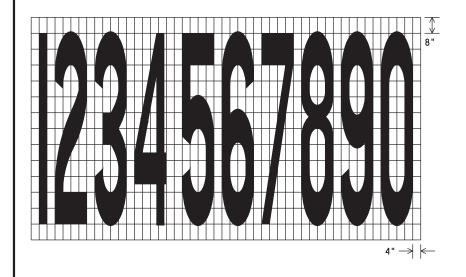


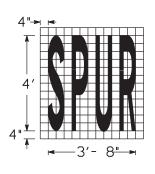


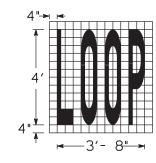


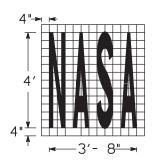










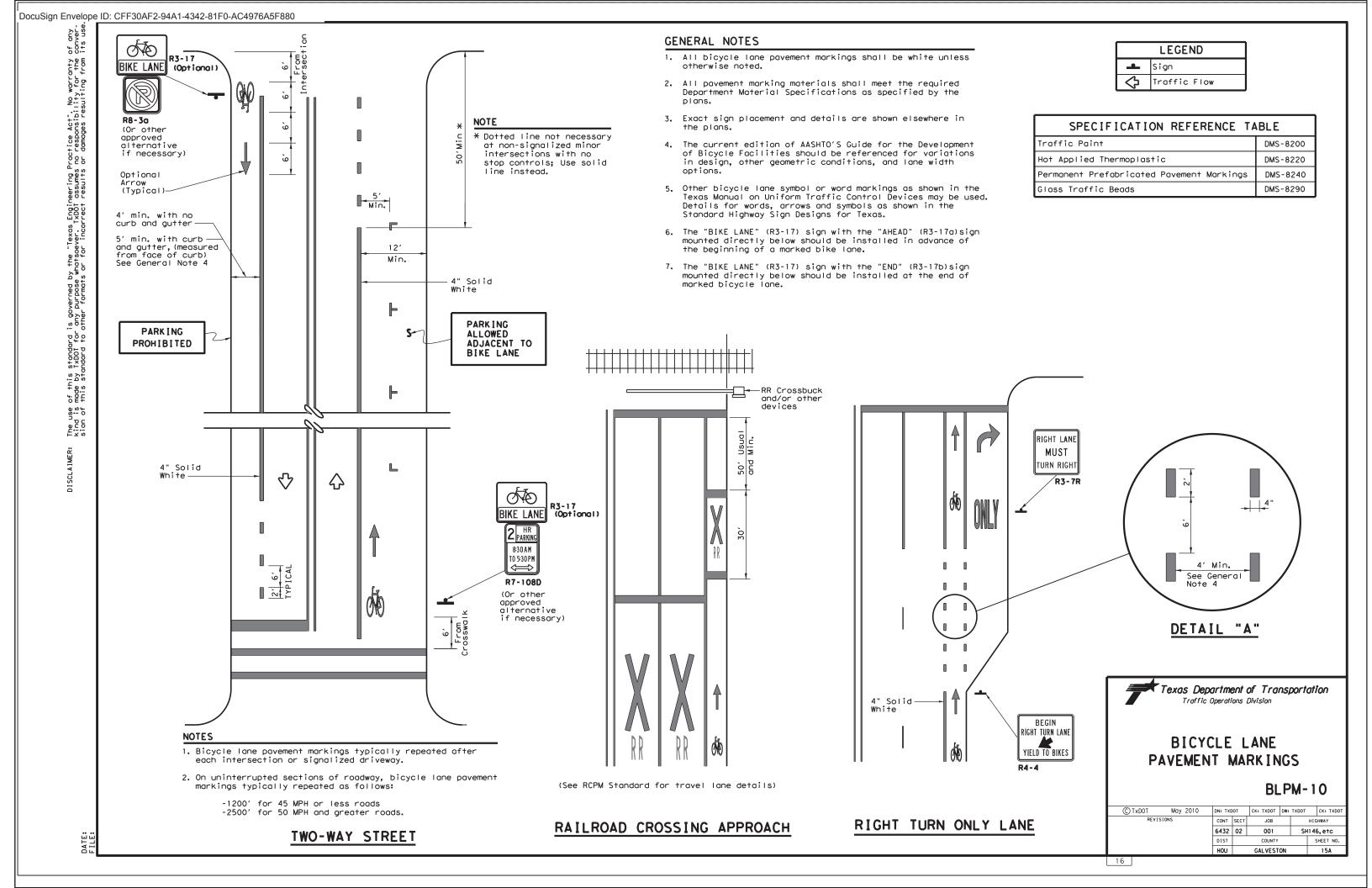




PAVEMENT MARKING (SHIELD)

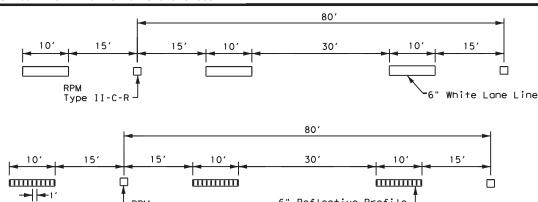
PM(SHIELD-2)-1	7

FILE:	DN:		CK:	CK: DW: CK:			к:	
○ TxDOT 2004	DIST	FED RI	EG	PROJECT NO.			SHEET	
REVISIONS 07-12-17 07-30-17	HOU	6		6432-02-001 15			15	
	COUNTY			CONTROL	SECT	JOB		HIGHWAY
	GALVESTON		NC	6432	02	001	SH	1146e†c



- RPM

Type II-C-R



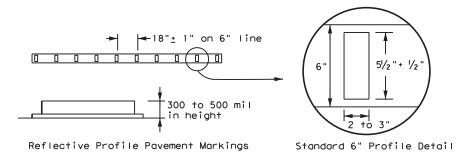
6" Reflective Profile

Pavement Markings (See profile

details below)

Reflectorized raised pavement markers Type II-C-R shall be spaced on 80'centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway

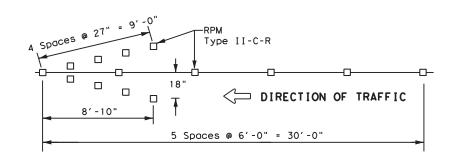
TRAFFIC LANE LINES PAVEMENT MARKING



NOTE

Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

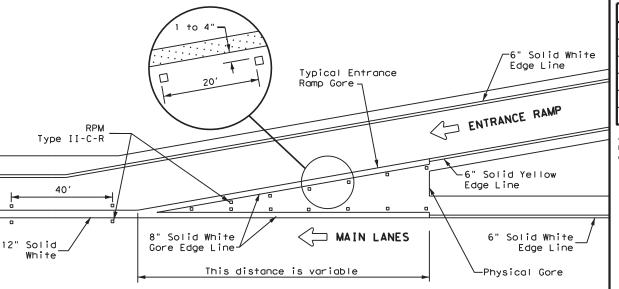
EDGE LINE PAVEMENT MARKINGS



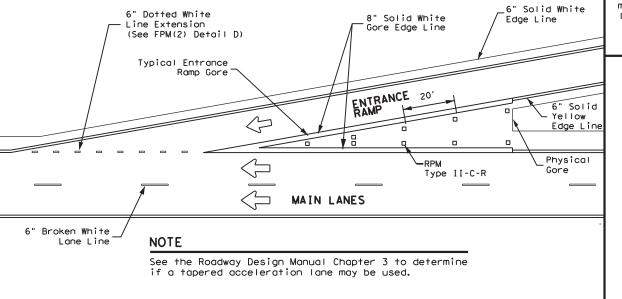
NOTES

- 1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way
- 2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

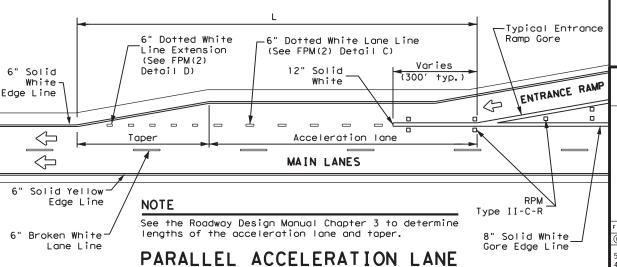
WRONG WAY ARROW

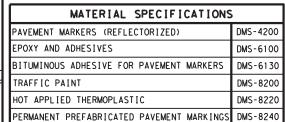


TYPICAL ENTRANCE RAMP GORE MARKING

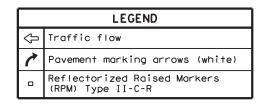


TAPERED ACCELERATION LANE



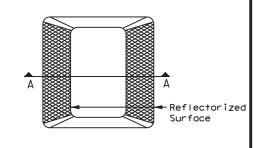


All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

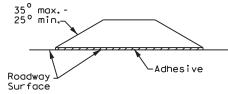


GENERAL NOTE

On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

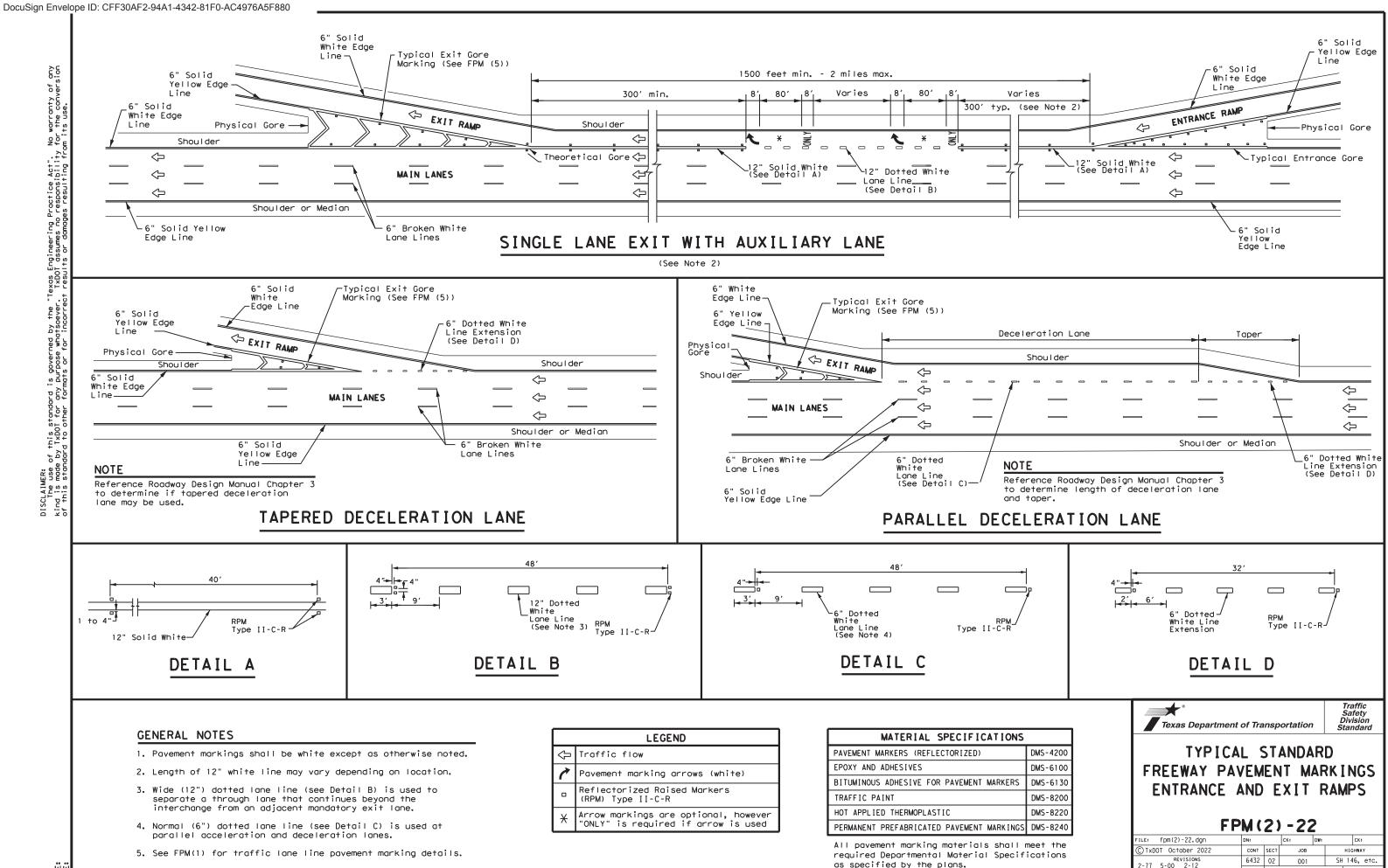


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

Traffic Safety Division Standard

FPM(1)-22

FILE: Tpm(1)-22. dgn	DN:		CK:	DM:		CK	•	
© TxDOT October 2022	CONT	SECT	JOB		HIGHWAY		λY	
REVISIONS 5-74 8-00 2-12	6432	02	001		SH 1	46,	etc.	
4-92 2-08 10-22	DIST		COUNTY			SHEET NO.		
5-00 2-10	HOU		GALVEST	ON		16		



DIST

COUNTY

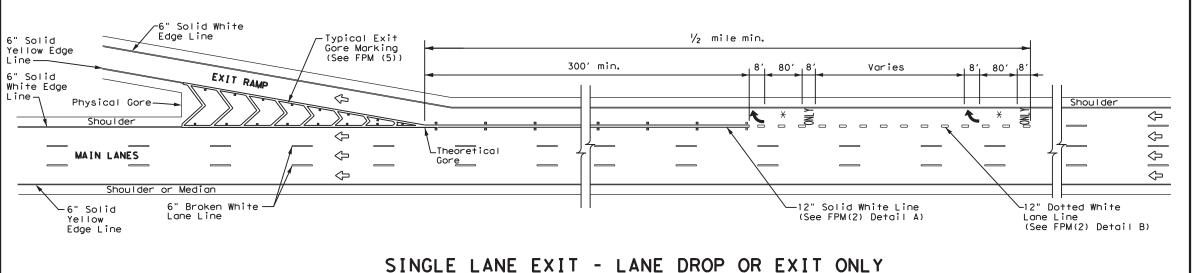
GAL VESTON

SHEET NO.

4-92 8-00 10-22

8-95 2-10

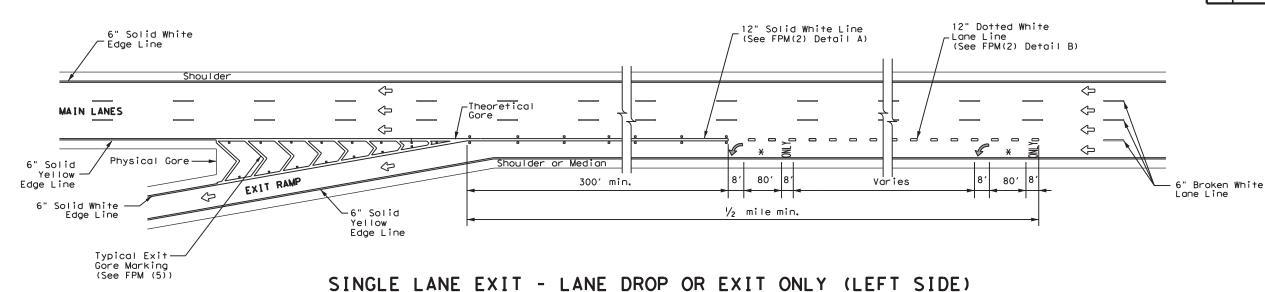
DATE: FILE:

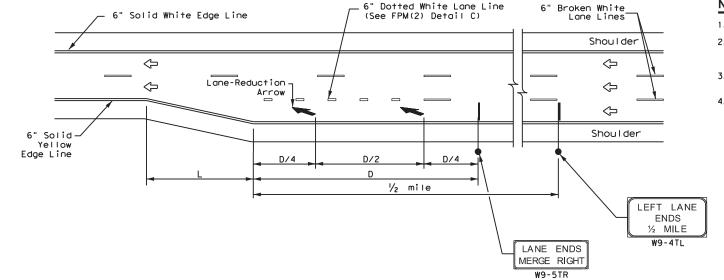


MATERIAL SPECIFICATION	S
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKING	S DMS-8240

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

LEGEND						
Φ	Traffic flow					
7	Pavement marking arrows (white)					
0	Reflectorized Raised Markers (RPM) Type II-C-R					
X	Arrow markings are optional, however "ONLY" is required if arrow is used					





FREEWAY LANE REDUCTION

NOTES

- 1. Large Guide signs shall conform to the TxDOT Freeway Signing Handbook.
- 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.
- Arrows and sign details can be found in the Standard Highway Sign Designs for Texas (SHSD) at http://www.txdot.gov.
- 4. These guidelines may also be applied to the design of a right side lane reduction. Use LANE ENDS MERGE LEFT (W9-5TL) and RIGHT LANE ENDS 1/2 MILE (W9-4TR) signs in lieu of what is shown on drawing.

ADVANCED WARNING SIGN DISTANCE (D)								
Posted Speed	D (f+)	L (f†)						
45 MPH	775							
50 MPH	885							
55 MPH	990							
60 MPH	1,100							
65 MPH	1,200	L=WS						
70 MPH	1,250							
75 MPH	1,350							
80 MPH	1,500							
85 MPH	1,625							

GENERAL NOTES

- 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 FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
- 4. Edge lines are not required in curb and gutter sections of frontage roads.
- See FPM(1) for traffic lane line pavement marking details.

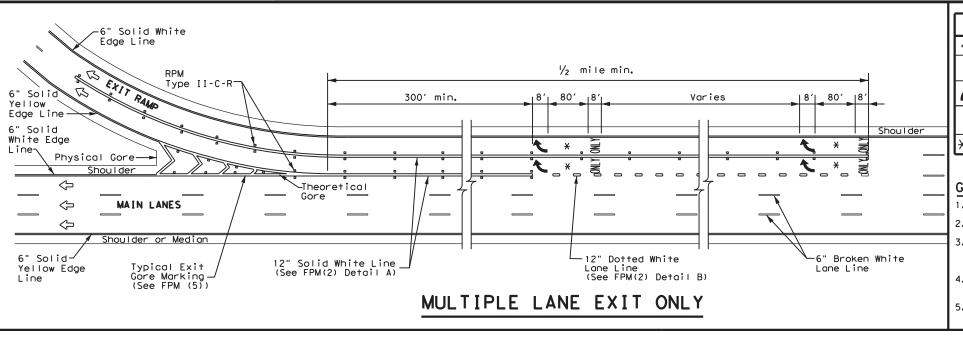


Traffic Safety Division Standard

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

FPM(3)-22

FILE: fpm(3)-22.dgn	DN:		CK:	DW:		CK:
©TxDOT October 2022	CONT	SECT	JOB		HIC	HWAY
REVISIONS 4-92 2-10	6432	02	001		SH 14	l6, etc.
5-00 2-12	DIST	COUNTY			5	SHEET NO.
8-00 10-22	HOU		GALVES	TON		18
23C						



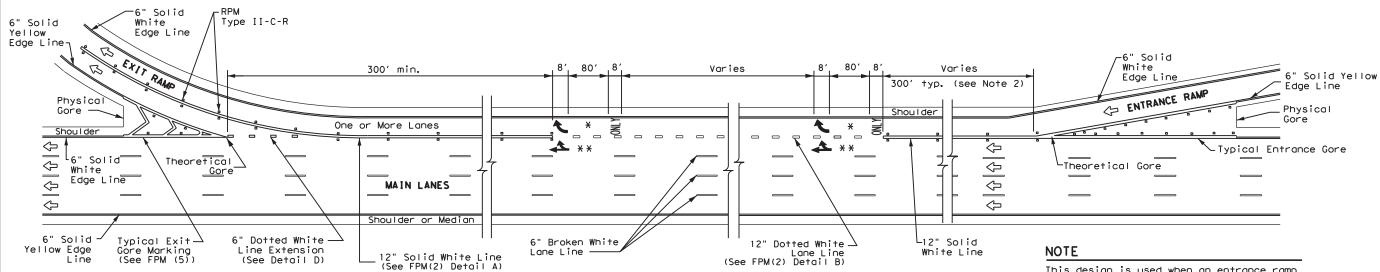
LEGEND					
₽	Traffic Flow				
_	Reflectorized Raised Markers (RPM) Type II-C-R				
7	Pavement marking arrow (white)				
X	Arrow markings are optional, however "ONLY" is required if arrow is used				
XX	Arrow markings are optional				

MATERIAL SPECIFICATIONS	5
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.

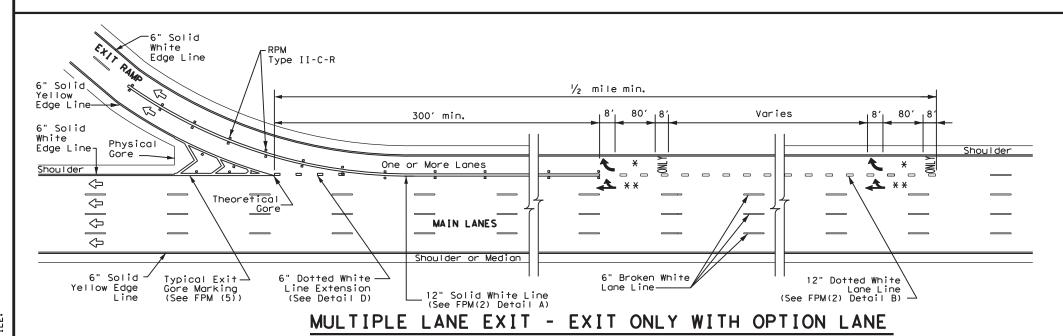
GENERAL NOTES

- 1. Pavement markings shall be white except as otherwise noted.
- 2. Length of 12" white line may vary depending on location.
- 3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
- 4. Edge lines are not required in curb and gutter sections of frontage roads.
- 5. See FPM(1) for traffic lane line pavement marking details.



SINGLE LANE ENTRANCE WITH MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

This design is used when an entrance ramp is followed by a dual lane exit ramp within 2400' downstream (theoretical gore to theoretical gore).



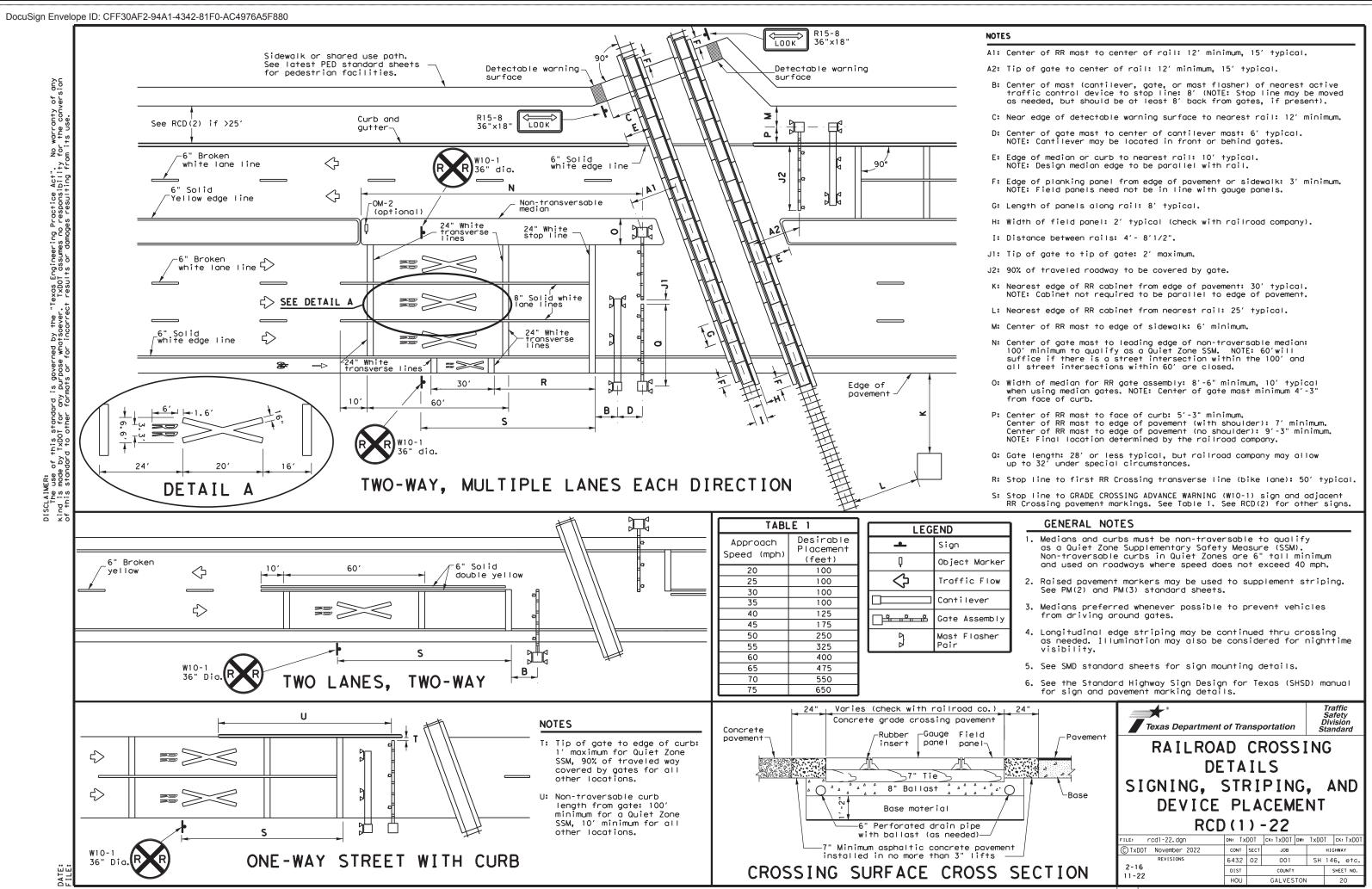


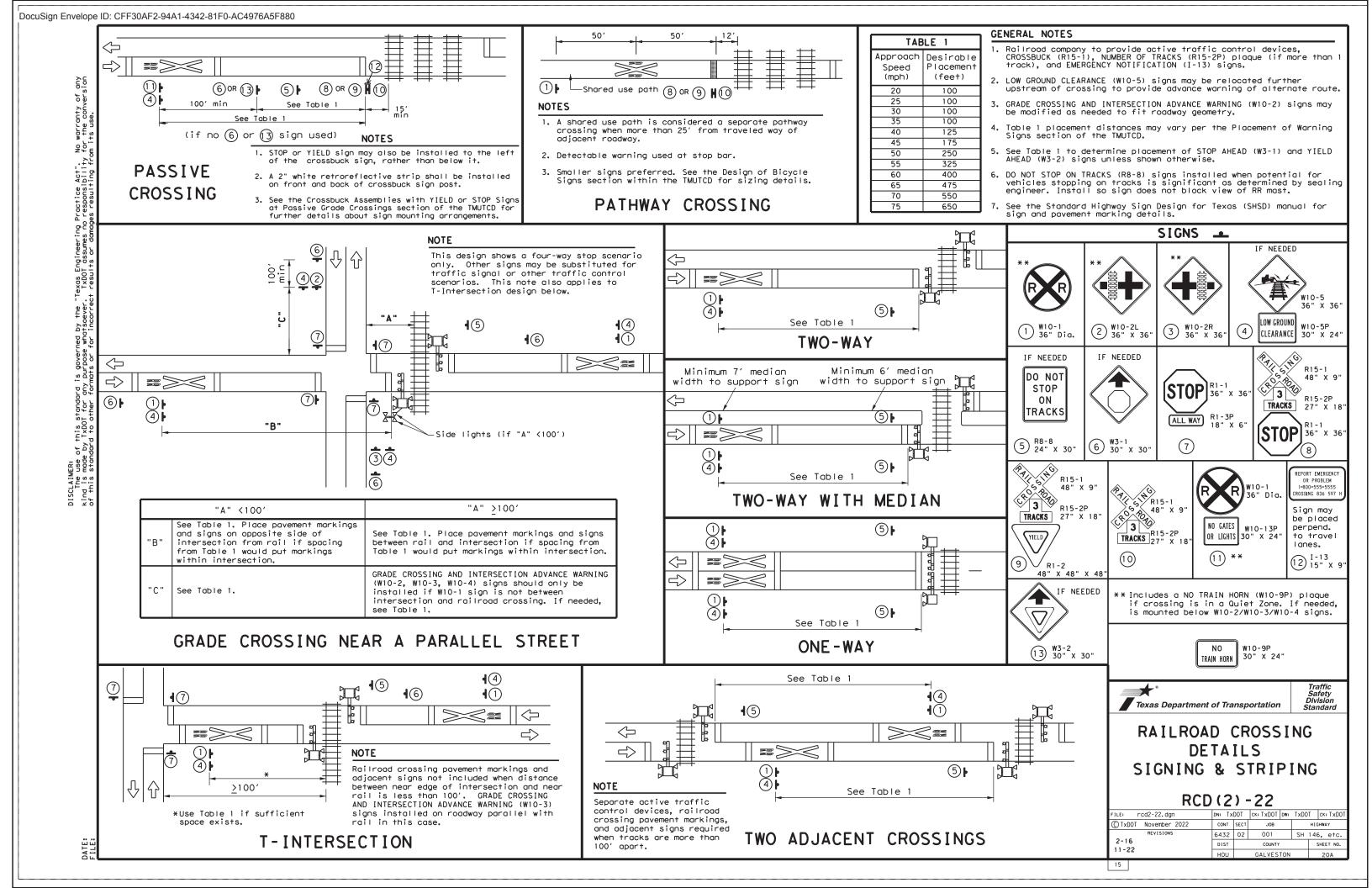
TYPICAL STANDARD
FREEWAY PAVEMENT MARKINGS
MULTIPLE LANE DROP (EXIT)
DETAILS

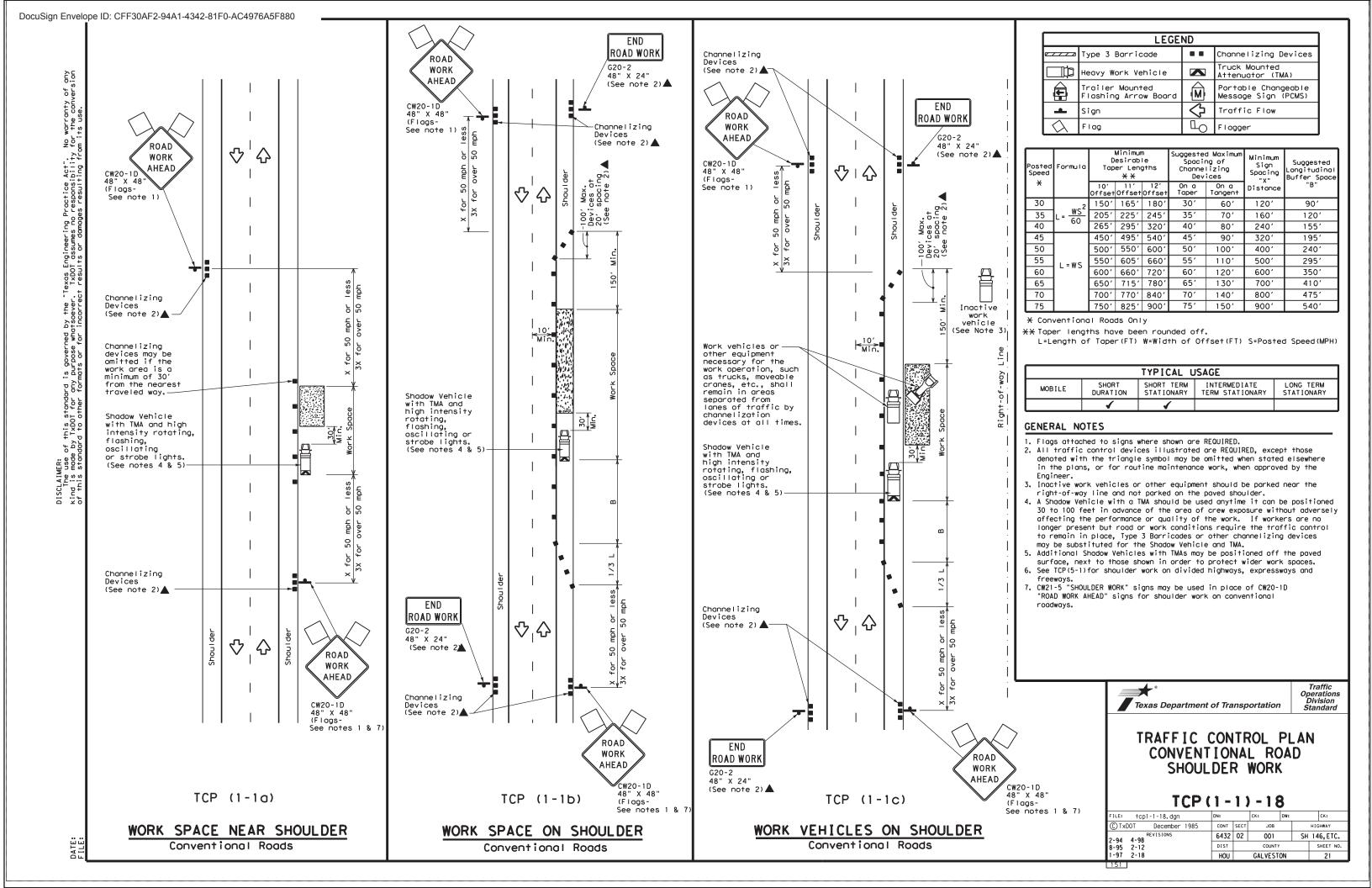
| DN: | CK: | DW: | CONT | SECT | JOB |

Traffic Safety Division Standard

LE: Ipilit47-22.ugii	DINE		CK:	UW:	CK:
TxDOT October 2022	CONT	SECT	JOB		H [GHWAY
REVISIONS 1-77 2-10	6432	02	001	SH	146, etc.
-00 2-12	DIST COUNTY			SHEET NO.	
-00 10-22	HQU	GALVESTON		10h	19
26					







DocuSign Envelope ID: CFF30AF2-94A1-4342-81F0-AC4976A5F880 Warning Sign Sequence in Opposite Direction END CW20-4D ROAD WORK 48" X 48" Same as Below ONE LANE ROAD G20-2 ROAD ♡Ⅰ☆ WORK 48" X 24" CW3-4 48" X 48" AHEAD AHEAD (See note 2) BE 42" X 42 " PREPARED CW20-1D 48" X 48' TO STOP TO (Flags-ONCOMING See note 1) TRAFFIC CW20-7 R1-2aP 48" X 36" (See note 8) $\overline{\omega}$ END CW16-2P XXXROAD WORK FEET (See note 2) 📥 G20-2 48" X 24" Channelizing devices separate work space Except in emergencies, flagger stations shall be from traveled wayilluminated at night of this standard is governed by the "Te by TxDOI for any purpose whatscever, dard to other formats or for incorrect Snadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. (See notes 5 & 6) Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. (See notes 5 & 6) CW20-7 48" X 48" 42" X 42 " X 42" ONCOMING | R1-2aP | 48" X 36" emergencies, flagger stations CW16-2P TRAFFIC 24" X 18" (See note 8) FEET shall be (See note 2) 🛦 illuminated at night BE PREPARED TO STOP CW3-4 48" X 48" (See note 2) 🛦 48" X 48" ♡□☆ ♡Ⅰ仑 ONE LANE ROAD AHEAD CW20-4D ONE LANE 48" X 48" ROAD END AHEAD CW20-4D ROAD WORK 48" X 48" G20-2 48" X 24" ROAD WORK AHEAD CW20-1D 48" X 48" ROAD (Flags-TCP (1-2a) WORK See note 1)

AHEAD

ONE LANE TWO-WAY

CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)

CW20-1D

(Flags-See note 1)

48" X 48"

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

Speed	Formula	**		Suggested Maximum Spacing of Channelizing Devices		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	WS ²	150′	1651	1801	30′	60′	120'	90′	2001
35	L = WS	2051	2251	245'	35′	70′	160'	120'	250'
40	80	2651	2951	3201	40′	80′	240'	155′	3051
45		450′	495′	540′	45′	90′	320'	195′	360′
50		5001	5501	6001	50′	100′	400'	240′	425′
55	L=WS	550′	6051	660′	55′	110′	500′	295′	495′
60	L - # 3	600′	660′	720′	60′	120'	600'	350′	570′
65	1	650′	715′	7801	65′	130'	700′	410′	645′
70		700′	770′	840'	70′	140′	800'	475′	730′
75		750′	8251	900′	75′	150′	900'	540'	820′

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

	TYPICAL USAGE										
MOBILE SHORT SHORT TERM INTERMEDIATE LONG TERM DURATION STATIONARY TERM STATIONARY STATIONARY											
	1	1									

GENERAL NOTES

- 1. Flags attached to signs where shown are REQUIRED.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
- 4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
- 5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- 6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

TCP (1-2b)

ONE LANE TWO-WAY

CONTROL WITH FLAGGERS

- 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. II. If the work space is located near a horizontal or vertical curve, the buffer distances
- should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
- 12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.

13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.



TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

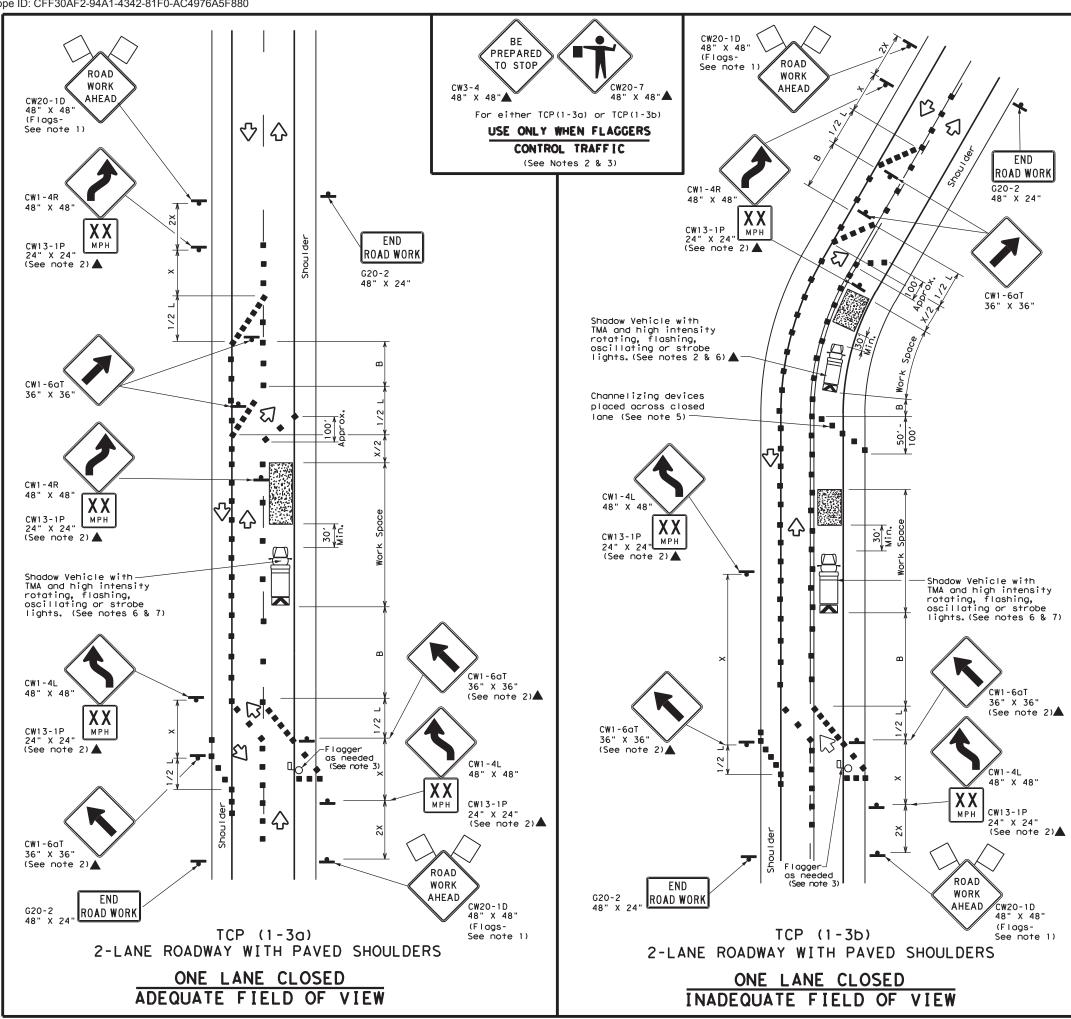
Traffic

TCP(1-2)-18

FILE: TCD1-2-18.agn	DN:		CK:	DW:	CK:	
© TxDOT December 1985		SECT	JOB		HIGHWAY	
4-90 4-98	6432	02	001 SI		146,ETC.	
2-94 2-12	DIST		COUNTY		SHEET NO.	
1-97 2-18	HOU	GALVESTON		N	22	
1621						

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and is governed by the "To any purpose whatsoever. formats or for incorrect



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

Posted Speed	Formula	Minimum Desirable Taper Lengths **			Spacii Channe		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"
30	WS ²	150′	165′	180′	30′	60′	1201	90,
35	L = WS	2051	225′	245'	35′	70′	160′	120'
40	80	265′	295′	3201	40′	80′	240'	155′
45		450′	495′	540'	45′	90′	320'	195′
50		5001	550′	600′	50′	100′	400'	240'
55	L=WS	550′	6051	660′	55′	110′	500′	295′
60	- "3	600′	660′	720′	60′	120'	600'	350′
65		650′	715′	780′	65′	1301	700′	410′
70		700′	770′	840′	70′	140′	800′	475′
75		750′	825′	900'	75′	150′	900'	540′

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE										
MOBILE SHORT SHORT TERM INTERMEDIATE LONG TERM DURATION STATIONARY TERM STATIONARY STATIONARY										
	<b>√</b>	1								

#### GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.

2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.

3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.

4. DO NOT PASS, PASS WITH CARE and construction regulatory speed

zone signs may be installed downstream of the ROAD WORK AHEAD signs.

5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure.

Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.

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

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

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

Texas Department of Transportation

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

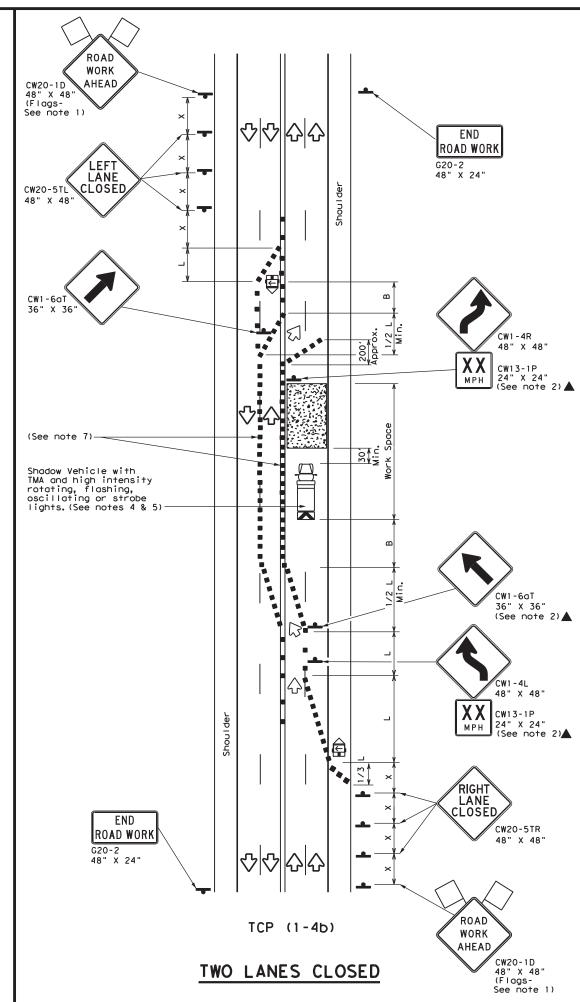
FILE: tcp1-3-18.dgn	DN:		CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB		HIGHWAY
REVISIONS 2-94 4-98	6432	02	001	SH	146,ETC.
8-95 2-12	DIST		COUNTY		SHEET NO.
1-97 2-18	HOU		GALVESTO	N	23

ranty of any conversion

No warre for the

END ROAD WORK ROAD WORK G20-2 48" X 24" AHEAD CW20-1D 48" X 48" (Flags-See note 1)  $\bigcirc$ **&** & : for 50 mph or less 3x for over 50 mph Texas Engineering Practice Act".

TxD01 assumes no responsibility
t results or damages resulting fro Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. (See notes 4 & 5) DISCLAIMER:
The use of this standard is made by TxDOT for any of this standard to other form RIGHT LANE CLOSED CW20-5TR  $\bigcirc$ **쇼** 쇼 ROAD END WORK ROAD WORK AHEAD G20-2 48" X 24" CW20-1D 48" X 48" (Flags-See note 1) TCP (1-4a) ONE LANE CLOSED



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

Posted Speed	Formula	XX Devices		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space			
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"
30	WS ²	150′	165′	180′	30′	60′	120′	90′
35	L = WS	2051	2251	245'	35′	70′	160′	120′
40	80	265′	2951	320′	40′	80′	240'	155′
45		4501	4951	540'	45′	90′	320′	195′
50		500′	550′	600′	50′	100′	400′	240′
55	L=WS	550′	605′	660′	55′	110′	500′	295′
60	- 11/3	600'	660′	7201	60′	120'	600′	350′
65		650′	715′	780′	65′	130′	700′	410′
70		7001	770′	840′	70′	140′	800′	475′
75		750′	825′	900′	75′	150′	900′	540′

- * Conventional Roads Only
- imes 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.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer. 3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the
- visibility of the work zone is less than 1500 feet.
- 4. A Shadow Vehicle with a TMA should be used anytime it can be positioned  $30\ \text{to}\ 100\ \text{feet}$  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 channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.



TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

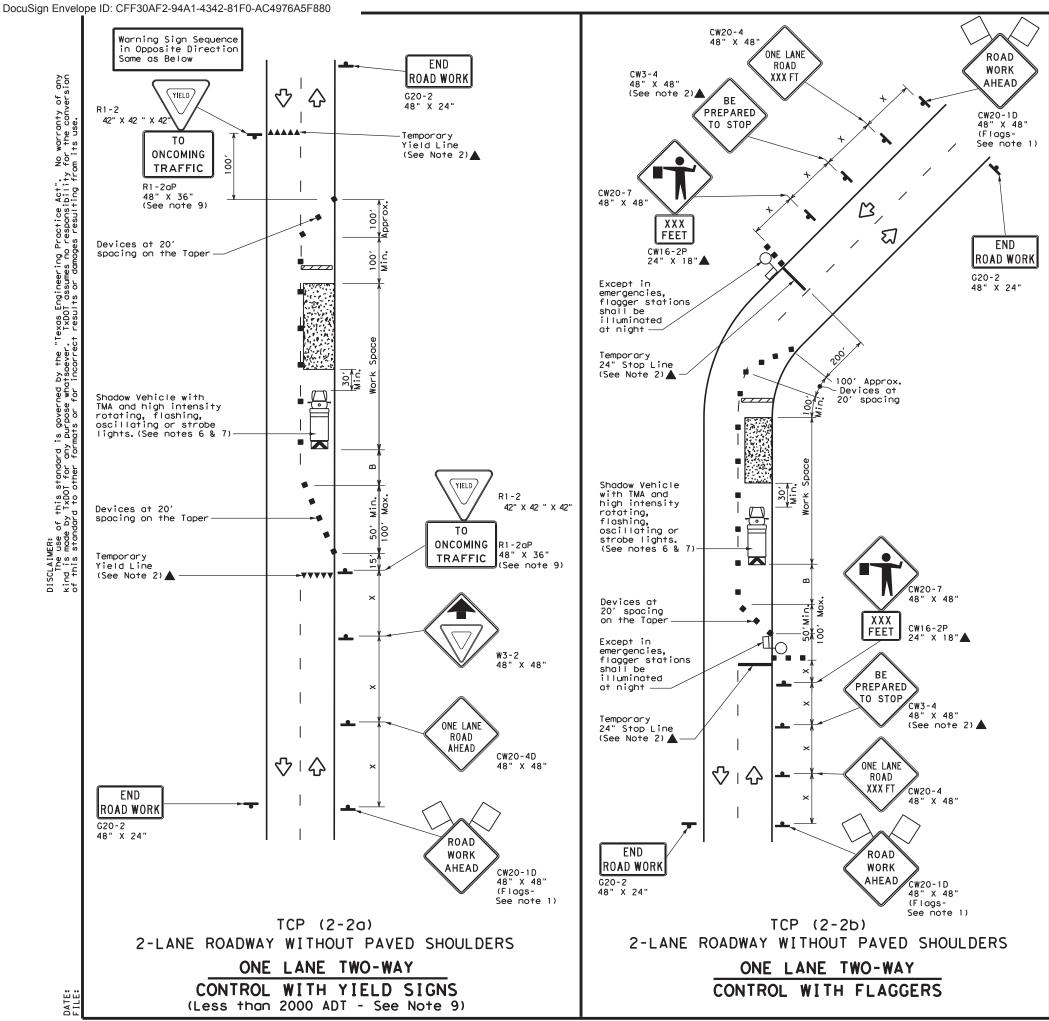
TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:		CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB		HIGHWAY
REVISIONS 2-94 4-98	6432	02	001	S	H 146,ETC.
8-95 2-12	DIST		COUNTY		SHEET NO.
1-97 2-18	HOU	HOU GALVESTON			24
1 1 5 41					

GALVESTON

GALVESTON

26



**LEGEND** Type 3 Barricade Channelizing Devices ruck Mounted leavy Work Vehicle Attenuator (TMA) Portable Changeable Message Sign (PCMS) railer Mounted Flashing Arrow Board Traffic Flow ign  $\triangle$ F lagger Flag

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Spaci: Channe		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"	
30	L = WS ²	150′	1651	180′	30'	60′	120′	90′	200′
35		2051	225'	245'	35′	70′	160′	120'	250′
40	60	265′	2951	3201	40'	80'	240′	155′	305′
45	L=WS	4501	4951	540′	45'	90′	3201	195′	360'
50		500′	550′	600'	50′	100′	400′	240′	425′
55		550′	6051	660′	55′	110′	500′	295′	495′
60		600'	660′	720′	60′	120'	600′	350′	570′
65		650′	715′	7801	65′	130′	700′	410′	645'
70		700′	770′	840′	701	140′	8001	475′	730′
75		750′	8251	900′	75'	150′	900′	540′	820′

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE								
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY				
	1	1	1					

#### **GENERAL NOTES**

- 1. Flags attached to signs where shown, are REQUIRED.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
   4. Flaggers should use two-way radios or other methods of communication to control traffic.
- 5. Length of work space should be based on the ability of flaggers to communicate.
- 6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow
- 7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

## TCP (2-2a)

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

#### TCP (2-2b)

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

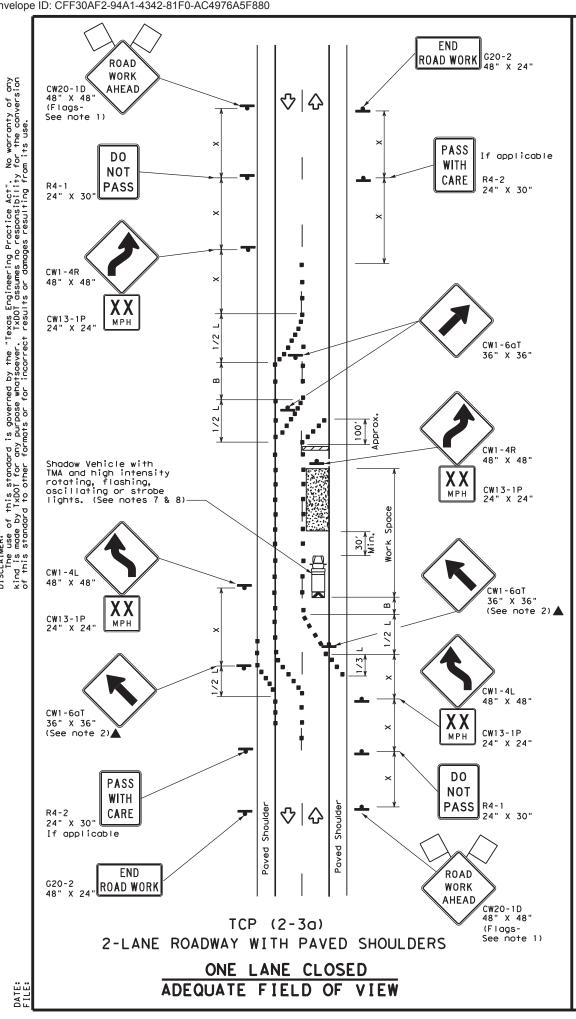


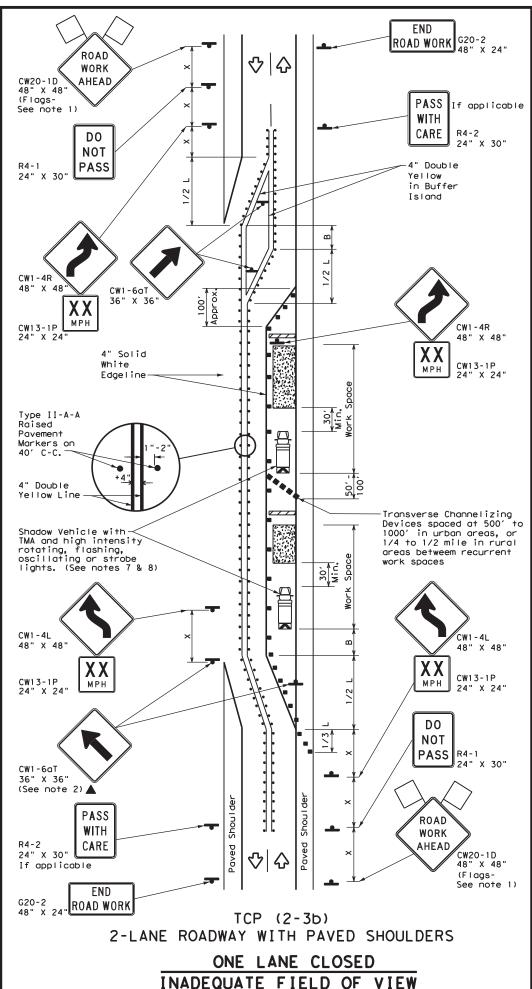
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

LE: tcp2-2-18.dgn	DN:		CK:	DW:	CK:
TxDOT December 1985	CONT	SECT	JOB		HIGHWAY
REVISIONS 3-95 3-03	6432	02	001 SH		146,ETC.
-97 2-12	DIST	COUNTY			SHEET NO.
-98 2-18	HOU	GALVESTON			27





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

Posted Speed	Formula	Minimum Desirable Taper Lengths **			Spaci Channe		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"
30		1501	1651	180'	30′	60′	120′	90′
35	L = WS	2051	225′	245	35′	70′	160′	120′
40	80	265′	2951	320	40′	80′	240′	155′
45		450'	495′	540	45′	90′	320′	195′
50		500′	550′	600	50′	100'	400′	240′
55	L=WS	5501	6051	660	55′	110′	500′	295′
60	- " -	600′	660′	720	60′	120'	600'	350′
65		650′	715′	780′	65′	130′	7001	410′
70		700′	770′	840	70′	140′	8001	475′
75		750′	825′	900′	75′	150′	900′	540′

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper (FT) W=Wighth of Offset (FT) S=Posted Speed (MPH)

		TYP	CAL L	JSAGE	
MOBILE	SHORT DURATION	SHOR' STAT	TERM ONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
					TCP (2-3b) ONLY
				1	1

GENERAL NOTES

. Flags attached to signs where shown, are REQUIRED.

- . All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
 When work space will be in place less than three days existing pavement
- markings may remain in place. Channellizing devices shall be used to separate
- Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue
- The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
 Conflicting pavement marking shall be removed for long term projects.
 A Shadow Vehicle with a TMA should be used anytime it can be positioned
- 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

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



Traffic Operations Division Standard

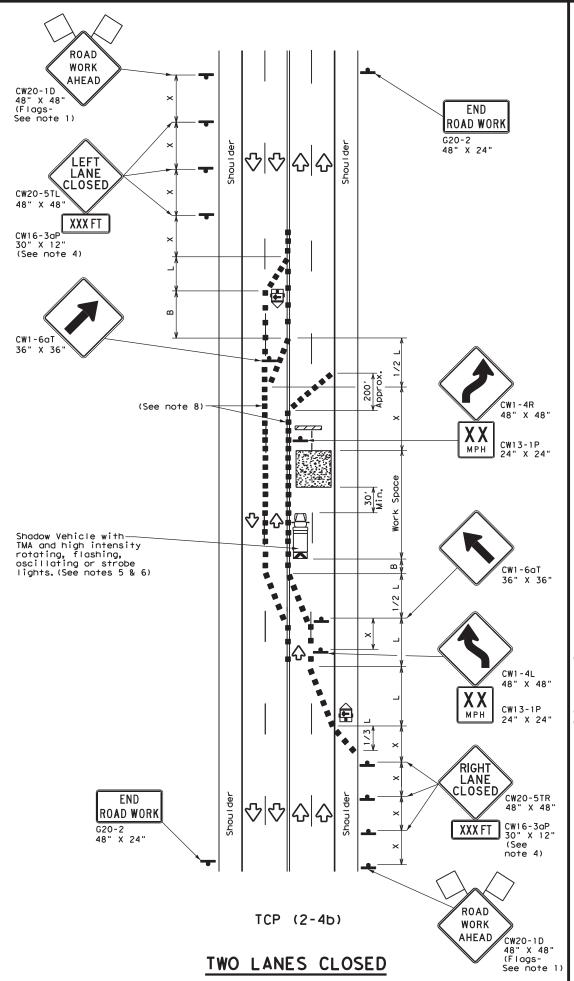
TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN: CF		CK: DW:		CK:
© TxDOT December 1985	CONT	SECT	JOB		H I GHWAY
REVISIONS 8-95 3-03	6432	02	001	146,ETC.	
1-97 2-12	DIST	DIST COUNTY			SHEET NO.
4-98 2-18	HOU		GALVEST	ON	28

No warranty of any for the conversion its use. ROAD END Texas Engineering Practice Act".

TxDOI assumes no responsibility ROAD WORK AHEAD CW20-1D 48" X 48' G20-2 48" X 24" (Flags-See note 1) for 50 MPH or less 3x for over 50 MPH Shadow Vehicle with TMA and , √N MIN MIN high intensity rotating, flashing, oscillating or of this standard by TxDOI for any strobe lights. (See notes 5 & 6 __ RIGHT LANE CLOSED CW20-5TR _48" X 48 XXX FT CW16-3aP 30" X 12" END ROAD WORK ◇ ◇ ◇ ◇ ROAD G20-2 48" X 24" WORK AHEAD CW20-1D 48" X 48" (Flags-See note TCP (2-4a) ONE LANE CLOSED



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

Speed	Formula	**			Spacii Channe		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space	
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"	
30	ws ²	150′	1651	180′	30′	60'	120′	90′	
35	L = WS	2051	225′	2451	35′	701	160′	120′	
40	80	2651	295′	320′	40'	80′	240'	155′	
45		450'	495′	540'	45′	90'	3201	1951	
50		500′	550′	600'	50′	100′	400′	240′	
55	L=WS	550′	605′	660′	55′	110'	500′	295′	
60	L - # 3	600′	660′	720′	60′	120'	600′	350′	
65		650′	715′	780′	65′	130′	700′	410′	
70		700′	770′	840′	70′	140'	800′	475′	
75		750′	825′	900′	75′	150′	900′	540′	

* Conventional Roads Only

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

	TYPICAL USAGE									
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY						
		1	1							

GENERAL NOTES

- 1. Flags attached to signs where shown, are REQUIRED.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
- For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental
- 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
- Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

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

TCP (2-4b)

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



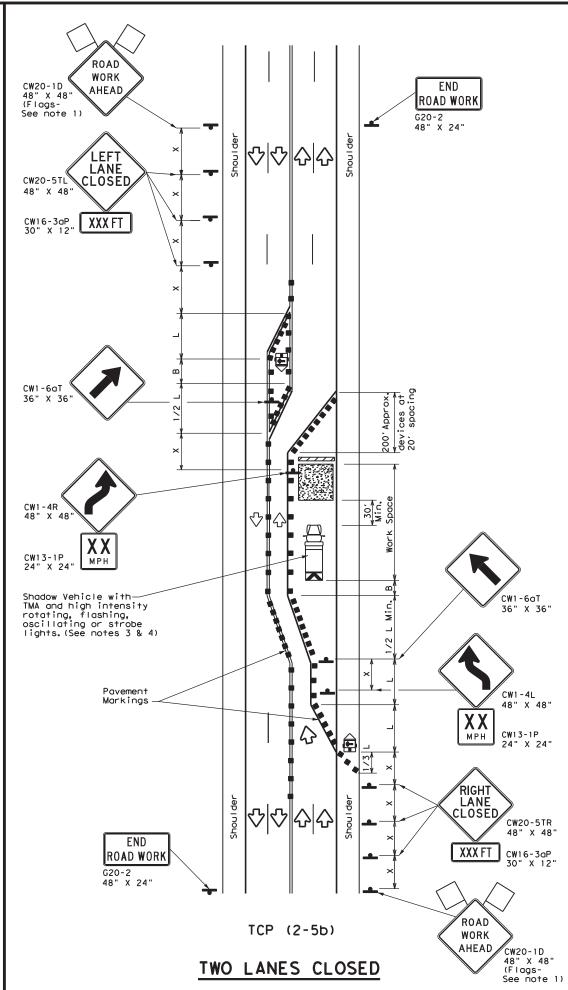
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

- 1	FILE: tcp2-4-18.dgn	DN:		CK:	DW:	CK:	
	© TxDOT December 1985	CONT	SECT	JOB		HIGHWAY	
	8-95 3-03 REVISIONS	6432	02	001	SH	1 146,ETC.	
	1-97 2-12	DIST		COUNTY		SHEET NO.	
	4-98 2-18	HOU		GALVEST	ON	29	
	1641					,	

Texas Engineering Practice Act". No warranty of any TXDOI assumes no responsibility for the conversion tresults or damages resulting from its use. WORK END AHEAD CW20-1D 48" X 48" (Flags-ROAD WORK See note 1) 48" X 24" Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. (See notes 3 & 4) Pavement Markings RIGHT LANE CLOSED CW20-5TR 48" X 48" XXX FT CW16-3aP ROAD WORK G20-2 48" X 24" ROAD WORK AHEAD CW20-1D 48" X 48" (Flags-TCP (2-5a) ONE LANE CLOSED



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

Posted Speed	Formula	D	Minimur esirab er Len X X	le	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	ws²	150′	165′	180′	30′	60′	120′	90′
35	L = WS	2051	2251	245'	35′	70′	160′	120′
40	80	2651	2951	3201	40′	80′	240′	155′
45		450′	4951	540'	45′	90′	320′	195′
50		500′	5501	6001	50′	100′	400′	240'
55	L=WS	550′	605′	660′	55′	110'	500′	295′
60	L-W3	600′	660′	720'	60′	120'	600′	350′
65		650′	715′	780′	65′	130′	700′	410'
70		700′	770′	840'	70′	140′	800′	475′
75		750′	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

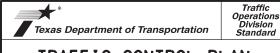
- Flags attached to signs where shown, are REQUIRED.
 All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew eposure 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 substitutued for the Shadow Vehicle and TMA.
- 4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
- 5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

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

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

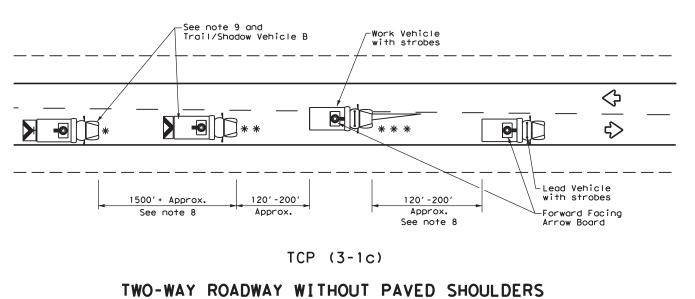


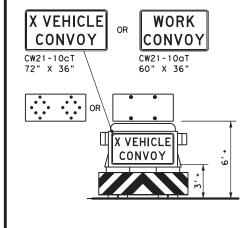
TRAFFIC CONTROL PLAN LONG TERM LANE CLOSURES MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn				DN:	N: CK:		DW:		CK:
© TxDOT December 1985		CONT	SECT	JOB		HIGHWAY			
8-95	2-12	REVISIONS		6432	02	001	SH	1 14	16,ETC.
1-97 3-03			DIST		COUNTY			SHEET NO.	
4-98	2-18			HOU		GALVEST	ON		30

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TRAIL/SHADOW VEHICLE B

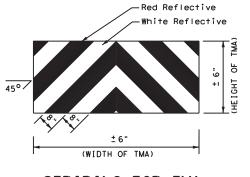
with Flashing Arrow Board in CAUTION display

	LEGEND								
*	Trail Vehicle		ARROW BOARD DISPLAY						
* *	Shadow Vehicle	ARROW BOARD DISPLAT							
* * *	Work Vehicle	₽	RIGHT Directional						
	Heavy Work Vehicle	F	LEFT Directional						
	Truck Mounted Attenuator (TMA)		Double Arrow						
	Traffic Flow	0	CAUTION (Alternating Diamond or 4 Corner Flash)						

TYPICAL USAGE								
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY				
1								

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.
- 5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
- 6. Each vehicle shall have two-way radio communication capability.
- 7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- 8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and VEHICLE may vary according to terrain, work activity and other factors.
- . "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY" (CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
- 10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

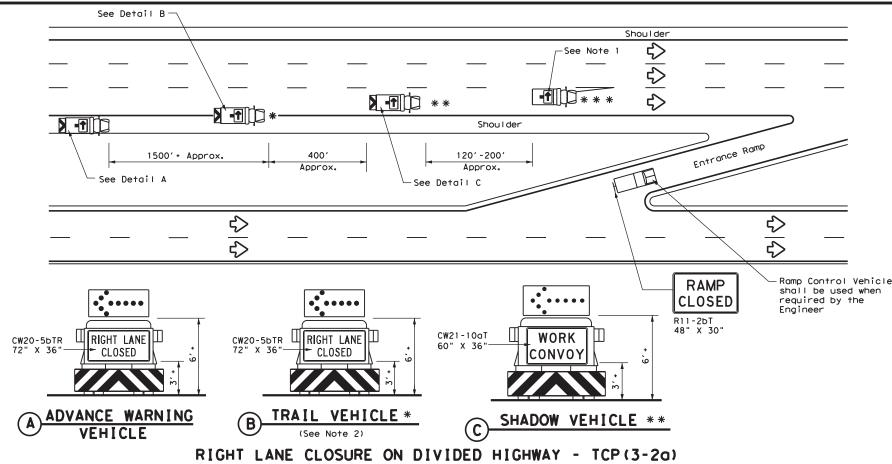
Traffic Operations Division Standard

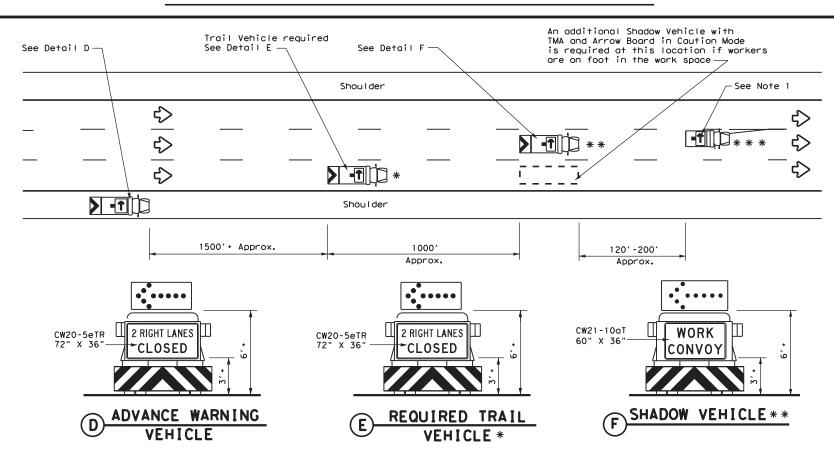
TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP (3-1)-13

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75							

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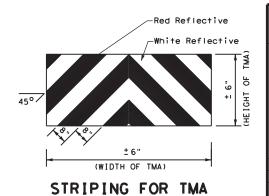
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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	SHORT DURATION		INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY				
1								

GENERAL NOTES

- 1. 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
- For TCP(3-2a) 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(3-2a) and TCP(3-2b) are required.
- 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.
- Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may 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 legibility 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.
- 12. 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 necessary.



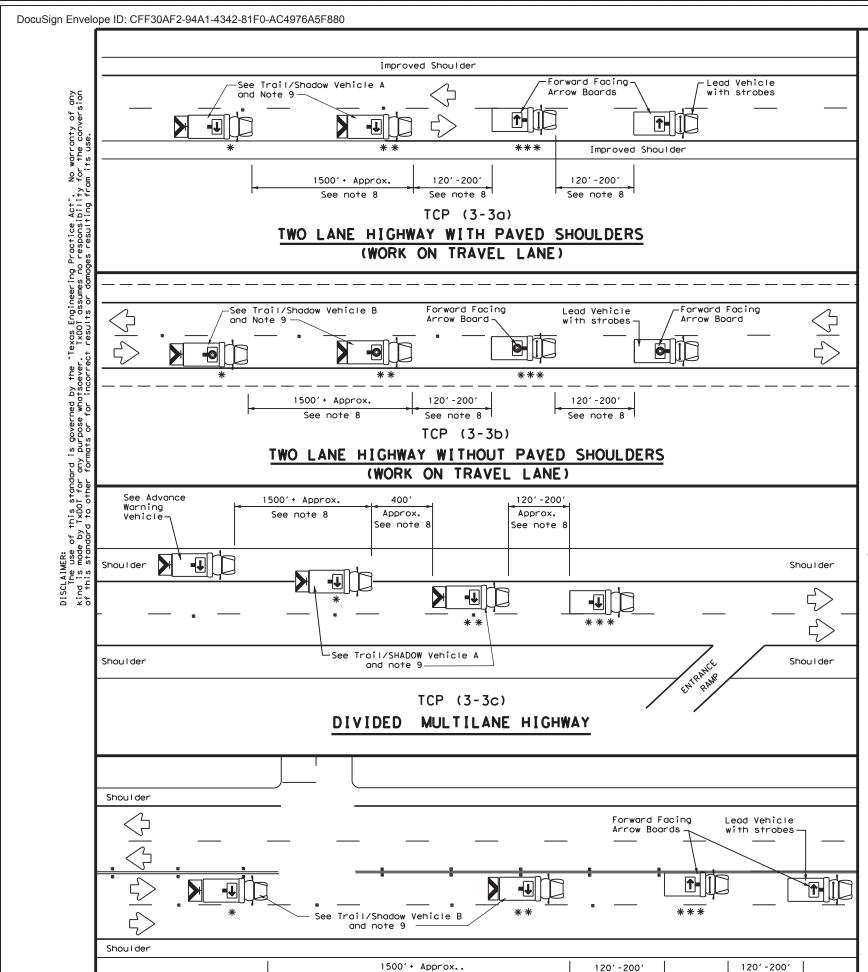


TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP (3-2) -13

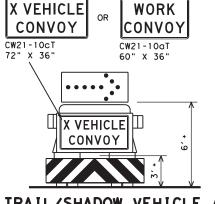
Traffic

FILE: tcp3-2.dgn	DN: T	<dot< td=""><td>ck: TxDOT</td><td>DW:</td><td>TxD01</td><td>ck: TxDOT</td></dot<>	ck: TxDOT	DW:	TxD01	ck: TxDOT
CTxDOT December 1985	CONT	SECT	JOB		-	HIGHWAY
REVISIONS 2-94 4-98	6432	02	001 SH		SH 1	46,ETC.
8-95 7-13	DIST	COUNTY				SHEET NO.
1-97	HOU		GALVESTO	N		33



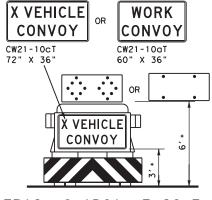
See note 8

TCP(3-3d)UNDIVIDED MULTILANE HIGHWAY See note 8



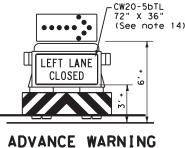
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

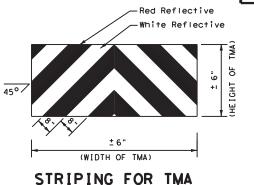


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



VEHICLE



LEGEND Trail Vehicle ARROW BOARD DISPLAY Shadow Vehicle Work Vehicle RIGHT Directional LEFT Directional Heavy Work Vehicle 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 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
- wehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.

 2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- 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 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
- 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 convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK
- VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.

 X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
- Used on the SHADUW VEHICLE IT a IRAIL VEHICLE IS used.

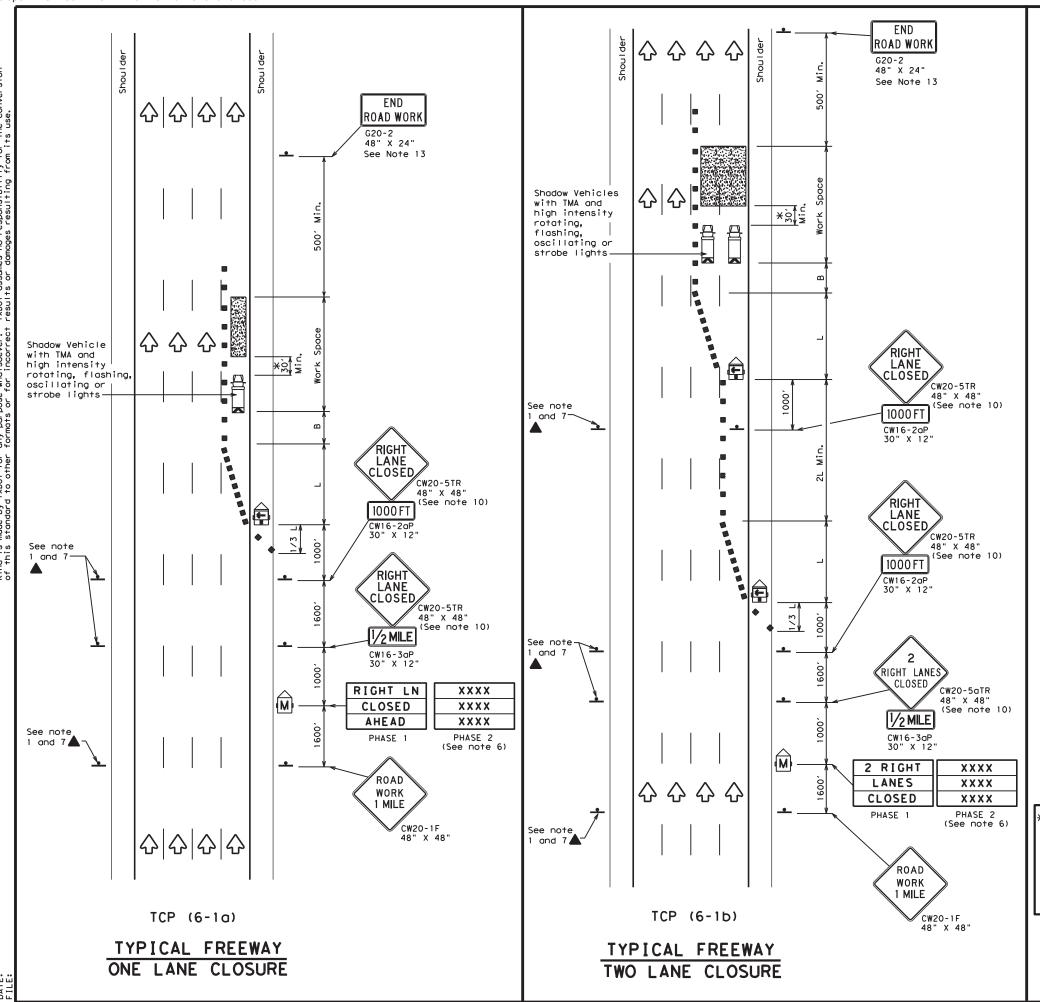
 10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
- 11.A double arrow shall not be displayed on the arrow board on the Advance Warning
- 12. For divided highways with three or four lanes in each direction, use TCP(3-2). 13. Standard diamond shape versions of the CW20-5 series signs may be used as an
- option if the rectangular signs shown are not available.
- 14.The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
- 15.0n two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.



Operations Division Standard

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

FILE: tcp3-3.dgn	DN: T	kD0T	CK: TXDOT D	ow: TxDC	T CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB		HIGHWAY
REVISIONS 2-94 4-98	6432	02	001 S		146,ETC.
8-95 7-13	DIST		COUNTY		SHEET NO.
1-97 7-14	HOU		GALVESTON	N	34



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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **		Spacin Channe		Suggested Longitudinal Buffer Space	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	"B"
45		4501	4951	540′	451	90'	195′
50		500′	550′	6001	50'	100′	240′
55	L=WS	550′	6051	660′	55'	110′	295′
60	- " -	600'	660′	720′	60'	120'	350′
65		650′	715′	780′	65′	130′	410′
70		700′	770′	840′	701	140′	475′
75		750′	8251	9001	75'	150′	540′
80		800'	8801	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

- 1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- 2. 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
- 3. 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.
- 6. 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.
- 7. Duplicate construction warning signs should be erected on the medians side of freeways where median width will permit and traffic volume justifies the signing.
- 8. 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 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

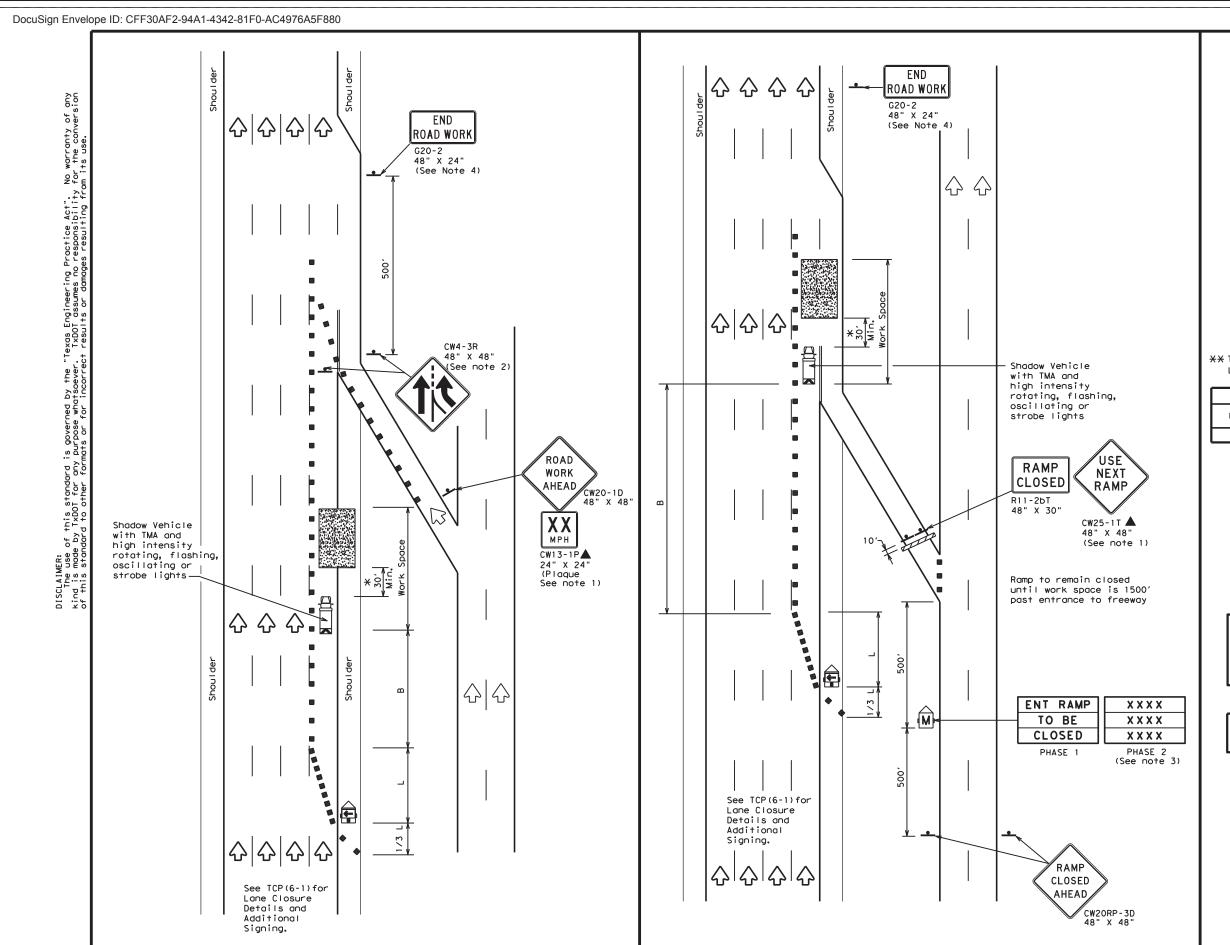


Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

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© TxDOT	February 19	998	CONT	SECT	JOB		н	IGHWAY
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8-12			DIST		COUNTY			SHEET NO.
			H0U		GALVEST	ON		35



TCP (6-2a)

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

ENTRANCE RAMP CLOSED

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

Posted Speed	Formula	D	Minimur esirab Lengti **	le	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	550′	600'	50′	100′	240′
55	L=WS	550′	6051	660′	55′	110′	295′
60	L "3	600′	660′	7201	60′	120′	350′
65		650′	715′	780′	65′	130′	410′
70		700' 770'		840′	70′	140′	475′
75		750' 825' 900'		75′	150′	540′	
80		800′	880′	960′	80′	160′	615′

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

TYPICAL USAGE							
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY			
	1	1	✓				

#### GENERAL NOTES

- 1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated
- 2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
- 3. See "Advance Notice List" on BC(6) for recommended date
- and time formatting options for PCMS Phase 2 message. 4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

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

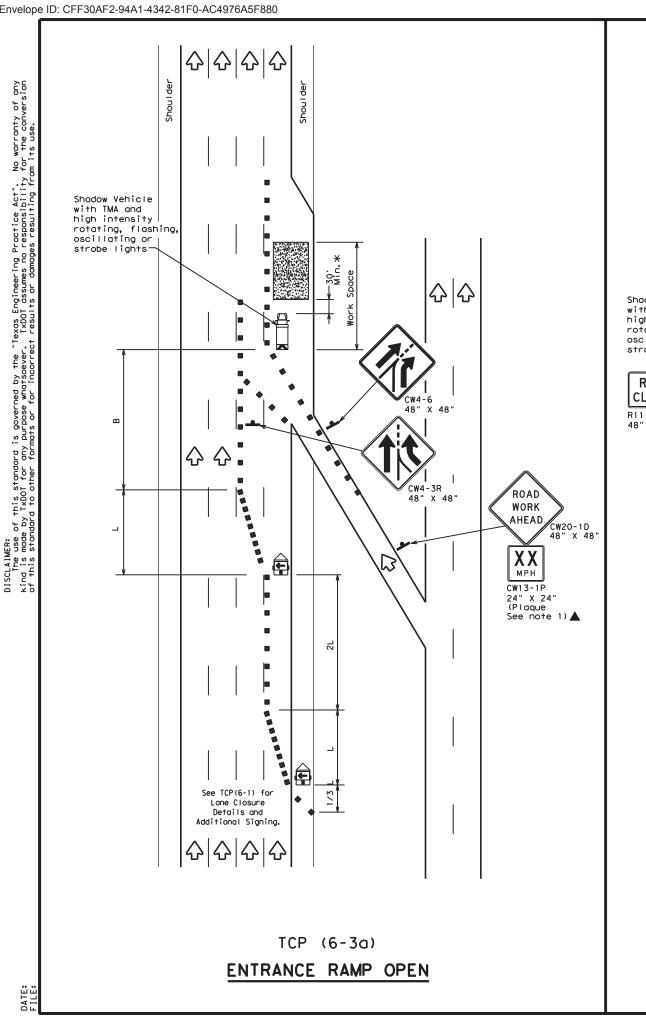
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

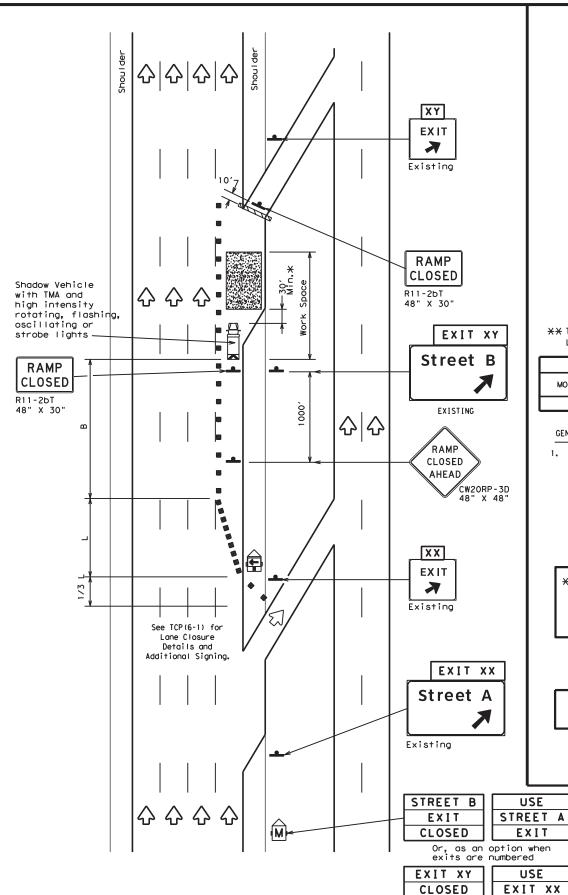


## TRAFFIC CONTROL PLAN WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: To	<b>CDOT</b>	CK: TXDOT	ow: TxDC	T CK: TXDOT
© TxDOT February 1994	CONT	SECT	JOB		HIGHWAY
REVISIONS	6432	02	001 SH		146,ETC.
1-97 8-98	DIST	IST COUNTY		SHEET NO.	
4-98 8-12	HOU		GALVESTO	N	36





TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			Spacir 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′	100′	240'
55	L=WS	550′	605′	660′	55′	110'	295′
60	- 113	600'	660′	720′	60′	120'	350′
65		650′	715′	780′	65′	130′	410'
70		700′	770′	840′	70′	140′	475′
75		750′	750' 825' 900'		75′	150'	540′
80		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(MPF

	TYPICAL USAGE						
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY			
	1	1	✓				

#### GENERAL NOTES:

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

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

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

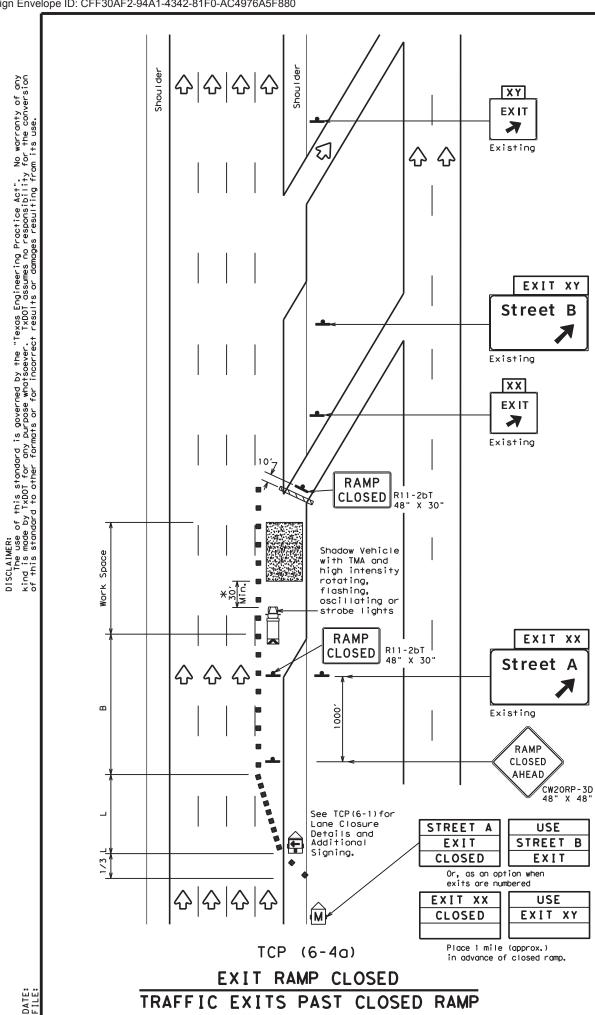
Texas Department of Transportation Traffic Operations Division Standard

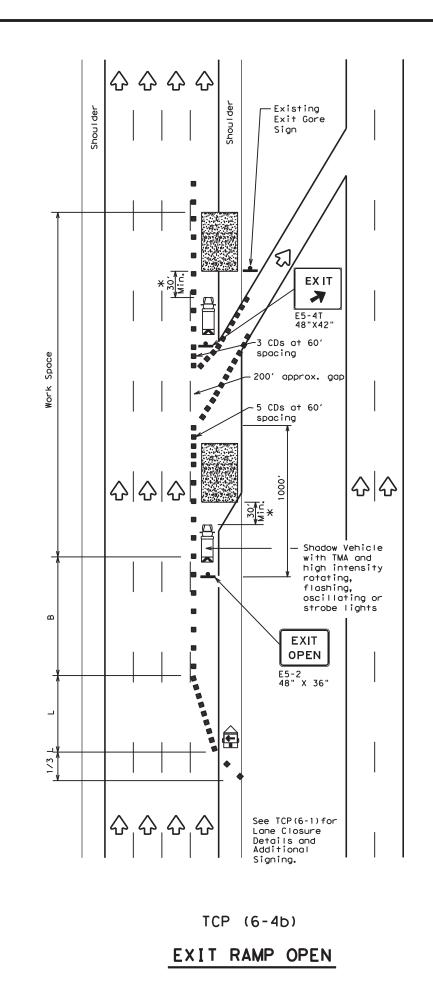
## TRAFFIC CONTROL PLAN WORK AREA BEYOND RAMP

TCP (6-3) -12

DN: TXDOT CK: TXDOT DW: TXDOT CK: TXDO tcp6-3.dgn © TxD0T February 1994 JOB 001 6432 02 SH 146, ETC. COUNTY 4-98 8-12

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





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

Posted Speed	Formula	Desirable Taper Lengths "L" **		Spacin Channe		Suggested Longitudinal Buffer Space		
		10' Offset	11' Offset	12' Offset	12' On a On a ffset Taper Tangent		"B"	
45		450'	495′	540′	451	90′	195′	
50		5001	550′	6001	50′	100′	240′	
55	L=WS	550′	605′	660′	55′	110′	295′	
60	L-W3	600′	660′	720′	60′	120'	350′	
65		650'	715′	780′	65′	130′	410′	
70		700′	770′	840′	70′	140′	475′	
75		750' 825' 900'		75′ 150′		540′		
80		800'	880′	960′	80′ 160′		615′	

 $\fill \fill \fil$ 

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

- 1. 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 advance of the area of crew exposure without adversely affecting the work performance.

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



## TRAFFIC CONTROL PLAN WORK AREA AT EXIT RAMP

TCP (6-4) -12

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	© TxDOT	Feburary 1994	CONT	SECT	JOB		1	HIGHWAY
		REVISIONS	6432	02	001		SH	146,ETC.
	1-97 8-98		DIST	DIST COUNTY				SHEET NO.
	4-98 8-12	?	HOU		GALVESTO	NC		38

TCP (6-5a)

EXIT RAMP OPEN

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

Posted Speed	Formula	Desirable Taper Lengths "L" **		Špaci 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	1	500′	5501	600'	50′	100′	240′
55	L=WS	550'	605′	660′	55′	110'	295′
60	- 113	600′	660′	720′	60′	120'	350′
65		650′	715′	780′	65′	130′	410′
70		700′	770′	840′	701	140′	475′
75		750' 825' 900'		75′	150′	540′	
80		800′	880′	960′	80'	160′	615′

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

	TYPICAL USAGE						
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY			
	1	1	√				

GENERAL NOTES

- 1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere $% \left(1\right) =\left(1\right) \left(1$
- 2. See BC standards for sign details.
- 3. If adequate longitudinal buffer length "B" does not exist between the $\,$ work space and the exit ramp, consideration should be given to closing

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

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



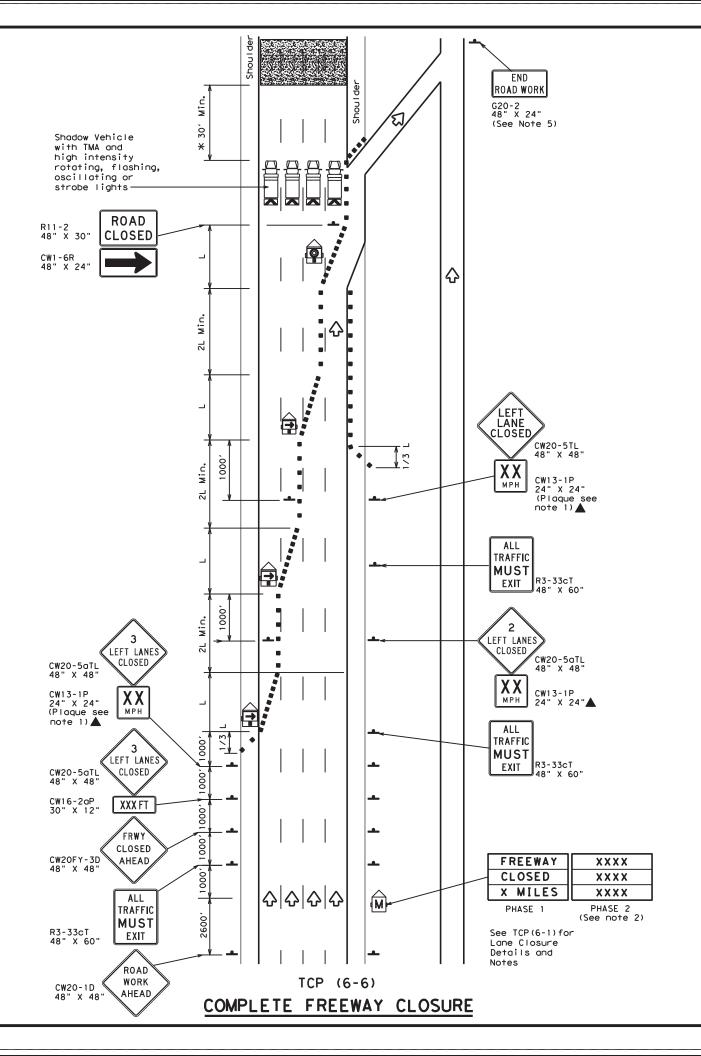
Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

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

Posted Speed	Formula	Desirable Taper Lengths "L" **			Spacir Channe		Suggested Longitudinal Buffer Space
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	"B"
45		4501	495′	540′	45′	90′	195′
50		5001	550′	6001	50′	100′	240′
55	L=WS	550′	605′	6601	55′	110′	295′
60	L-W3	600'	660′	720′	60′	120'	350′
65		650′	715′	7801	65′	130′	410′
70		700′	770′	840′	70′	140'	475′
75		750′	8251	900′	75′	150′	540′
80		800'	880′	960′	80′	160′	615′

** Taper lengths have been rounded off.

L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

	TYPICAL USAGE							
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY				
	1	1	1					

GENERAL NOTES

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

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

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



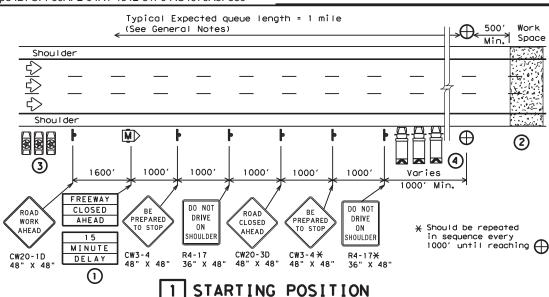
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY CLOSURE

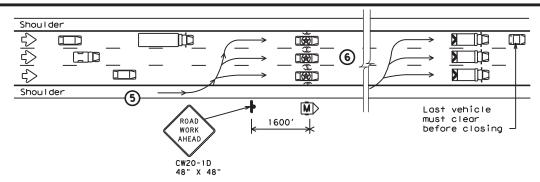
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	1-97 8-98 4-98 8-12			COUNTY			SHEET NO.
4-98 8-1			GALVESTON				40
206				,			

206

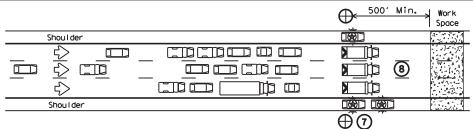


- Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will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



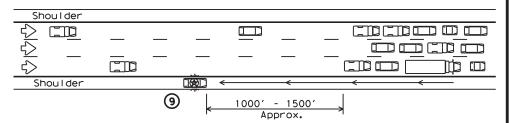
2 REDUCING SPEED OPERATION

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



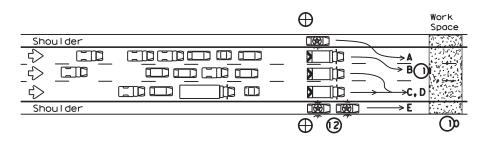
3 ALL TRAFFIC STOPPED AT CP

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



WARNING THE TRAFFIC QUEUE

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



RELEASING STOPPED TRAFFIC

- (n) All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.
- (n) When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically
- (1)2 The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.
- (1)3 LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

	LEGEND							
	Channelizing Devices	\oplus	Control Position (CP)					
M	Portable Changeable Message Sign (PCMS)		Barrier Vehicle with Truck Mounted Attenuator					
	Law Enforcement Officer's Vehicle(LEOV)	♡	Traffic Flow					

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

GENERAL NOTES

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

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



TRAFFIC CONTROL PLAN SHORT DURATION FREEWAY **CLOSURE SEQUENCE**

TCP (6-7) -12

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FILE:	tcp6-7.dgn	DN: T	kD0T	ck: TxDOT	DW:	T×DOT	ck: TxDOT
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	REVISIONS	6432	02	001		SH 14	I6,ETC.
1-97 8-12		DIST		COUNTY			SHEET NO.
4-98		HOLL		GAL VESTO)N		41

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- 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.
- 7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- 8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- 9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- 10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
- 11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- 12. The Engineer has the final decision on the location of all traffic control devices.
- 13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT

http://www.txdot.gov

COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)

MATERIAL PRODUCER LIST (MPL)

ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"

STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)

TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)

TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12



Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS

BC(1)-21

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- $\mbox{$\sharp$}$ May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)
- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
- 2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
- Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
- The "ROAD WORK NEXT X MILES" (G20-1aT) sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
- Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads. 6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in
- the plans or as determined by the Engineer/Inspector, shall be in place.

BEGIN T-INTERSECTION ★ ★ G20-9TP ZONE TRAFFI X X R20-5T * X R20-5aTP BHEN BORKERS ARE PRESENT ROAD WORK <⇒ NEXT X MILES * # G20-2bT WORK ZONE G20-1bTL 1000'-1500' - Hwy INTERSECTED 1 Block - City 1000'-1500' - Hwy 1 Block - City ROADWAY \Rightarrow G20-1bTR ROAD WORK 801 WORK ZONE G20-26T * * Limit WORK ZONE * * G20-9TP G20-6T ★ ★ R20-5T FINES ldouri f * R20-5aTP MHEN MORKERS ARE PRESENT ROAD WORK

CSJ LIMITS AT T-INTERSECTION

- 1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
- 2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING 1,5,6

SIZE

SPACING

				_
Sign Number or Series	Conventional Road	Expressway/ Freeway	Posted Speed	S
CW204			MPH	(
CW21 CW22	48" × 48"	48" × 48"	30	
CW23			35	_
CW25			40	_
0111			45	
CW1, CW2, CW7, CW8,	36" × 36"	48" × 48"	50	_
CW9, CW11,	30 × 30	10 2 10	55	
CW14			60	
CW3 CW4			65	
CW3, CW4, CW5, CW6,	48" × 48"	48" × 48"	70	
CW8-3,			75	
CW10, CW12			80	
			*	

Posted Speed	Sign△ Spacing "X"
МРН	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500 ²
60	600²
65	700 ²
70	800 ²
75	900 ²
80	1000 ²
*	* 3

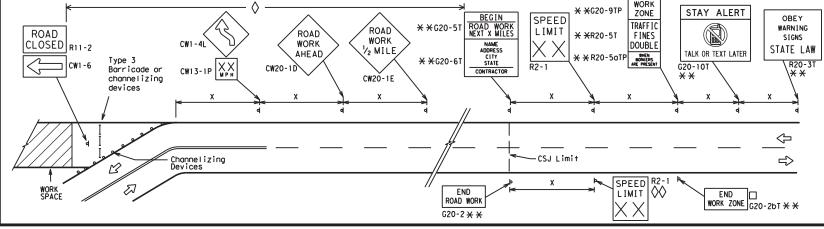
- * For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.
- riangle Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS BEGIN WORK ZONE SPEED STAY ALERT LIMIT TRAFFIC ★ X R20-5T WORK FINES WARNING * * G20-5 R4-1 PASS appropriate AHEAD SIGNS DOUBLE CW20-1D ROAD ★ R20-5aTP MORKERS STATE LAW TALK OR TEXT LATER CW13-1P R2-1X ? ROAD ★ ★ G20-6T WORK G20-10T * * R20-3T * * AHEAD AHEAD ХX Type 3 Barricade or MPH CW13-1P CW20-1D channelizing devices \Diamond \Diamond \triangleleft \Diamond \Rightarrow \Rightarrow \Rightarrow Beginning of -SPEED \Rightarrow END G20-2bT * NO-PASSING R2-1 LIMIT line should $\otimes | \times \times$ END coordinate ROAD WORK When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional with sign "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still location **NOTES** within the project limits. See the applicable TCP sheets for exact location and spacing of signs and The Contractor shall determine the appropriate distance

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



to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer No decimals shall be used.

- ☐ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- ** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
- Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.
- Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND					
I	Type 3 Barricade				
000	Channelizing Devices				
-	Sign				
х	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.				

LECEND

SHEET 2 OF 12

Division Texas Department of Transportation

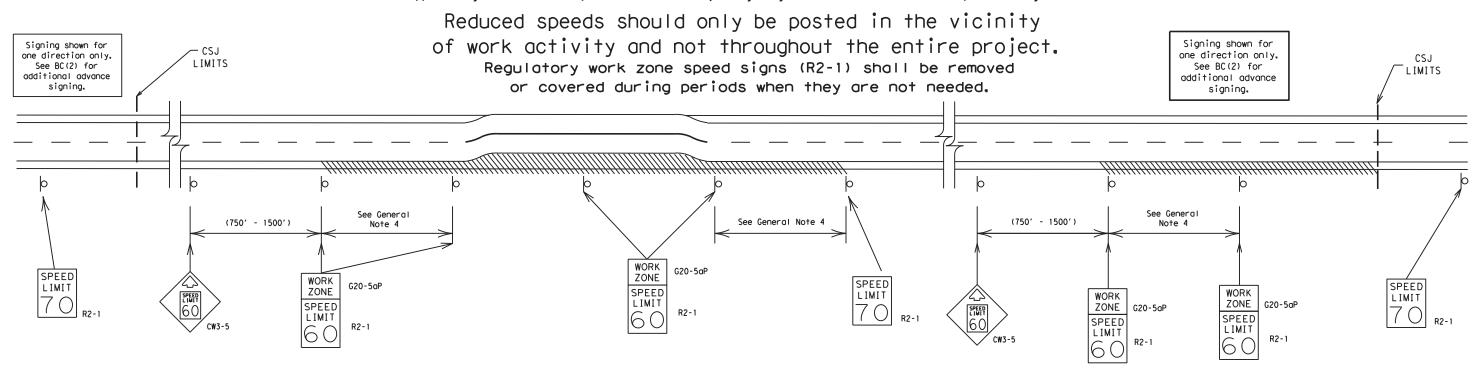
BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.

(See Removing or Covering on BC(4)).

GENERAL NOTES

- 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)).
- Fabrication, erection and maintenance of the ADVANCE SPEED LIMIT (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- 7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- 8. Techniques that may help reduce traffic speeds include but are not limited to:
 A. Law enforcement.
 - B. Flagger stationed next to sign.
 - C. Portable changeable message sign (PCMS).
 - D. Low-power (drone) radar transmitter.
- E. Speed monitor trailers or signs.
- 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 Safety Division Standard

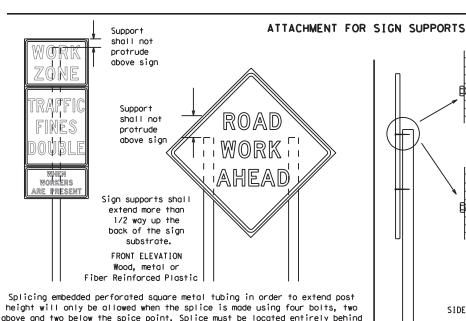
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

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

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



SIDE ELEVATION Wood

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

other means.

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

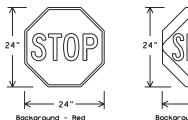
STOP/SLOW PADDLES

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.

- 1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24". 2. STOP/SLOW paddles shall be retroreflectorized when used at night.
- 3. STOP/SLOW paddles may be attached to a staff with a minimum
- length of 6' to the bottom of the sign.
- 4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



Background Legend & Bor	- Red rder - White	Background - Orange Legend & Border - Black					
SHEETING RE	QUIREMENT	S (WHEN USED AT NIGH					
USAGE	COLOR	SIGN FACE MATERIA					
V CK CBOLIND	DED	TYPE B OP C SHEETIN					

SHEETING RE	QUIREMEN	TS (WHEN USED AT NIGHT)
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations. show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer,
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets. The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
- The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
- Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
- The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

- The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
 - a. Long-term stationary work that occupies a location more than 3 days.
 - Intermediate-term stationary work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
 - Short-term stationary daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration work that occupies a location up to 1 hour.
 - Mobile work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
- The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above
- the ground. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

- The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

- All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300
- for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{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 the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
- Burlap shall NOT be used to cover signs. Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

- 1. Where sign supports require the use of weights to keep from turning over, the use 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

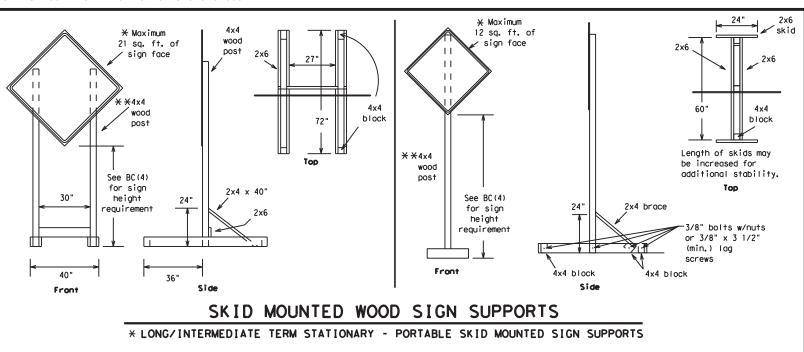
Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face. SHEET 4 OF 12



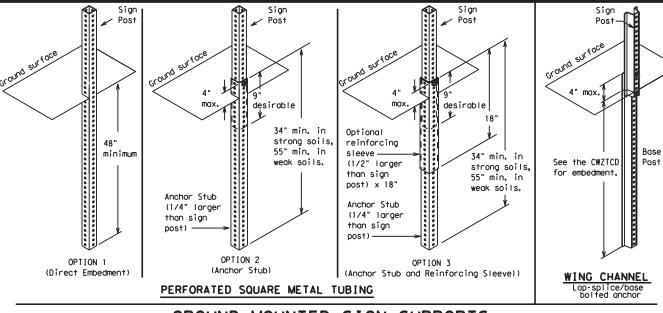
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4) - 21

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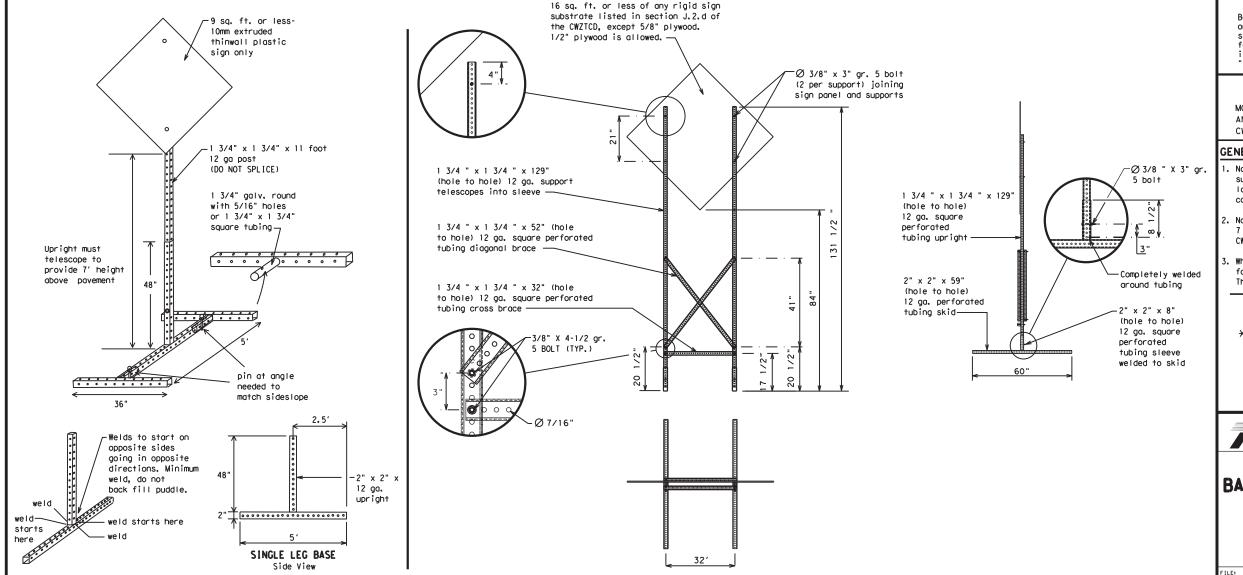


Side View



GROUND MOUNTED SIGN SUPPORTS

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



WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

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

SENERAL NOTES

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

SHEET 5 OF 12



Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: T	KDOT	ck: TxDOT	DW:	TxDOT	ck: TxDOT	
CTxDOT November 2002	CONT	SECT	JOB		HI	GHWAY	
REVISIONS	6432	02	001		SI	SH 146, etc.	
9-07 8-14	DIST	COUNTY			SHEET NO.		
7-13 5-21	HOU	GALVESTON				46	

SKID MOUNTED	PERFORATED	SQUARE	STEEL	TUBING	SIGN	<u>SUPPORTS</u>	

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

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 "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP.
- Always use the route or interstate designation (IH. US. SH. FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 10. Do not present redundant information on a two-phase message: i.e. keeping two lines of the message the same and changing the third line.
- 11. Do not use the word "Danger" in message.
- 12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- 13. Do not display messages that scroll horizontally or vertically across the face of the sign.
- 14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- 15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- 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 RD
CROSSING	XING	Road	
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle		South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving		Traffic	TRAF
Hazardous Material		Travelers	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle		Time Minutes	TIME MIN
Highway	HWY	Upper Level	UPR LEVEL
Hour (s)	HR, HRS	Vehicles (s)	VEH, VEHS
Information	INFO	Warning	WARN
It Is	ITS	Wed∩esday	WED
Junction	JCT	Weight Limit	WT LIMIT
Left	LFT	West	W
Left Lane	LFT LN	Westbound	(route) W
Lane Closed	LN CLOSED	Wet Pavement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT
Maintenance	MAINT		
Morringridice	MAINI		

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

Other Condition List

ROUGH

ROAD

XXXX FT

ROADWORK

NEXT

FRI-SUN

US XXX

EXIT

X MILES

LANES

SHIFT

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	RIGHT LN	RIGHT LN	TWO-WAY
CLSD AT	CLOSED	NARROWS	TRAFFIC
FM XXXX	XXX FT	XXXX FT	XX MILE
RIGHT X	RIGHT X	MERGING	CONST
LANES	LANES	TRAFFIC	TRAFFIC
CLOSED	OPEN	XXXX FT	XXX FT
CENTER	DAYTIME	LOOSE	UNEVEN
LANE	LANE	GRAVEL	LANES
CLOSED	CLOSURES	XXXX FT	XXXX FT

NIGHT I-XX SOUTH EXIT IANE CLOSURES CLOSED

VARIOUS EXIT XXX LANES CLOSED CLOSED X MILE EXIT RIGHT LN CLOSED TO BE

> CLOSED X LANES CLOSED TUE - FRI

CLOSED XXXXXXXX BLVD CLOSED

ΜΔΙΙ

DRIVEWAY

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

DETOUR

X MILE

ROADWORK

PAST

SH XXXX

BUMP

XXXX FT

TRAFFIC

SIGNAL

XXXX FT

Phase 2: Possible Component Lists

Action to Take/Effect on Travel Location Warnina List List List MERGE FORM ΔΤ **SPEED** RIGHT X LINES FM XXXX LIMIT XX MPH RIGHT MAXIMUM DETOUR USE BEFORE RAILROAD NEXT XXXXX SPEED X EXITS RD EXIT CROSSING XX MPH USE EXIT USE NEXT MINIMUM EXIT XXX I-XX SPEED MILES NORTH XX MPH STAY ON USE PAST **ADVISORY** US XXX I-XX E US XXX SPEED SOUTH TO I-XX N EXIT XX MPH TRUCKS WATCH XXXXXXX RIGHT LANF USF FOR TΟ US XXX N **TRUCKS** XXXXXXX EXIT WATCH **EXPECT** US XXX USF DELAYS CAUTION TO **TRUCKS** FM XXXX **EXPECT PREPARE** DRIVE DELAYS TO SAFELY STOP REDUCE DRIVE END SPEED SHOULDER WITH XXX FT USE CARE

Notice List TUE-FRI XX AM-

X PM

* * Advance

ΔPR XX-X PM-X AM

BEGINS MONDAY

> BEGINS MAY XX

> > NFXT

FRI-SUN

MAY X-X XX PM -XX AM

XX AM TΟ XX PM

NEXT AUG XX

> TONIGHT XX PM-XX AM

TUE

* * See Application Guidelines Note 6.

APPLICATION GUIDELINES

- 1. Only 1 or 2 phases are to be used on a PCMS.
- 2. The 1st phase (or both) should be selected from the 'Road/Lane/Ramp Closure List" and the "Other Condition List".
- 3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- 4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
- 6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

USF

OTHER

ROUTES

STAY

IANF

- 1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- 2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- 3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- 4. Highway names and numbers replaced as appropriate.

WATCH

FOR

WORKERS

- 5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- 6. AHEAD may be used instead of distances if necessary.
- 7. FI 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

SHEET 6 OF 12

Texas Department of Transportation

Traffic Safety Division

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6) - 21

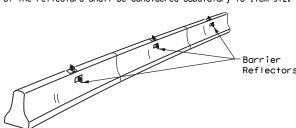
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© TxDOT	November 2002	CONT	SECT	JOB			HIGHWAY	
	REVISIONS	6432	02	001		SH	146, etc.	
9-07	8-14	DIST	ST COUNTY				SHEET NO.	
7-13	5-21	HOU		GALVESTO	N		47	

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

FULL MATRIX PCMS SIGNS

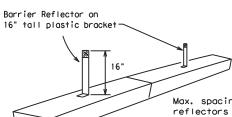
- 1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- 2. When symbol signs, such as the "Flagger Symbol" (CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- 3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute
- 4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow

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



CONCRETE TRAFFIC BARRIER (CTB)

- 3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- 4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- 5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- 6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- 7. Maximum spacing of Barrier Reflectors is forty (40) feet.
- 8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation. 9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's
- recommendations. 10.Missing or damaged Barrier Reflectors shall be replaced as directed
- 11. Single slope barriers shall be delineated as shown on the above detail.

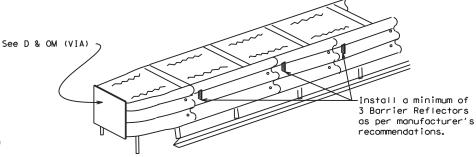


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES LPCB is approved for use in work

zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

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

LOW PROFILE CONCRETE BARRIER (LPCB)



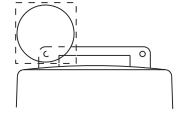
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

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



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

WARNING LIGHTS

- 1. Warning lights shall meet the requirements of the TMUTCD.
- 2. Warning Lights shall NOT be installed on barricades.
- 3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
- 4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
- 5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
- 7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
- 8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

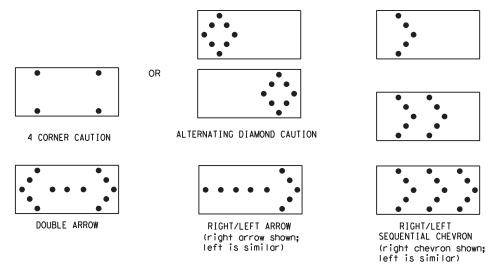
- 1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- 3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
- 4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions,
- 5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- 6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

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

- 1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- 2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed
- 3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- 4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- 7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- 8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- 9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

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

- The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
- Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions
- or work on shoulders unless the "CAUTION" display (see detail below) is used. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
- 4. The Flashing Arrow Board should be able to display the following symbols:



- 5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.

 The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.

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

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

 13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow
- 14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

	REQUIREMENTS										
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE								
В	30 × 60	13	3/4 mile								
С	48 × 96	15	1 mile								

ATTENTION Flashing Arrow Boards shall be equipped with automatic dimming devices

WHEN NOT IN USE. REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).

 2. Refer to the CWZTCD for the requirements of Level 2 or
- 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.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



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

BC(7) - 21

FILE:	bc-21.dgn	DN: T	×D0T	ck: TxDOT	DW:	TxDOT	ck: TxDOT
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GENERAL NOTES

- 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" (CWTCD).
- Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
- The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

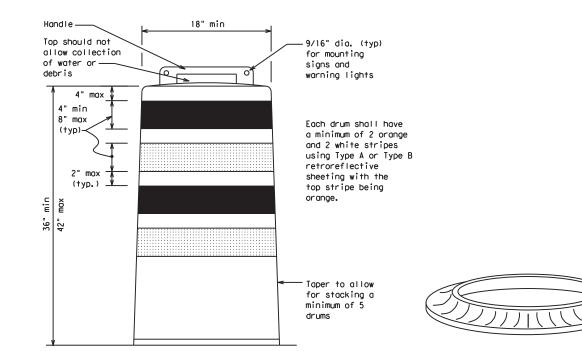
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
- 4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
- 5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
- 6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
- Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
- 8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- 9. Drum body shall have a maximum unballasted weight of 11 lbs.
 10.Drum and base shall be marked with manufacturer's name and model number.

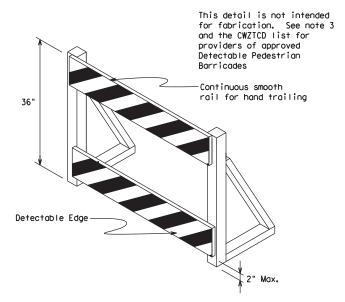
RETROREFLECTIVE SHEETING

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

BALLAST

- 1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
- Bases with built-in ballast shall weigh between 40 lbs, and 50 lbs, Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
- When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
- 6. Ballast shall not be placed on top of drums.
- 7. Adhesives may be used to secure base of drums to pavement.





DETECTABLE PEDESTRIAN BARRICADES

- When existing pedestrian facilities are disrupted, closed, or relocated in a TIC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Refer to WZ(BTS-2) for Pedestrian Control requirements for Sidewalk Diversions, Sidewalk Detours and Crosswalk Closures.
 Where pedestrians with visual disabilities normally use the
- . Where pedestrians with visual disabilities normally use the closed sidewalk, a Detectable Pedestrian Barricade shall be placed across the full width of the closed sidewalk instead of a Type 3 Barricade.
- Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, same concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
- 4. Tope, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines (ADAAG)" and should not be used as a control for pedestrian movements.
- Warning lights shall not be attached to detectable pedestrian barricades.
- 6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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

See Ballast



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 2. Chevrons and other work zone signs with an orange background shall be manufactured with Type $B_{\rm FL}$ or Type $C_{\rm FL}$ Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- 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.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12

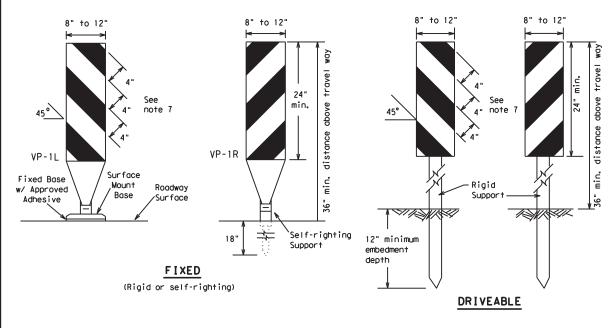


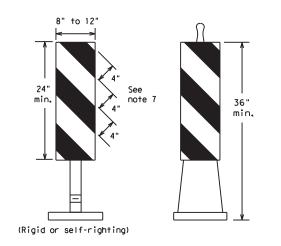
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) -21

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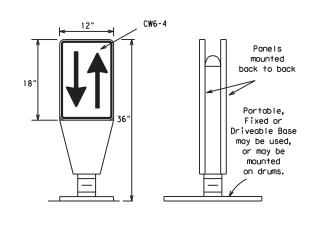




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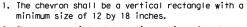
- Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

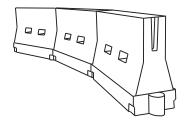


- Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
- 3. Chevrons, when used, shall be erected on the outside of a sharp curve 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.
- 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.
- 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

- 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 driveoble, 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 erront vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
- 4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
- 7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

Fixed Base w/ Approved Adhesive

(Driveable Base, or Flexible

Support can be used)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

30	2	10' Offset	111	12'	-	
	2		Offset	Offset	On a Taper	On a Tangent
		150′	165′	180′	30′	60′
35 L=	$\frac{\text{WS}^2}{60}$	2051	225′	245′	35′	70′
40	60	265′	2951	320′	40′	80′
45		450′	4951	540′	45′	90'
50		500′	550′	600′	50′	100′
55	=WS	550′	6051	660′	55′	110′
60	- 11 3	600'	660′	720′	60′	120′
65		650′	715′	780′	65′	130′
70		700′	770′	840′	70'	140′
75		750′	825′	900'	75′	150′
80		800'	880′	960'	80′	160′

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

SUGGESTED MAXIMUM SPACING OF
CHANNELIZING DEVICES AND
MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



Safety
Division
Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

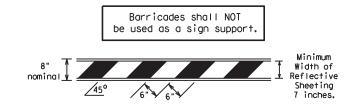
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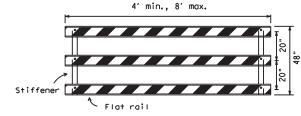
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TYPE 3 BARRICADES

- 1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
- 2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
- 3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring, When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
- 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".
- Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
- 7. Warning lights shall NOT be installed on barricades.
- 8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of $\overline{35}$ lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
- Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless

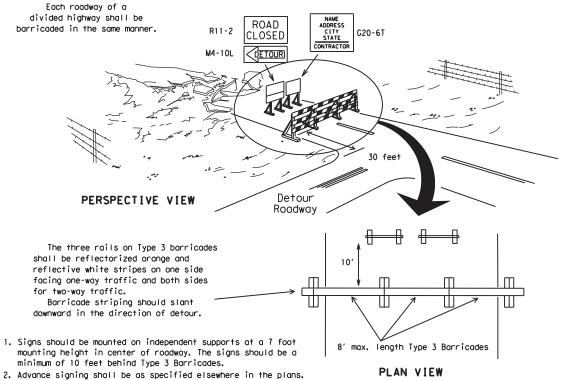


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



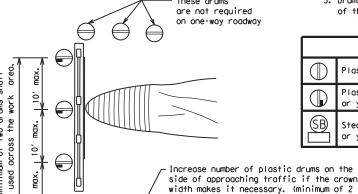
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

Typical shoulder width is less than 4 feet. Plastic Drum PERSPECTIVE VIEW These drums



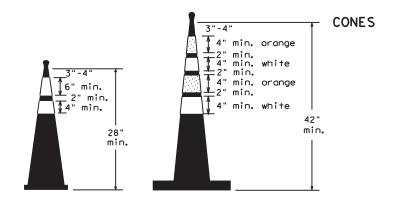
1. Where positive redirectional capability is provided, drums may be omitted.

- 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
- 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.



and maximum of 4 drums) PLAN VIEW

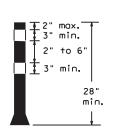
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



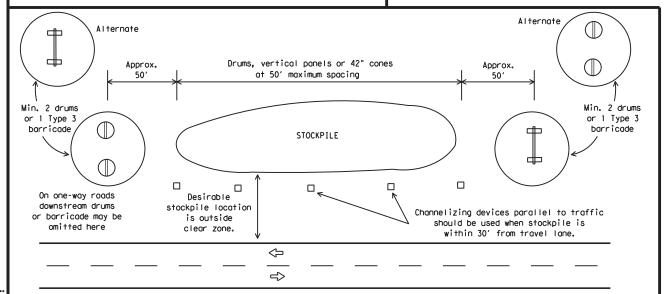
Two-Piece cones

4" min.

One-Piece cones



Tubular Marker



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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

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

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

SHEET 10 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

- The Contractor shall be responsible for maintaining work zone and existing povement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- 2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- 6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
- 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 markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

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

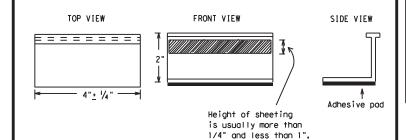
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- 3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

- Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
- The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
- Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
- The removal of povement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- 5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- 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 Fnaineer.
- Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
- 10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



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

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the
 - A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
 - B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
- 3. Small design variances may be noted between tab manufacturers.
- 4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work,

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

SHEET 11 OF 12



Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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PAVEMENT MARKING PATTERNS 10 to 12" Type II-A-An 10 to 12"¬ Yellow Type II-A-A Type Y buttons RAISED PAVEMENT MARKERS - PATTERN A REFLECTORIZED PAVEMENT MARKINGS - PATTERN A Type II-A-A <>> 000000000000 Type \ 4 to 8" RAISED PAVEMENT MARKERS - PATTERN B REFLECTORIZED PAVEMENT MARKINGS - PATTERN B Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings. CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE. TWO-WAY HIGHWAYS Type I-C Type W buttons--Type I-C or II-C-R 0000 0000 Type I-A-Type Y buttons ₹> ₹> Type I-A-Type Y buttons-0000 Type W buttons-└Type I-C or II-C-R REFLECTORIZED PAVEMENT MARKINGS RAISED PAVEMENT MARKERS ⊂Type I-C Prefabricated markings may be substituted for reflectorized pavement markings. EDGE & LANE LINES FOR DIVIDED HIGHWAY \diamondsuit Type W buttons Type I-C 0000 _____ 00000 0000 White / \Diamond \Diamond -Type II-A-A Type Y buttons __ ₹> ₹> Type W buttons-RAISED PAVEMENT MARKERS REFLECTORIZED PAVEMENT MARKINGS Prefabricated markings may be substituted for reflectorized pavement markings. LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS Type I-C Type W buttons -0000 \Diamond Type II-A-A Type ₹> 0000 0000 0000 Type W buttons-/ -Type I-C REFLECTORIZED PAVEMENT MARKINGS RAISED PAVEMENT MARKERS Prefabricated markings may be substituted for reflectorized pavement markings. TWO-WAY LEFT TURN LANE

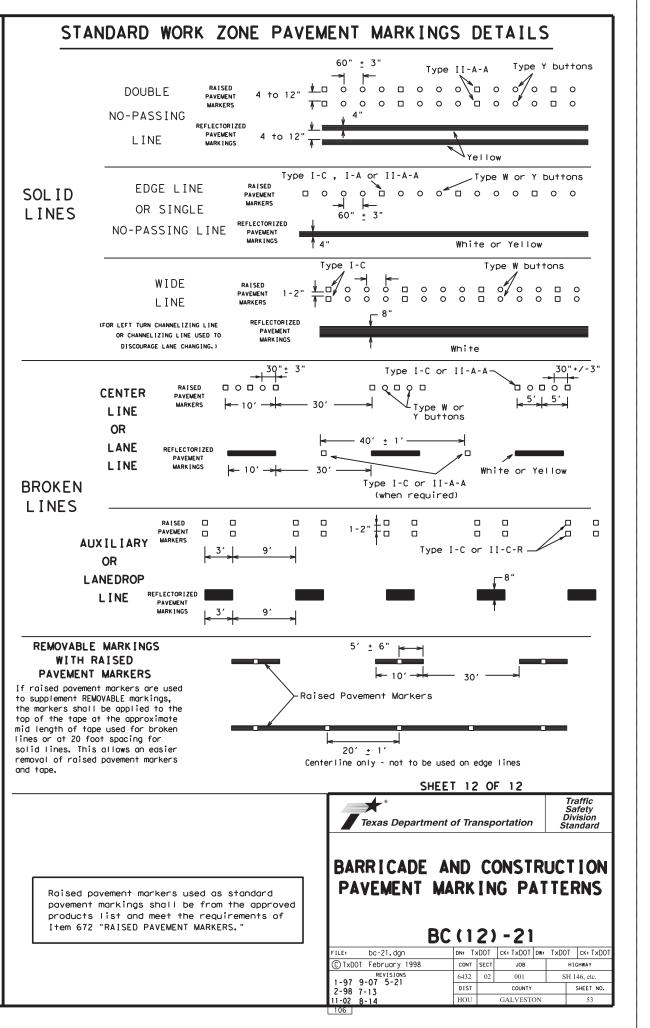
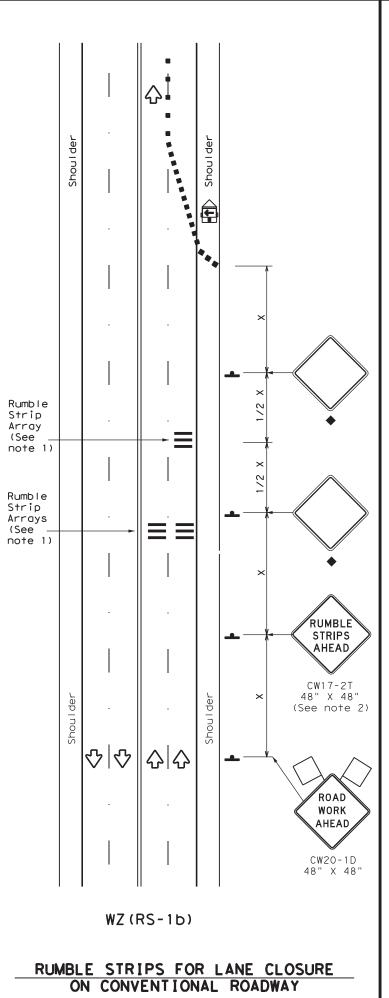


TABLE 1 Warning sign and rumble strip of Rumble sequence in Flagger Strip opposite direction (Length of Work Area) Arrays is same as below. No warranty of any for the conversion om its use. < 4,500 1/8 Mile > 4,500 2 3,500 1/4 Mile > 3,500 2 < 2,600 1/2 Mile <u>></u> 2,600 2 hed by the "Texas Engineering Practice Act". Whatsoever, TxD0T assumes no responsibility for incorrect results or damages resulting fro < 1,600 1 Mile 2 <u>></u> 1,600 N/A > 1 Mile -See note 8 Rumble Strip SCLAIMER:
The use of this standard
The use of this standard
this etandard to other for Array (See note 1) Rumble Strip Array (See note 1) The second Rumble Strip Array is required when the ADT thresholds in Table 1 indicate the need for 2 Arrays. RUMBLE \Diamond AHEAD, CW17-2T 48" X 48" (See note 2) ROAD WORK AHEAD CW20-1D 48" X 48" WZ (RS-1a) RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



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.
- 4. Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- B. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- 10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

Speed	Formula	D	Minimur esirab er Len X X	le	Spacir 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′	1651	180′	30′	60′	120'	90′
35	L = WS	2051	225′	2451	35′	70′	160′	120′
40	80	265′	2951	3201	40′	80'	240'	155′
45		450′	495′	540'	45′	90′	320'	195′
50		500′	550′	6001	50′	100′	4001	240′
55	L=WS	550′	6051	660′	55′	110′	500′	295′
60	L - # 3	600'	660′	720′	60′	120'	600'	350′
65		6501	715′	7801	65′	130′	700′	410′
70		700′	770′	840'	70′	140′	8001	475′
75		750′	825′	900′	75′	150′	900′	540′

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

TYPICAL USAGE									
MOBILE SHORT SHORT TERM DURATION STATIONARY			INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY					
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.
- For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2							
Speed	Approximate distance between strips in an array						
≤ 40 MPH	10′						
> 40 MPH & <u><</u> 55 MPH	15′						
= 60 MPH	20′						
<u>></u> 65 MPH	* 35′+						



TEMPORARY RUMBLE STRIPS

WZ(RS)-22

ILE: wzrs22.dgn	DN: Tx	DOT	ck: TxDOT	DW:	TxDOT	СК	: TxDOT
CTxDOT November 2012	CONT	SECT	JOB			H I GHW	ΔY
REVISIONS	6432	02	001		SH 1	46,	etc.
2-14 1-22 4-16	DIST	COUNTY			SHE	ET NO.	
4-18	HOU	GALVESTON			Ę	54	

11

DocuSign

Certificate Of Completion

Envelope Id: CFF30AF294A1434281F0AC4976A5F880

Subject: Complete with DocuSign: Galveston 6432-02-001 Melody ___2-13-2023.pdf

Source Envelope:

Document Pages: 62 Certificate Pages: 5

AutoNav: Enabled

Envelopeld Stamping: Enabled

Time Zone: (UTC-06:00) Central Time (US & Canada)

Status: Completed

Envelope Originator: Rhonda Hebert 125 E. 11th Street Austin, TX 78701

Rhonda.Hebert@txdot.gov IP Address: 204.64.21.234

Record Tracking

Status: Original

2/14/2023 1:04:42 PM

Security Appliance Status: Connected

Storage Appliance Status: Connected

Holder: Rhonda Hebert

Rhonda.Hebert@txdot.gov

Pool: StateLocal

Signatures: 1

Initials: 0

Pool: Texas Department of Transportation

Location: DocuSign

Location: DocuSign

Signer Events

Meloday Galland

Melody.Galland@txdot.gov

Area Engineer

TxDOT

Security Level: Email, Account Authentication

(Optional)

Signature

Status

COPIED

COPIED

DocuSigned by:

Signature Adoption: Drawn on Device Using IP Address: 204.64.21.250

Timestamp

Sent: 2/14/2023 1:06:28 PM Viewed: 2/14/2023 10:03:31 PM Signed: 2/14/2023 10:05:35 PM

Electronic Record and Signature Disclosure:

Accepted: 11/30/2016 4:08:38 PM

ID: 50ce1066-4604-4f6c-8d2b-1cd63d2ff80d

In Person Signer Events	Signature	Timestamp
Editor Delivery Events	Status	Timestamp
Agent Delivery Events	Status	Timestamp
Intermediary Delivery Events	Status	Timestamp
Certified Delivery Events	Status	Timestamp

Carbon Copy Events

rhonda hebert

rhonda.hebert@txdot.gov Contract Specialist

TxDOT

Security Level: Email, Account Authentication (Optional)

Electronic Record and Signature Disclosure:

Not Offered via DocuSign

Steven Sills

steven.sills@txdot.gov

Texas Department of Transportation

Security Level: Email, Account Authentication

(Optional)

Electronic Record and Signature Disclosure:

Not Offered via DocuSign

Timestamp

Sent: 2/14/2023 10:05:41 PM Resent: 2/14/2023 10:05:53 PM Viewed: 2/15/2023 8:39:33 AM

Sent: 2/14/2023 10:05:42 PM Viewed: 2/15/2023 7:35:07 AM

Witness Events	Signature	Timestamp	
Notary Events	Signature	Timestamp	
Envelope Summary Events	Status	Timestamps	
Envelope Sent	Hashed/Encrypted	2/14/2023 1:06:28 PM	
Certified Delivered	Security Checked	2/14/2023 10:03:31 PM	
Signing Complete	Security Checked	2/14/2023 10:05:35 PM	
Completed	Security Checked	2/14/2023 10:05:42 PM	
Payment Events	Status	Timestamps	
Electronic Record and Signature Disclosure			

Electronic Record and Signature Disclosure created on: 1/9/2015 7:21:34 AM Parties agreed to: Meloday Galland

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Browsers (for SIGNERS):	Internet Explorer 6.0?, Mozilla FireFox 1.0, NetScape 7.2 (or above)
Email:	Access to a valid email account
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