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STATE OF TEXAS  
DEPARTMENT OF TRANSPORTATION  
PLANS OF PROPOSED  
ROUTINE MAINTENANCE CONTRACT

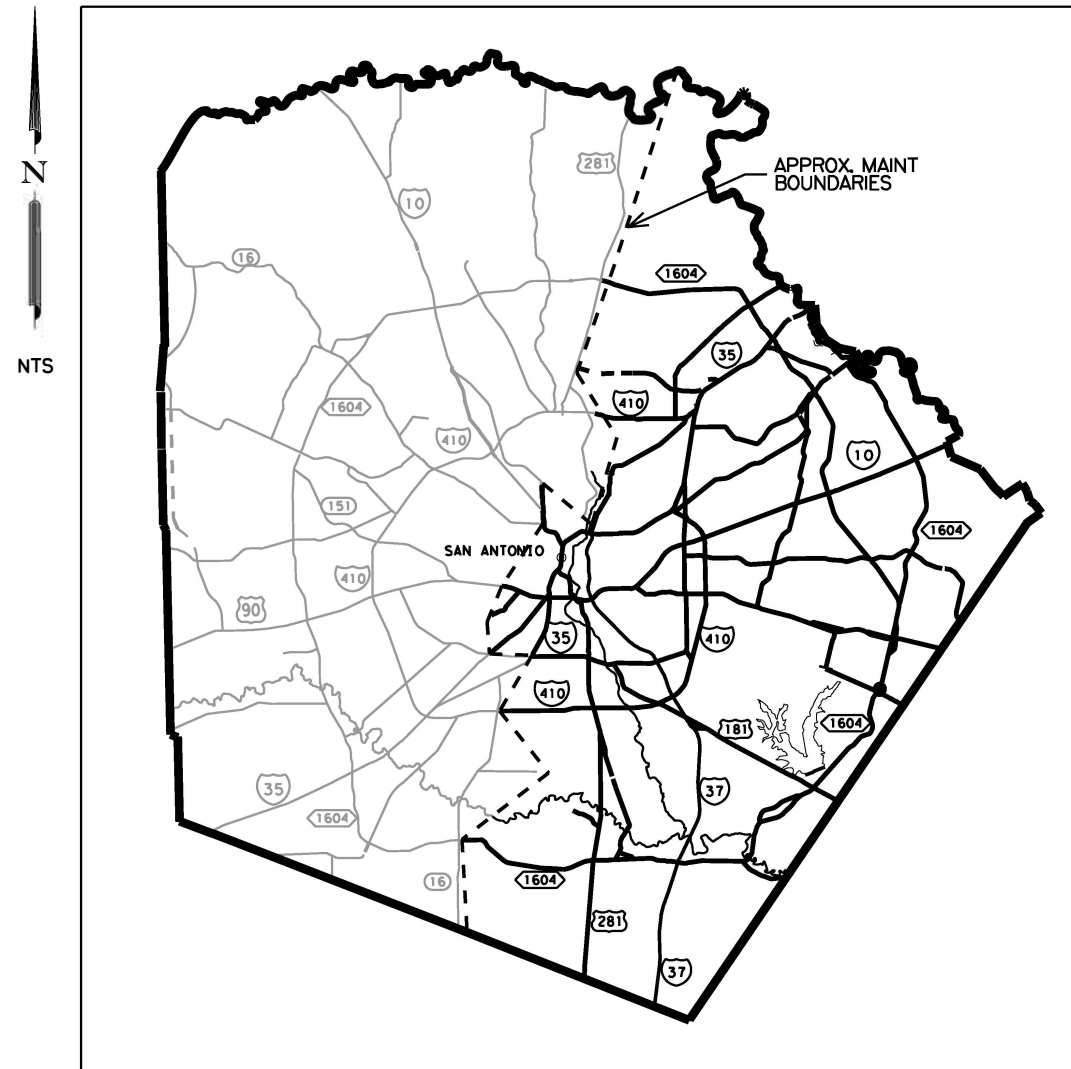
MAINTENANCE PROJECT NO.			SHEET NO.
RMC 6411-41-001			1
STATE	DIST. STATE	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

TYPE OF WORK

**PAVEMENT REPAIR**

PROJECT NO.: RMC 6411-41-001  
HIGHWAY: VARIOUS LOCATIONS  
LIMITS: EAST BEXAR COUNTY

AREA OF DISTURBED SOIL = 0 ACRES



TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING:

*K. J. P.E.* 7/27/22  
MAINTENANCE CONTRACT ENGINEER DATE

RECOMMENDED FOR LETTING

*Michelle R. Barton* 7/27/22  
MAINTENANCE CONTRACT OFFICE DATE

RECOMMENDED FOR LETTING

*Jessica Castiglione, PE* 7/27/22  
DIRECTOR OF OPERATIONS DATE

EXCEPTIONS: NONE  
EQUATIONS: NONE  
RAILROAD: NONE

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

FILE LOCATION AND NAME  
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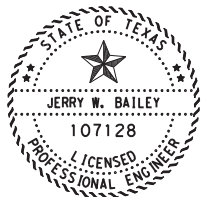
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*Jerry W. Bailey, P.E.*

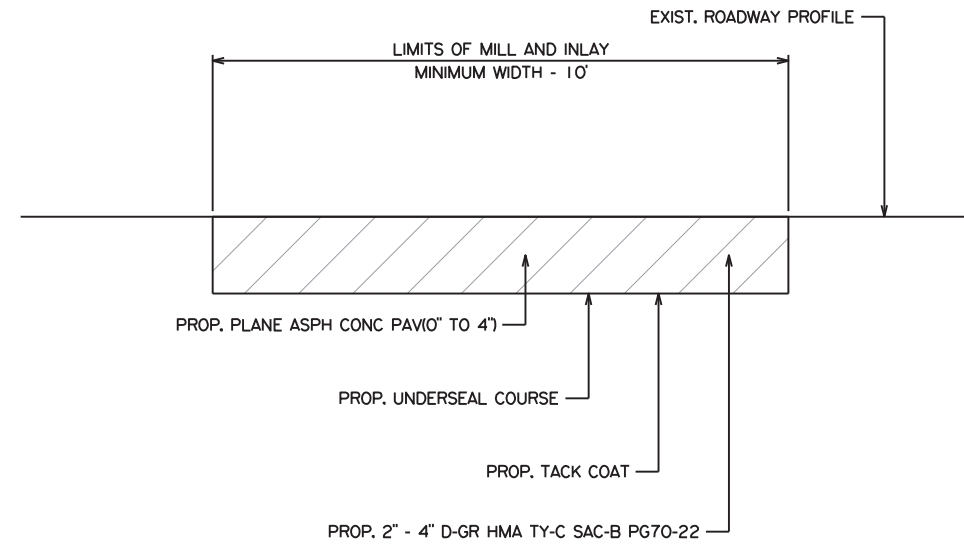
7/19/2022

JERRY W. BAILEY, P.E. DATE

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE (& \*) HAVE BEEN SPECIFICALLY SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT

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TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

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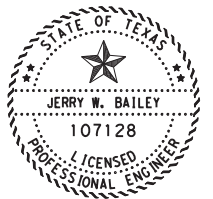


TYPICAL SECTION NO. 1  
MILL AND INLAY

N.T.S.

LIMITS OF MILL AND INLAY:  
 BID ITEM 0354-6023 PLANE ASPH CONC PAVI(0" TO 4")  
 BID ITEM 3076-6025 D-GR HMA TY-C SAC-B PG70-22  
 BID ITEM 3076-6066 TACK COAT  
 BID ITEM 3085-6001 UNDERSEAL COURSE

NOTES:  
 1. MINIMUM LENGTH OF MILL AND INLAY WILL BE 250 FT.  
 2. BEFORE PLACEMENT OF D-GR HMA TY-C SAC-B PG70-22, TACK ALL SIDES AND BOTTOM OF MILL AND INLAY.



*Jerry W. Bailey, P.E.*

7/19/2022  
 JERRY W. BAILEY, P.E.      DATE

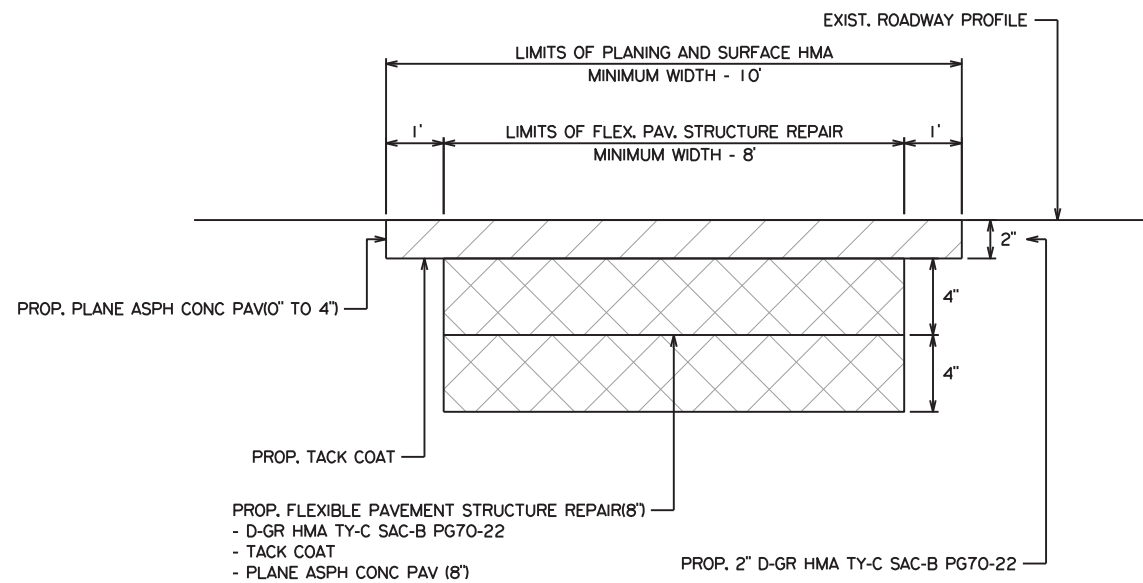
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**VARIOUS  
TYPICAL SECTIONS  
PROPOSED**

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STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
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**TYPICAL SECTION NO. 3**  
**FLEXIBLE PAVEMENT STRUCTURE REPAIR**

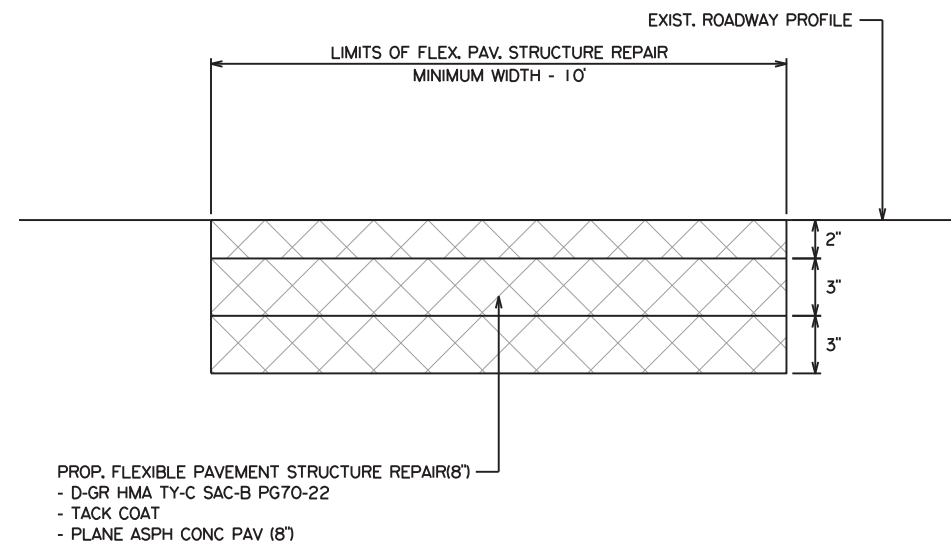
N.T.S.

LIMITS OF PLANING AND SURFACE HMA:  
 BID ITEM 0354-6023 PLANE ASPH CONC PAV(0" TO 4")  
 BID ITEM 3076-6025 D-GR HMA TY-C SAC-B PG70-22  
 BID ITEM 3076-6066 TACK COAT

LIMITS OF FLEXIBLE PAVEMENT STRUCTURE REPAIR:  
 BID ITEM 0351-6004 FLEXIBLE PAVEMENT STRUCTURE REPAIR(8')

**NOTES:**

1. NOTIFY THE ENGINEER WHEN OBJECTIONABLE OR UNSTABLE MATERIAL IS ENCOUNTERED BENEATH THE FLEXIBLE PAVEMENT STRUCTURE REPAIR DEPTH. REMOVAL AND REPLACEMENT OF THIS MATERIAL WILL BE AT THE DISCRETION OF THE ENGINEER. WHEN DIRECTED, REMOVE ALL OBJECTIONABLE OR UNSTABLE MATERIAL ENCOUNTERED BELOW THE SPECIFIED FLEXIBLE PAVEMENT STRUCTURE REPAIR DEPTH AND REPLACE WITH D-GR HMA TY-C SAC-B PG70-22. THIS WORK WILL NOT BE PAID FOR SEPARATELY; IT WILL BE MADE SUBSIDIARY TO ITEM 0351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.
2. FLEXIBLE PAVEMENT STRUCTURE REPAIR D-GR HMA TY-C SAC-B PG70-22 WILL BE PLACED IN 2 - 4" LIFTS. PLACEMENT WILL BE AT A RATE OF 110 LB/SQ. YD. FOR EACH INCH OF PAVEMENT.
3. MINIMUM LENGTH OF FLEXIBLE PAVEMENT STRUCTURE REPAIR WILL BE 50 FT.
4. LENGTH OF PLANING, FINAL SURFACE LIFT HMA, AND TACK COAT WILL EXTEND 5 FT. BEFORE BEGINNING AND AFTER END OF THE FLEXIBLE PAVEMENT STRUCTURE REPAIR. THIS WORK WILL NOT BE PAID FOR SEPARATELY; IT WILL BE MADE SUBSIDIARY TO ITEM 0351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.
5. BEFORE PLACEMENT OF FLEXIBLE PAVEMENT STRUCTURE REPAIR D-GR HMA TY-C SAC-B PG70-22, TACK COAT ALL SIDES AND BOTTOM OF EACH LIFT OF FLEXIBLE PAVEMENT STRUCTURE REPAIR. THE ENGINEER WILL SET THE RATE OF APPLICATION OF TACK COAT BETWEEN 0.04 AND 0.10 GAL. OF RESIDUAL ASPHALT PER SQUARE YARD OF SURFACE AREA. THIS WORK WILL NOT BE PAID FOR SEPARATELY; IT WILL BE MADE SUBSIDIARY TO ITEM 0351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.



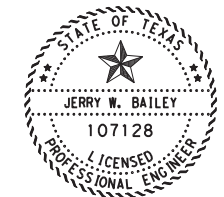
**TYPICAL SECTION NO. 4**  
**FLEXIBLE PAVEMENT STRUCTURE REPAIR**

N.T.S.

LIMITS OF FLEXIBLE PAVEMENT STRUCTURE REPAIR:  
 BID ITEM 0351-6004 FLEXIBLE PAVEMENT STRUCTURE REPAIR(8')

**NOTES:**

1. NOTIFY THE ENGINEER WHEN OBJECTIONABLE OR UNSTABLE MATERIAL IS ENCOUNTERED BENEATH THE FLEXIBLE PAVEMENT STRUCTURE REPAIR DEPTH. REMOVAL AND REPLACEMENT OF THIS MATERIAL WILL BE AT THE DISCRETION OF THE ENGINEER. WHEN DIRECTED, REMOVE ALL OBJECTIONABLE OR UNSTABLE MATERIAL ENCOUNTERED BELOW THE SPECIFIED FLEXIBLE PAVEMENT STRUCTURE REPAIR DEPTH AND REPLACE WITH D-GR HMA TY-C SAC-B PG70-22. THIS WORK WILL NOT BE PAID FOR SEPARATELY; IT WILL BE MADE SUBSIDIARY TO ITEM 0351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.
2. D-GR HMA TY-C SAC-B PG70-22 WILL BE PLACED IN 3 LIFTS. THE FIRST TWO LIFTS WILL EACH BE 3". THE FINAL SURFACE LIFT WILL BE 2". PLACEMENT WILL BE AT A RATE OF 110 LB/SQ. YD. FOR EACH INCH OF PAVEMENT.
3. MINIMUM LENGTH OF FLEXIBLE PAVEMENT STRUCTURE REPAIR WILL BE 50 FT.
4. LENGTH OF PLANING, FINAL SURFACE LIFT HMA, AND TACK COAT WILL EXTEND 5 FT. BEFORE BEGINNING AND AFTER END OF THE FLEXIBLE PAVEMENT STRUCTURE REPAIR. THIS WORK WILL NOT BE PAID FOR SEPARATELY; IT WILL BE MADE SUBSIDIARY TO ITEM 0351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.
5. BEFORE PLACEMENT OF D-GR HMA TY-C SAC-B PG70-22, TACK COAT ALL SIDES AND BOTTOM OF EACH LIFT OF D-GR HMA TY-C SAC-B PG70-22. THE ENGINEER WILL SET THE RATE OF APPLICATION OF TACK COAT BETWEEN 0.04 AND 0.10 GAL. OF RESIDUAL ASPHALT PER SQUARE YARD OF SURFACE AREA. THIS WORK WILL NOT BE PAID FOR SEPARATELY; IT WILL BE MADE SUBSIDIARY TO ITEM 0351 FLEXIBLE PAVEMENT STRUCTURE REPAIR.



*Jerry W. Bailey, P.E.*

JERRY W. BAILEY, P.E.      7/19/2022  
 DATE

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<b>VARIOUS TYPICAL SECTIONS PROPOSED</b>			
SHEET 02 OF 02			
FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			4
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS



**Project Number:** RMC 6411-41-001

**Sheet 1**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

**General Notes**

===== **Basis of Estimate** =====

**3076-6025 D-GR HMA TY-C SAC-B PG70-22**

Location	Area	Rate	Depth	Loaded Rate	Quantity
Bexar	46,334 SY	110 LB/SY-IN	2.00 inches	220.00 LB/SY	5,097 TON
	<i>Total Area</i>	<i>46,334 SY</i>		<i>Total Quantity</i>	<i>5,097 TON</i>

**3076-6066 TACK COAT**

Location	Area	Rate	Quantity
Bexar	46,334 SY	0.10 GAL/SY	4,633 GAL
	<i>Total Area</i>	<i>46,334 SY</i>	<i>Total Quantity</i>

**3085-6001 UNDERSEAL COURSE**

Location	Area	Rate	Quantity
Bexar	46,334 SY	0.30 GAL/SY	13,900 GAL
	<i>Total Area</i>	<i>46,334 SY</i>	<i>Total Quantity</i>

**TxDOT Project Supervisor** – The project will be managed by:

Timothy Parker, P.E.  
9320 SE Loop 410  
San Antonio, TX 78223

This project consists of flexible pavement structure repair, planing, seal coat and hot mix inlay, on various highways in Bexar County. The majority of this work will be at specific locations listed in the project plans. There will also be a portion of the work that will be done at locations not listed in the project plans.

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

Notify the Engineer's office by telephone each morning by 8:15 a.m. that work is scheduled, with work location and time of arrival or reason for not working that day.

**Project Number:** RMC 6411-41-001

**Sheet 2**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

Provide and maintain an e-mail address for receipt of work orders and correspondence throughout the term of this contract. Respond to any correspondence within 24 hours to confirm receipt.

The location of work areas for the non-site specific work cannot be predetermined and work may occur anywhere within the limits of this contract as shown on the plans.

All work on this contract will be issued by work order. A work order will consist of site specific and/or non-site specific work. Work orders may include multiple roadways within each county. "Mobilization (Call Out) Each" will be paid per work order issued.

A callout work order will include the location of each repair, the bid items for the repairs and the approximate quantity of work to be performed. Callout work orders will be issued based on priority need, and work at locations not shown in the project plans may be required prior to work at sites shown in the project plans. Time charges on each callout work order shall begin 7 calendar days from the callout work order date.

A work order will consist of any combination of the callout bid items listed in this contract. A work order may include multiple locations within the counties identified in the plans for this contract. Once work has started, continuously prosecute the work until all work on each work order is satisfactorily completed. Liquidated Damages will be assessed for any day charged beyond the authorized time on each work order.

Site specific and non-site specific work locations may include small work quantities at freeway interchanges, multilane intersections, bridge approaches and departures, etc. There is no specific limit (either maximum or minimum) for quantities on a given work order.

Contractor shall submit a work schedule for approval prior to beginning work.

Contact the Engineer or the City when construction operations are within 400 feet of a signalized intersection to determine/verify the location of loop detectors, conduit, ground-boxes, etc. Repair or replace any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work.

Remove existing raised pavement markings as the work progresses or as approved. This work is subsidiary to the various bid items. Properly dispose materials removed.

**Item 2 "Instructions to Bidders"**

Contractor questions on this project are to be addressed to the following individual:  
Henry Fojtik, P.E. [Henry.Fojtik@txdot.gov](mailto:Henry.Fojtik@txdot.gov)

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

**GENERAL NOTES**

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STATE	DIST.	COUNTY		
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CONT.	SECT.	JOB	HIGHWAY NO.	
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**Project Number:** RMC 6411-41-001

**Sheet 3**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

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

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

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

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

View plans online or download from the web at:

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

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

<http://www.txdot.gov/business/letting-bids/repro-companies.html>

**Item 5 "Control of Work"**

Contact TxDOT TransGuide Maintenance at 210-731-5109 to determine/verify the location of loop detectors, conduit, ground boxes, etc. Any ITS equipment damaged by the Contractor will be repaired or replaced by the Contractor at their expense by a pre-approved method.

Contact TxDOT at 210-615-5975 or City of San Antonio Signal Operations Office at 210-207-7720, when construction operations are within 400 feet of signalized intersection to determine/verify the location of loop detectors, conduit, ground boxes, etc. Signal equipment damaged by the Contractor will be repaired or replaced by the Contractor at their expense by a pre-approved method.

Reference all existing striping and other pavement markings to allow these markings to be re-established. Ensure the markings (lane lines, edge lines, ramp gores, etc.) are in line with signs, TMS arrows, etc. located on overhead sign supports.

Taper ACP placed at curb inlets, traffic inlets and slotted drains.

When a bridge deck is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean all of these features if they weren't properly protected. This work is subsidiary work to applicable bid items.

When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations. For electrical lines and poles shown in the plans, if the lines need to be de-energized or if poles need to be braced, contact the electrical company. Work pertaining to de-energizing lines, bracing poles and other protective measures will not be paid by TxDOT.

**Project Number:** RMC 6411-41-001

**Sheet 4**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

**Item 6 "Control of Materials"**

Show the stockpile lot and/or sub lot numbers on all tickets for all materials.

Remove materials or debris within the construction limits not incorporated in the finished roadway section of right of way and dispose of in a manner acceptable to the Engineer at the expense of the Contractor.

If waste areas or material source areas result from this project, the Contractor is reminded to follow the requirements of the Texas Aggregate Quarry and Pit Safety Act. In addition, it is requested that these areas not be visible from any highway on the State system.

**Item 7 "Legal Relations and Responsibilities"**

The total disturbed area within the project is anticipated at less than one (1) acre. Due to this type of construction, the project qualifies for exclusion under the Construction General Permit (CGP) issued by the Texas Commission on Environmental Quality (TCEQ). However, should the sum of the Engineer's anticipated disturbances and the Contractor's (On ROW and off ROW) PSL's equal or exceed the one (1) acre threshold; both TxDOT and the Contractor have project responsibilities under the CGP that reverts to non-exclusion status. Obtain approval for all non-depicted areas of disturbance that increases the initial soil and vegetation disturbed area estimates before work starts at these locations.

Notify the Engineer of the disturbed acreage within one (1) mile of the project limits. Obtain authorization from the TCEQ for Contractor PSL's for construction support activities on or off ROW.

**Item 8 "Prosecution and Progress"**

Between April 1st and October 31st the Texas Commission on Environmental Quality (TCEQ), is monitoring weather conditions on a daily basis in the San Antonio area to forecast the probability of ozone formation. In the event weather conditions indicate that excessive ozone may occur, the National Weather Service working with the TCEQ will issue an Air Quality Health Alert Day for the following day. TCEQ estimates that approximately 25 Air Quality Health Alert Days might be issued during the ozone formation season.

On Air Quality Health Alert Days, lane closures and the use of small gasoline engines will not be allowed until after 12 noon on all highways inside Loop 1604. The State will notify the Contractor by 4:00 p.m. of the day before the Air Quality Health Alert Day to inform them of the restrictions for the following day and to request their assistance in reducing any other operations that may contribute to an increase in the ozone readings. If these restrictions affect the critical items of work previously scheduled by the Contractor, a working day will not be charged. Time charges on these days will be as determined by the Engineer for each day.

Working days will be computed and charged in accordance with Article 8.3.1.5: Calendar-Day work week.

**GENERAL NOTES**

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CONT.	SECT.	JOB	HIGHWAY NO.
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**Project Number:** RMC 6411-41-001

**Sheet 5**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

Allowable hours for the closures of freeway ramps and direct connectors shall be as approved by the Engineer. For complete closure of a ramp or direct connector, detour signing must be provided as directed or approved.

Work will not be permitted on holiday weekends and during other major events that TxDOT determines will cause significant traffic congestion, unless otherwise approved.

For pavement repair, remove only the amount of pavement that can be replaced within the same working day.

Before opening highway lanes to traffic, each repair location shall provide a stable driving surface flush with the adjacent pavement.

**Item 9 “Measurement and Payment”**

When approved, provide uniformed, off-duty law enforcement officers with marked vehicles during work that requires a lane closure. The officer in marked vehicles shall be located as approved to monitor or direct traffic during the closure. The method used to direct traffic at signalized intersections shall be as approved. Additional officers and vehicles may be provided when approved or directed.

Complete the daily tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Show proof of certification by the Texas Commission on Law Enforcement Standards.

All law enforcement personnel used in Work Zone Traffic Control shall be trained for performing duties in work zones and are required to take “Safe and Effective Use of Law Enforcement Personnel in Work Zones” (Course #133119) which can be found online at the following site: [www.nhi.fhwa.dot.gov](http://www.nhi.fhwa.dot.gov)

Certificates of completion should be available to all who finish the course. These should be kept by the officers in order to substantiate completion when reporting to the work site.

Minimums, scheduling fees, etc. will not be paid; TxDOT will consider paying cancellation fees on a case-by-case basis.

**Item 302 “Aggregates for Surface Treatments”**

Previously tested aggregates found to contain excessive quantities of dust (more than 0.5 percent passing the No. 40 sieve) during precoating, stockpiling or hauling operations, may be rejected. Use Test Method Tex-200-F, Part I for testing.

Precoated Aggregate Type PE shall consist of crushed slag, crushed stone or natural limestone rock asphalt.

**Project Number:** RMC 6411-41-001

**Sheet 6**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

The Engineer will utilize the Ignition Oven Method (Tex 236-F) for aggregate gradation, with the option of utilizing belt or vacuum extraction gradation in the event the ignition oven malfunctions.

**Item 316 “Surface Treatments”**

When using latex asphalt, avoid drifting of asphalt onto traffic and adjacent properties.

Ensure that the asphalt for precoating the aggregate and the asphalt used for the surface treatment will not result in a reaction that may adversely affect the bonding of the aggregate and asphalt during the surface treatment operation.

Do not add bag house fines in the production of precoated material.

Clean all concrete curbs, islands, medians, etc. that get coated with asphalt.

**Item 320 “Equipment for Asphalt Concrete Pavement”**

Construct all longitudinal ACP joints adjacent to a travel lane with a joint maker device that will create a 3:1 to 6:1 taper. For placement of 2 inches or more, the device shall provide a maximum ½ inch vertical edge. Taper outside edges (next to the grass) or backfill (shoulder-up) the same day.

Provide a material transfer device capable of providing a continuous flow of material to the paver. The material transfer device will consist of a windrow elevator or better.

**Item 351 “Flexible Pavement Structure Repair”**

Remove all loose sub-base material encountered below the specified depth of the flexible pavement structure to be repaired or replaced with *(whatever material used)*.

For pavement repair, remove only the amount of pavement which can be replaced within the same working day.

Place all surface treatments one foot beyond the edge of the saw cut joint. This one foot overlap will be considered subsidiary to Item 351.

**Item 354 “Planing and Texturing Pavement”**

Retain planed material.

Take precaution to avoid damage to existing bridge decks and armor joints. Repair any damage to the bridge decks and/or armor joints as approved.

GENERAL NOTES

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STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

**Project Number:** RMC 6411-41-001

**Sheet 7**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

**Item 500 “Mobilization”**

"Materials on Hand" payments will not be considered in determining percentages for mobilization payments.

**Item 502 “Barricades, Signs, and Traffic Handling”**

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.

Furnish and install all signs, barricades and other incidentals necessary for proper traffic control, in accordance with part VI of the “Texas Manual on Uniform Traffic Control Devices for Streets and Highways” and in accordance with the standard plan sheets. Additional devices may be needed to supplement these requirements. All warning signs shall be factory made and in satisfactory condition.

When a Traffic Control Plan (TCP) standard requires the use of one of the following devices, a Type III barricade, channelizing devices or shadow vehicle with orange flags or warning lights, use a shadow vehicle equipped with a Truck Mounted Attenuator (TMA).

Erect temporary traffic control signs in locations that will not obstruct the traveling public’s view of the permanent roadway signing or obstruct sight distance at intersections and curves.

Any lane closures will require prior approval. Request approval 48 hours in advance of lane closures. If a lane closure has to be cancelled due to weather or other unforeseen circumstances, immediately notify the inspector and reschedule the lane closure as necessary.

In addition to providing a Contractor’s Responsible Person (CRP) and a phone number for emergency contact, have an employee(s) available to respond on the project for emergencies and for taking corrective measures within 2 hours.

After written notification, the time frame to provide properly maintained signs and barricades before considered in non-compliance is 48 hours from receipt of the notification.

No more than one lane will be blocked at any time at a specific work site, unless otherwise authorized.

Be prepared for one way traffic control operations.

Avoid placing stockpiles within the roadway’s horizontal clear zone. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

**Project Number:** RMC 6411-41-001

**Sheet 8**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

When arrowboards are required, provide a standby unit in good working condition at the jobsite ready for immediate use.

Temporary Rumble Strips are to be used according to WZ(RS)-22.

Number of rumble strip arrays as directed by engineer.

**Item 585 “Ride Quality for Pavement Surfaces”**

Ride quality requirements are waived.

**Item 662 “Work Zone Pavement Markings”**

Remove work zone marker tabs placed prior to the final course of asphaltic concrete pavement or surface treatment removed daily as the ACP operations progress. This removal is subsidiary to this Item.

**Item 666 “Reflectorized Pavement Markings”**

If TY II material is used (vs. an acrylic or epoxy) as the sealer for the TY I markings, place the TY II a minimum of 14 calendar days (to provide adequate curing) before placing the TY I markings.

**Item 672 “Raised Pavement Markers”**

Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

GENERAL NOTES

FED. DIV. NO.	PROJECT		SHEET NO.
6	RMC 6411-41-001		5C
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

**Project Number:** RMC 6411-41-001

**Sheet 9**

**County:** Bexar

**Control:** 6411-41-001

**Highway:** Various

**Item 3085 “Underseal Course”**

The minimum application rates are listed in Table UC. The Engineer may adjust the application rates taking into consideration the existing pavement surface conditions.

Table UC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Hot Asphalt	0.15
Spray Applied Underseal Membrane	0.20
Seal Coat – Emulsion (CHFRS-2P, CRS-2P)	0.25
Seal Coat – Asphalt (AC-15P, AC-20-5TR, AC-20XP, AC10-2TR)	0.23
Aggregate for Seal Coat Options TY PB GR 4(AC) or TY B GR 4(Emulsion)	1 CY:120 SY

**Item 6185 “Truck Mounted Attenuator”**

TMA Stationary by the DAY is intended to pay for Truck Mounted Attenuator(s) required by the Traffic Control Plan Standards.

TMA Mobile Operation by the DAY is intended to pay for Truck Mounted Attenuator(s) required by the Traffic Control Plan Standards.

The TMA’s will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA’s needed for the project.

GENERAL NOTES

FED. DIV. NO.	PROJECT		SHEET NO.
6	RMC 6411-41-001		5D
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 6411-41-001

DISTRICT San Antonio

COUNTY Bexar

HIGHWAY IH0410

CONTROL SECTION JOB				6411-41-001		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00189434			
COUNTY				Bexar			
HIGHWAY				IH0410			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	SY	6,267.000		6,267.000	
	354-6023	PLANE ASPH CONC PAV(0" TO 4")	SY	46,334.000		46,334.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	500-6033	MOBILIZATION (CALLOUT)	EA	10.000		10.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		12.000	
	510-6002	ONE-WAY TRAF CONT (PILOT CAR)	HR	50.000		50.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	50.000		50.000	
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	2,500.000		2,500.000	
	662-6002	WK ZN PAV MRK NON-REMOV (W)4"(DOT)	LF	250.000		250.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	10,000.000		10,000.000	
	662-6005	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	LF	40.000		40.000	
	662-6006	WK ZN PAV MRK NON-REMOV (W)6"(DOT)	LF	25.000		25.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	75.000		75.000	
	662-6010	WK ZN PAV MRK NON-REMOV (W)8"(DOT)	LF	25.000		25.000	
	662-6011	WK ZN PAV MRK NON-REMOV (W)8"(LNDP)	LF	50.000		50.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	1,000.000		1,000.000	
	662-6013	WK ZN PAV MRK NON-REMOV (W)12"(LNDP)	LF	75.000		75.000	
	662-6014	WK ZN PAV MRK NON-REMOV (W)12"(SLD)	LF	400.000		400.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	500.000		500.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	15.000		15.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	1,000.000		1,000.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	10,000.000		10,000.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	150.000		150.000	
	662-6038	WK ZN PAV MRK NON-REMOV (Y)8"(SLD)	LF	150.000		150.000	
	666-6006	REFL PAV MRK TY I (W)4"(DOT)(100MIL)	LF	450.000		450.000	
	666-6017	REFL PAV MRK TY I (W)6"(DOT)(090MIL)	LF	40.000		40.000	
	666-6029	REFL PAV MRK TY I (W)8"(DOT)(090MIL)	LF	40.000		40.000	
	666-6033	REFL PAV MRK TY I (W)8"(LNDP)(100MIL)	LF	100.000		100.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	1,000.000		1,000.000	
	666-6039	REFL PAV MRK TY I (W)12"(LNDP)(100MIL)	LF	100.000		100.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	400.000		400.000	
	666-6045	REFL PAV MRK TY I (W)18"(SLD)(100MIL)	LF	40.000		40.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	500.000		500.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	20.000		20.000	
	666-6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	5.000		5.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	15.000		15.000	
	666-6093	REFL PAV MRK TY I (W)(RR XING)(100MIL)	EA	2.000		2.000	



CONTROLLING PROJECT ID 6411-41-001

DISTRICT San Antonio  
HIGHWAY IH0410

COUNTY Bexar

# Estimate & Quantity Sheet

CONTROL SECTION JOB				6411-41-001		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00189434			
COUNTY				Bexar			
HIGHWAY				IH0410			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	666-6096	REFL PAV MRK TY I (W)(SYMBOL)(100MIL)	EA	2.000		2.000	
	666-6099	REF PAV MRK TY I(W)18"(YLD TRI)(100MIL)	EA	20.000		20.000	
	666-6111	REFL PAV MRK TY I(W)(BIKE SYML)(100MIL)	EA	2.000		2.000	
	666-6117	REFL PAV MRK TY I (W)(BIKE DOT)(100MIL)	EA	25.000		25.000	
	666-6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF	250.000		250.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	350.000		350.000	
	666-6156	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	5.000		5.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	2,500.000		2,500.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	10,000.000		10,000.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	2,500.000		2,500.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	10,000.000		10,000.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	2,500.000		2,500.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	10,000.000		10,000.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	2,500.000		2,500.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	10,000.000		10,000.000	
	668-6084	PREFAB PAV MRK TY C (W) (NUMBER)	EA	2.000		2.000	
	668-6115	PREFAB PAV MRK TY C (MULTI) (SHIELD)	EA	2.000		2.000	
	672-6006	REFL PAV MRKR TY I-A	EA	25.000		25.000	
	672-6007	REFL PAV MRKR TY I-C	EA	50.000		50.000	
	672-6008	REFL PAV MRKR TY I-R	EA	25.000		25.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	400.000		400.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	100.000		100.000	
	3076-6025	D-GR HMA TY-C SAC-B PG70-22	TON	5,097.000		5,097.000	
	3076-6066	TACK COAT	GAL	4,633.000		4,633.000	
	3085-6001	UNDERSEAL COURSE	GAL	13,900.000		13,900.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	50.000		50.000	
	6185-6002	TMA (STATIONARY)	DAY	50.000		50.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	50.000		50.000	



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**TCP SUMMARY**

SHT. NO.	SHEET	0510 6002	0533 6002	0662 6001	0662 6002	0662 6004	0662 6005	0662 6006	0662 6008	0662 6010	0662 6011	0662 6012	0662 6013	0662 6014	0662 6016	0662 6029
		ONE-WAY TRAF CONT (PILOT CAR)	RUMBLE STRIPS (CENTERLINE)	WK ZN PAV MRK NON-REMOV (W4)BRK)	WK ZN PAV MRK NON-REMOV (W4)DOT)	WK ZN PAV MRK NON-REMOV (W4)SLD)	WK ZN PAV MRK NON-REMOV (W6)BRK)	WK ZN PAV MRK NON-REMOV (W6)DOT)	WK ZN PAV MRK NON-REMOV (W6)SLD)	WK ZN PAV MRK NON-REMOV (W8)DOT)	WK ZN PAV MRK NON-REMOV (W8)SLD)	WK ZN PAV MRK NON-REMOV (W12)LNDP)	WK ZN PAV MRK NON-REMOV (W12)SLD)	WK ZN PAV MRK NON-REMOV (W12)SLD)	WK ZN PAV MRK NON-REMOV (W24)SLD)	WK ZN PAV MRK NON-REMOV (W1)WORD)
N/A	N/A	HR	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA
		50	50	2,500	250	10,000	40	25	75	25	50	1,000	75	400	500	15
	TOTALS	<b>50</b>	<b>50</b>	<b>2,500</b>	<b>250</b>	<b>10,000</b>	<b>40</b>	<b>25</b>	<b>75</b>	<b>25</b>	<b>50</b>	<b>1,000</b>	<b>75</b>	<b>400</b>	<b>500</b>	<b>15</b>

**TCP SUMMARY (CONT.)**

SHT. NO.	SHEET	0662 6032	0662 6034	0662 6037	0662 6038	6001 6001	6185 6002	6185 6005
		WK ZN PAV MRK NON-REMOV (Y4)BRK)	WK ZN PAV MRK NON-REMOV (Y4)SLD)	WK ZN PAV MRK NON-REMOV (Y6)SLD)	WK ZN PAV MRK NON-REMOV (Y8)SLD)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
N/A	N/A	LF	LF	LF	LF	DAY	DAY	DAY
		1,000	10,000	150	150	50	50	50
	TOTALS	<b>1,000</b>	<b>10,000</b>	<b>150</b>	<b>150</b>	<b>50</b>	<b>50</b>	<b>50</b>

**ROADWAY SUMMARY**


SHT. NO.	SHEET	0351 6004	0354 6023	3076 6025	3076 6066	3085 6001
		FLEXIBLE PAVEMENT STRUCTURE REPAIR(8')	PLANE ASPH CONC PAV(0" TO 4')	D-GR HMA TY-C SAC-B PG70-22	TACK COAT	UNDERSEAL COURSE
		SY	SY	TON	GAL	GAL
50	MILL AND INLAY LOCATION SUMMARY		46,334	5,097	4,633	13,900
51	FLEXIBLE PAVEMENT STRUCTURE REPAIR LOCATION SUMMARY	6,267				
	TOTALS	<b>6,267</b>	<b>46,334</b>	<b>5,097</b>	<b>4,633</b>	<b>13,900</b>

**TRAFFIC SUMMARY**

SHT. NO.	SHEET	0666 6006	0666 6017	0666 6029	0666 6033	0666 6036	0666 6039	0666 6042	0666 6045	0666 6048	0666 6054	0666 6057	0666 6078	0666 6093	0666 6096	0666 6099
		REFL PAV MRK TY I (W4)DOT) (100MIL)	REFL PAV MRK TY I (W6)DOT) (090MIL)	REFL PAV MRK TY I (W8)DOT) (090MIL)	REFL PAV MRK TY I (W8)SLD) (100MIL)	REFL PAV MRK TY I (W8)SLD) (100MIL)	REFL PAV MRK TY I (W12)LNDP) (100MIL)	REFL PAV MRK TY I (W12)SLD) (100MIL)	REFL PAV MRK TY I (W18)SLD) (100MIL)	REFL PAV MRK TY I (W24)SLD) (100MIL)	REFL PAV MRK TY I (W)ARROW) (100MIL)	REFL PAV MRK TY I (W)DBL ARROW) (100MIL)	REFL PAV MRK TY I (W)WORD) (100MIL)	REFL PAV MRK TY I (W)RR XING) (100MIL)	REFL PAV MRK TY I (W)SYMBOL) (100MIL)	REFL PAV MRK TY I (W)8"YLD TRI) (100MIL)
N/A	N/A	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA
		450	40	40	100	1,000	100	400	40	500	20	5	15	2	2	20
	TOTALS	<b>450</b>	<b>40</b>	<b>40</b>	<b>100</b>	<b>1,000</b>	<b>100</b>	<b>400</b>	<b>40</b>	<b>500</b>	<b>20</b>	<b>5</b>	<b>15</b>	<b>2</b>	<b>2</b>	<b>20</b>

**TRAFFIC SUMMARY (CONT.)**

SHT. NO.	SHEET	0666 6111	0666 6117	0666 6138	0666 6147	0666 6156	0666 6300	0666 6303	0666 6306	0666 6309	0666 6312	0666 6315	0666 6318
		REFL PAV MRK TY I (W)BIKE SYML) (100MIL)	REFL PAV MRK TY I (W)BIKE DOT) (100MIL)	REFL PAV MRK TY I (Y8)SLD) (100MIL)	REFL PAV MRK TY I (Y24)SLD) (100MIL)	REFL PAV MRK TY I (Y)MED NOSE) (100MIL)	RE PM W/RET REQ TY I (W4) (BRK)(100 MIL)	RE PM W/RET REQ TY I (W4) (SLD)(100 MIL)	RE PM W/RET REQ TY I (W6) (BRK)(100 MIL)	RE PM W/RET REQ TY I (W6) (SLD)(100 MIL)	RE PM W/RET REQ TY I (Y4) (BRK)(100 MIL)	RE PM W/RET REQ TY I (Y4) (SLD)(100 MIL)	RE PM W/RET REQ TY I (Y6) (BRK)(100 MIL)
N/A	N/A	EA	EA	LF	LF	EA	LF	LF	LF	LF	LF	LF	LF
		2	25	250	350	5	2,500	10,000	2,500	10,000	2,500	10,000	2,500
	TOTALS	<b>2</b>	<b>25</b>	<b>250</b>	<b>350</b>	<b>5</b>	<b>2,500</b>	<b>10,000</b>	<b>2,500</b>	<b>10,000</b>	<b>2,500</b>	<b>10,000</b>	<b>2,500</b>



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## VARIOUS SUMMARIES


SHEET 01 OF 02

FED. DIV. NO.	FEDERAL AID PROJECT	SHEET NO.
6		7
STATE	DIST.	COUNTY
TEXAS	SAT	BEXAR
CONT.	SECT.	JOB
6411	41	001
		HIGHWAY NO.
		VARIOUS

TRAFFIC SUMMARY (CONT.)

SHT. NO.	SHEET	0666 6321 RE PM W/RET REQ TY I (Y6" (SLD)(1.00 MIL)	0668 6084 PREFAB PAV MRK TY C (W) (NUMBER)	0668 6115 PREFAB PAV MRK TY C (MULTI) (SHIELD)	0672 6006 REFL PAV MRKR TY I-A	0672 6007 REFL PAV MRKR TY I-C	0672 6008 REFL PAV MRKR TY I-R	0672 6009 REFL PAV MRKR TY II-A-A	0672 6010 REFL PAV MRKR TY II-C-R
N/A	N/A	LF 10,000	EA 2	EA 2	EA 25	EA 50	EA 25	EA 400	EA 100
	TOTALS	10,000	2	2	25	50	25	400	100

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 Texas Department of Transportation © 2022			
<h2>VARIOUS SUMMARIES</h2>			
SHEET 02 OF 02			
FED. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			8
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

**DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.**

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC," OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

**I. GENERAL**

- (1) TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER.
- (2) THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE PERTINENT BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.
- (3) DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.
- (4) THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING / UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND / OR PERMANENT LANE, RAMP, CONNECTOR, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.
- (5) ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.
- (6) TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.
- (7) AT NO TIME SHALL TWO CONSECUTIVE INTERSECTING ROADWAYS BE CLOSED AT THE SAME TIME DURING CONSTRUCTION.
- (8) AT NO TIME SHALL TWO CONSECUTIVE RAMP BE CLOSED AT THE SAME TIME DURING CONSTRUCTION OR OVERLAY OPERATIONS.
- (9) UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE ENGINEER, LANE CLOSURES SHALL BE LIMITED ACCORDING TO THE FOLLOWING RESTRICTIONS:
  - DAYTIME CLOSURES MONDAY THRU FRIDAY EACH DAY FROM 9 AM TO 3 PM (WITH UNIFORMED OFF DUTY LAW ENFORCEMENT OFFICERS).
  - NIGHTTIME CLOSURES WHEN APPROVED BY THE ENGINEER.
  - WEEKEND CLOSURES (9 PM FRIDAY TO 5 AM MONDAY) WHEN APPROVED BY THE ENGINEER.
 NEITHER LANE CLOSURES NOR ROADWAY CLOSURES WILL BE PERMITTED FOR THE FOLLOWING KEY DATES AND/OR SPECIAL EVENTS:
  - BETWEEN DECEMBER 15 AND JANUARY 1.
  - WEDNESDAY BEFORE THANKSGIVING THRU THE SUNDAY AFTER THANKSGIVING.
  - SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY.
  - SATURDAY AND SUNDAY WHEN JULY 4 FALLS ON A FRIDAY OR MONDAY.
  - EASTER WEEKEND
- (10) COORDINATE WITH ADJACENT PROJECTS.
- (11) COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO ITEM 502.
- (12) COORDINATE WITH THE RELEVANT AGENCY, CITY OF SAN ANTONIO OR TXDOT, FOR ANY NECESSARY SIGNAL TIMING REVISIONS.
- (13) TRAFFIC CONTROL DEVICES AND SIGNS ARE TO BE MAINTAINED ON A DAILY BASIS.
- (14) ALL LANES ARE TO BE OPEN TO TRAFFIC AT THE END OF EACH WORKING DAY.

**2. SEQUENCE OF WORK**

- (1) THIS PROJECT WILL BE CONSTRUCTED AS PER THE STEPS SPECIFIED BELOW IN "SEQUENCE OF WORK - STEPS:" BEFORE THE COMMENCEMENT OF EACH STEP, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS, AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.
- (2) REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE STEPS SPECIFIED BELOW IN "SEQUENCE OF WORK - STEPS:"

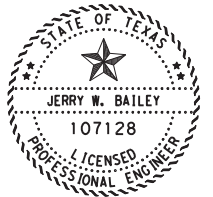
**STEPS**

MILL AND INLAY (TYPICAL SECTION NO. 1)

- (1) PLACE CHANGEABLE MESSAGE SIGNS AS DIRECTED AT LEAST 3 DAYS PRIOR TO WORK BEGINNING AT ANY GIVEN LOCATION TO INFORM THE PUBLIC OF THE UPCOMING CONSTRUCTION. NOTIFY THE INSPECTOR TO CONTACT LANE CLOSURE GROUP (AREA OFFICE, PIO, MAINTENANCE SECTION, DISTRICT MAINTENANCE, DISTRICT CONSTRUCTION, AND TRANSGUIDE)
- (2) PLACE BARRICADES AND ALL APPLICABLE TRAFFIC CONTROL DEVICES AS SHOWN ON THE STANDARD SHEETS. ALLOWABLE TIMES FOR LANE CLOSURES ARE SHOWN ON THE LANE CLOSURES & ASSESSMENT FEE TABLE.
- (3) PLANE 2" TO 4" OF EXISTING ASPHALT IN THE DIRECTION OF TRAFFIC, AS DIRECTED. DO NOT PLANE MORE AREA THAN CAN BE REPAIRED IN THE SAME WORKING DAY.
- (4) PLACE UNDERSEAL COURSE, TACK COAT, AND TY C HOT MIX ASPHALT ON THE PLANED AREA.
- (5) PLACE NON-REMOVABLE WORK ZONE PAVEMENT MARKINGS PRIOR TO OPENING LANES TO TRAFFIC.
- (6) PLACE FINAL (TY I) PAVEMENT MARKINGS.
- (7) PERFORM CLEAN-UP OPERATIONS.
- (8) REMOVE BARRICADES AND ALL APPLICABLE TRAFFIC CONTROL DEVICES.

FLEXIBLE PAVEMENT STRUCTURE REPAIR (8") (TYPICAL SECTION NO. 2)

- (1) PLACE CHANGEABLE MESSAGE SIGNS AS DIRECTED AT LEAST 3 DAYS PRIOR TO WORK BEGINNING AT ANY GIVEN LOCATION TO INFORM THE PUBLIC OF THE UPCOMING CONSTRUCTION. NOTIFY THE INSPECTOR TO CONTACT LANE CLOSURE GROUP (AREA OFFICE, PIO, MAINTENANCE SECTION, DISTRICT MAINTENANCE, DISTRICT CONSTRUCTION, AND TRANSGUIDE)
- (2) PLACE BARRICADES AND ALL APPLICABLE TRAFFIC CONTROL DEVICES AS SHOWN ON THE STANDARD SHEETS. ALLOWABLE TIMES FOR LANE CLOSURES ARE SHOWN ON THE LANE CLOSURES & ASSESSMENT FEE TABLE.
- (3) PLANE 2" OF EXISTING ASPHALT IN THE DIRECTION OF TRAFFIC EXTENDING 1 FT BEYOND EACH SIDE OF THE BASE REPAIR AND 5 FT BEYOND EACH END OF THE BASE REPAIR. DO NOT PLANE MORE AREA THAN CAN BE REPAIRED AND COVERED WITH HOT MIX ASPHALT THE SAME WORK DAY.
- (4) PERFORM FLEXIBLE PAVEMENT STRUCTURE REPAIR ON DESIGNATED AREAS OF BASE FAILURE TO A DEPTH OF 8" BELOW PLANED SURFACE UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- (5) PLACE TACK COAT AND 2" TY C HOT MIX ASPHALT AS DIRECTED BY THE ENGINEER.
- (6) PLACE NON-REMOVABLE WORK ZONE PAVEMENT MARKINGS PRIOR TO OPENING LANES TO TRAFFIC.
- (7) PLACE FINAL (TY I) PAVEMENT MARKINGS ONCE ALL REPAIRS ARE COMPLETED FOR THAT AREA.
- (8) PERFORM CLEAN-UP OPERATIONS.
- (9) REMOVE BARRICADES AND ALL APPLICABLE TRAFFIC CONTROL DEVICES.



*Jerry W. Bailey, P.E.*

JERRY W. BAILEY, P.E.      7/19/2022  
DATE

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CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

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FLEXIBLE PAVEMENT STRUCTURE REPAIR (8') (TYPICAL SECTION NO. 3)

- (1) PLACE CHANGEABLE MESSAGE SIGNS AS DIRECTED AT LEAST 3 DAYS PRIOR TO WORK BEGINNING AT ANY GIVEN LOCATION TO INFORM THE PUBLIC OF THE UPCOMING CONSTRUCTION. NOTIFY THE INSPECTOR TO CONTACT LANE CLOSURE GROUP (AREA OFFICE, PIO, MAINTENANCE SECTION, DISTRICT MAINTENANCE, DISTRICT CONSTRUCTION, AND TRANSGUIDE)
- (2) PLACE BARRICADES AND ALL APPLICABLE TRAFFIC CONTROL DEVICES AS SHOWN ON THE STANDARD SHEETS. ALLOWABLE TIMES FOR LANE CLOSURES ARE SHOWN ON THE LANE CLOSURES & ASSESSMENT FEE TABLE.
- (3) PERFORM FLEXIBLE PAVEMENT STRUCTURE REPAIR ON DESIGNATED AREAS OF BASE FAILURE TO A DEPTH OF 8" BELOW PLANED SURFACE UNLESS OTHERWISE DIRECTED BY THE ENGINEER. DO NOT PLANE MORE AREA THAN CAN BE REPAIRED AND COVERED WITH HOT MIX ASPHALT THE SAME WORK DAY.
- (4) PLACE NON-REMOVABLE WORK ZONE PAVEMENT MARKINGS PRIOR TO OPENING LANES TO TRAFFIC.
- (5) PLACE FINAL (TY I) PAVEMENT MARKINGS ONCE ALL REPAIRS ARE COMPLETED FOR THAT AREA.
- (6) PERFORM CLEAN-UP OPERATIONS.
- (7) REMOVE BARRICADES AND ALL APPLICABLE TRAFFIC CONTROL DEVICES.

3. SAFETY

- (1) THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC(1)-21 THRU BC(12)-21. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE LATEST VERSION OF "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS," THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS," AND TXDOT STANDARDS.
- (2) BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS, TO PROVIDE FOR THE SAFE PASSAGE OF TRAFFIC AT ALL TIMES.
- (3) THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTOR'S PERSONNEL.
- (4) BARRICADES SHALL NOT BE USED AS SIGN SUPPORT. SUPPORT FOR SIGNS SHALL EITHER BE TEMPORARY, FIXED, OR PORTABLE SIGN SUPPORT AS DIRECTED BY THE ENGINEER.
- (5) THE DISTANCE PLAQUE IN EITHER FEET OR MILES MAY BE REQUIRED FOR USE IN CONJUNCTION WITH WARNING SIGNS.
- (6) CONTRACTOR IS TO PROVIDE ACCESS TO INTERSECTING STREETS, RAMPS, AND DRIVEWAYS AT ALL TIMES, EXCEPT WHERE SPECIFICALLY SHOWN TO BE CLOSED. ADEQUACY OF ACCESS WILL BE AT THE DISCRETION OF THE ENGINEER.
- (7) ALL CONSTRUCTION TRAFFIC IS TO BE REGULATED SUCH THAT THE TRAVELING PUBLIC EXPERIENCES A MINIMUM OF INCONVENIENCE AT TIMES WHEN IT IS NECESSARY FOR CONSTRUCTION VEHICLES TO STOP, UNLOAD, OR CROSS ROADWAYS UNDER TRAFFIC. WARNING SIGNS AND FLAGGER SHALL BE PROVIDED AS NECESSARY TO ADEQUATELY PROTECT THE TRAVELING PUBLIC.
- (8) CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

4. HAULING EQUIPMENT

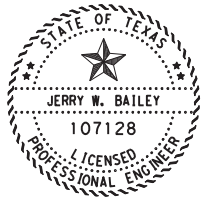
- (1) WHEN EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS IS TO BE USED FOR MOVING DIRT OR OTHER MATERIAL ALONG OR ACROSS PAVEMENTED SURFACES, CONTRACTOR SHALL ENSURE SAID EQUIPMENT USES RUBBER TIRES. CONTRACTOR SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED / APPROVED BY THE ENGINEER.
- (2) THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES DO NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE NOR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

5. FINAL CLEAN UP

UPON COMPLETION OF CONSTRUCTION AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.


6. PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER ITEM 662 WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE PERTINENT BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.



*Jerry W. Bailey, P.E.*

JERRY W. BAILEY, P.E.      7/19/2022  
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**BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:**

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

**WORKER SAFETY NOTES:**


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

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

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

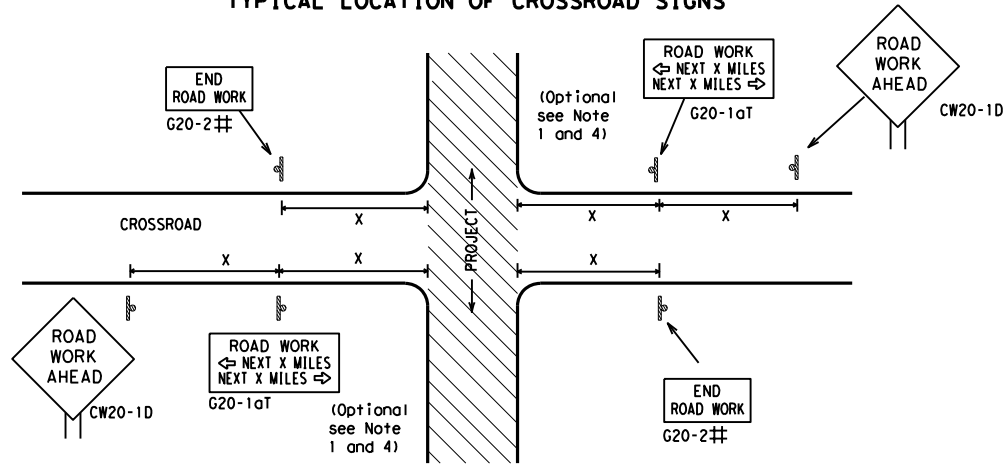
<p><b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b>  <a href="http://www.txdot.gov">http://www.txdot.gov</a></p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
<p><b>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</b></p> <p><b>BC (1) -21</b></p>			
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© TxDOT November 2002	CONT	SECT	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21		JOB 6411 41 OO1	VARIOUS SHEET NO. 11
	DIST	COUNTY	
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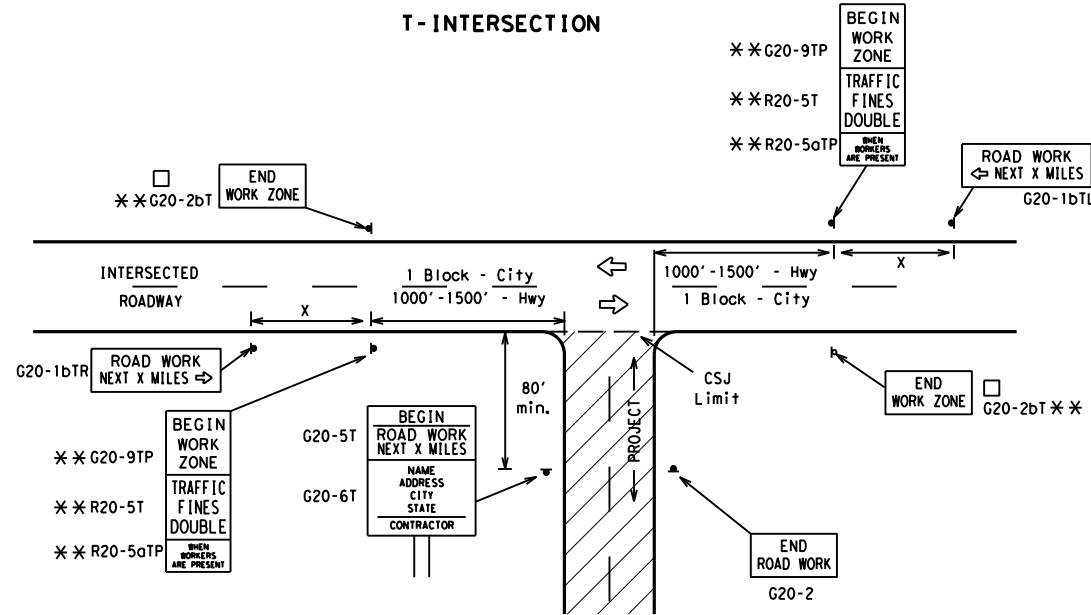
**TYPICAL LOCATION OF CROSSROAD SIGNS**



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

- The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
- The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per 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.
- When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

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

**TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING<sup>1,5,6</sup>**

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 <sup>4</sup>	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
			80	1000 <sup>2</sup>
			*	* <sup>3</sup>

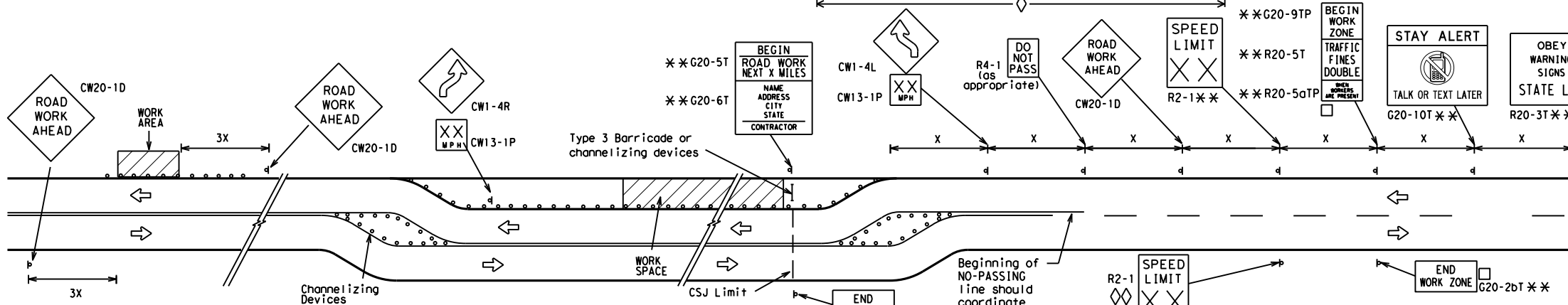
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

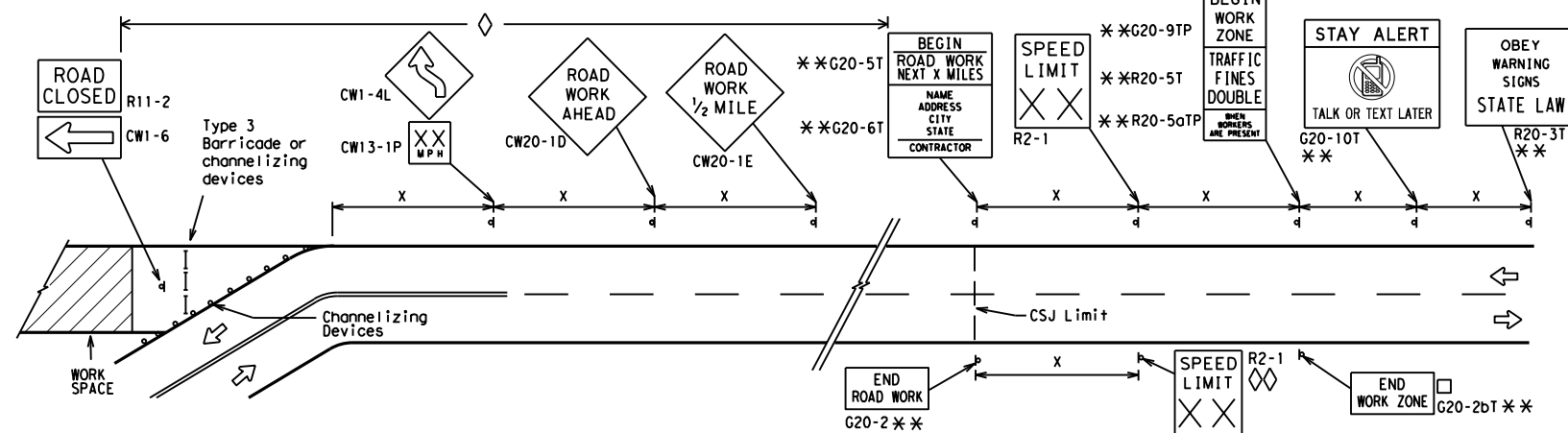
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

**WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS**



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

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



**NOTES**

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

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

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC(2)-21**

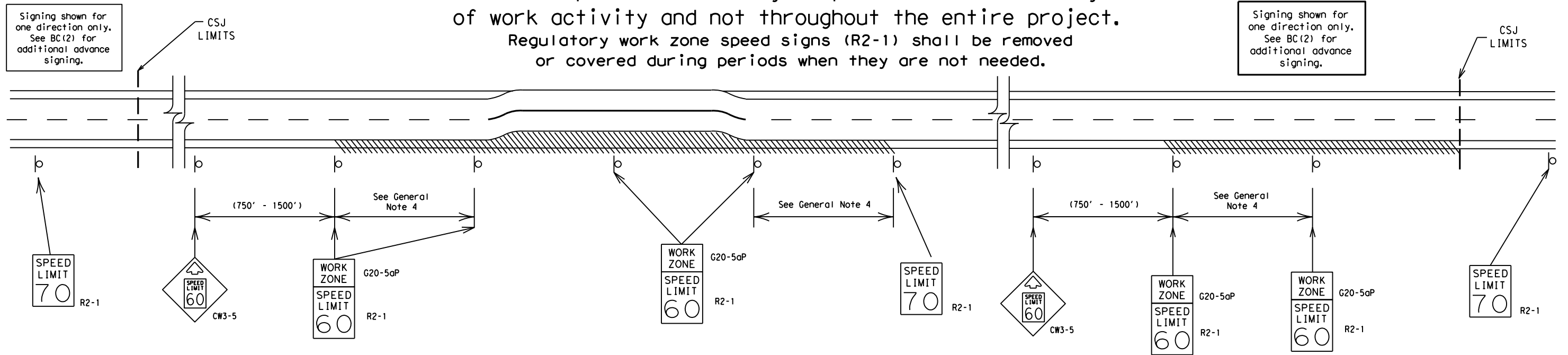
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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- 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.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
  - Law enforcement.
  - Flagger stationed next to sign.
  - Portable changeable message sign (PCMS).
  - Low-power (drone) radar transmitter.
  - 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.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

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## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

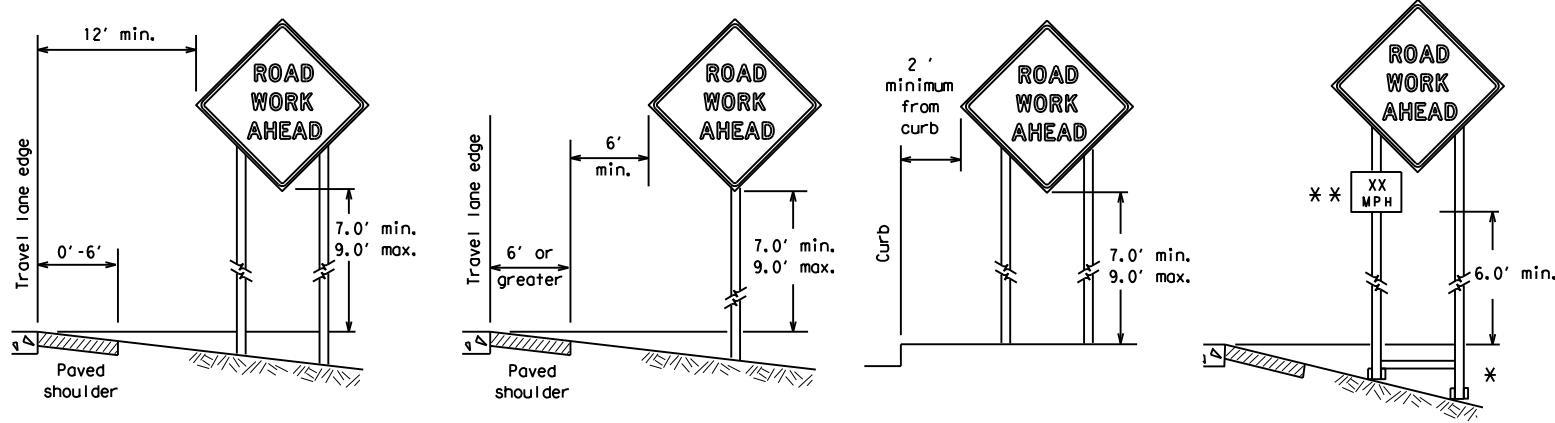
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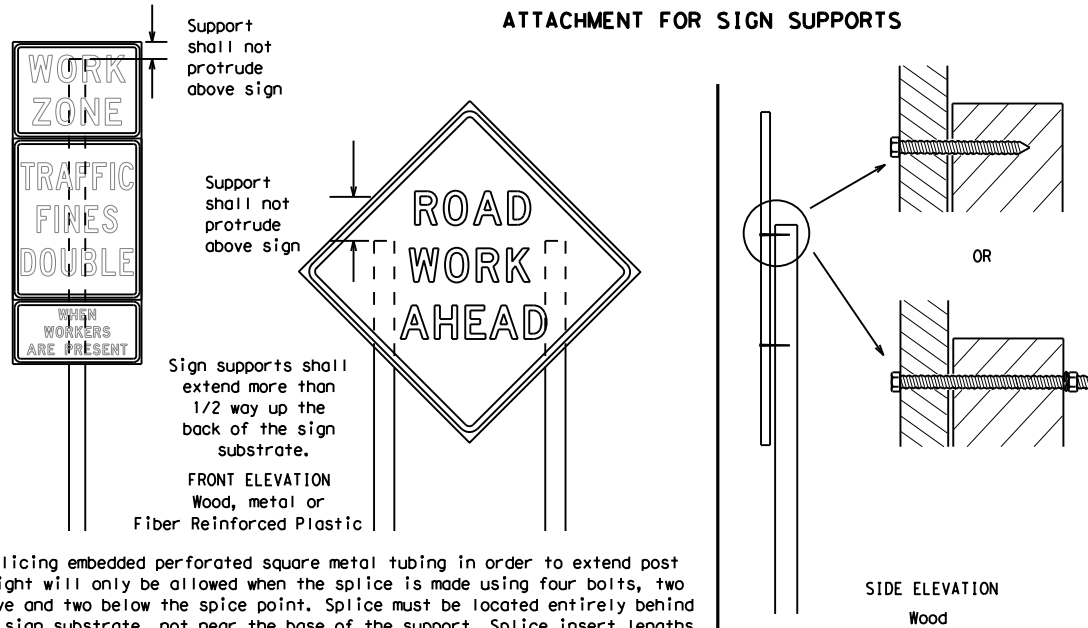
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



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

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

**ATTACHMENT FOR SIGN SUPPORTS**



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

**GENERAL NOTES FOR WORK ZONE SIGNS**

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
- The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any 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.
  - Long-term stationary - work that occupies a location more than 3 days.
  - Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
  - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
  - Short, duration - work that occupies a location up to 1 hour.
  - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

**SIGN MOUNTING HEIGHT**

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

**SIZE OF SIGNS**

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

**SIGN SUBSTRATES**

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

**REFLECTIVE SHEETING**

- All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B<sub>FL</sub> or Type C<sub>FL</sub>, 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**

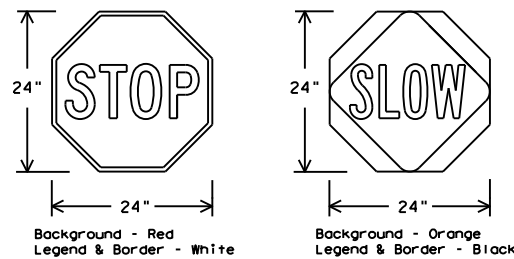
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
- Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
- Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
- Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

**FLAGS ON SIGNS**

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

**STOP/SLOW PADDLES**

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B <sub>FL</sub> OR C <sub>FL</sub> 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 TS-CD standard.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
- If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

SHEET 4 OF 12



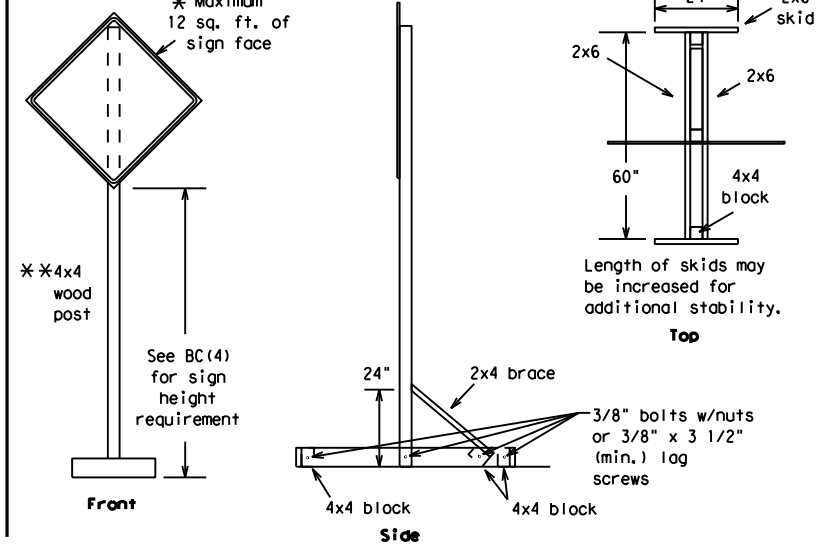
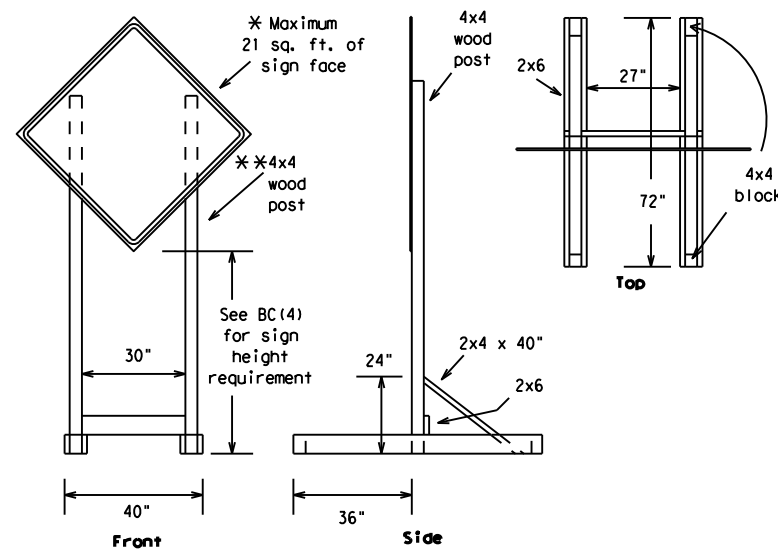
**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

BC (4) - 21

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		6411	41	OO1	VARIOUS				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	SAT	BEXAR	14					

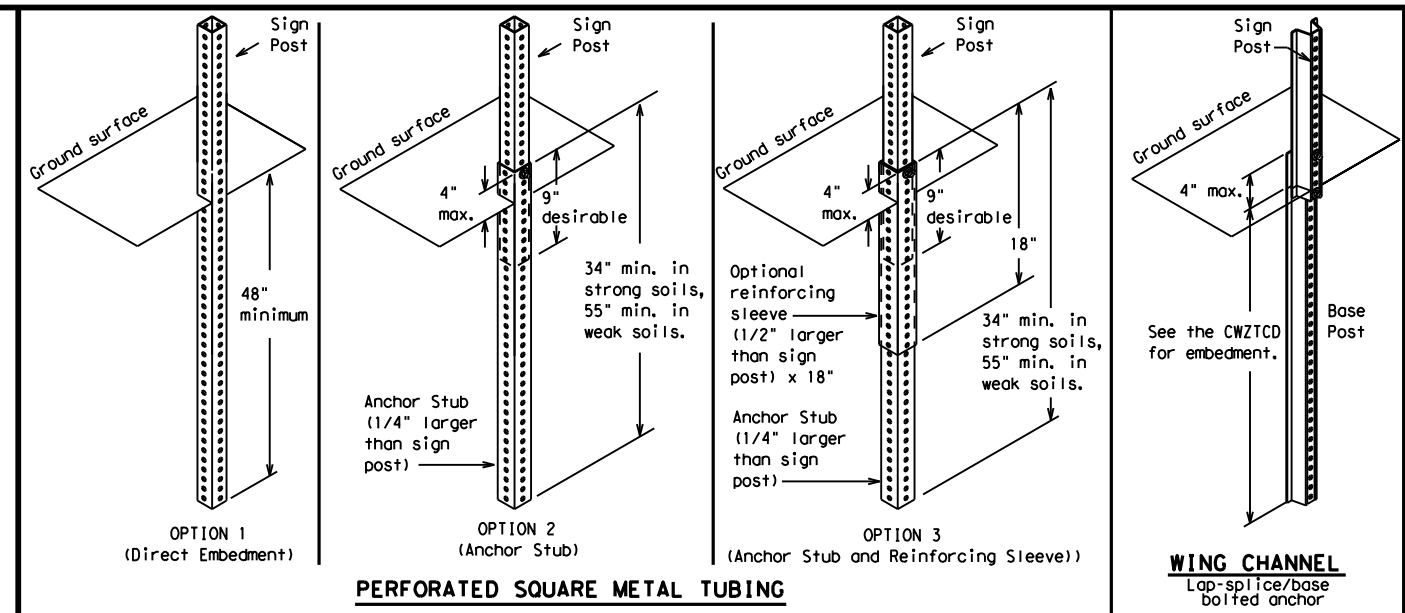
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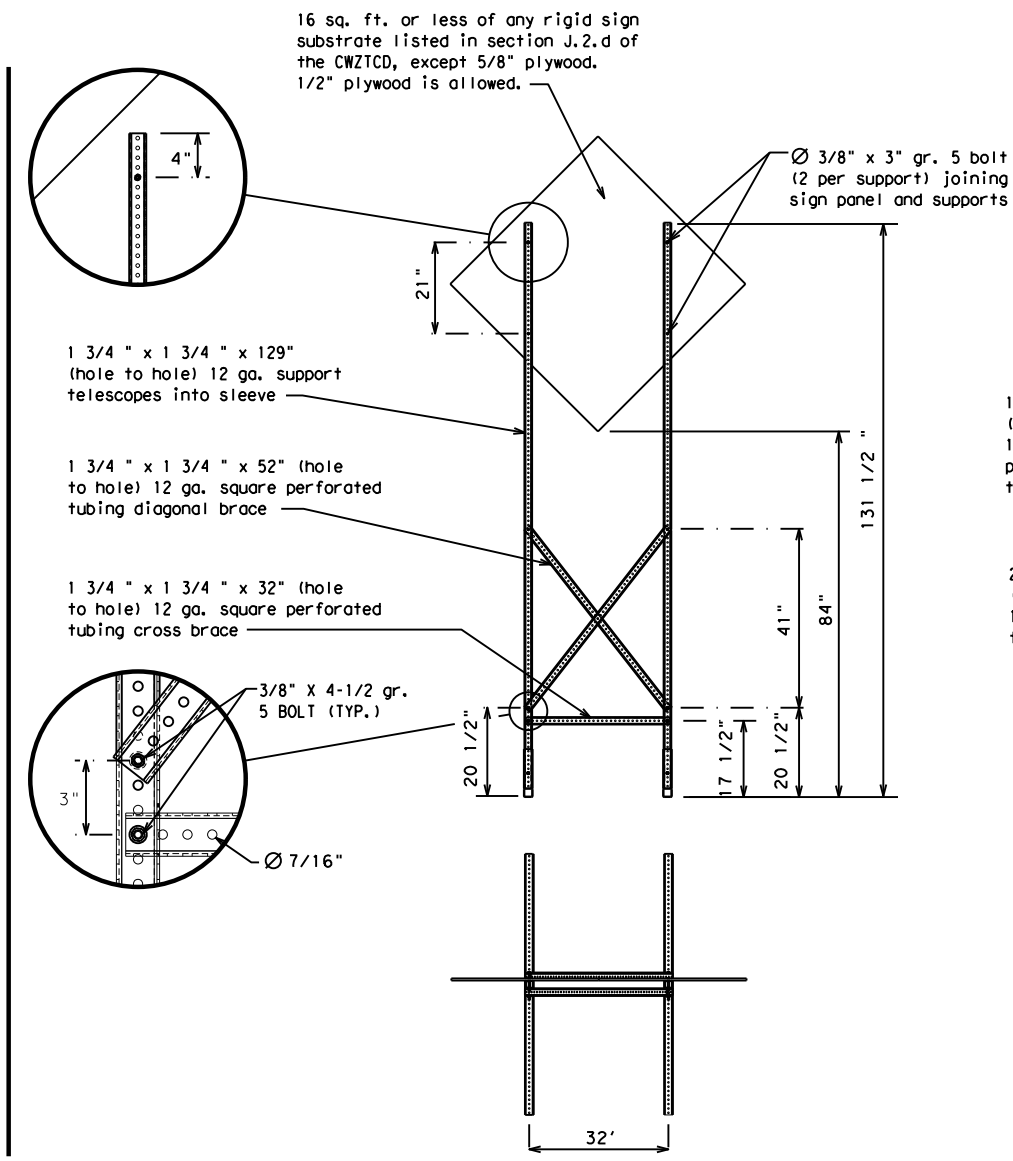
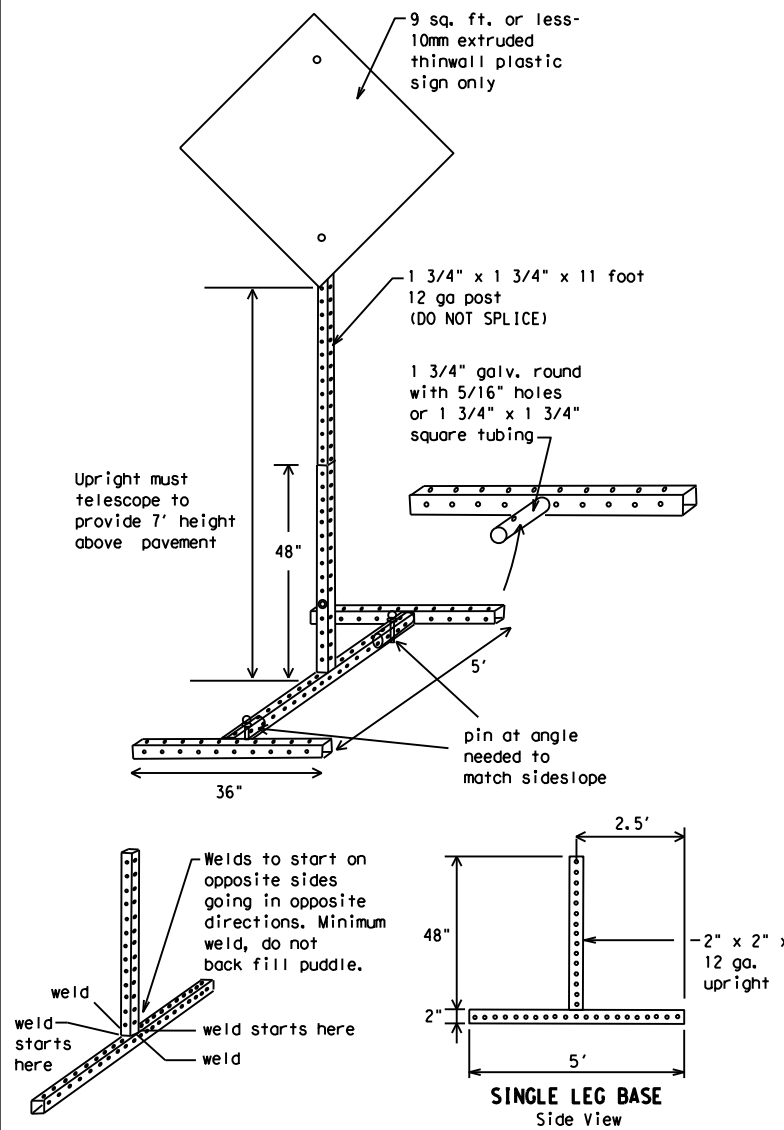
### SKID MOUNTED WOOD SIGN SUPPORTS

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



### GROUND MOUNTED SIGN SUPPORTS

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



### SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

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

SHEET 5 OF 12



## BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	SAT	BEXAR	15	

DATE:  
FILE:

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
- Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXX BLVD CLOSED	

### Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	LANES SHIFT *

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

MERGE RIGHT	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE *	

### Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXXXX TO XXXXXX
US XXX TO FM XXXX

### Warning List

SPEED LIMIT XX MPH
MAXIMUM SPEED XX MPH
MINIMUM SPEED XX MPH
ADVISORY SPEED XX MPH
RIGHT LANE EXIT
USE CAUTION
DRIVE SAFELY
DRIVE WITH CARE

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

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

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

## FULL MATRIX PCMS SIGNS

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

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DATE: FILE:

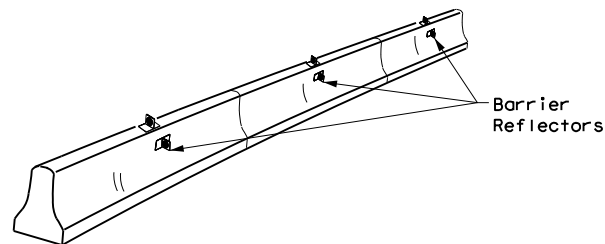
WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking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

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

<h3>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h3>			
<h2>BC (6) - 21</h2>			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CR:	TxDOT
REVISIONS	6411	DW:	TxDOT
9-07	8-14	CK:	TxDOT
7-13	5-21	CONT	SECT
		41	001
		DIST	COUNTY
		SAT	BEXAR
		JOB	HIGHWAY
			VARIOUS
		SHEET NO.	16

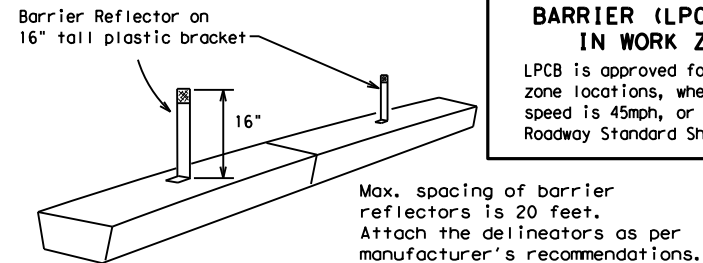
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



**CONCRETE TRAFFIC BARRIER (CTB)**

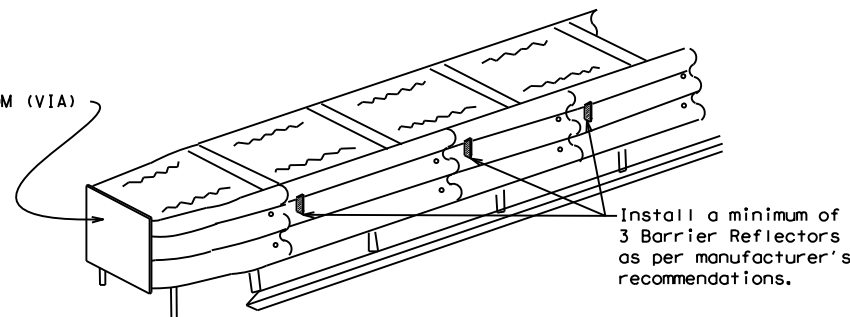
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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



**LOW PROFILE CONCRETE BARRIER (LPCB) 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.

**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 appropriate 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**

**WARNING LIGHTS**

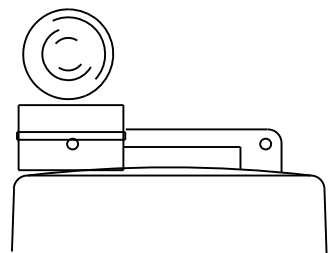
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

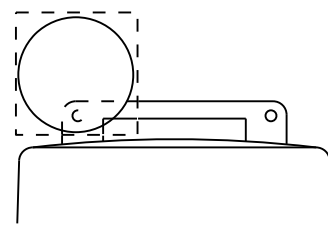
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



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

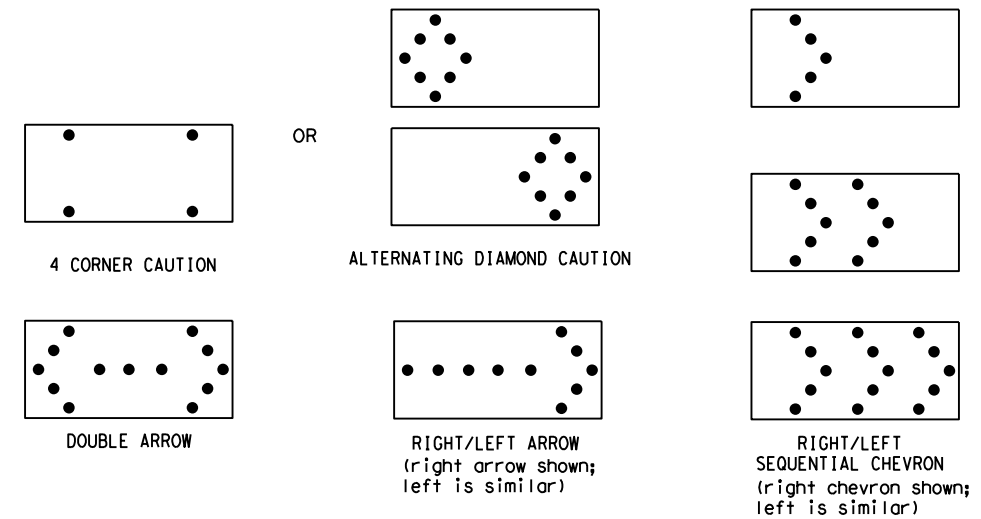


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- A full matrix 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.
- Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

**ATTENTION**  
 Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

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

**BC (7) -21**

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	OO1	VARIOUS
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	SAT	BEXAR	17	

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**GENERAL NOTES**

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

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

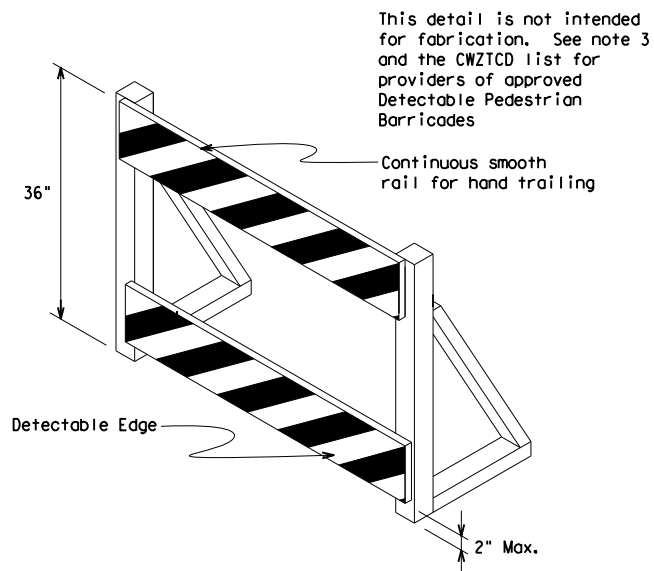
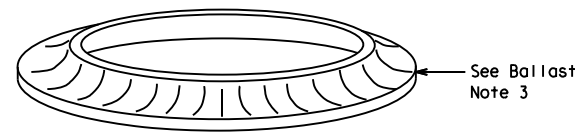
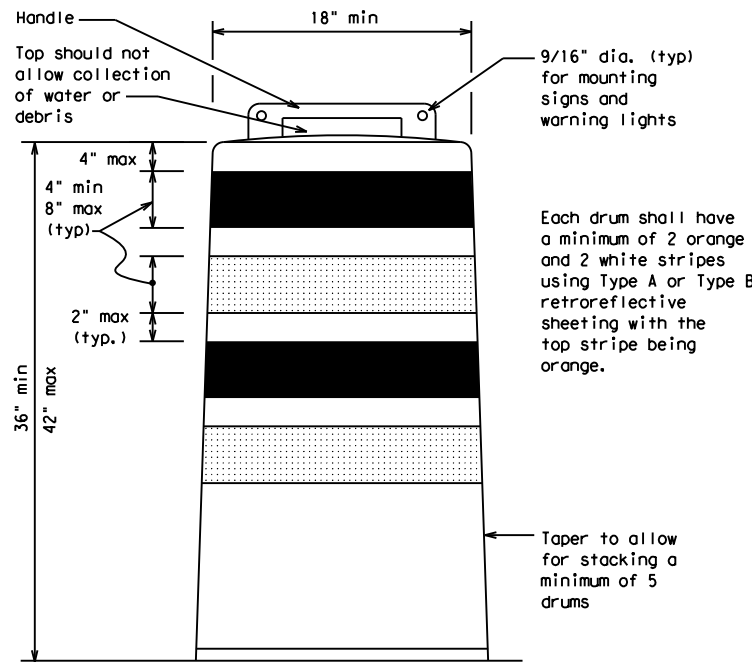
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

**RETROREFLECTIVE SHEETING**

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

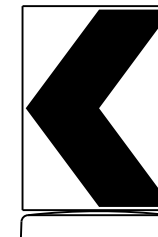
**BALLAST**

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

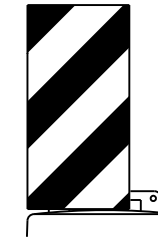


**DETECTABLE PEDESTRIAN BARRICADES**

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



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



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

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

**SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS**

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B<sub>FL</sub> or Type C<sub>FL</sub> Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations, they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC(8) - 21**

FILE:	bc-21.dgn	DN:	TxDOT	CR:	TxDOT	OW:	TxDOT	CK:	TxDOT
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REVISIONS		64	41	OOI	VARIOUS				
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7-13									



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**FIXED**  
(Rigid or self-righting)

**DRIVEABLE**



**PORTABLE**

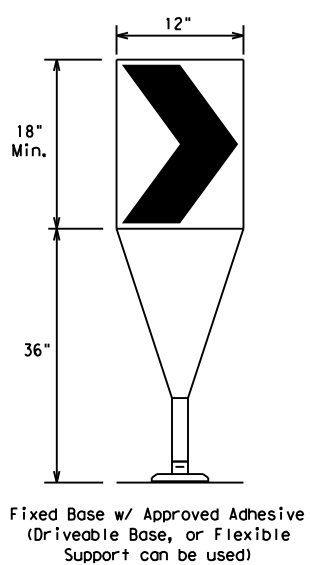
**VERTICAL PANELS (VPs)**

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



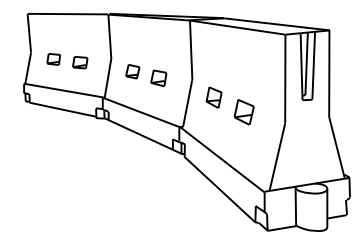
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

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



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

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

- LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- LCDs used as barricades 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.
- Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
- When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long 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**

**GENERAL NOTES**

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

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

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

**SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS**

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 21**

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	SECT	HIGHWAY			
REVISIONS	6411	41	OOI	VARIOUS					
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**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.



**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



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

**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

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



PERSPECTIVE VIEW

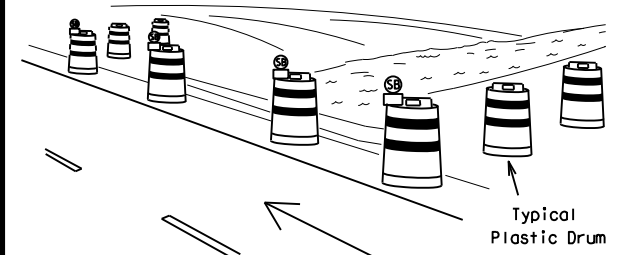
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



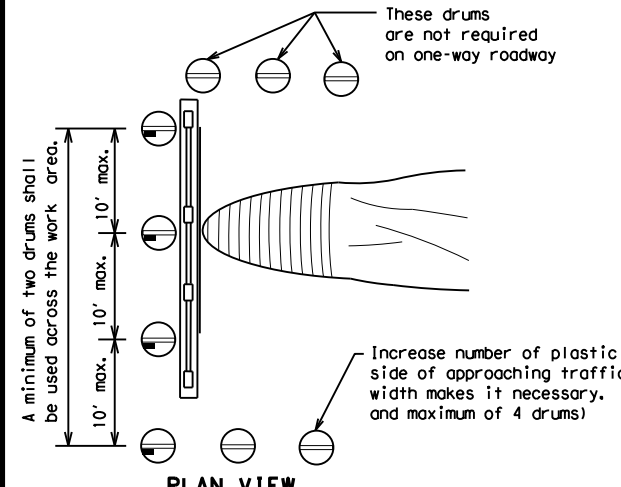
PLAN VIEW

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

**TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION**



PERSPECTIVE VIEW

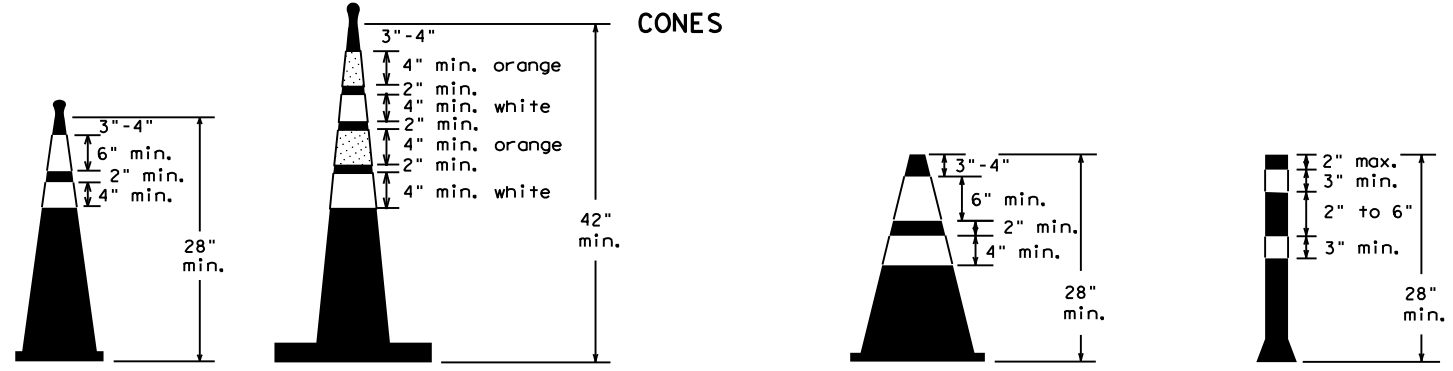


PLAN VIEW

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

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

**CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS**

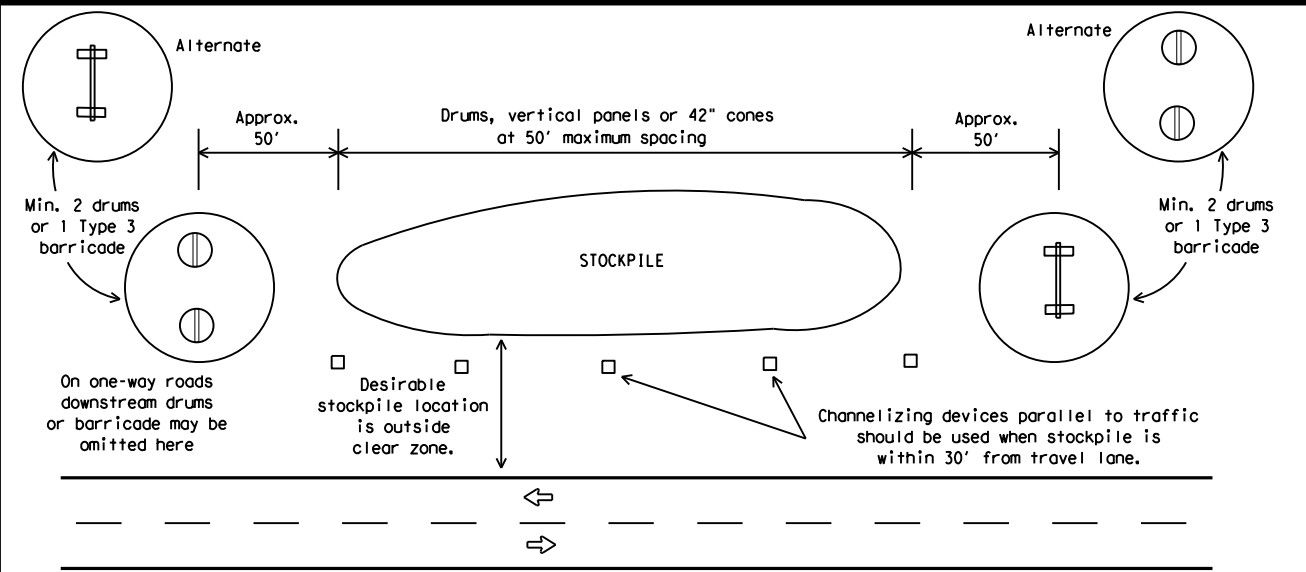


Two-Piece cones

One-Piece cones

Tubular Marker

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

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



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	OO1	VARIOUS
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	SAT	BEXAR	20	

DATE: FILE:



## WORK ZONE PAVEMENT MARKINGS

### GENERAL

- The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

### RAISED PAVEMENT MARKERS

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

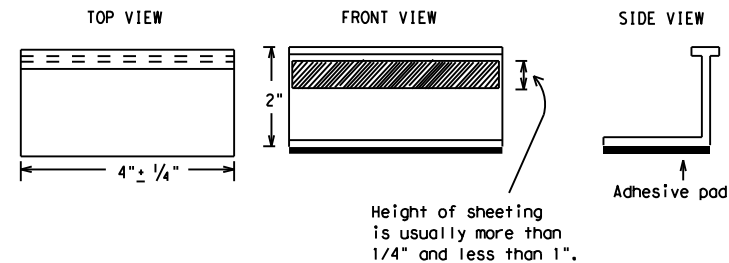
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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.
- The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

### REMOVAL OF PAVEMENT MARKINGS

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

## Temporary Flexible-Reflective Roadway Marker Tabs



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

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

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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DATE:  
FILE:

SHEET 11 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11)-21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
	6411	41	OO1	VARIOUS
REVISIONS	DIST	COUNTY	SHEET NO.	
2-98 9-07 5-21	SAT	BEXAR	21	
1-02 7-13				
11-02 8-14				

105

## PAVEMENT MARKING PATTERNS



REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



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.



RAISED PAVEMENT MARKERS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN B

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



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



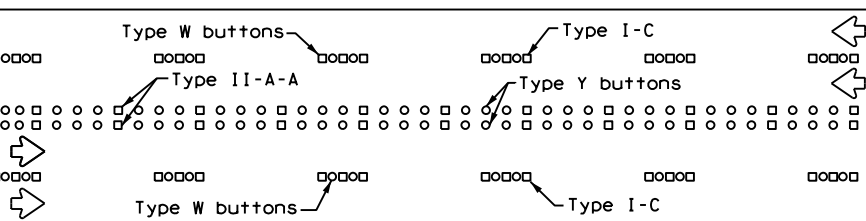
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



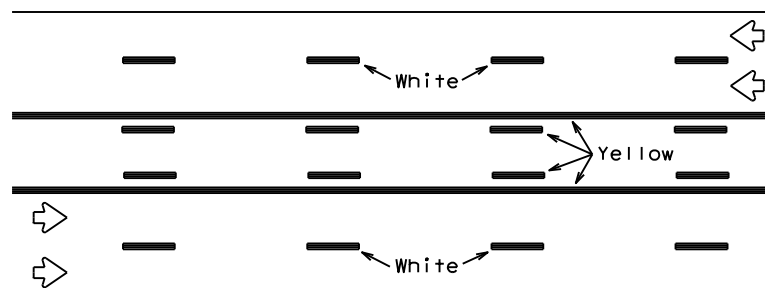
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



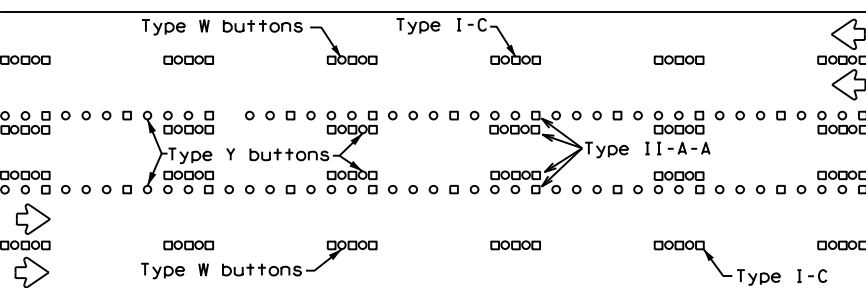
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

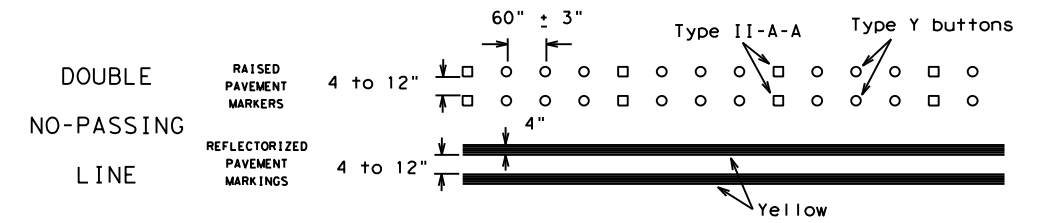
Prefabricated markings may be substituted for reflectorized pavement markings.



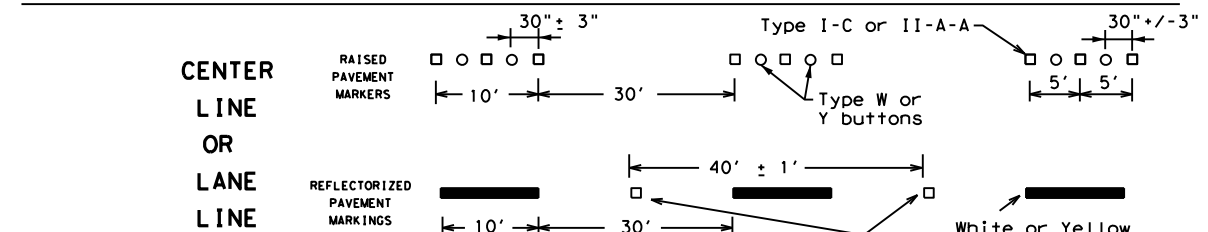
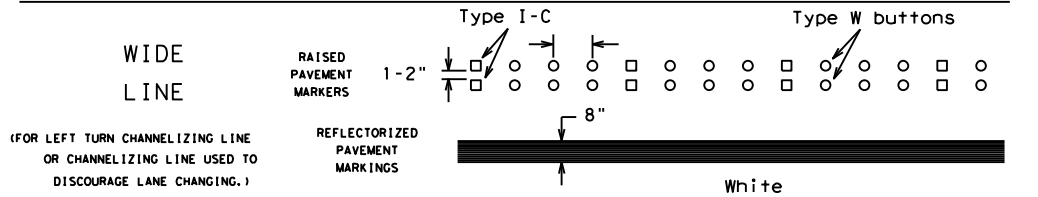
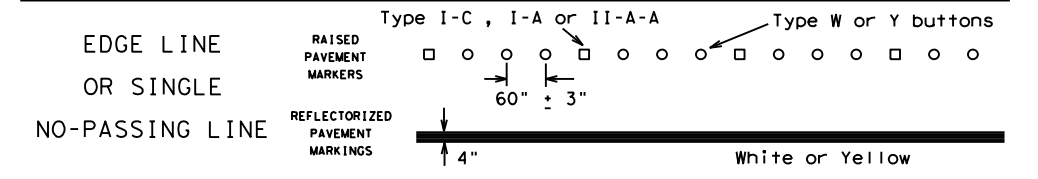
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

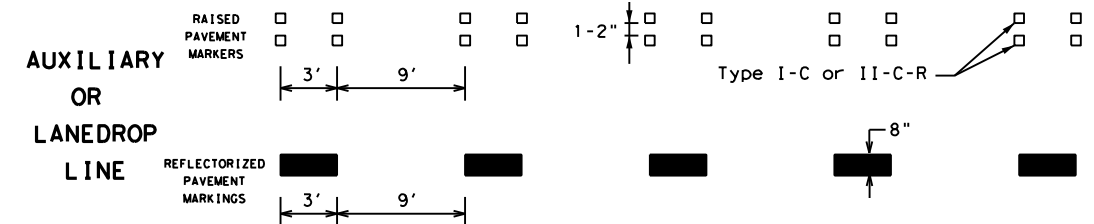
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

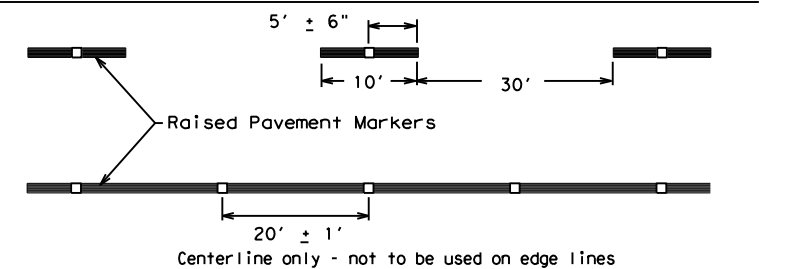


### BROKEN LINES



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

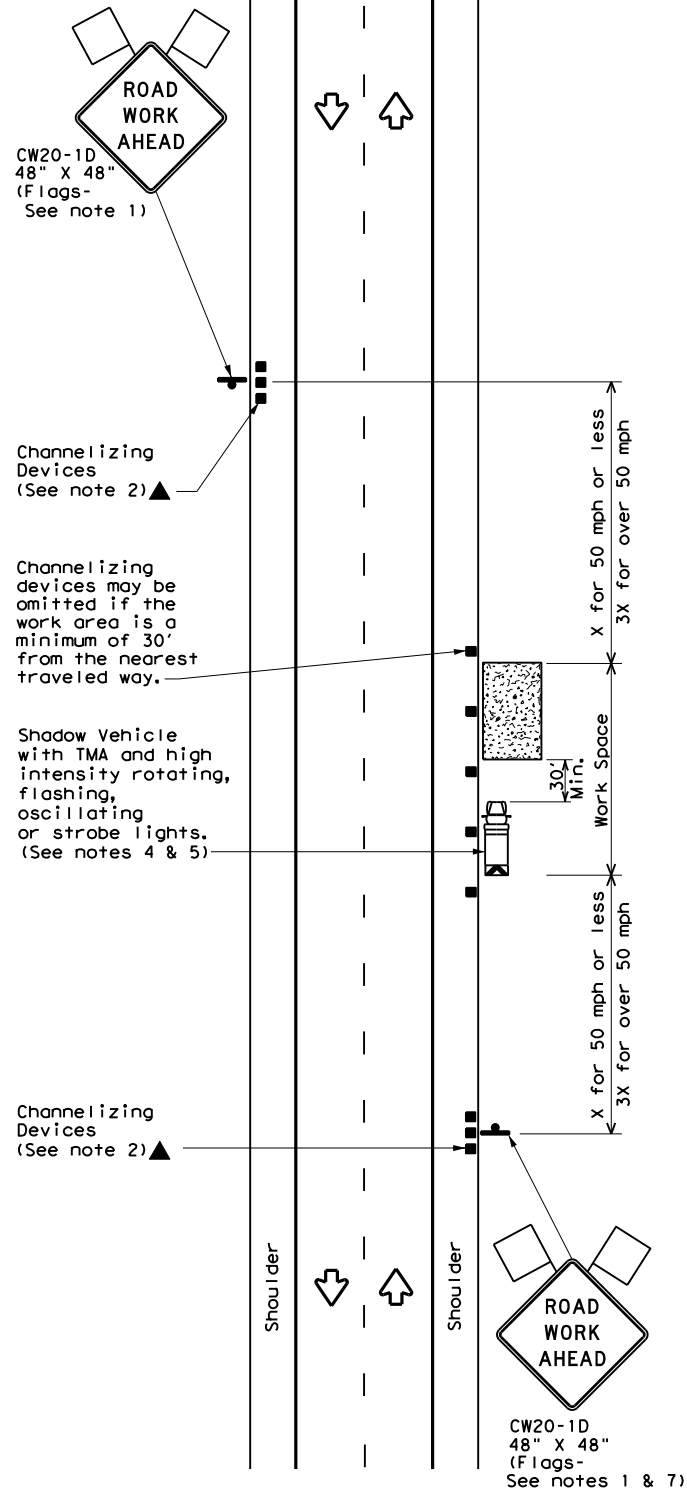
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	OO1	VARIOUS
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	SAT	BEXAR	22	
11-02 8-14				

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

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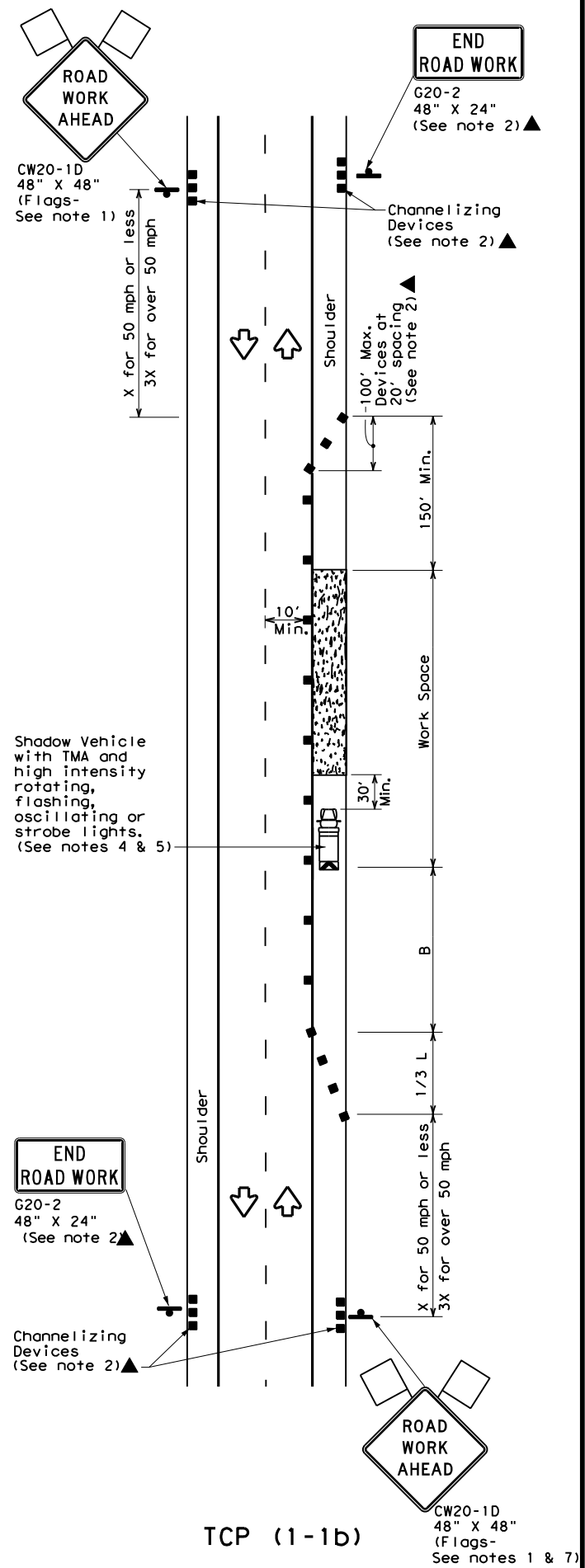
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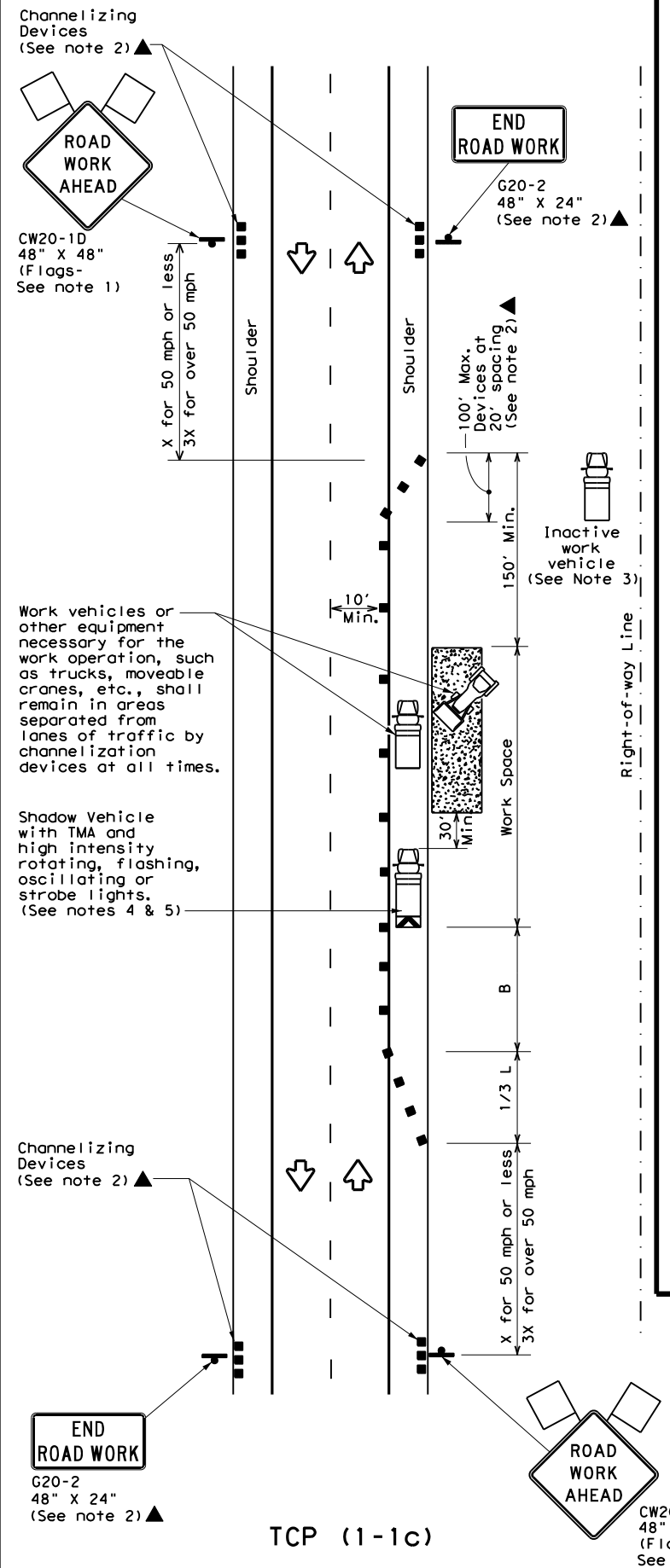
TCP (1-1a)

**WORK SPACE NEAR SHOULDER**  
Conventional Roads



TCP (1-1b)

**WORK SPACE ON SHOULDER**  
Conventional Roads



TCP (1-1c)

**WORK VEHICLES ON SHOULDER**  
Conventional Roads

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
  - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
  - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

**TRAFFIC CONTROL PLAN**  
**CONVENTIONAL ROAD**  
**SHOULDER WORK**

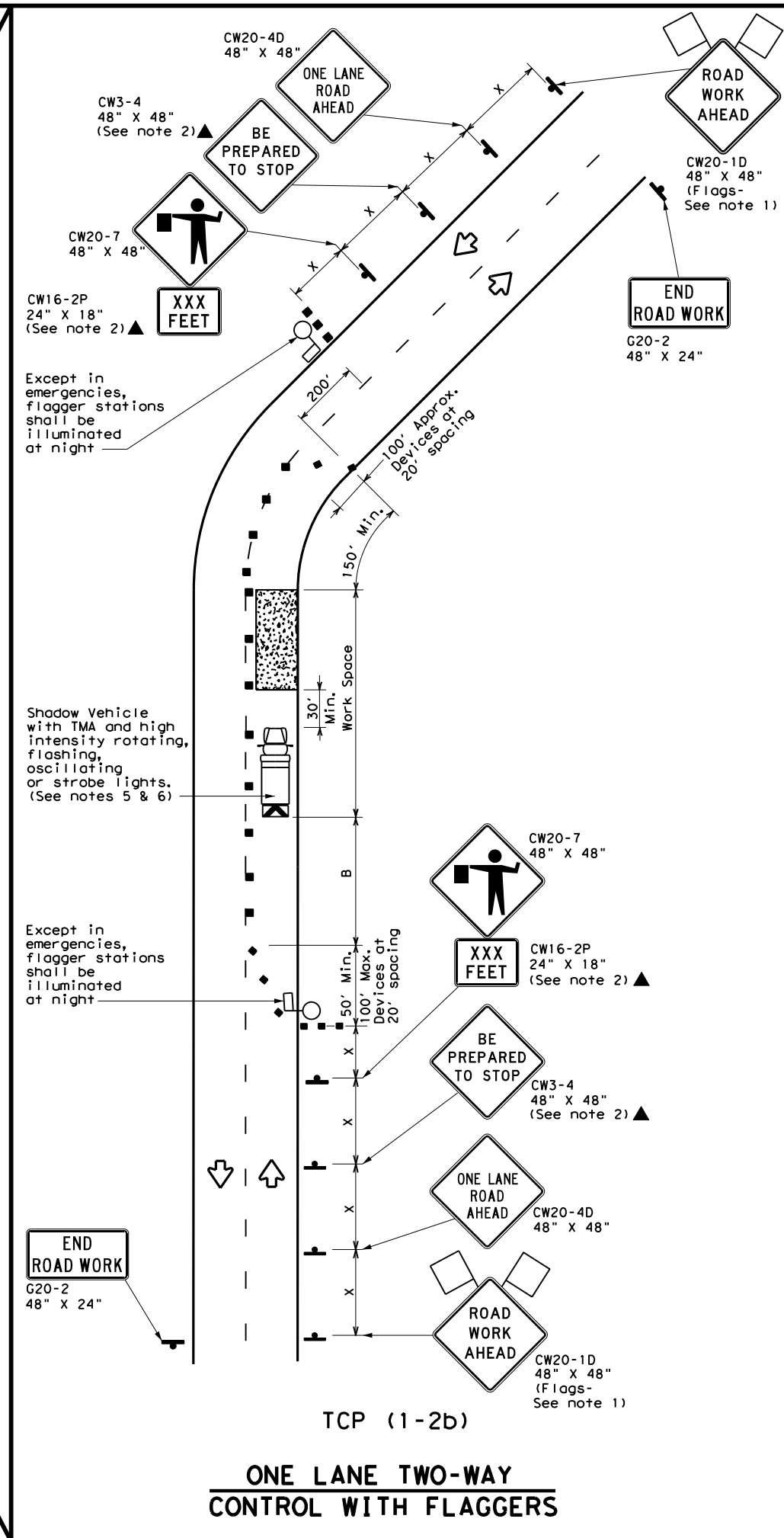
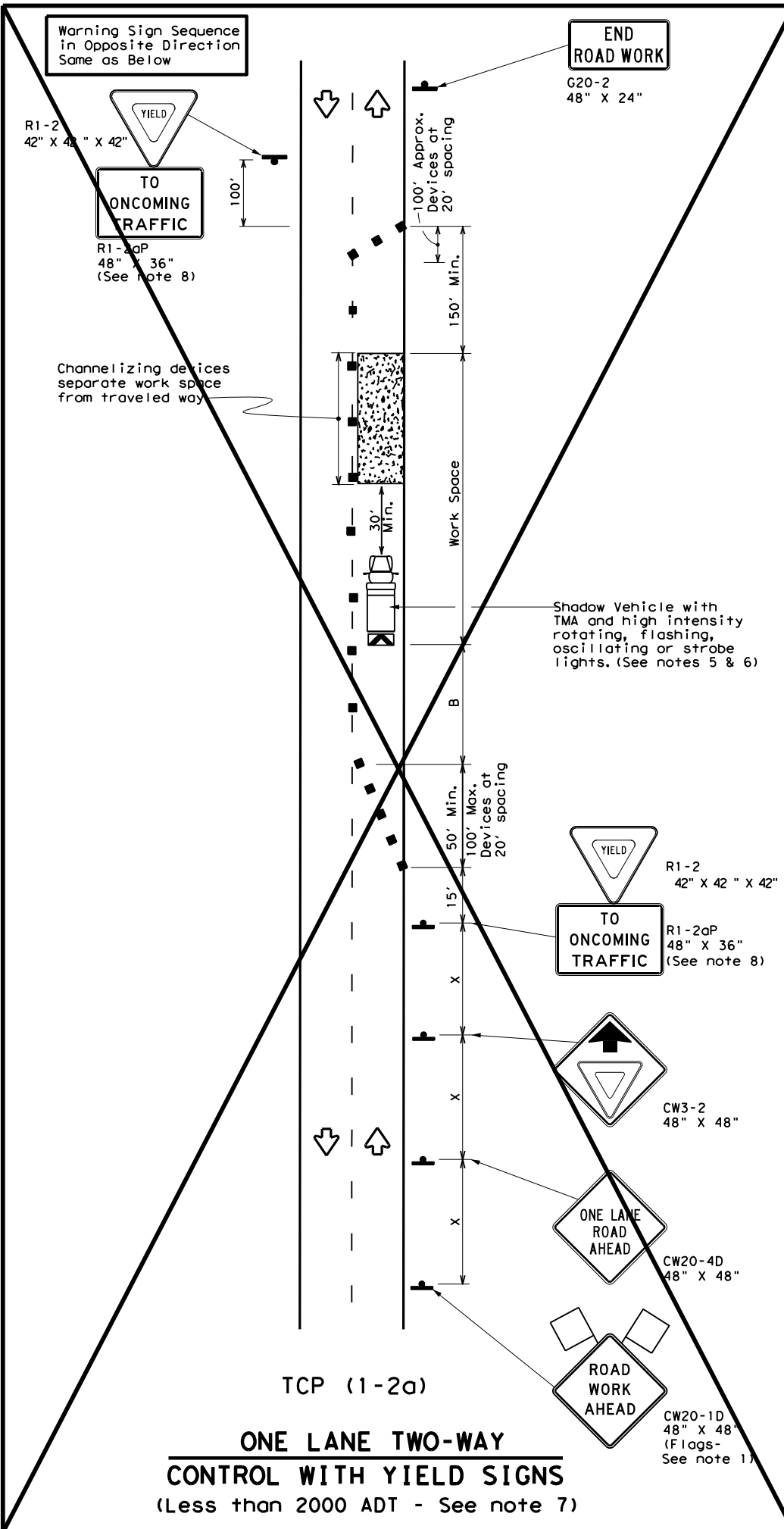
**TCP (1-1) - 18**

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	64	41	OOI	VARIOUS
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	SAT	BEXAR	23	
1-97 2-18				

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FILE:

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

Posted Speed * X	Formula L = WS <sup>2</sup> / 60	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

**GENERAL NOTES**

- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
  - Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
- ~~**TCP (1-2a)**~~
- R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
  - R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.
- ~~**TCP (1-2b)**~~
- Flaggers should use two-way radios or other methods of communication to control traffic.
  - Length of work space should be based on the ability of flaggers to communicate.
  - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
  - Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
  - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN**  
**ONE-LANE TWO-WAY**  
**TRAFFIC CONTROL**

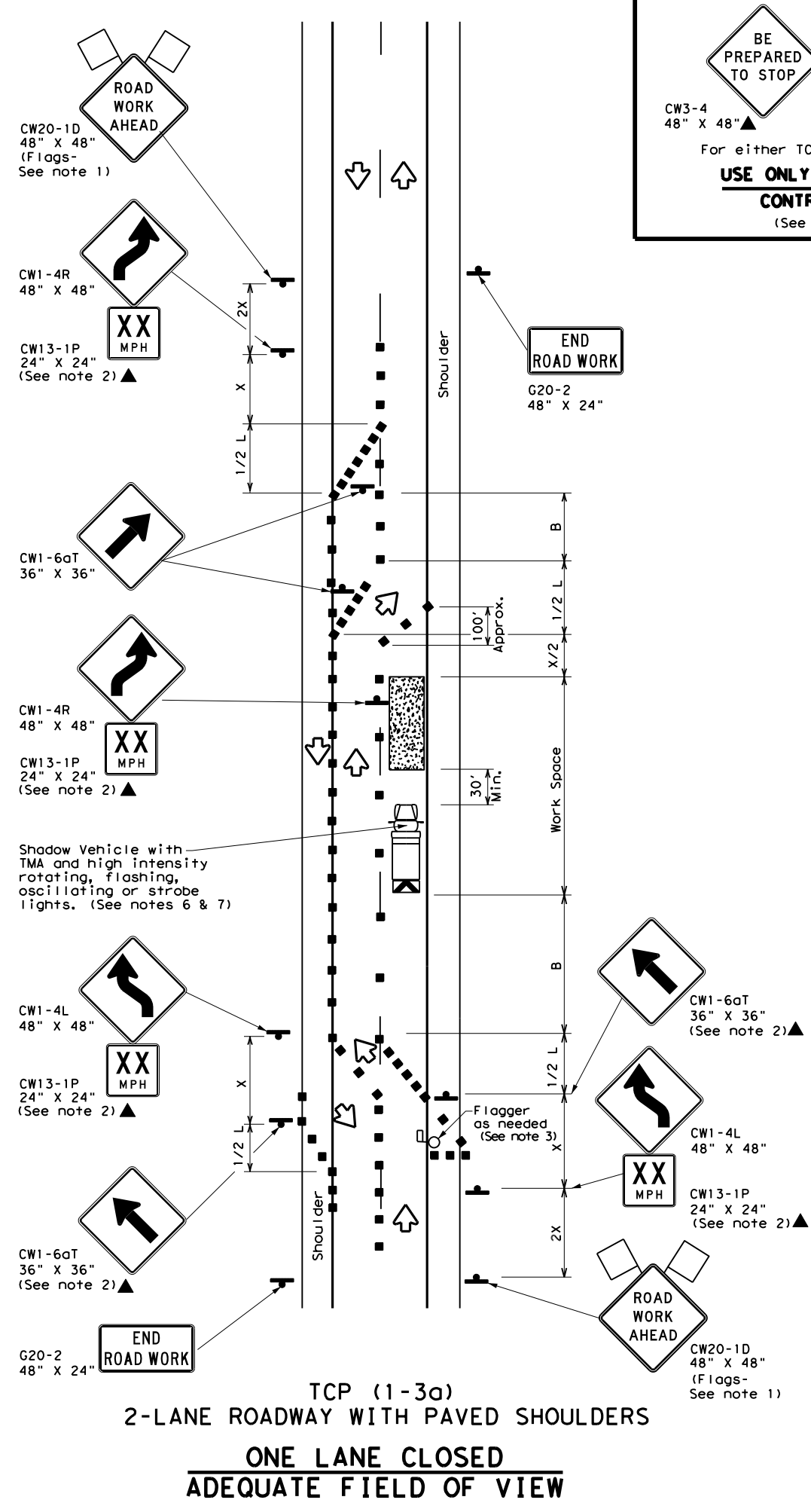
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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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4-90 4-98	DIST	COUNTY	SHEET NO.	
2-94 2-12	SAT	BEXAR	24	
1-97 2-18				

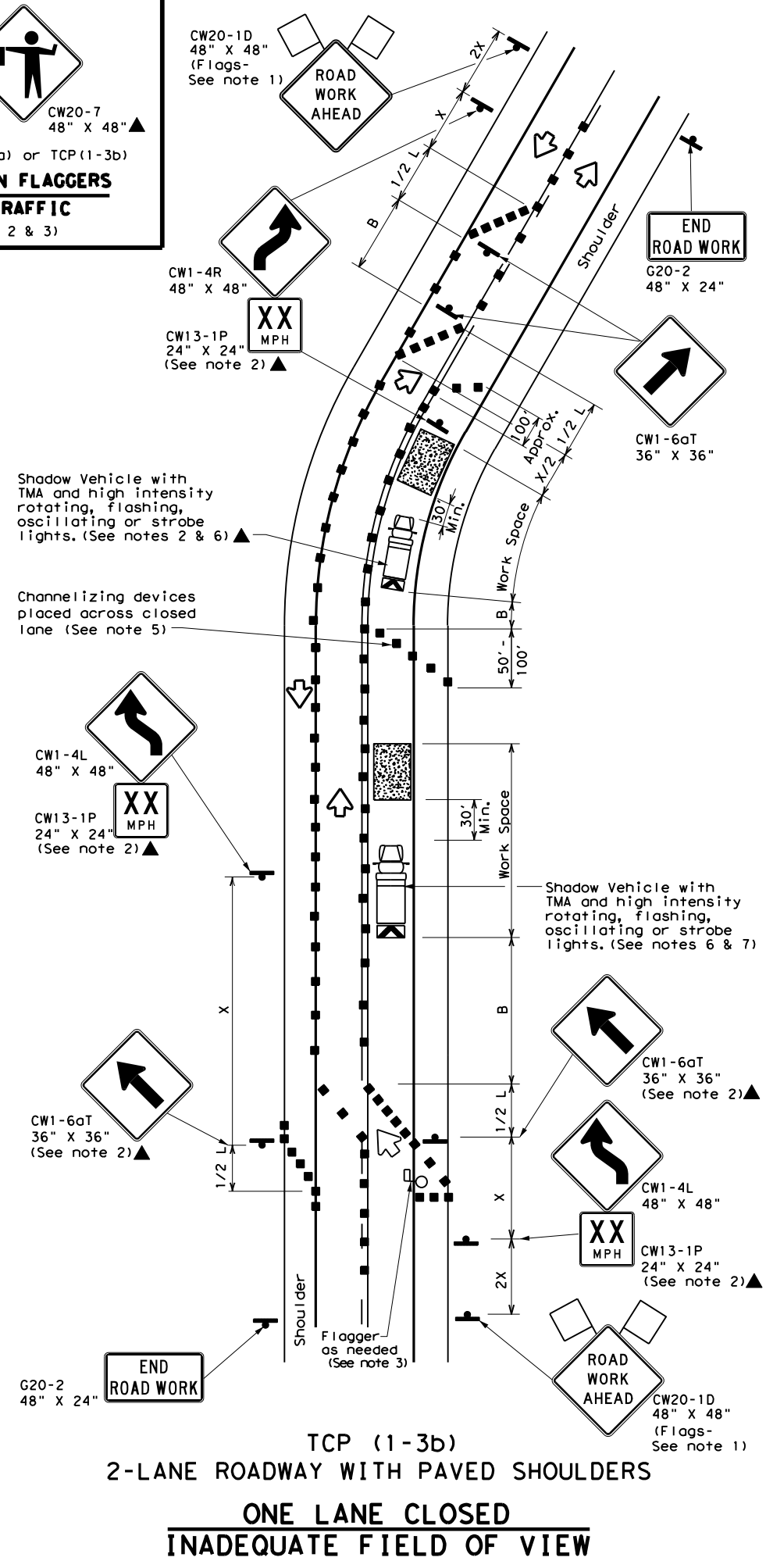
152

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BE PREPARED TO STOP  
CW3-4 48" X 48"▲  
CW20-7 48" X 48"▲  
For either TCP(1-3a) or TCP(1-3b)  
**USE ONLY WHEN FLAGGERS CONTROL TRAFFIC**  
(See Notes 2 & 3)



**LEGEND**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

**TYPICAL USAGE**

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - 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.
  - DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
  - 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.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
  - 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.

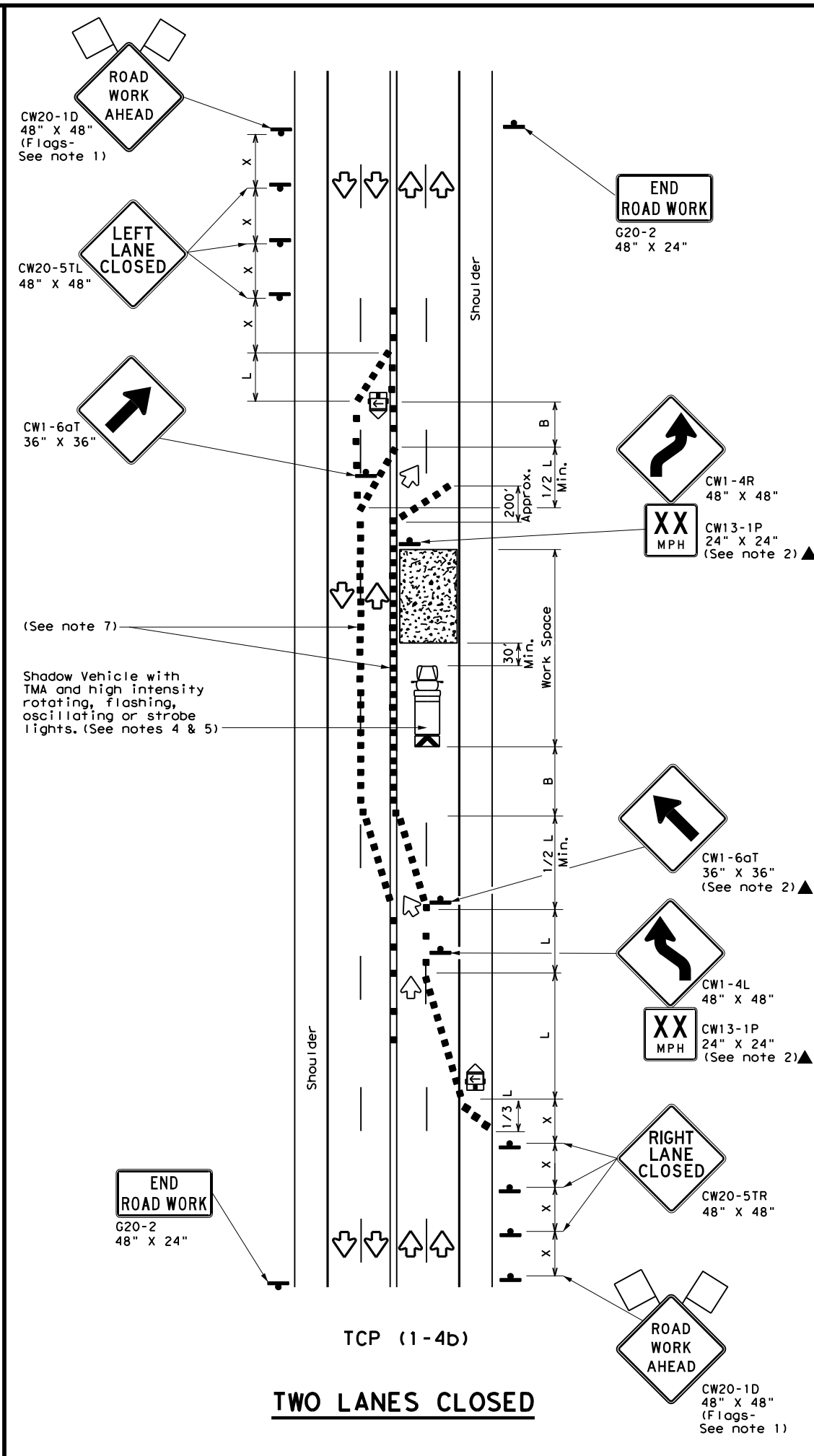
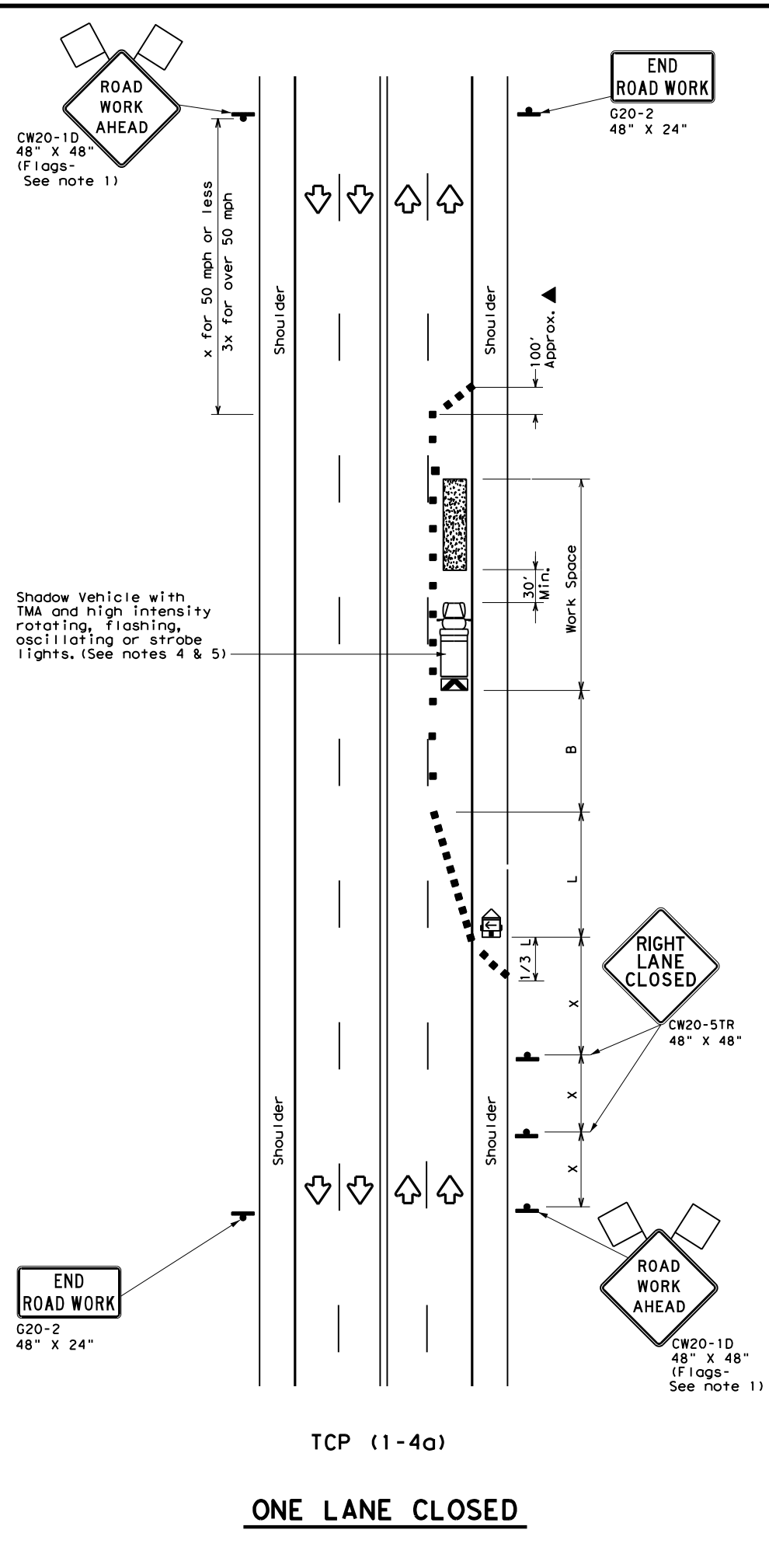
Texas Department of Transportation  
Traffic Operations Division Standard

**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	6411	41	001	VARIOUS
2-94 4-98				
8-95 2-12				
1-97 2-18	SAT		BEXAR	SHEET NO. 25

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DATE: FILE:



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

**TCP (1-4a)**

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

**TCP (1-4b)**

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

Texas Department of Transportation  
 Traffic Operations Division Standard

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

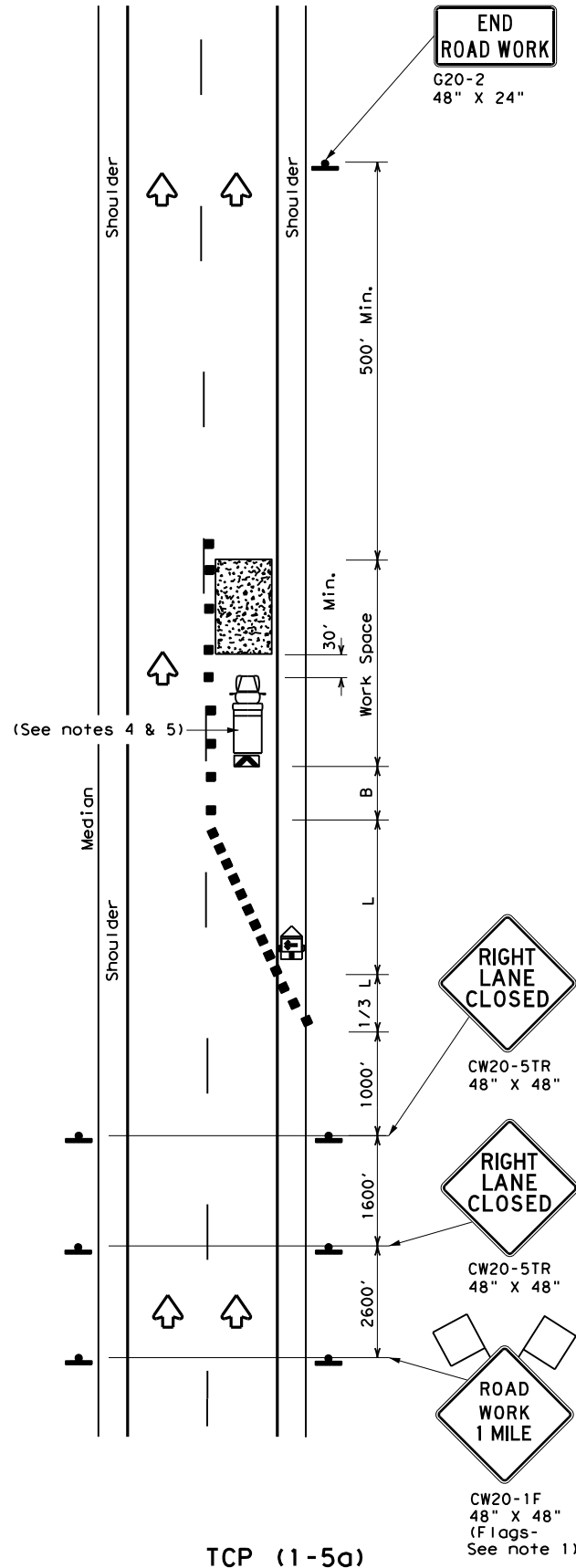
**TCP (1-4) - 18**

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© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS		6411	41	OO1	VARIOUS
2-94	4-98	DIST	COUNTY	SHEET NO.	
8-95	2-12	SAT	BEXAR	26	
1-97	2-18				

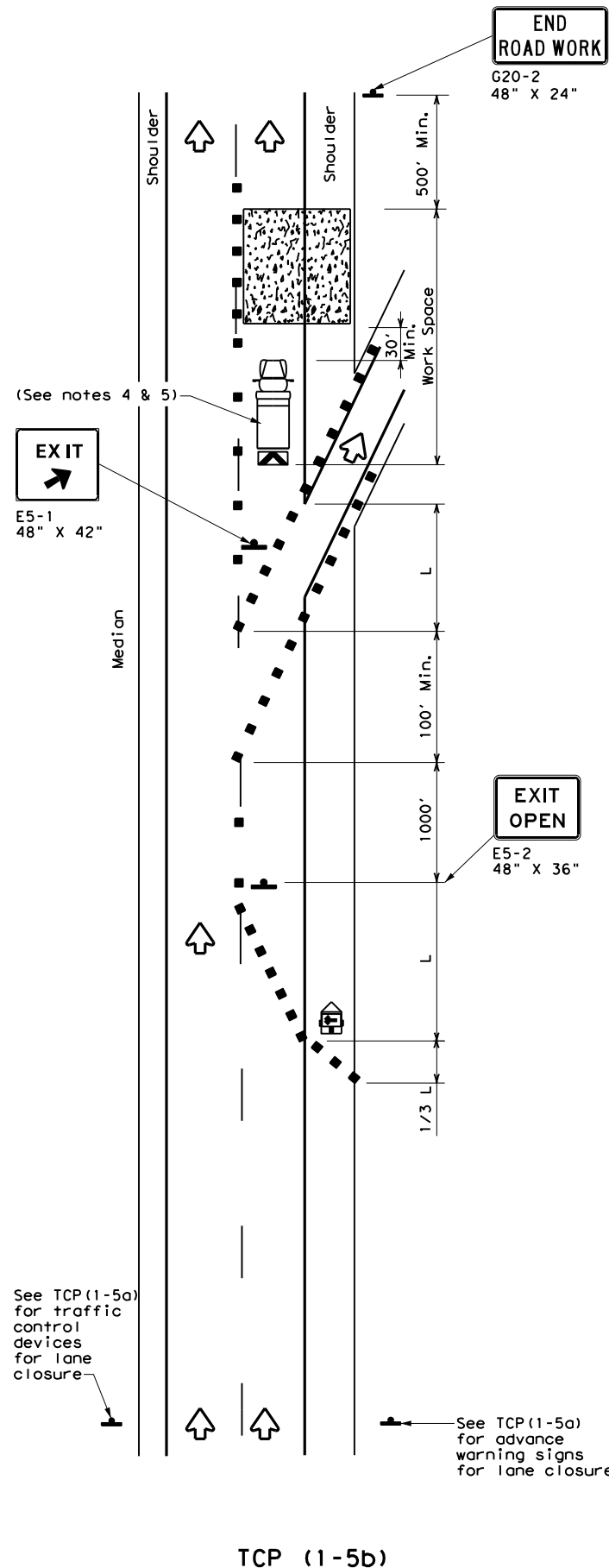
154

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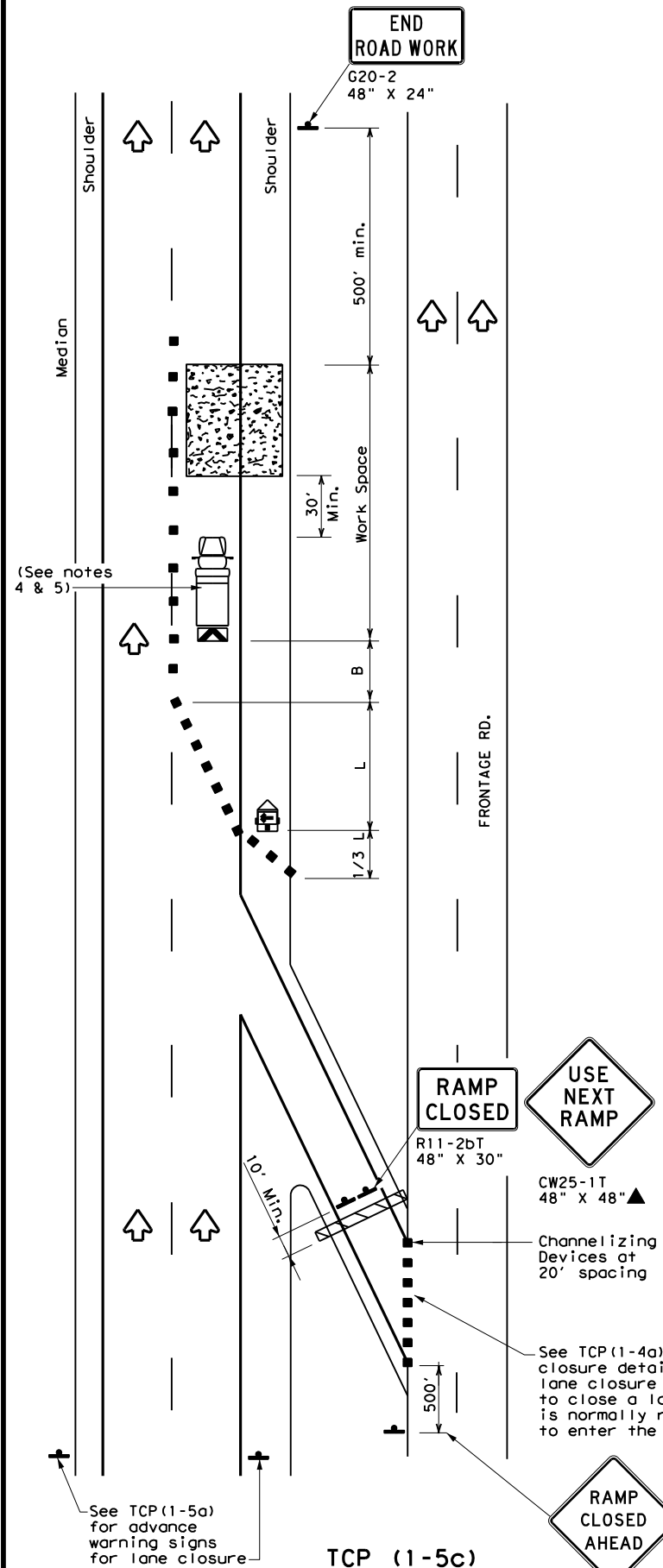
DATE:  
FILE:



**ONE LANE CLOSURE**



**LANE CLOSURE NEAR EXIT RAMP**



**LANE CLOSURE NEAR ENTRANCE RAMP**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
  - Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation  
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN  
 LANE CLOSURES FOR  
 DIVIDED HIGHWAYS**

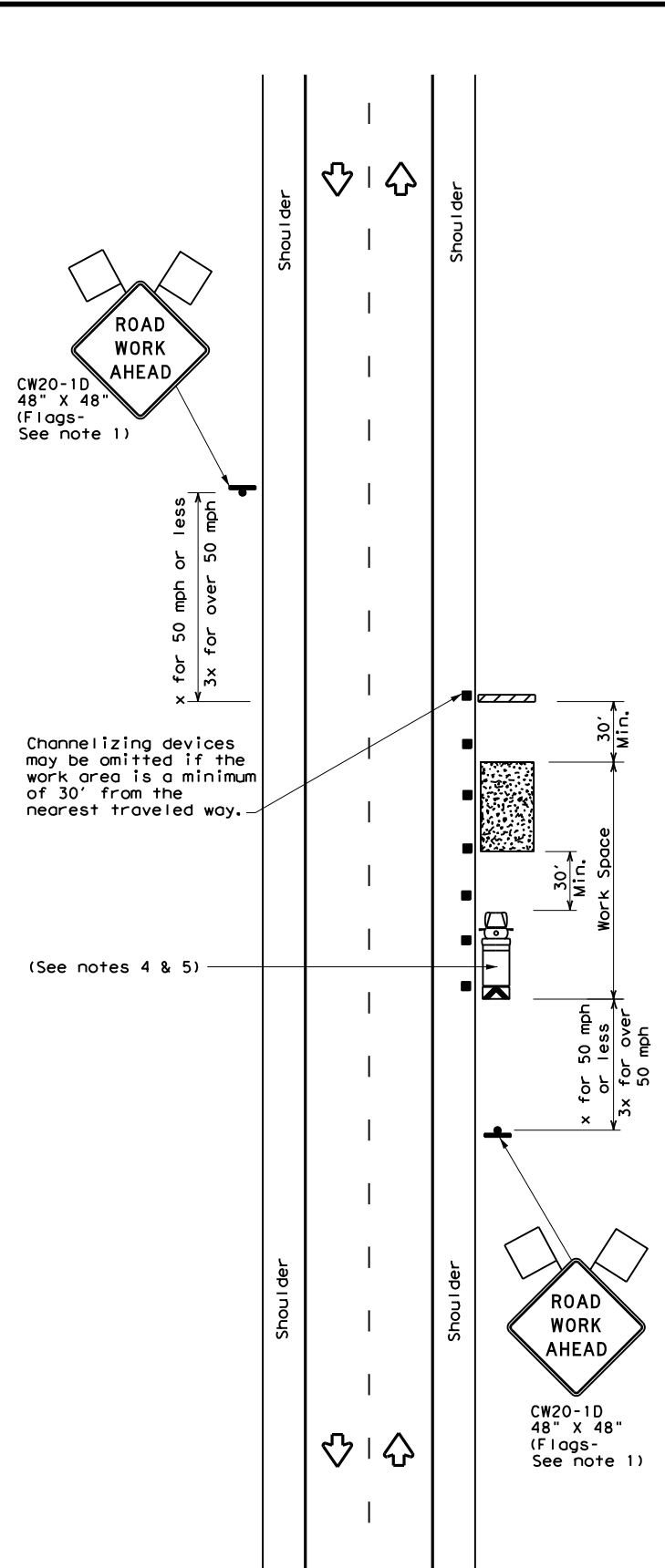
**TCP (1-5) - 18**

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY	SHEET NO.	
	SAT	BEXAR	27	



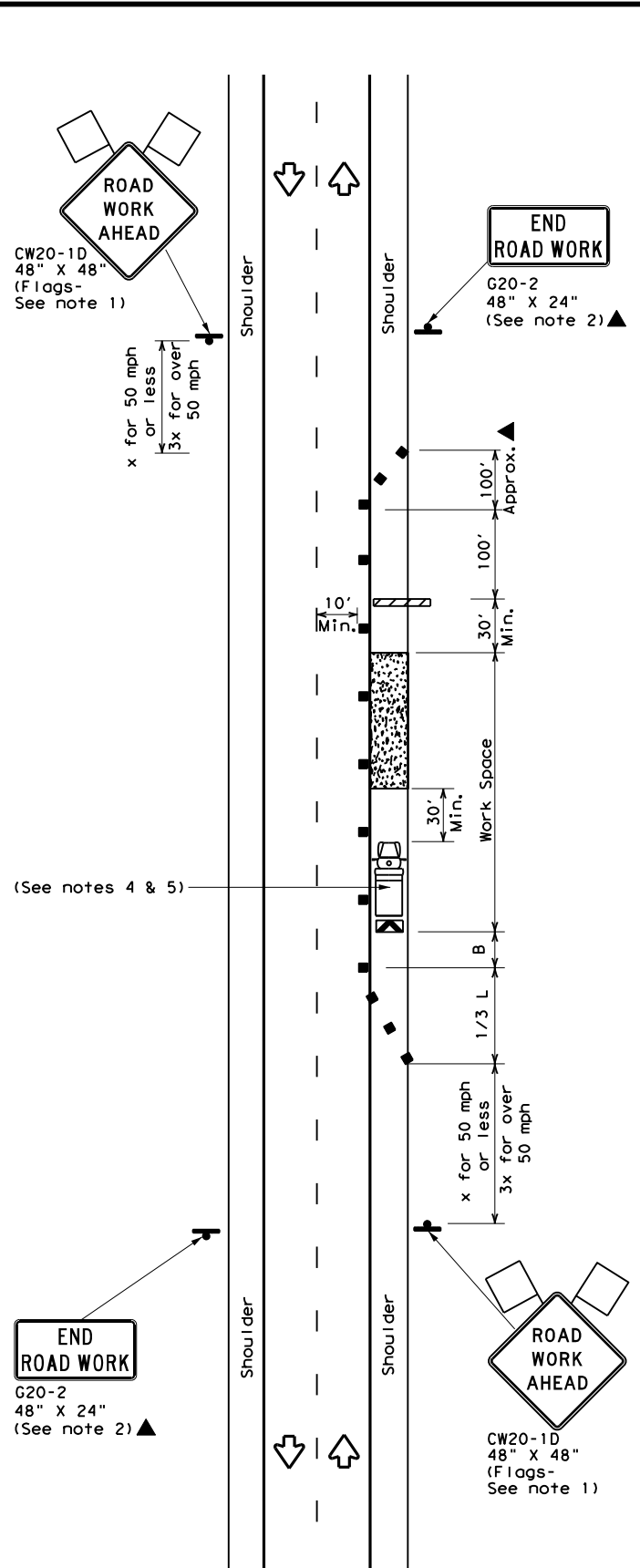
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DATE: FILE:



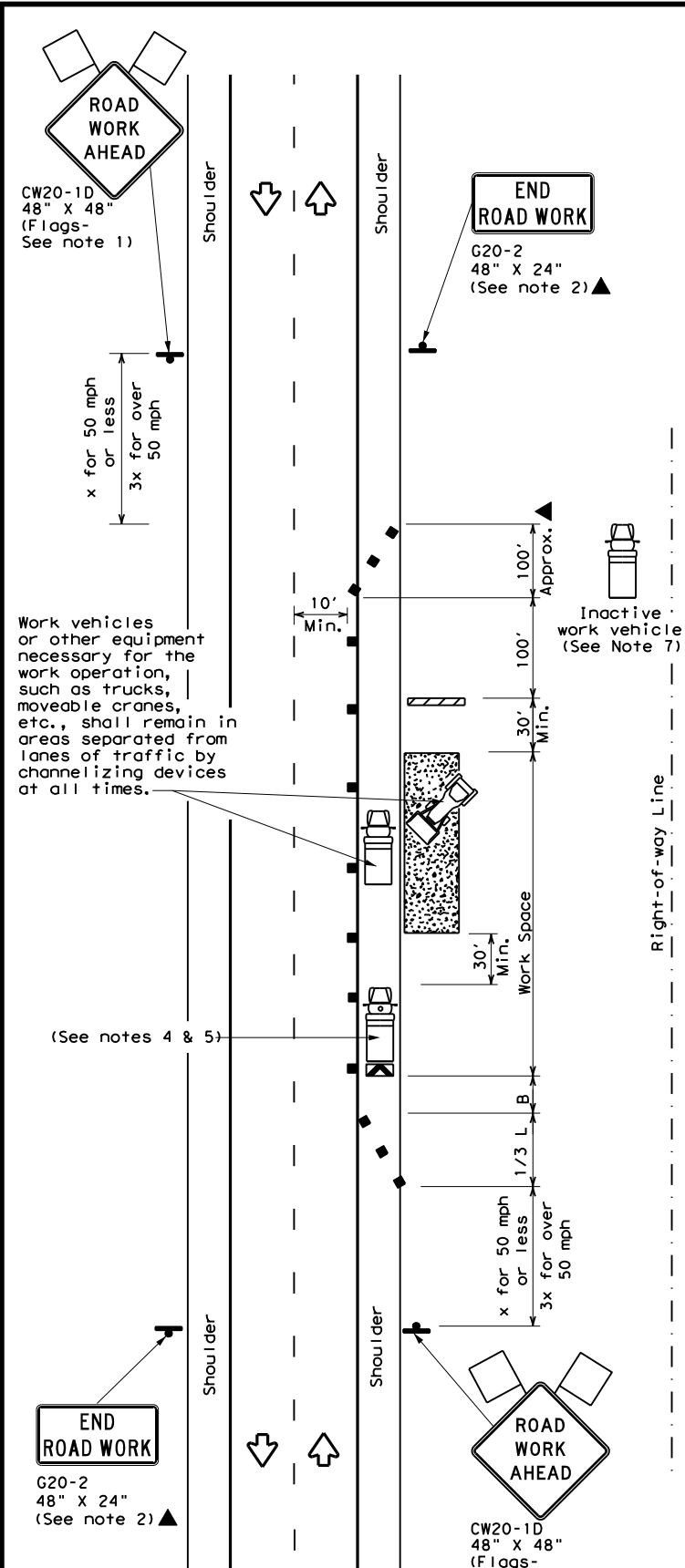
TCP (2-1a)

**WORK SPACE NEAR SHOULDER**  
Conventional Roads



TCP (2-1b)

**WORK SPACE ON SHOULDER**  
Conventional Roads



TCP (2-1c)

**WORK VEHICLES ON SHOULDER**  
Conventional Roads

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70	700'	770'	840'	70'	140'	800'	475'	
75	750'	825'	900'	75'	150'	900'	540'	

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

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

**GENERAL NOTES**

- Flags attached to signs where shown, are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
- Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
- Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
- Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
- CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

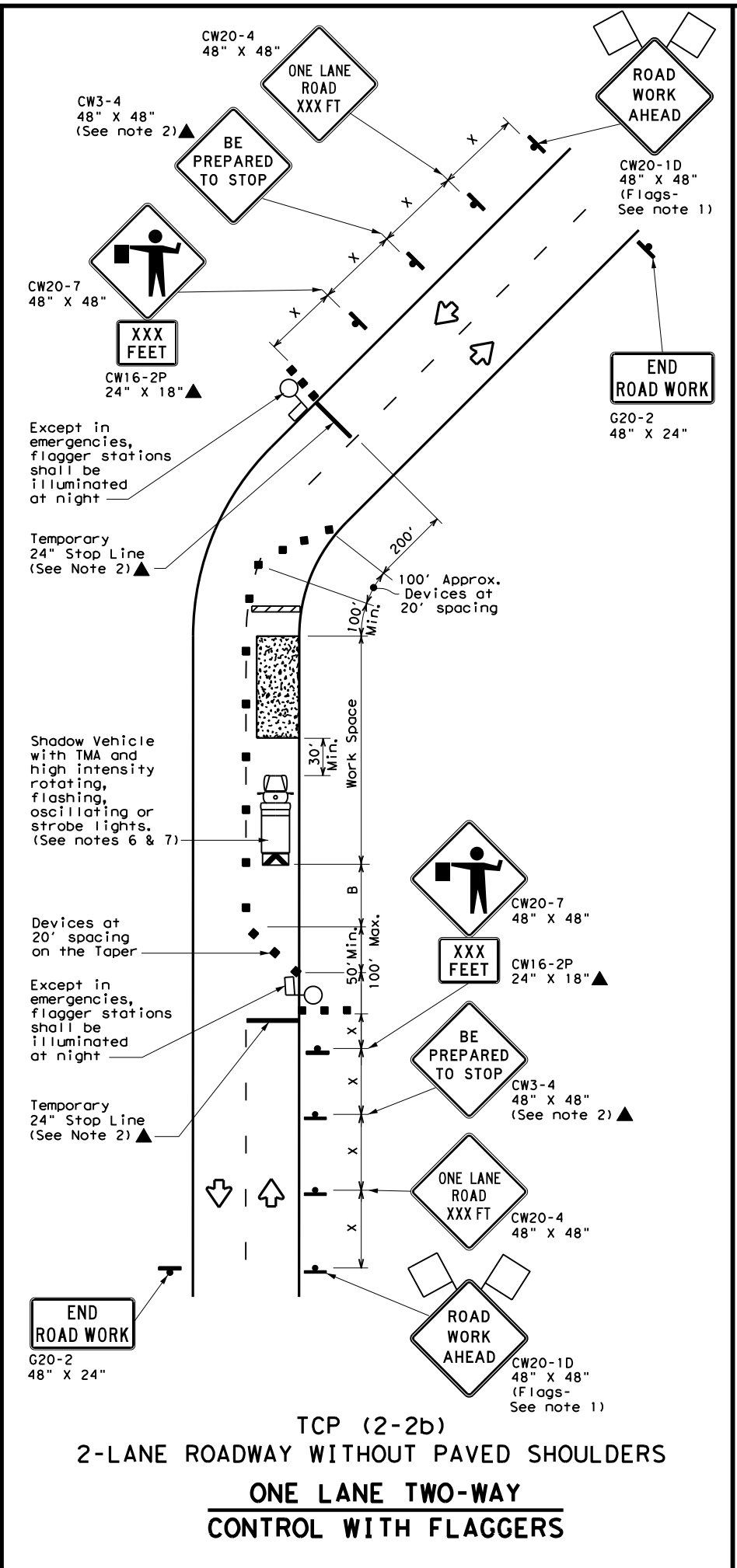
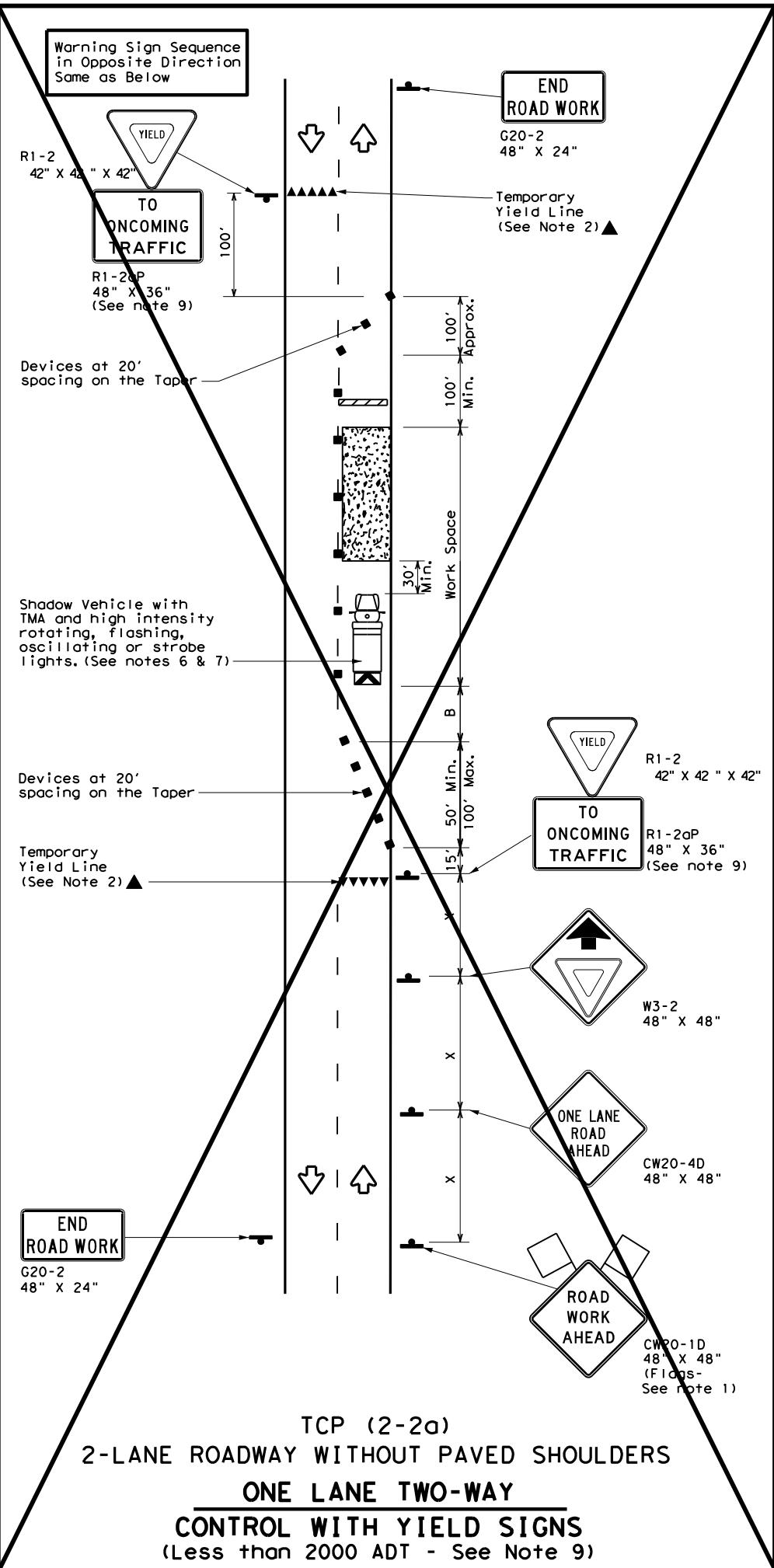


**TRAFFIC CONTROL PLAN**  
**CONVENTIONAL ROAD**  
**SHOULDER WORK**

**TCP (2-1) - 18**

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	SAT	BEXAR	28	
1-97 2-18				

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**LEGEND**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

**TYPICAL USAGE**

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

**GENERAL NOTES**

- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
  - Flaggers should use two-way radios or other methods of communication to control traffic.
  - Length of work space should be based on the ability of flaggers to communicate.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- ~~TCP (2-2a)~~
- The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
  - The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.
- TCP (2-2b)
- Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
  - If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
  - Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation  
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN  
 ONE-LANE TWO-WAY  
 TRAFFIC CONTROL**

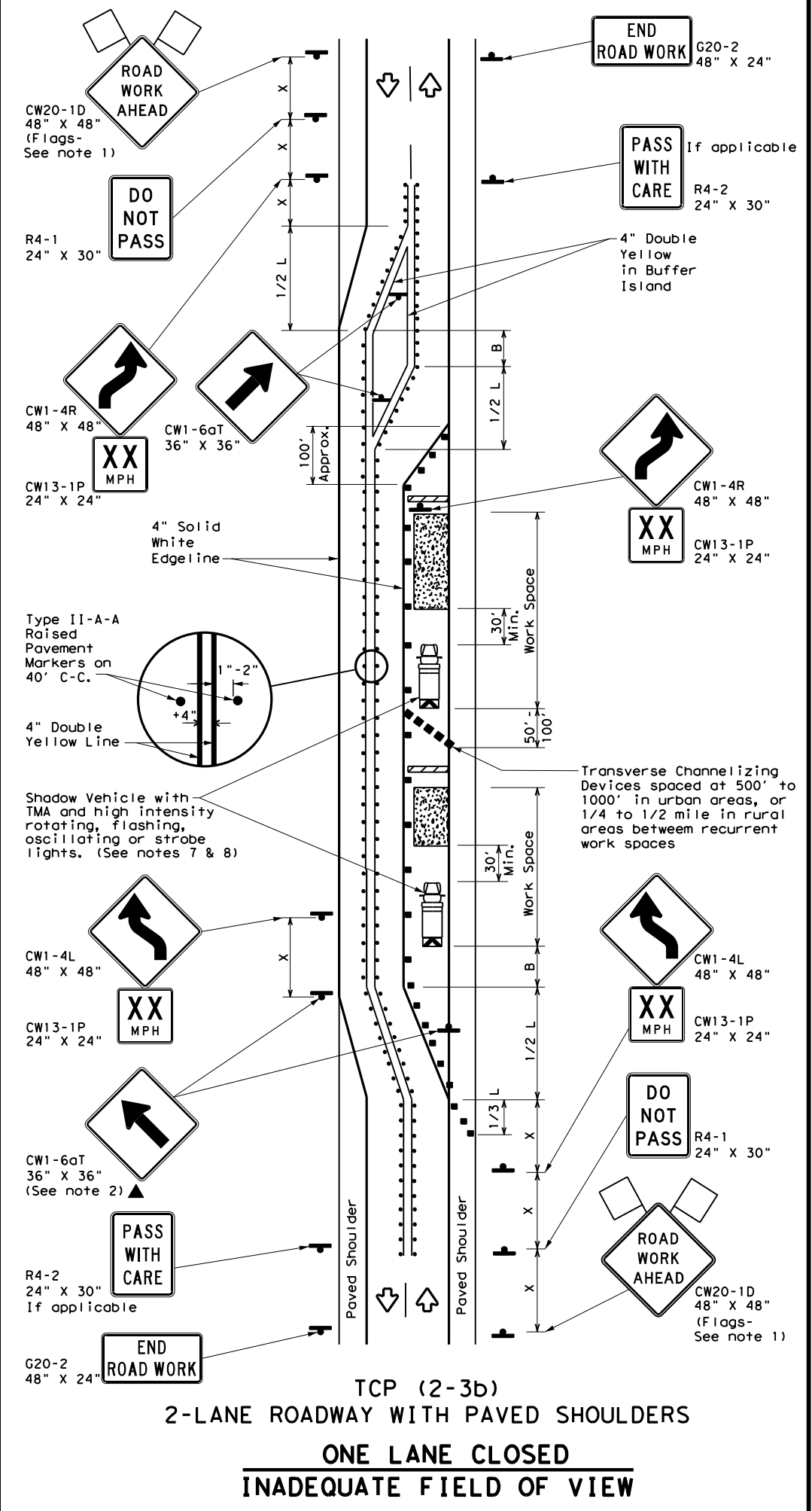
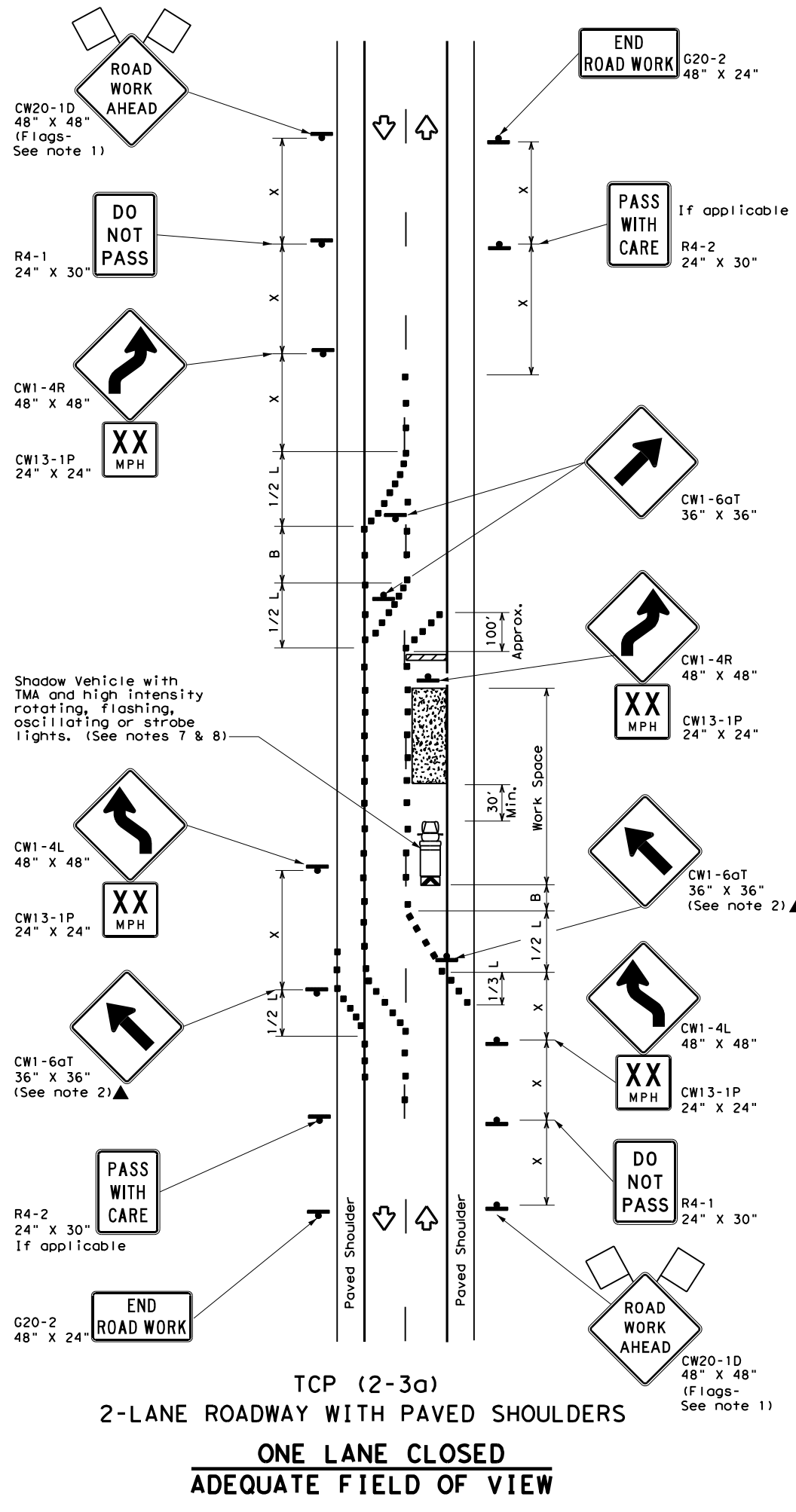
**TCP (2-2) - 18**

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	SAT	BEXAR	29	
4-98 2-18				

DATE:  
FILE:

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DATE: FILE:



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	70'	120'	90'
35		205'	225'	245'	35'	80'	160'	120'
40		265'	295'	320'	40'	90'	240'	155'
45	L = WS	450'	495'	540'	45'	100'	320'	195'
50		500'	550'	600'	50'	110'	400'	240'
55		550'	605'	660'	55'	120'	500'	295'
60		600'	660'	720'	60'	130'	600'	350'
65		650'	715'	780'	65'	140'	700'	410'
70		700'	770'	840'	70'	150'	800'	475'
75		750'	825'	900'	75'	160'	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
			✓	✓
				TCP (2-3b) ONLY

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
  - Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
  - The R4-1 "DO NOT PASS," R4-2 "PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
  - Conflicting pavement marking shall be removed for long term projects.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
- TCP (2-3a)**
- Conflicting pavement markings shall be removed for long-term projects. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter device spacing is intended for the area of the conflicting markings, not the entire work zone.

Traffic Operations Division Standard

**TEXAS DEPARTMENT OF TRANSPORTATION**

**TRAFFIC CONTROL PLAN**  
**TRAFFIC SHIFTS ON**  
**TWO-LANE ROADS**

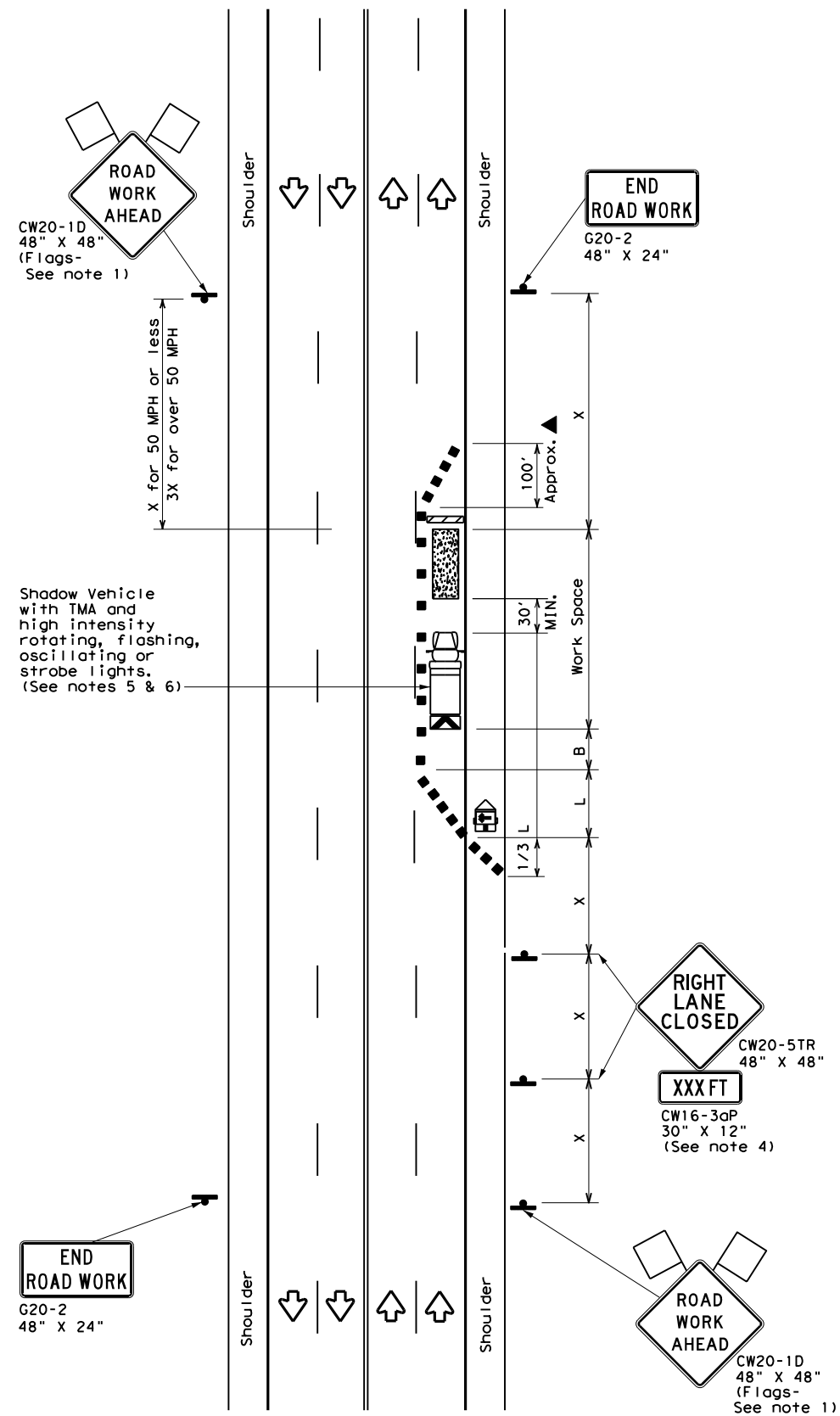
**TCP (2-3) - 18**

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© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS		6411	41	001	VARIOUS
8-95	3-03	DIST	COUNTY	SHEET NO.	
1-97	2-12	SAT	BEXAR	30	
4-98	2-18				

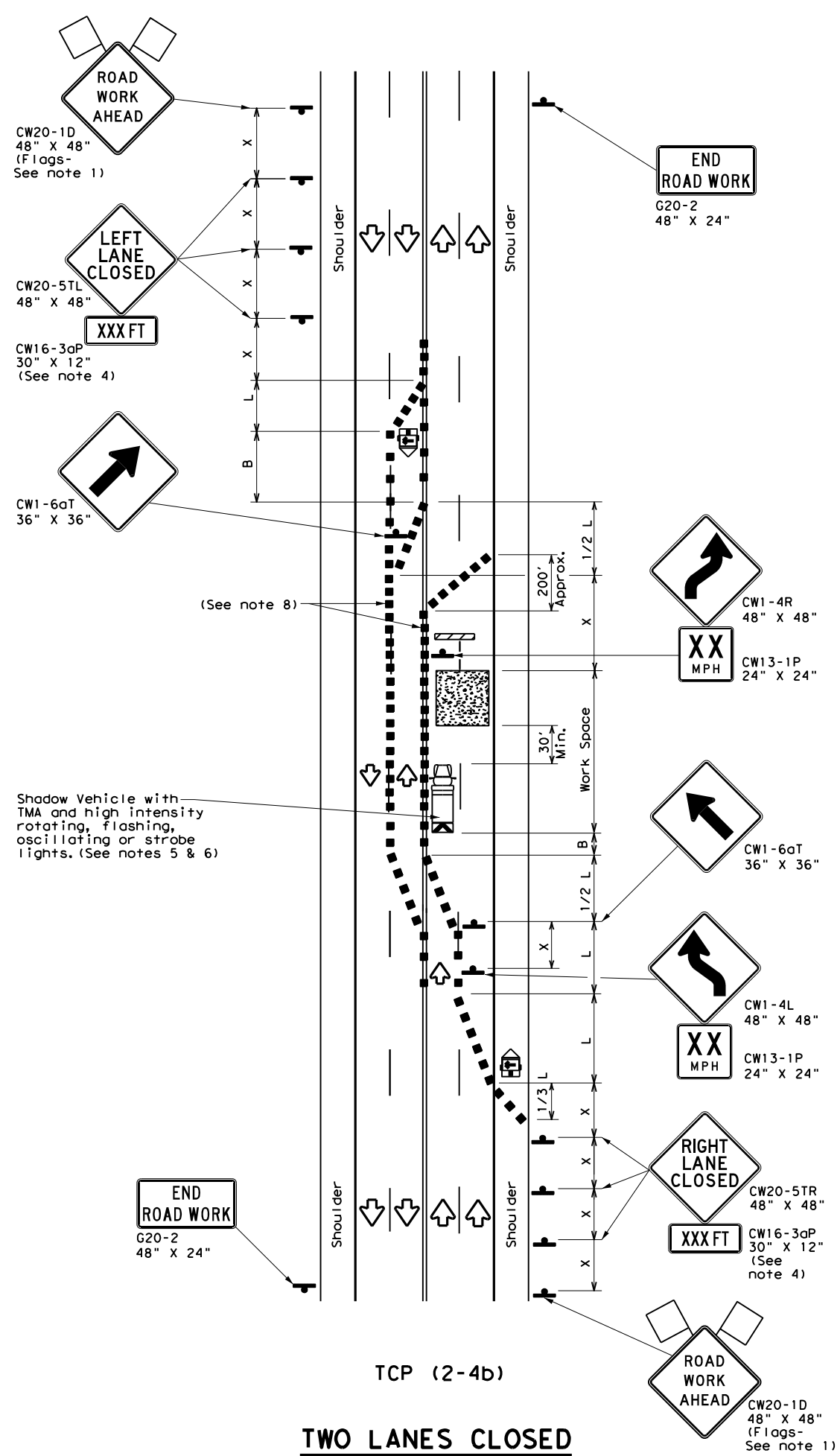
163

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DATE: FILE:



TCP (2-4a)  
**ONE LANE CLOSED**



TCP (2-4b)  
**TWO LANES CLOSED**

**LEGEND**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

**TYPICAL USAGE**

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

**GENERAL NOTES**

- Flags attached to signs where shown, are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
- For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

**TCP (2-4a)**

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

**TCP (2-4b)**

- For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(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.



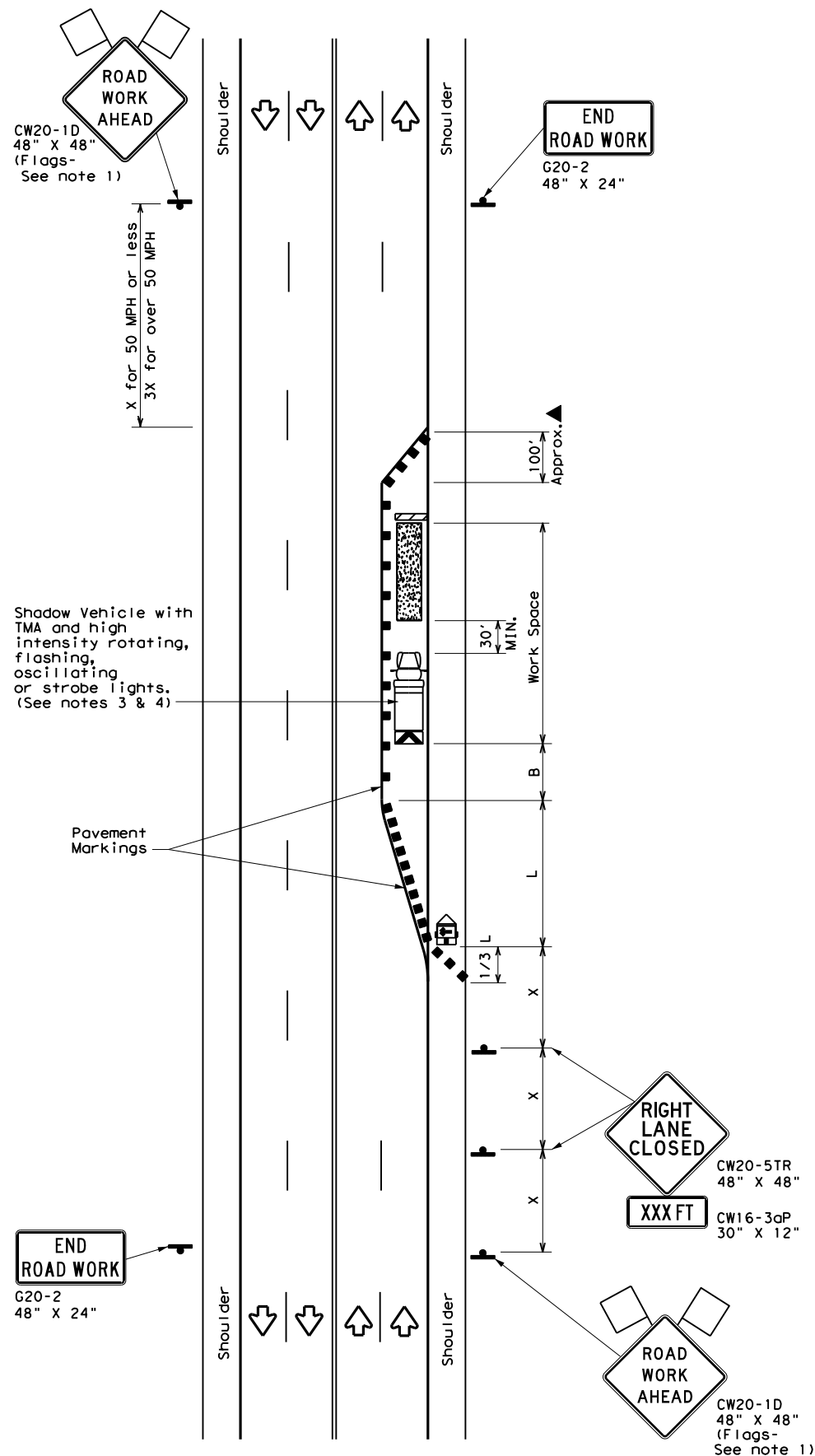
**TRAFFIC CONTROL PLAN  
LANE CLOSURES ON MULTILANE  
CONVENTIONAL ROADS**

**TCP (2-4) - 18**

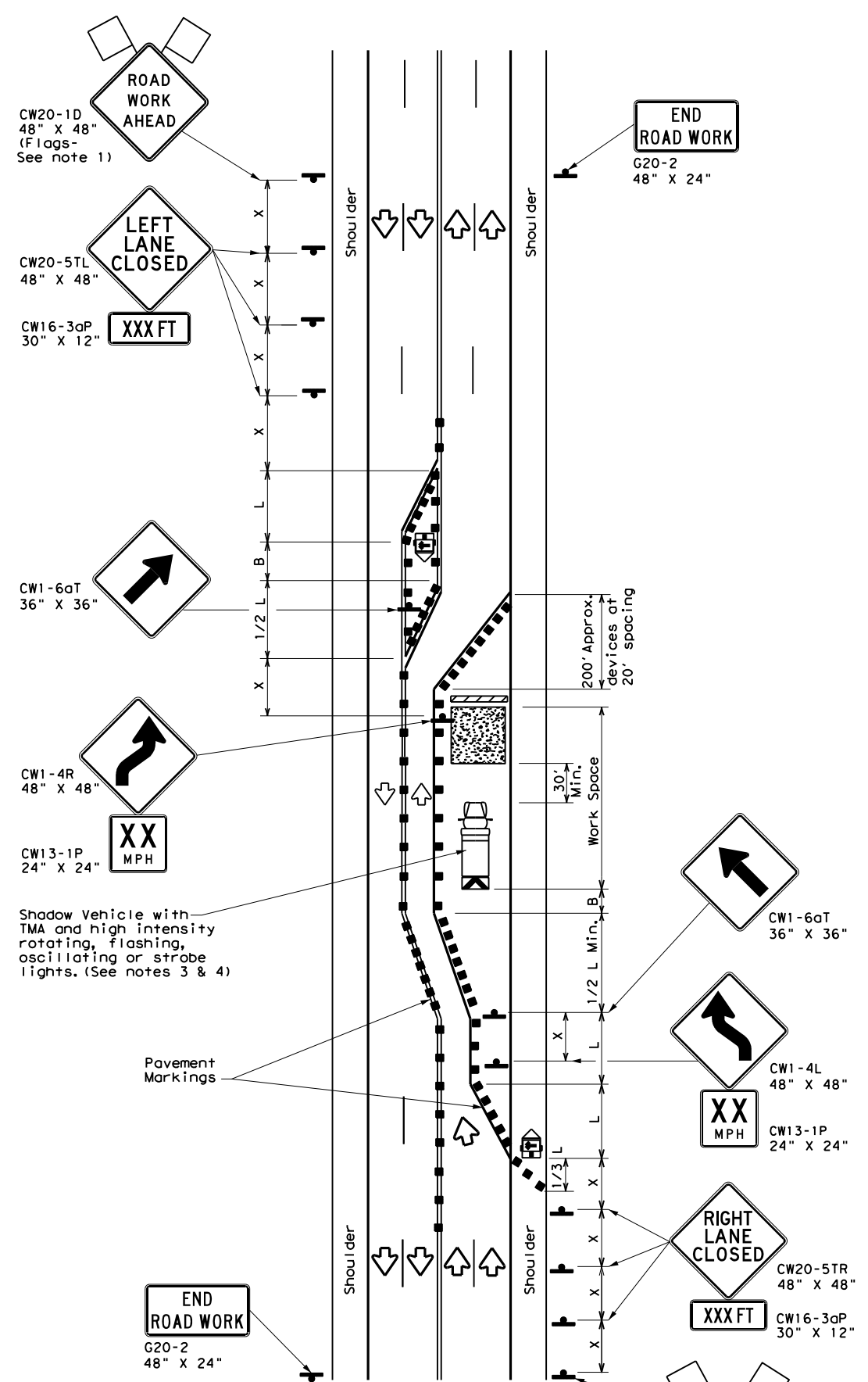
FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	OO1	VARIOUS
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	SAT	BEXAR	31	
4-98 2-18				

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DATE: FILE:



TCP (2-5a)  
**ONE LANE CLOSED**



TCP (2-5b)  
**TWO LANES CLOSED**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths X X			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
  - The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

**TCP (2-5a)**

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

**TCP (2-5b)**

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

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN  
 LONG TERM LANE CLOSURES  
 MULTILANE CONVENTIONAL RDS.

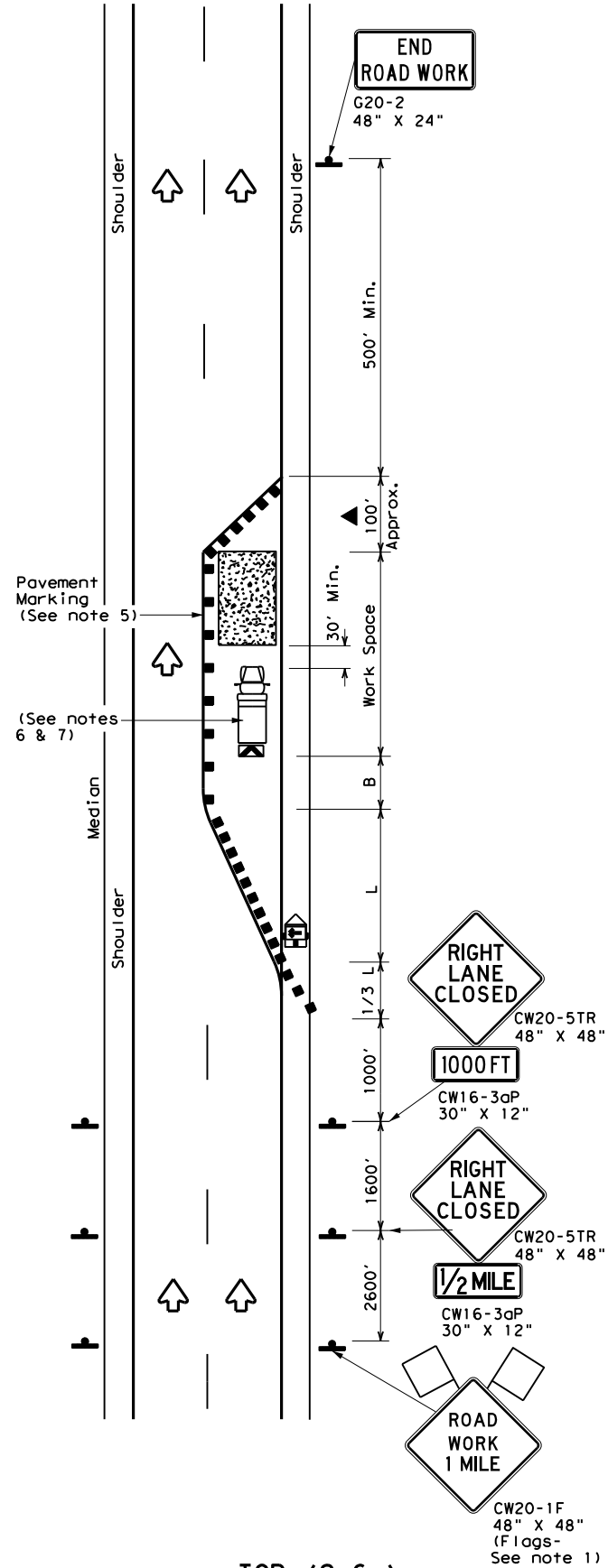
TCP (2-5) - 18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
8-95 2-12 REVISIONS	6411	41	001	VARIOUS
1-97 3-03	DIST	COUNTY	SHEET NO.	
4-98 2-18	SAT	BEXAR	32	

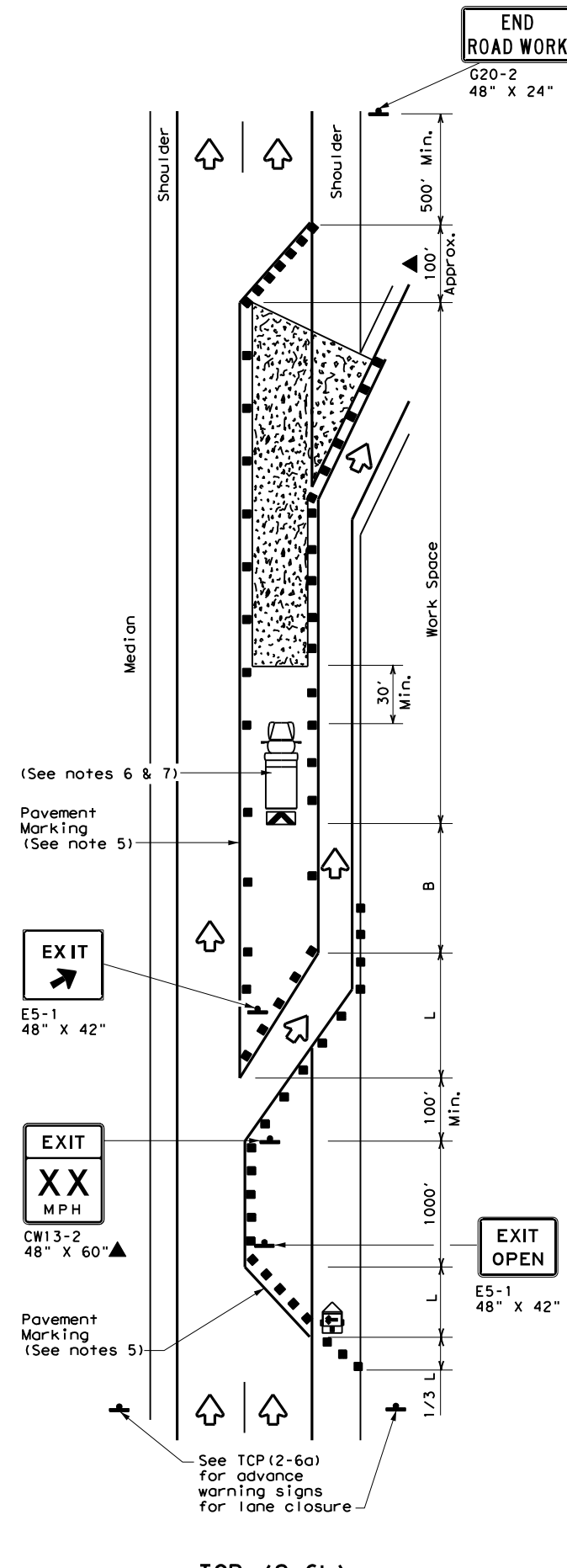
165

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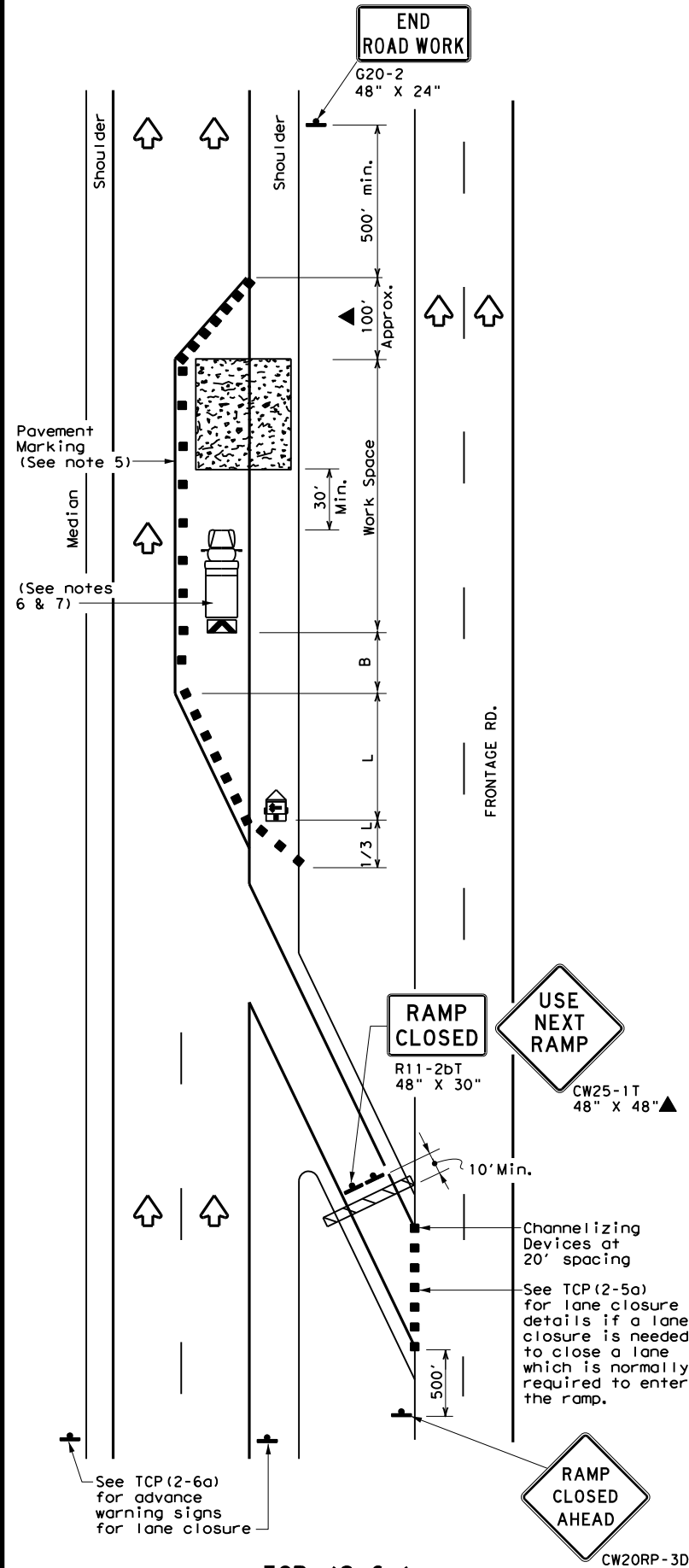
DATE: FILE:



TCP (2-6a)  
**ONE LANE CLOSURE**



TCP (2-6b)  
**LANE CLOSURE NEAR EXIT RAMP**



TCP (2-6c)  
**LANE CLOSURE NEAR ENTRANCE RAMP**

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

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

Texas Department of Transportation  
 Traffic Operations Division Standard

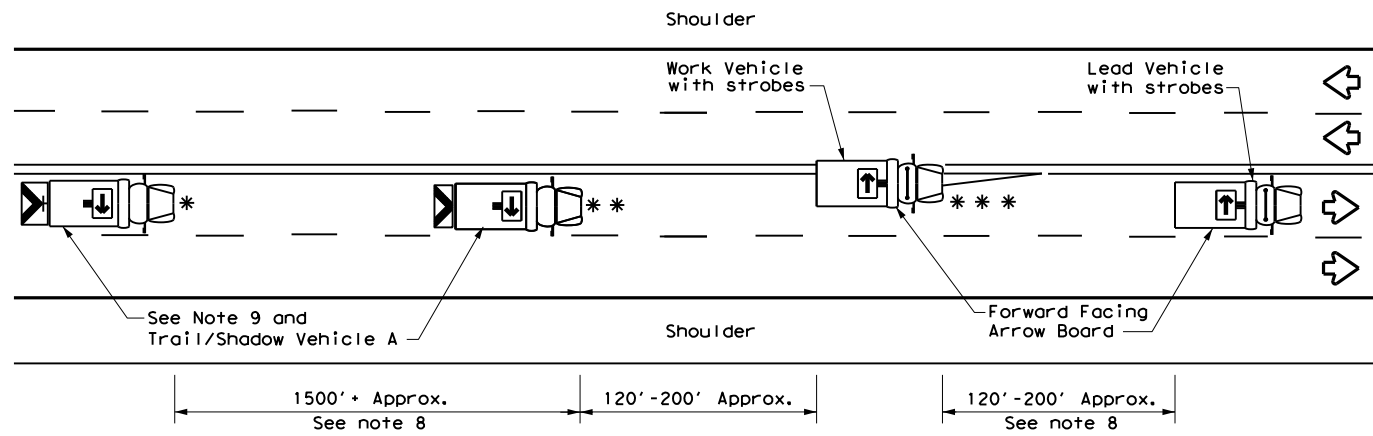
## TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

### TCP (2-6) - 18

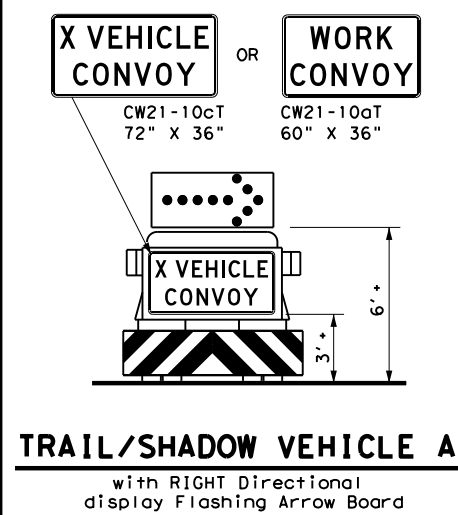
FILE: tcp2-6-18.dgn	DW: _____	CK: _____	DW: _____	CK: _____
© TxDOT December 1985	CONT: 64	SECT: 41	JOB: 001	HIGHWAY: VARIOUS
REVISIONS	DATE		BY	
2-94 4-98	8-95 2-12		1-97 2-18	
	DIST: SAT	COUNTY: BEXAR	SHEET NO.: 33	

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**TCP (3-1a)**  
**UNDIVIDED MULTILANE ROADWAY**



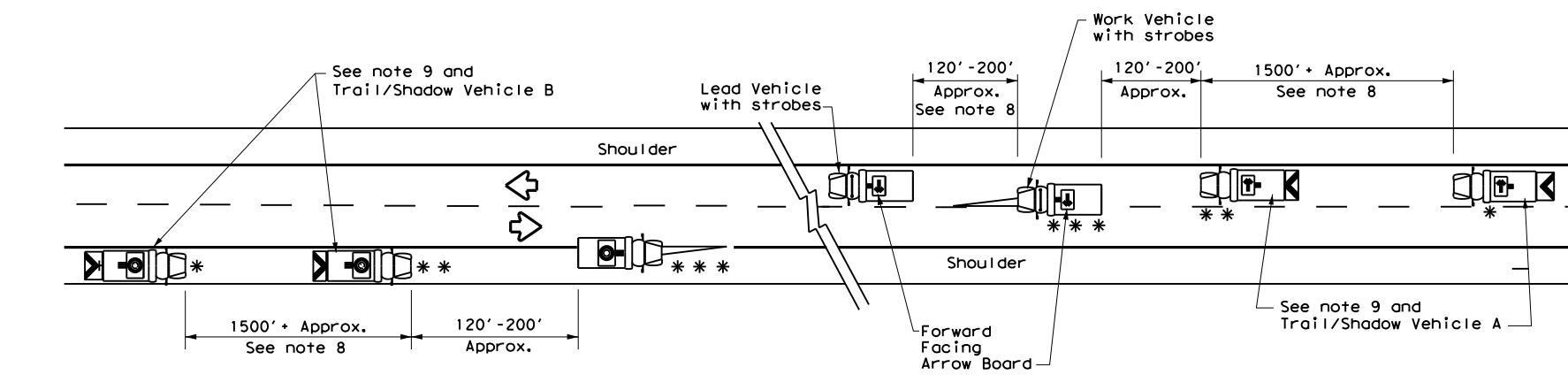
**TRAIL/SHADOW VEHICLE A**  
with RIGHT Directional display Flashing Arrow Board

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

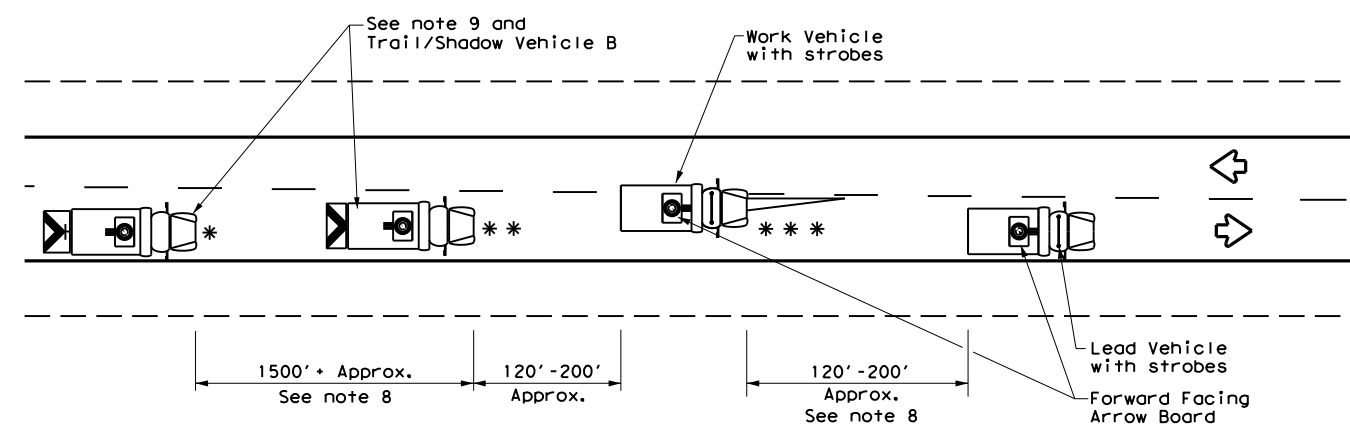
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**GENERAL NOTES**

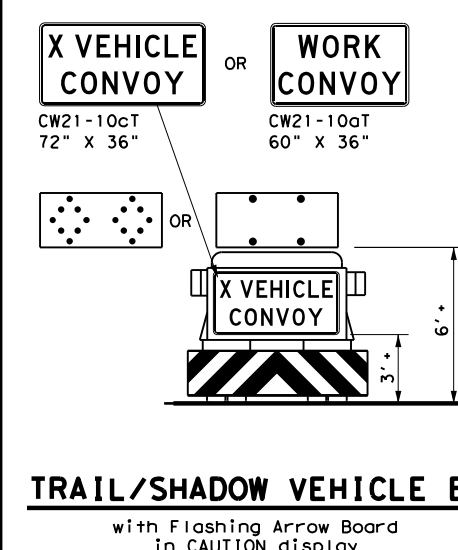
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic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



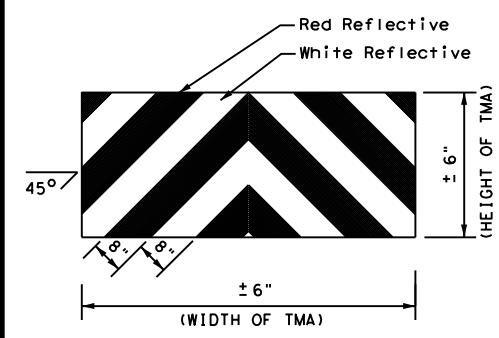
**TCP (3-1b)**  
**TWO-WAY ROADWAY WITH PAVED SHOULDERS**



**TCP (3-1c)**  
**TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS**



**TRAIL/SHADOW VEHICLE B**  
with Flashing Arrow Board in CAUTION display



**STRIPING FOR TMA**

**TRAFFIC CONTROL PLAN  
MOBILE OPERATIONS  
UNDIVIDED HIGHWAYS**

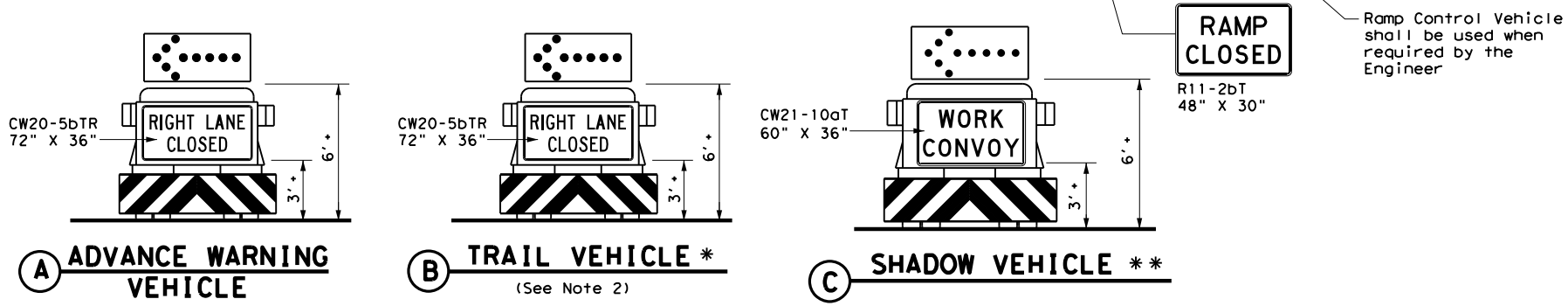
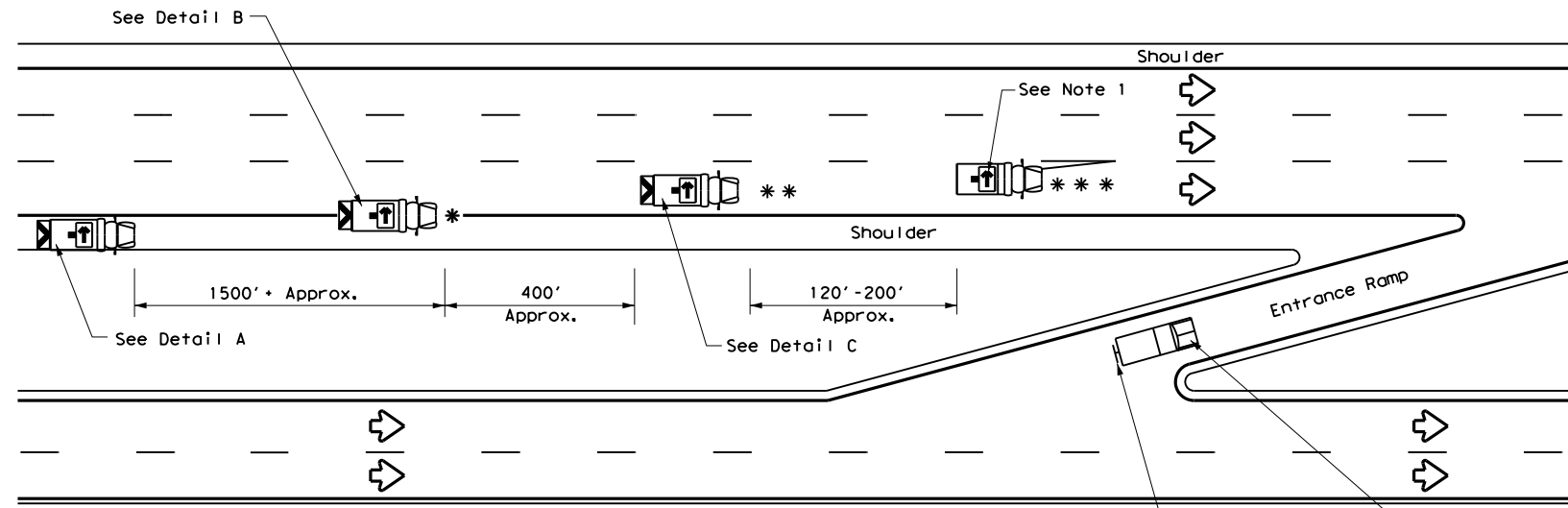
**TCP (3-1) - 13**

FILE:	tcp3-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY				
REVISIONS		6411	41	OO1	VARIOUS				
2-94	4-98	DIST	COUNTY	SHEET NO.					
8-95	7-13	SAT	BEXAR	34					
1-97									

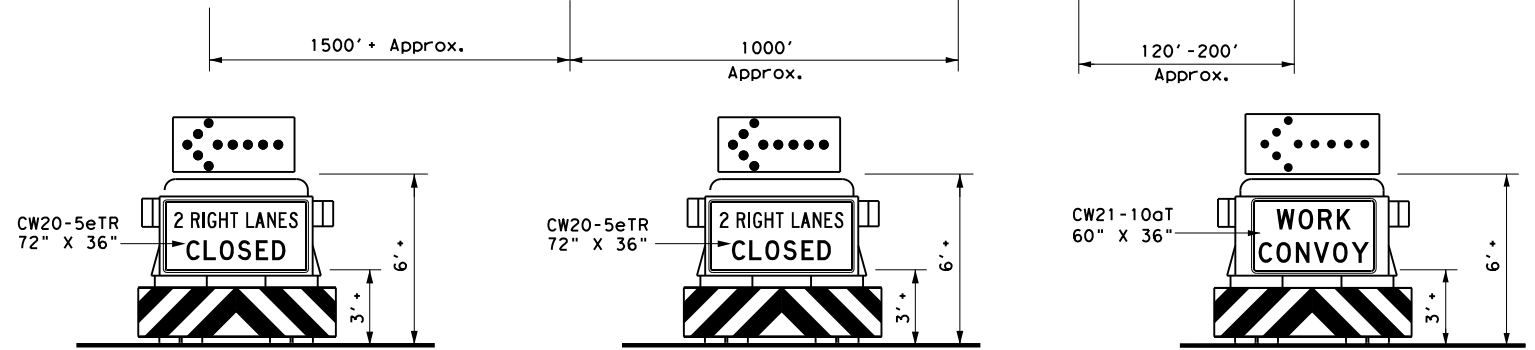
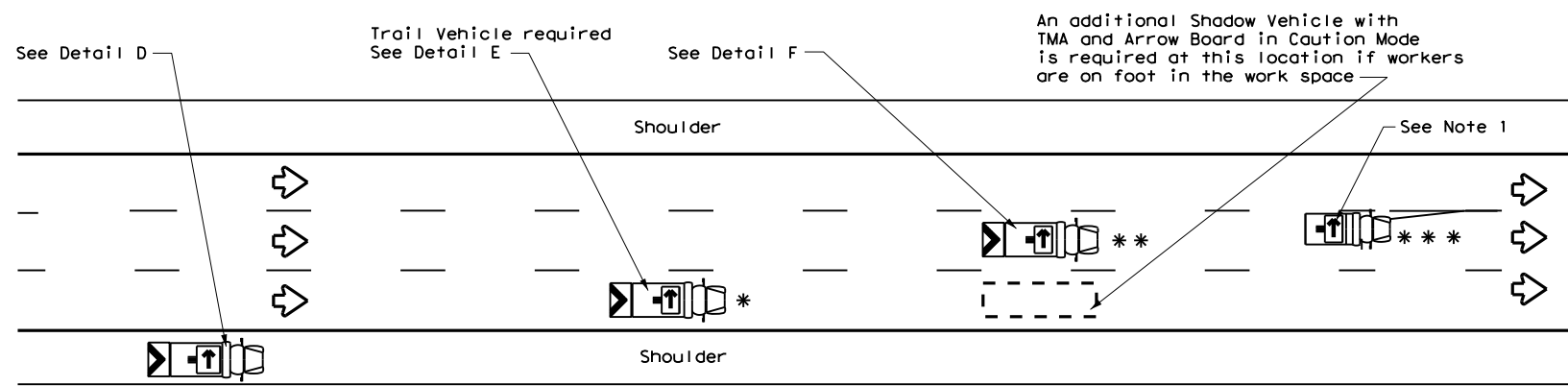


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DATE: FILE:



**RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)**



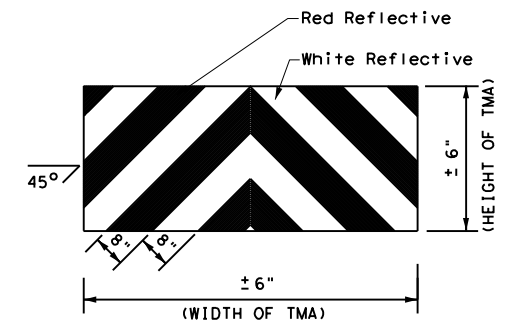
**INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)**

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**GENERAL NOTES**

- ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
- For TCP(3-2a) 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.
- 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.
- 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.
- Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
- Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
- The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



**STRIPING FOR TMA**

Texas Department of Transportation  
Traffic Operations Division Standard

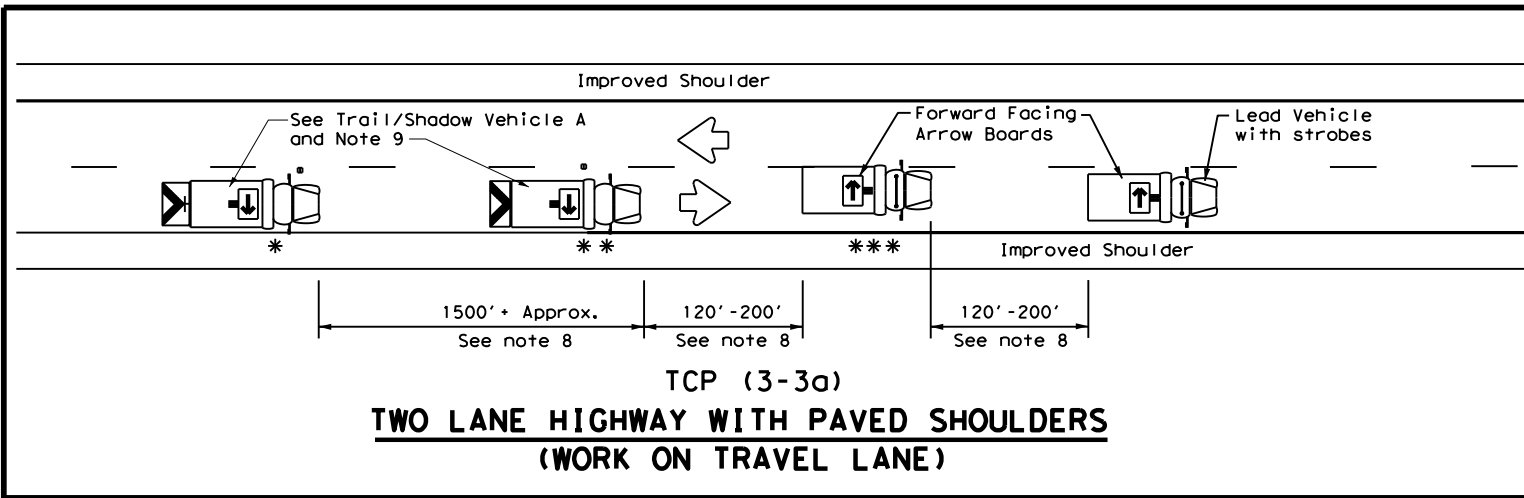
## TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

### TCP(3-2)-13

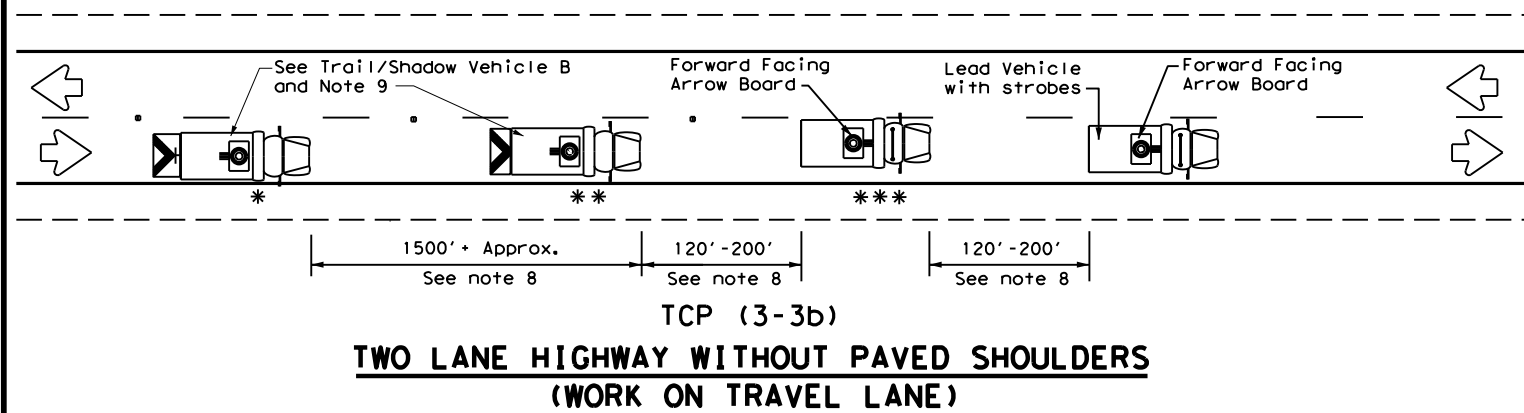
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	OO1	VARIOUS
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	SAT	BEXAR	35	
1-97				

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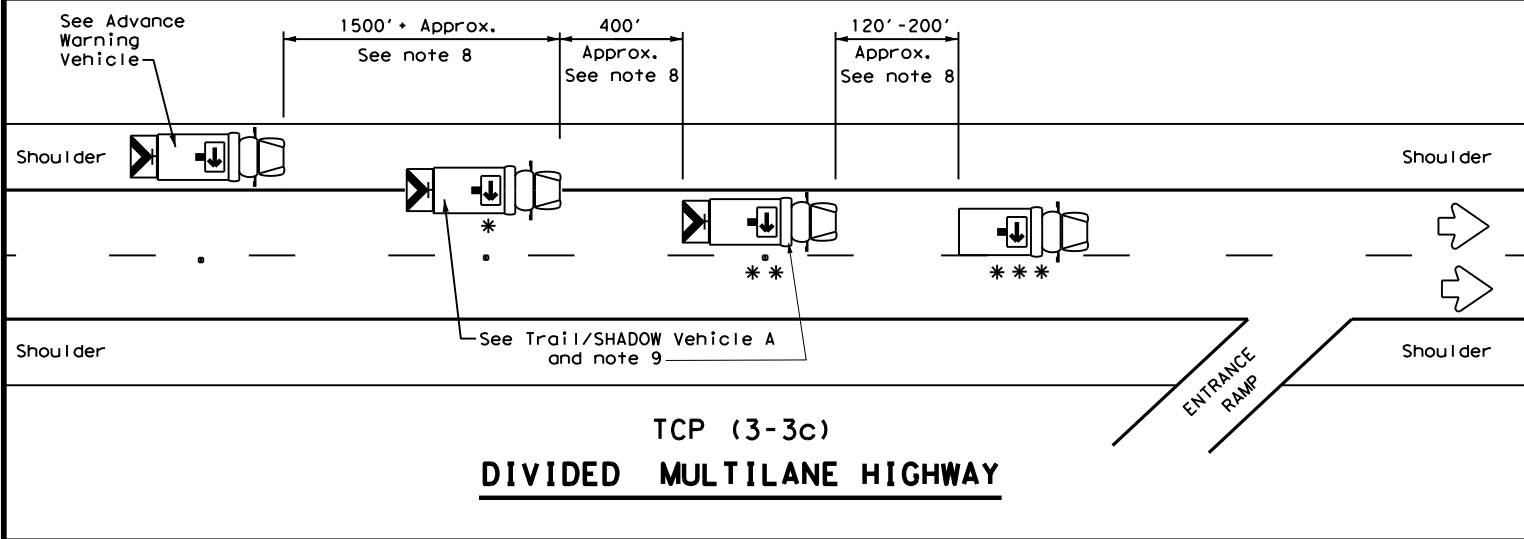
DATE: FILE:



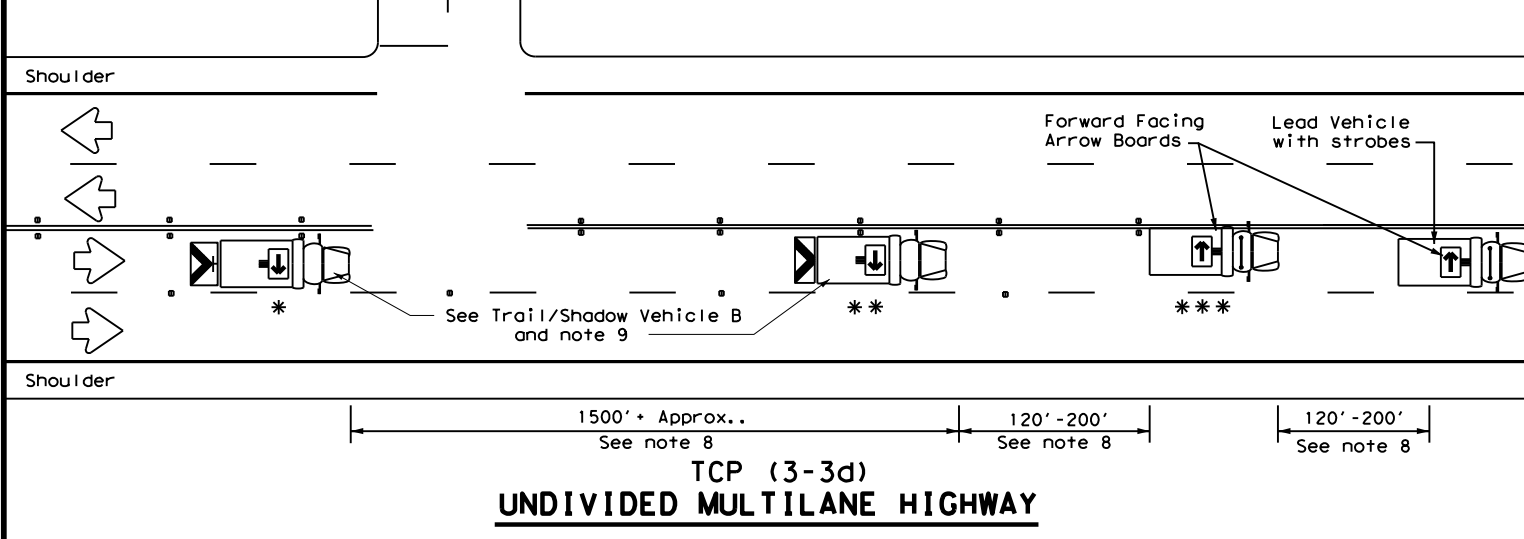
**TCP (3-3a)**  
**TWO LANE HIGHWAY WITH PAVED SHOULDERS**  
**(WORK ON TRAVEL LANE)**



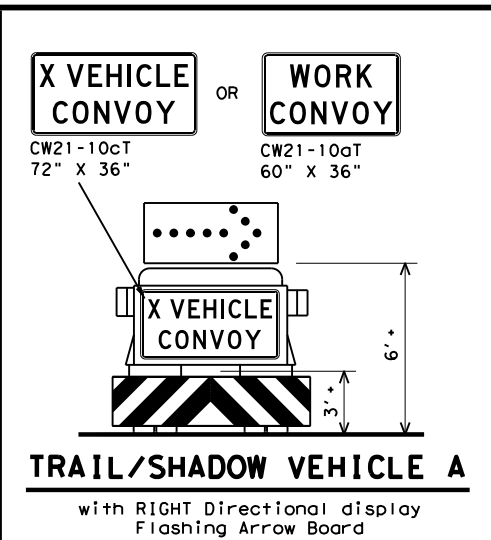
**TCP (3-3b)**  
**TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS**  
**(WORK ON TRAVEL LANE)**



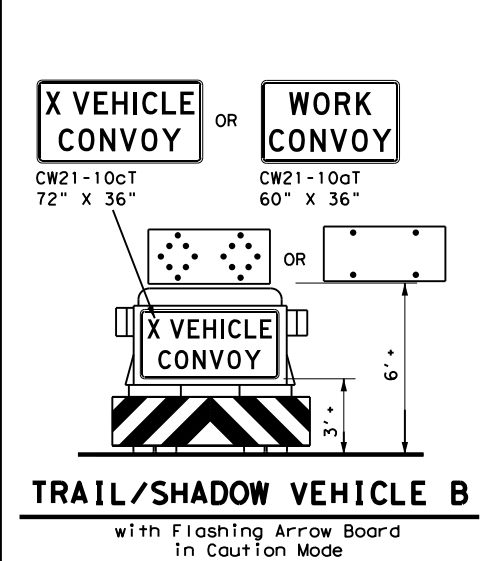
**TCP (3-3c)**  
**DIVIDED MULTILANE HIGHWAY**



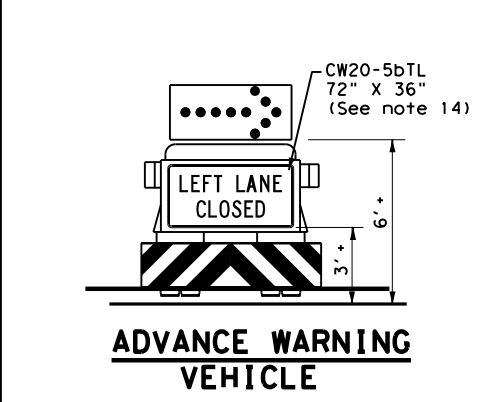
**TCP (3-3d)**  
**UNDIVIDED MULTILANE HIGHWAY**



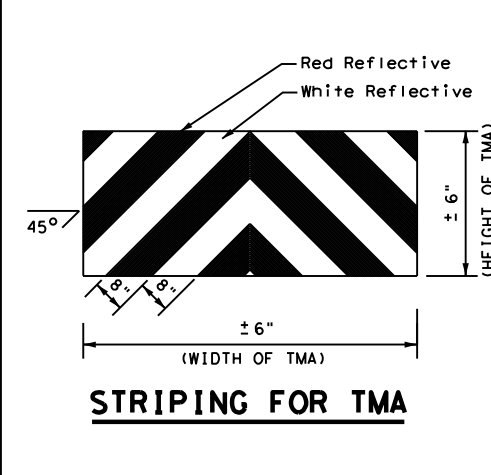
**TRAIL/SHADOW VEHICLE A**  
 with RIGHT Directional display  
 Flashing Arrow Board



**TRAIL/SHADOW VEHICLE B**  
 with Flashing Arrow Board  
 in Caution Mode



**ADVANCE WARNING VEHICLE**



**STRIPING FOR TMA**

LEGEND		
* Trail Vehicle		ARROW BOARD DISPLAY
** Shadow Vehicle		
*** Work Vehicle		RIGHT Directional
		LEFT Directional
		Double Arrow
		CAUTION (Alternating Diamond or 4 Corner Flash)

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

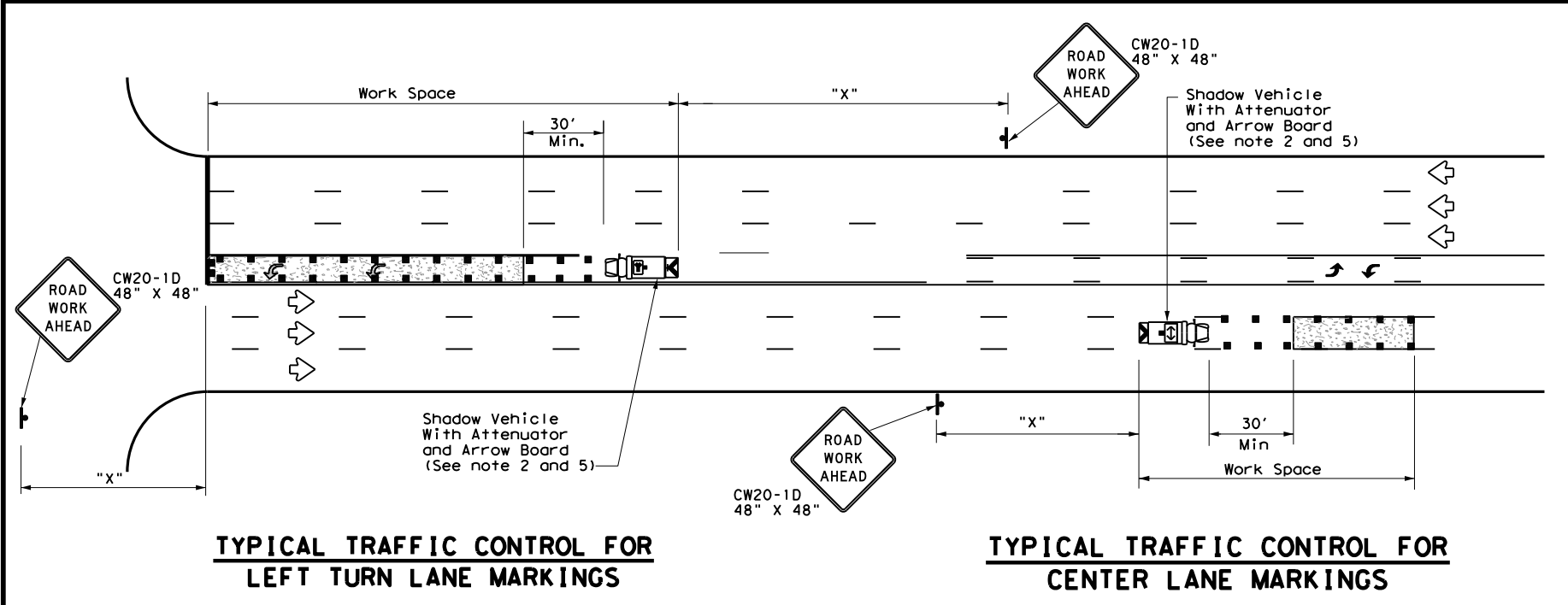
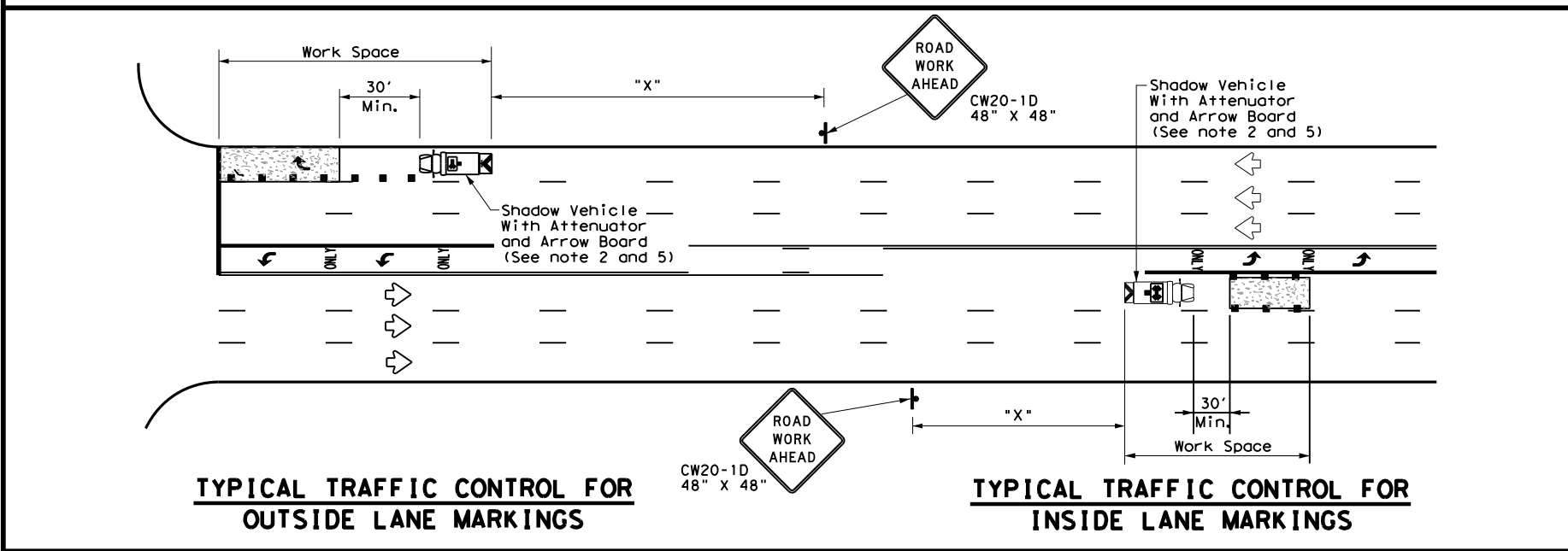
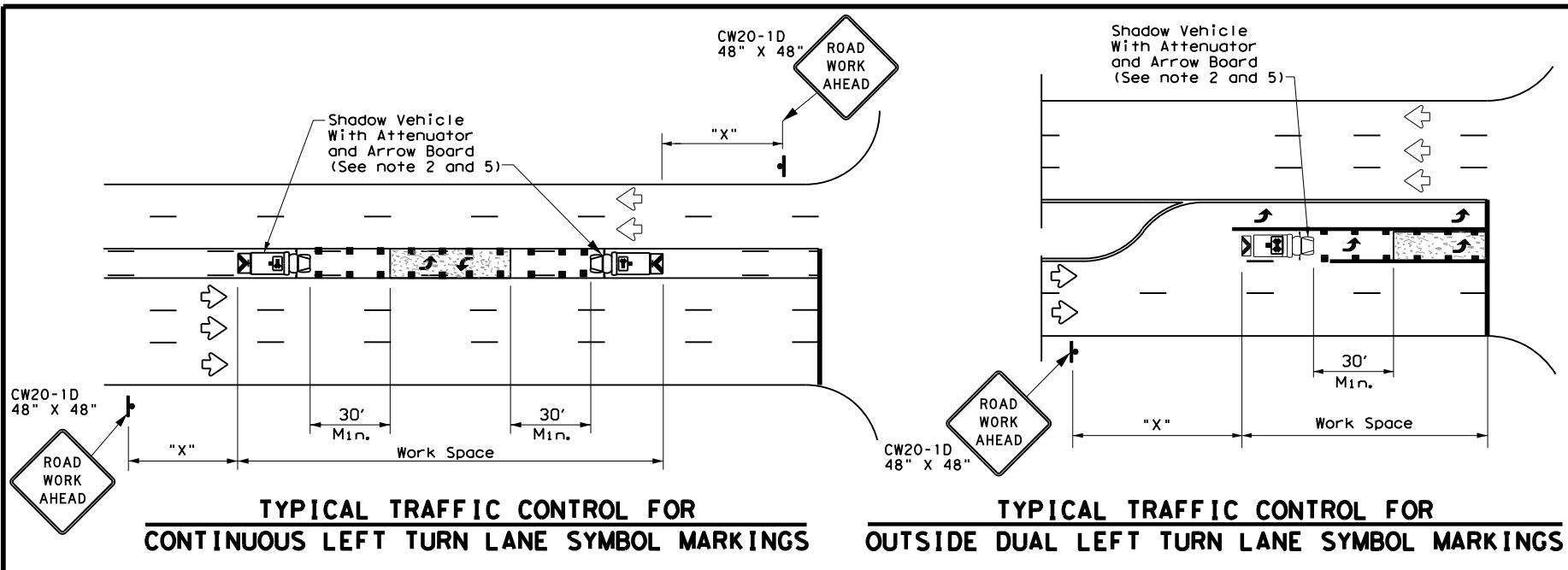
**GENERAL NOTES**

- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
- 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 vehicle.
- 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 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.
- 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.
- A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
- For divided highways with three or four lanes in each direction, use TCP(3-2).
- Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
- 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.

		Traffic Operations Division Standard	
<b>TRAFFIC CONTROL PLAN          MOBILE OPERATIONS          RAISED PAVEMENT          MARKER INSTALLATION/          REMOVAL          TCP (3-3) - 14</b>			
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT September 1987	CONT: 6411	SECT: 41	JOB: OO1
REVISIONS	2-94 4-98	8-95 7-13	1-97 7-14
	DIST: SAT	COUNTY: BEXAR	SHEET NO.: 36

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DATE: FILE:



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

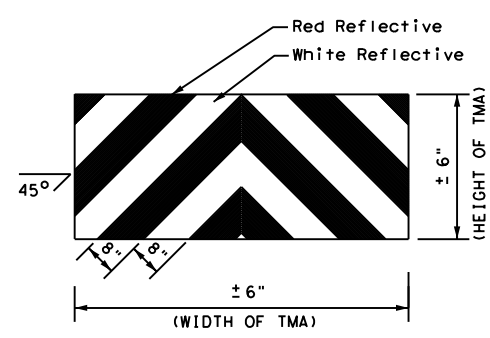
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

**GENERAL NOTES**

1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



Texas Department of Transportation  
 Traffic Operations Division Standard

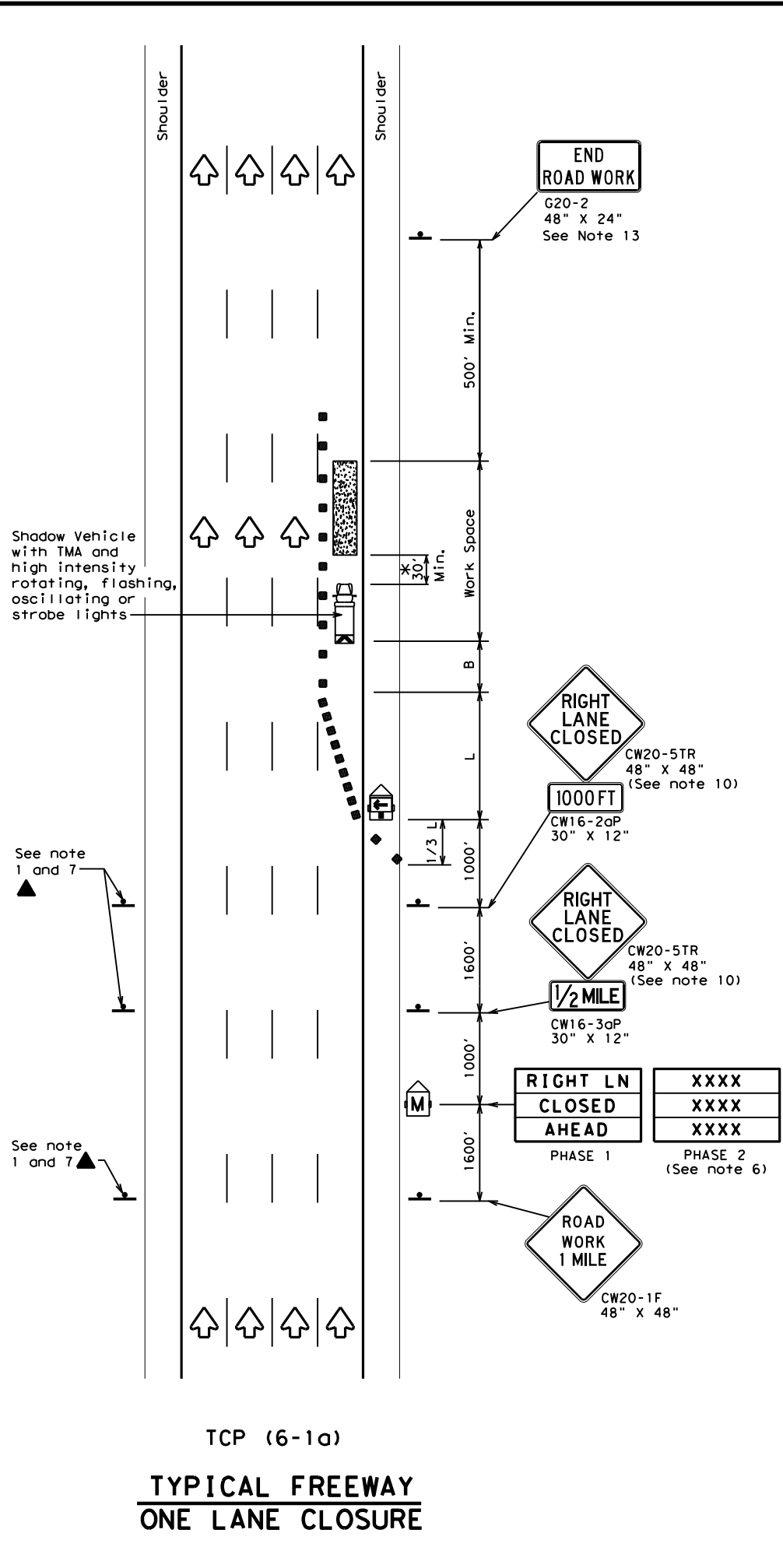
**TRAFFIC CONTROL PLAN  
 MOBILE OPERATIONS FOR  
 ISOLATED WORK AREAS  
 UNDIVIDED HIGHWAYS**

**TCP(3-4)-13**

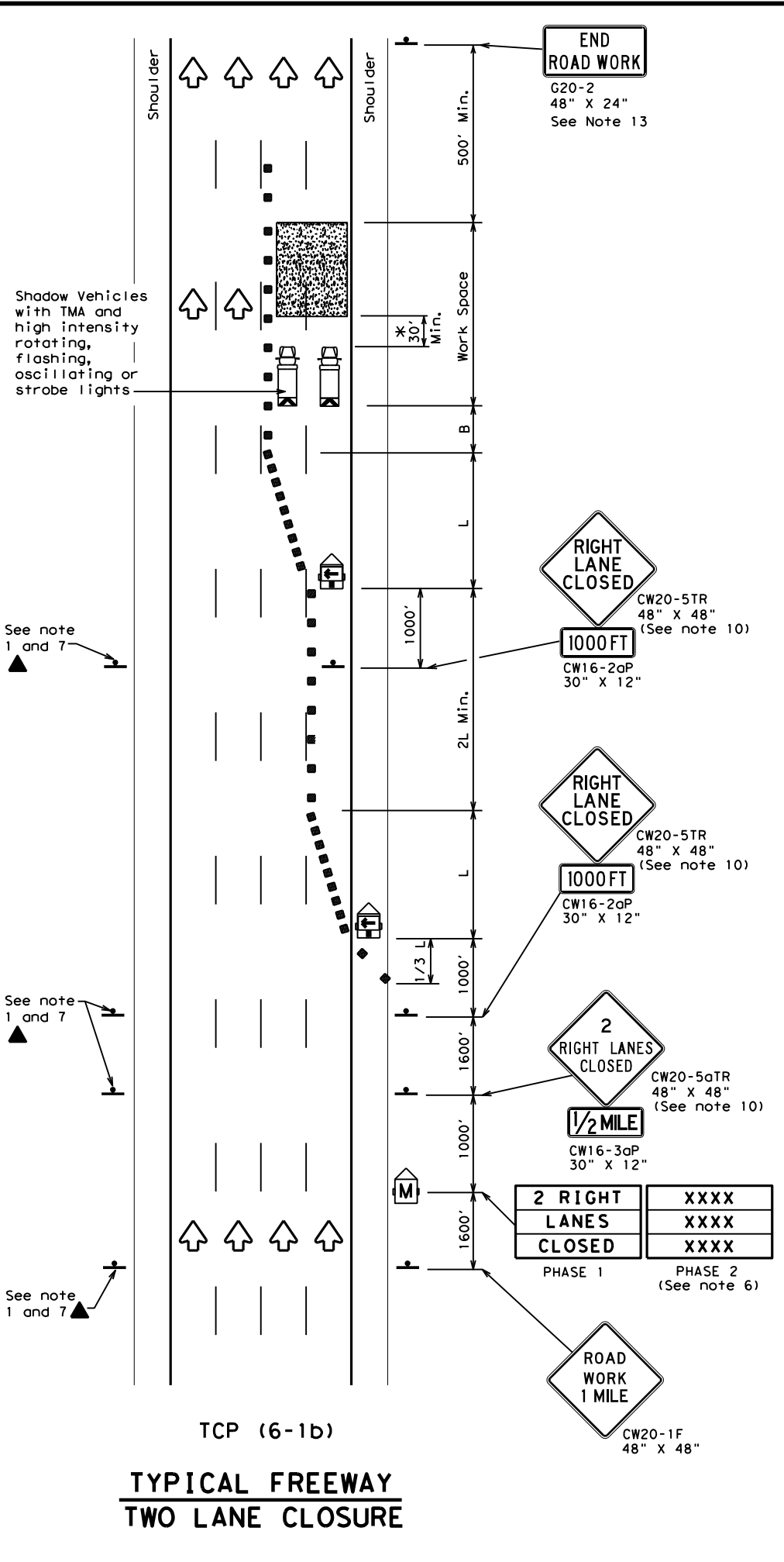
FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT July, 2013	CONT: 6411	SECT: 41	JOB: 001	HIGHWAY: VARIOUS
REVISIONS	DIST: SAT	COUNTY: BEXAR	SHEET NO. 37	

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DATE: FILE:



TCP (6-1a)  
**TYPICAL FREEWAY  
ONE LANE CLOSURE**



TCP (6-1b)  
**TYPICAL FREEWAY  
TWO LANE CLOSURE**

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

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

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

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

**GENERAL NOTES**

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

\* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA 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.



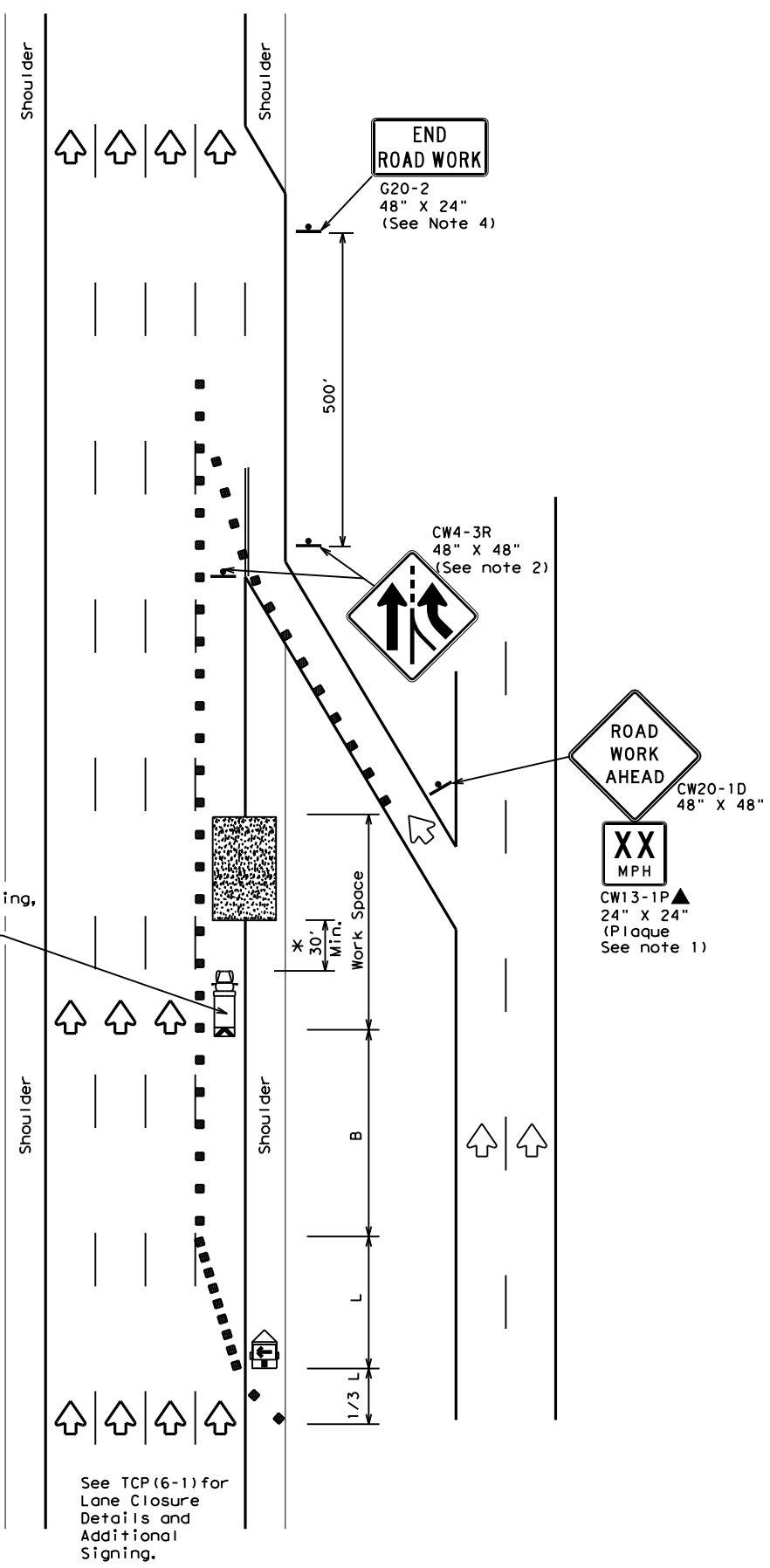
**TRAFFIC CONTROL PLAN  
FREEWAY LANE CLOSURES**

**TCP (6-1) - 12**

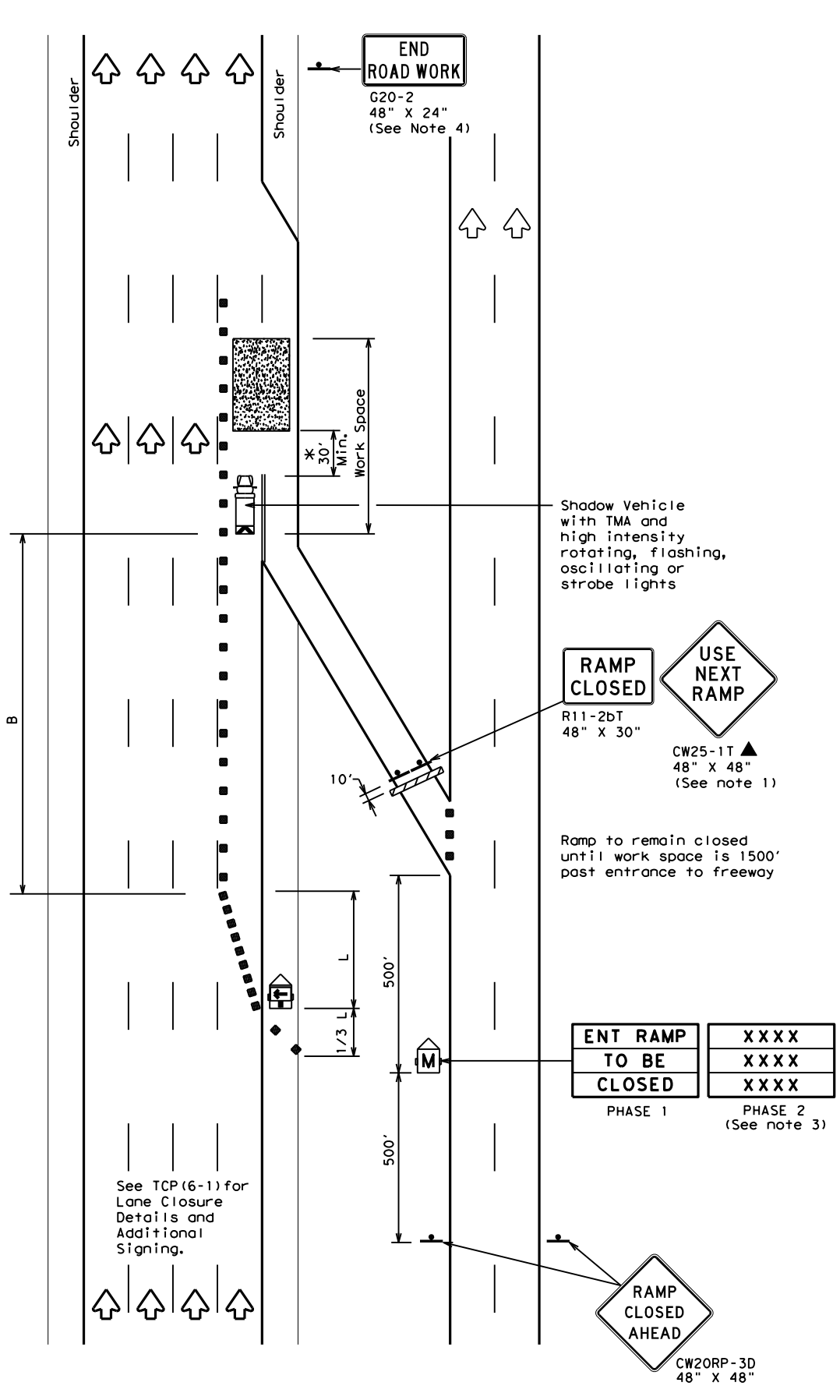
FILE:	tcp6-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
8-12	REVISIONS	6411	41	001	VARIOUS				
		DIST	COUNTY	SHEET NO.					
		SAT	BEXAR	38					

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DATE: FILE:



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



TCP (6-2b)  
ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

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

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

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



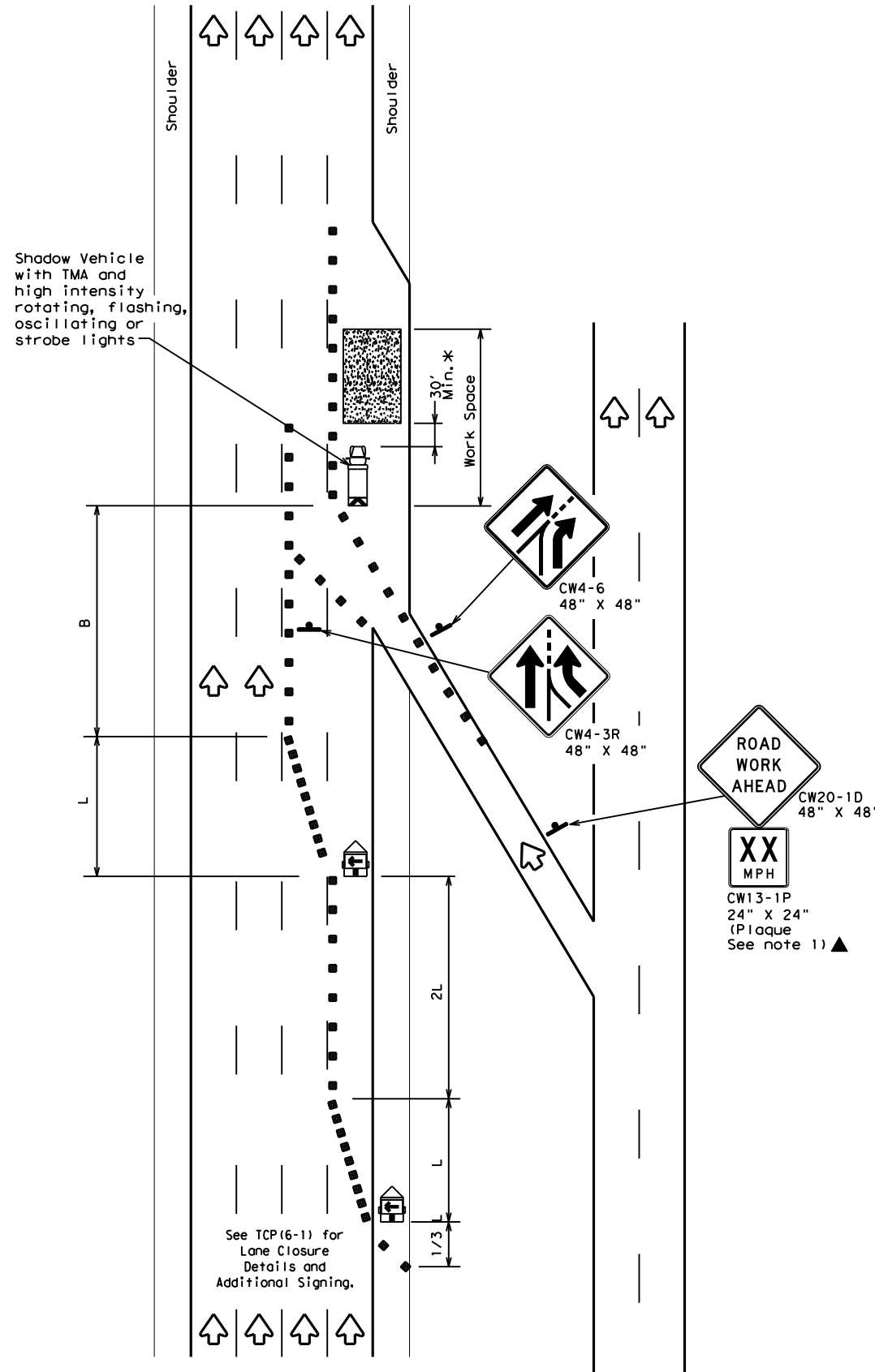
TRAFFIC CONTROL PLAN  
WORK AREA NEAR RAMP

TCP (6-2) - 12

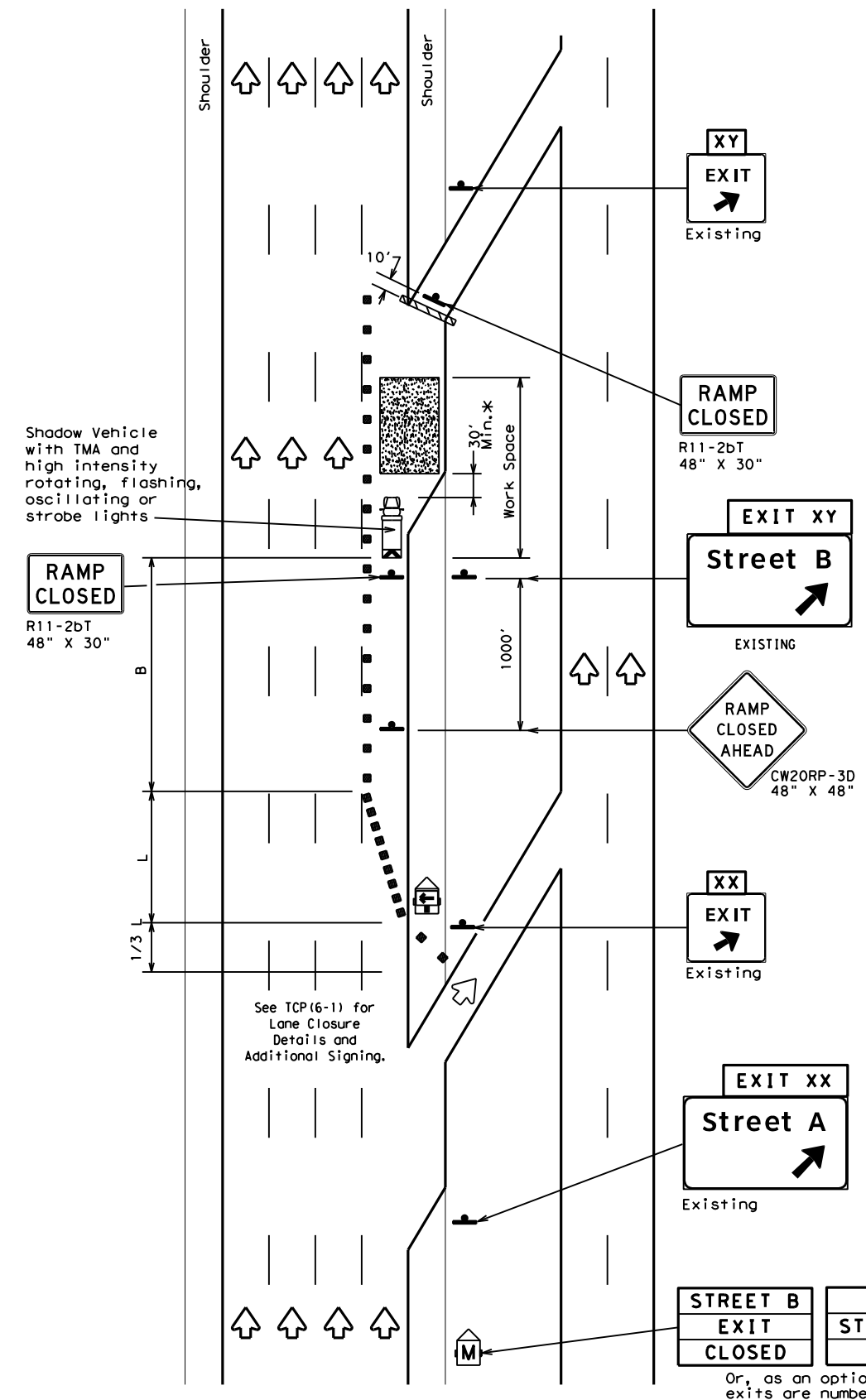
FILE:	tcp6-2.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	February 1994	CONT	SECT	JOB	HIGHWAY				
REVISIONS		6411	41	001	VARIOUS				
1-97	8-98	DIST	COUNTY	SHEET NO.					
4-98	8-12	SAT	BEXAR	39					

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TCP (6-3a)  
ENTRANCE RAMP OPEN



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

STREET B  
EXIT  
CLOSED

USE  
STREET A  
EXIT

Or, as an option when  
exits are numbered

EXIT XY  
CLOSED

USE  
EXIT XX

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

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

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

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

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

GENERAL NOTES:  
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

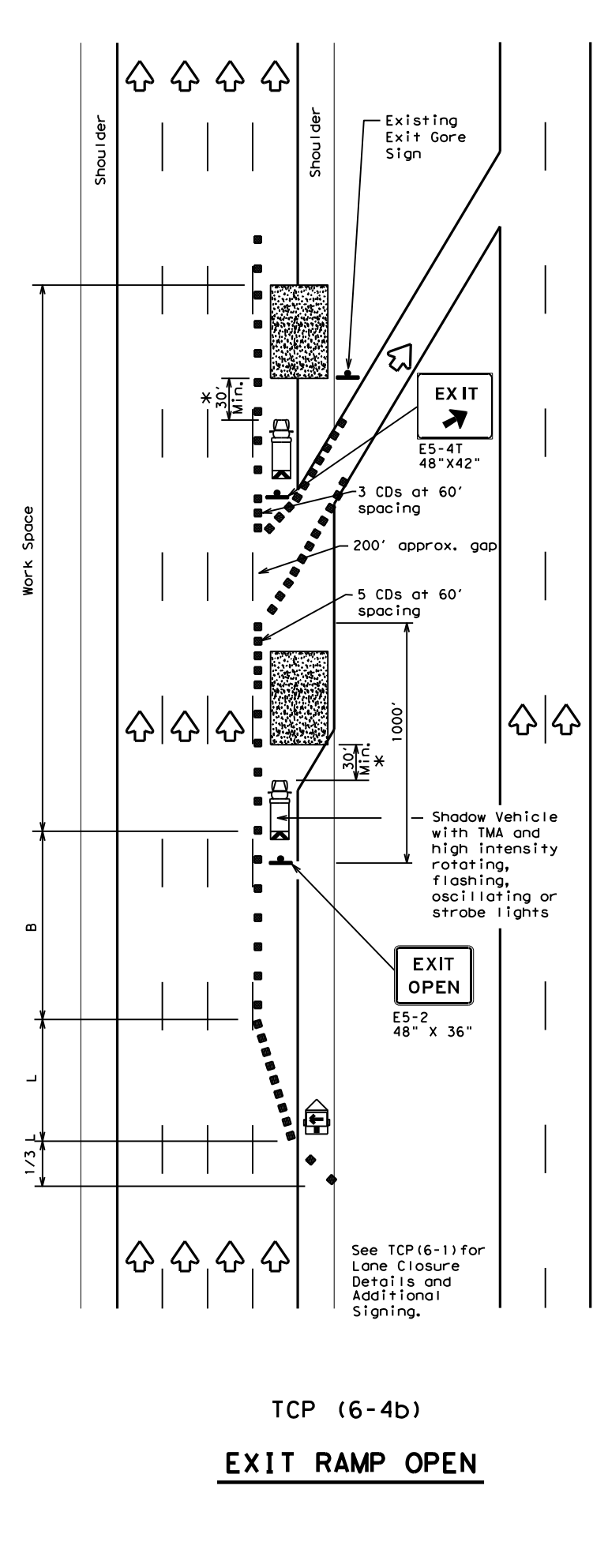
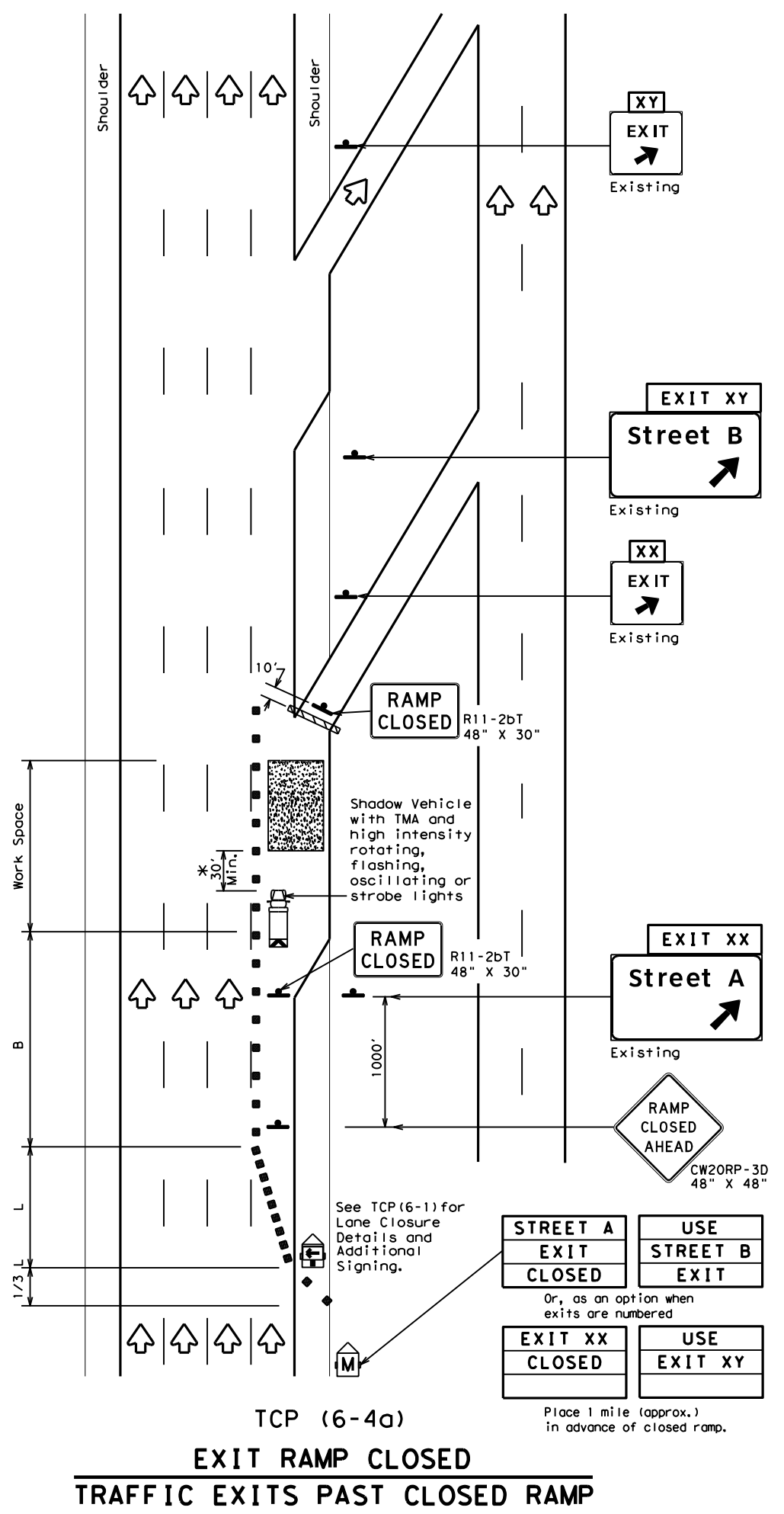
TRAFFIC CONTROL PLAN  
WORK AREA BEYOND RAMP

TCP (6-3) - 12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	SAT	BEXAR	40	

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DATE:  
FILE:



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

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

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

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

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

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

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

Texas Department of Transportation  
Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN**  
**WORK AREA AT EXIT RAMP**

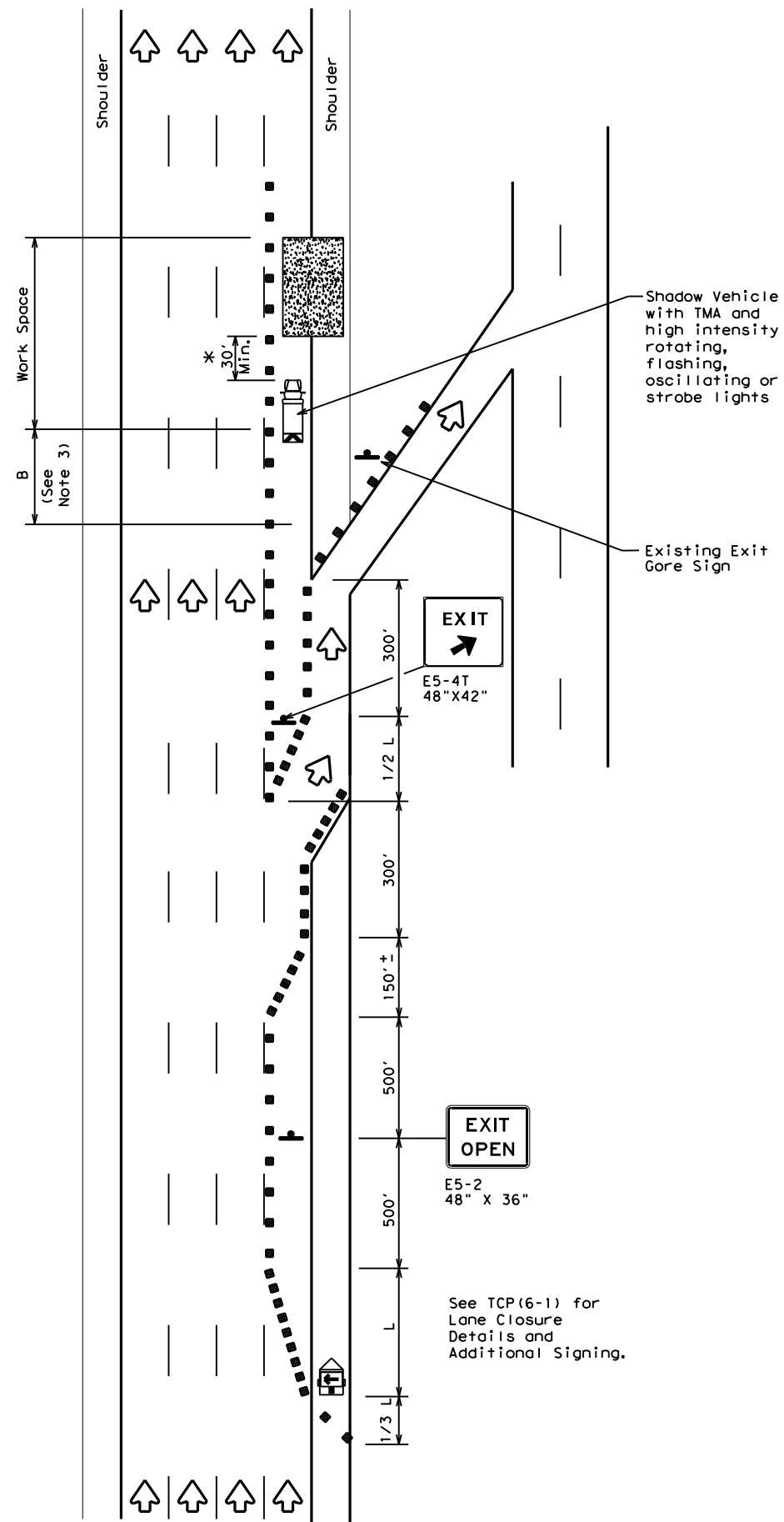
**TCP (6-4) - 12**

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	SAT	BEXAR	41	

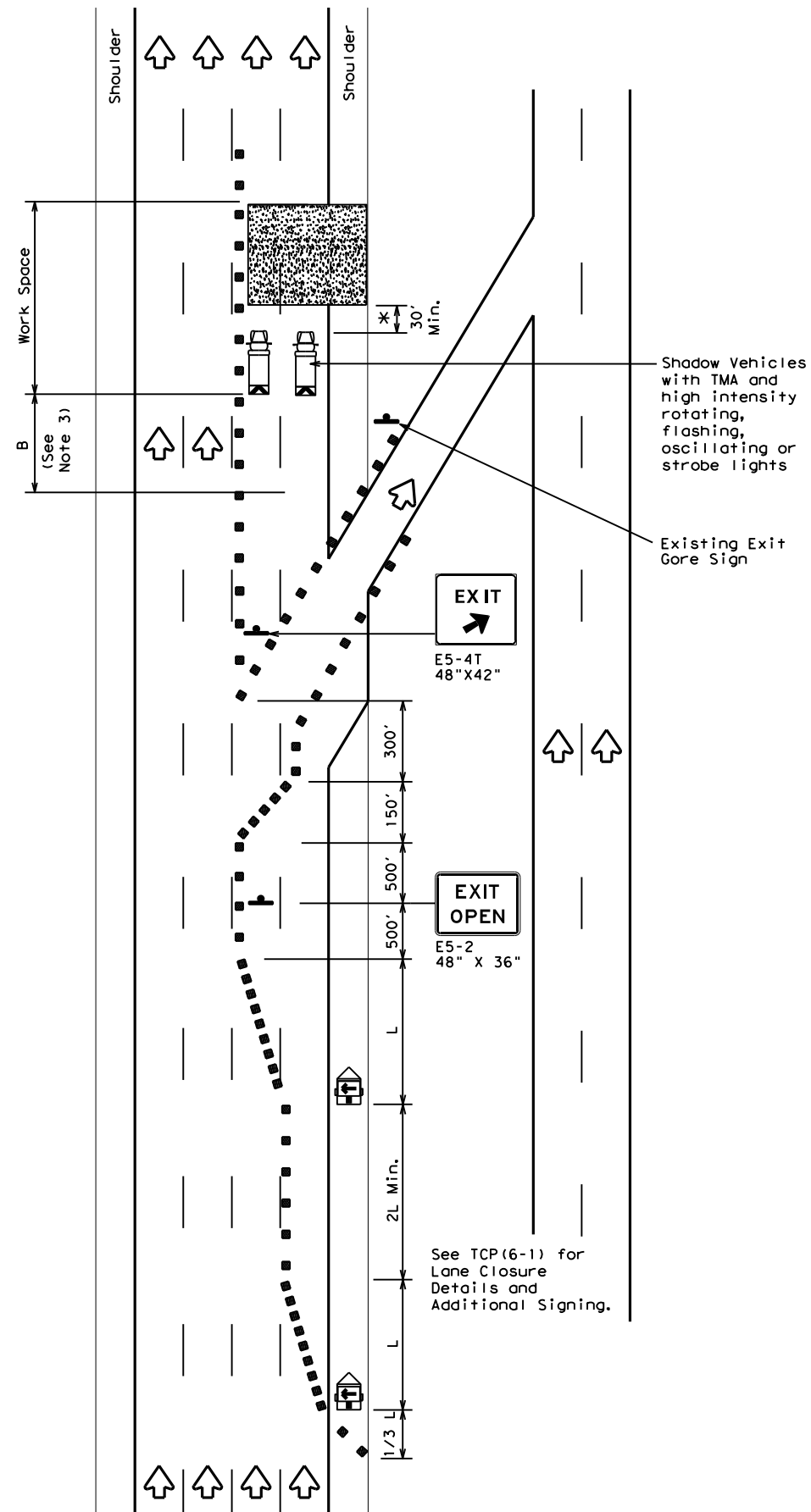


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DATE: FILE:



TCP (6-5a)  
**EXIT RAMP OPEN**



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

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

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

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

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

**GENERAL NOTES**

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

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

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

Texas Department of Transportation  
Traffic Operations Division Standard

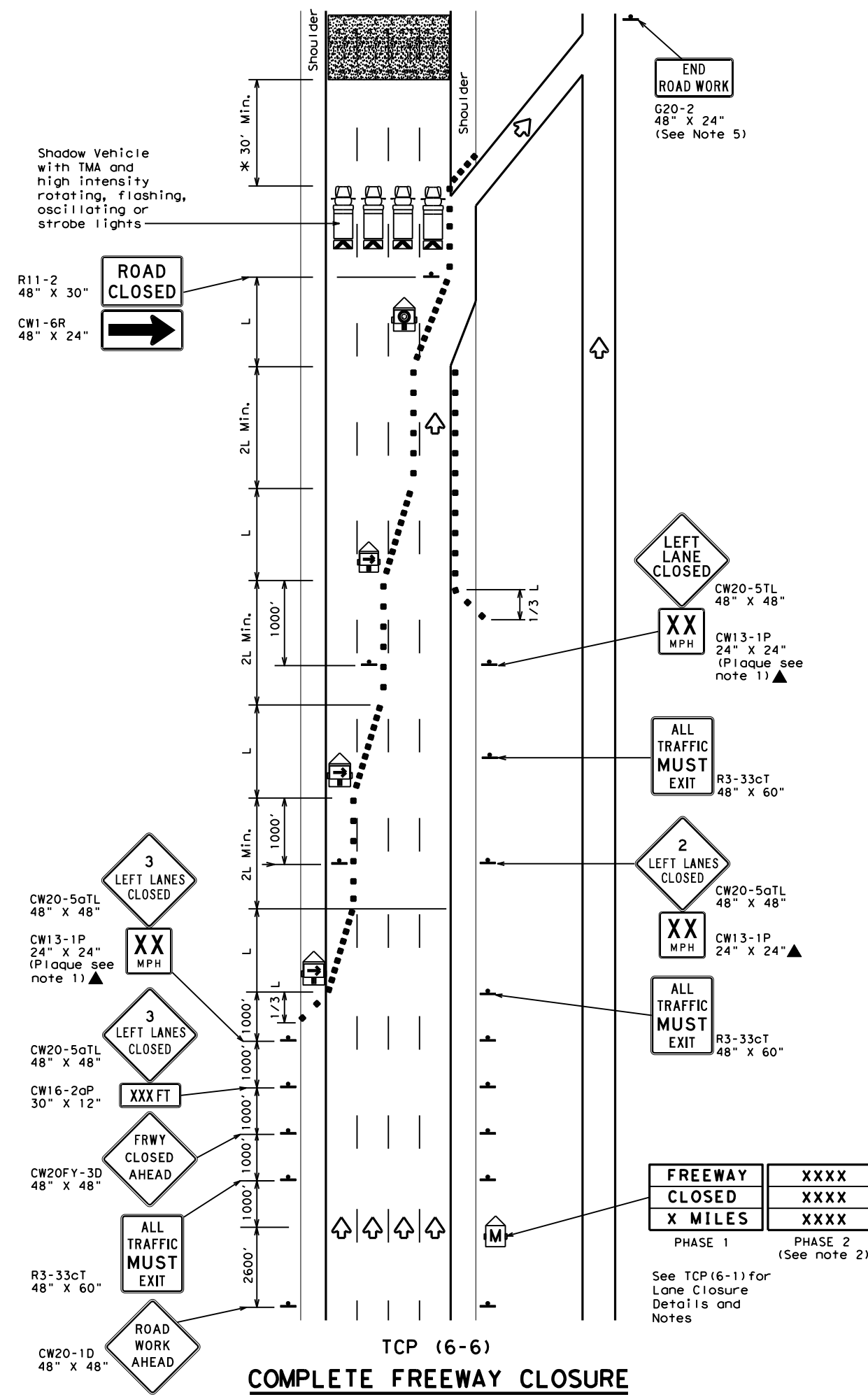
**TRAFFIC CONTROL PLAN  
WORK AREA BEYOND EXIT RAMP**

**TCP (6-5) - 12**

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	SAT	BEXAR	42	

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DATE:  
FILE:



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

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

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

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

**GENERAL NOTES**

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

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

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

**Texas Department of Transportation**  
Traffic Operations Division Standard

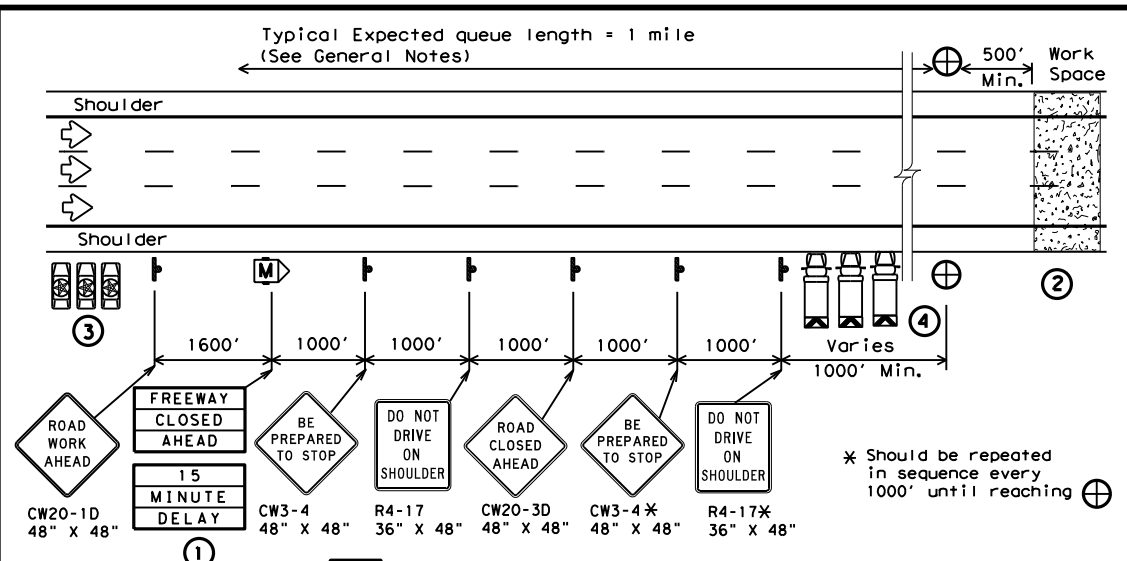
**TRAFFIC CONTROL PLAN**  
**FREEWAY CLOSURE**

**TCP (6-6) - 12**

FILE: tcp6-6.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	SAT	BEXAR	43	

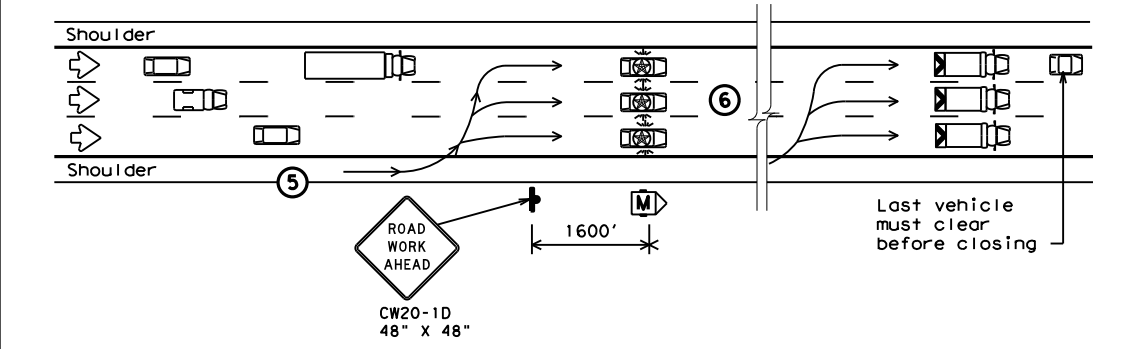
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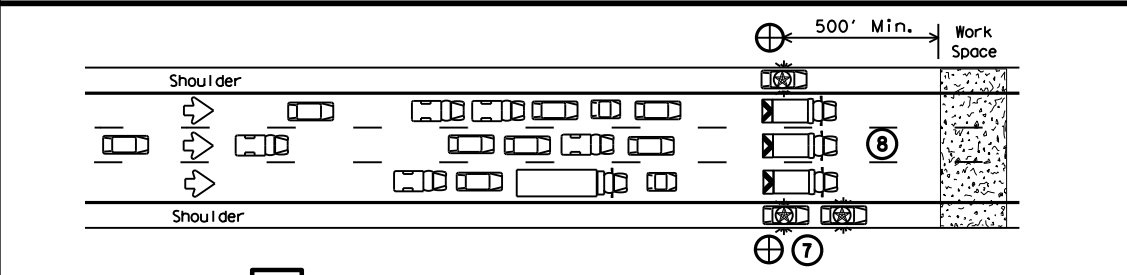
### 1 STARTING POSITION

- ① 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.
- ③ 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.



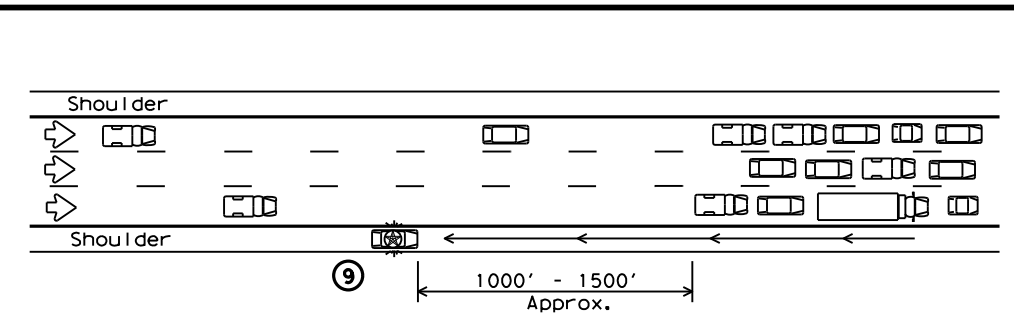
### 2 REDUCING SPEED OPERATION

- 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.



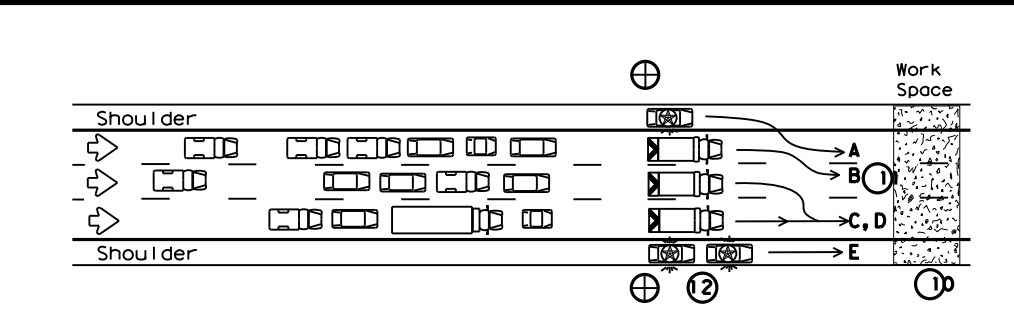
### 3 ALL TRAFFIC STOPPED AT CP

- 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.
- ⑧ The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



### 4 WARNING THE TRAFFIC QUEUE

- ⑨ The WARNING LEOV should proceed to the right shoulder of the roadway, with emergency lights on approximately 1000' in advance of the traffic queue (stopped traffic) as the queue develops. When determined that limited sight distance situations (crest of hills, sharp roadway curvature, etc.) may occur to motorists approaching the queue, the WARNING LEOV may proceed 1/4 mile or more in advance of the queue.



### 5 RELEASING STOPPED TRAFFIC

- ⑩ All equipment, materials, personnel, and other items should be removed from the roadway and maintain an adequate clear zone.
- ⑪ When the roadway is clear for traffic, the LEOV should proceed forward from the left shoulder followed by the barrier vehicles, from left to right, as shown alphabetically in the plan view.
- ⑫ The LEOV or LEOVs on the right shoulder may remain on the shoulder until satisfied that traffic is moving satisfactorily before merging or proceeding.
- ⑬ LEOVs and barrier vehicles should re-group at their respective starting positions if necessary.

LEGEND			
■	Channelizing Devices	⊕	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.

**Texas Department of Transportation**  
Traffic Operations Division Standard

## TRAFFIC CONTROL PLAN

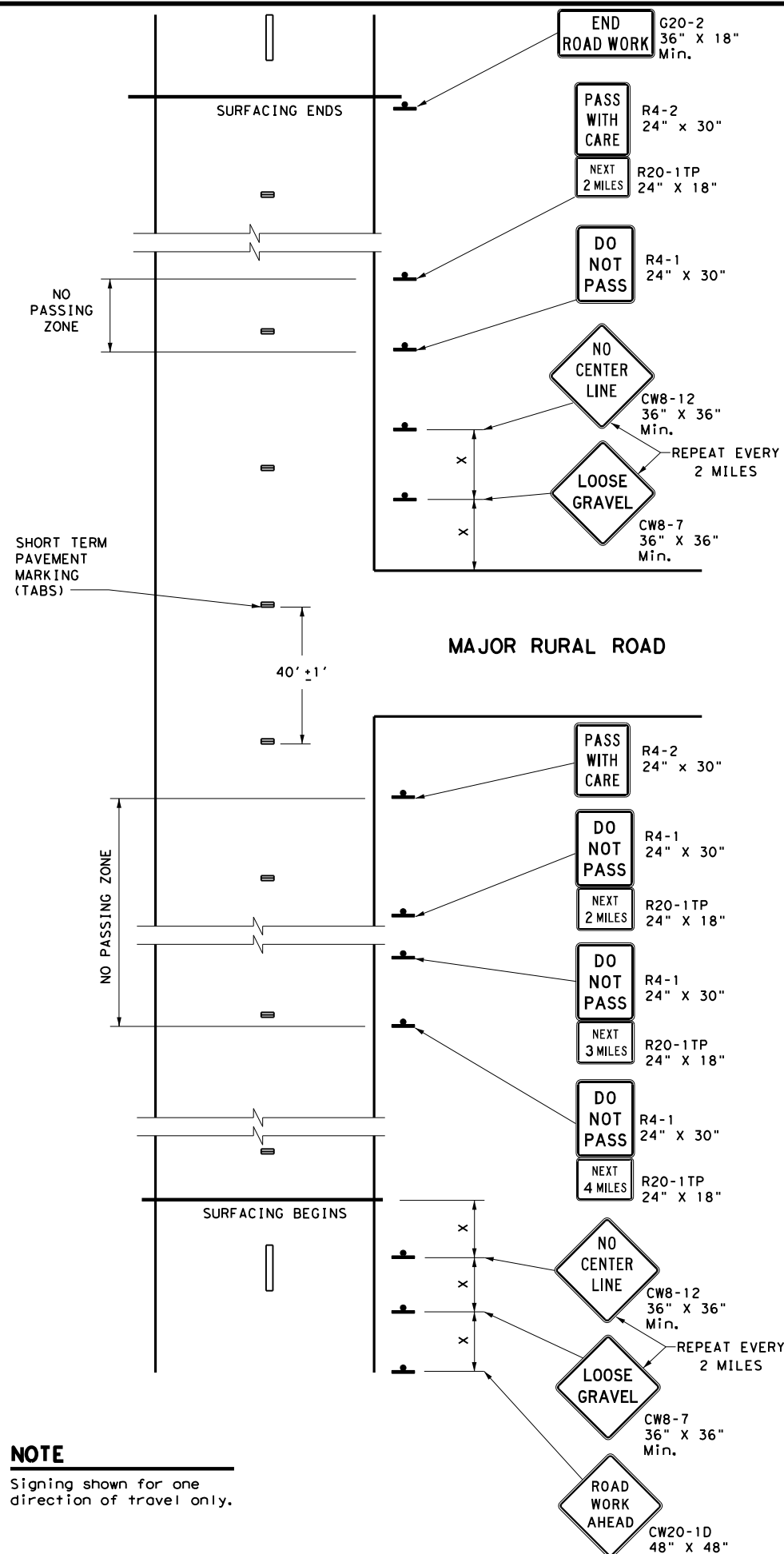
### SHORT DURATION FREEWAY CLOSURE SEQUENCE

# TCP (6-7) - 12

FILE: tcp6-7.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-97 8-12	DIST	COUNTY	SHEET NO.	
4-98	SAT	BEXAR	44	

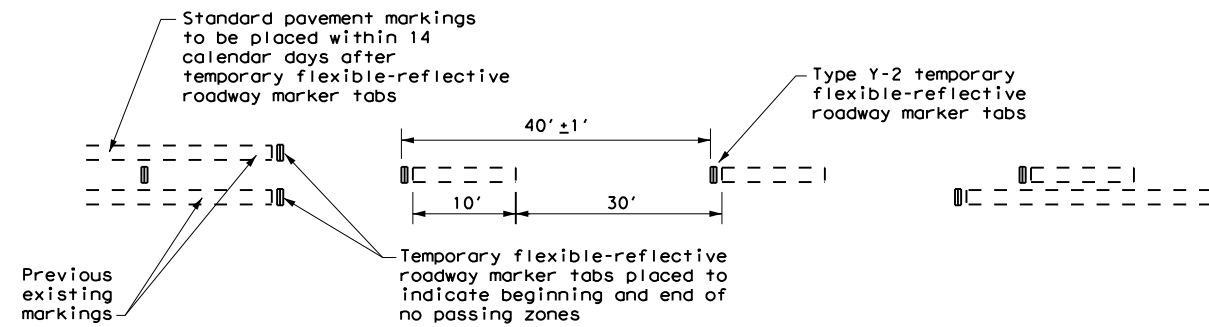
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**NOTE**  
 Signing shown for one direction of travel only.

**NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS**



**TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS**  
 For seal coat, micro-surface or similar operations

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

- Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.
- At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.
- Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.
- R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

**"NO CENTER LINE" SIGN (CW8-12)**

- Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.
- At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.
- The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

**"LOOSE GRAVEL" SIGN (CW8-7)**

- When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.
- The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

**PAVEMENT MARKINGS**

- Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.
- Tabs shall not be used to simulate edge lines.
- Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

**COORDINATION OF SIGN LOCATIONS**

- The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.
- Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

\* Conventional Roads Only

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

**GENERAL NOTES**

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



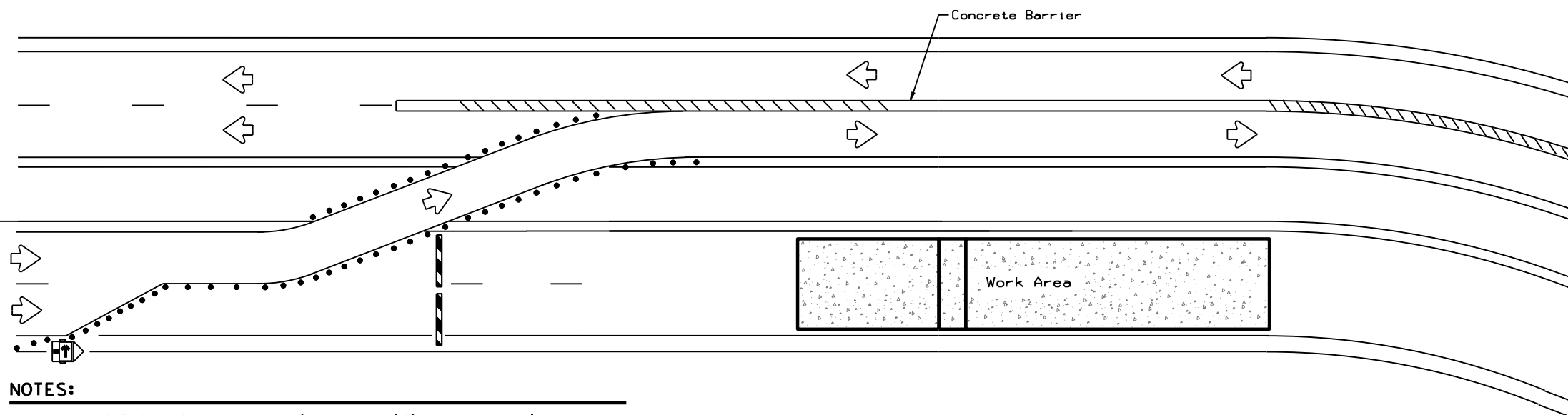
**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**

**TCP (7-1) - 13**

FILE: tcp7-1.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	6411	41	001	VARIOUS
4-92 4-98	DIST	COUNTY	SHEET NO.	
1-97 7-13	SAT	BEXAR	45	

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LEGEND	
	Type 3 Barricade
	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
	Safety glare screen

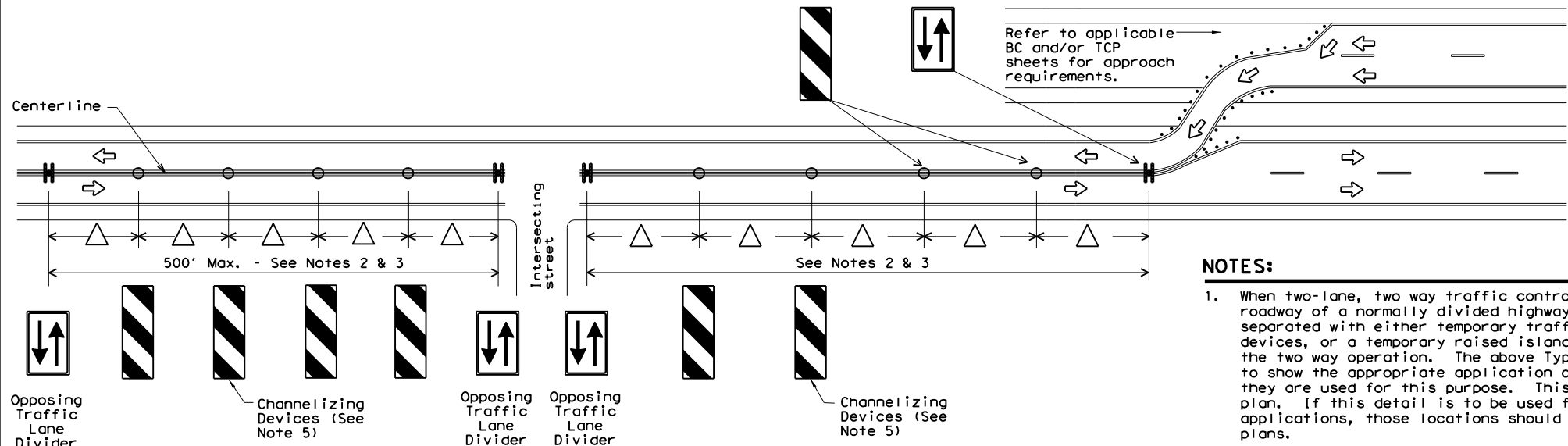
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:  
  
<http://www.txdot.gov/business/resources/producer-list.html>

**NOTES:**

- Length of Safety Glare screen will be specified elsewhere in the plans.
- The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
- Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
- Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
- This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

**BARRIER DELINEATION WITH MODULAR GLARE SCREENS**



**NOTES:**

- When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.
- Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.
- Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
- Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
- Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

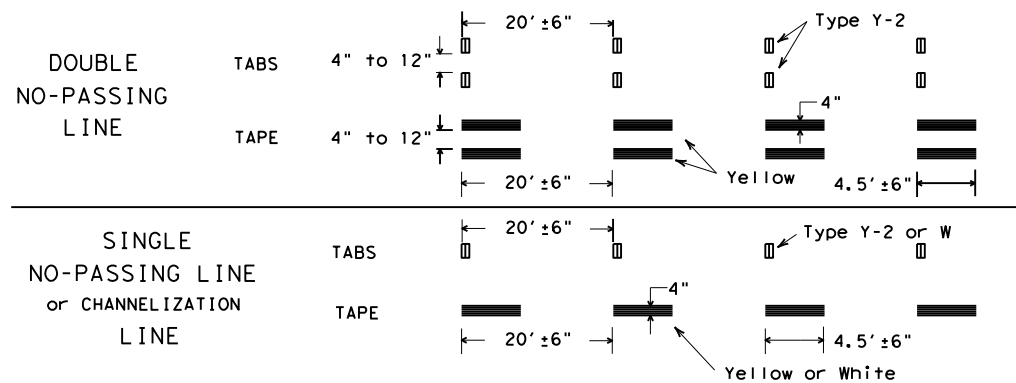
**VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS**

		Traffic Operations Division Standard	
<b>TRAFFIC CONTROL PLAN TYPICAL DETAILS</b>			
<b>WZ(TD) - 17</b>			
FILE:	wz1d-17.dgn	DN:	TxDOT
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REVISIONS		OW:	TxDOT
4-98	2-17	CONT	SECT
3-03		6411	41
7-13		JOB	OO1
		DIST	COUNTY
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		HIGHWAY	VARIOUS
		SHEET NO.	46

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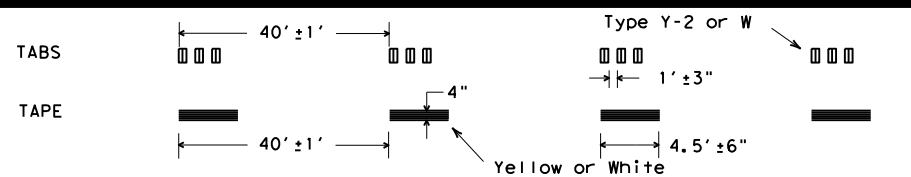
## WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

### SOLID LINES



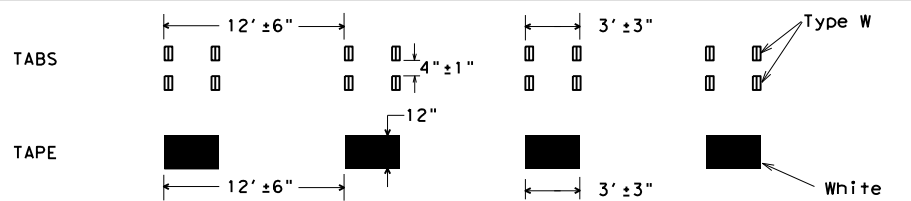
### BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

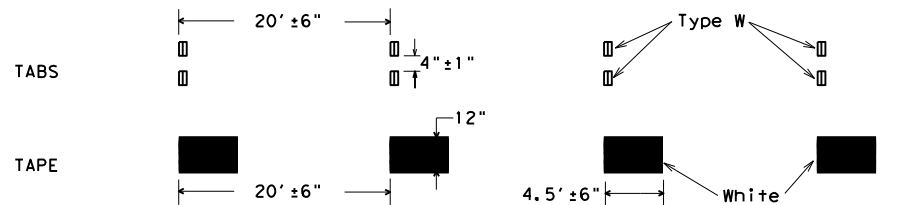


### WIDE DOTTED LINES

(FOR LANE DROP LINES)



### WIDE GORE MARKINGS



### NOTES:

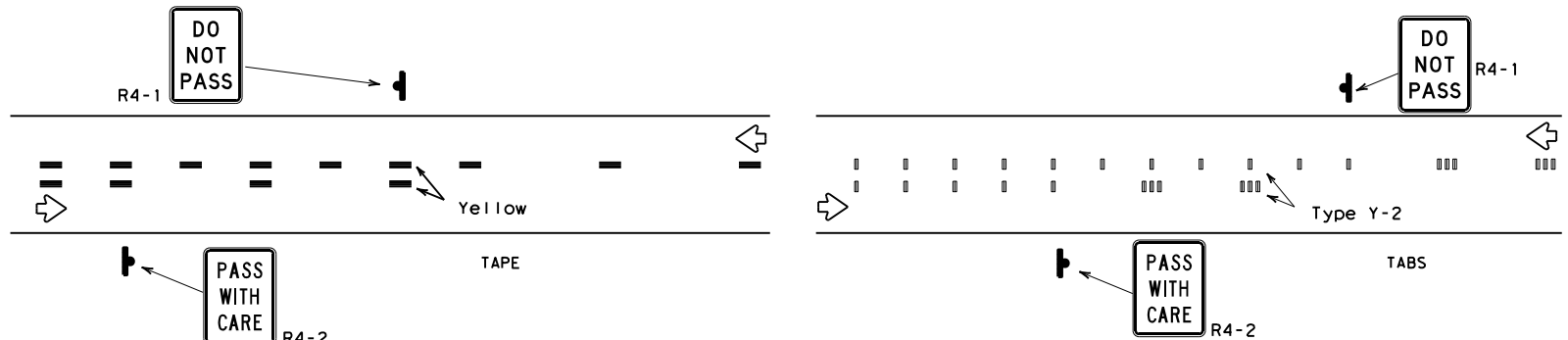
- Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible-reflective roadway marker tabs unless otherwise specified elsewhere in plans.
- Short term pavement markings shall NOT be used to simulate edge lines.
- Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
- Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
- No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
- For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
- For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
- For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

### TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

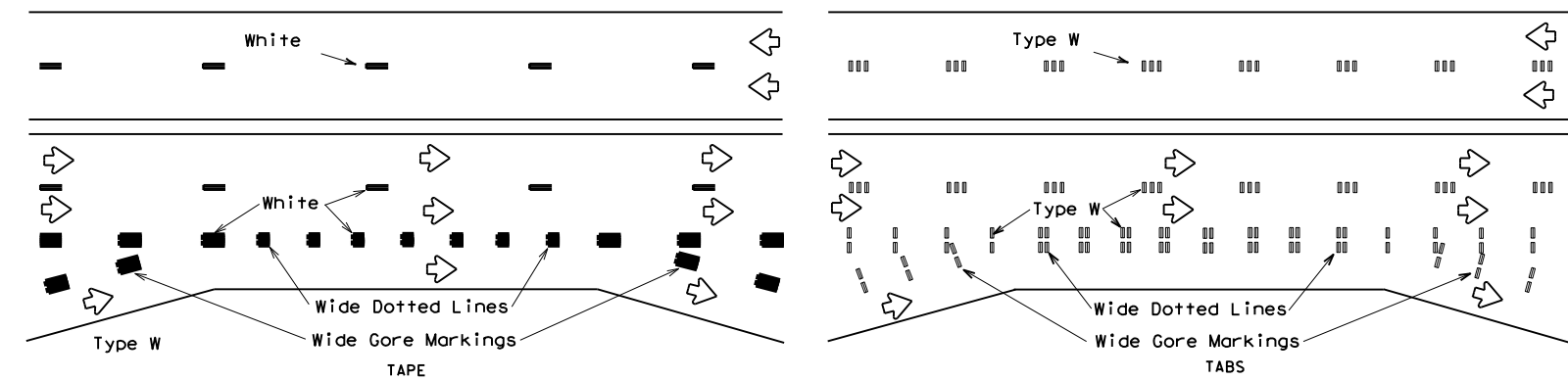
- Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
- Tabs shall meet requirements of Departmental Material Specification DMS-8242.
- When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
- No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

DATE:  
FILE:

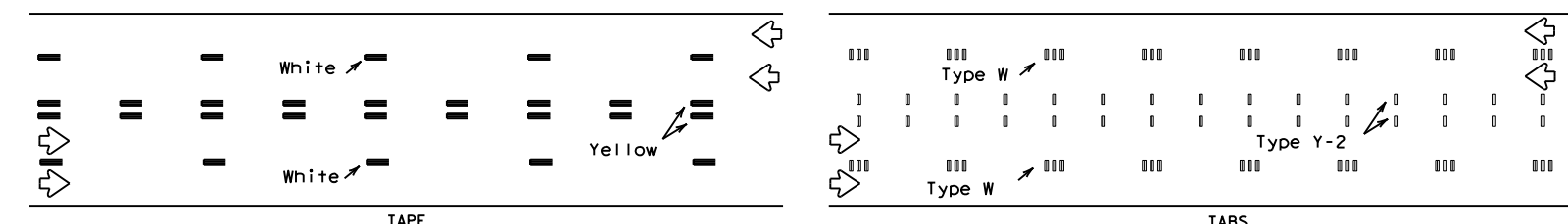
## WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



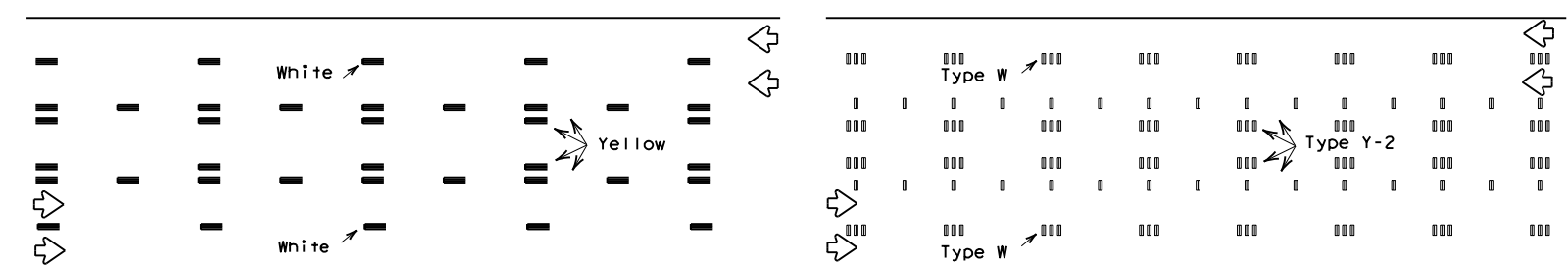
### CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



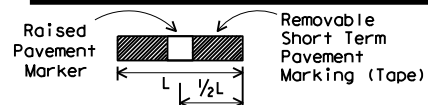
### LANE LINES FOR DIVIDED HIGHWAY



### LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



### TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

### PREFABRICATED PAVEMENT MARKINGS

- Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
- Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Construction-Grade Prefabricated Pavement Markings."

### RAISED PAVEMENT MARKERS

- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

### DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

- DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:  
[http://www.txdot.gov/business/contractors\\_consultants/material\\_specifications/default.htm](http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm)



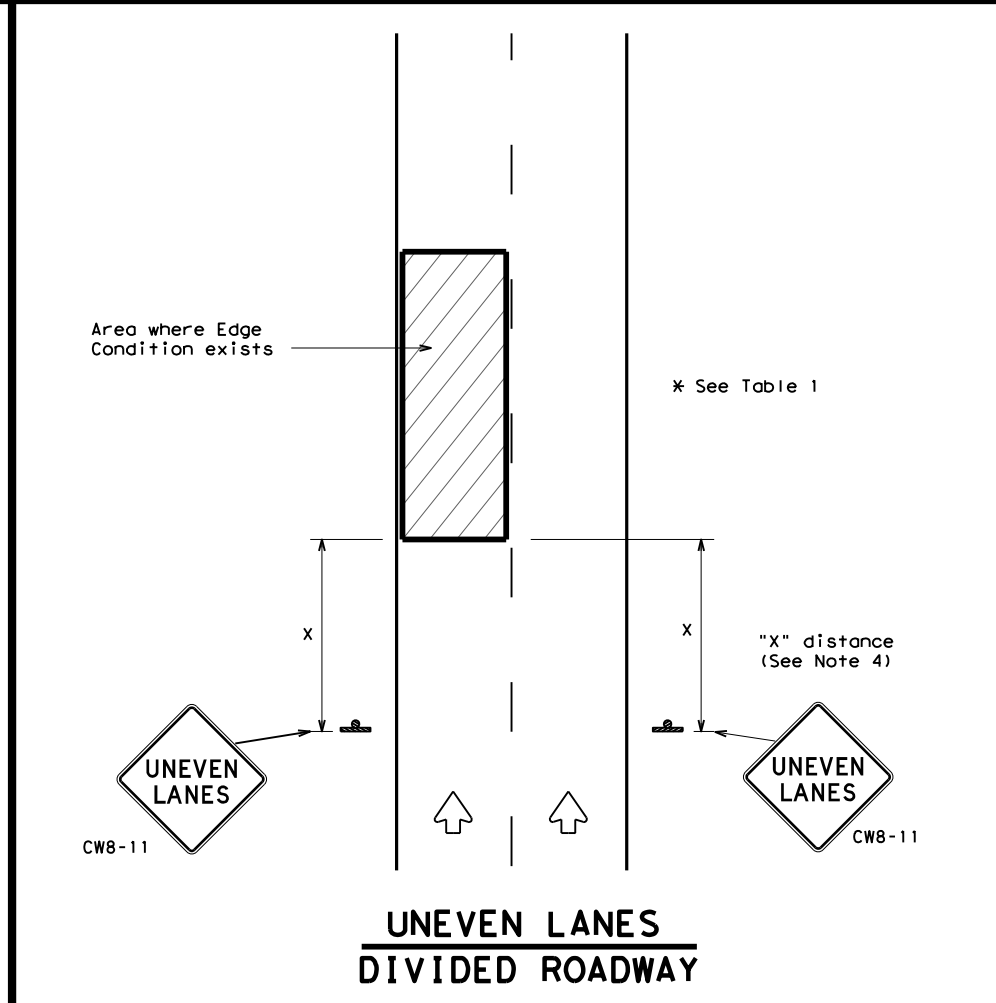
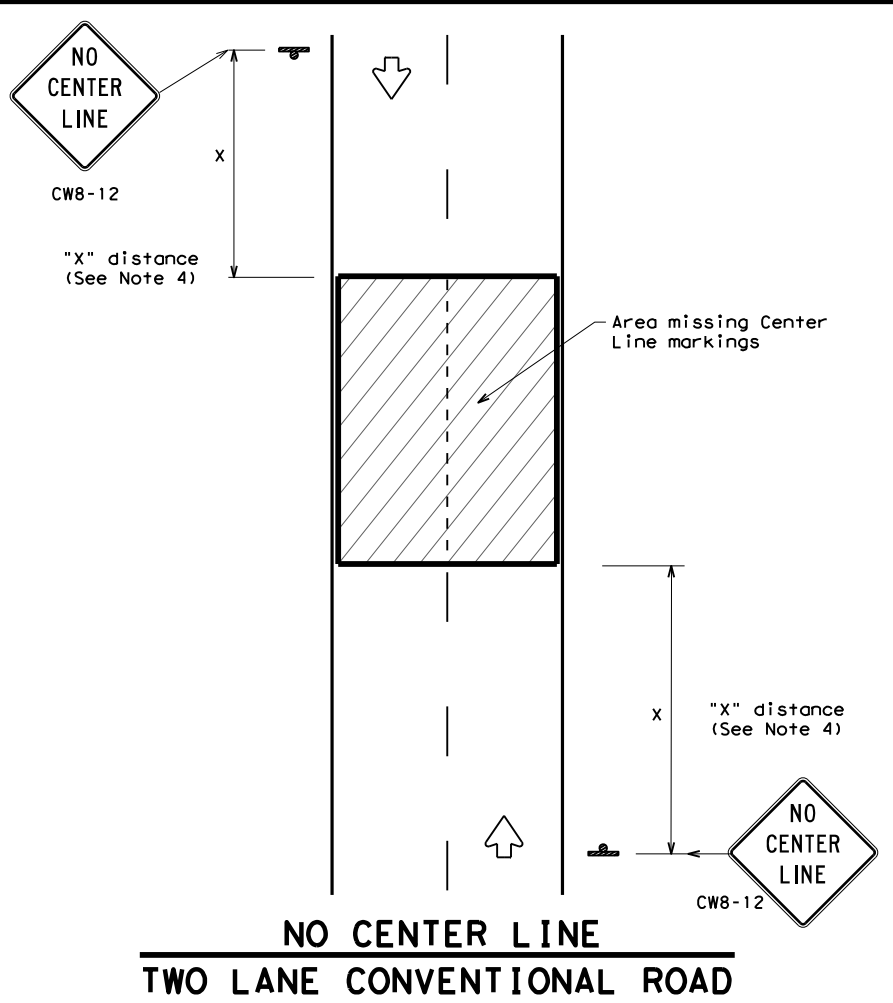
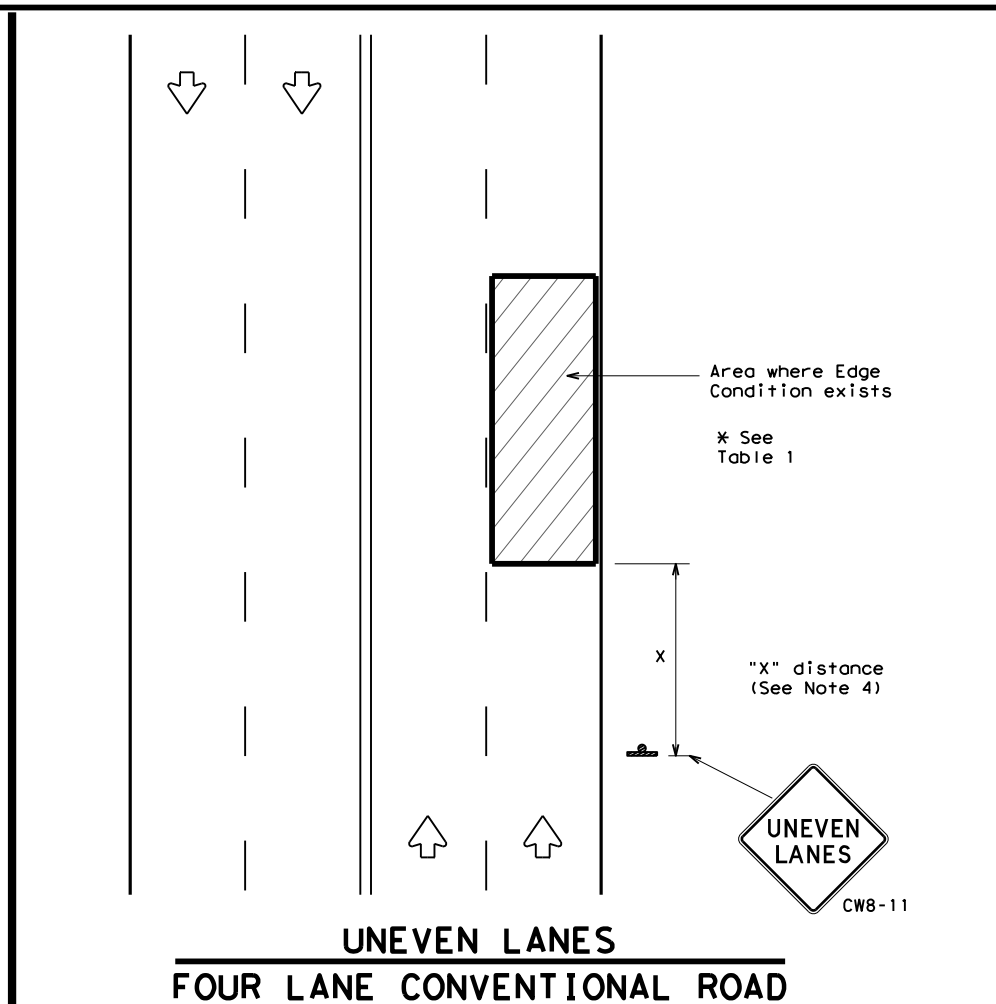
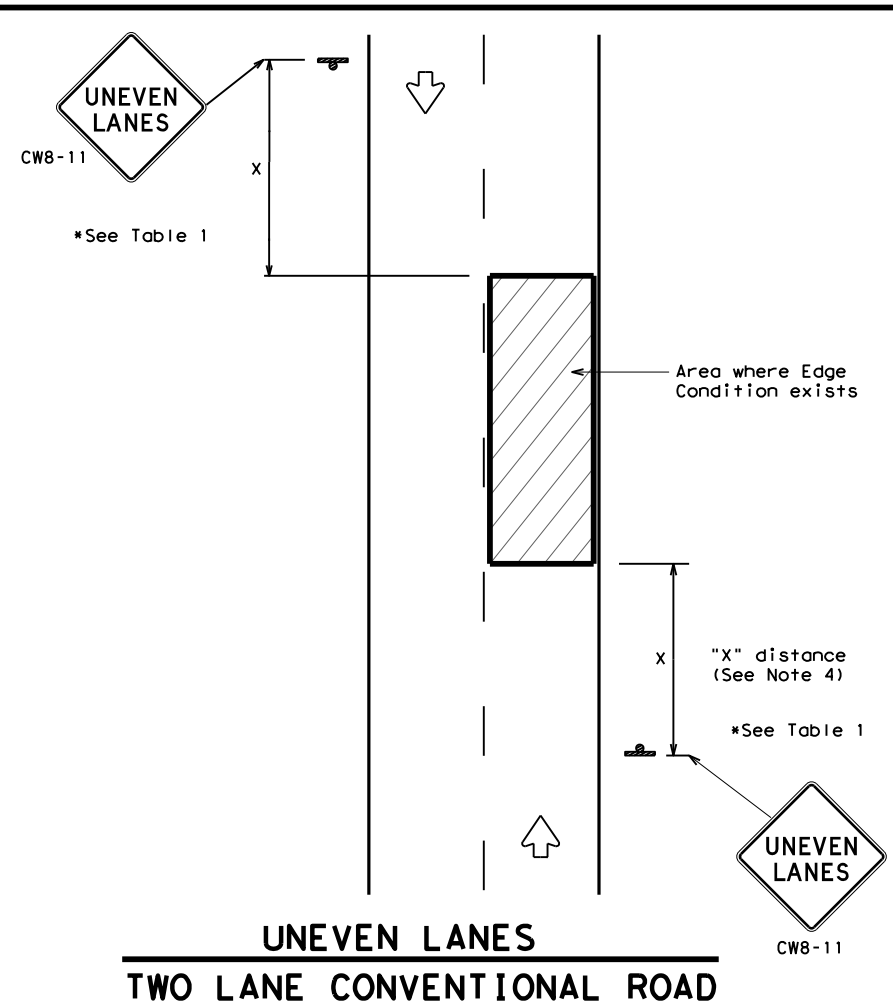
## WORK ZONE SHORT TERM PAVEMENT MARKINGS

### WZ (STPM) - 13

FILE:	wzstpm-13.dgn	DN:	TxDOT	CK:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	April 1992	CONT:	6411	SECT:	41	JOB:	OO1	HIGHWAY: VARIOUS	
REVISIONS:		DIST:		COUNTY:		SHEET NO.:			
1-97		SAT:		BEXAR		47			
3-03									
7-13									

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DATE: FILE:



DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B <sub>FL</sub> OR TYPE C <sub>FL</sub> SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

**GENERAL NOTES**

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

Edge Condition	Edge Height (D)	* Warning Devices
①	Less than or equal to: 1/4" (maximum-planing) 1/2" (typical-overlay)	Sign: CW8-11
②	Less than or equal to 3"	Sign: CW8-11
③	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

**TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.**

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation  
Traffic Operations Division Standard

## SIGNING FOR UNEVEN LANES

### WZ (UL) - 13

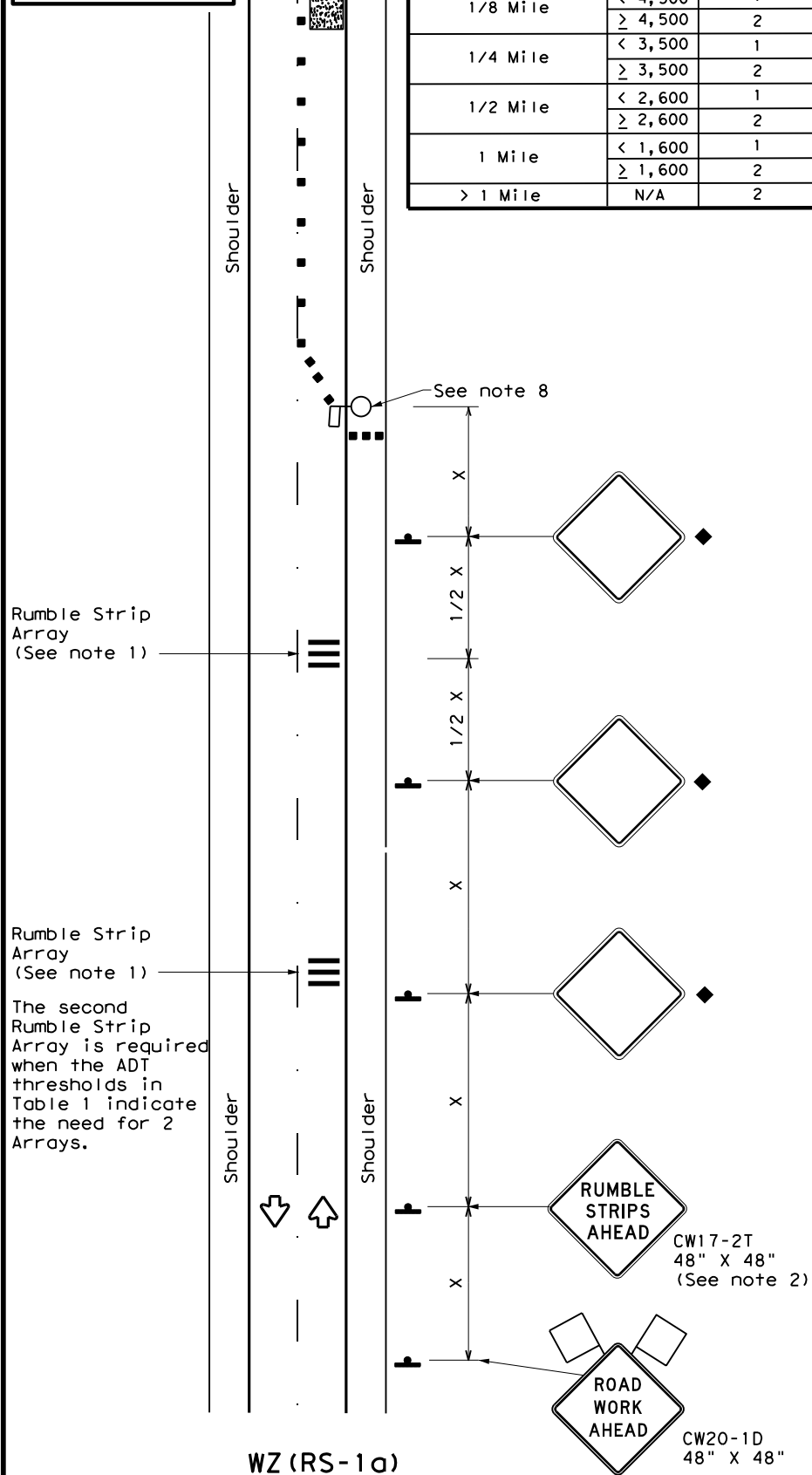
FILE: wzu1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
8-95 2-98 7-13	DIST	COUNTY	SHEET NO.	
1-97 3-03	SAT	BEXAR	48	



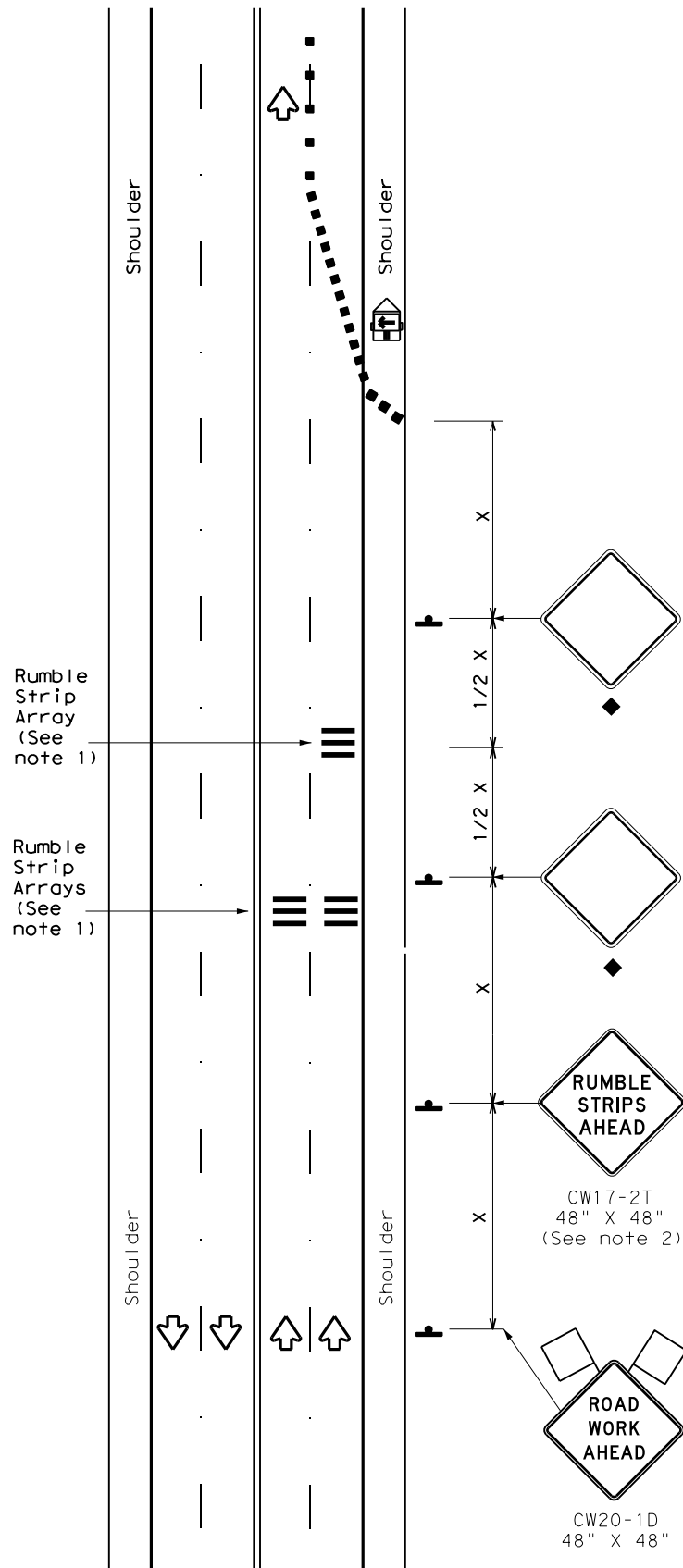
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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

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



**RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION**



**RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY**

**GENERAL NOTES**

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

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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40		265'	295'	320'	40'	80'	240'	155'
45	L = WS	450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60		600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.  
 \* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

Texas Department of Transportation Traffic Safety Division Standard

## TEMPORARY RUMBLE STRIPS

### WZ (RS) - 22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	SAT	BEXAR	49	


DATE: FILE:

7/19/2022 11:12:22 AM T:\Maint\Design\01 Maintenance Design Project Folder\GRMC\FY2023\GRMC\*6411\*41\*001\Pion Set\03 Roadway\GRMC\*GEN\*SUM\*MILL AND INLAY.dgn

MILL AND INLAY LOCATION SUMMARY

SECTION	ROADWAY	RM LIMITS		DIRECTION	GPS (DECIMAL DEGREES)		PHYSICAL LOCATION	LANE WIDTH (FT)	LENGTH OF REPAIR (FT)	TOTAL SQUARE YARDS	0354-6023	3076-6025	3076-6066	3085-6001
		FROM	TO		PLANE ASPH CONC PAVIO' TO 4' (SY)	D-GR HMAD-GR HMA TY-C SAC-B PG70-22 (TON)					TACK COAT (GAL)	UNDERSEAL COURSE (GAL)		
		LATITUDE	LONGITUDE											
EAST BEXAR	IH 410	22 + 0.263	23 + 0.151	EB & WB	29.5161	-98.456931	BROADWAY TO NACOGDOCHES	12	31,000	41,334	41,334	4,547	4,133	12,400
							NON-SITE SPECIFIC LOCATIONS			5,000	5,000	550	500	1,500
									<b>TOTAL</b>	<b>46,334</b>	<b>46,334</b>	<b>5,097</b>	<b>4,633</b>	<b>13,900</b>

NOTE: RM LIMITS, GPS LAT/LONG, AND PHYSICAL LOCATIONS ARE APPROXIAMATE. EXACT LOCATIONS TO BE IDENTIFIED BY THE ENGINEER IN THE FIELD AND IN THE WORK ORDER.



Texas Department of Transportation  
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**VARIOUS  
MILL AND INLAY  
LOCATION SUMMARY**

SHEET 01 OF 01

FED. DIV. NO.	FEDERAL AID PROJECT	SHEET NO.	
6		50	
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS


7/19/2022 11:12:23 AM T:\Maint\Design\01 Maintenance Design Project Folder\GRMC\FY2023\GRMC\*6411\*41\*001\Pion Set\03 Roadway\GRMC\*GEN\*SUM\*FLEX PAV REPAIR.dgn

FLEXIBLE PAVEMENT STRUCTURE REPAIR LOCATION SUMMARY

0351-6004
-----------

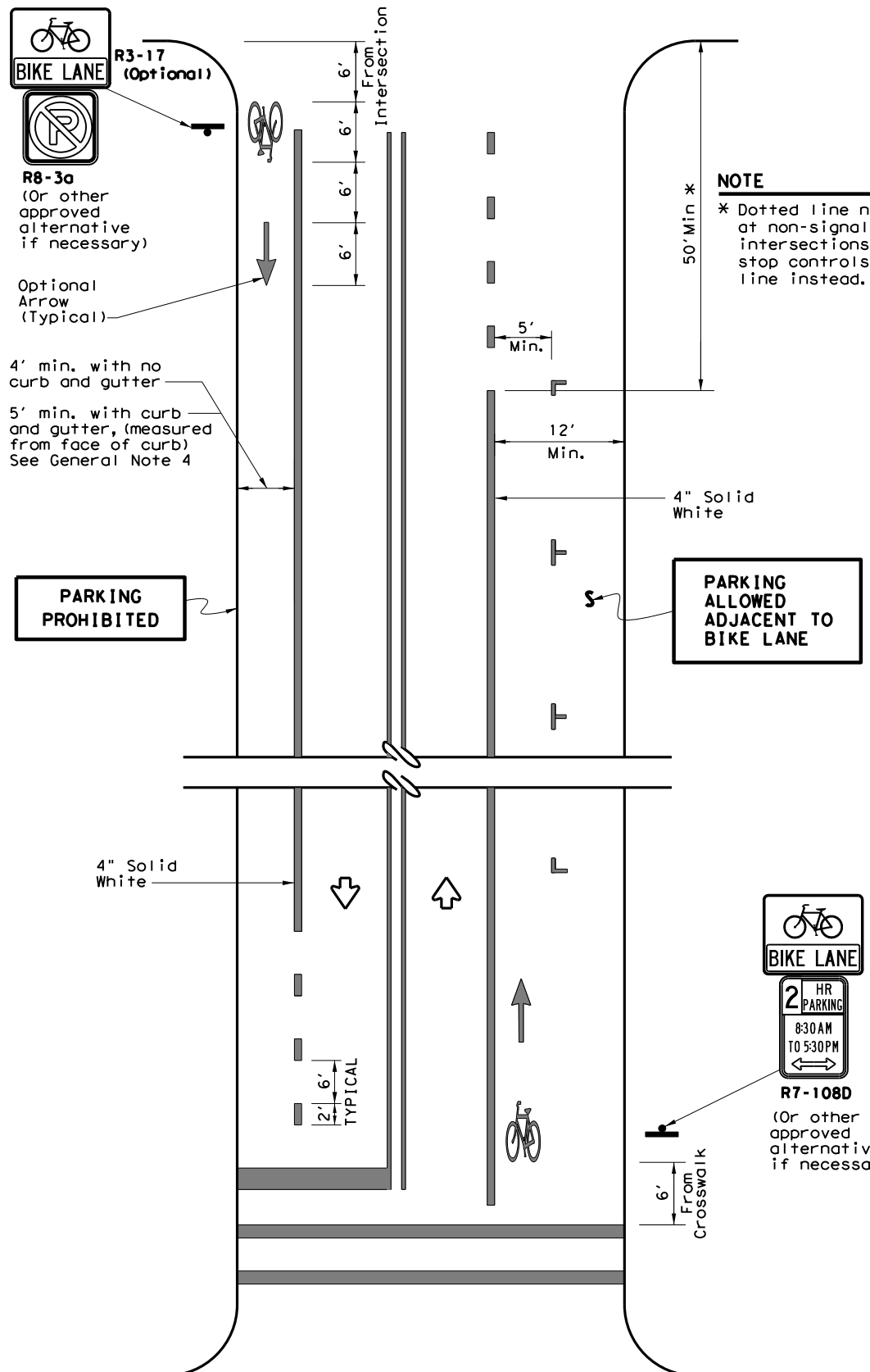
SECTION	ROADWAY	RM LIMITS		DIRECTION	GPS (DECIMAL DEGREES)		PHYSICAL LOCATION	LANE WIDTH (FT)	LENGTH OF REPAIR (FT)	TOTAL SQUARE YARDS	FLEXIBLE PAVEMENT STRUCTURE REPAIR(SY)
		FROM	TO		LATITUDE	LONGITUDE					
EAST BEXAR	IH 10	577 + 0.547	577 + 0.605	EB	29.408274	-98.437289	EBML AMANDA ST. BRIDGE APPROACH	13	150	217	217
EAST BEXAR	IH 37	130 + 0.076	130 + 0.080	EB & WB	29.281767	-98.395707	SOUTHTON RD INTERSECTION UNDER IH 37	37	685	2,817	2,817
EAST BEXAR	LP 1604	540 + 1.947	542 + 0.003	SB	29.532651	-98.3012	SBML DEPARTURE FROM FM 78 OVERPASS	26	410	1,184	1,184
EAST BEXAR	LP 1604	540 + 1.947	542 + 0.003	NB	29.532801	-98.3010	NBML APPROACH TO FM 78 OVERPASS	26	167	482	482
NON-SITE SPECIFIC LOCATIONS										1,567	1,567
<b>TOTAL</b>										<b>6,267</b>	<b>6,267</b>

NOTE: RM LIMITS, GPS LAT/LONG, AND PHYSICAL LOCATIONS ARE APPROXIMATE. EXACT LOCATIONS TO BE IDENTIFIED BY THE ENGINEER IN THE FIELD AND IN THE WORK ORDER. STRUCTURAL PAVEMENT REPAIR LOCATIONS MAY NOT BE CONTINUOUS. EXACT LENGTHS AND WIDTHS OF PAVEMENT REPAIR AREAS WILL BE PROVIDED BY THE ENGINEER.

 Texas Department of Transportation © 2022			
<b>VARIOUS FLEXIBLE PAVEMENT STRUCTURE REPAIR LOCATION SUMMARY</b>			
SHEET 01 OF 01			
FED. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
6			51
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
6411	41	001	VARIOUS

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DATE:  
FILE:



**NOTES**

1. Bicycle lane pavement markings typically repeated after each intersection or signalized driveway.
2. On uninterrupted sections of roadway, bicycle lane pavement markings typically repeated as follows:  
-1200' for 45 MPH or less roads  
-2500' for 50 MPH and greater roads.

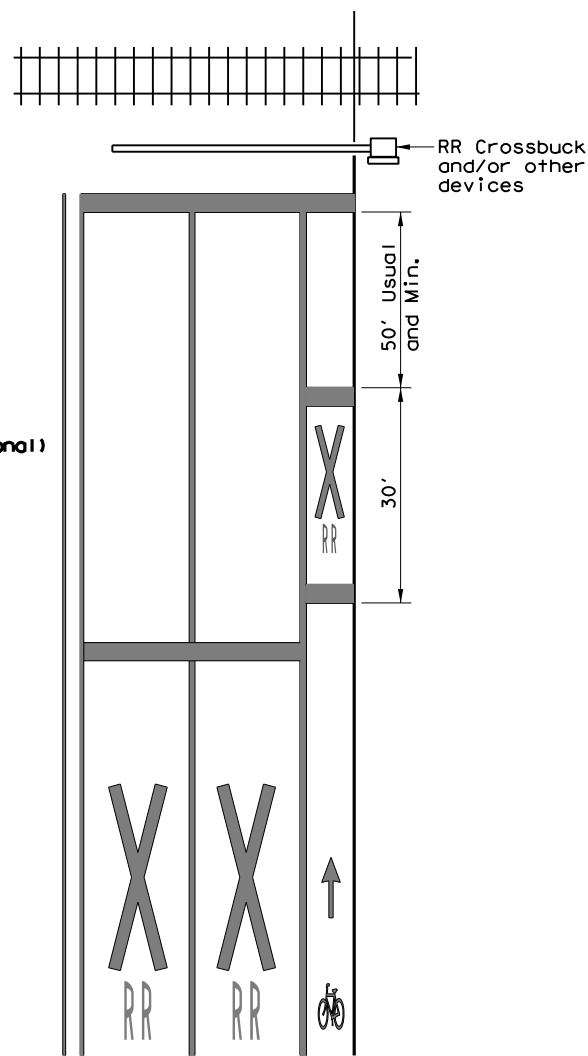
**TWO-WAY STREET**

**GENERAL NOTES**

1. All bicycle lane pavement markings shall be white unless otherwise noted.
2. All pavement marking materials shall meet the required Department Material Specifications as specified by the plans.
3. Exact sign placement and details are shown elsewhere in the plans.
4. The current edition of AASHTO'S Guide for the Development of Bicycle Facilities should be referenced for variations in design, other geometric conditions, and lane width options.
5. Other bicycle lane symbol or word markings as shown in the Texas Manual on Uniform Traffic Control Devices may be used. Details for words, arrows and symbols as shown in the Standard Highway Sign Designs for Texas.
6. The "BIKE LANE" (R3-17) sign with the "AHEAD" (R3-17a) sign mounted directly below should be installed in advance of the beginning of a marked bike lane.
7. The "BIKE LANE" (R3-17) sign with the "END" (R3-17b) sign mounted directly below should be installed at the end of marked bicycle lane.

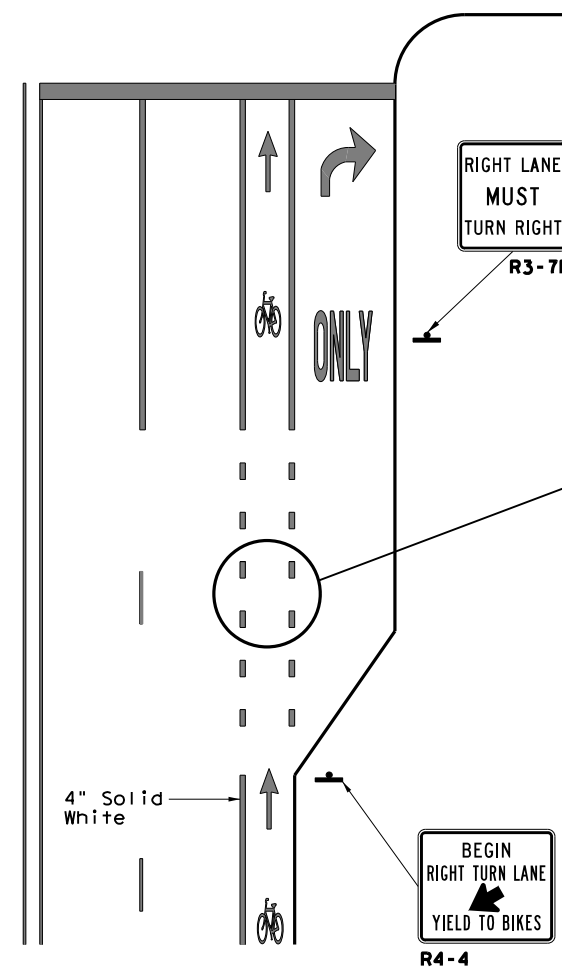
**NOTE**

\* Dotted line not necessary at non-signalized minor intersections with no stop controls; Use solid line instead.



(See RCPM Standard for travel lane details)

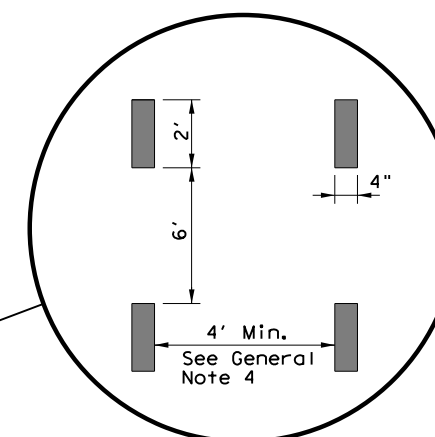
**RAILROAD CROSSING APPROACH**



**RIGHT TURN ONLY LANE**

LEGEND	
	Sign
	Traffic Flow

SPECIFICATION REFERENCE TABLE	
Traffic Paint	DMS-8200
Hot Applied Thermoplastic	DMS-8220
Permanent Prefabricated Pavement Markings	DMS-8240
Glass Traffic Beads	DMS-8290



**DETAIL "A"**

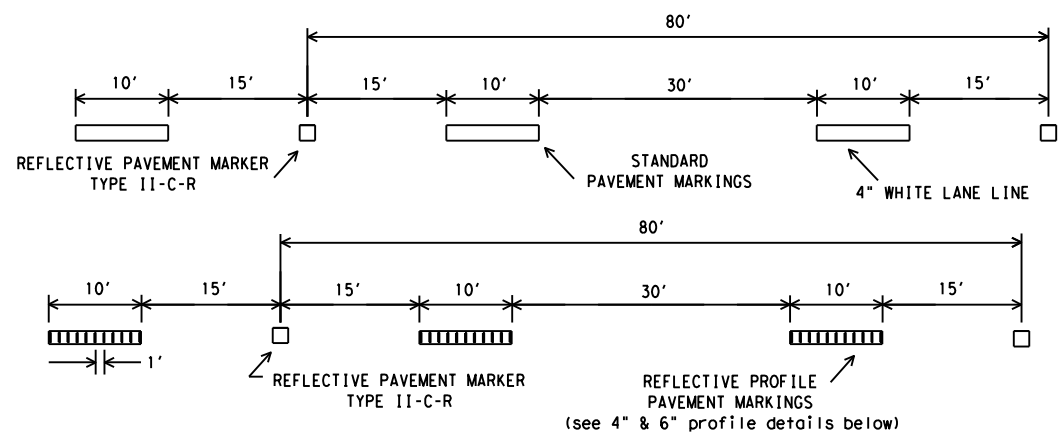
Texas Department of Transportation  
Traffic Operations Division

**BICYCLE LANE  
PAVEMENT MARKINGS**

**BLPM-10**

© TxDOT	May 2010	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
6411	41	001	VARIOUS		
DIST	COUNTY	SHEET NO.			
SAT	BEXAR	52			

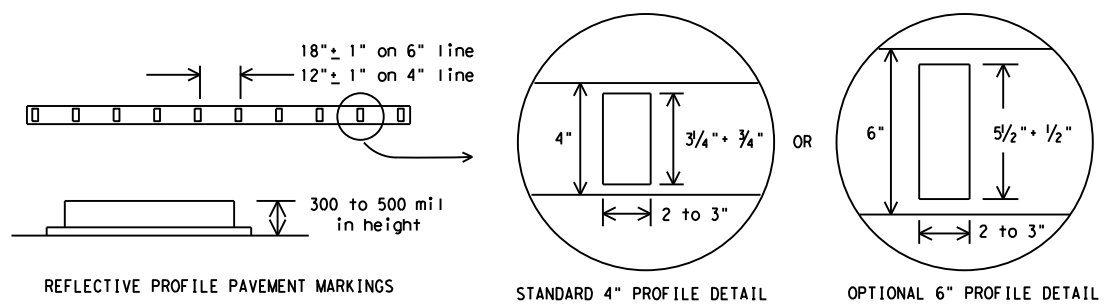
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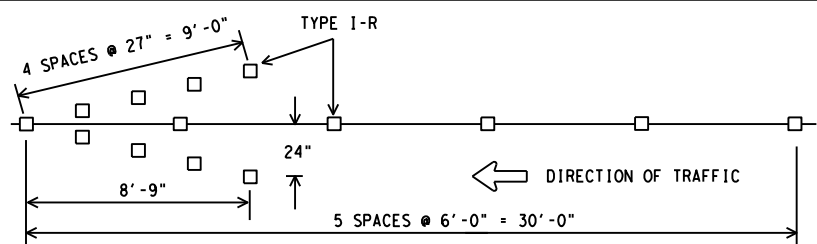
PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

**TRAFFIC LANE LINES PAVEMENT MARKING DETAILS**

EDGE LINES SHOULD TYPICALLY BE 4" WIDE AND THE MATERIALS SHALL BE AS SPECIFIED IN THE PLANS. IF RAISED PROFILE PAVEMENT MARKINGS ARE USED SEE DETAILS BELOW.

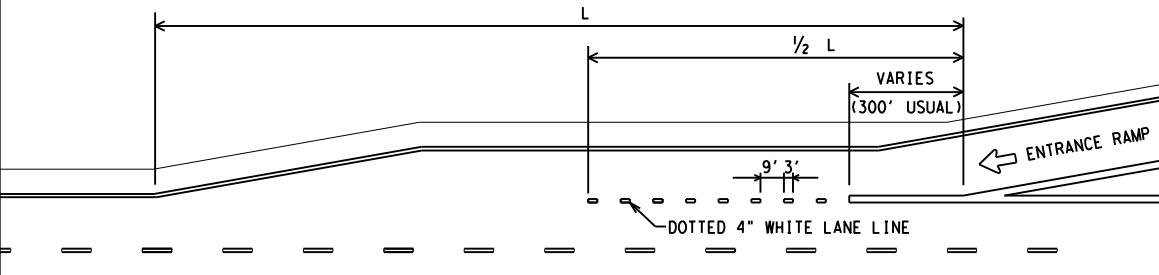


**EDGE LINE PAVEMENT MARKINGS**

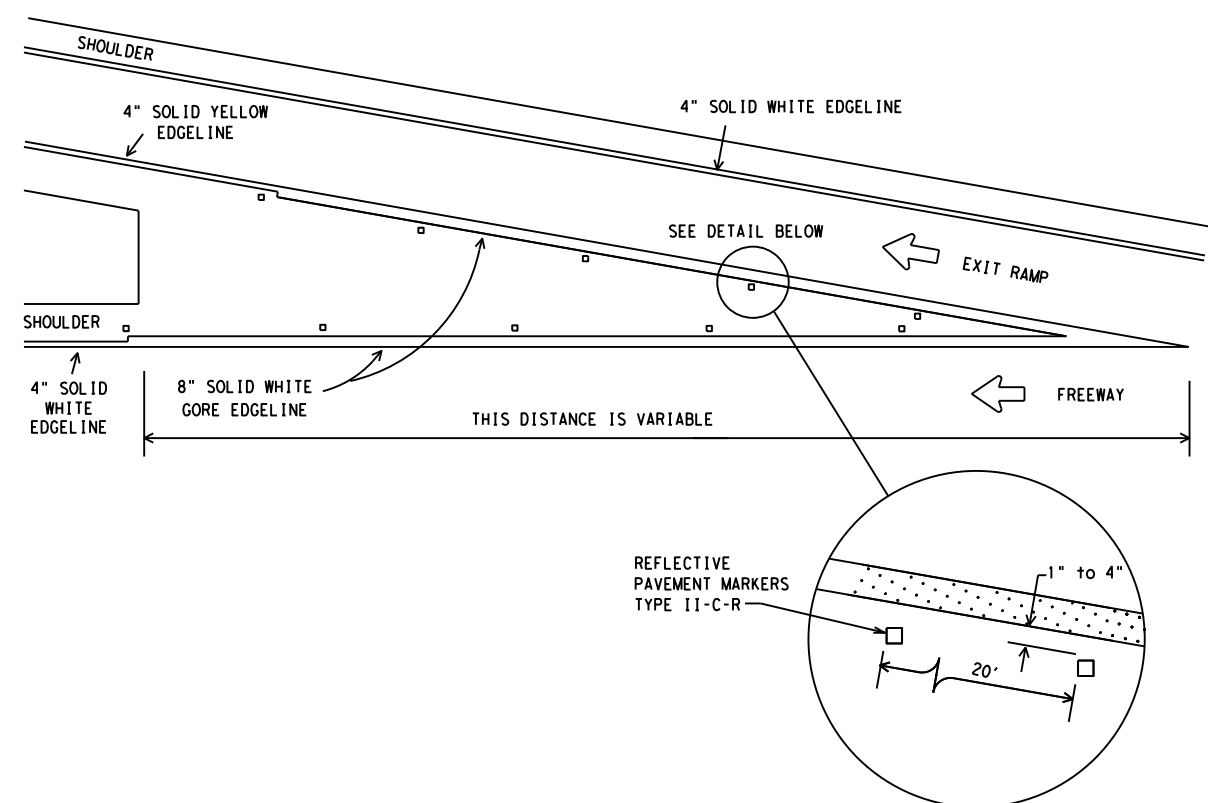


ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED. REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMP. LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

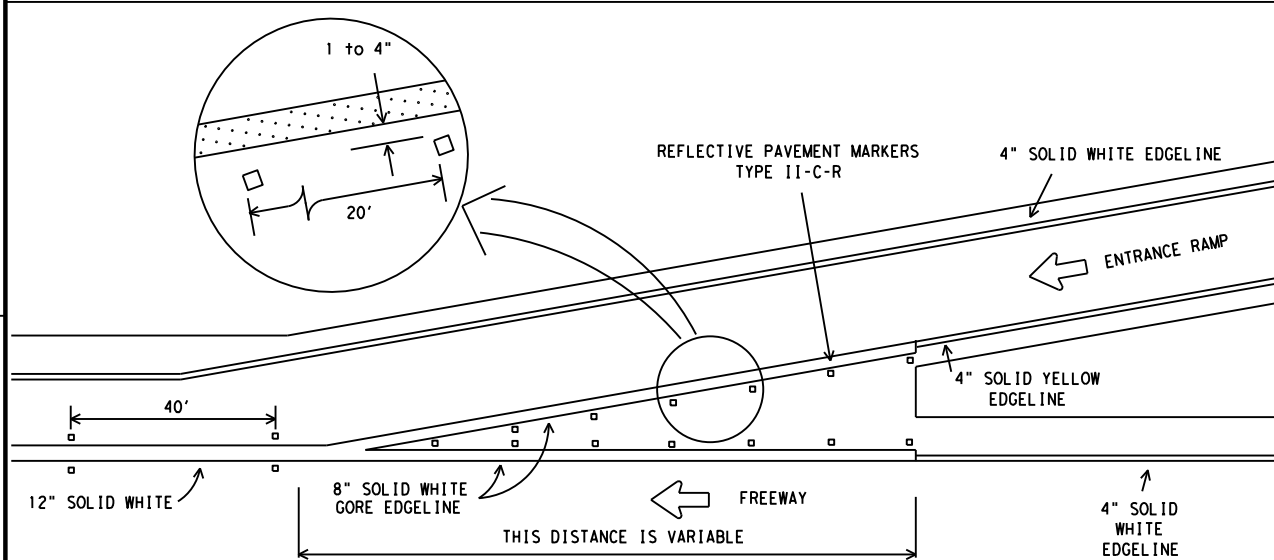
**WRONG WAY ARROW DETAIL**



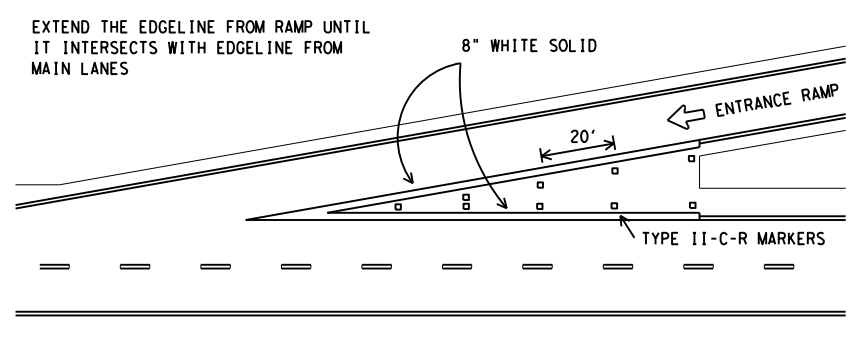
**PARALLEL ACCELERATION LANE**



**TYPICAL EXIT RAMP GORE MARKING**



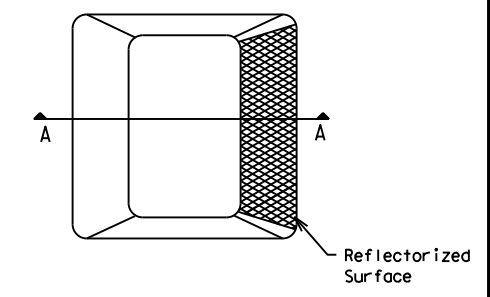
**TYPICAL ENTRANCE RAMP GORE MARKING**



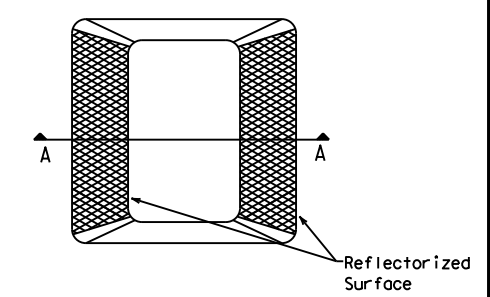
**TAPERED ACCELERATION LANE**

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

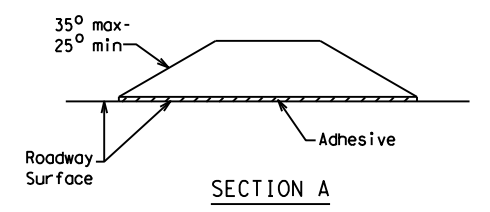
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

**RAISED PAVEMENT MARKERS**

Texas Department of Transportation  
Traffic Operations Division

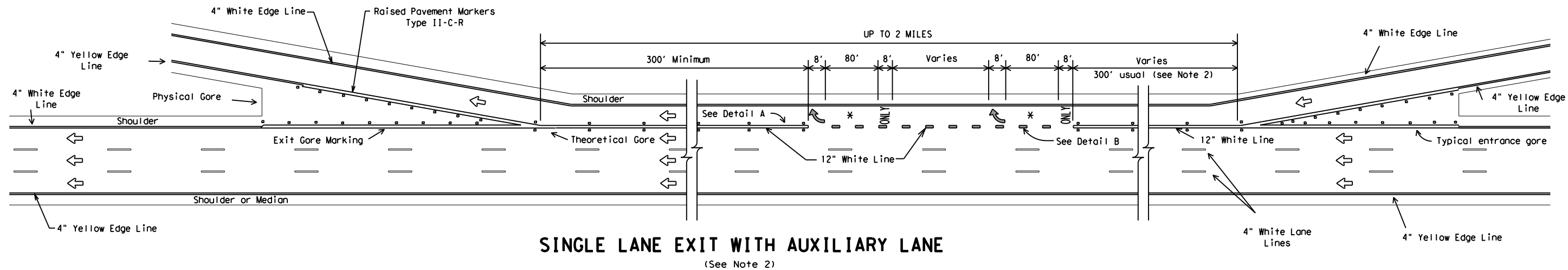
**TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS**  
FPM(1)-12

© TxDOT May 1974		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10	6411	41	OOI	VARIOUS
5-00	2-12	DIST		COUNTY	SHEET NO.
8-00		SAT		BEXAR	53
2-08					

DATE:  
FILE:

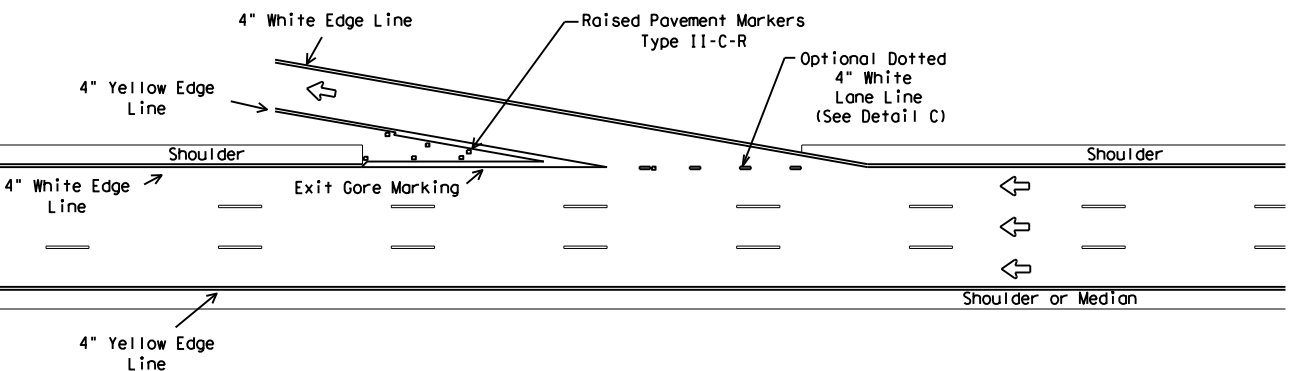
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:  
FILE:

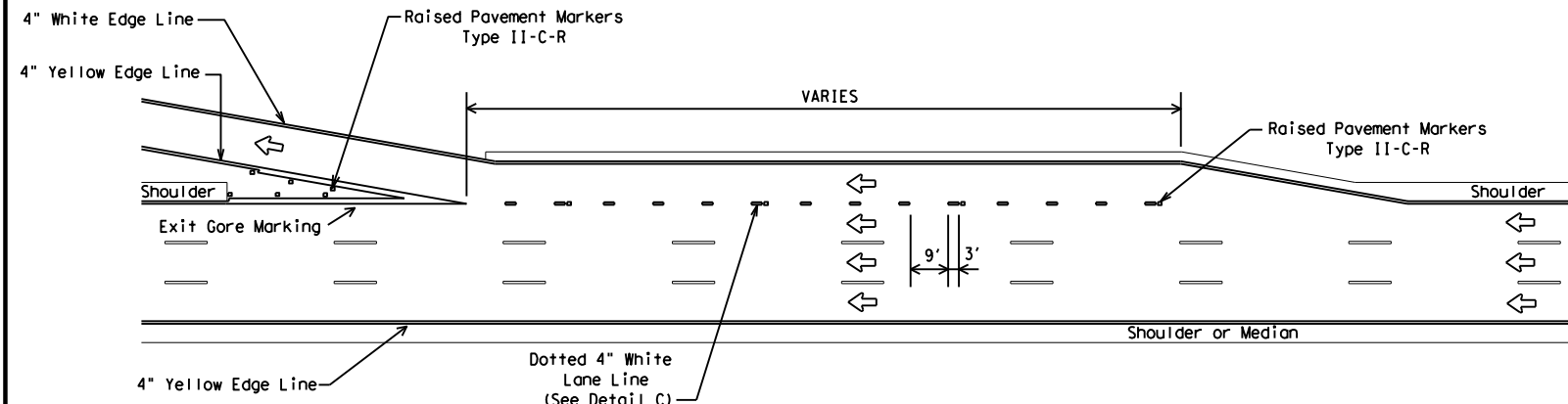


**SINGLE LANE EXIT WITH AUXILIARY LANE**

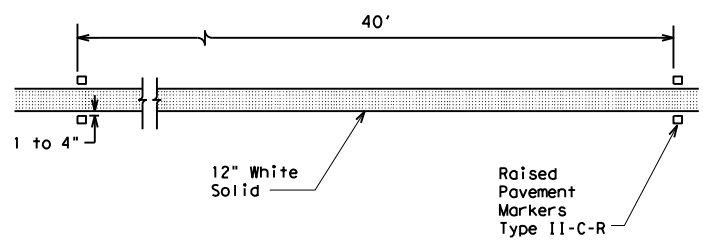
(See Note 2)



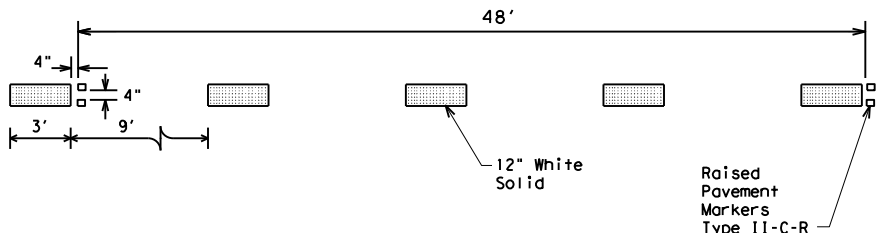
**TAPERED DECELERATION LANE**



**PARALLEL DECELERATION LANE**

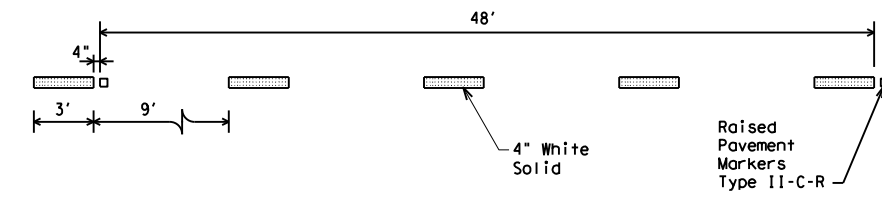


**DETAIL A**



**DETAIL B**

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



**DETAIL C**

Normal (4") Dotted Lane Line (See Note 4)

**GENERAL NOTES**

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (4") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

LEGEND	
←	Denotes direction of traffic.
↪	Pavement marking arrows (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used

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

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

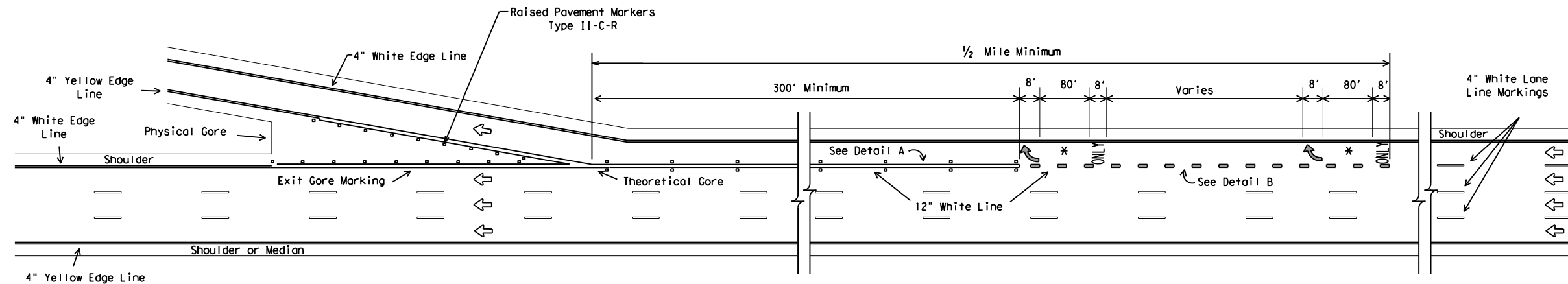


**TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPs**  
**FPM(2)-12**

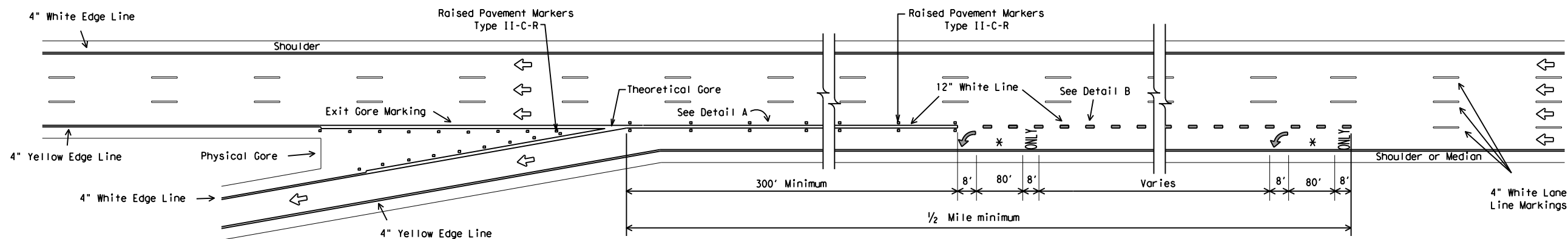
© TxDOT February 1977		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10	6411	41	OO1	VARIOUS
8-95	2-12				
5-00		DIST	COUNTY		SHEET NO.
8-00		SAT	BEXAR		54

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DATE:  
FILE:

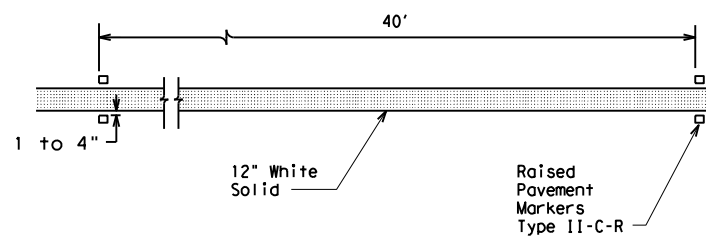


**SINGLE LANE EXIT - LANE DROP OR EXIT ONLY**

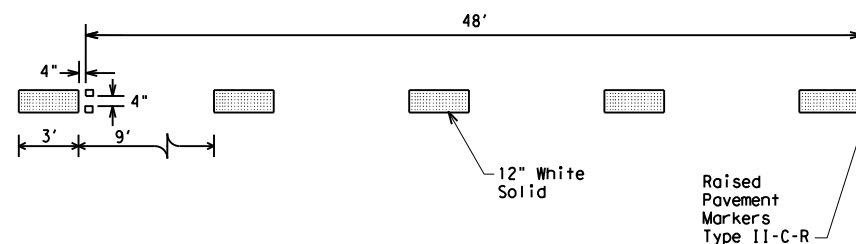


**SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFTHAND)**

LEGEND	
←	Denotes direction of traffic.
↪	Pavement marking arrows (white)
✱	Arrow markings are optional, however "ONLY" is required if arrow is used



**DETAIL A**



**DETAIL B**

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

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

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

**GENERAL NOTES**

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

**Texas Department of Transportation**  
Traffic Operations Division

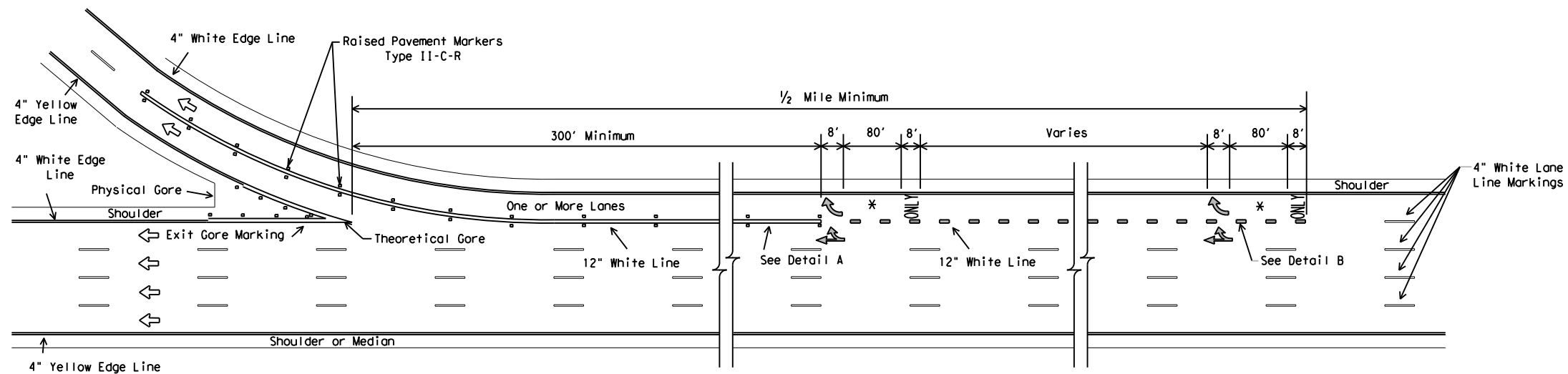
**TYPICAL STANDARD  
FREEWAY PAVEMENT MARKINGS  
LANE DROP (EXIT ONLY) EXIT RAMPS  
FPM(3) - 12**

REVISIONS		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
NO.	DATE	CON.	SECT.	JOB	HIGHWAY
5-00		6411	41	OOI	VARIOUS
8-00					
2-10					
2-12		SAT		BEXAR	55

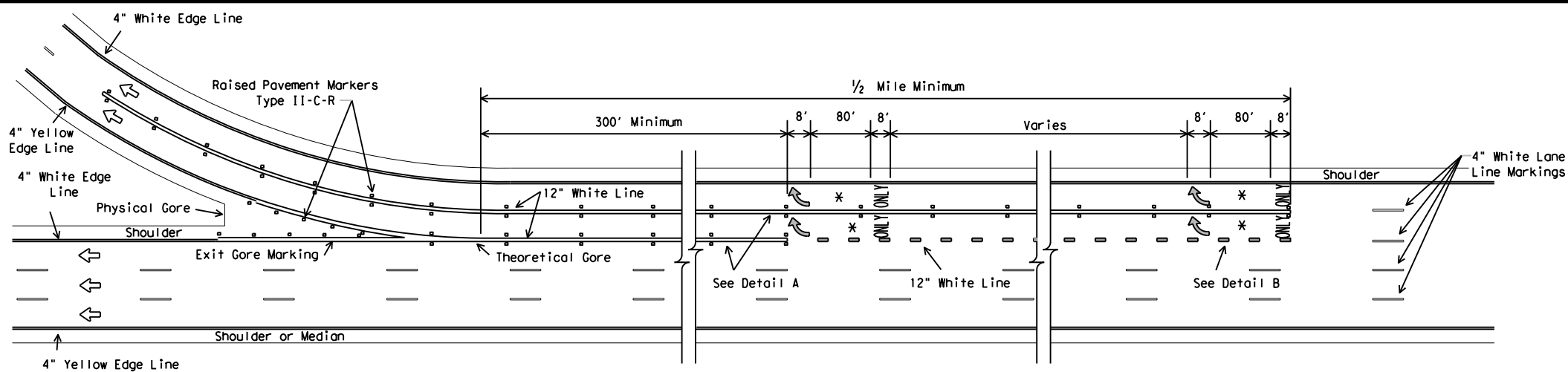


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DATE:  
FILE:



**MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE**

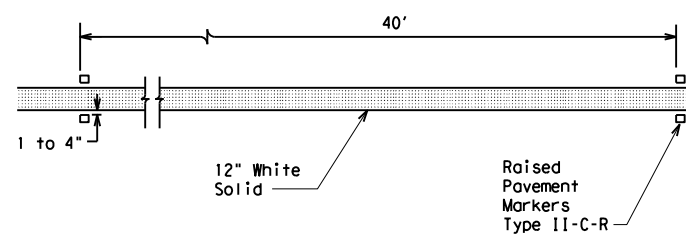


**MULTIPLE LANE EXIT ONLY**

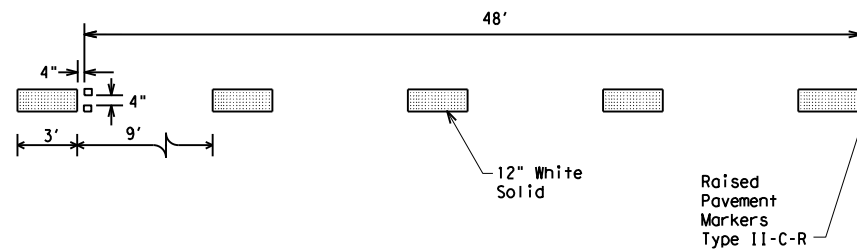
LEGEND	
	Denotes direction of traffic
	Pavement marking arrow (white)
	Optional Pavement Marking Arrows (white)
	Arrow markings are optional, however "ONLY" is required if arrow is used

**GENERAL NOTES**

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



**DETAIL A**



**DETAIL B**

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

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

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

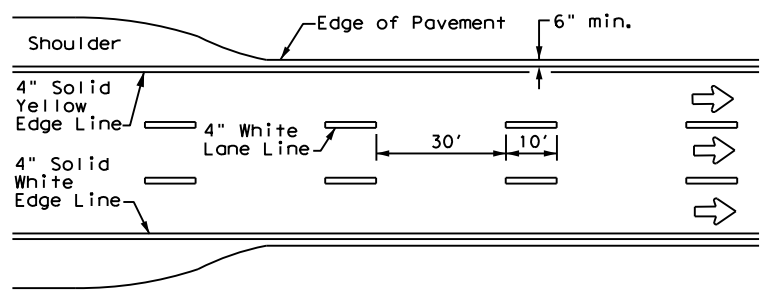


**TYPICAL STANDARD  
FREEWAY PAVEMENT MARKINGS  
LANE DROP (EXIT ONLY) DETAILS**

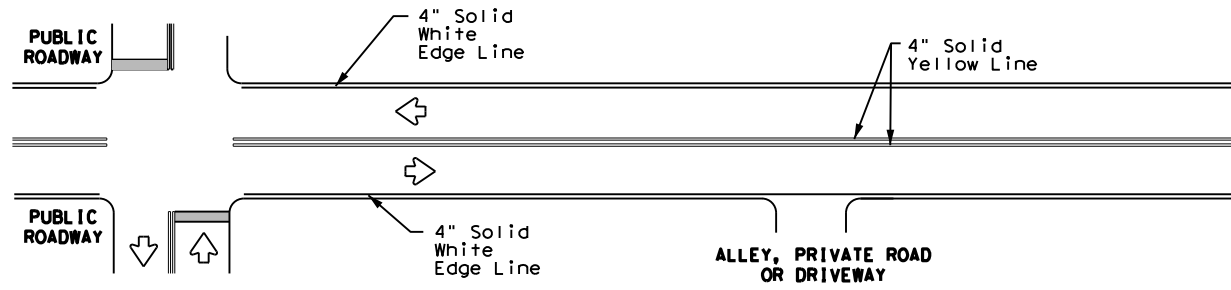
**FPM(4) - 12**

© TxDOT April 1992		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS					
CONT	SECT	JOB	HIGHWAY		
6411	41	OO1	VARIOUS		
DIST	COUNTY		SHEET NO.		
SAT	BEXAR		56		

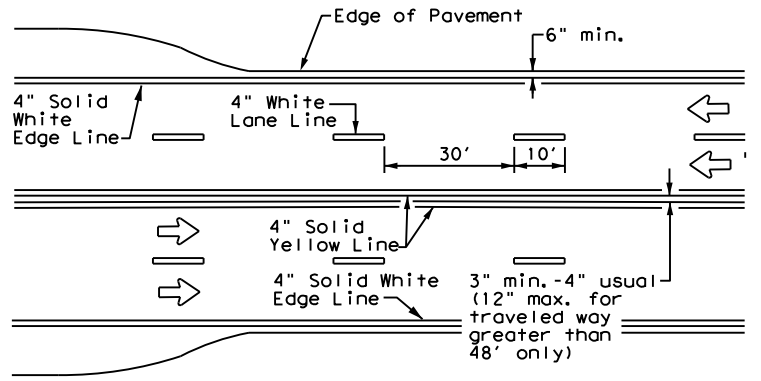
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



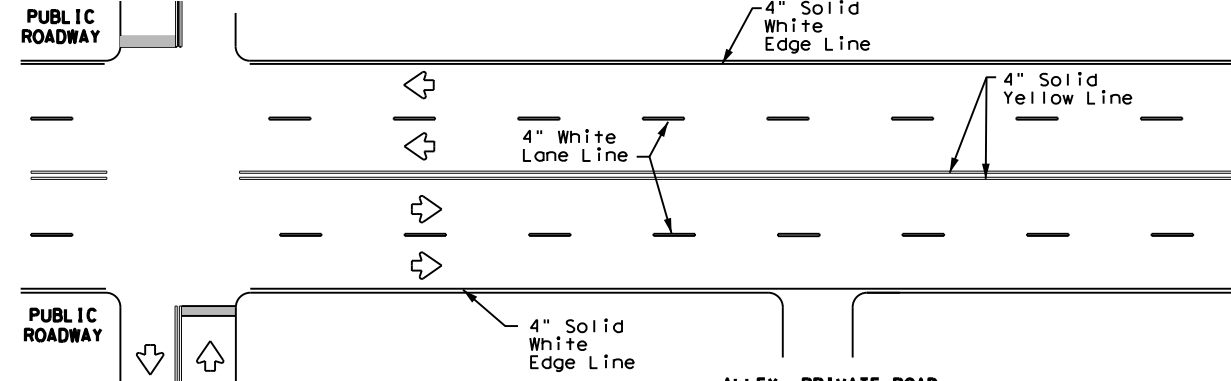
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



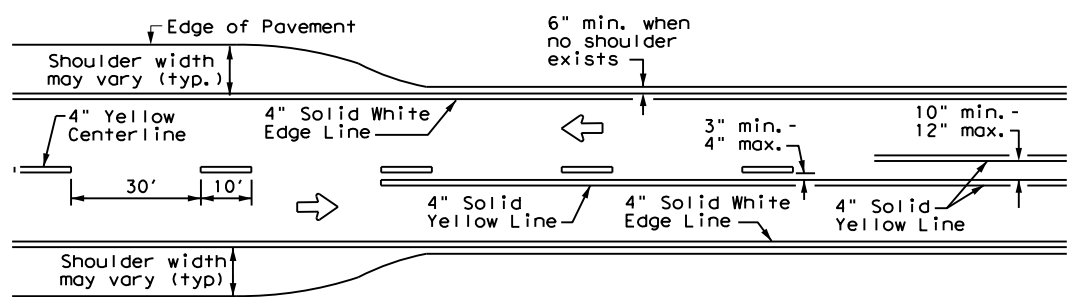
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



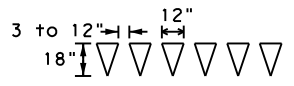
**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



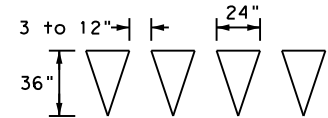
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



**TWO LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

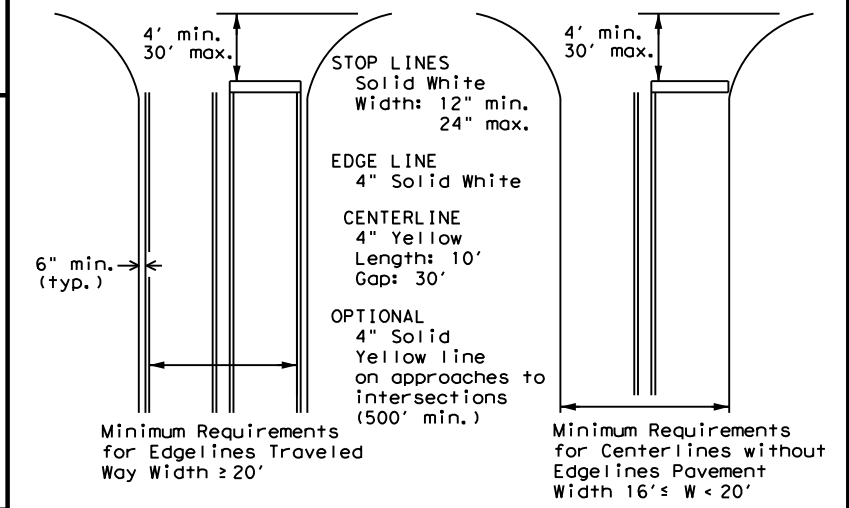
**YIELD LINES**

**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 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.

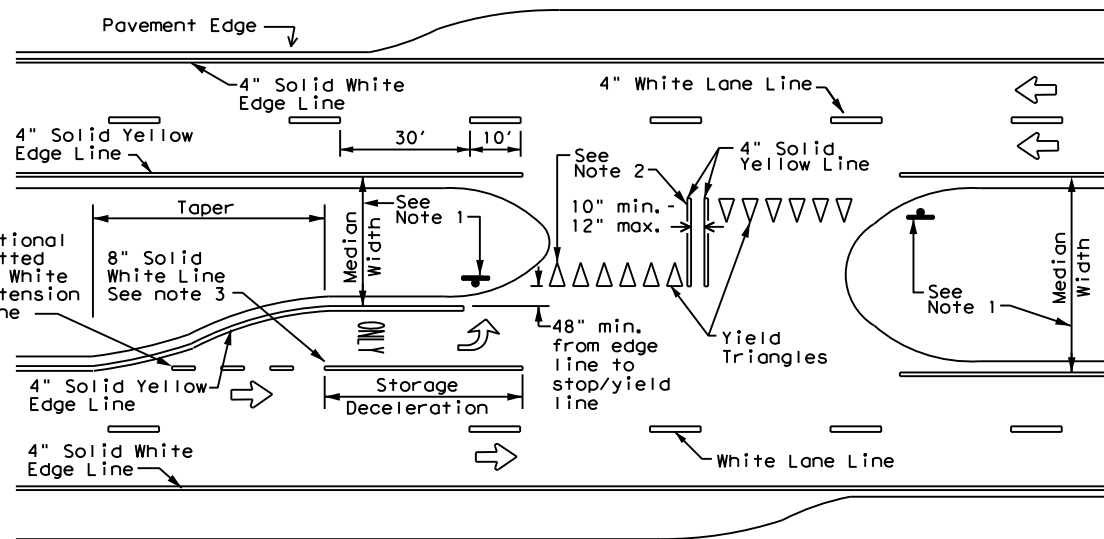
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

**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.
2. 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 triangles shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.



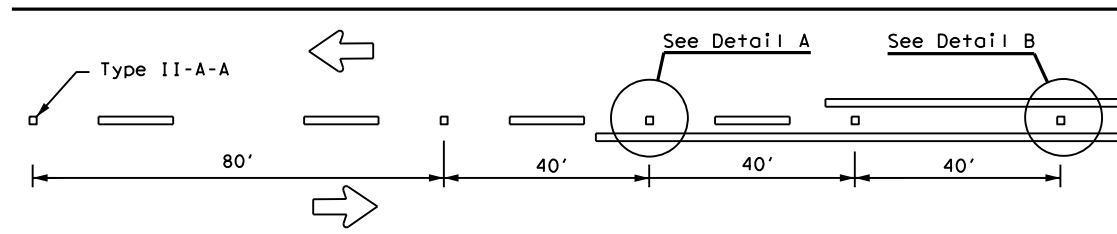
**TYPICAL STANDARD  
PAVEMENT MARKINGS**

**PM(1) - 20**

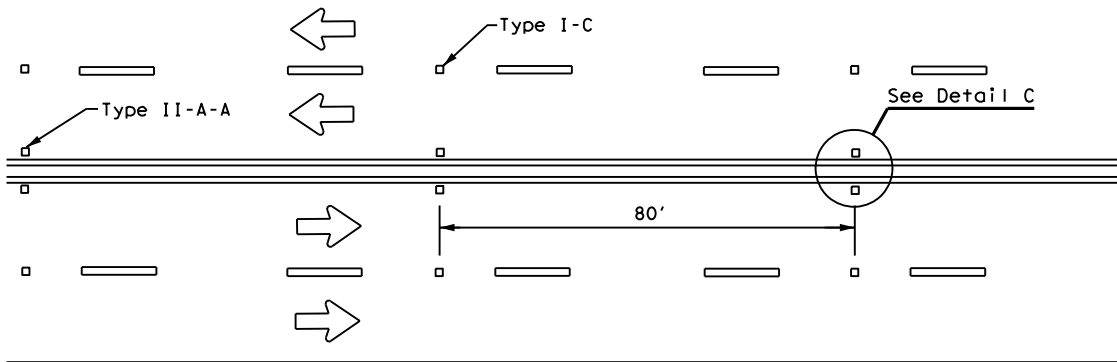
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
8-95 3-03 REVISIONS	6411	41	001	VARIOUS
5-00 2-12	DIST	COUNTY	SHEET NO.	
8-00 6-20	SAT	BEXAR	57	

# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

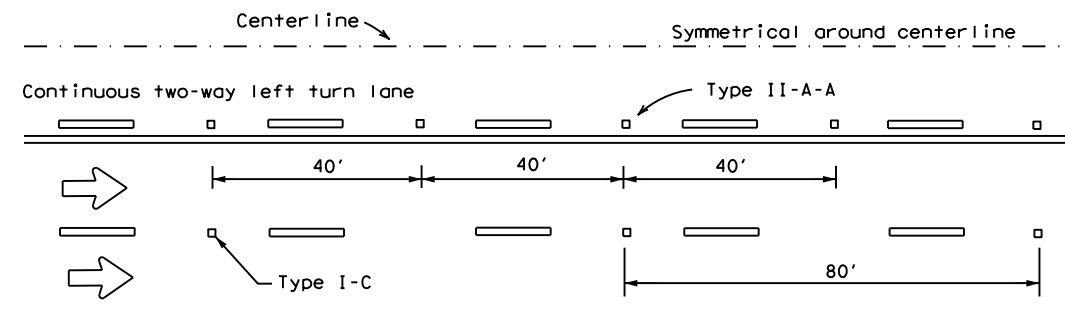
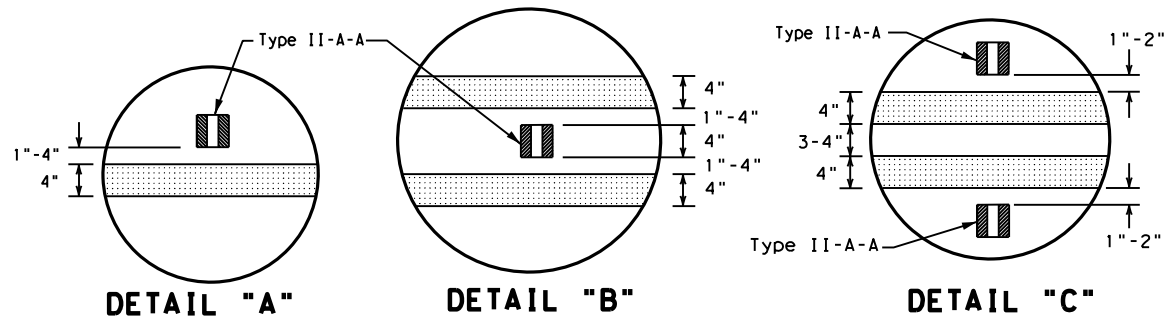
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



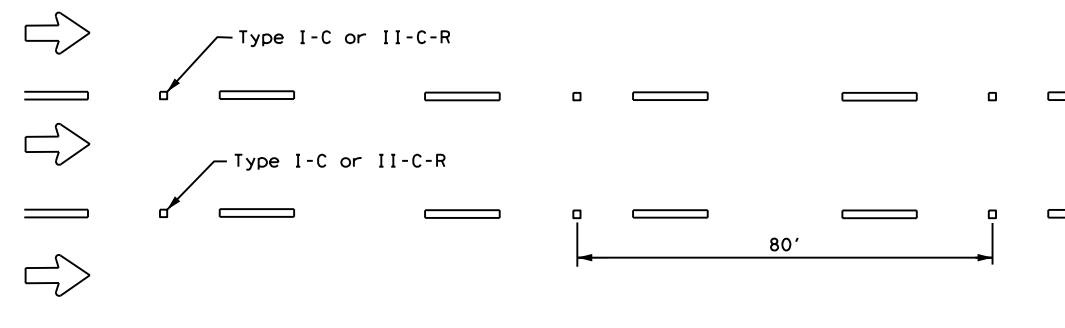
**CENTERLINE FOR ALL TWO LANE ROADWAYS**



**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY HIGHWAYS**



**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**

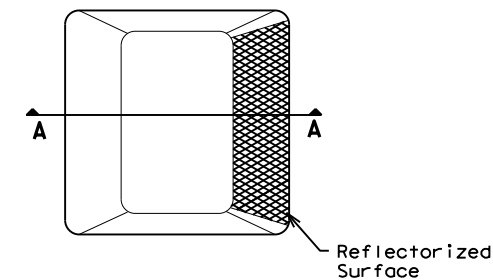


**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

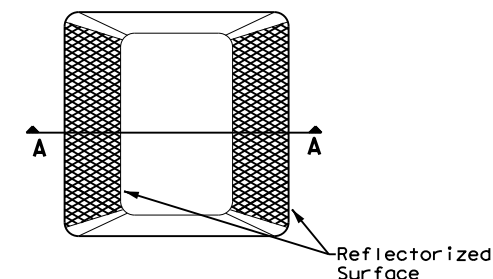
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

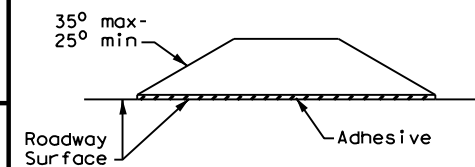
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

**RAISED PAVEMENT MARKERS**

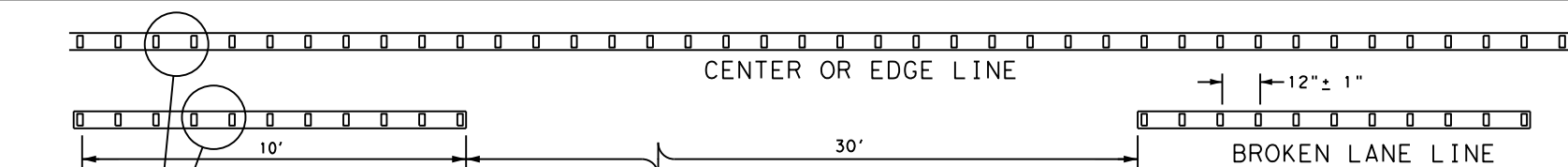


## POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2) - 20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
4-92 2-10 REVISIONS	6411	41	001	VARIOUS
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	BEXAR		58

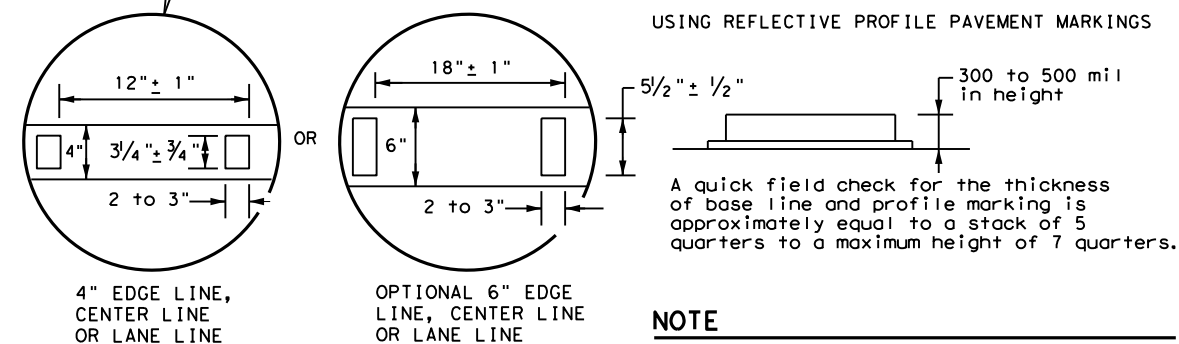
### GENERAL NOTES

- All raised pavement markers placed in 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.



### REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

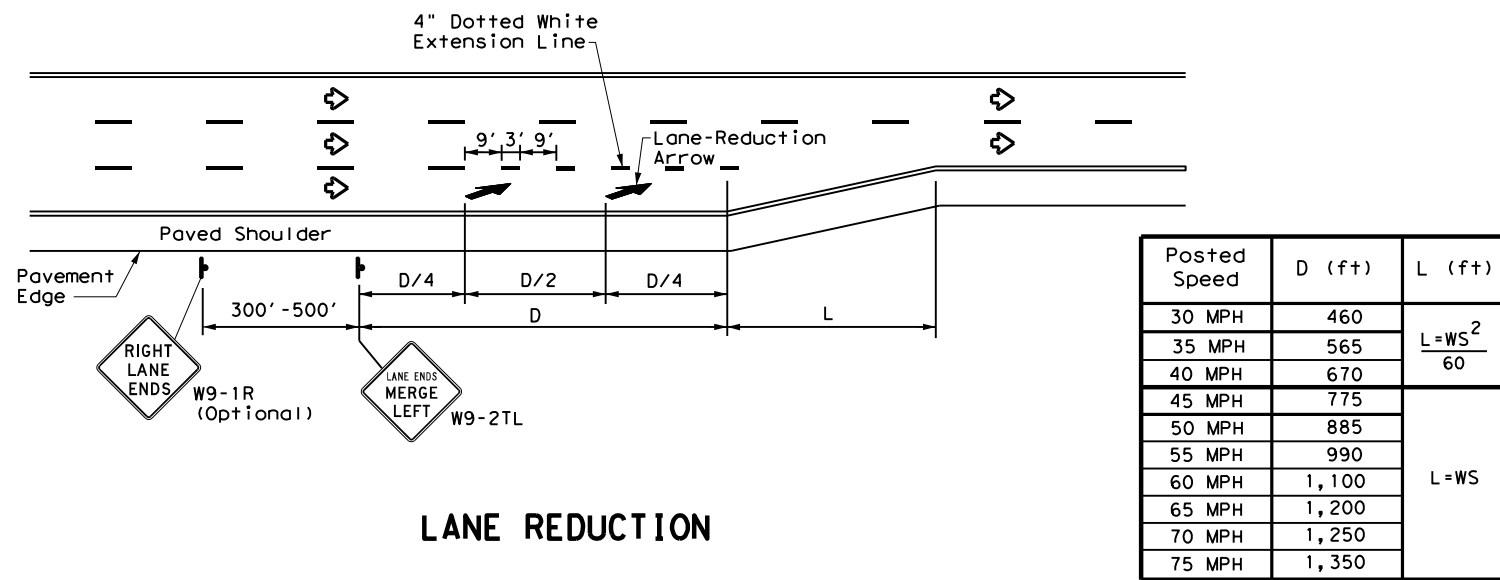


### NOTE

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

DATE:  
FILE:

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Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	L = WS
45 MPH	775	
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

**NOTES**

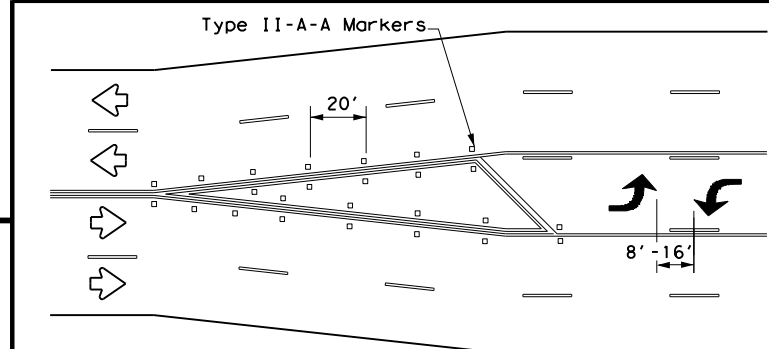
- Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
- On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
- For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

**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.
- 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 pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

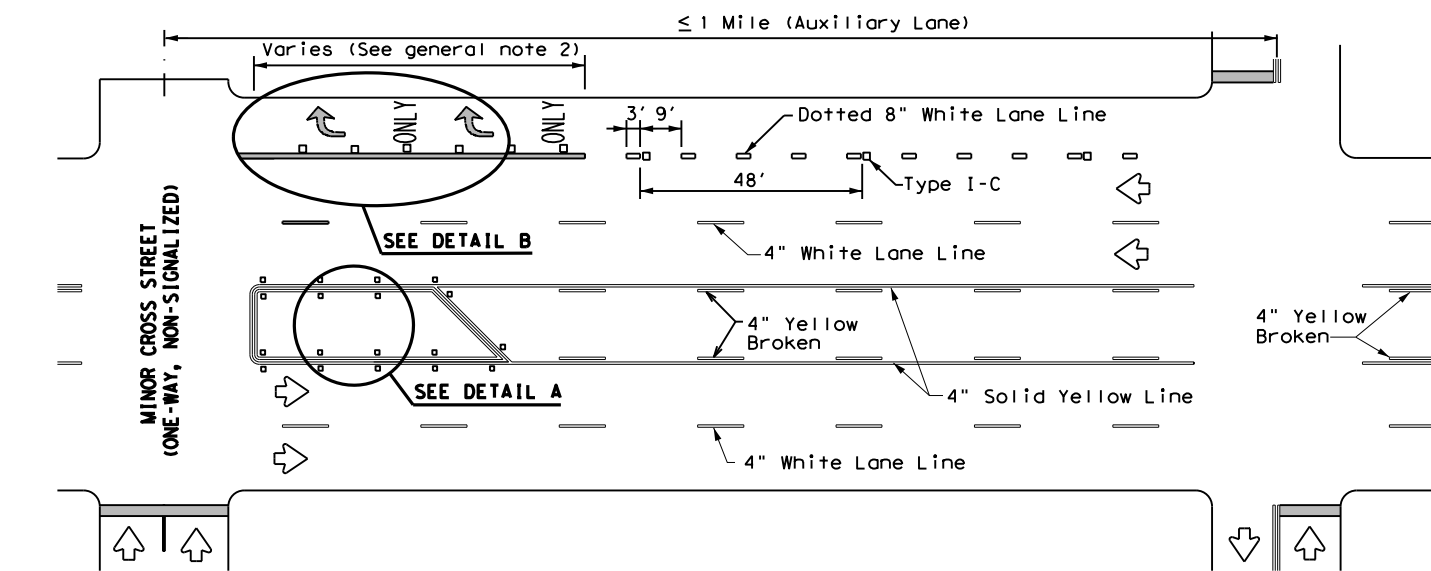
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

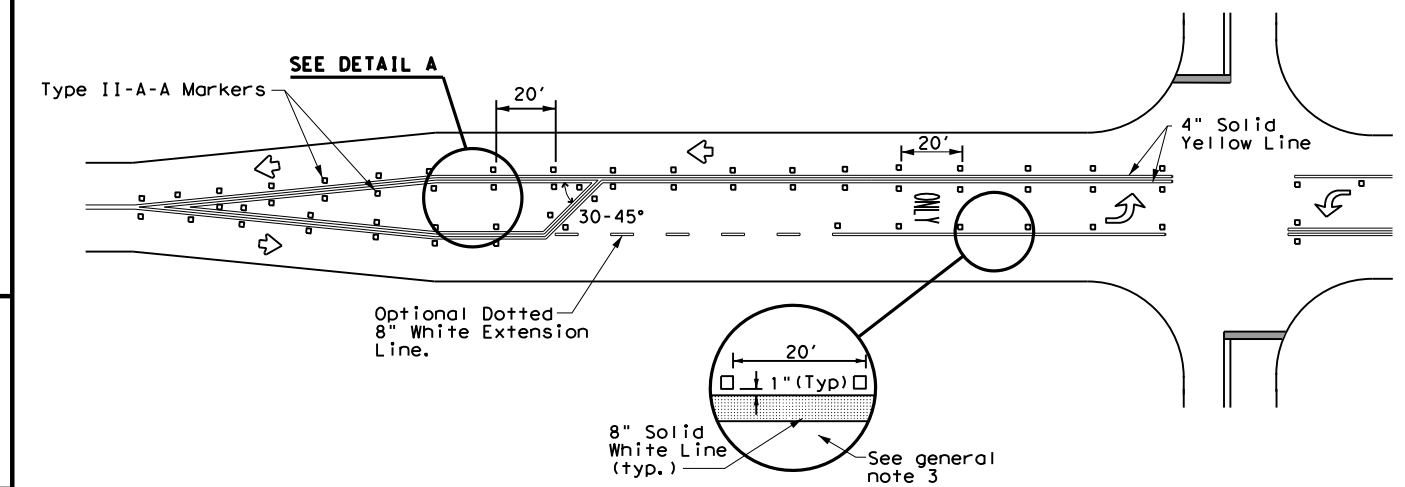


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

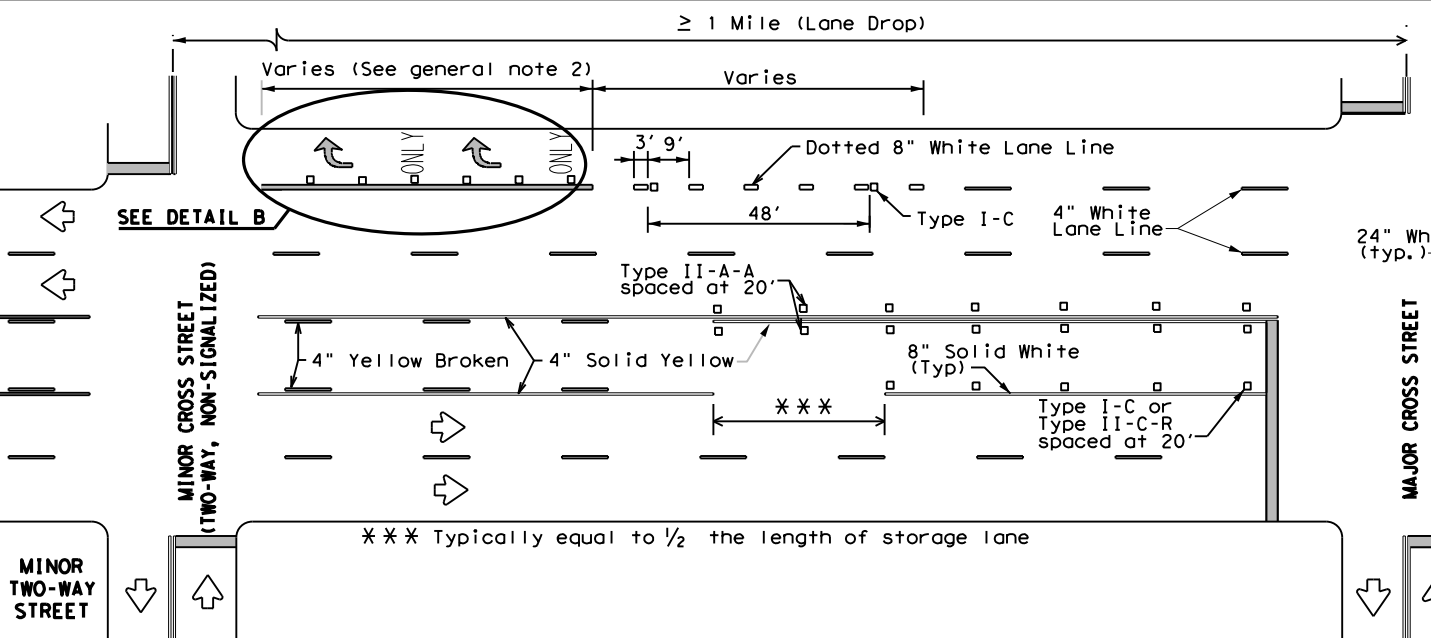
**TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY**



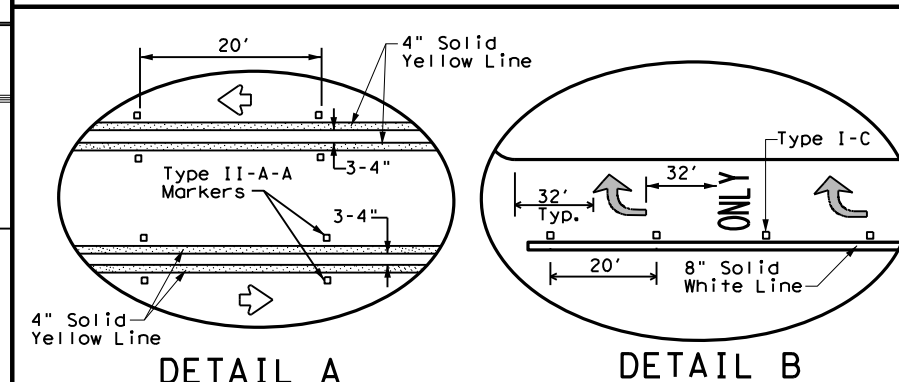
**TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE**



**TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS**



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



DETAIL A

DETAIL B

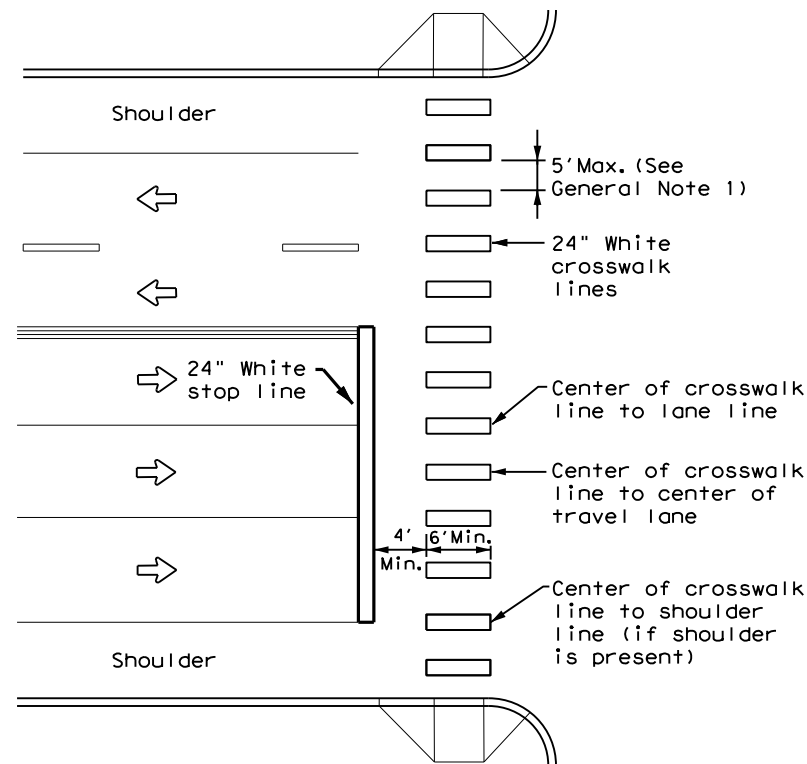
Texas Department of Transportation  
Traffic Safety Division Standard

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

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
5-00 2-10	DIST	COUNTY	SHEET NO.	
8-00 2-12	SAT	BEXAR	59	
3-03 6-20				

DATE: FILE:

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**HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH**

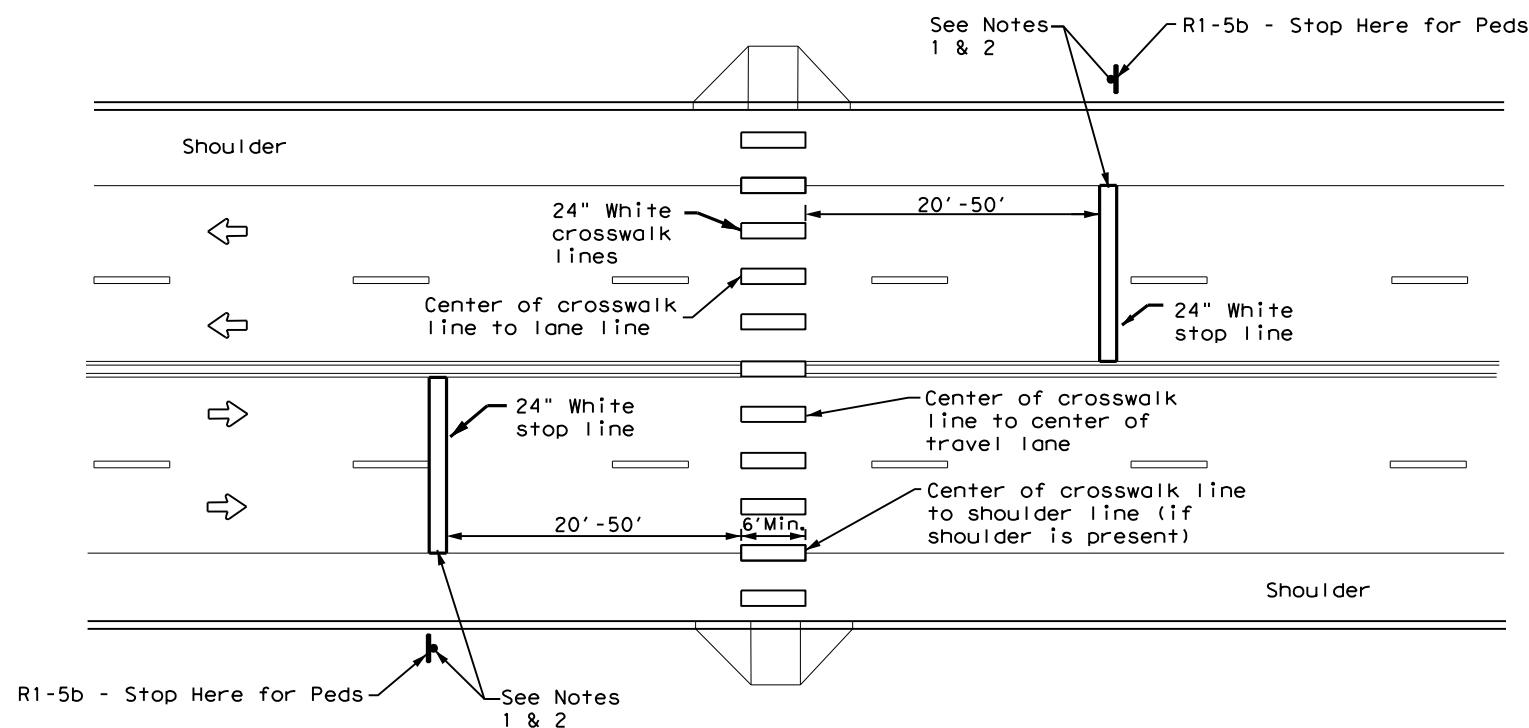
**GENERAL NOTES**

1. 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).
2. 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.
3. 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 State 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."
7. 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.



**UNSIGNALIZED MID BLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK**

**NOTES:**

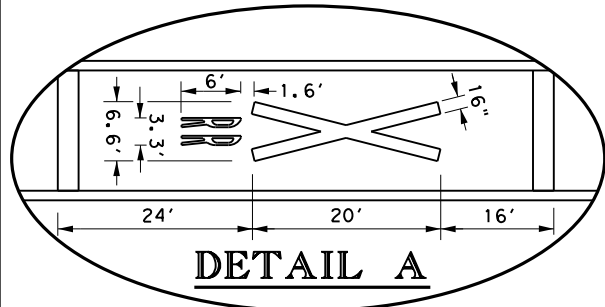
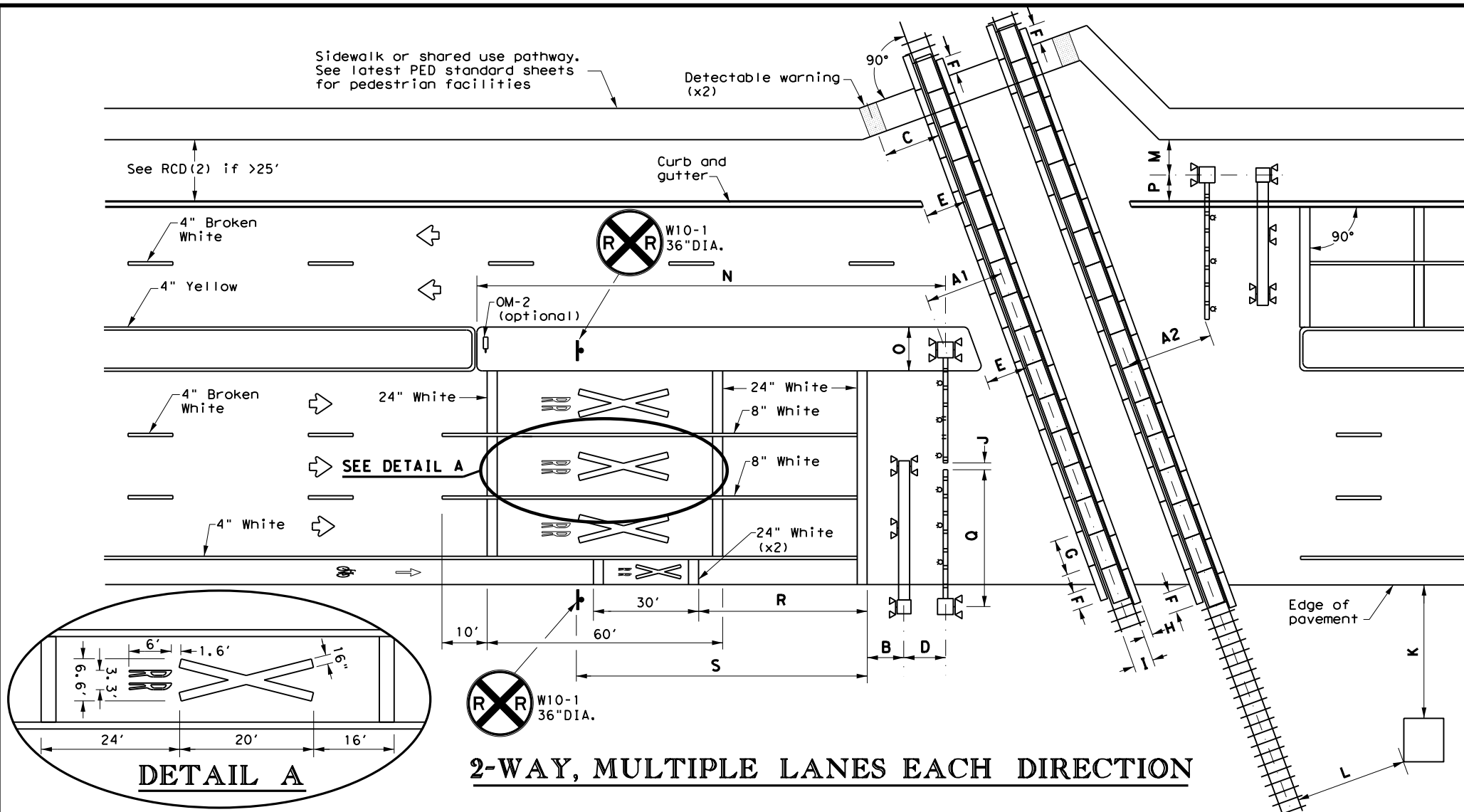
1. Use stop bars with "Stop Here for Pedestrians" signs at unsignalized mid block crosswalks.
2. Use stop bars with "Stop Here on Red" signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

<p><b>CROSSWALK PAVEMENT MARKINGS</b></p> <p><b>PM(4) - 22</b></p>			
FILE: pm4-22.dgn	DN:	CK:	DW:
© TxDOT June 2020	CONT	SECT	JOB
3-22 REVISIONS	6411	41	001
	DIST	COUNTY	SHEET NO.
	SAT	BEXAR	60

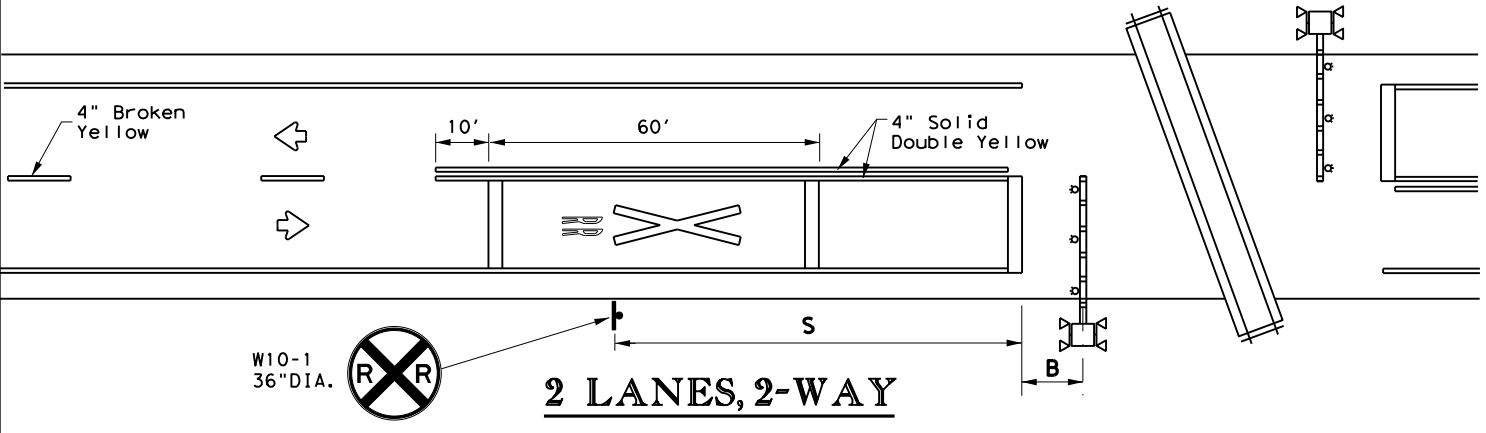
DATE:  
FILE:

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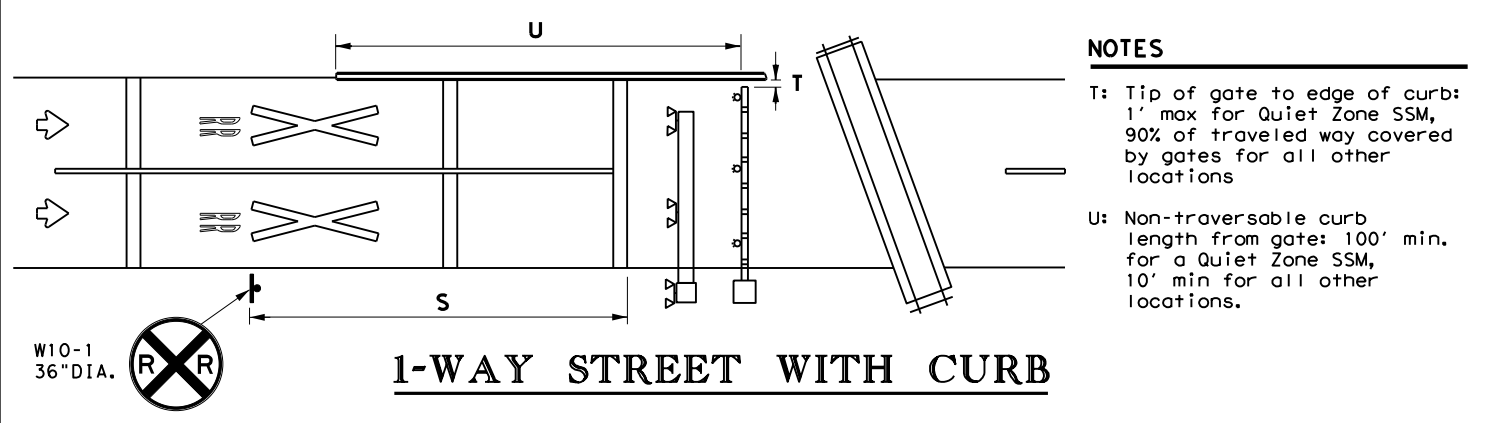
DATE: FILE:



**2-WAY, MULTIPLE LANES EACH DIRECTION**



**2 LANES, 2-WAY**



**1-WAY STREET WITH CURB**

- NOTES**
- T: Tip of gate to edge of curb: 1' max for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations
  - U: Non-traversable curb length from gate: 100' min. for a Quiet Zone SSM, 10' min for all other locations.

**NOTES**

- A1: Center of RR mast to center of rail: 12' minimum, 15' typical.
- A2: Tip of gate to center of rail: 12' minimum, 15' typical.
- B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).
- C: Center of detectable warning device to nearest rail: 6' minimum
- D: Center of gate mast to center of cantilever mast: 6' typical. NOTE: Cantilever may be located in front or behind gates.
- E: Edge of median or curb to nearest rail: 10' typical. NOTE: Design median edge to be parallel with rail.
- F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum. NOTE: Field panels need not be in line with gauge panels.
- G: Length of panels along rail: 8' typical.
- H: Width of field panel: 2' typical (check with railroad company).
- I: Distance between rails: 4'-8.5\".
- J: Tip of gate to tip of gate: 2' maximum for Quiet Zone SSM or 90% of traveled way covered by gates for all other locations.
- K: Nearest edge of RR cabin from edge of pavement: 30' typical. NOTE: Cabinet not required to be parallel to edge of pavement.
- L: Nearest edge of RR cabin from nearest rail: 25' typical.
- M: Center of RR mast to edge of sidewalk: 6' minimum.
- N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60' will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.
- O: Width of median: 8'-6\" minimum, 10' typical when using median gates. NOTE: Center of gate mast minimum 4'-3\" from face of curb.
- P: Center of RR mast to face of curb: 4'-3\" minimum. Center of RR mast to edge of pavement (with shoulder): 6' minimum. Center of RR mast to edge of pavement (no shoulder): 8'-3\" minimum. NOTE: BNSF prefers 5'-3\", 7', and 9'-3\" minimums, respectively.
- Q: Gate length: 28' or less typical, but railroad company may allow up to 32' under special circumstances.
- R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.
- S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.

**TABLE 1**

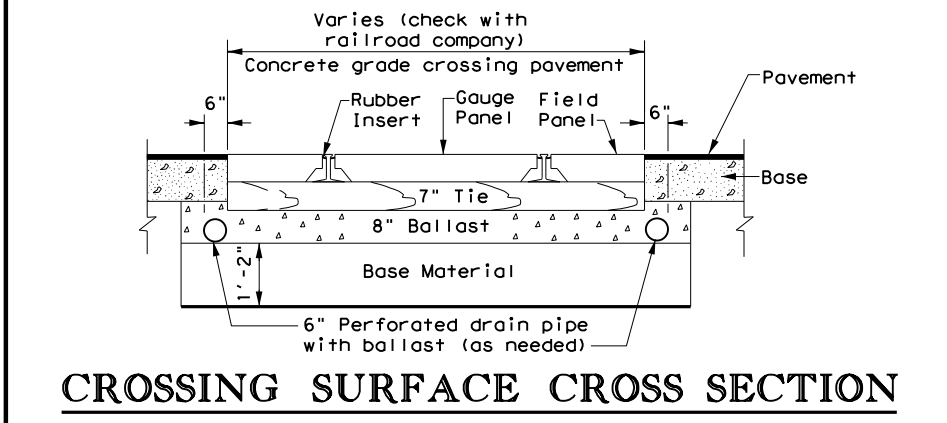
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

**LEGEND**

	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

**GENERAL NOTES**

- Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6\" tall minimum and used on roadways where speed does not exceed 40 mph.
- Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
- Medians preferred whenever possible to prevent vehicles from driving around gates.
- Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
- See SMD standard sheets for sign mounting details.
- See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.



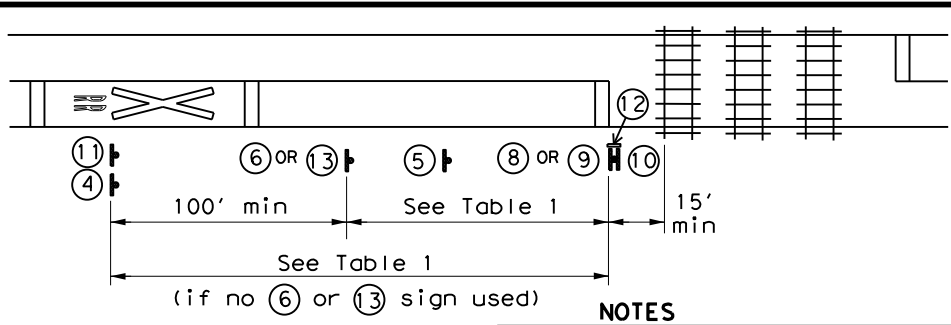
**CROSSING SURFACE CROSS SECTION**

Texas Department of Transportation  
Traffic Operations Division Standard

**RAILROAD CROSSING DETAILS  
SIGNING, STRIPING, AND  
DEVICE PLACEMENT  
RCD(1)-16**

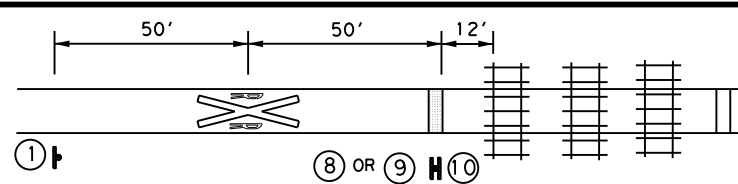
FILE: rcd1-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	OO1	VARIOUS
	DIST	COUNTY	SHEET NO.	
	SAT	BEXAR	61	

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### PASSIVE CROSSING

- NOTES**
1. Stop or yield sign may also be installed to the left of the crossbuck sign, rather than below it.
  2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.



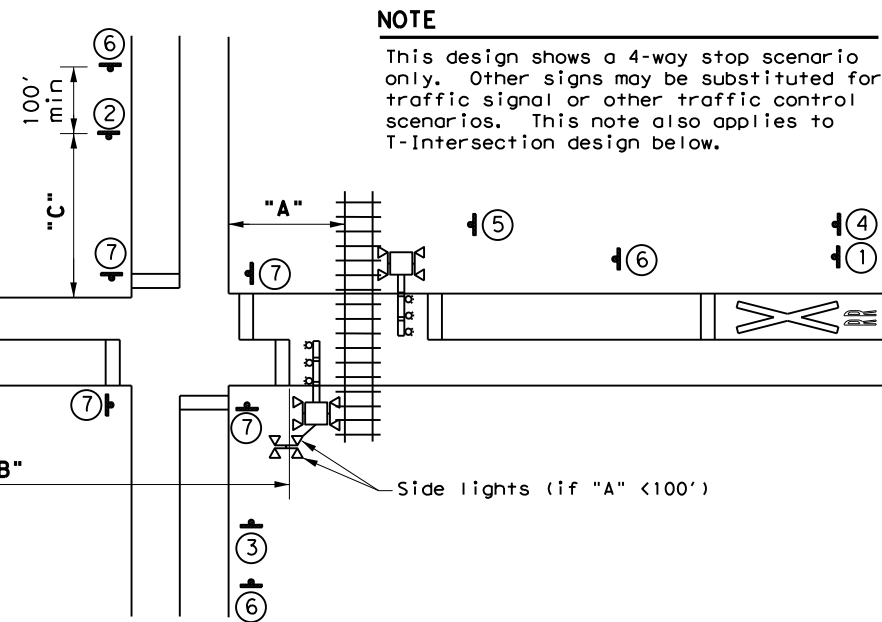
### PATHWAY CROSSING

- NOTES**
1. A shared use pathway is considered a separate pathway crossing when more than 25' from traveled way of adjacent roadway.
  2. Detectable warning used at stop bar.
  3. Smaller sign sizes preferred than shown to the right on this sheet.

Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

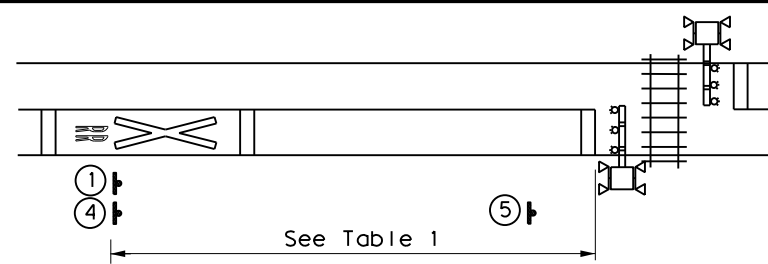
### GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS Plaque (R15-2P) (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per Sect. 2C.05 of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

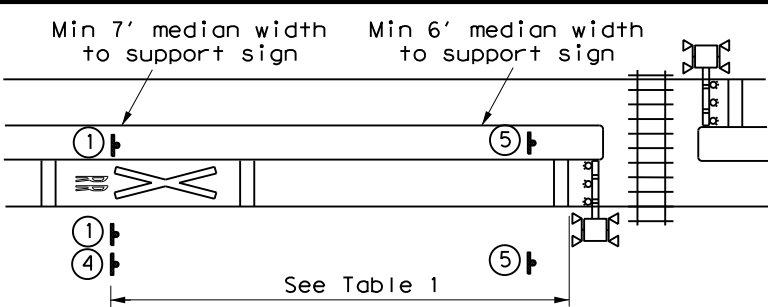


	"A" < 100'	"A" ≥ 100'
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

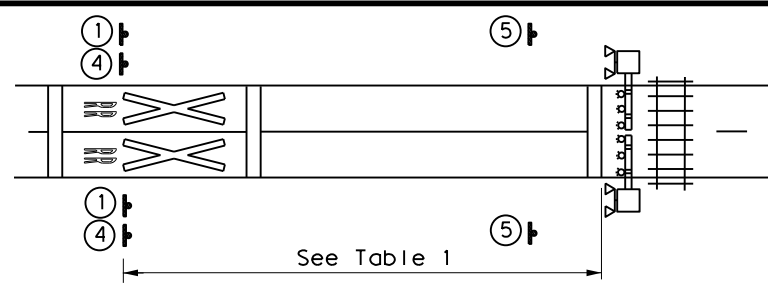
### GRADE CROSSING NEAR A PARALLEL STREET



### 2-WAY



### 2-WAY WITH MEDIAN

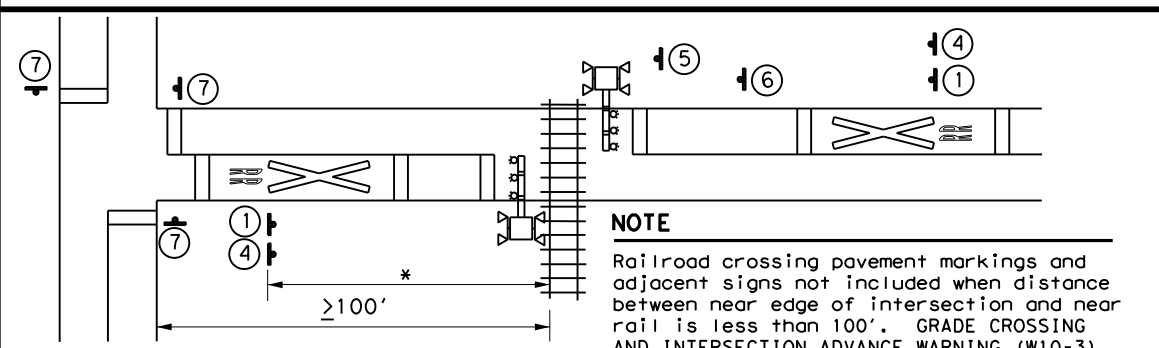


### 1-WAY

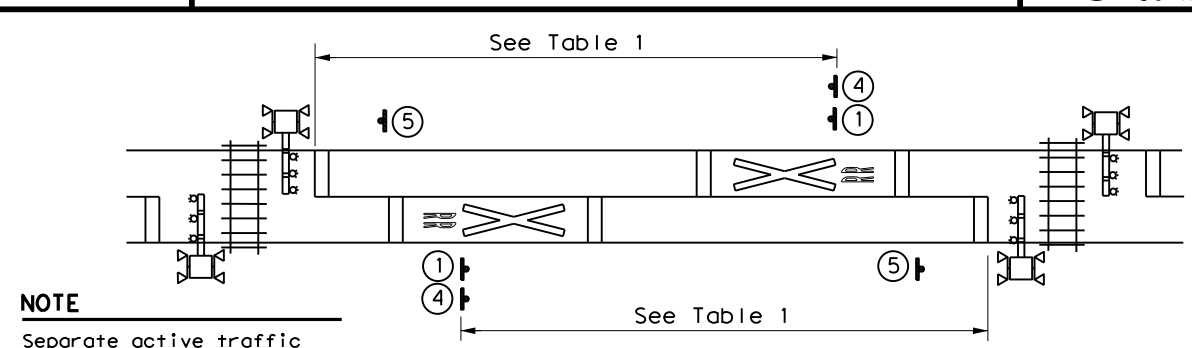
**SIGNS**


**IF NEEDED**

\*\* Includes a NO TRAIN HORN Plaque (W10-9P) if crossing is in a Quiet Zone. LOW GROUND CLEARANCE Plaque (W10-5P) if needed is mounted below W10-2/W10-3/W10-4 signs.



### T-INTERSECTION



### 2 ADJACENT CROSSINGS

Texas Department of Transportation  
 Traffic Operations Division Standard

## RAILROAD CROSSING DETAILS SIGNING & STRIPING

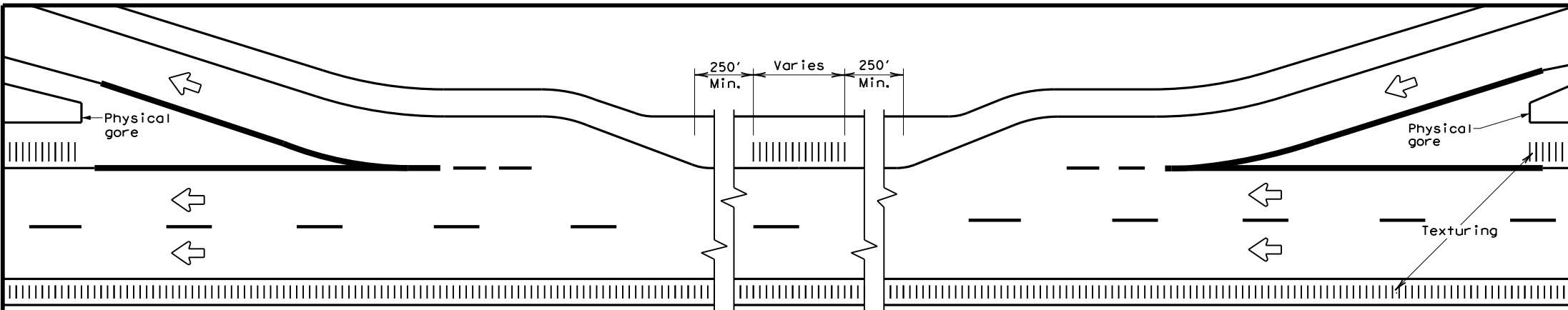
### RCD(2)-16

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© TxDOT FEBRUARY 2016 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY	SHEET NO.	
	SAT	BEXAR	62	

DATE: FILE:



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**TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMP**

**GENERAL NOTES**

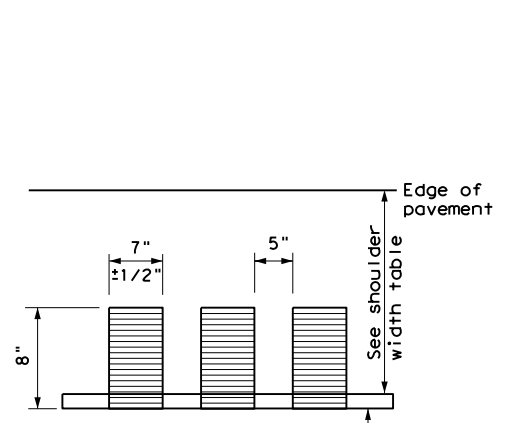
1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

**WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:**

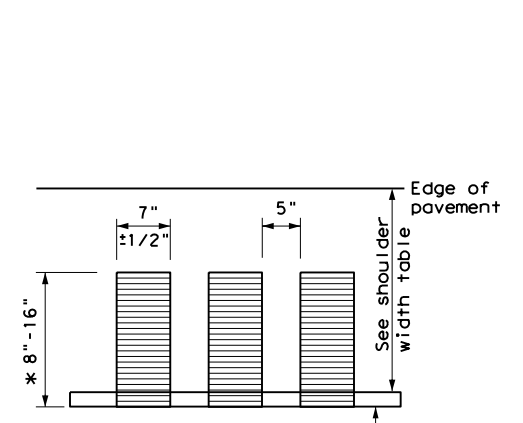
5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble strip.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

**WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:**

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

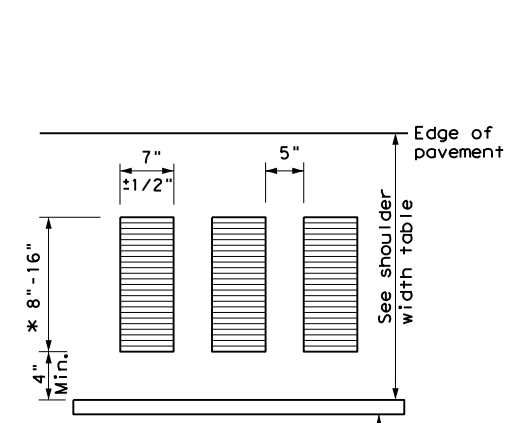


**PLAN VIEW**



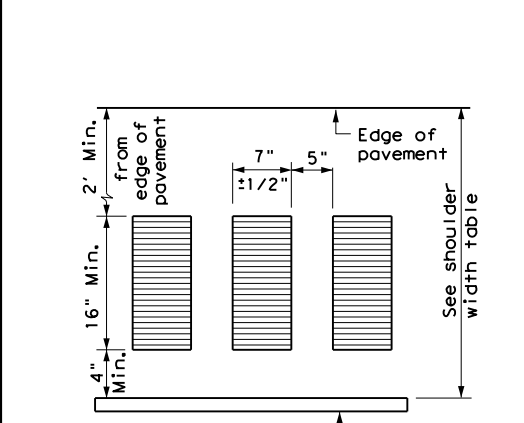
**PLAN VIEW**

\* This distance may vary based on width of shoulder

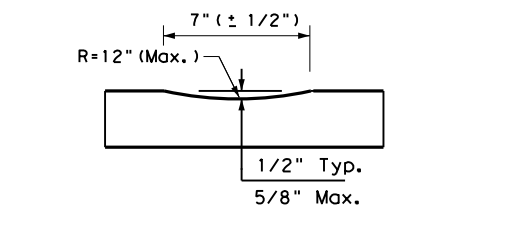


**PLAN VIEW**

\* This distance may vary based on width of shoulder

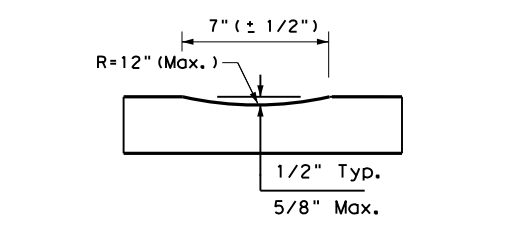


**PLAN VIEW**



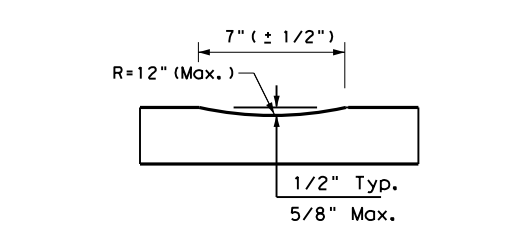
**PROFILE VIEW  
OPTION 1**

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



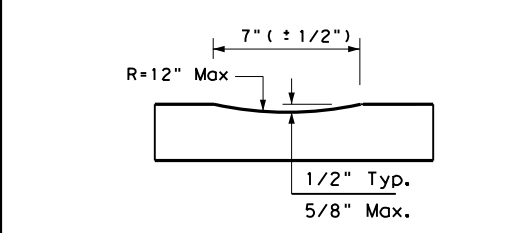
**PROFILE VIEW  
OPTION 2**

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



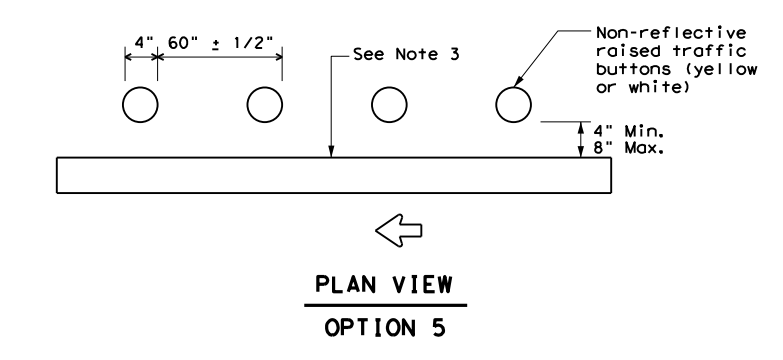
**PROFILE VIEW  
OPTION 3**

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



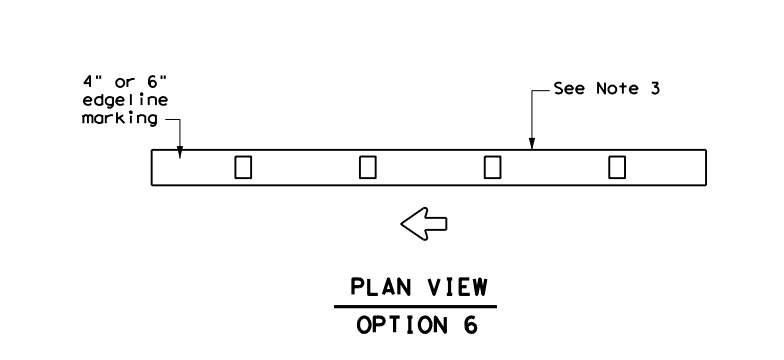
**PROFILE VIEW  
OPTION 4**

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



**PLAN VIEW  
OPTION 5**

**RAISED EDGELINE RUMBLE STRIPS**



**PLAN VIEW  
OPTION 6**

**PROFILE EDGELINE MARKINGS**

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3, 5 or 6	Option 2, 4, 5 OR 6

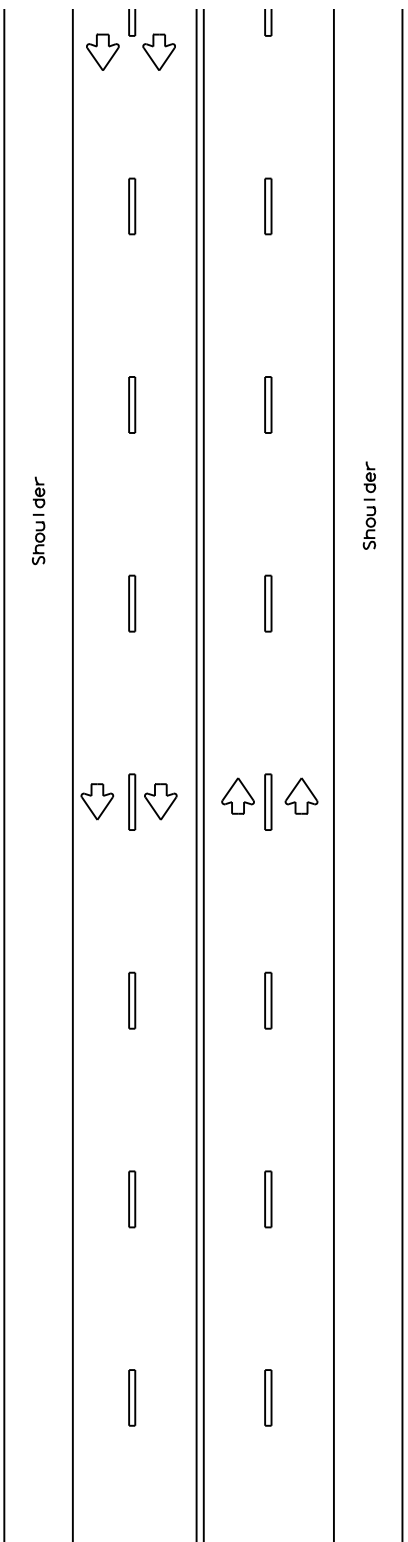
**EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS RS(1)-13**

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
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2-10	DIST	COUNTY	SHEET NO.	
10-13	SAT	BEXAR	63	

DATE:  
FILE:

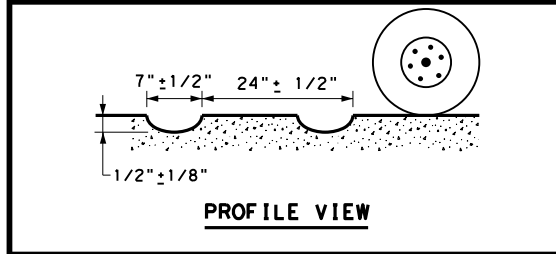
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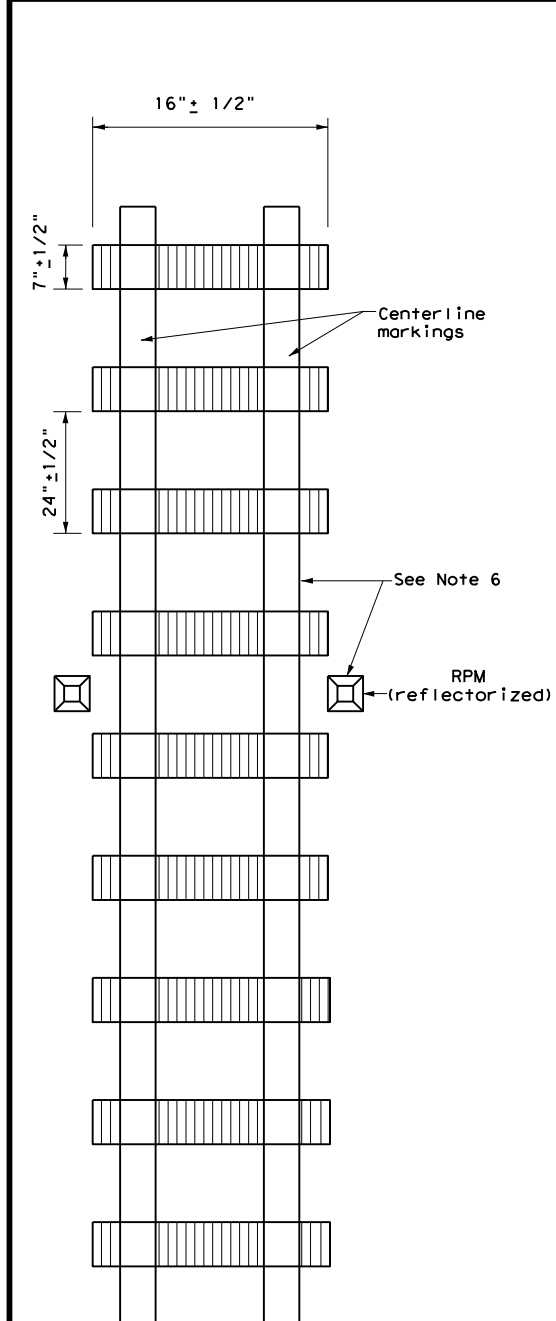


MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

**CENTERLINE RUMBLE STRIPS**

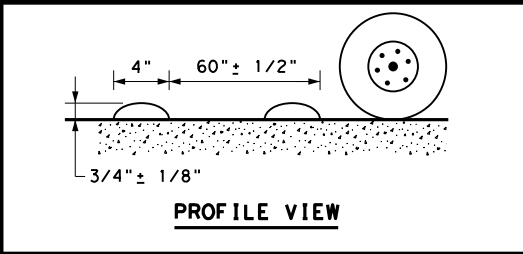


PROFILE VIEW

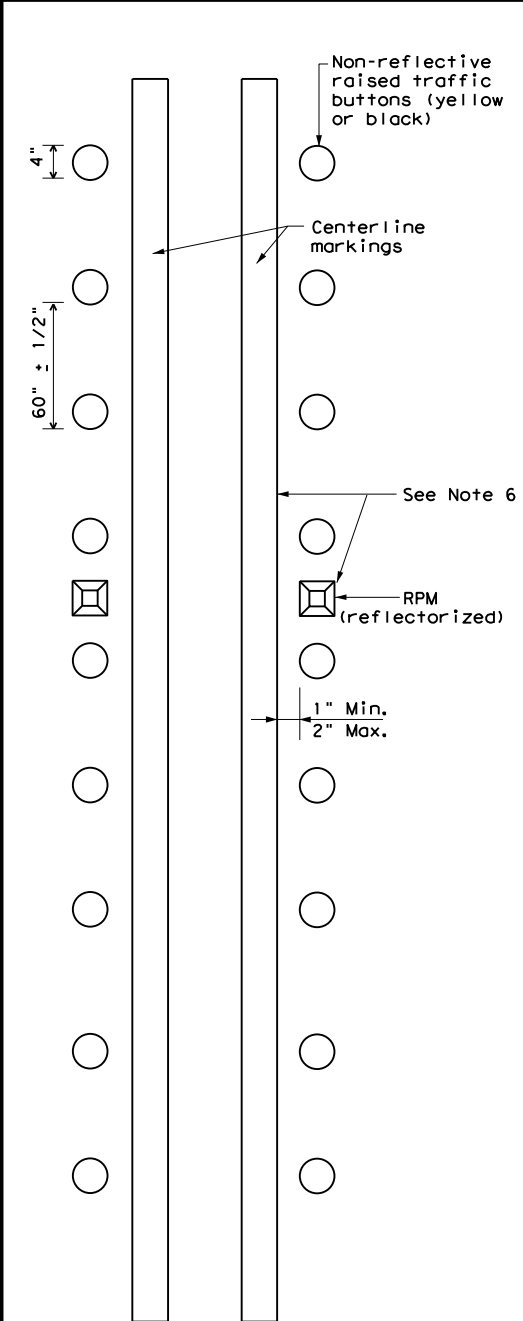


PLAN VIEW  
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

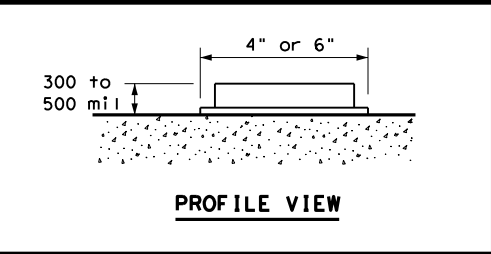


PROFILE VIEW

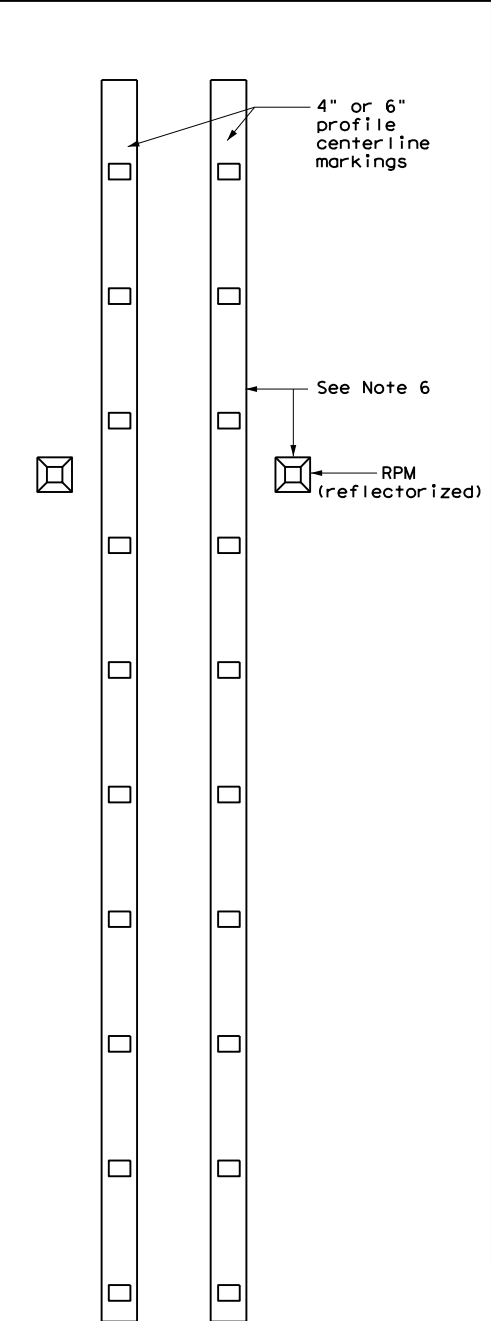


PLAN VIEW  
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW  
OPTION 3

PROFILE CENTERLINE MARKINGS

**GENERAL NOTES**

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

**WHEN INSTALLING CENTERLINE RUMBLE STRIPS:**

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.

**WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:**

11. See standard sheet RS(4).



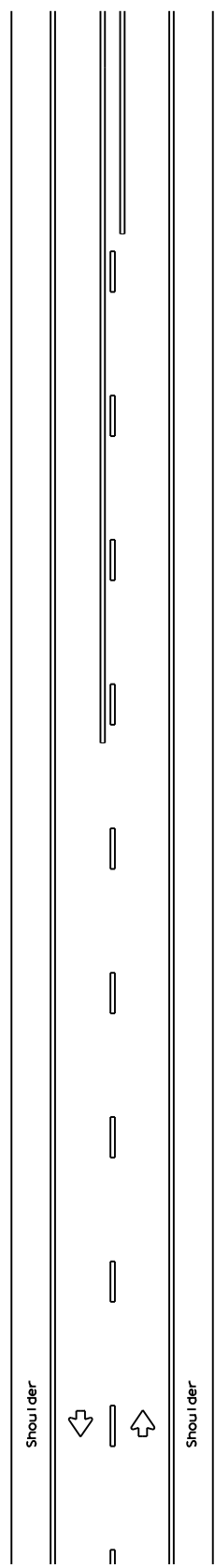
**CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS**

**RS(2) - 13**

FILE: r's(2)-13.dgn	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
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	SAT	BEXAR	64	

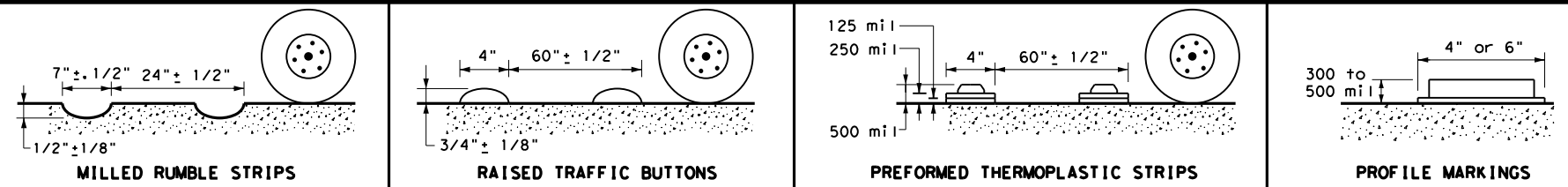
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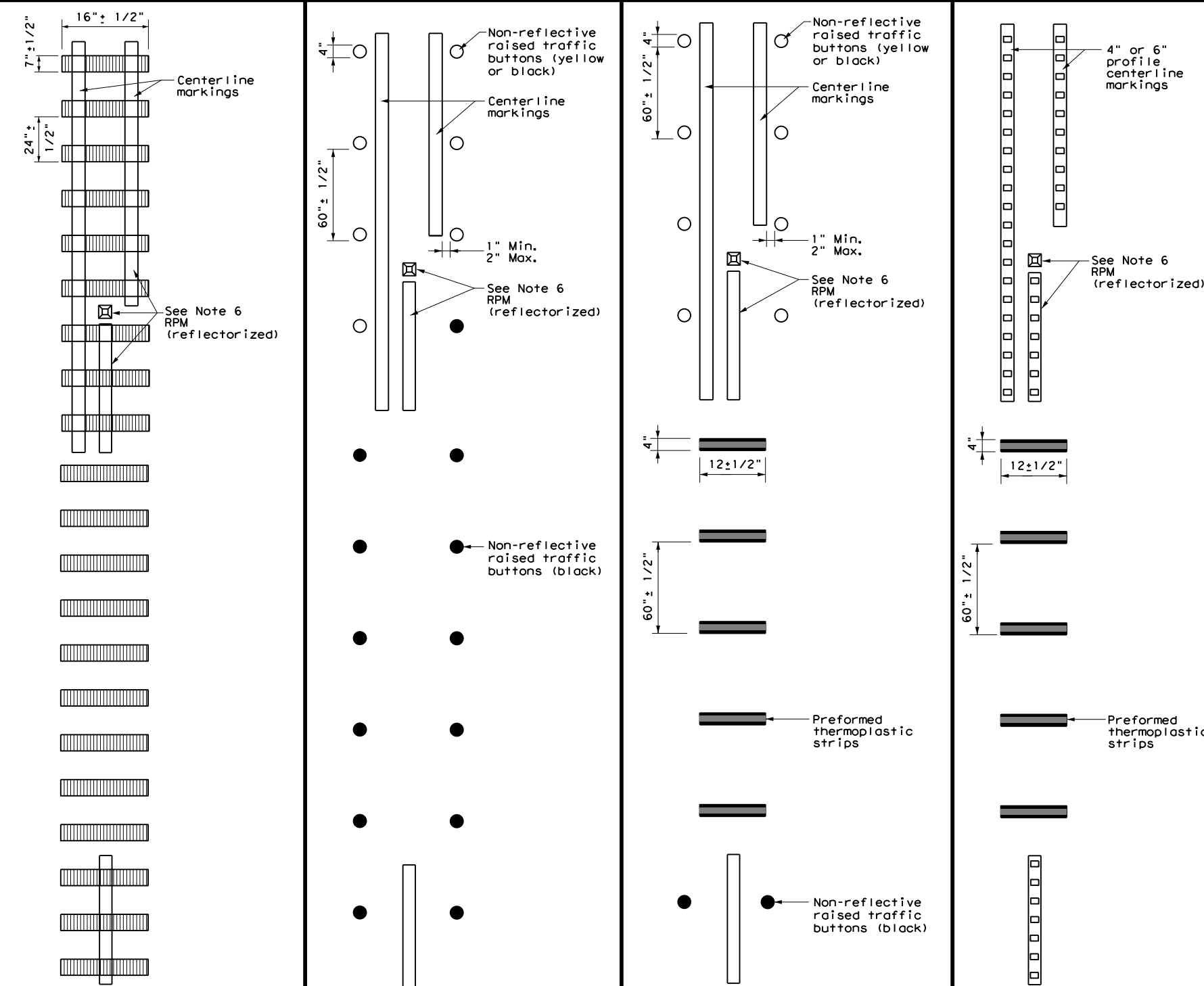


**TWO LANE TWO-WAY ROADWAYS**

**CENTERLINE RUMBLE STRIPS**



**PROFILE VIEW**



**PLAN VIEW OPTION 1**  
**MILLED CENTERLINE RUMBLE STRIPS**

**PLAN VIEW OPTION 2**  
**RAISED CENTERLINE RUMBLE STRIPS**

**PLAN VIEW OPTION 3**  
**RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS**

**PLAN VIEW OPTION 4**  
**PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS**

**GENERAL NOTES**

- This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
  - Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
  - Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
  - See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
  - Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks.
  - Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
  - Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
  - Pavement markings must be applied over milled centerline rumble strips.
- WHEN INSTALLING CENTERLINE RUMBLE STRIPS:**
- Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
  - When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
  - The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
- WHEN INSTALLING EDGELINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:**
- See standard sheet RS(4).

**Texas Department of Transportation**  
Traffic Operations Division Standard

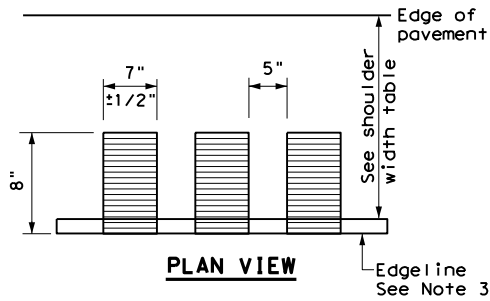
**CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS**

**RS(3) - 13**

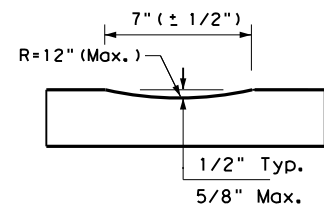
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	SAT	BEXAR	65	

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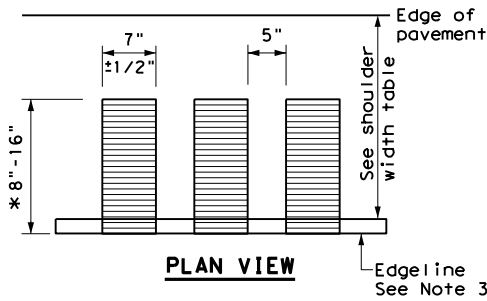


**PLAN VIEW**

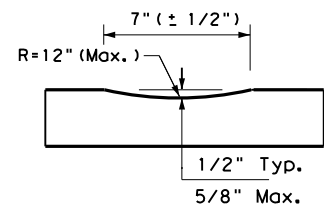


**PROFILE VIEW**  
OPTION 1

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**

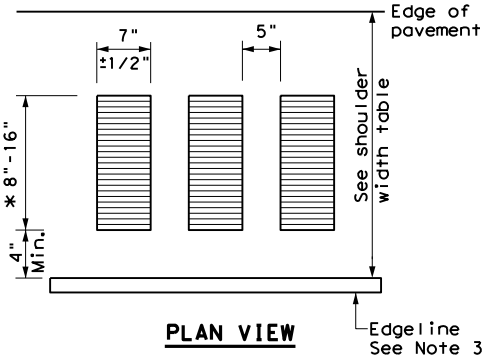


**PLAN VIEW**



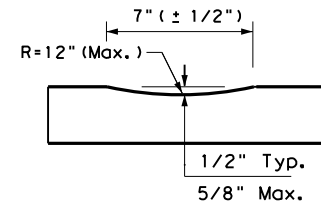
**PROFILE VIEW**  
OPTION 2

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



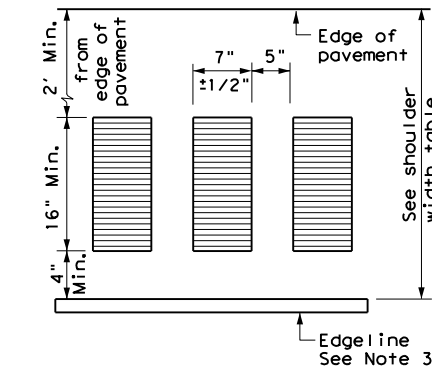
**PLAN VIEW**

\* This distance may vary based on width of shoulder

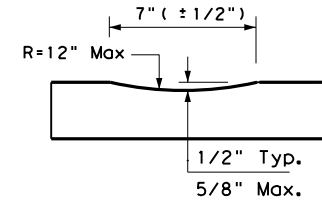


**PROFILE VIEW**  
OPTION 3

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**

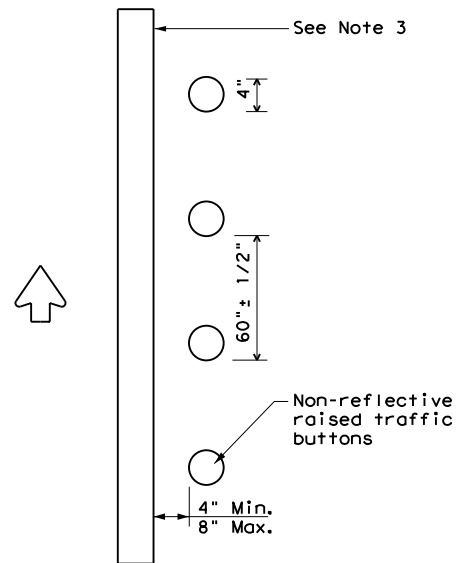


**PLAN VIEW**



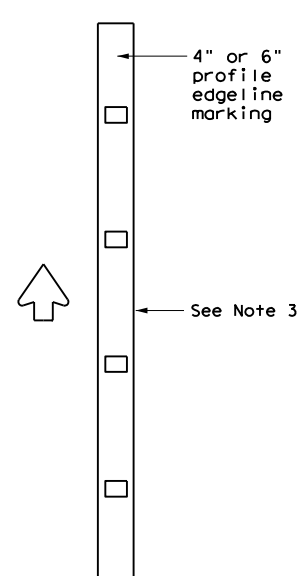
**PROFILE VIEW**  
OPTION 4

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



**PLAN VIEW**  
OPTION 5

**RAISED EDGELINE RUMBLE STRIPS**



**PLAN VIEW**  
OPTION 6

**PROFILE EDGELINE MARKINGS**

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

**GENERAL NOTES**

- Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
- Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
- Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
- See the table below for determining what options may be used for edgeline rumble strips.

**WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:**

- See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
- Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
- Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
- Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
- Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.

- On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

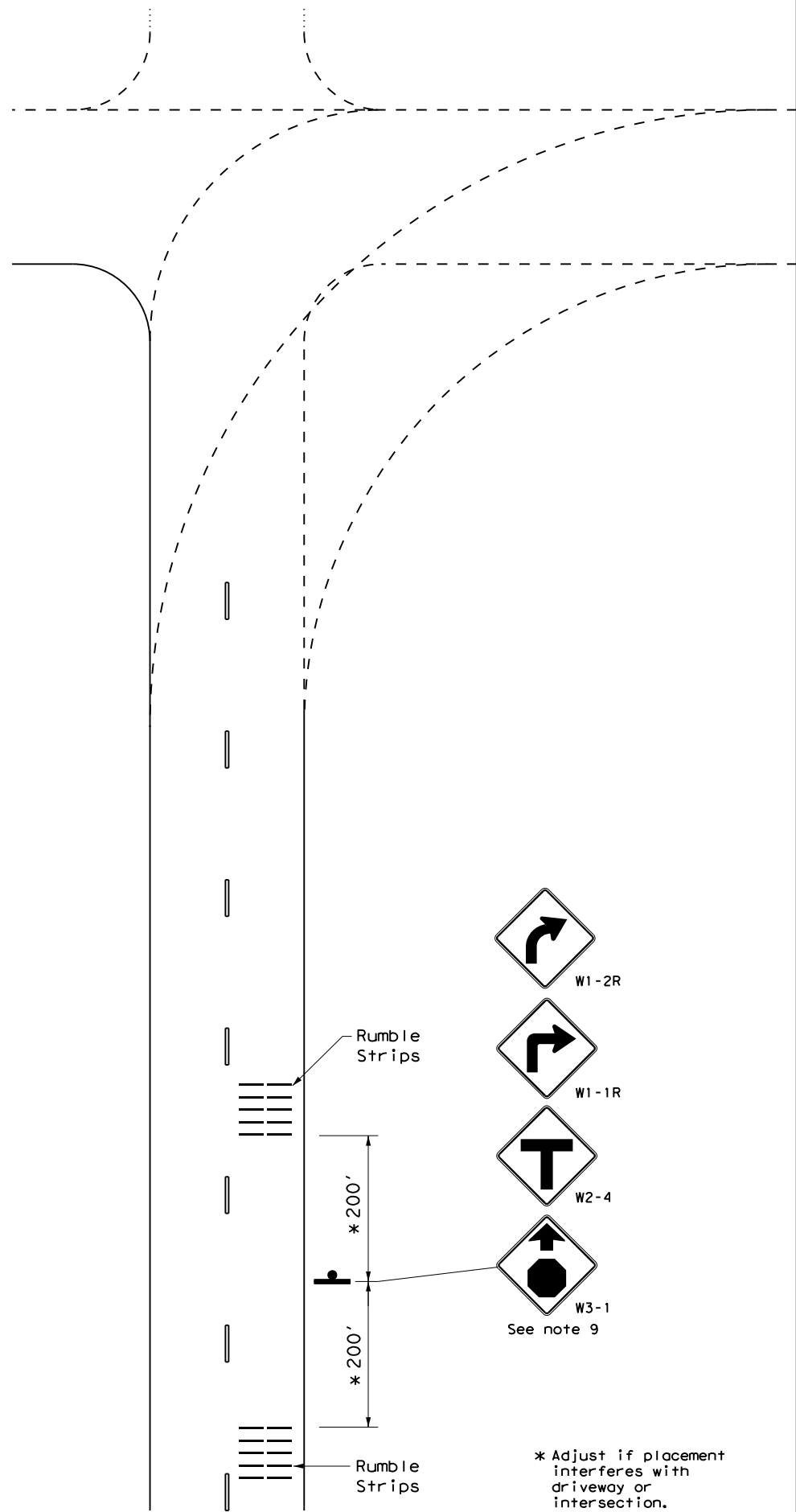
**WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:**

- Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
- Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
- Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
- Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
- The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
- Raised profile thermoplastic markings used as edgelines may substitute for buttons.

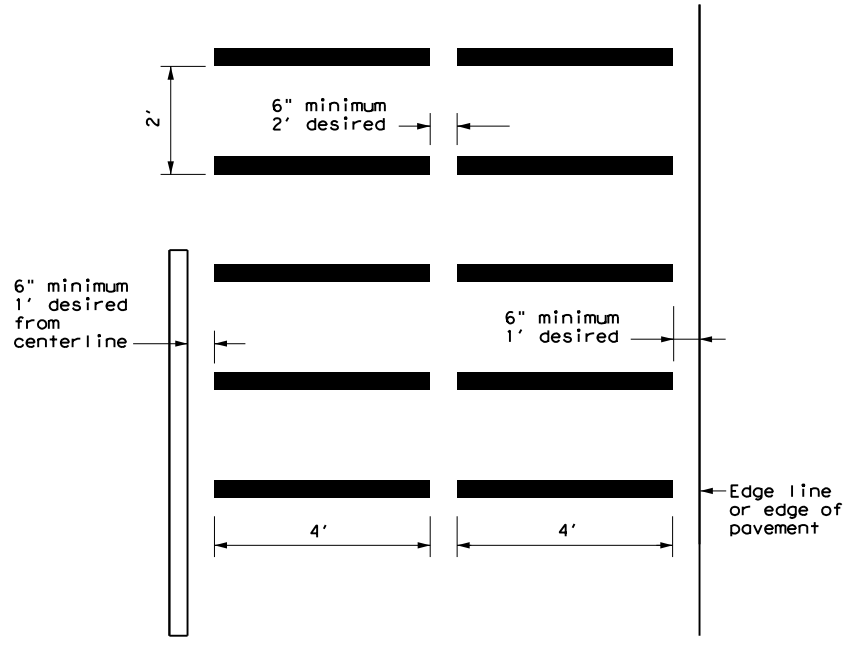
		<b>Texas Department of Transportation</b>		<b>Traffic Operations Division Standard</b>	
<b>EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13</b>					
FILE:	rs(4)-13.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS		6411	41	001	VARIOUS
		DIST	COUNTY		SHEET NO.
		SAT	BEXAR		66

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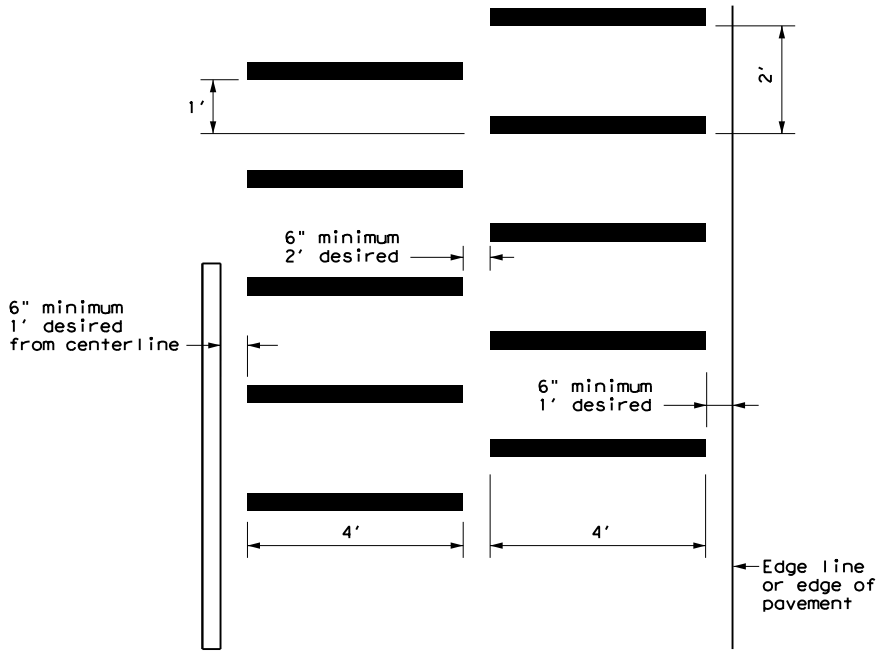
DATE:  
FILE:



### STANDARD PATTERN



### ALTERNATIVE PATTERN



### GENERAL NOTES

1. Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or Stop-controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed Stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.
2. When used, the rumble strips shall be placed 200 feet prior to and after the placement of the warning device.
3. The use of rumble strips should not be widespread or used indiscriminately.
4. Prefabricated black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.
5. A list of approved, prefabricated raised rumble strips can be obtained from the Traffic Operations Division.
6. Consideration should be given to noise levels when in-lane or transverse rumble strips are installed near residential areas, schools, churches, etc.
7. The use of the "Rumble Strips Ahead" sign may be used in advance of in-lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the guidelines for advance placement of warning sign included in the "Texas Manual on Uniform Traffic Control Devices".

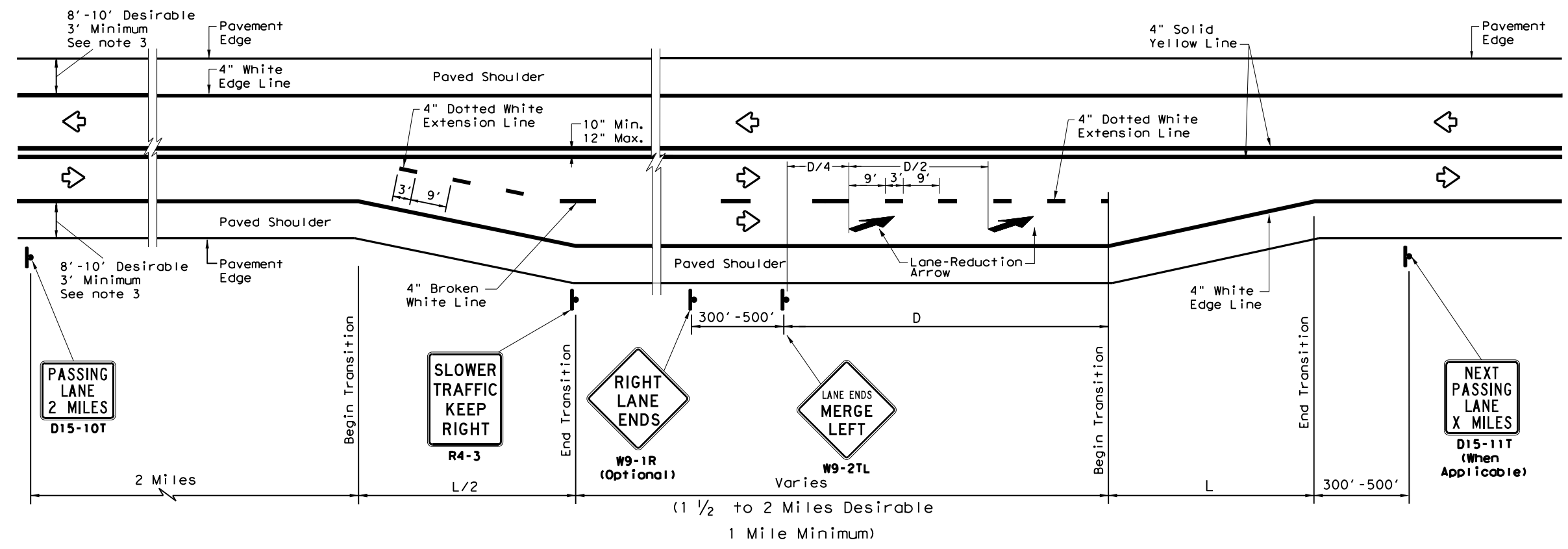


8. Consideration should be given to bicyclists. A 12 inch gap from the edge line may be used to accommodate bicyclists when a usable shoulder is not available. Additional gaps in the in-lane or transverse rumble strips are not recommended since they could cause motorists to swerve to avoid the rumble strips.
9. Other signs can be used as conditions warrant.

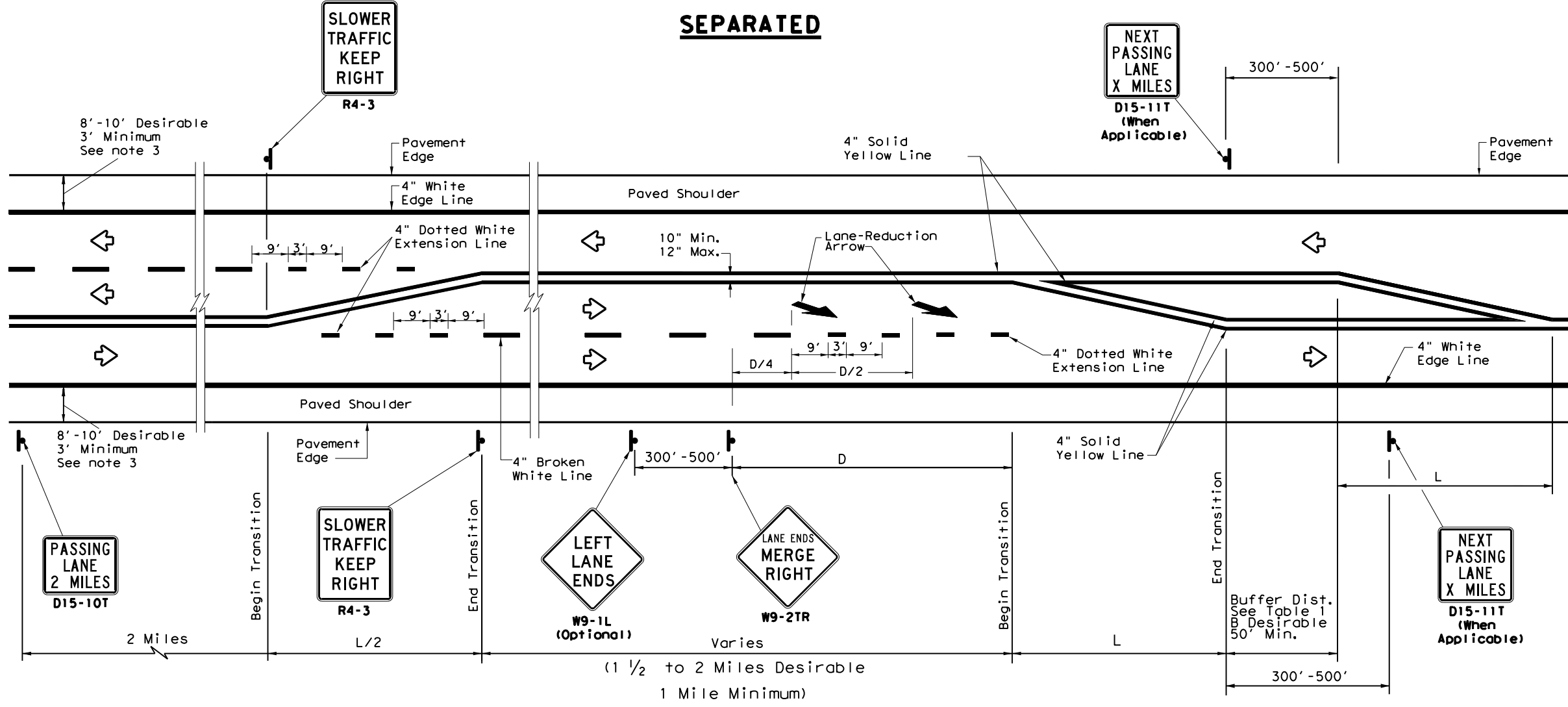
		Traffic Operations Division Standard	
<h2>TRANSVERSE OR IN-LANE RUMBLE STRIPS</h2> <h3>RS(5) - 13</h3>			
FILE: rs(5)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT April 2006	CONT: 6411	SECT: 41	JOB: 001
REVISIONS: 2-10 10-13	DIST: SAT	COUNTY: BEXAR	HIGHWAY: VARIOUS
			SHEET NO.: 67

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DATE:  
FILE:



**SEPARATED**



**ALTERNATING**

LEGEND	
	Sign
	Traffic Flow

TYPICAL TAPER LENGTH (L)	
Formula *	$L = WS$

\* Transition length should be rounded up to nearest 5 foot increment.

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

**EXAMPLE**  
A 12 foot lane is added on a 70 mph roadway. The length of the transition should be:  
 $L=12 \times 70=840$  ft

**TABLE 1  
ADVANCE WARNING SIGN  
DISTANCE (D)  
AND BUFFER DISTANCE (B)**

Posted Speed	D (FT)	B (FT)
40	670	305
45	775	360
50	885	425
55	990	495
60	1100	570
65	1200	645
70	1250	730
75	1350	820

**GENERAL NOTES**

1. For minimum and desirable design details, see the Roadway Design Manual, Chapter 4, Section 6, Super 2 Highways.
2. For Raised Pavement Markers (RPM) details, see Pavement Markings Standard sheet, PM(2). Note that RPMs are not recommended on the 4" dotted white extension lines.
3. For rumble strip options available for the designed shoulder width, see rumble strip standard sheet RS(4).



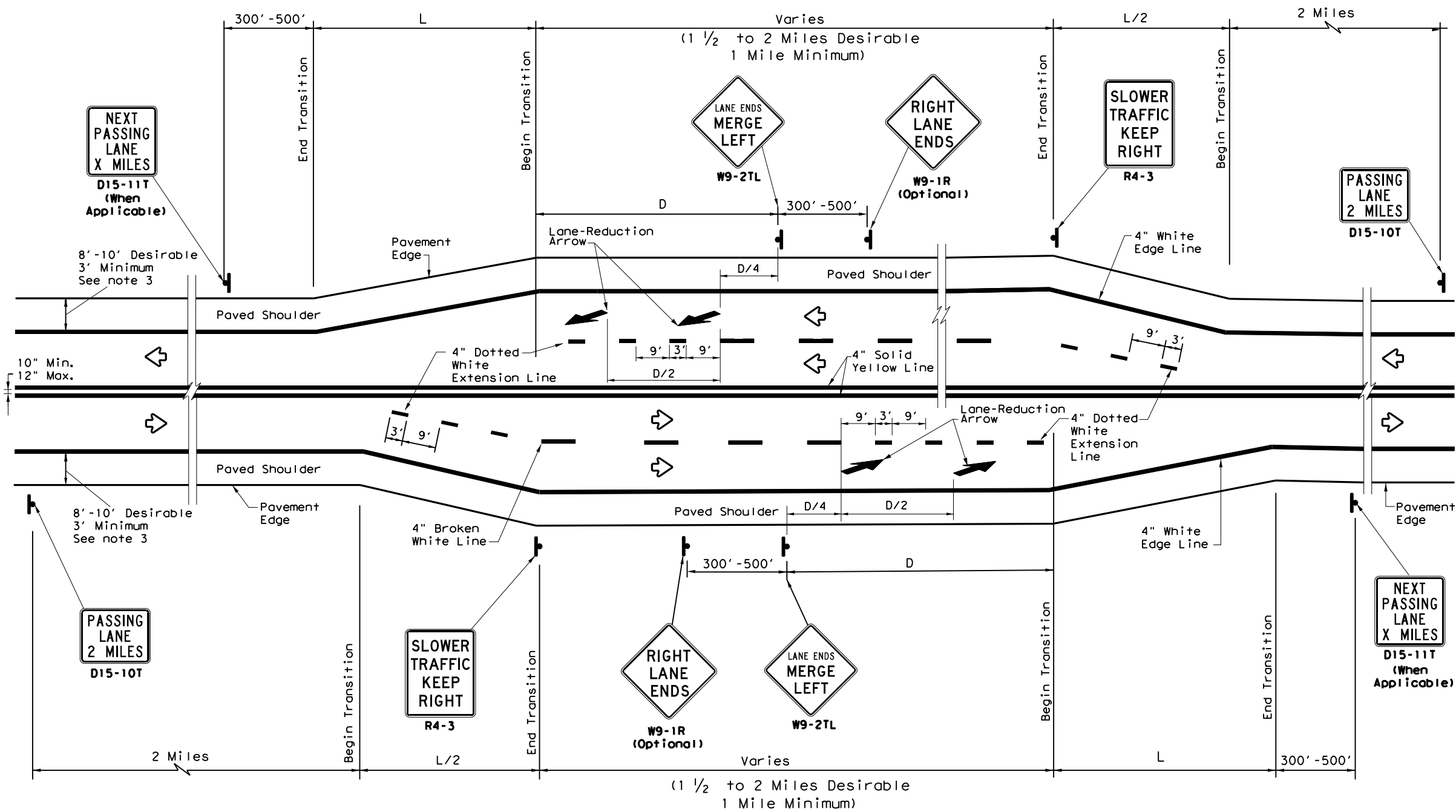
**TEXAS SUPER 2  
PASSING LANES**

**TS2 (PL-1) - 18**

FILE: ts2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT May 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	6411	41	001	VARIOUS
2-12	DIST	COUNTY	SHEET NO.	
3-12	SAT	BEXAR	68	
3-18				

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DATE:  
FILE:



**SIDE BY SIDE PASSING LANES**

LEGEND	
	Sign
	Traffic Flow

TYPICAL TAPER LENGTH (L)	
Formula *	$L = WS$

\* Transition length should be rounded up to nearest 5 foot increment.

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

**EXAMPLE**

A 12 foot lane is added on a 70 mph roadway. The length of the transition should be:

$L = 12 \times 70 = 840 \text{ ft}$

**TABLE 1  
ADVANCE WARNING  
SIGN DISTANCE (D)**

Posted Speed	D (FT)
40	670
45	775
50	885
55	990
60	1100
65	1200
70	1250
75	1350

**GENERAL NOTES**

1. For minimum and desirable design details, see the Roadway Design Manual, Chapter 4, Section 6, Super 2 Highways.
2. For Raised Pavement Markers (RPM) details, see Pavement Markings Standard sheet, PM(2). Note that RPMs are not recommended on the 4" dotted white extension lines.
3. For rumble strip options available for the designed shoulder width, see rumble strip standard sheet RS(4).

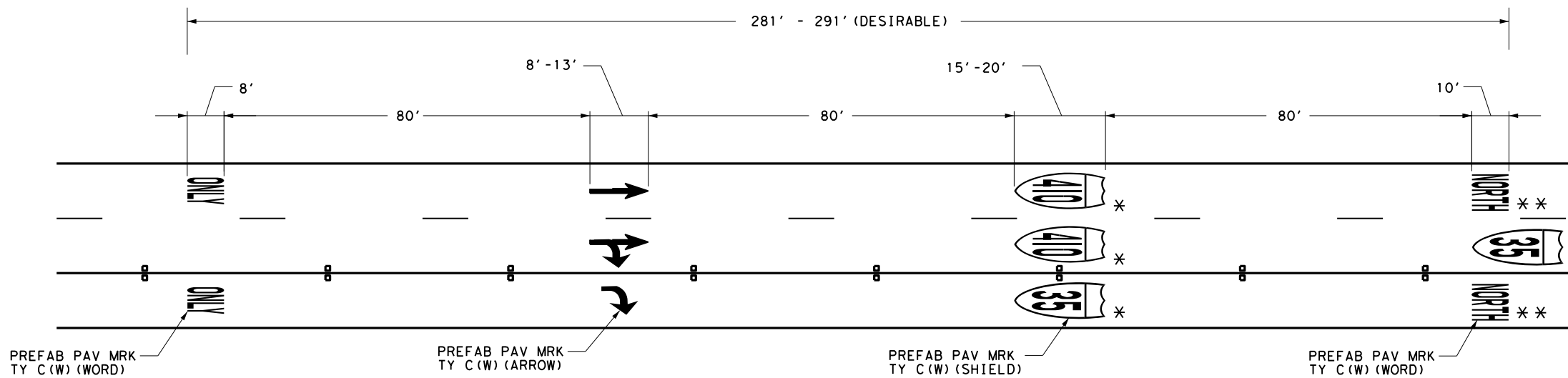


**TEXAS SUPER 2  
PASSING LANES**

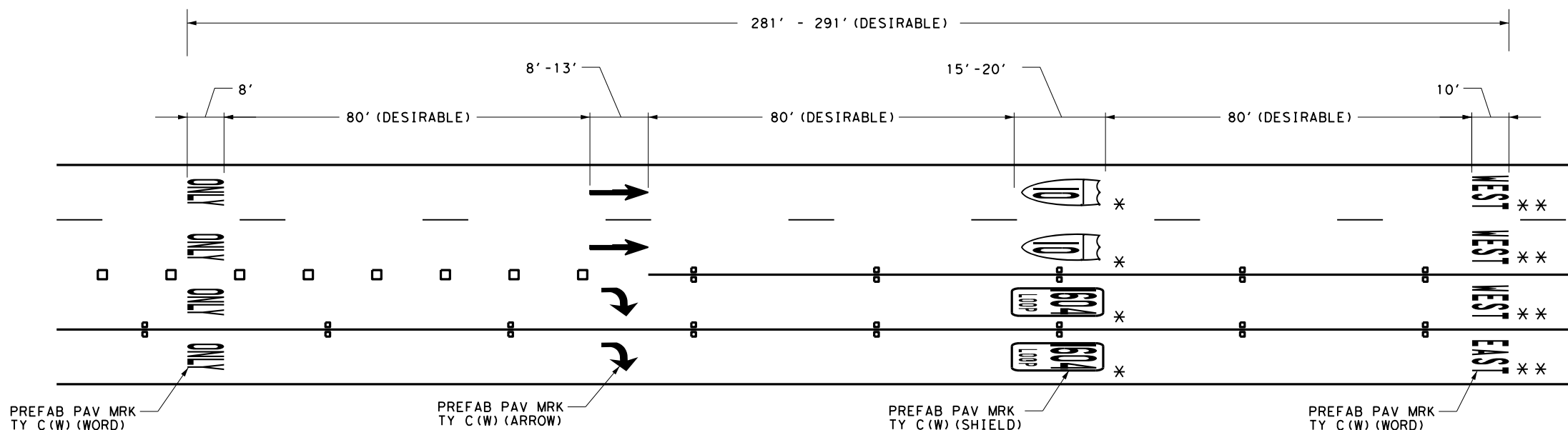
**TS2 (PL-2) - 18**

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2-12	DIST SAT	COUNTY BEXAR	SHEET NO. 69	

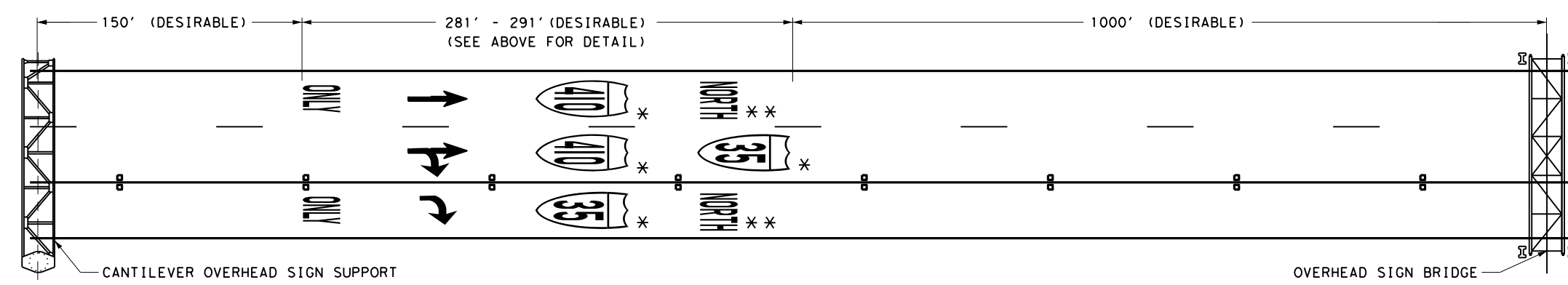




**HORIZONTAL SIGNING TYPICAL SPACING FOR SHARED LANES**



**HORIZONTAL SIGNING TYPICAL SPACING FOR EXCLUSIVE LANES**



**HORIZONTAL SIGNING PLACEMENT IN OVERHEAD SIGNING SYSTEM**

\* APPROPRIATE DESTINATION  
 \*\* CARDINAL DIRECTION

- NOTES:
1. SHARED ROUTES HAVE TWO SHIELDS WITH AN 80 FT GAP.
  2. PAVEMENT MARKING SPACING SHOWN ON THIS SHEET IS FOR A TYPICAL APPLICATION. SITE CONDITIONS MAY VARY PAVEMENT MARKING SPACING. SEE PLAN SHEETS FOR ACTUAL LOCATIONS.

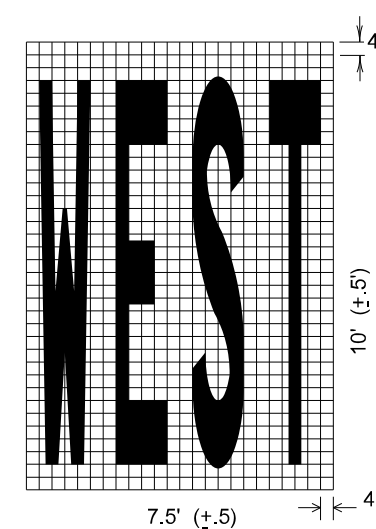
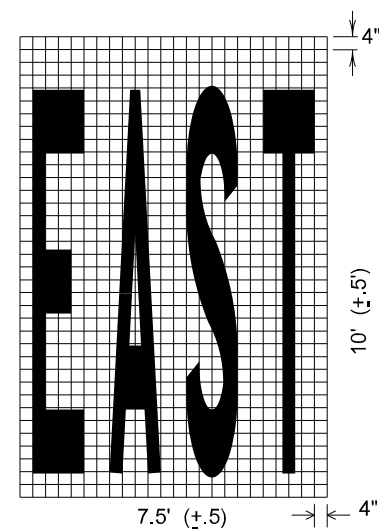
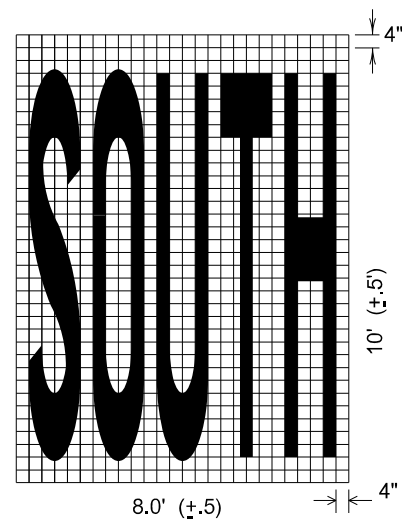
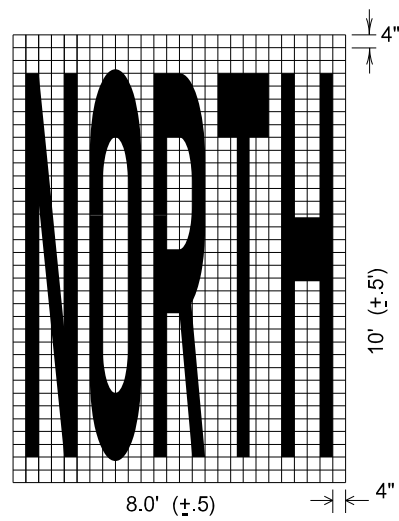
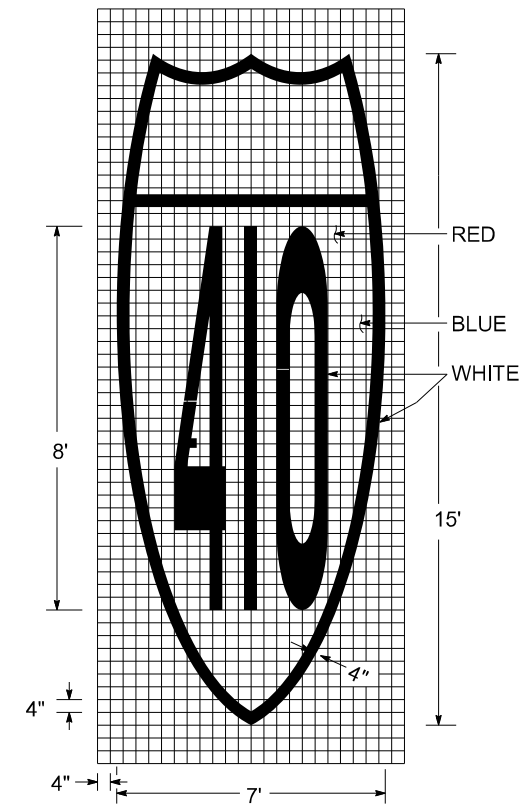
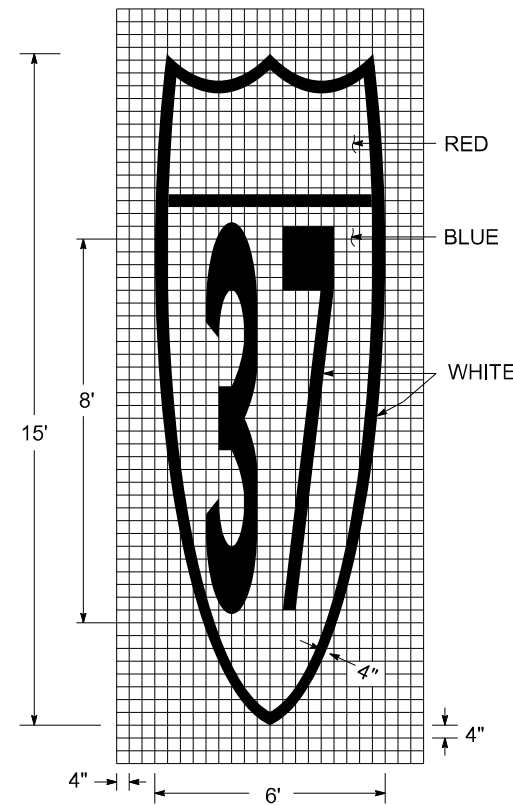
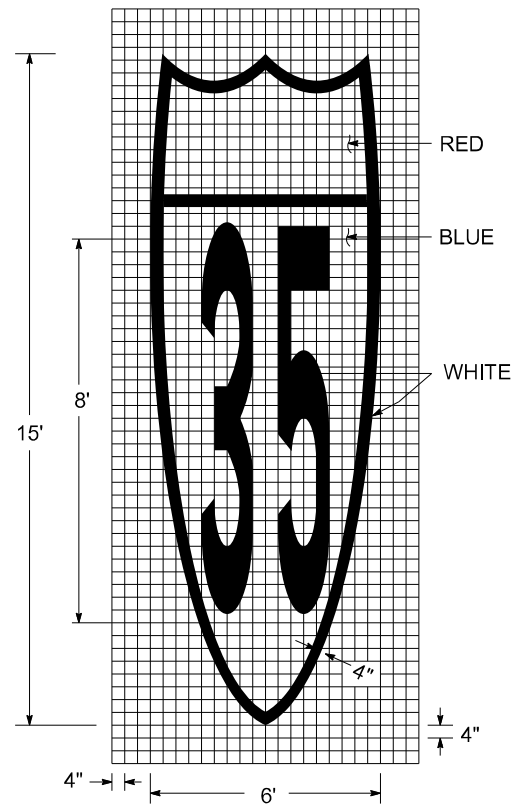
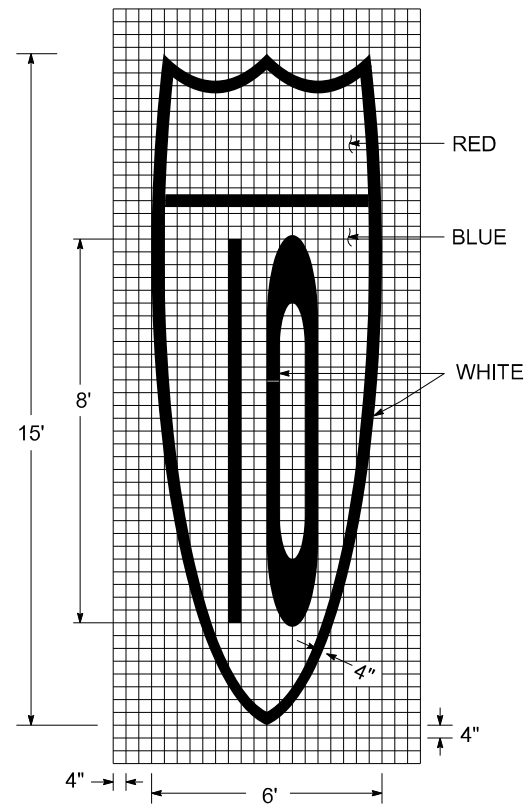
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ACC:

San Antonio District Standard  
**HORIZONTAL SIGNING & PAVEMENT MARKING LAYOUT DETAILS**  
 HSPM-08  
 © 2008 Texas Department of Transportation

REVISIONS	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
REV. 12-2011	6		70
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
641 I	41	001	VARIOUS



SCALE: 1" = 5'

LEVELS DISPLAYED

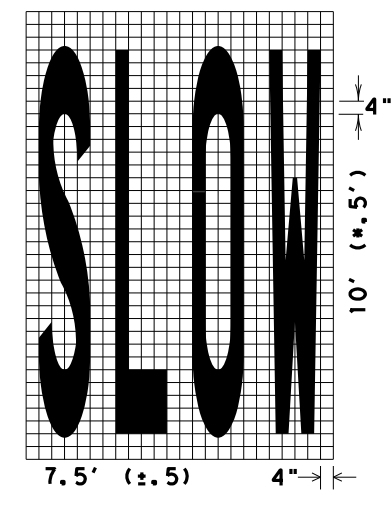
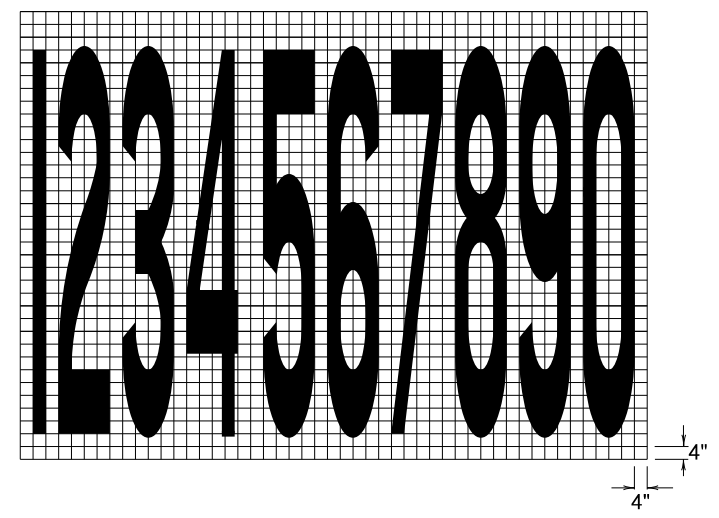
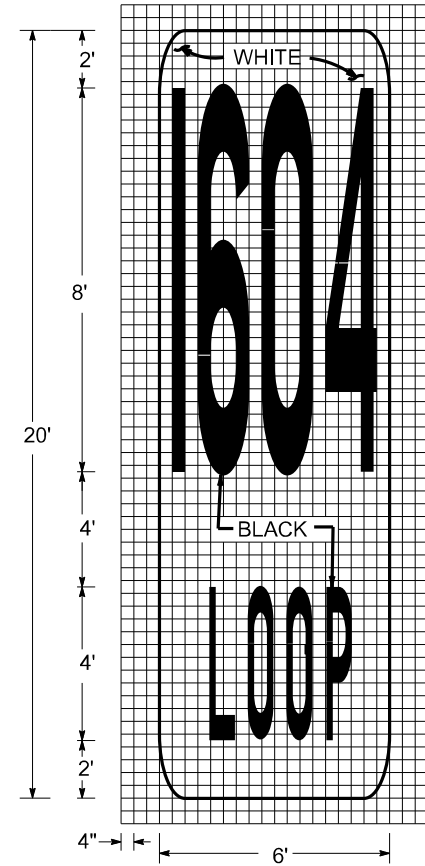
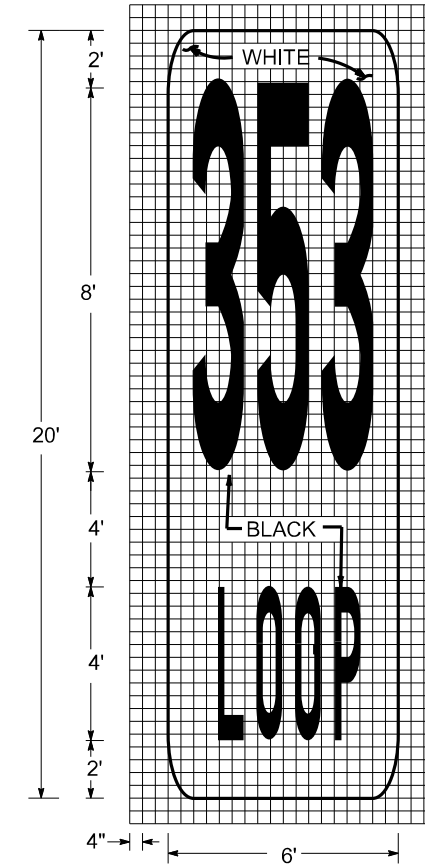
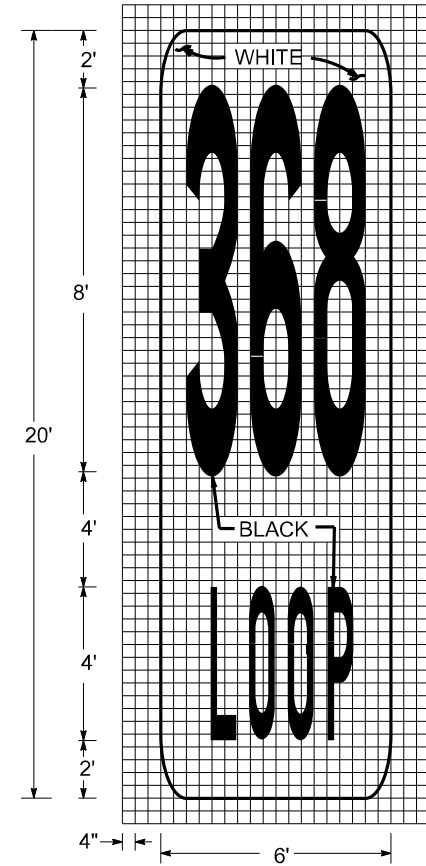
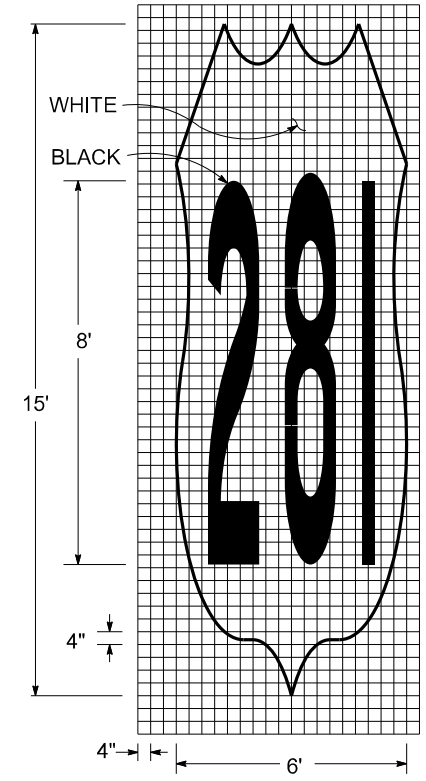
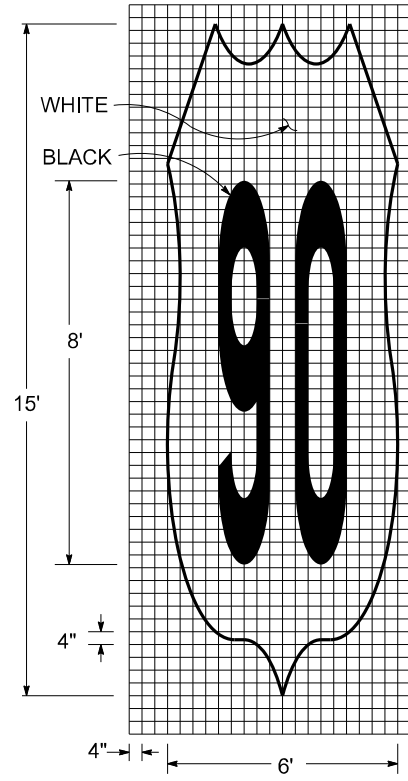
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ACC:

San Antonio District Standard  
**ROUTE NUMBER  
 PAVEMENT MARKING  
 SHIELD DETAILS**  
 PMSD(1) - 08  
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REVISIONS	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
REV. 12-2011	6		71
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TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
641 I	41	001	VARIOUS

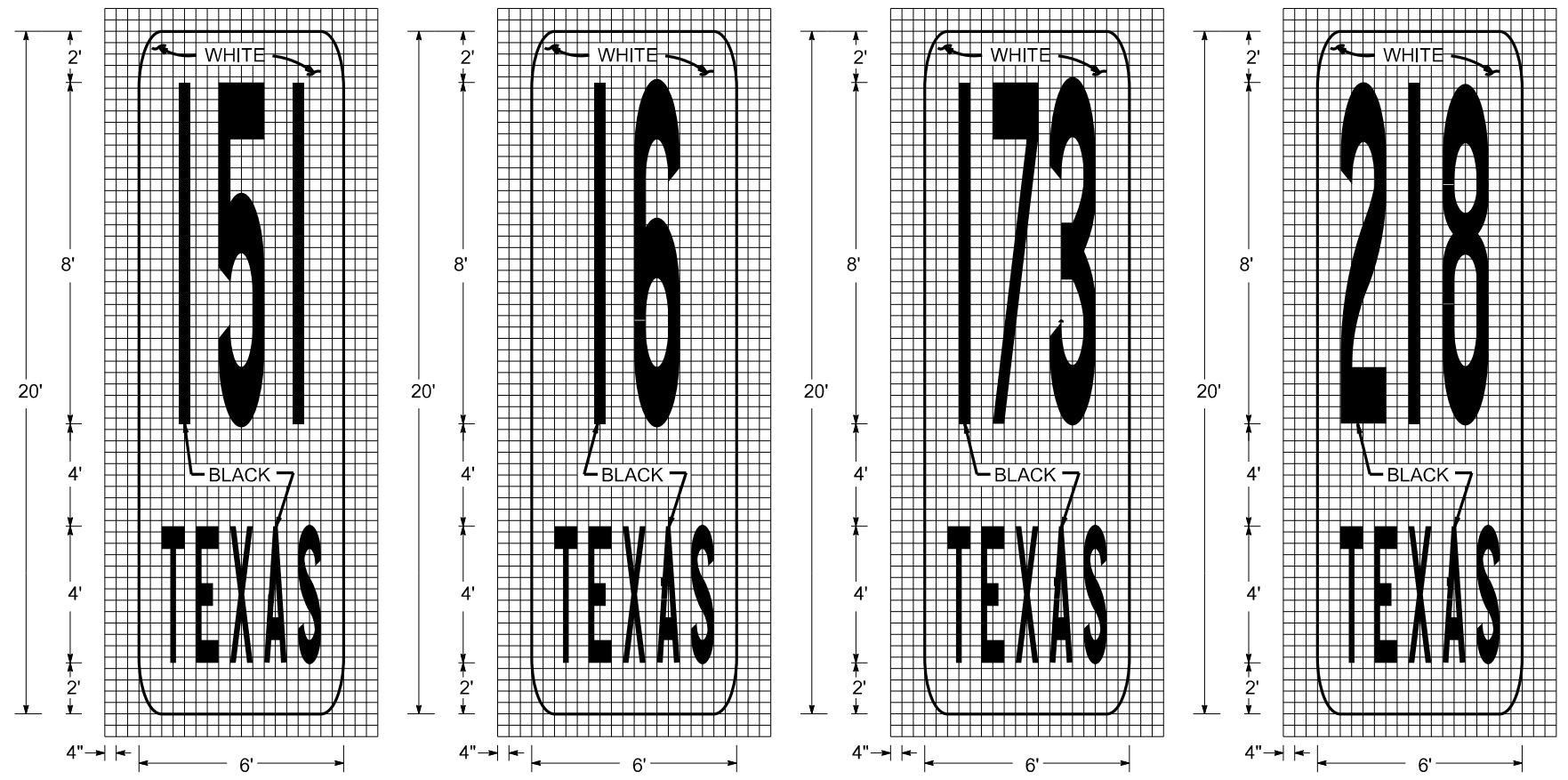
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San Antonio District Standard  
**ROUTE NUMBER  
 PAVEMENT MARKING  
 SHIELD DETAILS**  
 PMSD (2) - 08  
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REVISIONS	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
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641 I	41	001	VARIOUS

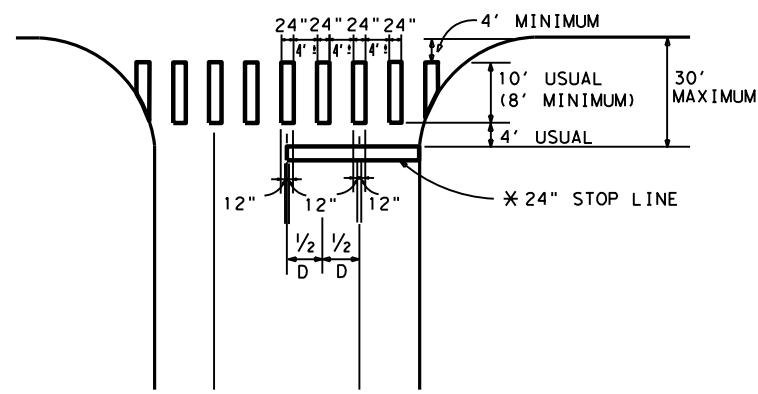
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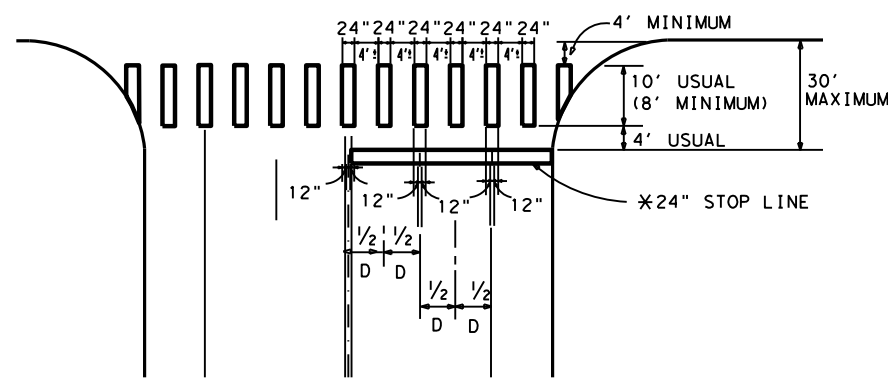
San Antonio District Standard  
**ROUTE NUMBER  
 PAVEMENT MARKING  
 SHIELD DETAILS**

© 2008  **PMSD (3) - 08**  
 Texas Department of Transportation

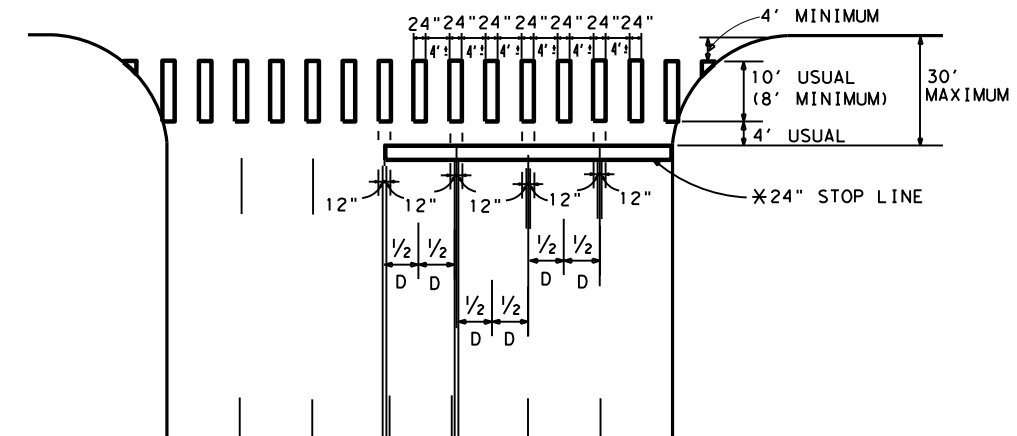
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			VARIOUS



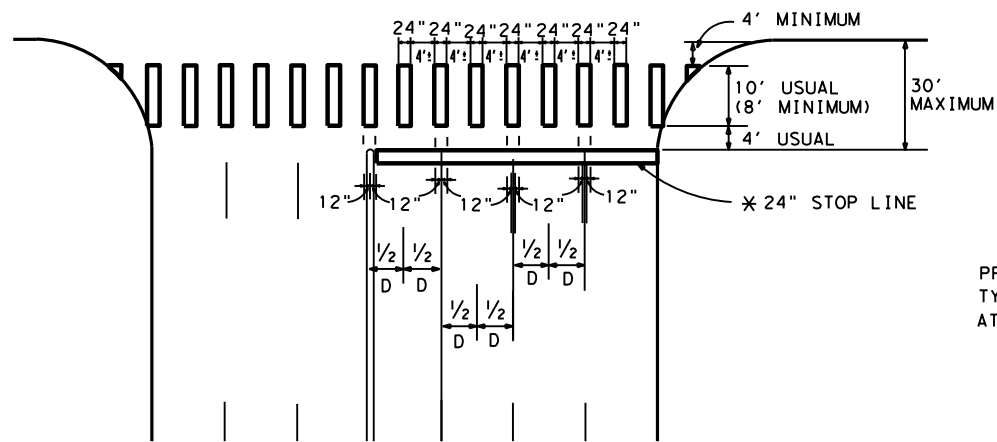
TWO LANES WITH SHOULDERS



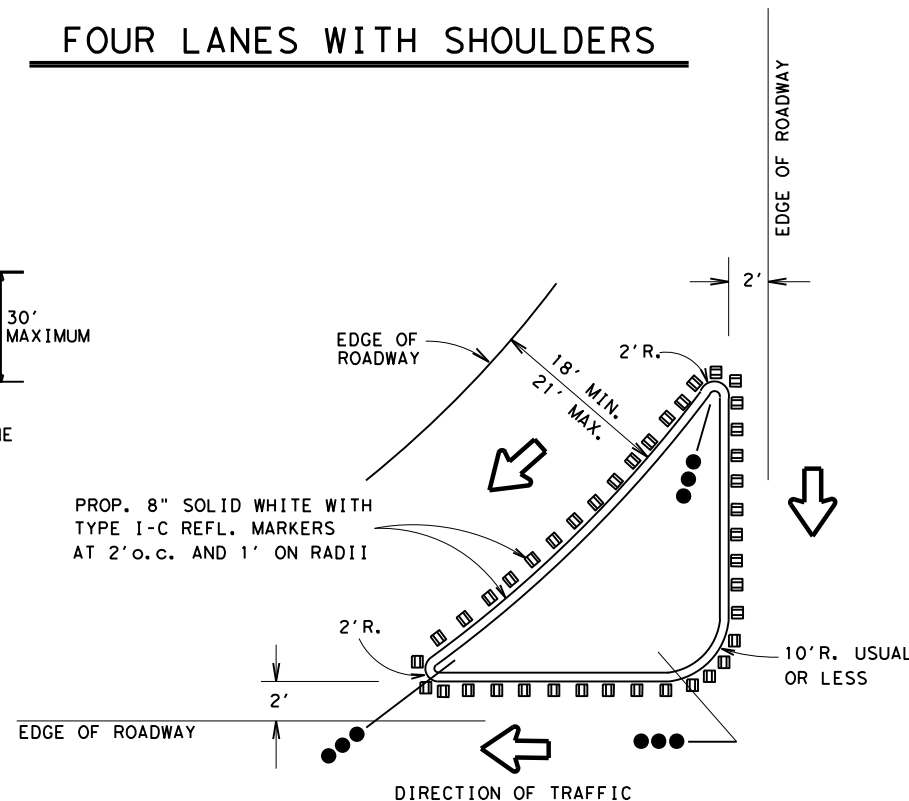
FOUR LANES WITH SHOULDERS



MULTI - LANES

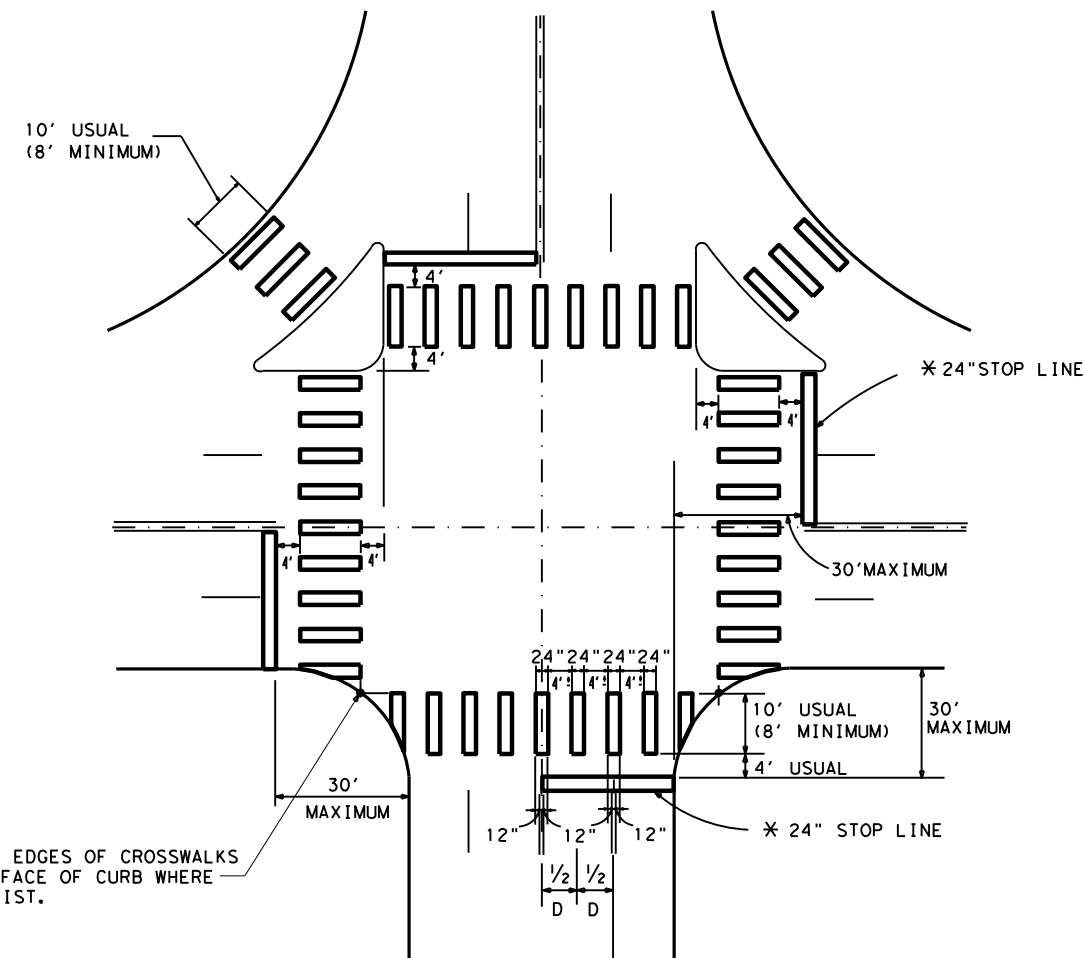


MULTI - LANE WITH MEDIAN

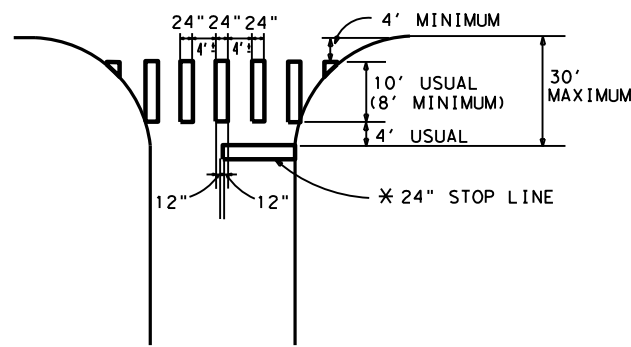


TYPICAL RIGHT TURN ISLAND WITH DELINEATION

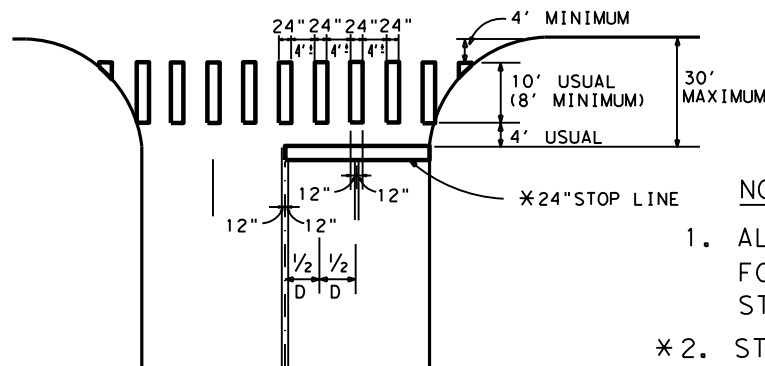
COMMON POINT OF OUTSIDE EDGES OF CROSSWALKS AT EDGE OF PAVEMENT OR FACE OF CURB WHERE NO RIGHT TURN ISLAND EXIST.



INTERSECTION WITH RIGHT - TURN ISLANDS



TWO LANES



FOUR LANES

**NOTES:**

1. ALL LONGITUDINAL LINES FORMING CROSSWALK AND STOP LINES SHALL BE WHITE
- \*2. STOP LINES AS REQUIRED ON DETAILED PAVEMENT MARKING PLANS.
3. "D" IS EQUAL TO ONE HALF THE DISTANCE.

ACC:  
LEVELS DISPLAYED  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16  
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32  
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48  
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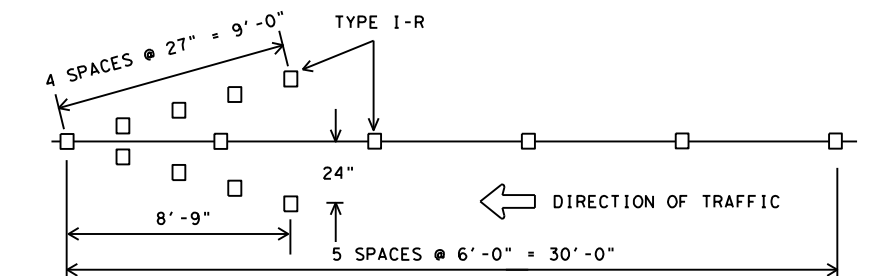
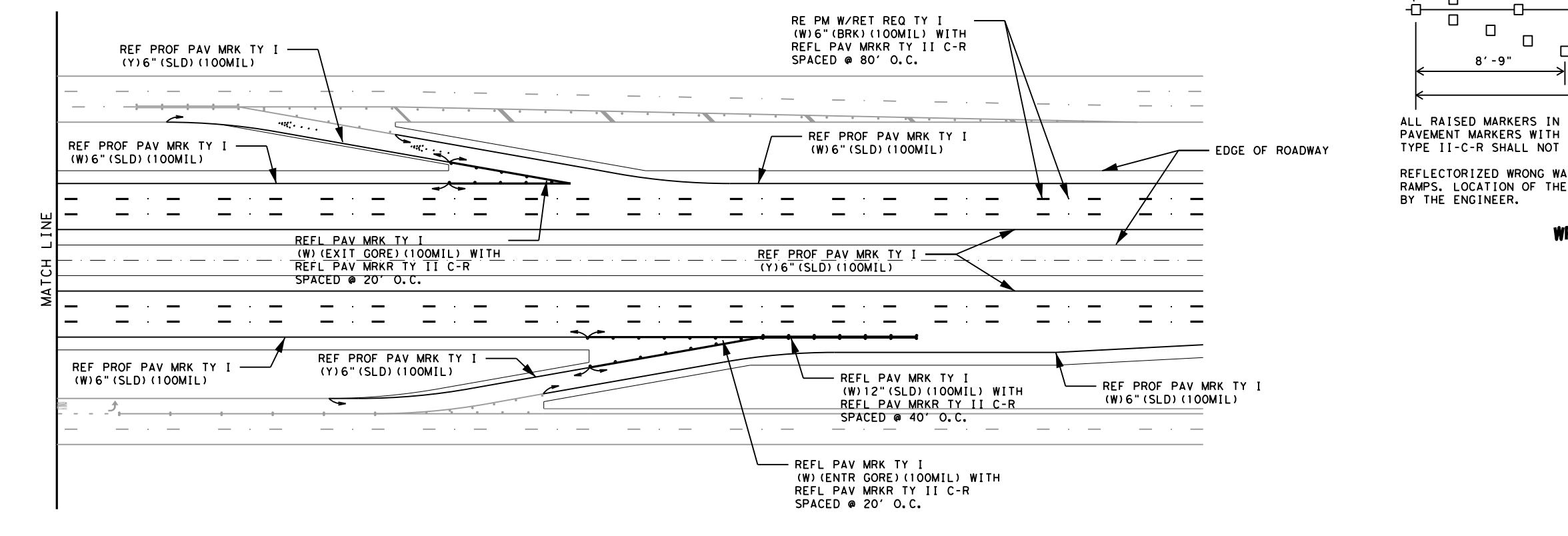
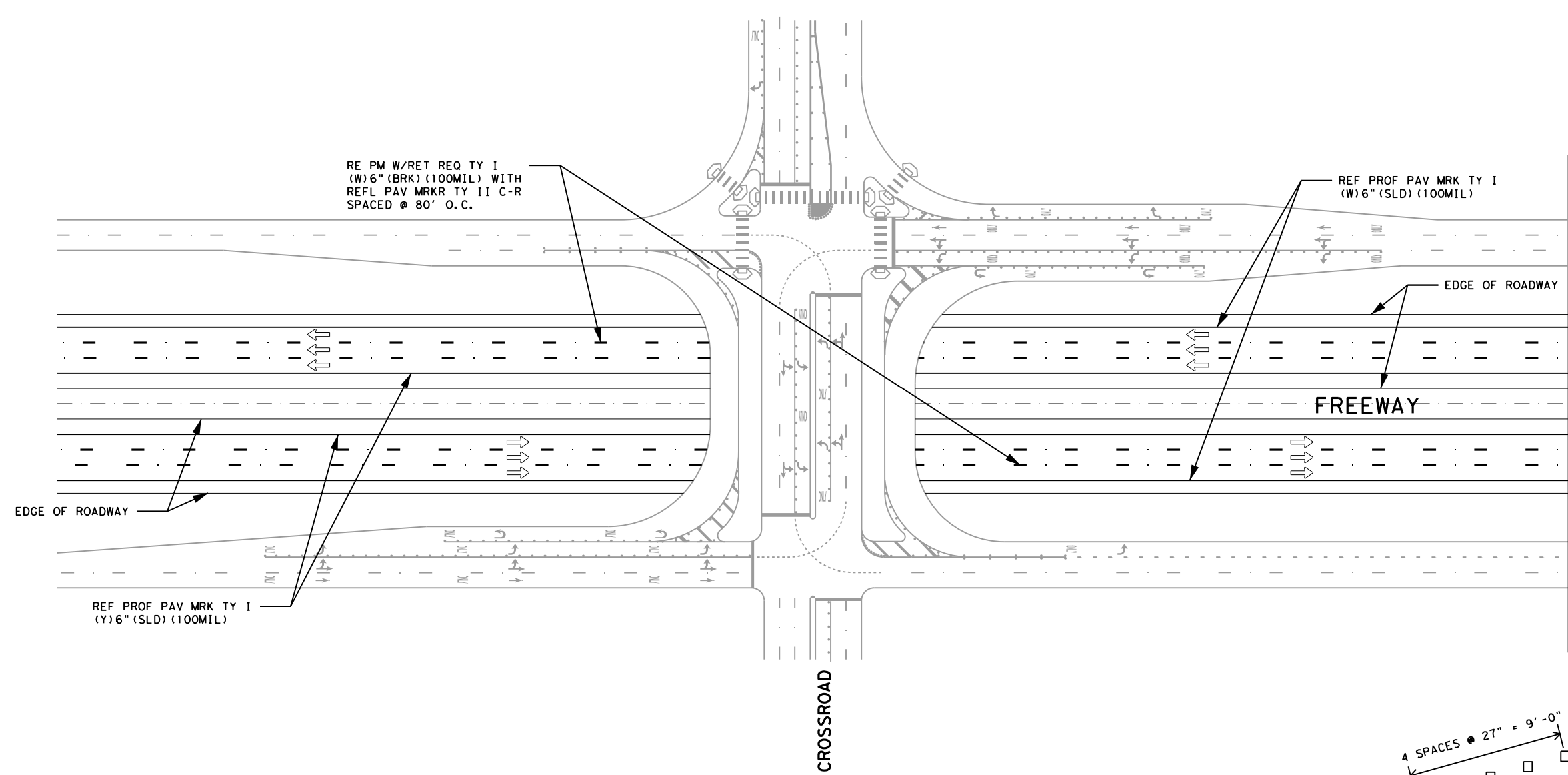
San Antonio District Standard  
**TYPICAL CROSSWALK DETAILS**

**TCD-05**

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REVISIONS	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
DEC 1999	6		74
AUG 2005			
STATE	DIST.	COUNTY	
TEXAS	SAT	BEXAR	
CONT.	SECT.	JOB	HIGHWAY NO.
64 I	41	001	VARIOUS

T:\Maint\Design\01 Maintenance Design Project Folder\GRMC\FY2023\GRMC\*6411\*41\*001\Plan\_Set\00 TX\B07\02Standards\01\_Currier\02\_Symbols\01\B-18 - 1.dwg  
 DRAWN BY: JCO3  
 REVISED BY: JCO3  
 DATE: 05/20/2018



ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

REFLECTORIZED WRONG WAY ARROWS, NOT TO EXCEED TWO, MAY BE PLACED ON EXIT RAMP. LOCATION OF THE ARROWS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER.

**WRONG WAY ARROW DETAIL**

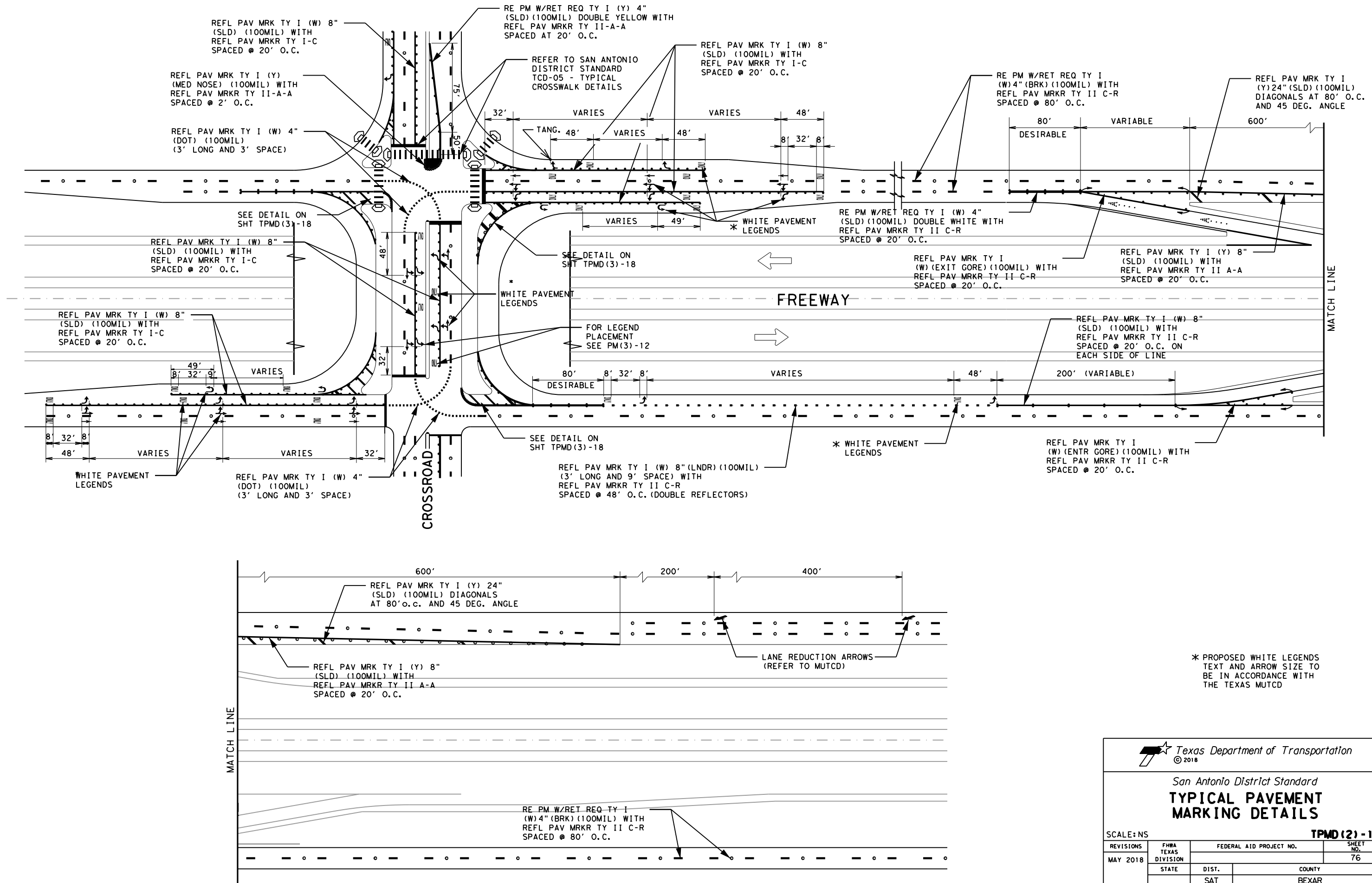
**Texas Department of Transportation**  
 © 2018

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**TYPICAL PAVEMENT MARKING DETAILS**

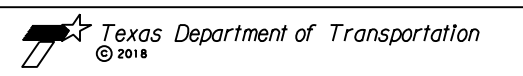
SCALE: NS **TPMD(1)-18**

REVISIONS	FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
MAY 2018		STATE	COUNTY	75
		TEXAS	BEXAR	
		CONT. SECT.	JOB	HIGHWAY NO.
		6411	41 001	VARIOUS

T:\Maint\Design\01 Maintenance Design Project Folder\GRMC\FY2023\GRMC\*6411\*41\*001\Plan\_Set\00 TYPICAL\2023\BANDS\01\_Currier\2\_SanAntonioDistrictStandard\01 - 18\TPMD(2)-18 - 1.dwg  
 DRAWN BY: JUC03  
 REVISED BY: JUC03  
 DATE: 01/11/23



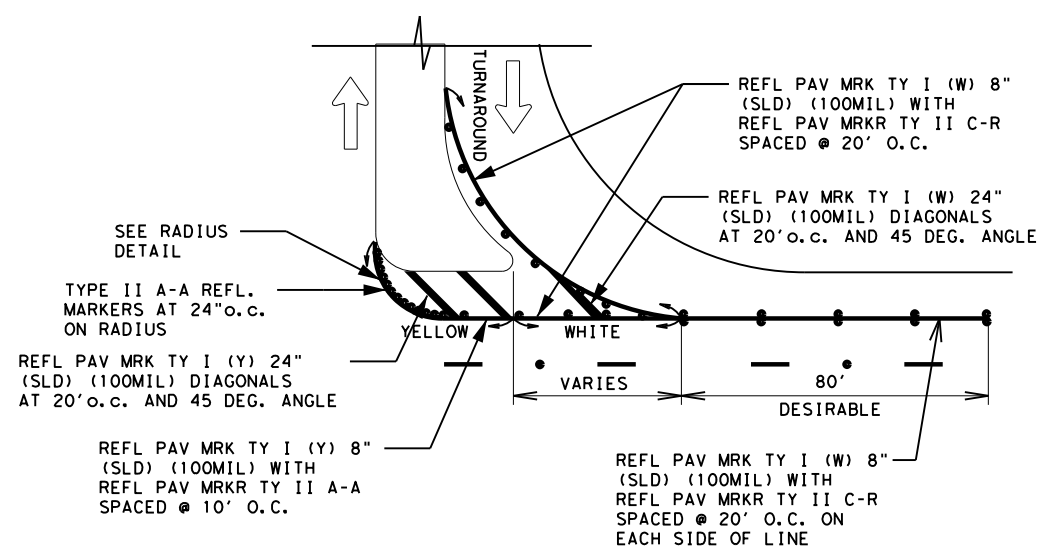
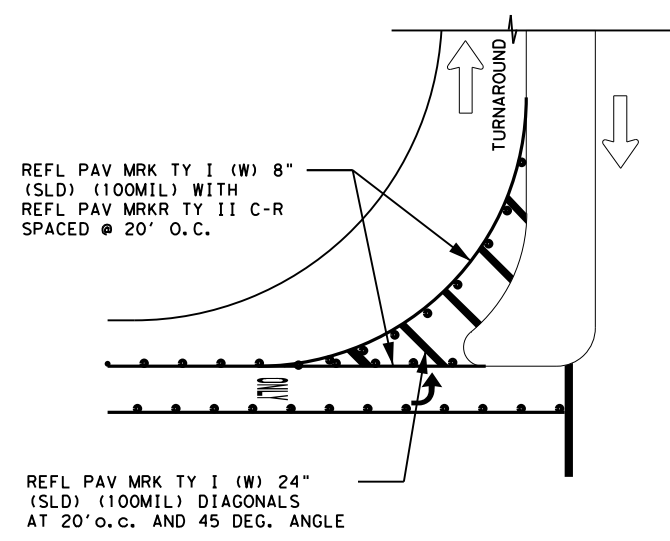
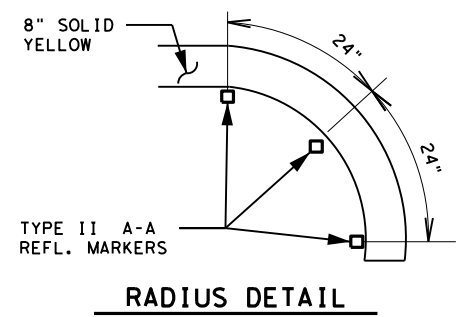
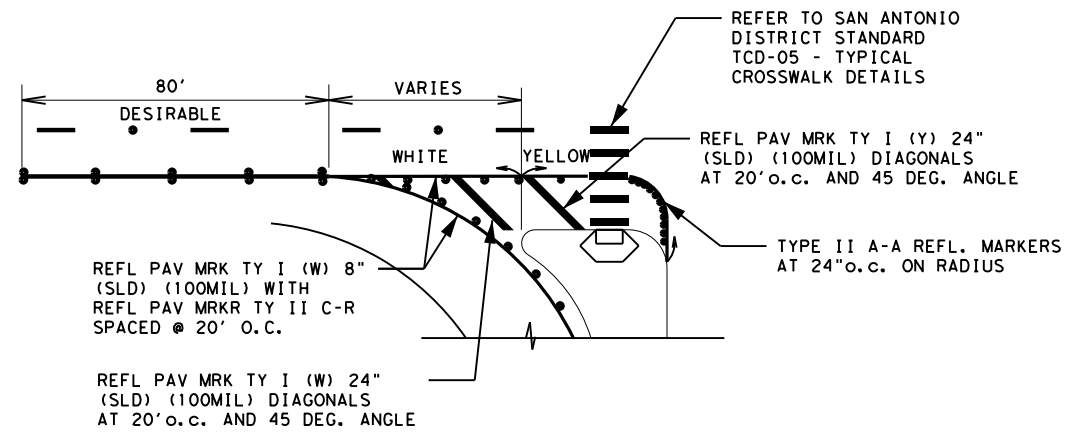
\* PROPOSED WHITE LEGENDS  
 TEXT AND ARROW SIZE TO  
 BE IN ACCORDANCE WITH  
 THE TEXAS MUTCD



San Antonio District Standard  
**TYPICAL PAVEMENT  
 MARKING DETAILS**

SCALE: NS **TPMD(2) - 18**

REVISIONS	FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.	SHEET NO.
MAY 2018			76
	STATE	DIST.	COUNTY
		SAT	BEXAR
	CONT.	SECT.	JOB
	6411	41	001
			HIGHWAY NO.
			VARIOUS



**TYPICAL TURNAROUND PAVEMENT MARKING DETAILS**

San Antonio District Standard  
**TYPICAL PAVEMENT MARKING DETAILS**

SCALE: NS **TPMD(3) - 18**

REVISIONS	FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
MAY 2018				77
	STATE	COUNTY		
	SAT	BEXAR		
	CONT.	SECT.	JOB	HIGHWAY NO.
	6411	41	001	VARIOUS