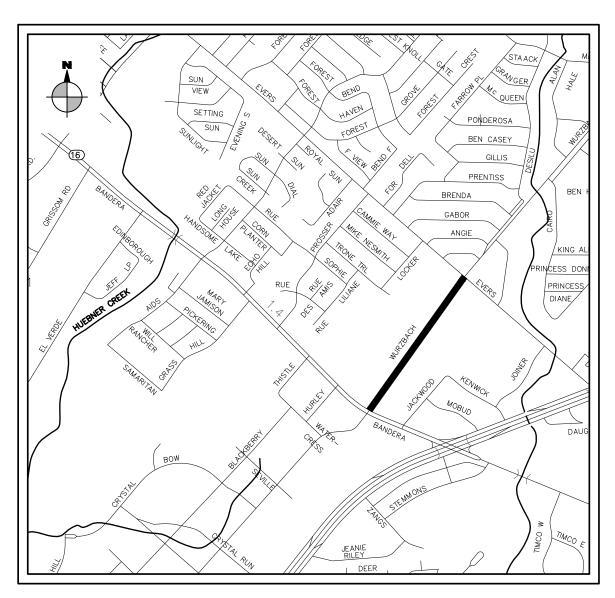
# **LEON VALLEY PUBLIC WORKS DEPARTMENT**



# **2025-01 - LEON VALLEY WURZBACH ROAD MAINTENANCE**



SHEET INDEX					
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Know what's **below. Call** before you dig.

PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL. OR BLAST — STOP AND CALL

THE LONE STAR NOTIFICATION COMPANY AT 1-800-669-8344









# GENERAL NOTES

- A. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO SURVEY THE EXISTING PAVEMENT MARKING LAYOUT TO ENSURE ACCURACY WHEN INSTALLING PROPOSED PAVEMENT MARKINGS.
- REFLECTORIZED PAVEMENT MARKINGS FOR STREETS SHALL BE 90 MIL THERMOPLASTIC. PAVEMENT MARKINGS SHALL BE PLACED ON THEIR EXISTING ALIGNMENTS UNLESS SHOWN OTHERWISE IN THE PLANS OR DIRECTED BY THE ENGINEER.
- C. THE CONTRACTOR SHALL BE RESPONSIBLE TO PRE-MARK ALL PAVEMENT MARKINGS PRIOR TO INSTALLATION. THE PRE-MARKINGS SHALL BE APPROVED BY THE ENGINEER PRIOR TO PROPOSED MARKING INSTALLATION. THIS WORK SHALL NOT BE PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- D. REMOVAL OF EXISTING RAISED PAVEMENT MARKINGS SHALL NOT BE PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- E. OBLITERATION OF EXISTING CONFLICTING PAVEMENT MARKING SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- THE CONTRACTOR SHALL INSTALL ONE (1) RAISED REFLECTIVE PAVEMENT MARKER TYPE II—BLUE—BLUE AT THE CENTER OF THE PAVEMENT TO MARK ALL FIRE HYDRANTS. THIS WORK SHALL NOT BE PAID FOR DIRECTLY BUT CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- G. ALL PAVEMENT MARKINGS SHALL BE IN ACCORDANCE WITH "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" – LATEST EDITION.
- H. ALL WORK SHALL BE PERFORMED DURING DAYLIGHT HOURS.
- I. THE CONTRACTOR SHALL SPRAY "ROUNDUP" OR EQUIVALENT WEED CONTROL IN AREAS TO BE SEALED. THIS WORK WILL BE DONE TWO WEEKS PRIOR TO SURFACING. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- J. PRIOR TO SURFACING, THE CONTRACTOR WILL BE REQUIRED TO CLEAN THE PAVEMENT OFF BY BROOMING. IF THE STREET IS CURB OR CURB AND GUTTERED, THE CONTRACTOR SHALL CLEAN ANY DEBRIS, DIRT OR VEGETATION FROM THE CURB OR CURB AND GUTTER. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
- K. PRIOR TO BEGINNING CONSTRUCTION ON ANY STREET, THE CONTRACTOR SHALL RECORD VIDEO OF ALL AREAS TO BE DISTURBED TO DOCUMENT THE EXISTING CONDITIONS ON THE PROJECT SITE.
- L. CONTRACTOR SHALL MATCH EXISTING ELEVATIONS AND PROVIDE POSITIVE DRAINAGE TO PREVENT WATER PONDING ALONG STREET.
- M. THE CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES IN THE FORM OF TEMPORARY SEDIMENT CONTROL FENCE OR CURB INLET GRAVEL FILTER WHEN SOILS ARE SIGNIFICANTLY DISTURBED AS DETERMINED BY THE ENGINEER.

# 2. PAVEMENTS

A. THE CONTRACTOR WILL BE REQUIRED TO MAINTAIN ALL STREETS IN AN ACCEPTABLE CONDITION, AS DIRECTED BY THE ENGINEER, FROM THE TIME WORK IS STARTED THRU FINAL ACCEPTANCE.

# CONCRETE STRUCTURES

- ALL EXPANSION JOINTS TO BE 1/2" ASPHALT IMPREGNATED FIBER BOARD, UNLESS OTHERWISE NOTED.
- B. ALL CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI UNLESS SHOWN OTHERWISE IN THE PLANS AND DETAILS.
- C. ALL REINFORCING STEEL SHALL BE GRADE 60 UNLESS SHOWN OTHERWISE IN THE PLANS OR DETAILS.
- D. WHERE PROPOSED CONCRETE TIES INTO EXIST CONCRETE, CONTRACTOR SHALL PLACE AN EXPANSION JOINT WITH 1/2"x18" SMOOTH DOWELS DRILLED AND EPOXY SET WITH AN EXPANSION CAP AT ONE END. DOWELS SHALL BE SET AT 18" C-C WITH A MINIMUM OF 2 DOWELS FOR CURB, CURB & GUTTER AND SIDEWALKS.

# 4. SIDEWALKS AND CURB RAMPS

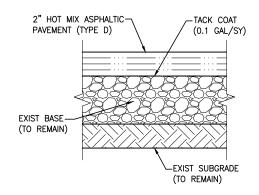
- A. THE CONTRACTOR SHALL PROTECT SECTIONS OF CURB, CURB & GUTTER, AND SIDEWALKS THAT WILL REMAIN IN PLACE FROM DAMAGE, AND REPAIR ANY DAMAGED CONCRETE AT CONTRACTORS OWN EXPENSE.
- B. CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH COSA 502.1 CONCRETE SIDEWALKS. THE CURB RAMPS WILL BE MEASURED AND PAID BY FACH.
- C. ANY CURB, SIDEWALK, TOPSOIL, AND SOD REMOVAL AND REPLACEMENT ASSOCIATED WITH THE CURB RAMPS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
- D. REINFORCING STEEL SHALL BE #3 BARS AT 18" O.C.E.W. NO WIRE MESH WILL BE ALLOWED.

# 5. PHASING AND STAGING NOTES

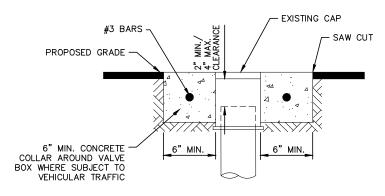
- A. CONTRACTOR SHALL ALLOW FOR TWO-WAY TRAFFIC AT ALL TIMES FOR ALL PHASES AND MAINTAIN ACCESS TO THE RESIDENTS.
- B. CONTRACTOR SHALL LIMIT WORK AREA TO ONE STREET AT A TIME OR AS APPROVED BY THE ENGINEER.
- C. SIDEWALK RAMPS SHALL BE COMPLETED PRIOR TO ANY STREET IMPROVEMENTS.

# 6. TRAFFIC NOTES

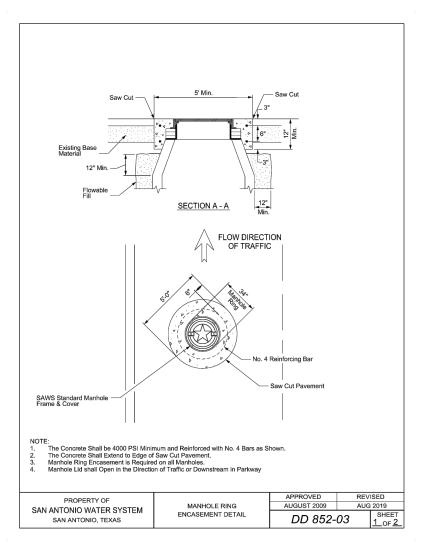
- A. CONTRACTOR SHALL NOTIFY ALL RESIDENTS WITHIN CONSTRUCTION AREA NO LESS THAN SEVEN (7) DAYS PRIOR TO WORK.
- B. ALL WORK SHALL START AFTER SUNRISE AND WORK SHALL BE ARRANGED THAT NO WORK IS PERFORMED AFTER SUNSET.
- C. ALL EXCAVATION SHALL BE BACKFILLED IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS AND PROJECT AREAS OPEN TO TRAFFIC ON NIGHTS, WEEKENDS. HOLIDAYS AND NON-WORKING DAYS.
- D. STREETS SHALL BE CLOSED TO THRU TRAFFIC IN ACCORDANCE WITH TRAFFIC CONTROL PLAN DURING PAVEMENT REHAB.
- E. PLASTIC DRUMS AND BARRICADES SHALL BE USED TO DEFINE CONSTRUCTION AREAS LEFT OVERNIGHT WITHIN THE PAVEMENT SECTION.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING AND MAINTAINING TRAFFIC CONTROL THROUGHOUT THE DURATION OF THE CONTRACT IN ACCORDANCE WITH THE "TEXAS MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES"
- G. ALL CONSTRUCTION SIGNS AND BARRICADES SHALL HAVE HIGH INTENSITY REFLECTIVE SHEETING AS APPROVED BY THE ENGINEER.
- H. WORKING HOURS: 8:00AM TO 5:00PM







ADJUSTED VALVE DETAIL
SCALE: NOT TO SCALE









# AL NOTES AND DET

N W

2025-01 WURZBACH F

Phone: (210) 822-2232
www.Ardura.com
ngineering License #F-10053
Ardura Group, Inc.
Surveying Firm 10194688



2 of 29

DRAWN BY: RM

CHECKED BY: BGS

APPROVED BY: BGS

OVERALL QUANTITY SUMMARY					
ITEM	DESCRIPTION	UNIT	QUANTITY		
COSA 100.01	MOBILIZATION	LS	1		
COSA 101.01	PREPARATION OF RIGHT-OF-WAY	LS	1		
COSA 203.01	TACK COAT	GAL	1,751		
COSA 205.04	HOT MIX ASPHALTIC PAVEMENT, TYPE D (2" COMP. DEPTH)	SY	17,508		
COSA 208.01	SALVAGING HAULING AND STOCKPILING RECLAIMABLE ASPHALTIC PAVEMENT (DEPTH VARIES)	SY	17,508		
COSA 530.01	BARRICADES, SIGNS, AND TRAFFIC HANDLING	LS	1		
COSA 535.01	4 INCH WIDE YELLOW LINE	LF	5,078		
COSA 535.02	4 INCH WIDE WHITE LINE	LF	486		
COSA 535.02	8 INCH WIDE WHITE LINE	LF	183		
COSA 535.11	COMBINATION THRU/LEFT WHITE ARROW	EA	1		
COSA 535.12	WORD "ONLY"	EA	4		
COSA 535.07	24 INCH WIDE YELLOW LINE	LF	55		
COSA 535.22	MEDIAN NOSE YELLOW	EA	1		
COSA 536.08	LEFT WHITE ARROW	EA	7		
COSA 536.08	RIGHT WHITE ARROW	EA	6		
COSA 537.06	PAVEMENT MARKER (TYPE I-C)	EA	200		
COSA 537.08	PAVEMENT MARKER (TYPE II A-A)	EA	650		
COSA 540.00	STORMWATER POLLUTION PREVENTION PLAN	LS	1		
SAWS 826.00	ADJUST VALVE BOX	EA	1		
SAWS 851.00	ADJUST EXISTING MANHOLE	EA	5		

ISSUES / REVISIONS

ISSUES / REVISIONS

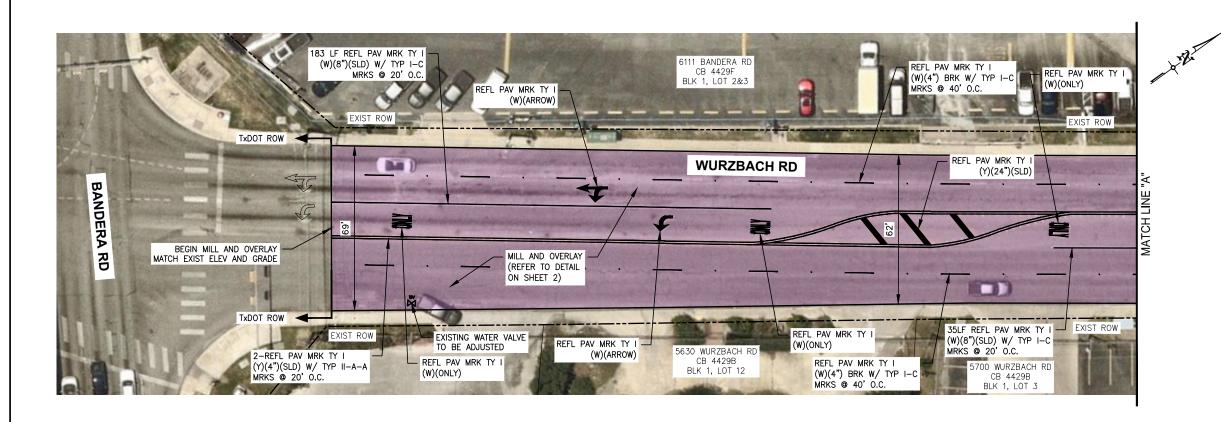
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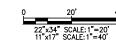
BY

2025-01 - LEON VALLEY
WURZBACH ROAD MAINTENANCE
OVERALL QUANTITIES

8918 Tesoro Dr., Suite 401 San Antonio, Texas 78217 Phone: (210) 822-2332 www.Ardura.com







# LEGEND

©SS EXIST SAN SWR MH

IN EXIST WATER VALVE

IN EXIST GAS VALVE

S SAN SWR MH TO BE ADJUSTED
WATER VALVE TO BE ADJUSTED
GAS VALVE TO BE ADJUSTED

——— EXIST ROW

ISSUES / REVISIONS

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RICARDO J ZAMORA

05/02/2025

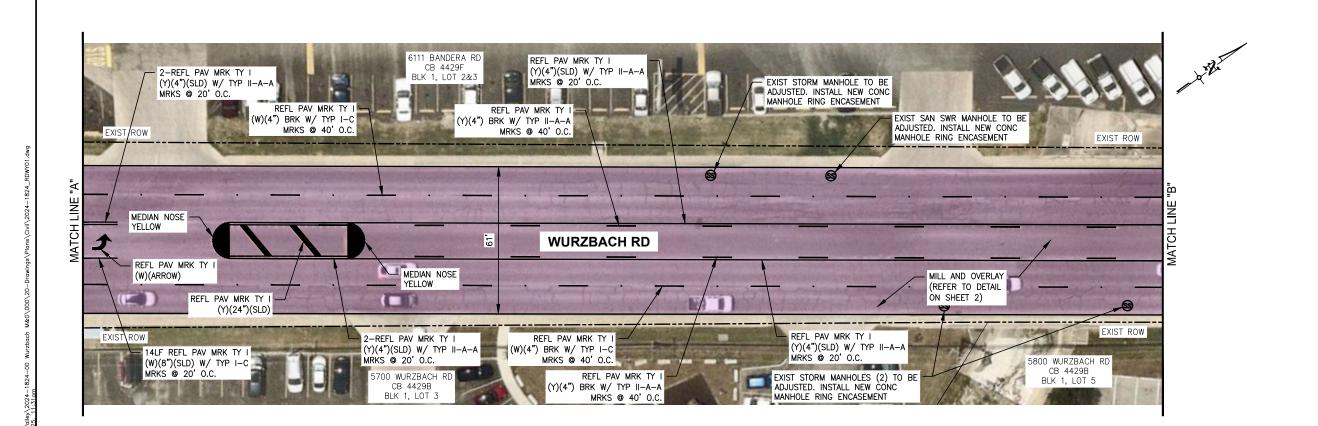
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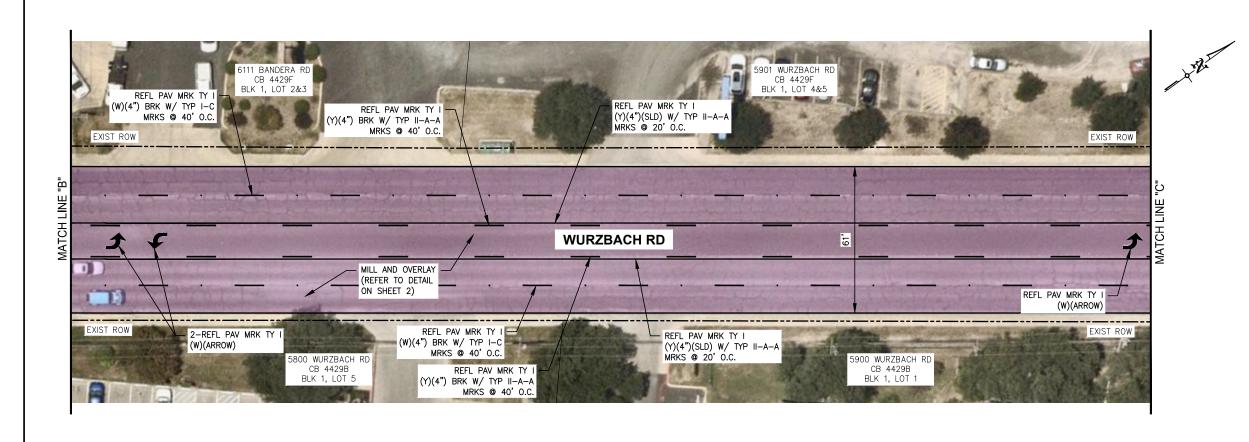
2025-01 - LEON VALLEY
WURZBACH ROAD MAINTENANCE
PROPOSED ROADWAY
IMPROVEMENTS

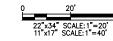
one; (210) 822-2232 www.Ardurra.com ering License #F-10053 <u>crdurra Group, Inc.</u>



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CHECKED BY: BGS
APPROVED BY: BGS
JOB NO.: 2024-1824-00







# LEGEND

SS EXIST SAN SWR MH EXIST WATER VALVE EXIST GAS VALVE

S SAN SWR MH TO BE ADJUSTED WATER VALVE TO BE ADJUSTED GAS VALVE TO BE ADJUSTED

--- EXIST ROW

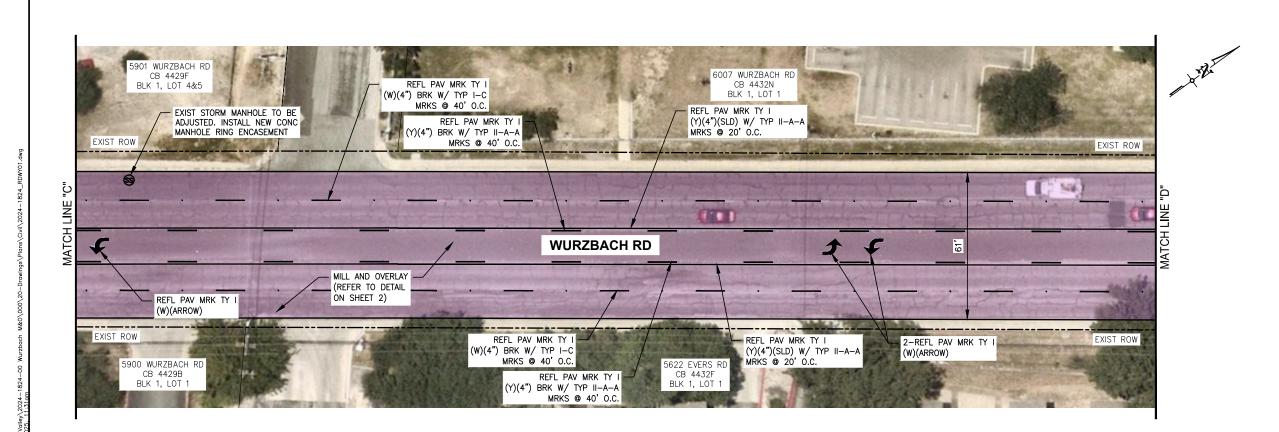
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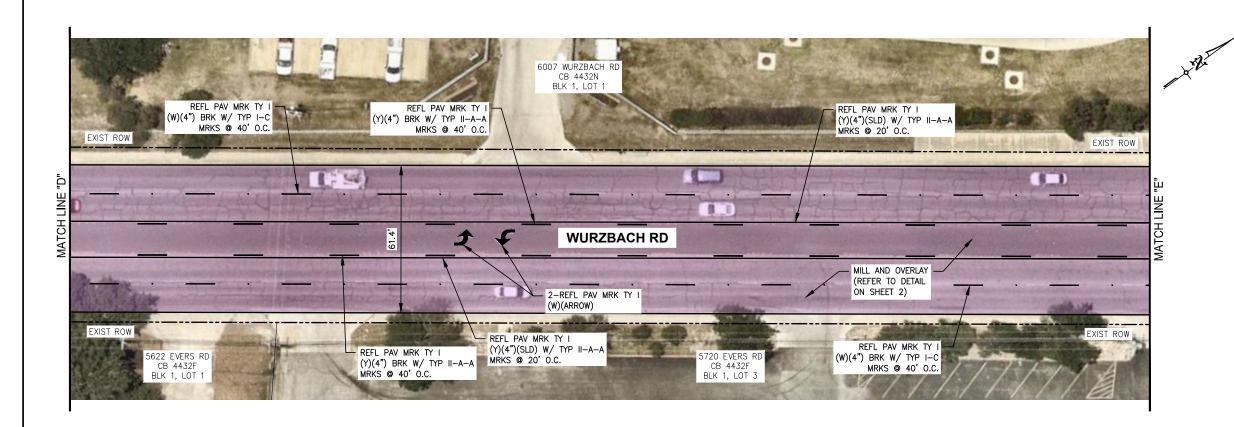
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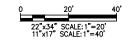
2025-01 - LEON VALLEY
WURZBACH ROAD MAINTENANCE
PROPOSED ROADWAY
IMPROVEMENTS



CHECKED BY: APPROVED BY: BGS JOB NO.: 2024-1824-00







# LEGEND

SS EXIST SAN SWR MH EXIST WATER VALVE EXIST GAS VALVE

SAN SWR MH TO BE ADJUSTED WATER VALVE TO BE ADJUSTED GAS VALVE TO BE ADJUSTED

--- EXIST ROW

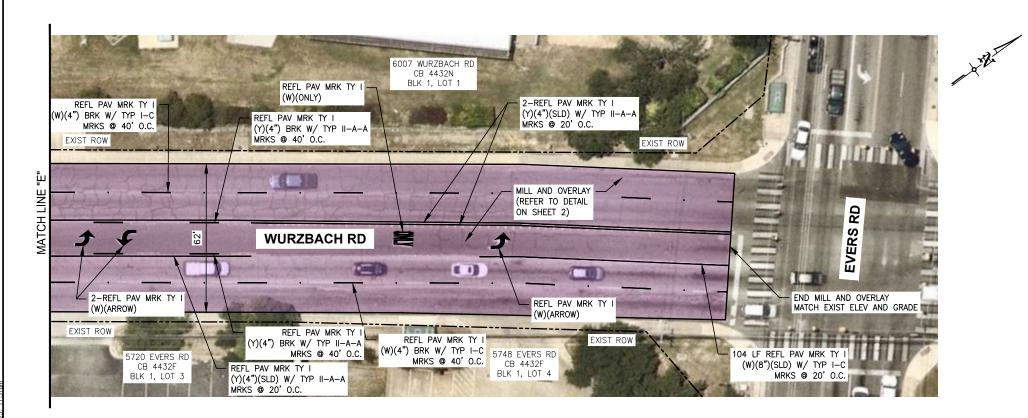
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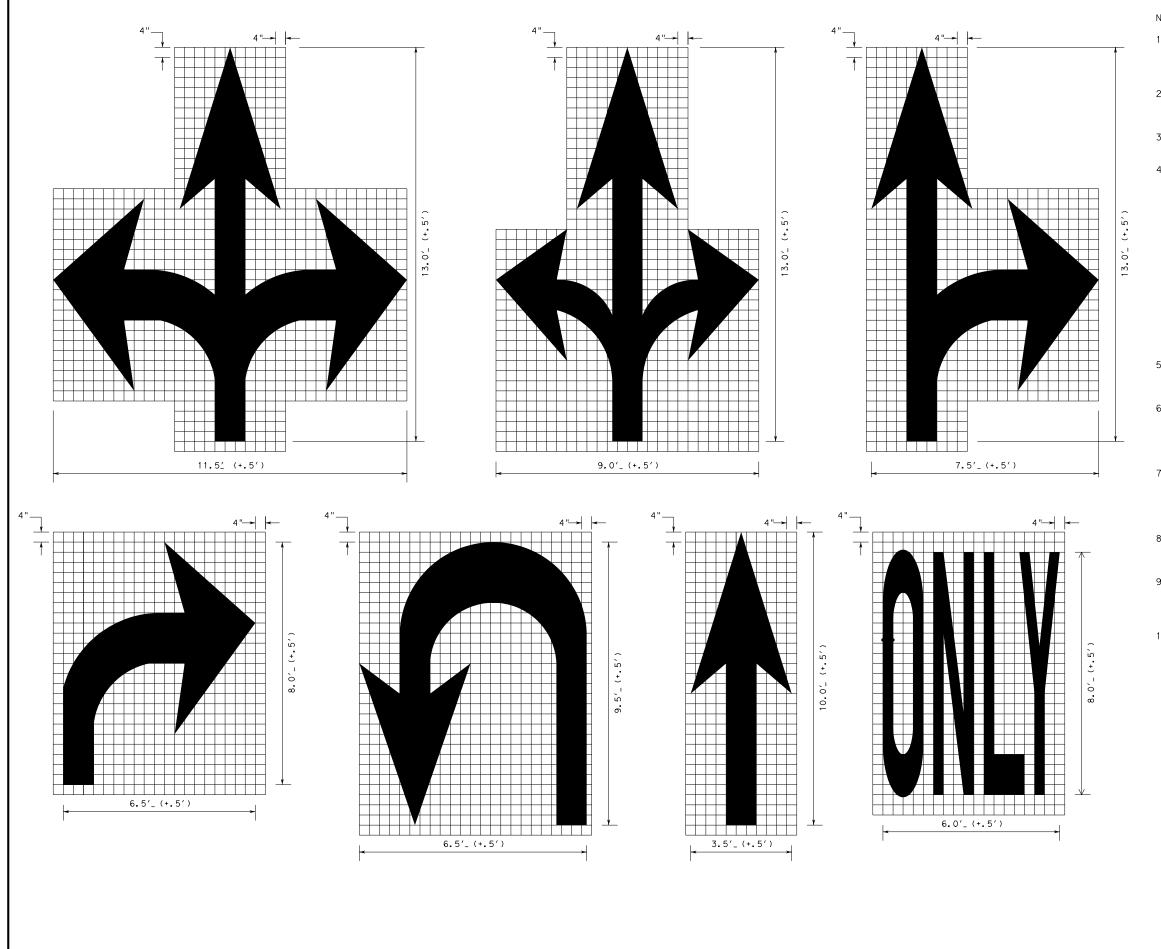
05/02/2025

# 2025-01 - LEON VALLEY WURZBACH ROAD MAINTENANCE PROPOSED ROADWAY IMPROVEMENTS



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DRAWN BY: RM				
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APPROVED BY: BGS				
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# NOTES:

- 1. MINIMUM 8 FOOT WHITE MARKINGS SHALL BE USED, UNLESS OTHERWISE NOTED. IF MESSAGE CONSISTS OF MORE THAN ONE WORD, IT SHOULD BE PLACED WITH FIRST WORD NEAREST THE DRIVER.
- 2. THESE DETAILS ARE STANDARD SIZE FOR NORMAL INSTALLATION; SIZES MAY BE REDUCED APPROXIMATELY ONE-THIRD DEPENDING ON CONDITIONS.
- 3. THE LONGITUDINAL SPACE BETWEEN MARKINGS SHOULD BE 30 FFFT.
- 4. MARKINGS CONSIDERED APPROPRIATE FOR USE WHEN WARRANTED INCLUDE THE FOLLOWING:
  - A. REGULATORY STOP RIGHT (LEFT) TURN ONLY 25 MPH SYMBOL ARROWS
  - B. WARNING
    STOP AHEAD
    SIGNAL AHEAD
    SCHOOL
    SCHOOL X-ING
    PED X-ING
  - R X R (SEE RCPM DETAIL)
    OTHER WORDS OR SYMBOLS MAY BE NECESSARY UNDER
    CERTAIN CONDITIONS
- 5. UNCONTROLLED USE OF PAVEMENT MARKINGS CAN RESULT IN DRIVER CONFUSION. WORD AND SYMBOL MARKINGS SHOULD BE NO MORE THAN THREE LINES.
- 6. THE WORD "STOP" SHALL NOT BE USED ON THE PAVEMENT UNLESS ACCOMPANIED BY A STOP LINE AND STOP SIGN. THE WORD "STOP" SHALL NOT BE PLACED ON THE PAVEMENT IN ADVANCE TO A STOP LINE, UNLESS EVERY VEHICLE IS REQUIRED TO STOP AT ALL TIMES.
- 7. PAVEMENT MARKINGS SHOULD GENERALLY BE NO MORE THAN ONE LANE IN WIDTH, WITH SCHOOL MESSAGES BEING THE EXCEPTION. FOR DETAILS OF SCHOOL AND SCHOOL CROSSING PAVEMENT MARKINGS, REFER TO PART VII OF THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
- 8. SPACING BETWEEN LETTERS SHOULD BE APPROXIMATELY 4 INCHES. THE WIDTH OF LETTERS MAY VARY DEPENDING ON THE WIDTH OF THE TRAVEL LANES.
- 9. LANE-USE ARROW MARKINGS MAY BE USED TO CONVEY EITHER GUIDANCE OR MANDATORY MESSAGES. ARROWS USED TO CONVEY A MANDATORY MOVEMENT MUST BE ACCOMPANIED BY STANDARD SIGNS AND THE PAVEMENT MARKING WORD "ONLY".
- 10.PAVEMENT MARKINGS ARE TO BE LOCATED AS SPECIFIED ELSEWHERE IN THE PLANS.

# SEPTEMBER 2009

# CITY OF SAN ANTONIO

DEPARTMENT OF PUBLIC WORKS

TRAFFIC ENGINEERING STANDARDS

# STANDARD PAVEMENT MARKINGS (ARROWS)

SHEET 3 OF 16

BY: LAN DSGN.BY: C.R.V. CHKD.BY: M.E. SHEET NO.: 7



#### CENTERLINE & EDGE FOR ALL TWO LANE STREETS CENTERLINE, LANE LINES, & EDGE LINES WITH PASSING ZONE FOR TWO-WAY LEFT TURN LANE 4" SOLID WHITE EDGE LINE 4" SOLID YELLOW LINE - CENTERLINE SEE DETAIL "A" \_\_\_ 4" YELLOW - TYPE II-A-A 4" YELLOW LANE LINE LANE LINE SYMMETRICAL AROUND CENTERLINE YELLOW LINE TYPE II-A-A CONTINUOUS TWO-WAY LEFT TURN LANE 4" SOLID WHITE EDGE LINE - 40′ CENTERLINE, LANE LINES & EDGE LINES - CURB FOR FOUR LANE TWO-WAY STREETS 4" WHITE LANE LINE RAISED PAVEMENT MARKER TYPE I-C, CLEAR FACE TOWARD NORMAL TRAFFIC, SHALL BE PLACED ON 40-FOOT CENTERS. CURB 4" SOLID WHITE FDGF LINE TYPE I-C **CURB** SOLID WHITE EDGE LINE 4" SOLID - TYPE I-C 4" WHITE YELLOW LINE LANE LINE LANE LINES & EDGE LINES FOR ONE-WAY MULTILANE STREET SEE DETAIL "B" RAISED PAVEMENT MARKERS TYPE II-C-R SHALL HAVE CLEAR FACE TOWARD NORMAL TRAFFIC AND RED FACE TOWARD WRONG-WAY TRAFFIC. TYPF II-A-A 4" SOLID WHITE CURB EDGE LINE TYPE I-C OR II-C-R 4" WHITE TYPE I-C LANE LINE 4" SOLID WHITE CURB EDGE LINE TYPE I-C OR II-C-E 4" WHITE LANE LINE TYPF II-A-A -1"-2" TYPE II-A-A 3-4' 4", - CURB 4" SOLID WHITE EDGE LINE TYPE II-A-A-DETAIL "A" DETAIL "B" ROADWAYS WITH REDUCED SHOULDER GUIDE FOR PLACEMENT OF STOP LINES. TYPE I-C WIDTHS ACROSS BRIDGE OR CULVERT **EDGE LINE & CENTERLINE** WHITE TYPE I-C 24" TYP. (12" MIN.) BRIDGE RAIL MIN OR FACE OF CURB SOLID WHITE 30' MAX STOP LINES 4" SOLID WHITE SOLID WHITE 20' TYP. I WIDTH: 24" EDGE LINE $\bigcirc$ (L) LANE WIDTH GREATER THAN OR EQUAL TO 10 (TYP.) (TYP.) VARIES 4" SOLID WHITE EDGE LINE 1. NO-PASSING ZONE ON BRIDGE APPROACH IS OPTIONAL BUT IF USED, IT SHALL BE A MINIMUM 500 FEET LONG. 2. FOR CROSSHATCHING LENGTH (L) SEE TABLE 1. 3. THE WIDTH OF THE OFFSET (W) AND THE REQUIRED CROSSHATCHING WIDTH IS THE FULL SHOULDER WIDTH IN

ADVANCE OF THE BRIDGE.

4. THE CROSSHATCHING SHOULD BE REQUIRED IF THE SHOULDER WIDTH IN ADVANCE OF THE BRIDGE IS 4 FOOT

OR WIDER AND ANY REDUCTION IN SHOULDER WIDTH ACROSS THE BRIDGE OCCURS.

# TABLE 1 - TYPICAL LENGTH (L)

* POSTED SPEED	FORMULA
45>	$L = \frac{WS^2}{60}$
<u>&gt;</u> 45	L= WS

- \* 85TH PERCENTILE SPEED MAY BE USED ON ROADS WHERE TRAFFIC SPEEDS NORMALLY EXCEED THE POSTED SPEED LIMIT.
  CROSSHATCHING LENGTH SHOULD BE ROUNDED UP TO NEAREST 5 FOOT INCREMENT.
- L= LENGTH OF CROSSHATCHING (FT) W= WIDTH OF OFFSET (FT)
- S= POSTED SPEED (MPH)

#### **FXAMPLES**:

AN 8 FOOT SHOULDER IN ADVANCE OF A BRIDGE REDUCES TO 4 FEET ON A 70 MPH ROADWAY. THE LENGTH OF THE CROSS-HATCHING SHOULD BE:

L=8X70=560 FT

A 4 FOOT SHOULDER IN ADVANCE OF A BRIDGE REDUCES TO 2 FEET ON A 40 MPH ROADWAY. THE LENGTH OF THE CROSS-HATCHING SHOULD BE: L= 4(40) / 60= 106.67 FT ROUNDED TO 110 FT

# YIELD LINES

18"

▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼ ▼

# GENERAL NOTES:

- . EDGELINE ADJACENT TO CURB AND GUTTER IS NOT REQUIRED IN ALL CASES, HOWEVER SHALL BE PLACED AS DIRECTED BY CITY TRAFFIC ENGINEER.
- THE TRAVELED WAY INCLUDES ONLY THAT PORTION OF THE ROADWAY USED FOR VEHICULAR TRAVEL AND NOT THE PARKING LANES, SIDEWALKS, BERMS AND SHOULDERS. THE TRAVELED WAYS SHALL BE MEASURED FROM THE INSIDE OF EDGELINE TO INSIDE OF EDGELINE OF A TWO LANE ROADWAY.
- 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.
- ALL PAVEMENT MARKING MATERIAL SHALL MEET THE REQUIRED MATERIAL SPECIFICATIONS AS SPECIFIED BY CITY OF SAN ANTONIO STANDARD SPECIFICATIONS.
- 4" SOLID WHITE EDGE LINES ARE OPTIONAL AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

# SEPTEMBER 2009

# CITY OF SAN ANTONIO

DEPARTMENT OF PUBLIC WORKS

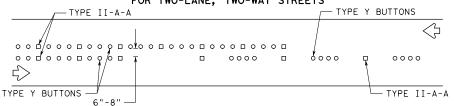
STANDARD PAVEMENT MARKINGS WITH REFLECTIVE RAISED PAVEMENT MARKERS FOR POSITION GUIDANCE 1 SHFFT 4 0F 16

\_% SUBMITTAL

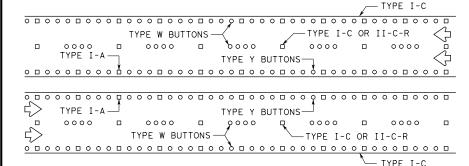


PLACED W/ REFLECTION PAVEMENT MARKERS (OPTIONAL)

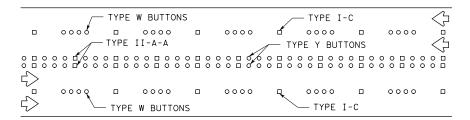
# CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY STREETS



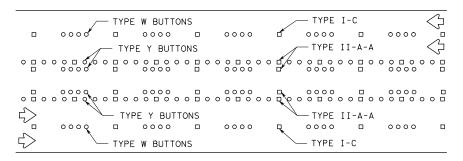
# EDGE & LANE LINES FOR DIVIDED STREET



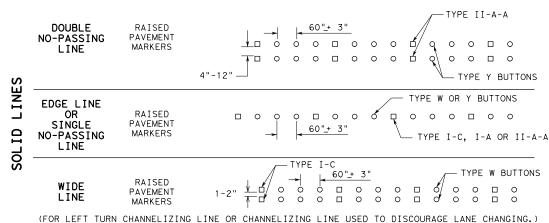
# LANE & CENTER LINES FOR MULTILANE UNDIVIDED STREETS

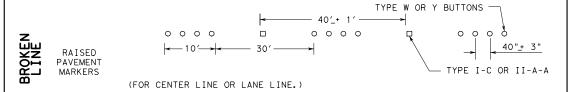


# TWO-WAY LEFT TURN LANE



# RAISED PAVEMENT MARKINGS PLACEMENT DETAILS PLACED W/ REFLECTION PAVEMENT MARKERS (OPTIONAL)





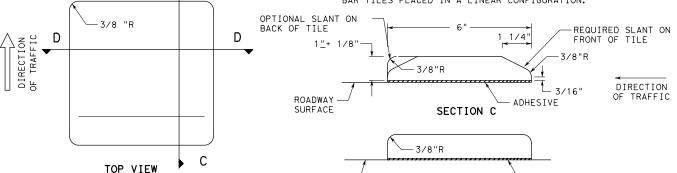
# JIGGLE BAR TILES

-ADHESIVE

# (NON-REFLECTORIZED)

"JIGGLE BARS" CONSIST OF A NUMBER OF JIGGLE BAR TILES PLACED IN A LINEAR CONFIGURATION.

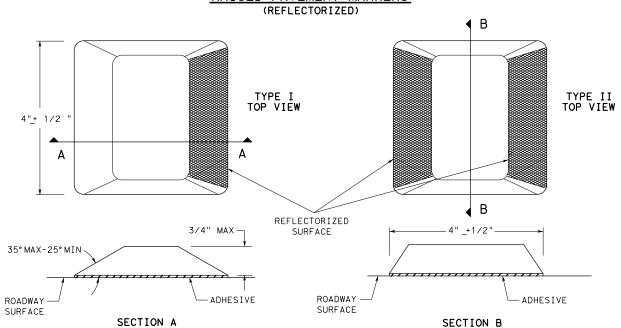
SECTION D



# RAISED PAVEMENT MARKERS

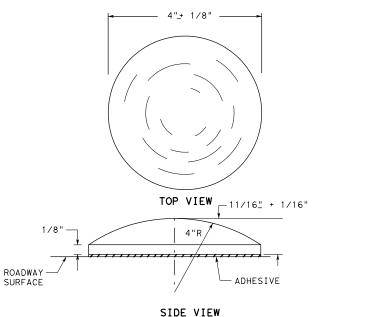
ROADWAY

SURFACE



# TRAFFIC BUTTONS (NON-REFLECTORIZED)

NOTE: MINIMUM AREA OF MARKERS SHALL BE NOT LESS THAN 12.5 SQUARE INCHES.



# NOTES:

- 1. RAISED PAVEMENT MARKERS (RPMs) MAY CONSIST OF TRAFFIC BUTTONS, PAVEMENT MARKERS AND/OR
  JIGGLE BAR TILES. PAVEMENT SURFACE SHALL BE
  PREPARED AND CLEANED SUBJECT TO APPROVAL OF THE CITY TRAFFIC ENGINEER BEFORE ADHESIVE AND RPMs ARE PLACED.
- JIGGLE BARS SHALL BE ORIENTED PERPENDICULAR TO ROADWAY. JIGGLE BARS SHALL ALSO BE PLACED AT SUCH OTHER LOCATIONS AS SHOWN IN PLANS OR AS DIRECTED BY THE CITY TRAFFIC ENGINEER.
- MARKERS, BUTTONS AND JIGGLE BAR TILES SHOWN ARE FOR ILLUSTRATION PURPOSES ONLY AND NOT INTENDED TO SPECIFY ANY PARTICULAR PRODUCT. ALL PAVEMENT MARKERS PROVIDED SHALL BE OF THE SAME MANUFACTURER.
- 4. ALL DIMENSIONS ARE +/- 1/8" UNLESS OTHERWISE
- ALL PAVEMENT MARKING MATERIALS SHALL MEET MATERIAL SPECIFICATIONS AS SPECIFIED BY CITY OF SAN ANTONIO STANDARD SPECIFICATIONS.
- TRAFFIC BUTTONS AND JIGGLE BAR TILES ARE TO BE USED ONLY FOR TEMPORARY TRAFFIC CONTROL OR AS DIRECTED BY THE CITY TRAFFIC ENGINEER.

# SEPTEMBER 2009

# CITY OF SAN ANTONIO

DEPARTMENT OF PUBLIC WORKS

RAISED PAVEMENT MARKERS, REFLECTIVE PAVEMENT MARKERS, TRAFFIC BUTTONS & JIGGLE BAR TILES 2

PROJECT NO. \_% SUBMITTAL

# BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
- 4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- 5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
- When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes iustify the sianina.
- 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.
- 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
- 13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

# WORKER SAFETY NOTES:

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

# COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

# THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov

COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)

MATERIAL PRODUCER LIST (MPL)

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

STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)

TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)

TRAFFIC ENGINEERING STANDARD SHEETS

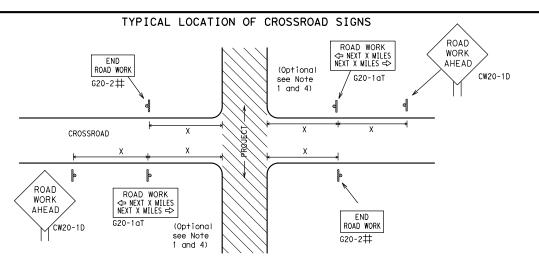
SHEET 1 OF 12



# BARRICADE AND CONSTRUCTION **GENERAL NOTES** AND REQUIREMENTS

BC(1)-21

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

#### BEGIN T-INTERSECTION WORK ZONE **X** ★ G20-9TP ★ ★ R20-5T FINES DOLIBL XX R20-5aTP WORKERS ARE PRESENT ROAD WORK <⇒ NEXT X MILES END ¥ ★ G20-2bT WORK ZONE G20-1bTI INTERSECTED 1000'-1500' - Hwy 1 Block - City 1000'-1500' - Hwy 1 Block - City ROADWAY $\Rightarrow$ BOAD WORK G20-1bTR NEXT X MILES => Limit WORK ZONE G20-2bT X X BEGIN WORK $\times$ $\times$ G20-9TP ZONE TRAFFI G20-6T X X R20-5T FINES IDOUBLE XX R20-5aTP WHEN WORKERS ROAD WORK G20-2

# CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING 1,5,

# SIZE

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

Posted Speed	Sign∆ Spacing "X"	
MPH	Feet (Apprx.)	
30	120	
35	160	
40	240	
45	320	
50	400	
55	500 <sup>2</sup>	
60	600 <sup>2</sup>	
65	700 <sup>2</sup>	
70	800 <sup>2</sup>	
75	900 <sup>2</sup>	

1000 <sup>2</sup>

80

SPACING

- \* 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.
- $\triangle$  Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

# GENERAL NOTES

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

#### SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS X X G20-9TP SPEED STAY ALERT ROAD LIMIT R4-1 PASS OBEY TRAFFIC ★ ★ R20-5T WORK FINES WARNING $\times$ $\times$ G20-5 CW1-4L AHEAD NEXT X MILE DOUBL F STGNS appropriate CW20-1D ROAD X R20-5aTP WORKERS STATE LAW TALK OR TEXT LATER CW13-1P R2-1++ ROAD ★ ★ G20-6T WORK CW20-1D WORK G20-10T X X R20-3T X X AHEAD CONTRACTOR AHEAD Type 3 Barricade or [MPH] CW13-1P CW20-1D channelizing devices $\triangleleft$ $\Diamond$ $\langle \neg$ $\Diamond$ $\Rightarrow$ $\Rightarrow$ $\leq$ $\Rightarrow$ Beginning of — NO-PASSING SPEED END R2-1 LIMIT WORK ZONE G20-2bT \* line should 3X $\otimes | \times \times$ FND coordinate ROAD WORK When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional with sign ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still G20-2 \* \* location NOTES within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizina devices.

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

BEGIN ★ ★G20-9TF ZONE STAY ALERT OBEY SPEED ROAD WORK TRAFFIC <del>X</del> **X** G20−5T ROAD LIMIT ROAD ROAD <del>X</del> <del>X</del>R20−5T FINES STGNS WORK CLOSED R11-2 WORK DOUBLE STATE LAW 1/2 MILE TALK OR TEXT LATER AHFAD  $\times$   $\times$  R20-5aTP Type 3  $\times \times G20-6T$ R20-3 R2-1 G20-10 Barricade or CW20-1D CW13-1P CW20-1E channelizina devices  $\triangleleft$ -CSJ Limi-Channelizina  $\Rightarrow$ SPEED R2-1 END ROAD WORK LIMIT END WORK ZONE G20-25T XX G20-2 X X

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

- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2b) 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 workers are present.
- $\star\star$  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
- Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND							
⊢⊣ Туре 3 Barricade							
000	OOO Channelizing Devices						
•	Sign						
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.						

SHEET 2 OF 12



Traffic Safety Division Standard

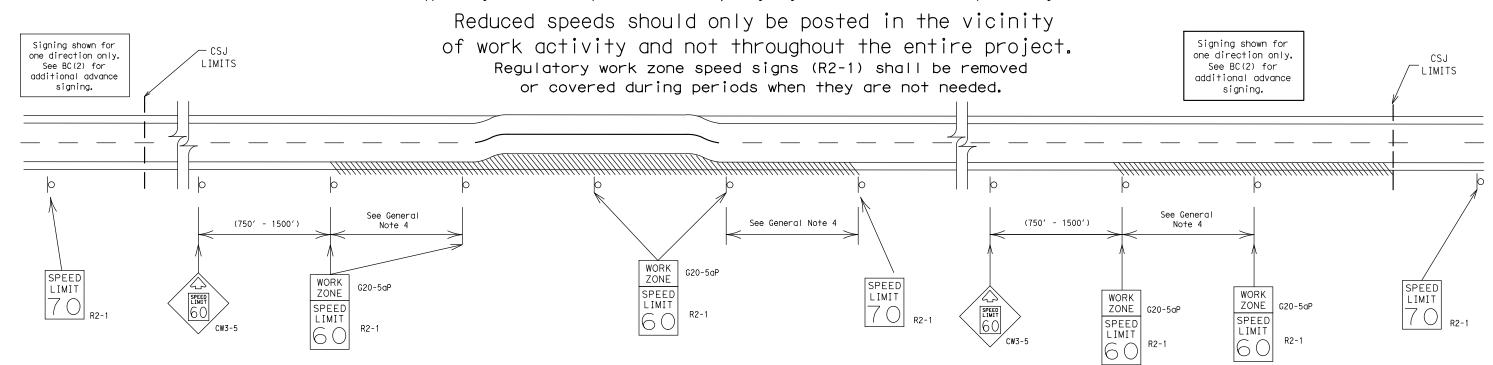
# BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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



# GUIDANCE FOR USE:

# LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

# SHORT TERM WORK ZONE SPEED LIMITS

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

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

# GENERAL NOTES

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

40 mph and greater 0.2 to 2 miles

35 mph and less

0.2 to 1 mile

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

SHEET 3 OF 12



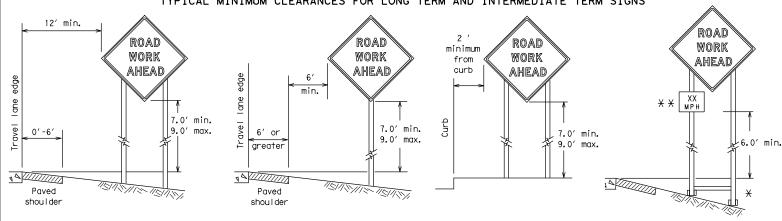
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

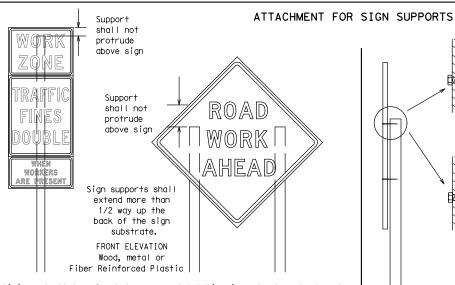
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TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



\* 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.

\* X 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.



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

SIDE ELEVATION

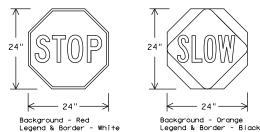
Wood

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

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

# STOP/SLOW PADDLES

- 1. 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 retroreflectorized when used at night.
- 3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



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 CW7TCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

#### GENERAL NOTES FOR WORK ZONE SIGNS

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

# <u>DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)</u>

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

# SIGN MOUNTING HEIGHT

- The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plagues 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.
- 4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
- Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

# SIZE OF SIGNS

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

# SIGN SUBSTRATES

- The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave. 3. 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

- 1. 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.
- 3. Orange sheeting, meeting the requirements of DMS-8300 Type  $B_{FL}$  or Type  $C_{FL}$ , shall be used for rigid signs with orange backgrounds.

# SIGN LETTERS

1. 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.
- 3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting. Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

# SIGN SUPPORT WEIGHTS

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

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

SHEET 4 OF 12

Traffic Safety Division Standard



# BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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going in opposite directions. Minimum

back fill puddle.

- weld starts here

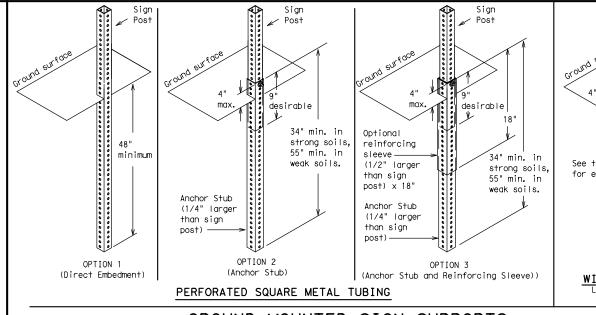
weld, do not

-2" x 2"

12 ga. upright

2"

SINGLE LEG BASE



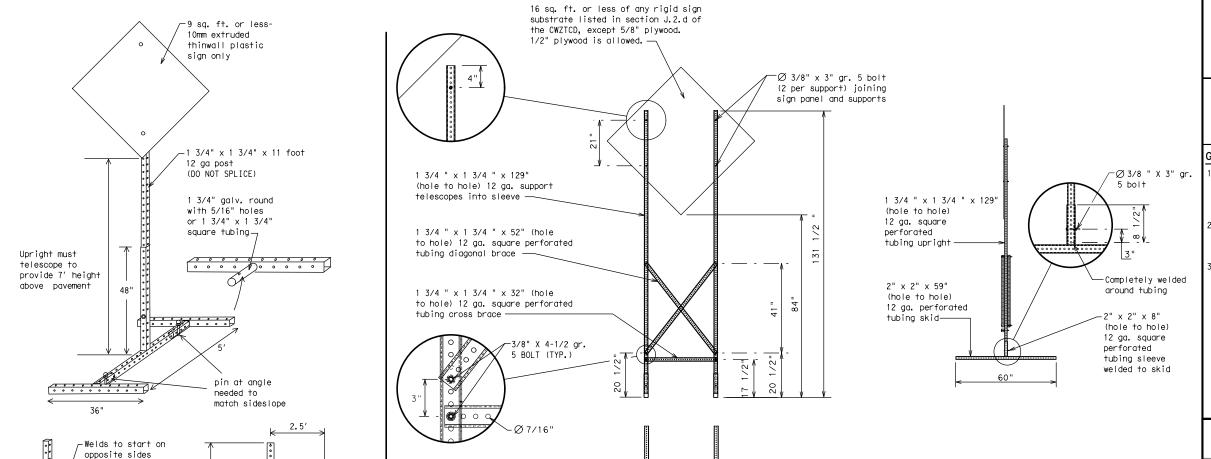
# Post Ground surface A" max. Base Post For embedment. WING CHANNEL Lap-splice/base bolted anchor

# GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.

The maximum sign square footage shall adhere to the manufacturer's recommendation.

Two post installations can be used for larger signs.



# WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign 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" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
- . No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
- 3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.
  - ← See BC(4) for definition of "Work Duration."
- $\times\!\!\!\!\times$  Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- ☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

# SHEET 5 OF 12



Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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© TxDOT	November 2002	CONT	SECT	JOB		HIC	CHWAY
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SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

32′

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

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

# PORTABLE CHANGEABLE MESSAGE SIGNS

- 1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 2. 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.
- 3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by
- 4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- 5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
- 8. The Engineer/Inspector may select one of two options which are 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.
- 9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
- 11. Do not use the word "Danger" in message. 12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- 13. Do not display messages that scroll horizontally or vertically across the face of the sign.
- 14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
- 15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- 16. Each line of text should be centered on the message board rather than left or right justified.
- 17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
	DONT	Saturday	SAT
Do Not East	E	Service Road	SERV RD
Eastbound	_	Shoulder	SHLDR
	(route) E EMER	Slippery	SLIP
Emergency		South	S
Emergency Vehicle		Southbound	(route) S
Entrance, Enter	ENT	Speed	SPD
Express Lane	EXP LN	Street	ST
Expressway	EXPWY	Sunday	SUN
XXXX Feet	XXXX FT	Telephone	PHONE
Fog Ahead	FOG AHD	Temporary	TEMP
Freeway	FRWY, FWY	Thursday	THURS
Freeway Blocked	FWY BLKD	To Downtown	TO DWNTN
Friday	FRI	Traffic	TRAF
Hazardous Driving		Travelers	TRVLRS
Hazardous Material		Tuesday	TUES
High-Occupancy	HOV	Time Minutes	TIME MIN
Vehicle	HWY	Upper Level	UPR LEVEL
Highway		Vehicles (s)	VEH, VEHS
Hour(s)	HR, HRS	Warnina	WARN
Information	INFO	Wednesday	WED
It Is	ITS	Weight Limit	WT LIMIT
Junction	JCT	West	W
Left	LFT	Westbound	(route) W
Left Lane	LFT LN	Wet Pavement	WET PVMT
Lane Closed	LN CLOSED	Will Not	WONT
Lower Level	LWR LEVEL		1 110111
Maintenance	MAINT		

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

# Phase 1: Condition Lists

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

mp Closure List	Other Cond	dition List	Action to Take/E Li		Location List	Warning List	* * Advance Notice List
FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT	MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT	DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX- XX X PM-X AM
RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE	USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT	STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT	TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT	WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN	EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES	REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT	USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
X LANES SHIFT in Phas	e 1 must be used with	n STAY IN LANE in Phase	STAY IN LANE **		<b>*</b> * Se	e Application Guidelir	nes Note 6.

Phase 2: Possible Component Lists

# APPLICATION GUIDELINES

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

# WORDING ALTERNATIVES

location phase is used.

- 1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- 2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- 3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- 4. Highway names and numbers replaced as appropriate.
- 5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- 6. AHEAD may be used instead of distances if necessary.
- 7. FT and MI. MILE and MILES interchanged as appropriate. 8. AT. BEFORE and PAST interchanged as needed.
- 9. Distances or AHEAD can be eliminated from the message if a

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

# FULL MATRIX PCMS SIGNS

BLVD

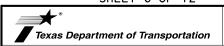
CLOSED

- 1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
- 2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
- 3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.

SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

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

SHEET 6 OF 12

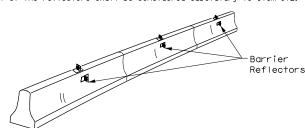


# BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

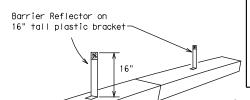
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- 1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of pregualified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1). 2. Color of Barrier 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.
- 4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- 5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- 6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
- 7. Maximum spacing of Barrier Reflectors is forty (40) feet.
- 8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
- 9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's
- 10.Missing or damaged Barrier Reflectors shall be replaced as directed
- 11. Single slope barriers shall be delineated as shown on the above detail.

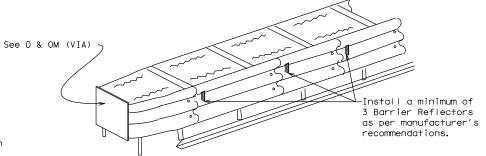


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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

# LOW PROFILE CONCRETE BARRIER (LPCB)

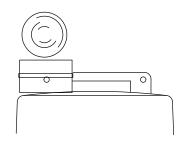


# DELINEATION OF END TREATMENTS

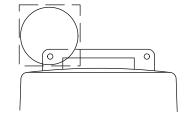
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

# BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

# WARNING LIGHTS

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

# WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

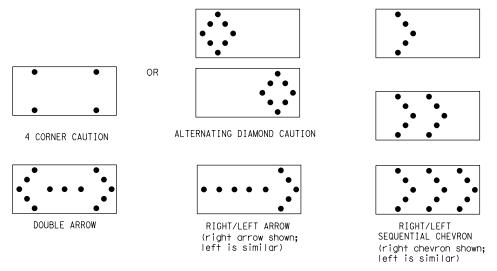
- 1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- 2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- 3. A series of sequential flashing warning lights placed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

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

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

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

- 1. 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.
- 2. 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.
- 3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
- 4. The Flashing Arrow Board should be able to display the following symbols:



- 5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
- 8. 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.
- 9. The sequential arrow display is NOT ALLOWED.
  10. The flashing arrow display is the TxDOT standard; however, the sequential chevron
- display may be used during daylight operations.
- 11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
  12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
  13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility,
- flash rate and dimming requirements on this sheet for the same size arrow.
- 14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

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

ATTENTION Flashing Arrow Boards shall be equipped with automatic dimmina 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

- 1. 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.
- 3. Refer to the CWZTCD for a list of approved TMAs.
- 4. TMAs are required on freeways unless otherwise noted n the plans.
- 5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
- 6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.



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

BC(7)-21

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- For long term stationary work zones on freeways, drums shall be used as
  the primary channelizing device.
- 2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
- 3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
- 4. 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" (CMUTCD).
- 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

GENERAL NOTES

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

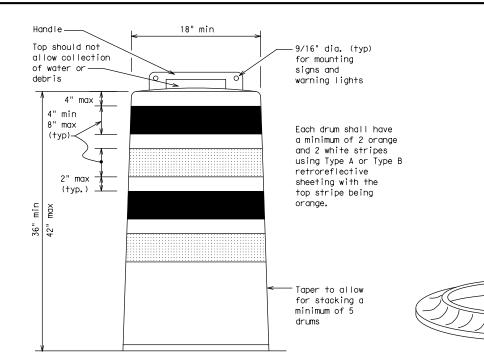
  8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- 9. Drum body shall have a maximum unballasted weight of 11 lbs.
- 10. Drum and base shall be marked with manufacturer's name and model number.

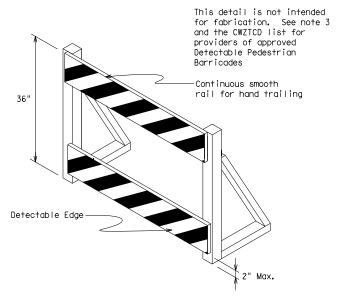
# RETROREFLECTIVE SHEETING

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

# **BALLAST**

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





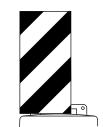
# DETECTABLE PEDESTRIAN BARRICADES

- 1. 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.
- 3. 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.
- 4. 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
- Warning lights shall not be attached to detectable pedestrian barricades.
- 6. Detectable pedestrian barricades should use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



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

See Ballast



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

SHEET 8 OF 12

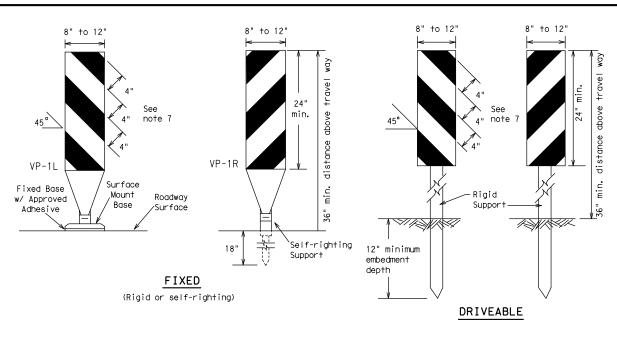


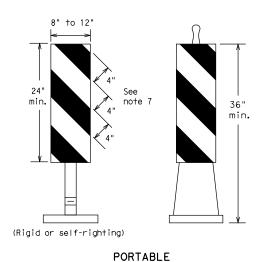
Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

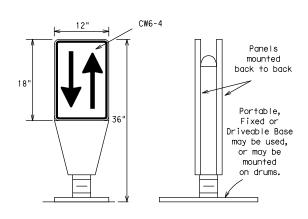
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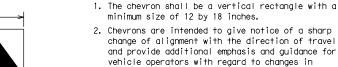
- 1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
- 2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation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

# VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.

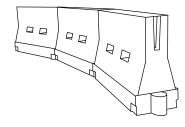
horizontal alignment of the roadway.

- 4. To be effective, the chevron should be visible for at least 500 feet.
- 5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type  $B_{FL}$  or Type  $C_{FL}$  conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
- 6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

# **CHEVRONS**

# **GENERAL NOTES**

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



# LONGITUDINAL CHANNELIZING DEVICES (LCD)

36"

Fixed Base w/ Approved Adhesive

(Driveable Base, or Flexible

Support can be used)

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

# WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

Formula			Channe	cing of nelizing evices		
	10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
2	150′	165′	180′	30′	60′	
L = WS	205′	225′	245′	35′	70′	
80	265′	295′	320′	40′	80′	
	450′	495′	540′	45′	90′	
	500′	550°	600′	50´	100′	
1 = W S	550′	605′	660′	55 <i>°</i>	110′	
	600′	660′	720′	60′	120′	
	650′	715′	780′	65 <i>′</i>	130′	
	700′	770′	840′	70′	140′	
	750′	825′	900′	75′	150′	
	800′	880′	960′	80′	160′	
		Formula Tap $ \begin{array}{c}                                     $	Formula Taper Leng $\frac{\times \times}{10'}$ $L = \frac{WS^2}{60}$ $150' 165'$ $205' 225'$ $265' 295'$ $450' 495'$ $500' 550'$ $550' 605'$ $600' 660'$ $650' 715'$ $700' 770'$ $750' 825'$	$L = WS$ $\frac{450'}{600}$ $\frac{450'}{600'}$ $\frac{450'}{600'}$ $\frac{650'}{600'}$ $\frac{660'}{600'}$ $\frac{770'}{770'}$ $\frac{840'}{750'}$ $\frac{825'}{900'}$	Formula $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	

Suggested Maximum

XX 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



Texas Department of Transportation

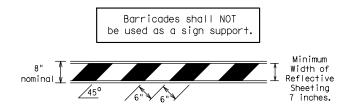
# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

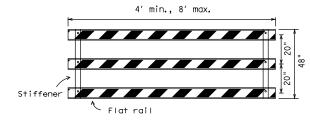
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# TYPE 3 BARRICADES

- 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.
- 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.
- 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.
- 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.
- Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

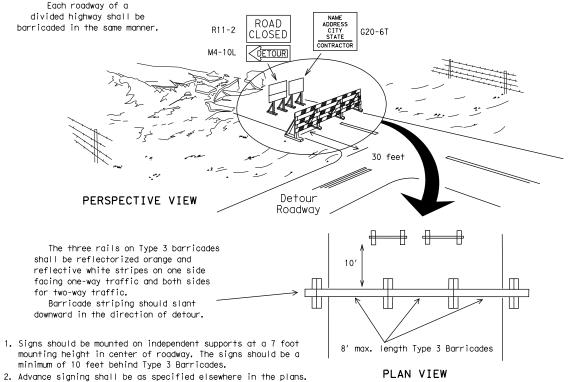


# TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

# TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



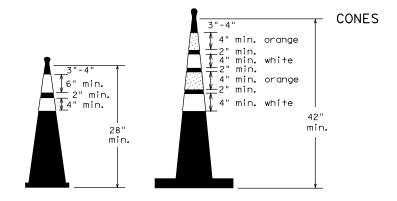
TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

1. Where positive redirectional capability is provided, drums may be omitted. 2. Plastic construction fencing may be used with drums for safety as required in the plans. 3. Vertical Panels on flexible support may be substituted for drums when the Typical shoulder width is less than 4 feet. Plastic Drum 4. When the shoulder width is greater than 12 feet, steady-burn lights PERSPECTIVE VIEW may be omitted if drums are used. 5. Drums must extend the length These drums are not required of the culvert widening. on one-way roadway LEGEND Plastic drum Plastic drum with steady burn light A minimum of two drums to be used across the work or yellow warning reflector teady burn warning light or yellow warning reflector  $\left\langle \cdot \right\rangle$ Increase number of plastic drums on the side of approaching traffic if the crown

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

width makes it necessary. (minimum of 2

and maximum of 4 drums)

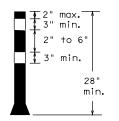


Two-Piece cones

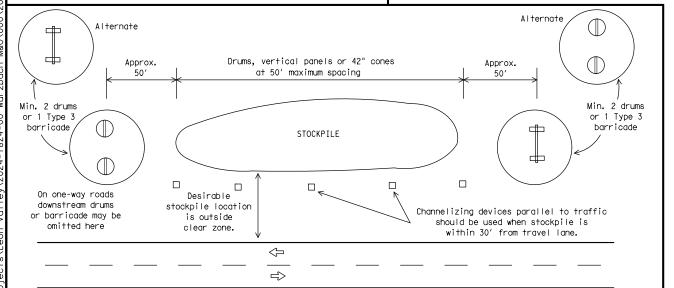
4" min.

PLAN VIEW

One-Piece cones



Tubular Marker



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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

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

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

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Traffic Safety Division Standard

# BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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# WORK ZONE PAVEMENT MARKINGS

# **GENERAL**

- 1. 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.
- 2. Color, patterns and dimensions shall be in conformance with the Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- 3. Additional supplemental pavement marking details may be found in the plans or specifications.
- 4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
- 6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing
- 7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

# RAISED PAVEMENT MARKERS

- 1. Raised pavement markers are to be placed according to the patterns
- 2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

# PREFABRICATED PAVEMENT MARKINGS

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

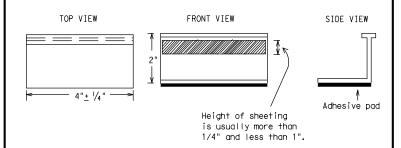
# MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
- 3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
- 4. 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

- 1. 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.
- 2. 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.
- 3. 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".
- 4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- 5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- 6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
- 7. Over-painting of the markings SHALL NOT BE permitted.
- 8. Removal of raised pavement markers shall be as directed by the
- 9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS, " unless otherwise stated in the plans.
- 10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

# Temporary Flexible-Reflective Roadway Marker Tabs



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

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

# RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

- 1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- 2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.
- Guidemarks shall be designated as: YELLOW - (two amber reflective surfaces with yellow body). WHITE - (one silver reflective surface with white body).

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

A list of pregualified 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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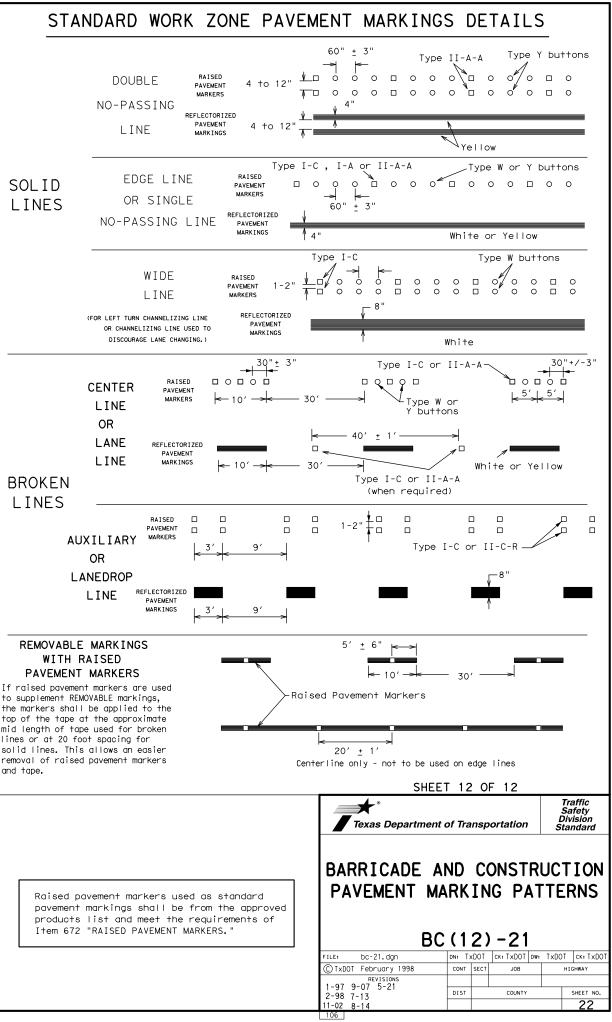
Division Standard

# BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

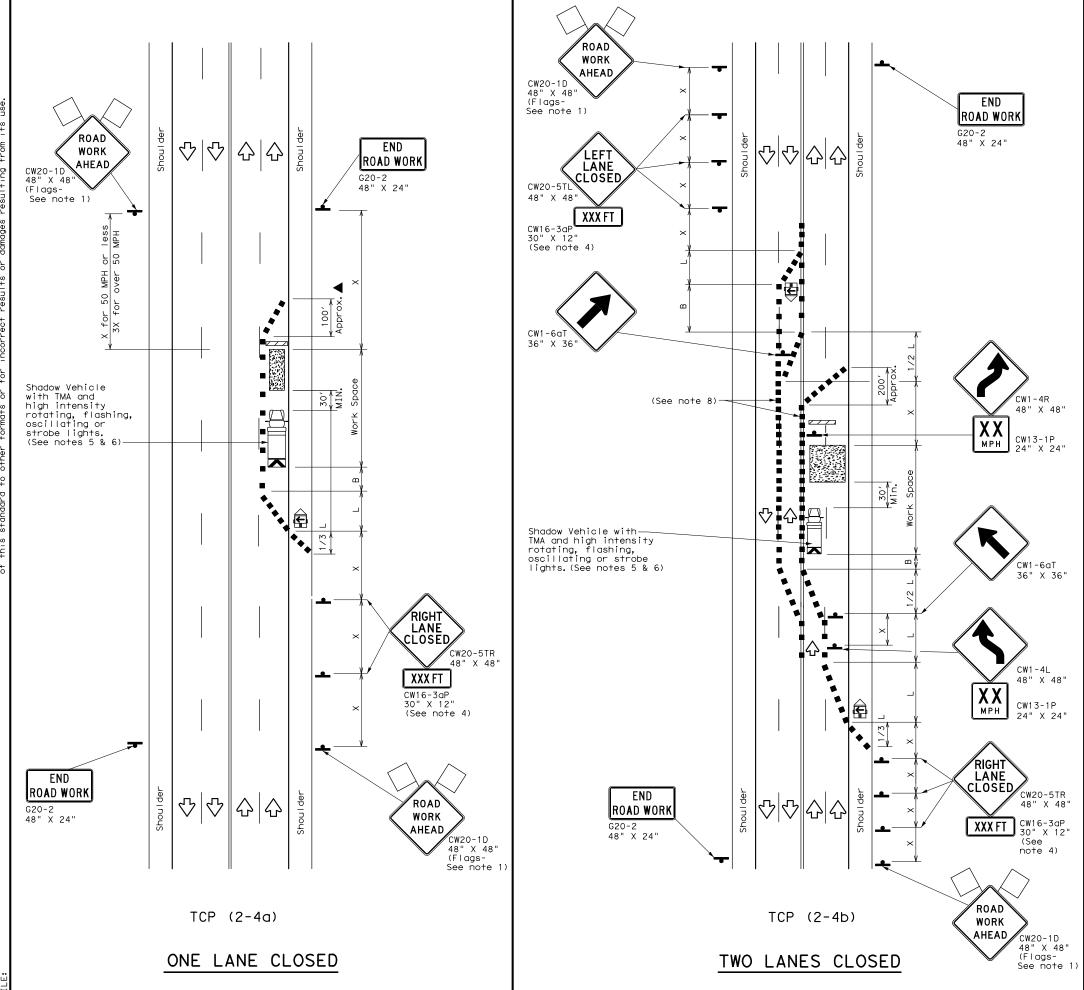
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-98 9-07 5-21 -02 7-13	DIST		COUNTY			SHEET NO.
-02 8-14						21

# 10 to 12" Type II-A-An RAISED PAVEMENT MARKERS - PATTERN A -Type II-A-A Type II-A-A-RAISED PAVEMENT MARKERS - PATTERN B Type I-C Type W buttons--Type I-C or II-C-R Type Y buttons O D O Type W buttons→ ∽Type I-C or II-C-R RAISED PAVEMENT MARKERS -Type I-C Type W buttons-0000 Type II-A-A Type Y buttons Type W buttons-RAISED PAVEMENT MARKERS Type W buttons Type I-Cпорог попоп -Type Y buttons-Type W buttons-⊢Type I-C RAISED PAVEMENT MARKERS



DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any
The use of this standard to any purpose what soever. TXD0T assumes no responsibility for the conversion
of this standard to other formats or for incorrect results or damages resulting from its use.



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

	V \							
Posted Speed			le	Spacir Channe		Minimum Sign Spacing "X"	Suggested Longitudinal Buffer Space	
*		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	Distance	"B"
30		150′	165′	180′	30′	60′	120′	90′
35	L= WS	205′	225′	245′	35′	70′	160′	120′
40	80	265′	295′	320′	40′	80′	240′	155′
45		450′	495′	540′	45′	90′	320′	195′
50		500′	550′	600′	50′	100′	400′	240′
55	L=WS	550′	605′	660′	55′	110′	500′	295′
60	L 113	600′	660′	720′	60′	120′	600′	350′
65		650′	715′	780′	65′	130′	700′	410′
70		700′	770′	840′	70′	140′	800′	475′
75		750′	825′	900′	75′	150′	900′	540′

\* Conventional Roads Only

\*\* Taper lengths have been rounded off.

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

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

# GENERAL NOTES

- 1. Flags attached to signs where shown, are REQUIRED.
- 2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
- 3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
- 4. 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.
- 5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
- Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

# TCP (2-4a)

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

# TCP (2-4b)

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



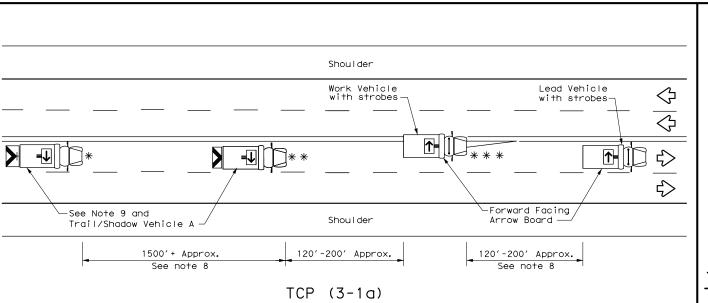
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE
CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:		CK:	DW:	CK:
ℂTxDOT December 1985	CONT	SECT	JOB		HIGHWAY
8-95 3-03 REVISIONS					
1-97 2-12	DIST		COUNTY		SHEET NO.
4-98 2-18					23

164

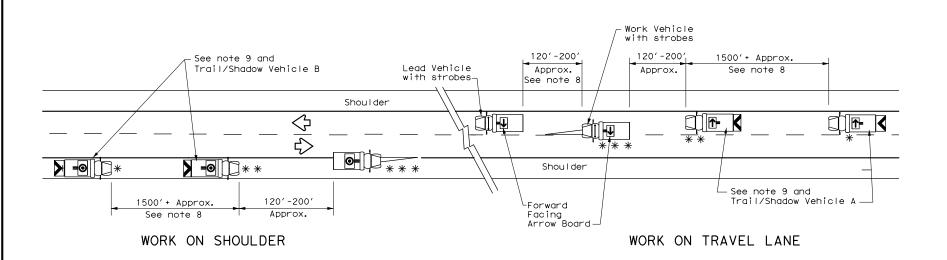


UNDIVIDED MULTILANE ROADWAY

# X VEHICLE WORK OR CONVOY CONVOY CW21-10cT CW21-10aT 72" X 36" •••••• X VEHICLE CONVOY

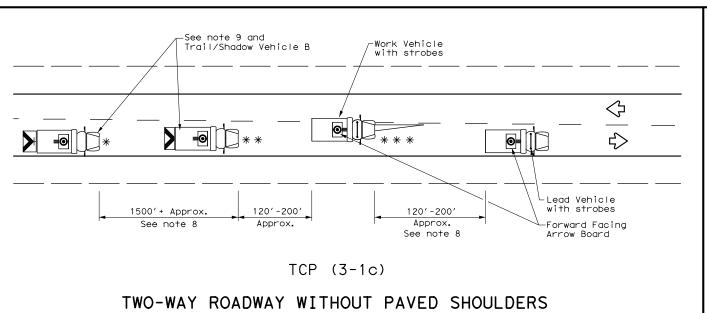
# TRAIL/SHADOW VEHICLE A

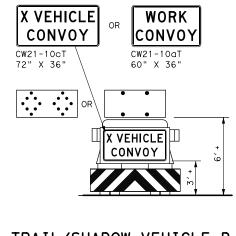
with RIGHT Directional display Flashing Arrow Board



# TWO-WAY ROADWAY WITH PAVED SHOULDERS

TCP (3-1b)





TRAIL/SHADOW VEHICLE B

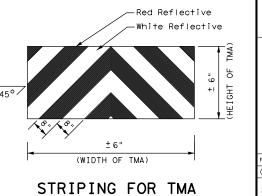
with Flashing Arrow Board in CAUTION display

	LEGEND					
*	Trail Vehicle	- ARROW BOARD DISPLAY				
* *	Shadow Vehicle					
* * *	Work Vehicle	RIGHT Directional				
	Heavy Work Vehicle	<b>—</b>	LEFT Directional			
	Truck Mounted Attenuator (TMA)	<b>*</b>	Double Arrow			
Ÿ	Traffic Flow	<b>©</b> =	CAUTION (Alternating Diamond or 4 Corner Flash)			

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

# GENERAL NOTES

- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LFAD 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.
- 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 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.
- "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.





# TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

Traffic Operation

Division Standard

FILE:	tcp3-1.dgn	DN: T	×DOT	ck: TxDOT	DW:	T×DOT	ck: TxDOT
© TxD0T	xDOT December 1985 CONT SECT JOB			HIGHWAY			
2-94 4-9	REVISIONS						
8-95 7-13		DIST		COUNTY			SHEET NO.
1-97							24

White

Extension

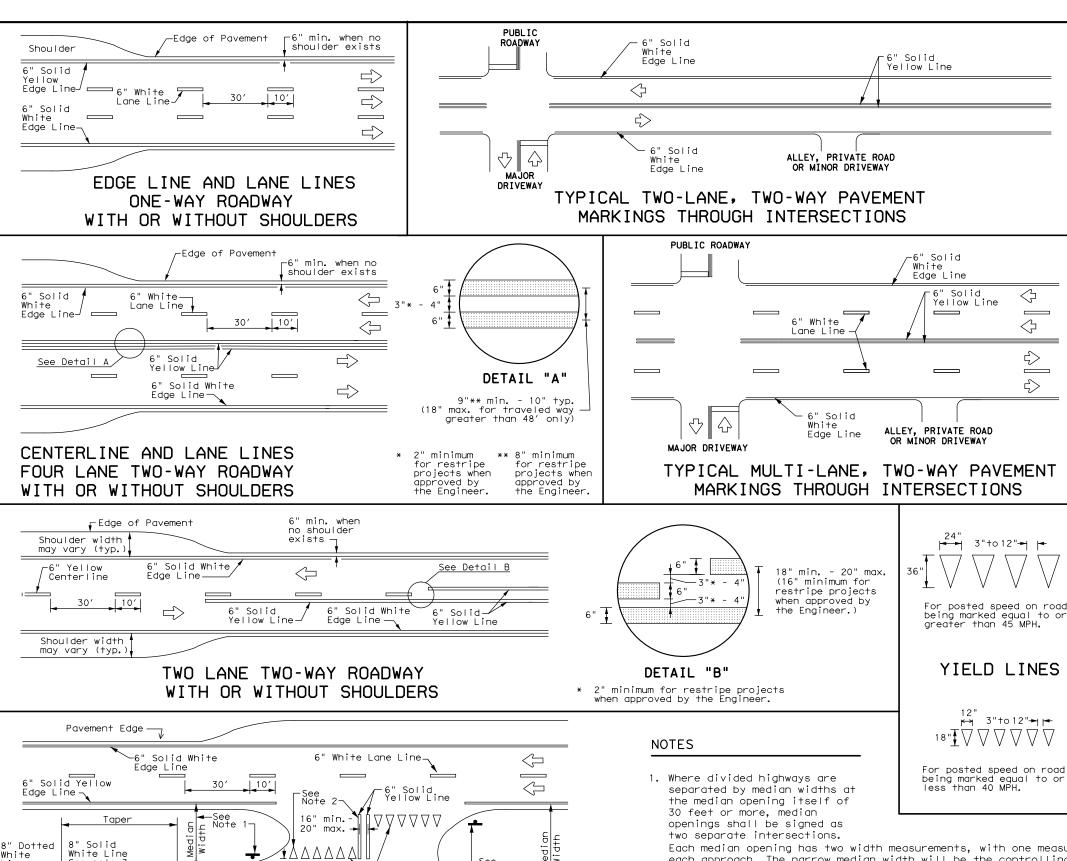
See note 3

6" Solid Yellow-

6" Solid White

Edge Line

Edge Line-



ΔΔΔΔΔ

\_48" min.

line to stop/yield

Storage

Deceleration

 $\Rightarrow$ 

from edge

FOUR LANE DIVIDED ROADWAY CROSSOVERS

Lines

-6" White Lane Line

#### **GENERAL NOTES**

 $\langle \Rightarrow$ 

 $\triangleleft$ 

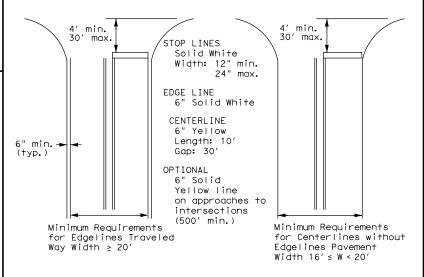
<>

₹>

- 1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines 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 center of edge line to the center of edge line 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.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

# GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

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 and stop bars are optional as determined by the Engineer.

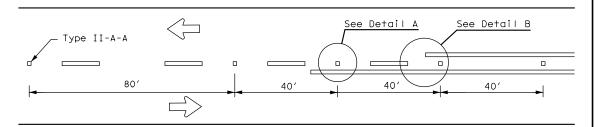
- 2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- 3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.



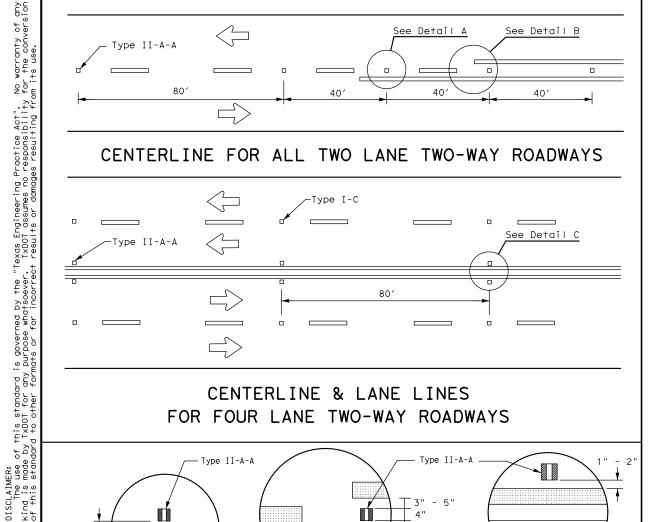
# TYPICAL STANDARD PAVEMENT MARKINGS

PM(1) - 22

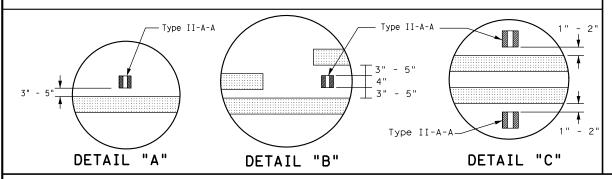
ILE: pm1-22.dgn	DN:		CK:	DW:	CK:
CTxDOT December 2022	CONT	SECT	JOB		HIGHWAY
REVISIONS 11-78 8-00 6-20					
-78 8-00 6-20 -95 3-03 12-22	DIST		COUNTY		SHEET NO.
5-00 2-12					25



# CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

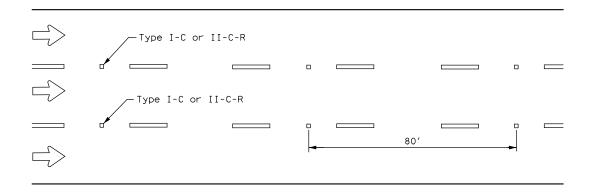


# CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



# Centerline < Symmetrical around centerline Continuous two-way left turn lane Type II-A-A 80′ Type I-C

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

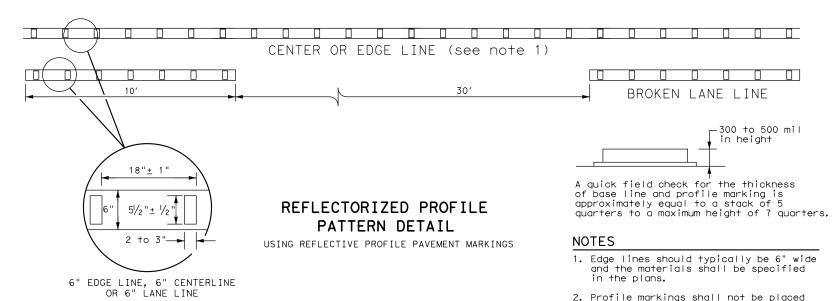


# LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

on roadways with a posted speed limit

of 45 MPH or less.

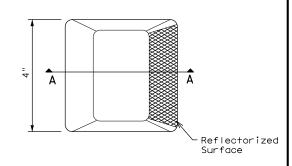


# GENERAL NOTES

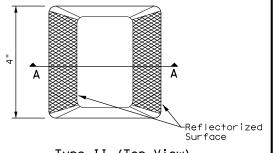
- All raised pavement markers placed along broken lines shall be placed in line with and midway between
- 2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal
- Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left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

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

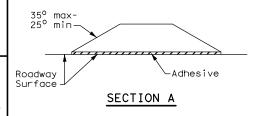
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



# RAISED PAVEMENT MARKERS



# POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE **MARKINGS**

Traffic Safety Division Standard

PM(2) - 22JOB

FILE: pm2-22.dgn ◯TxDOT December 2022 HIGHWAY REVISIONS 4-77 8-00 6-20 SHEET NO. 4-92 2-10 12-22 5-00 2-12 26

Pavement

RIGHT LANE

Edge

# **NOTES**

6" Dotted White

D/2

Lane-Reduction

LANE REDUCTION

White Lane Line

-8" Dotted White Lane Line

Dotted White Lane Line

-Type I-C or Type II-C-R See general Note 3

Varies (general Note 4)

Solid Yellow Line

≤ 1 Mile (Auxiliary Lane)

6" Broken

6" White Lane Line

Yellow

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

Varies

8" Solid White (typ.)

Type II-A-A spaced at 20

≥ 1 Mile (Lane Drop)

Arrow

D/4

Lane Line

D/4

MERGE LEFT

Varies (See general Note 2)

SEE DETAIL B

SEE DETAIL A

N

Varies (See general note 2)

Ł

4>

W9-2TL

Paved Shoulder

W9-1R

 $\Diamond$ 

SEE DETAIL

 $\Diamond$ 

 $\triangleleft$ 

(Optional)

300'-500'

- 1. 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.
- 2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- 3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
- 4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)					
Posted Speed	D (f+)	L (f+)			
30 MPH	460	wc2			
35 MPH	565	$L = \frac{WS^2}{60}$			
40 MPH	670	00			
45 MPH	775				
50 MPH	885				
55 MPH	990				
60 MPH	1,100	L=WS			
65 MPH	1,200				
70 MPH	1,250				
75 MPH	1,350				

Type II-A-A Markers.  $\triangleleft$  $\triangleleft$ 4>

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

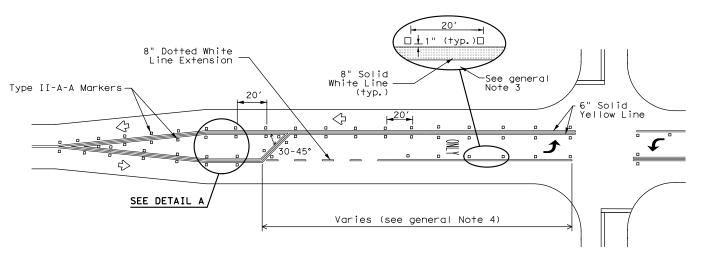
# TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

# GENERAL NOTES

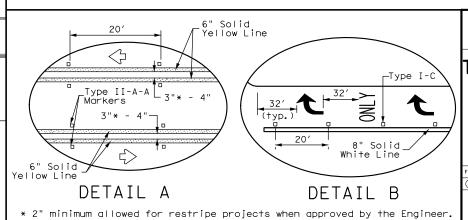
- 1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and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

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

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



# TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



「WO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

Texas Department of Transportation

Traffic Safety Division Standard

pm3-22.dgn C)TxDOT December 2022 HIGHWAY JOB REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12 SHEET NO. 27

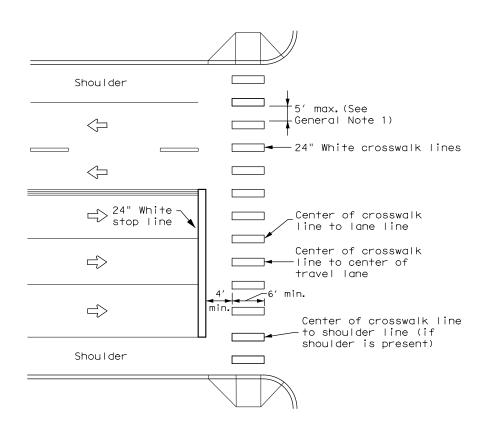
PM(3) - 22

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

 $\Diamond$ 

4" White top Line (typ.)

STREET



HIGH-VISIBILITY LONGITUDINAL CROSSWALK

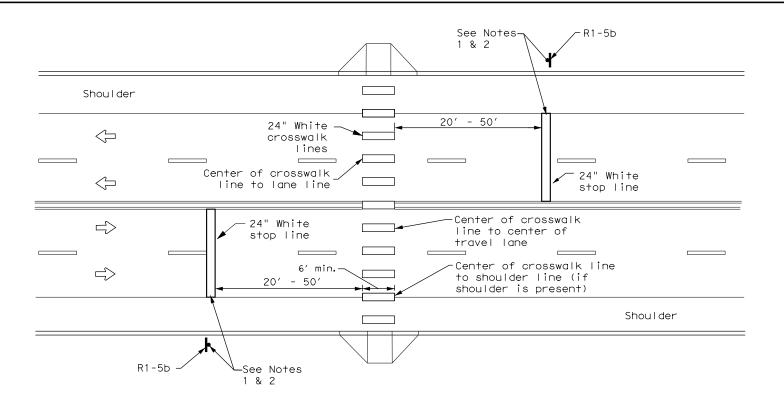
AT CONTROLLED APPROACH

# GENERAL NOTES

- Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
- 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
- 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	

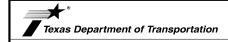
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



# UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

# NOTES:

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



Traffic Safety Division Standard

# CROSSWALK PAVEMENT MARKINGS

PM(4) - 22A

FILE: pm4-22a.dgn	DN:		CK:	DW:		CK:	
ℂTxDOT December 2022	CONT	SECT	JOB	JOB		HIGHWAY	
REVISIONS 6-20							
6-22	DIST	COUNTY		,	SHEET NO.		
12-22						28	

CROSSHATCH LENGTH (L)

L (f+)

300 ft

500 ft

Posted Speed

(MPH)

30

35

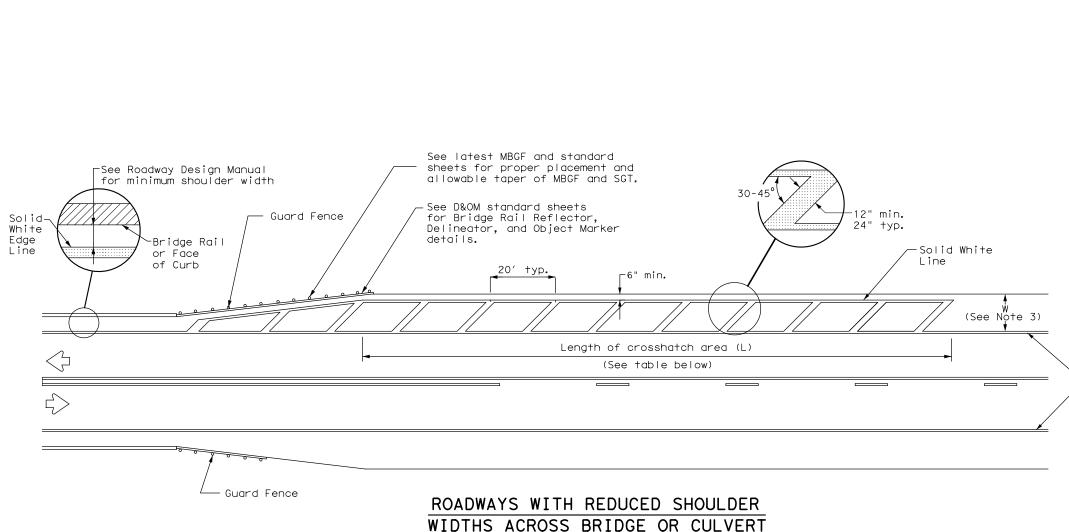
40 45

50

55 60

65 70

75



# NOTES

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
- 2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
- 3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
- 4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

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.

-Solid White Edge Line



Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

PM(5)-22

FILE: pm5-22.dgn	DN: Tx	DOT	ck: TxDOT	DW:	T×DOT	ck: TxDOT
◯TxDOT December 2022	CONT	SECT	JOB		HIGHWAY	
REVISIONS						
	DIST	COUNTY		SHEET NO.		
						29