

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
SEE SHEET 2	

**STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION**

**PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT**

FEDERAL AID PROJECT STP: 2025(161)HES

**SH 359, ETC.
COUNTY: DUVAL, ETC.
CSJ: 0086-09-042, ETC.**

FEDERAL AID PROJECT NO.			
STP 2025(161)HES			
CONT	SECT	JOB	HIGHWAY
0086	09	042, etc	359, etc
DIST	COUNTY		SHEET NO.
22	DUVAL, ETC.		1

DESIGN CRITERIA: HE

A.D.T.:

A.D.T. (2022): 2,495

A.D.T. (2042): 3,493

% TRUCK: 15.4%

FUNCTIONAL CLASS: MAJOR COLLECTOR

DESIGN SPEED: N/A

TDLR REQUIRED: NO

CSJ	LIMITS	ROADWAY LENGTH	BRIDGE LENGTH	NET LENGTH
0086-09-042	FROM CR 307 TO TEXAS BLVD	26,041.00 FT = 4.932 MI	0,000.00 FT = 0.000 MI	26,041.00 FT = 4.930 MI
2150-03-032	SH 255 TO 1.4 MILES SOUTH OF SH 255	7,175.52 FT = 1.359 MI	0,000.00 FT = 0.000 MI	7,175.52 FT = 1.359 MI
2150-04-095	1.4 MILES SOUTH OF SH 255 TO PAN AMERICA BLVD	68,312.64 FT = 12.938 MI	0,000.00 FT = 0.000 MI	68,312.64 FT = 12.940 MI

FINAL PLANS

LETTING DATE: _____

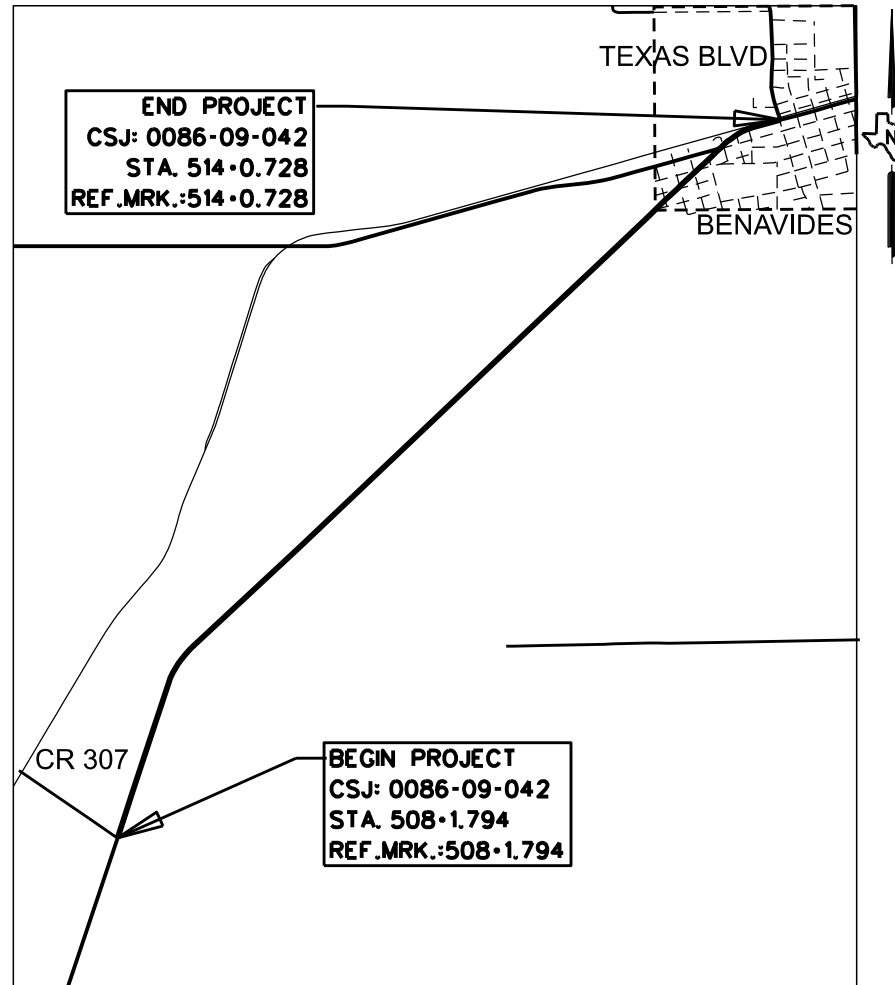
DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: \$ _____

CONTRACTOR: _____

INSTALL LED CURVE SIGN, LED CHEVRON, PAVEMENT MARKINGS
AND CENTERLINE RUMBLE STRIPS



REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH
BC (1)- 21 THRU BC (12)- 21 AND THE "TEXAS
MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

FINAL AS BUILT

THE CONSTRUCTION WAS PERFORMED
UNDER MY SUPERVISION IN ACCORDANCE
WITH THE PLANS AND CONTRACT

AREA ENGINEER

DATE

EXCEPTIONS: NONE
EQUATIONS: STA: NONE
RAILROAD CROSSINGS: NONE

2500 0 2500
SCALE: 1" = 5000'

RECOMMENDED FOR LETTING Signed by _____ 7/29/2024

AREA ENGINEER

APPROVED FOR LETTING Signed by _____ 7/29/2024

DIRECTOR OF TRANSPORTATION, PLANNING AND DEVELOPMENT

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, SEPTEMBER 1, 2024 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023)



DATE: 7/26/2024 11:49:50 AM
FILE: T:\LRD\TRPROPR1 Traffic Operations\Folders\PS&E\0086-09-042 -Districtwide Curves\General\Title_Border_TRF.dgn

7/26/2024 JTOVIAS T:\LRDITROPRA\1_Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Curves\General\Index of Sheets.dgn

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

DocuSigned by:

 633630C5730C4A4...
 7/26/2024
 DATE

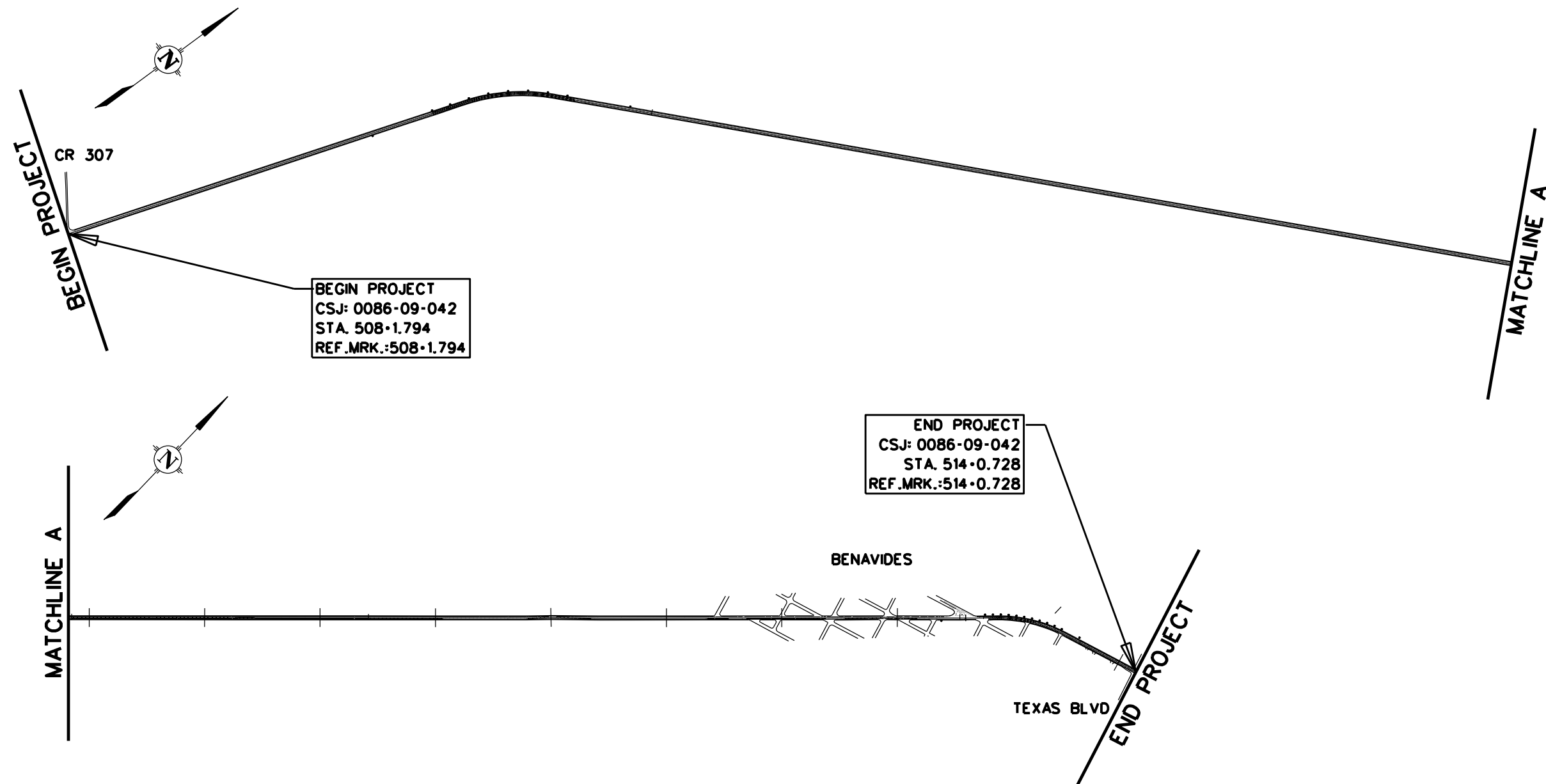
TEXAS DEPARTMENT OF TRANSPORTATION
 © 2024

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DN: J.T.	DW: J.T.	STATE	SHEET NUMBER			SHEET NO.
CK: D.G.	CK: D.G.	TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

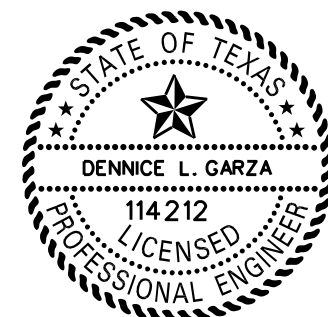
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BEGIN PROJECT
 CSJ: 0086-09-042
 STA. 508+1.794
 REF.MRK.:508+1.794

END PROJECT
 CSJ: 0086-09-042
 STA. 514+0.728
 REF.MRK.:514+0.728



THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY DENNICE L. GARZA, P.E. 114212. ON 7/26/2024

DocuSigned by:

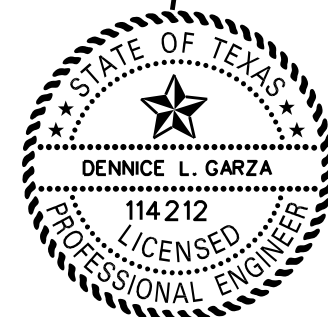
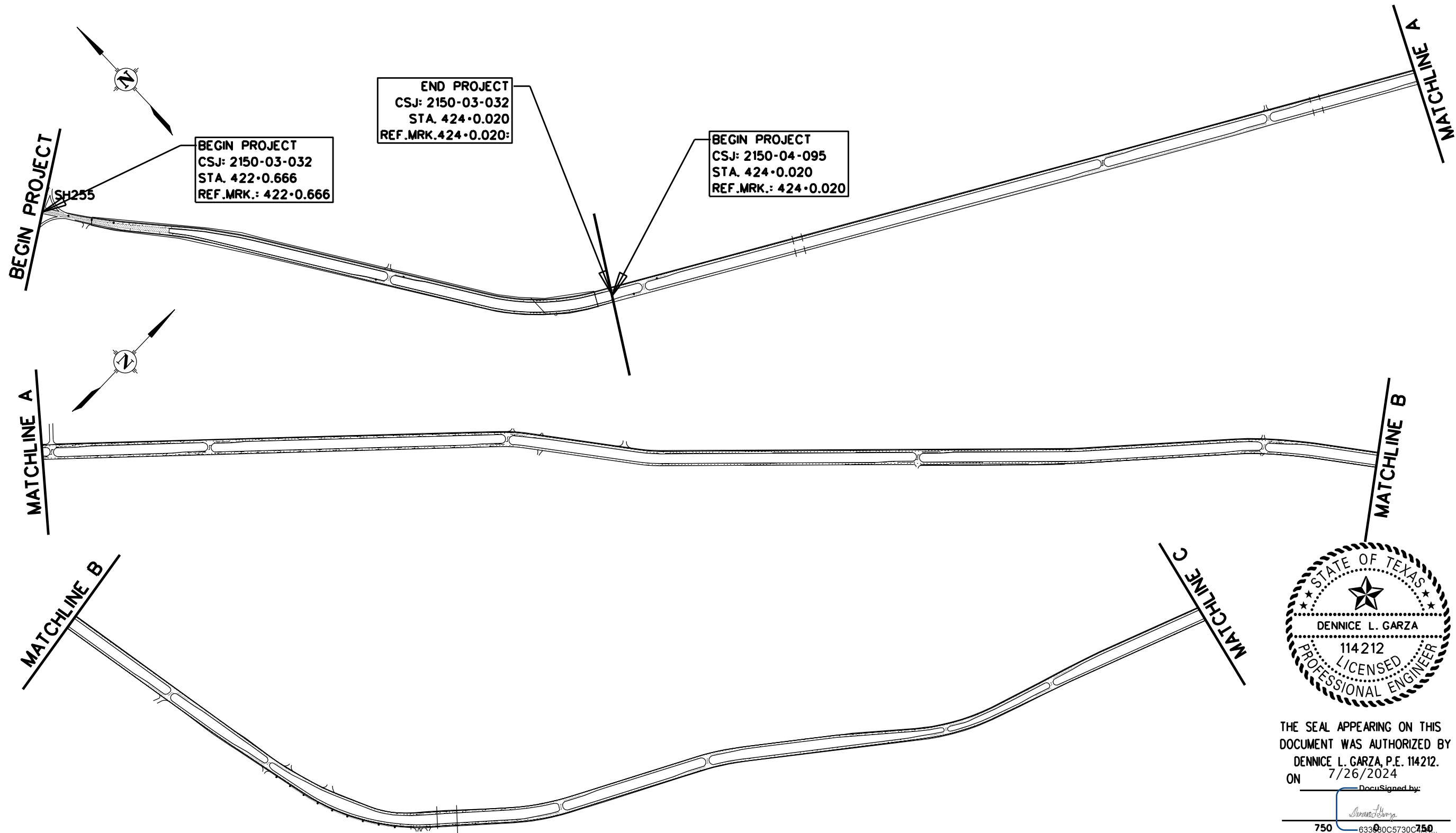
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PROJECT LAYOUT SH359

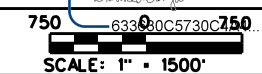
DW: J.T.	DW: J.T.	STATE	SHEET NUMBER			SHEET NO.
CK: D.G.	CK: D.G.	TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

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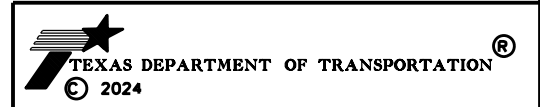


THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY DENNICE L. GARZA, P.E. 114212. ON 7/26/2024

DocuSigned by: *Dennice L. Garza*



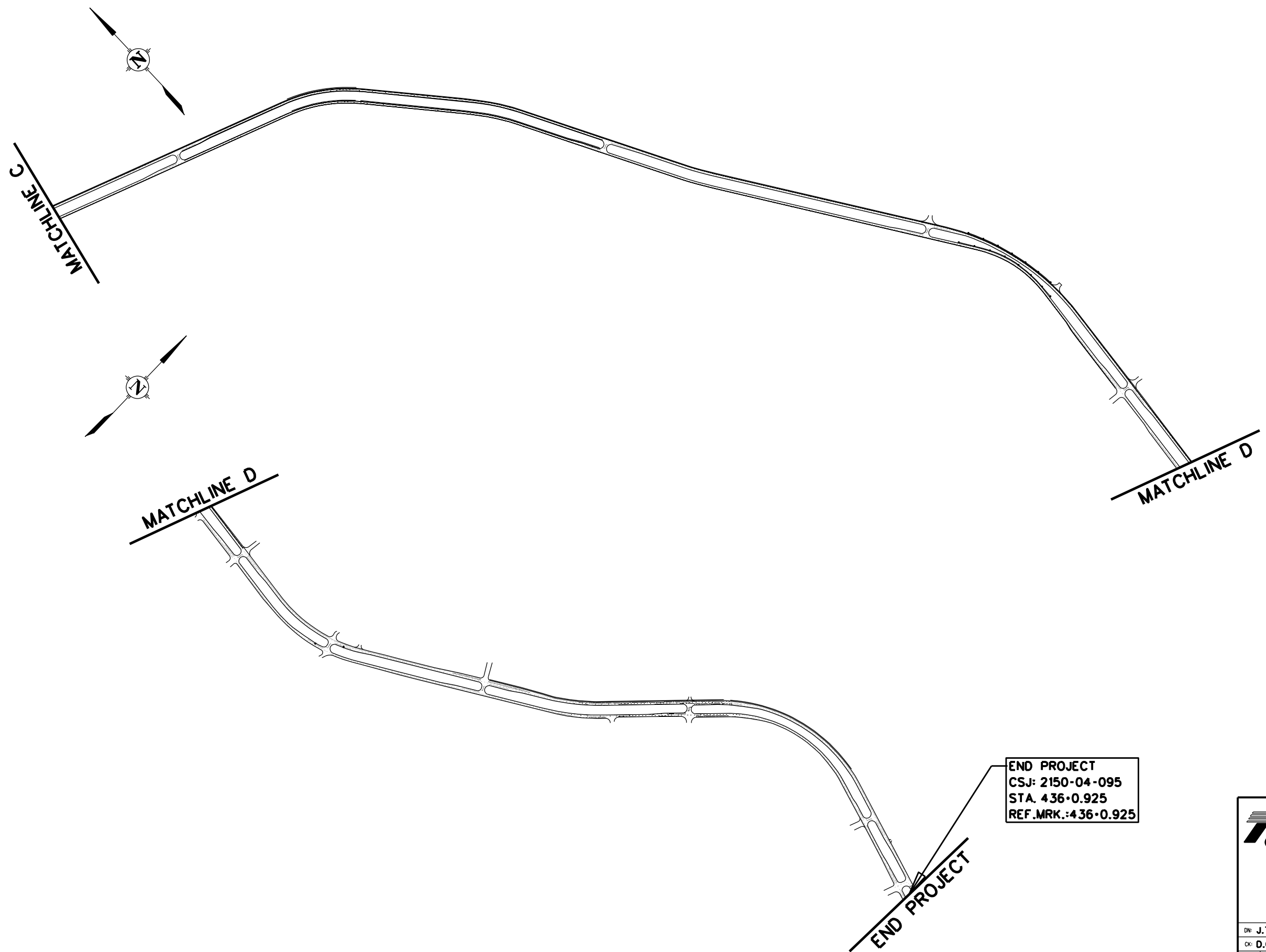
SCALE: 1" = 1500'



PROJECT LAYOUT FM1472

DW: J.T.	DW: J.T.	STATE	SHEET NUMBER			SHEET NO.
CK: D.G.	CK: D.G.	TEXAS	SHEET 1 OF 2			4
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

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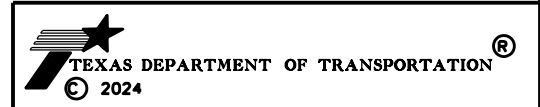
END PROJECT
 CSJ: 2150-04-095
 STA. 436+0.925
 REF.MRK.: 436+0.925



THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY DENNICE L. GARZA, P.E. 114212. ON 7/26/2024

DocuSigned by:

 750 633630 5730C4A 750
 SCALE: 1" = 1500'



PROJECT LAYOUT FM1472

DW: J.T.		DW: J.T.		STATE	SHEET NUMBER			SHEET NO.
CK: D.G.		CK: D.G.		TEXAS	SHEET 2 OF 2			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.		5
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.		

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Control: 0086-09-042, etc.

Highway: SH 359, etc

GENERAL NOTES:

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

Dennice Garza – Dennice.Garza@txdot.gov

Angel Martinez – Angel.Martinez@txdot.gov

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

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

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

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

Item 5 - Control of the Work

The Contractor shall maintain and preserve the integrity of all “existing survey markers” by avoiding the disturbance of such markers, which include all control points (horizontal and/or vertical), stakes, marks, and right-of-way markers. The Department will repair all Contractor disturbed control points, stakes, marks, and right-of-way markers. The cost for any and all repairs to the “existing survey markers” will be deducted from money due or to become due to the Contractor.

Reference all existing striping and pavement markings in a manner which allow the markings to be re-established. Place extra reference (if needed) to ensure that the markings (lane lines, edge lines, ramp gores, etc.) are in-line with signs on OSB’s, TMS arrows, etc.

Prior to construction must call 811 to verify any utilities located within project limits. Contractor will also coordinate with utility owners listed below for any adjustments

needed to sanitary sewer manholes, water valves, gas valve, telecommunication, television manhole located within project limits. The utility company is responsible for any adjustment when necessary. The work should be performed in a manner as to not delay construction contractor work activity.

Item 6 - Control of Materials

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link:

<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

Item 7 - Legal Relations and Responsibilities

No significant traffic generator events identified.

Jurisdictional Waters of the United States and Project Specific Locations (PSL) Coordination - This project requires permit(s) with environmental resource agencies. There is a high probability that environmentally sensitive areas will be encountered on contractor designated project specific locations (PSLS) for the project (including but not limited to haul roads, equipment staging areas, parking areas, etc.).

Requirements for Work within Jurisdictional Waters of the United States: The department has been authorized to perform work within designated areas of the project under U.S. Army Corps of Engineers (USACE) nationwide permit (NWP) #14 and/or #3a and/or #3b.

The contractor will not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area (i.e. an area where the USACE has jurisdiction) that has not been previously evaluated by the USACE as part of the permitting for this project. Such activities include, but are

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not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here includes materials delivered to or from the PSL. The permit area includes all waters of the U.S. and their associated wetlands affected by activities associated with this project. Special restrictions may be required for such work in these USACE jurisdictional areas. The contractor will be responsible for any and all consultations with the USACE regarding activities, including PSLs, which have not been previously evaluated by the USACE. The Contractor will provide the department with a copy of all consultation(s) or approval(s) from the USACE prior to initiating activities.

The contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determination(s) that their activities do not affect a USACE permit area. The contractor will maintain copies of their determination(s) for review by the department and/or any regulatory agency.

The disturbed area for all project locations in the Contract, and the Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, the Contractor shall provide a copy of the Contractor Notice of Intent (NOI) for the PSLs to the Engineer and to the local government operating a municipal separate storm sewer system (MS4) if applicable. If the total area of project disturbed areas and PSLs total between 1-acre but less than 5-acres, the Contractor shall post the appropriate Contractor Construction Site Notice for all Contractor PSLs to be in compliance with TCEQ storm water regulations.

In order to expedite the approval process for PSLs or to eliminate or minimize potential impacts to project progress, initiate coordination efforts with the U.S.A.C.E. within 30 days from the date of "authorization to begin work" for all PSLs that are in areas where the USACE has jurisdiction (i.e. USACE permit areas). If this is not done, the contractor waives the right to request any contract time considerations if project progress is impacted and PSL'S approval is still pending.

Requests submitted to the area engineer will be evaluated on this basis and will require documentation showing substantial early coordination efforts to expedite the approval process as herein stated. The request will include a detailed chronological summary status with dates of coordination activities with the resource agencies, including those occurring after the initial coordination, to be reviewed and confirmed by the district's environmental section.

For PSLs that fall within USACE permit areas, the Contractor must document and coordinate with the USACE, if required, before any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

1. Restricted Use of Materials for Previously Evaluated Permit Areas. The Contractor will document both the project specific location (PSL) and their authorization, and the Contractor will maintain copies for review by the Department and/or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project, then:
 - a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or
 - b. temporary fill (Item 132, Embankment) within a USACE permit area may be restricted.
 - c. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area may be restricted; and,
 - d. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at an approved location within a USACE evaluated area may be restricted.
2. Contractor Materials from Areas Other than Previously Evaluated Areas. The Contractor will provide the Department with a copy of all USACE coordination or approvals before initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off-right-of-way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites, including:
 - a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
 - b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

Storm Water Regulations Requirements:

The Contractor shall be responsible for (off ROW) PSLs applicable to the TCEQ Construction General Permit (CGP) requirements and will notify the Engineer of the disturbed acreage within one (1) mile of the project limits. The Contractor shall

obtain any required authorization form the TCEQ for any Contractor PSLs for construction support activities on or off ROW.

The total disturbed areas within the ROW are anticipated at less than one (1) acre and/or this project is classified as "surface work" consisting of an asphalt overlay of an existing roadway without shoulder-up disturbances. Due to this type of construction, the project qualifies for exclusion under the Construction General Permit (CGP) issued by the Texas Commission on Environmental Quality (TCEQ) on March 5, 2023. However, should the sum of the Engineer's anticipated disturbances and all of the Contractor's (On ROW and off ROW) PSLs equal or exceed the one (1) acre threshold, both TxDOT and the Contractor shall have project responsibilities under the CGP that reverts to non-exclusion status. To ensure project compliance with all applicable water quality regulations, the Contractor shall obtain Engineer approval for all non-depicted areas of disturbance that increases the Engineer's initial soil and vegetation disturbed area estimates before associated work operations start.

Item 8 - Prosecution and Progress

Before starting work, provide a sequence of work and estimated progress schedule meeting the requirements of Section 8.5.2, "Progress Schedule."

No closures will be allowed on the weekends which include the following holidays: January 1, the last Monday in May, July 4, the first Monday in September, the fourth Thursday in November, December 25 and Easter weekend.

Nighttime work will be allowed to be performed, as approved and directed by the Engineer. Refer to the Sequence of Work, Traffic Control Plan, etc. shown in the plans, for other details.

Equipment and material may be pre-staged at approved locations.

Item 9 - Measurement and Payment

Coordinate and provide off-duty law enforcement officers with officially marked vehicles (if patrol cruisers are available from the enforcement agency involved) during the following operations: lane closures, *and/or* during a one-way traffic control situation. For payment through TxDOT state force account method, complete the weekly tracking forms provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Item 500 - Mobilization

"Materials-on-Hand" payments will not be considered in determining percentages used to compute mobilization payments.

Item 502 - Barricades, Signs, and Traffic Handling

Designate, as the Contractor Responsible Person (CRP), an English-speaking employee on-call nights and weekends (or any other time that work is not in progress) with a local address and telephone number for maintenance of signs and barricades. This employee will be located within one (1) hour of traveling time to the project site. Notify the Engineer in writing of the name, address and telephone number of this employee. Furnish this information to local law enforcement officials.

When advanced warning flashing arrow panel(s) is/are specified, maintain one standby unit in good condition at the job site ready for immediate use is required.

Traffic control required for this project will not be paid for directly, but will be considered subsidiary to the various bid items.

Limit lane closures to a maximum of 2 miles. If more than one lane closure location is desired, provide a minimum of a 2 mile passing zone between locations. Provide a separate sign set up for each location.

Ensure equipment not in use, stockpile aggregate, and other working materials are:

- A minimum of 30 feet from the edge of the travel lane;
- Do not obstruct traffic or sight distance;
- Do not interfere with the access from abutting property; or
- Do not interfere with roadway drainage.

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

During the holiday time frame of December 21st through January 1st, every effort should be taken to ensure that all travel lanes remain open where possible.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the

County: Duval, etc.

Control: 0086-09-042, etc.

Highway: SH 359, etc

effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 505 – Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

Provide 1 Truck Mounted Attenuator as required by the Engineer. Provide backup and always keep operational and available on the jobsite at all times during traffic control operations. The Truck Mounted Attenuator will be made available for utilization for the entire duration of the project, including all alternative locations.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

It is not anticipated that any erosion, sedimentation, or environmental control devices will be needed on this project. However, in the event that such controls are necessary, the SW3P for this project shall consist of the use of any temporary erosion control measures deemed necessary by the Engineer and as provided under this item. Payment for this work will be determined in accordance with Article 4.4, "Changes in the Work".

Item 644 - Small Roadside Sign Assemblies

Salvage and deliver all aluminum sign faces to the local TxDOT maintenance office.

Item 666 – Reflectorized Pavement Markings

Reflectivity requirements for Type I will be as per Item 666.

Payment on Type I markings requiring retroreflective testing will be made at a 75% rate until passing test results are received.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0086-09-042

DISTRICT Laredo
HIGHWAY FM 1472, SH 359

COUNTY Duval, Webb

CONTROL SECTION JOB				0086-09-042		2150-03-032		2150-04-095		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00210182		A00210183		A00210186			
COUNTY				Duval		Webb		Webb			
HIGHWAY				SH 359		FM 1472		FM 1472			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	500-7001	MOBILIZATION	LS	1.000						1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1.000		0.500		1.500		3.000	
	505-7003	TMA (MOBILE OPERATION)	DAY	18.000		5.000		25.000		48.000	
	533-7001	MILL RUMBLE STRIPS (ASPHALT) (SHLDR)	LF	45,577.000		4,224.000		273,293.000		323,094.000	
	533-7002	MILL RUMBLE STRIPS (ASPH) (CENTERLINE)	LF	22,788.000						22,788.000	
	644-7025	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	23.000						23.000	
	666-7022	REFL PAV MRK TY I (W)8"(SLD)(060MIL)	LF			1,500.000		7,200.000		8,700.000	
	666-7034	REFL PAV MRK TY I (W)24"(SLD)(060MIL)	LF			340.000		1,200.000		1,540.000	
	666-7040	REFL PAV MRK TY I (W)(ARROW)(060MIL)	EA			2.000		144.000		146.000	
	666-7064	REFL PAV MRK TY I (W)(WORD)(060MIL)	EA			2.000		48.000		50.000	
	666-7121	REFL PAV MRK TY I (Y)24"(SLD)(060MIL)	LF			200.000				200.000	
	666-7406	REFL PAV MRK TY I (W)6"(BRK)(060MIL)	LF			100.000		34,162.000		34,262.000	
	666-7409	REFL PAV MRK TY I (W)6"(SLD)(060MIL)	LF	52,040.000		1,200.000		139,286.000		192,526.000	
	666-7418	REFL PAV MRK TY I (Y)6"(BRK)(060MIL)	LF	6,299.000						6,299.000	
	666-7421	REFL PAV MRK TY I (Y)6"(SLD)(060MIL)	LF	8,855.000		2,000.000		136,646.000		147,501.000	
	672-7002	REFL PAV MRKR TY I-C	EA	988.000		391.000		3,950.000		5,329.000	
	672-7004	REFL PAV MRKR TY II-A-A	EA	686.000						686.000	
	678-7002	PAV SURF PREP FOR MRK (6")	LF	67,194.000		3,300.000		310,094.000		380,588.000	
	678-7004	PAV SURF PREP FOR MRK (8")	LF			1,500.000		7,200.000		8,700.000	
	678-7008	PAV SURF PREP FOR MRK (24")	LF			540.000		1,200.000		1,740.000	
	678-7009	PAV SURF PREP FOR MRK (ARROW)	EA			2.000		144.000		146.000	
	678-7016	PAV SURF PREP FOR MRK (WORD)	EA			2.000		48.000		50.000	
	6003-7001	LEAD LED CURVE SIGN	EA	4.000						4.000	
	6003-7002	LED CHEVRON	EA	38.000						38.000	
18		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000		1.000		3.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000		1.000		3.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000		1.000		3.000	

7/30/2024 JTOVIAS T:\LRDTRDPR\1_Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Curves\General\E&Q.dgn

SUMMARY OF MOBILIZATION ITEMS		
	500	502
	7001	7001
CSJ: 0086-09-042	MOBILIZATION	BARRICADES, SIGNS AND TRAFFIC HANDLING
	LS	MO
CSJ: 0086-09-042	1.00	1.00
CSJ: 2150-03-032	0.00	0.50
CSJ: 2150-04-095	0.00	1.50
PROJECT TOTALS	1.00	3.00

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEM	
	505
	7003
CSJ: 0086-09-042	TMA (MOBILE OPERATION)
	DAY
CSJ: 0086-09-042	18
CSJ: 2150-03-032	5
CSJ: 2150-04-095	25
PROJECT TOTALS	48

SUMMARY OF SIGNING ITEMS			
	644	6003	6003
	7025	7001	7002
CSJ: 0086-09-042	IN SW RD SN SUPRAN TV580(1)SA(P)	LEAD LED CURVE SIGN	LED CHEVRON
	EA	EA	EA
CSJ: 0086-09-042	23	4	38
CSJ: 2150-03-032			
CSJ: 2150-04-095			
PROJECT TOTALS	23	4	38

SUMMARY OF ROADWAY ITEMS		
	533	533
	7001	7002
CSJ: 1229-01-077	MILL RUMBLE STRIPS (ASPHALT) (SHLDR)	MILL RUMBLE STRIPS (ASPH) (CENTERLINE)
	LF	LF
CSJ: 0086-09-042	45577.00	22788
CSJ: 2150-03-032	4224.00	
CSJ: 2150-04-095	273293.00	
PROJECT TOTALS	323094.00	22788

SUMMARY OF PAVEMENT MARKING ITEMS																
	666	666	666	666	666	666	666	666	666	672	672	678	678	678	678	678
	7022	7034	7040	7064	7121	7406	7409	7418	7421	7002	7004	7002	7004	7008	7009	7016
CSJ: 0086-09-042	REFL PAU MRK TY I <W>8" <SLD> <060MIL>	REFL PAU MRK TY I <W>24" <SLD> <060MIL>	REFL PAU MRK TY I <W><ARROW> <060MIL>	REFL PAU MRK TY I <W><WORD> <060MIL>	REFL PAU MRK TY I <Y>24" <SLD> <060MIL>	REFL PAU MRK TY I <W>6" <BRK> <060MIL>	REFL PAU MRK TY I <W>6" <SLD> <060MIL>	REFL PAU MRK TY I <Y>6" <BRK> <060MIL>	REFL PAU MRK TY I <Y>6" <SLD> <060MIL>	REFL PAU MRKR TY I-C	REFL PAU MRKR TY II-A-A	PAU SURF PREP FOR MRK <6">	PAU SURF PREP FOR MRK <8">	PAU SURF PREP FOR MRK <24">	PAU SURF PREP FOR MRK <ARROW>	PAU SURF PREP FOR MRK <WORD>
	LF	EA	EA	LF	LF	LF	LF	LF	LF	EA	EA	LF	LF	LF	EA	EA
CSJ: 0086-09-042							52040	6299	8855	988	686	67194				
CSJ: 2150-03-032	1500	340	2	2	200	100	1200		2000	391		3300	1500	540	2	2
CSJ: 2150-04-095	7200	1200	144	48		34162	139286		136646	3950		310094	7200	1200	144	48
PROJECT TOTALS	8700	1540	146	50	200	34262	192526	6299	147501	5329	686	380588	8700	1740	146	50



QUANTITY SUMMARY SHEETS

DN: J.T.	DW: J.T.	STATE	SHEET NUMBER			SHEET NO.
CK: D.G.	CK: D.G.	TEXAS	SHEET 1 OF 1			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION	
							FRP - Fiberglass TWT - Thin-Wall 10BWG - 10 BWG S80 - Sch 80	1 or 2	UA-Universal Conc UB-Universal Bolt SA-Slipbase-Conc SB-Slipbase-Bolt WS-Wedge Steel WP-Wedge Plastic	PREFABRICATED P - "Plain" T - "T" U - "U" EXT or 2EXT - * of Ext BM - Extruded Wind Beam WC - 1.12 "/ft Wing Channel EXAL - Extruded Alum Sign Panels	
31	1	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36X36	X		S80	1	SA	P	
	2	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	3	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	4	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	5	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	6	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	7	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	8	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	9	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	10	W1-2L	SYMBOL - HORIZ CURVE LEFT	36X36	X		S80	1	SA	P	
32	11	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36X36	X		S80	1	SA	P	
		W1-8R	<CHEVRON RIGHT>	18X24	X						
		W1-8L	<CHEVRON LEFT>	18X24	X		S80	1	SA	P	
	12	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	13	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	14	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	15	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	16	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	17	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	18	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	19	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	20	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	21	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	22	W1-8R	<CHEVRON RIGHT>	18X24	X		S80	1	SA	P	
		W1-8L	<CHEVRON LEFT>	18X24	X						
	23	W1-2L	SYMBOL - HORIZ CURVE LEFT	36X36	X		S80	1	SA	P	

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ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
<http://www.txdot.gov/>

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).



SUMMARY OF SMALL SIGNS

SOSS

FILE: sum16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
4-16	DIST	COUNTY	SHEET NO.	
8-16	LRD	DUVAL, ETC.	12	

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

WORKER SAFETY NOTES:

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


COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

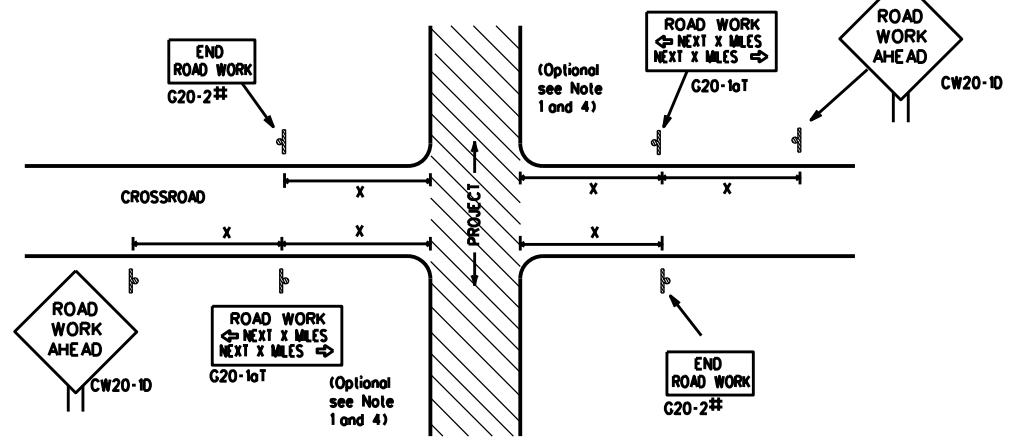
<p>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov</p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)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

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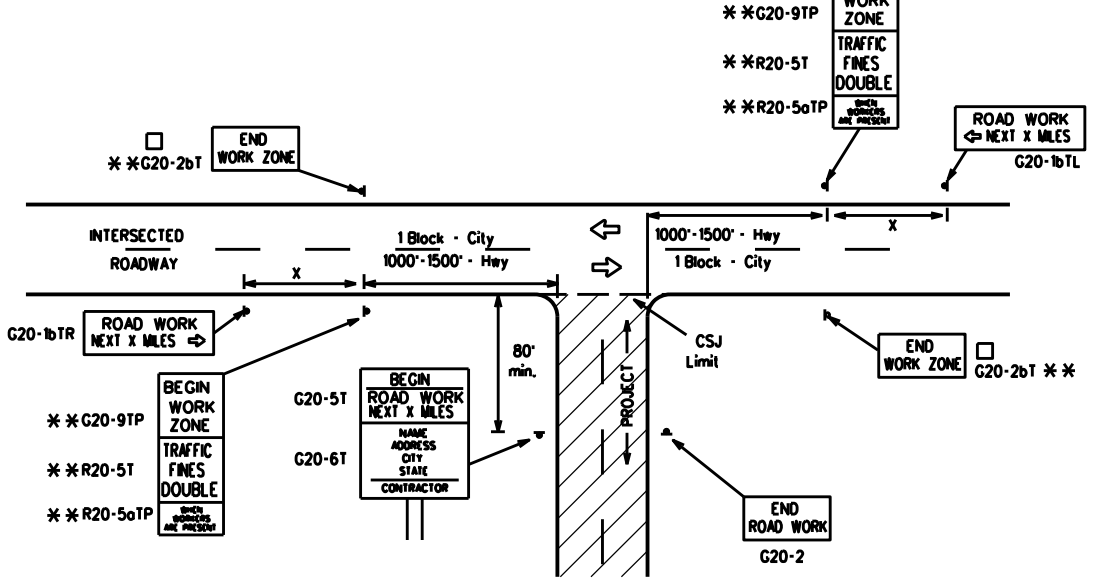
 Texas Department of Transportation		Traffic Safety Division Standard	
<p>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</p> <p>BC(1)-21</p>			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CK:	TxDOT
		DW:	TxDOT
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		CONT	SECT
		0086	09
		JOB	042, ETC
		SH359, ETC.	
		DIST	COUNTY
		LRD	DUVAL, ETC.
		SHEET NO.	13

TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

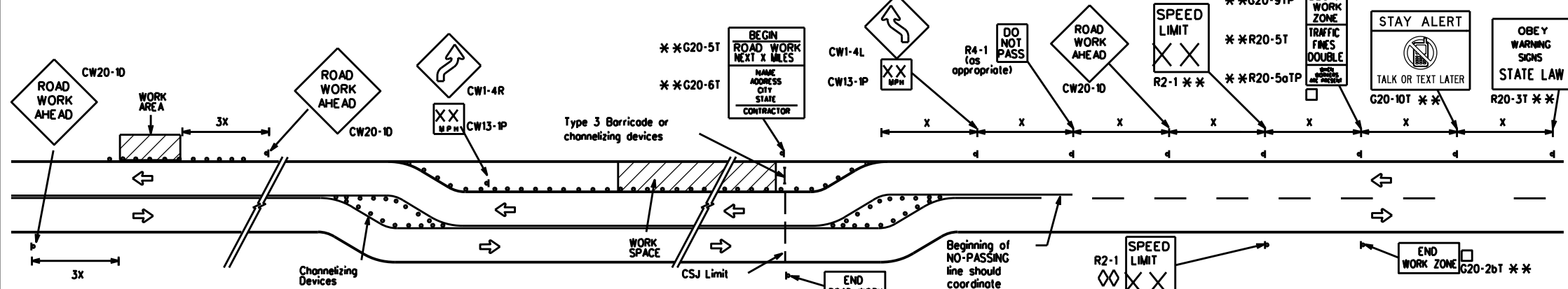
Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Spacing "X" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW23			40	240
CW25			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48"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

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

GENERAL NOTES

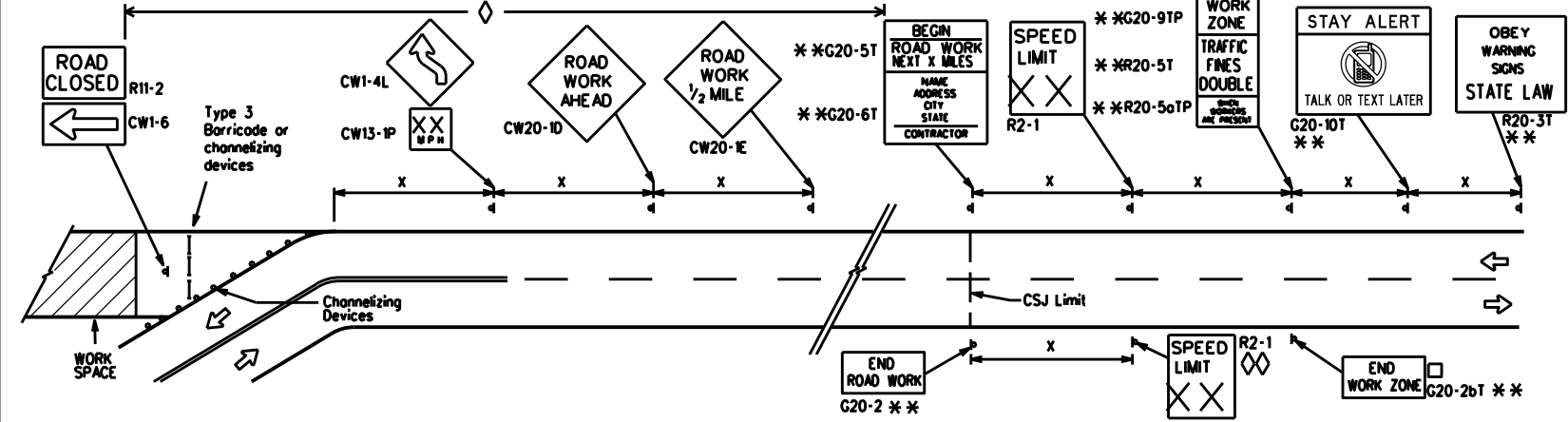
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

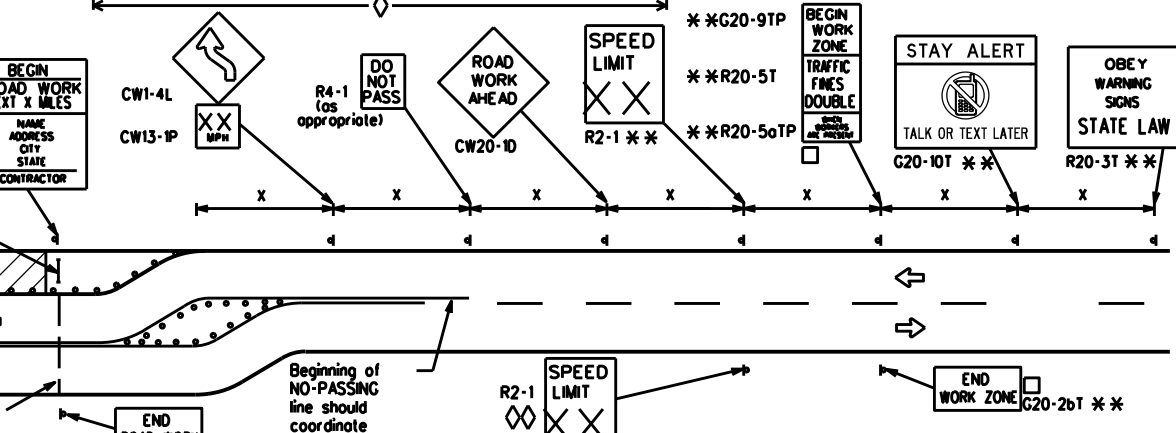


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

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

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086 09	042, ETC	SH359, ETC.	
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LRD	DUVAL, ETC.	14	

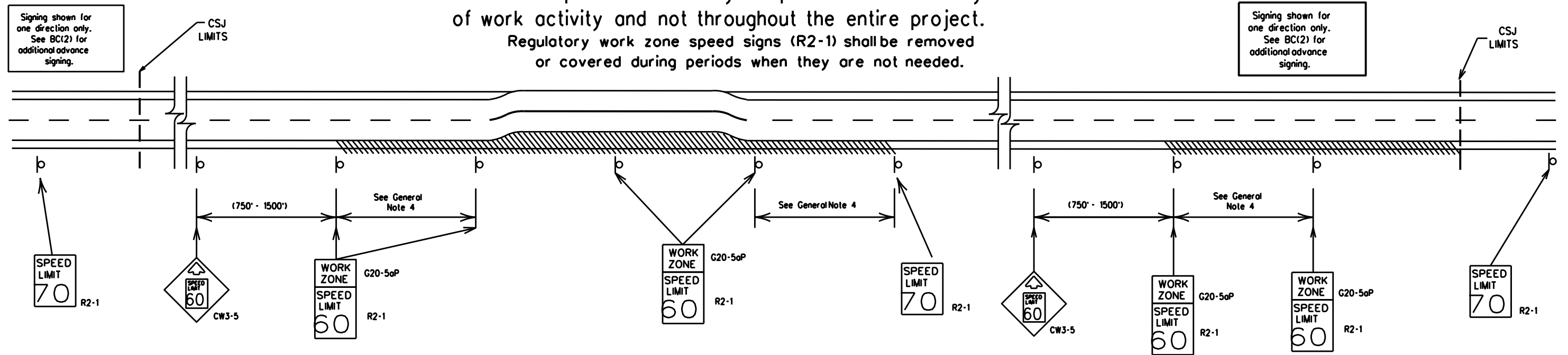
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- Frequency of work zone speed limit signs should be:
 - 40 mph and greater 0.2 to 2 miles
 - 35 mph and less 0.2 to 1 mile
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- Fabrication, erection and maintenance of the "ADVANCE SPEED LIMIT" (CW3-5) sign, "WORK ZONE" (G20-5aP) plaque and the "SPEED LIMIT" (R2-1) signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Low enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form *1204 in the TxDOT e-form system.

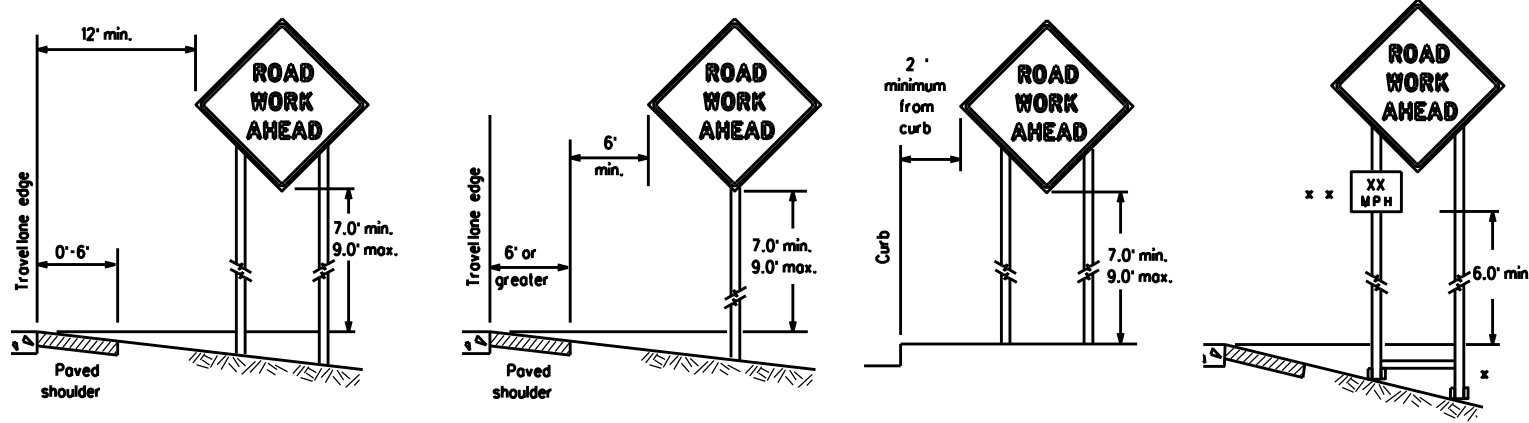
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SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC(3)-21</h3>			
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS	0086	09	042, ETC
9-07	8-14		SH359, ETC.
7-13	5-21		
DIST	COUNTY		SHEET NO.
LRO	DUVAL, ETC.		15

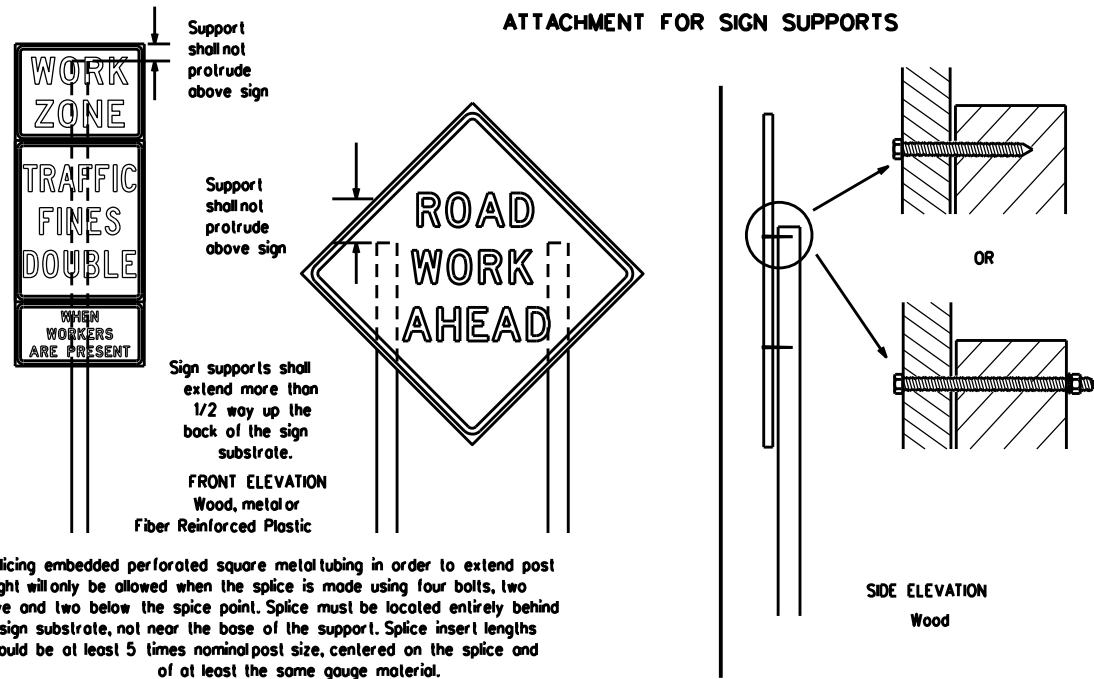
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS

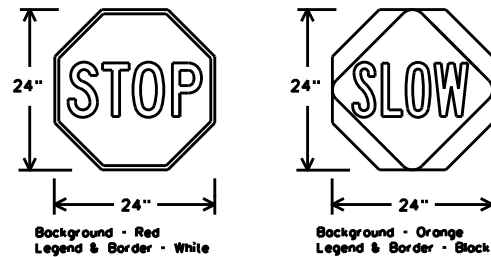


Nois shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

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

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".
2. STOP/SLOW paddles shall be retroreflective 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 _{TL} OR C _{TL} 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

1. 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.
2. 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.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. 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.
5. 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 CWZTCO 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.
6. 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

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. 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.
5. 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.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCO) 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.
7. 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.
8. 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.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

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.
 - b. 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.
 - c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - d. Short duration - work that occupies a location up to 1 hour.
 - e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. 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.
3. 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.
5. 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

1. 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 CWZTCO lists each substrate that can be used on the different types and models of sign supports.
2. "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).
2. 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 or Type C, 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

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. 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.
4. 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.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. 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.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices shall not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCO list.
7. 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.
8. 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



BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

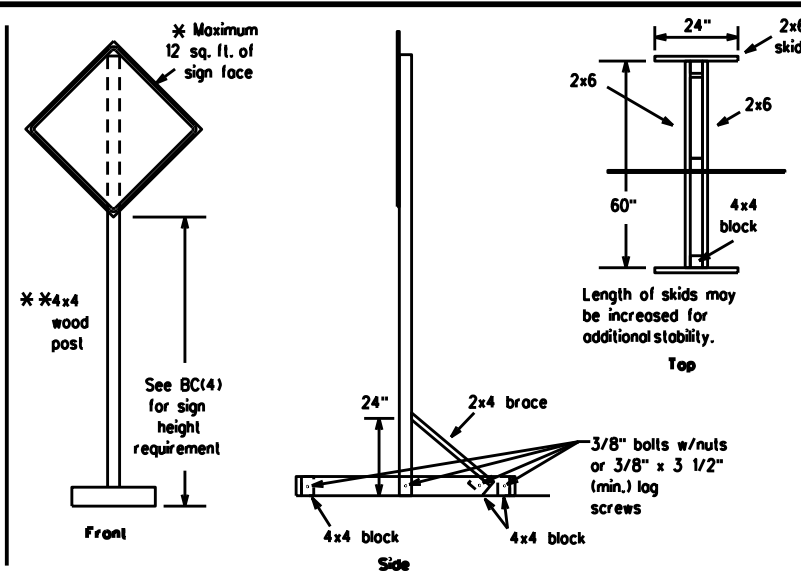
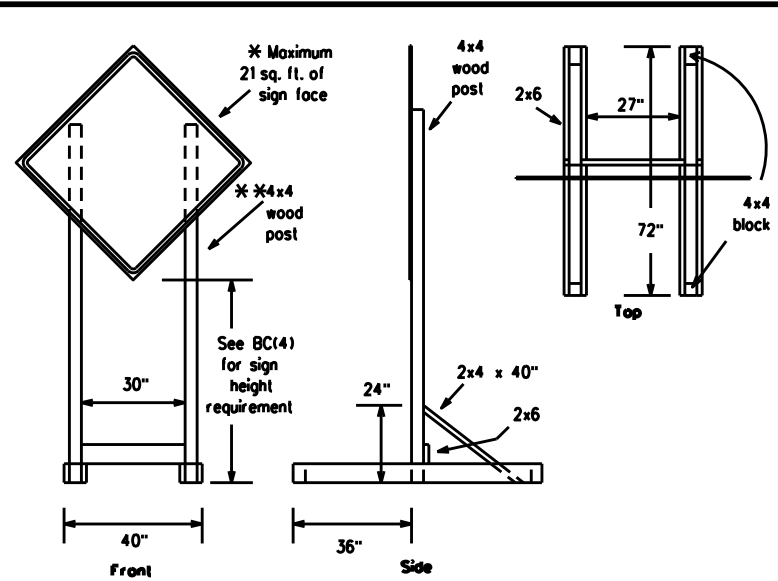
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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LRD	DUVAL, ETC.	16	

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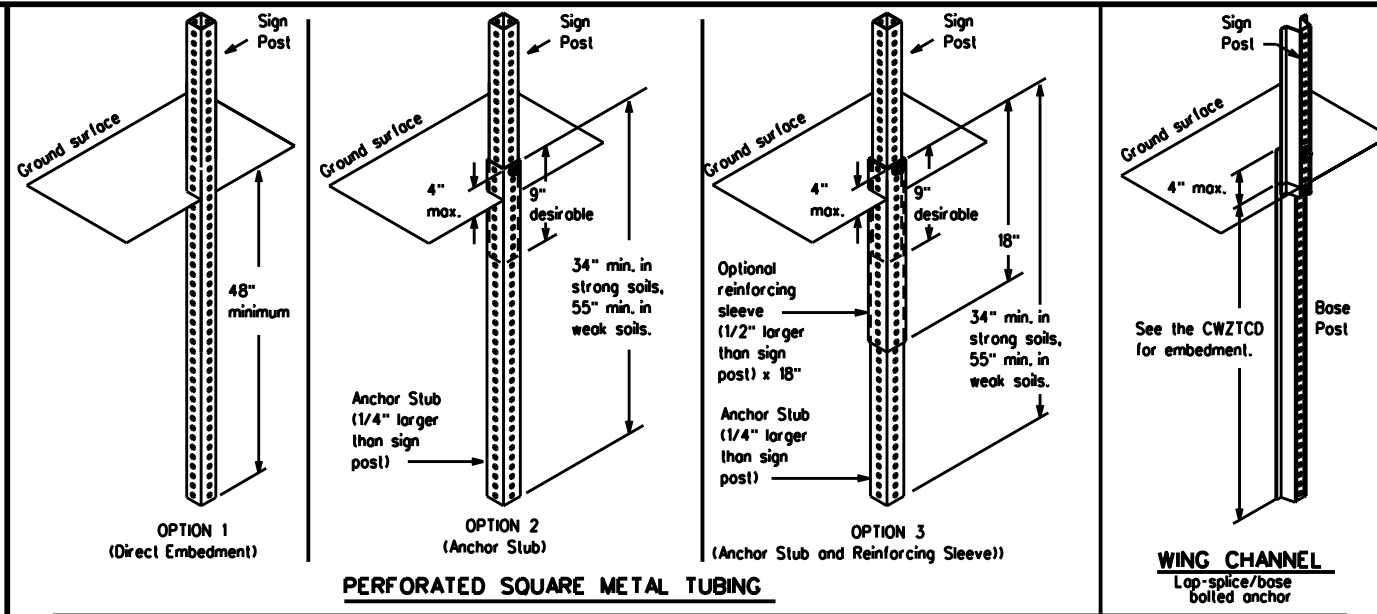
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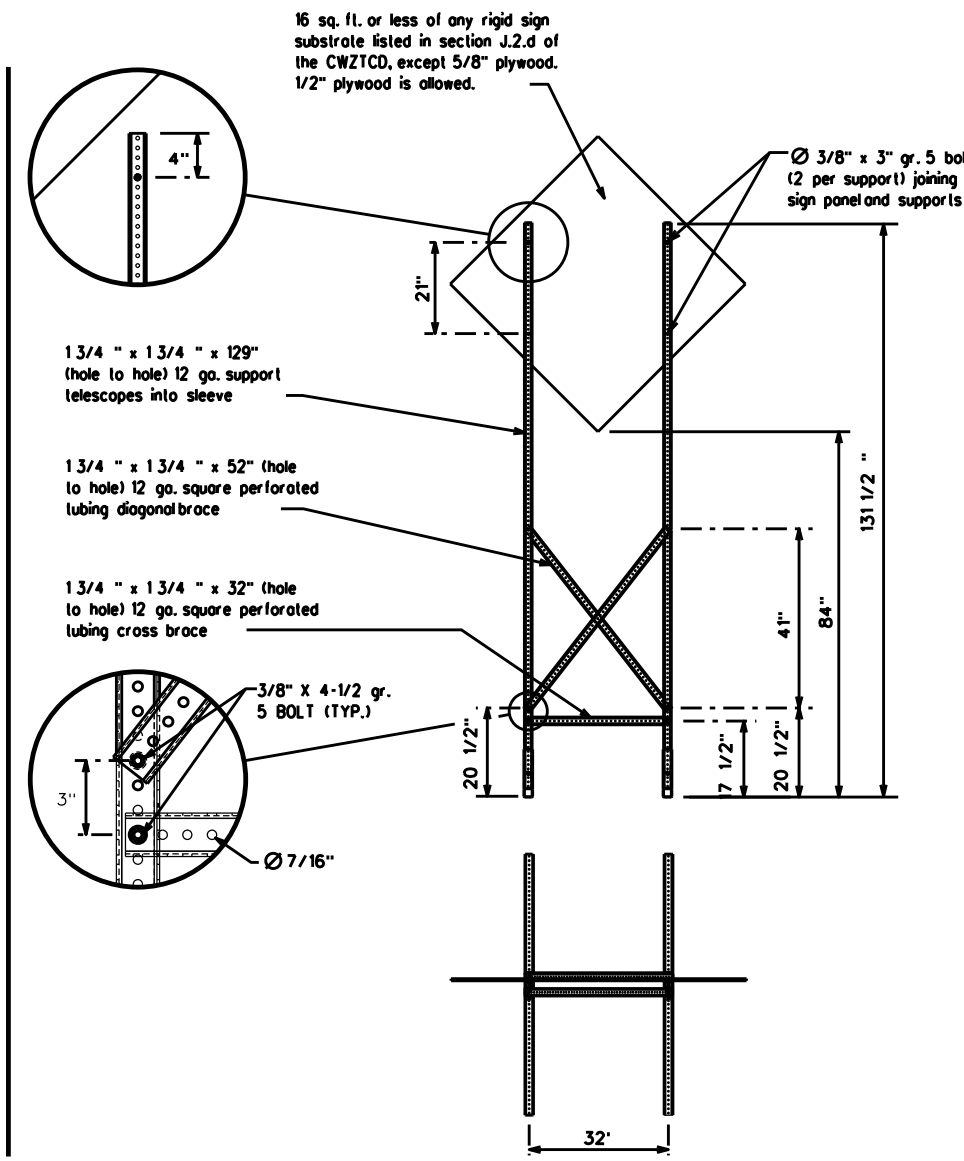
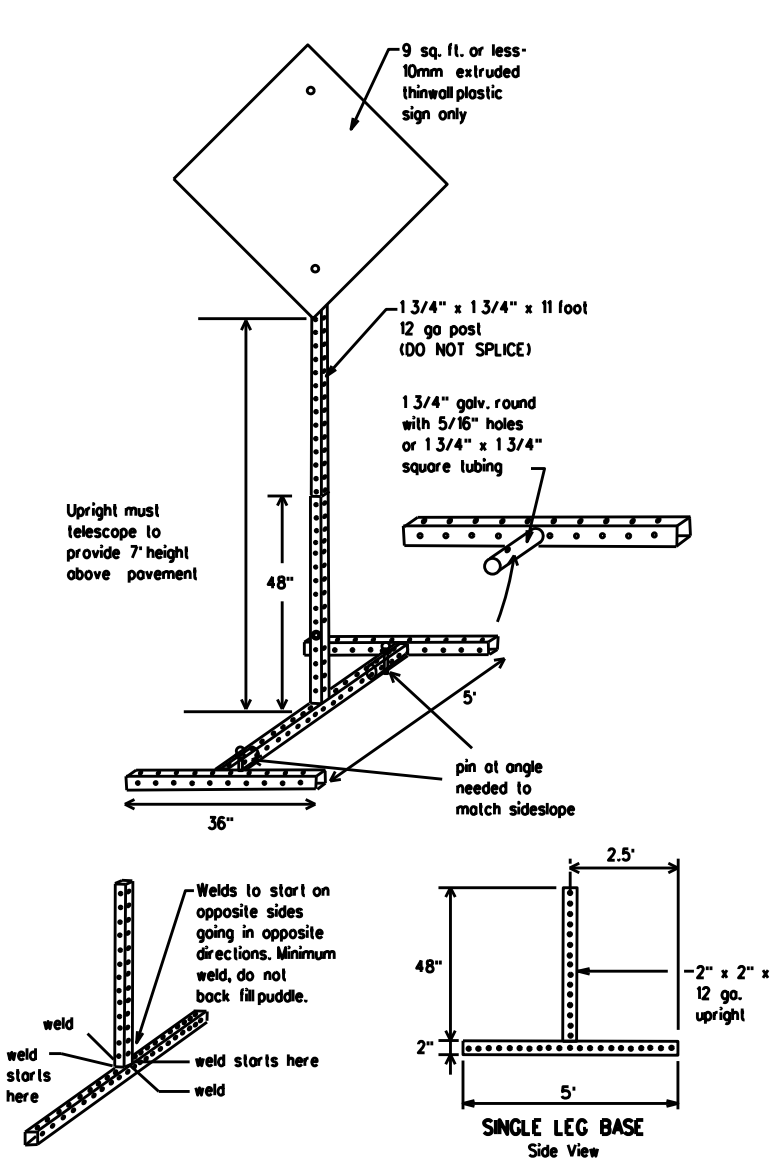
SKID MOUNTED WOOD SIGN SUPPORTS

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



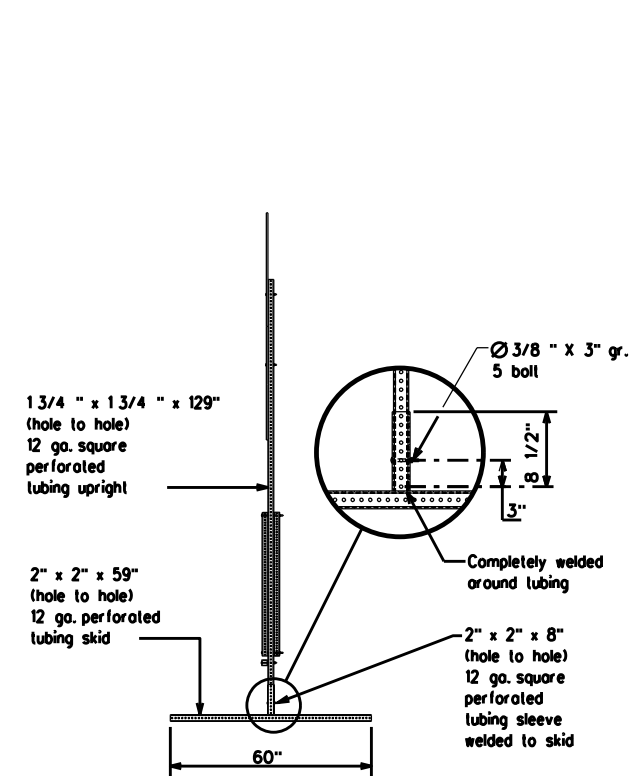
GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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



WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

1. 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.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

- * See BC(4) for definition of "Work Duration."
- ** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- ☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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REVISIONS	0086	09	042, ETC						
9-07	8-14	DIST:	COUNTY:						
7-13	5-21	LRD	DUVAL, ETC.						
			SHEET NO.	17					

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE
ROAD CLOSED AT SH XXX
ROAD CLSD AT FM XXXX
RIGHT X LANES CLOSED
CENTER LANE CLOSED
NIGHT LANE CLOSURES
VARIOUS LANES CLOSED
EXIT CLOSED
MALL DRIVEWAY CLOSED
XXXXXXXX BLVD CLOSED

Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

MERGE RIGHT
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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



BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

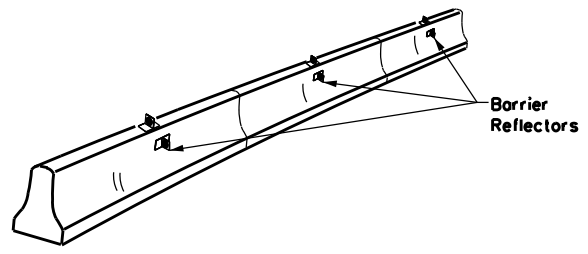
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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LRO	DUVAL, ETC.	18	

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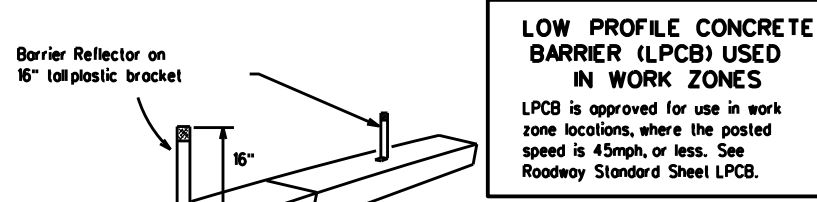
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

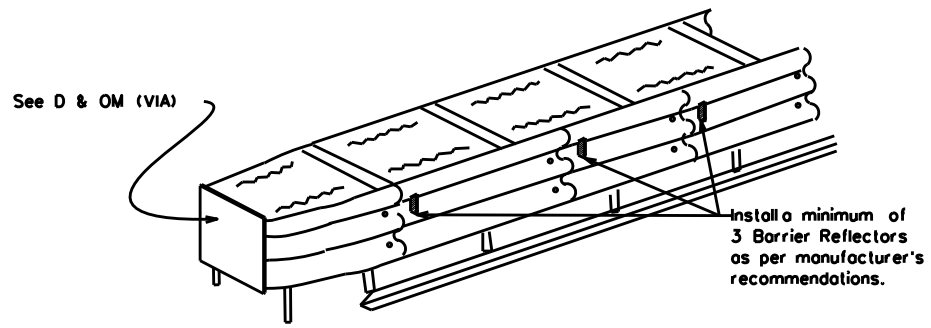
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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



LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES
 LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

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

LOW PROFILE CONCRETE BARRIER (LPCB)



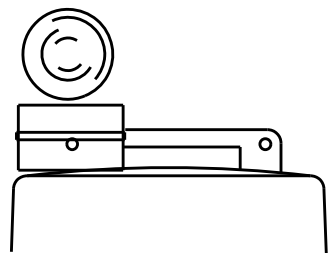
DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES
 End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

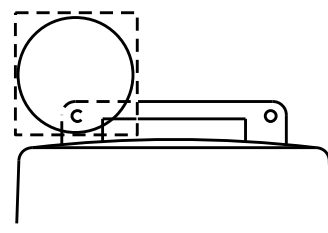
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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



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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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



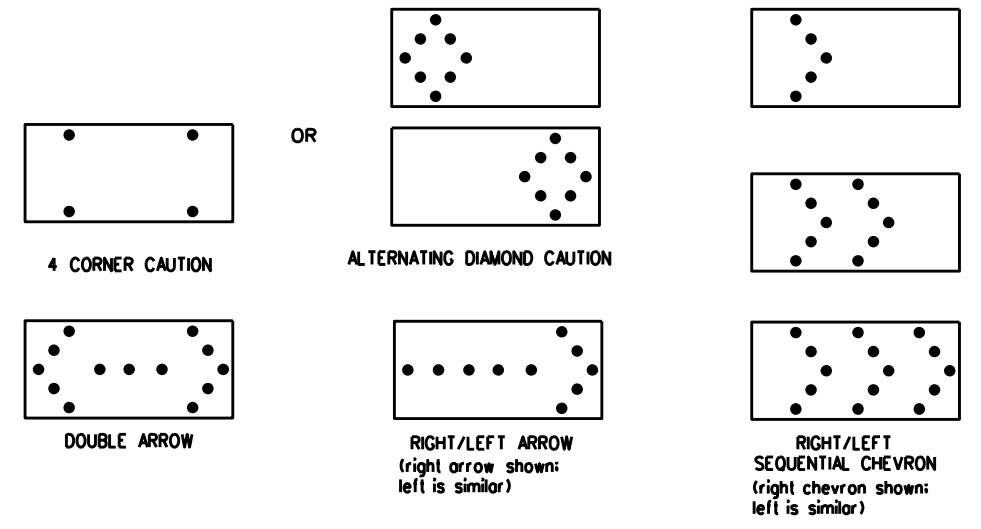
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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



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

BC(7)-21

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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
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9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	LRO	DUVAL, ETC.		19				

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

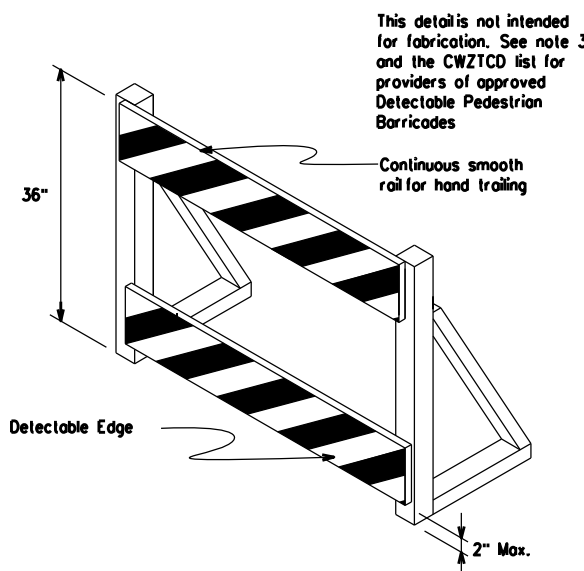
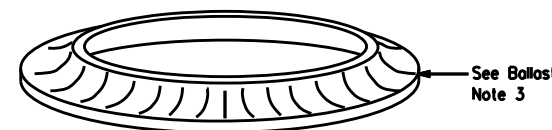
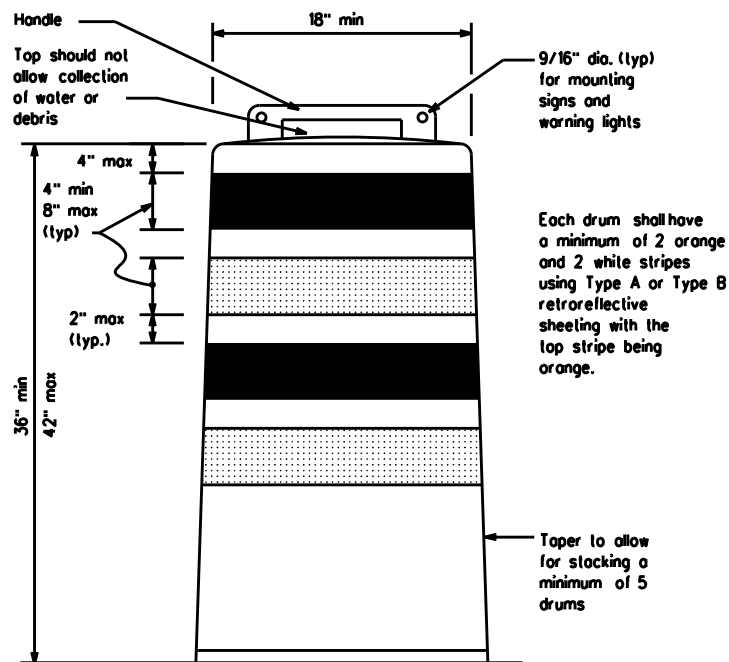
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

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

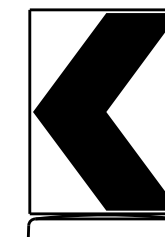
BALLAST

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

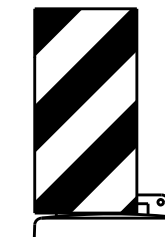


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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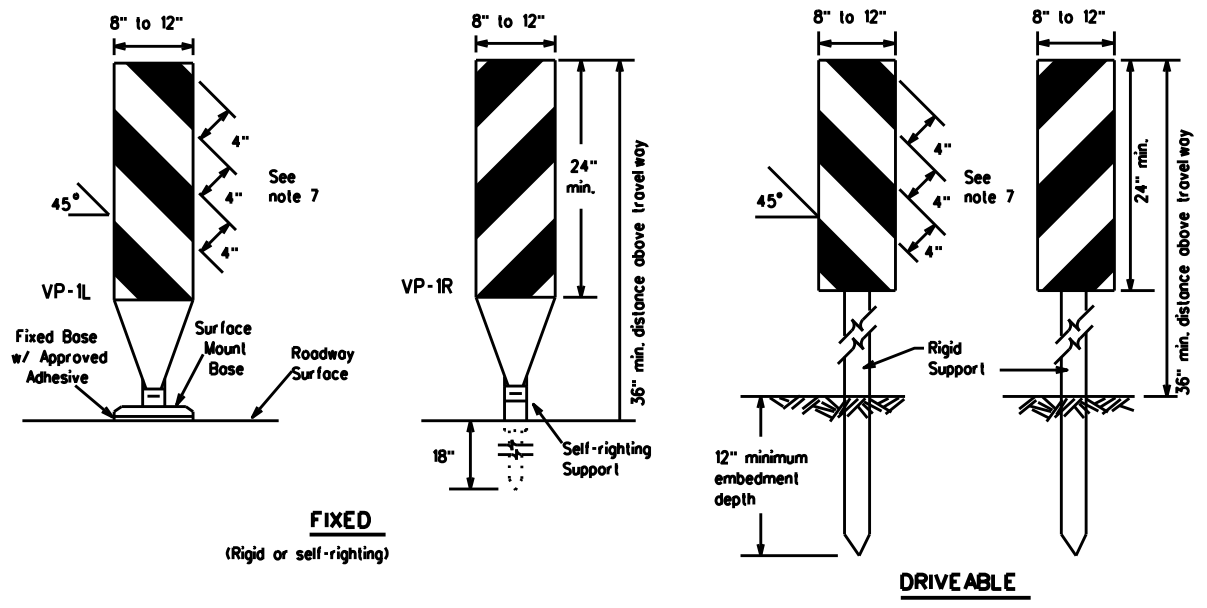
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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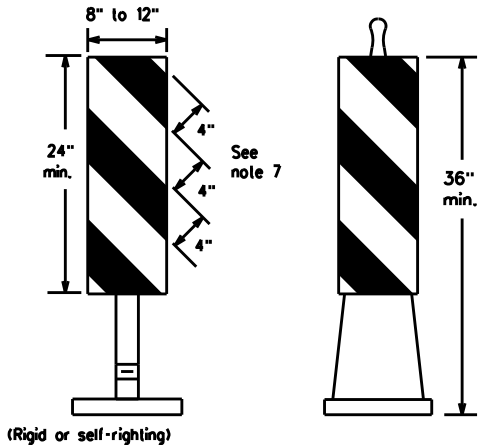
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FIXED
(Rigid or self-righting)

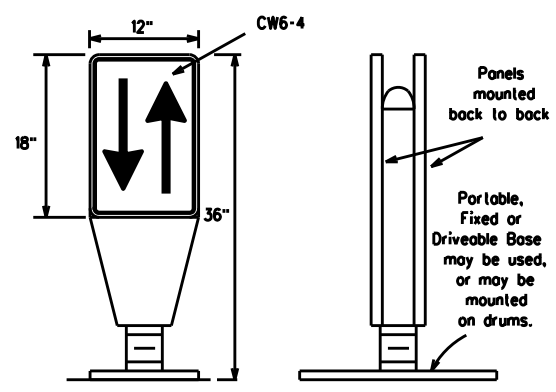
DRIVEABLE



PORTABLE

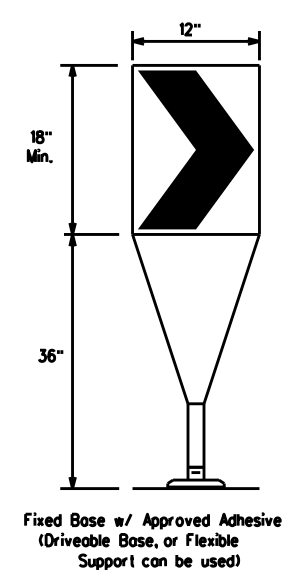
VERTICAL PANELS (VPs)

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



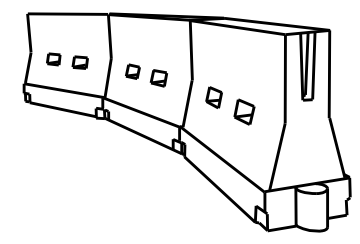
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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



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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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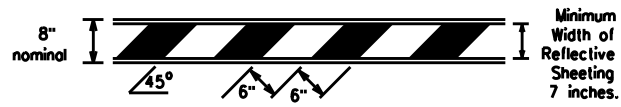
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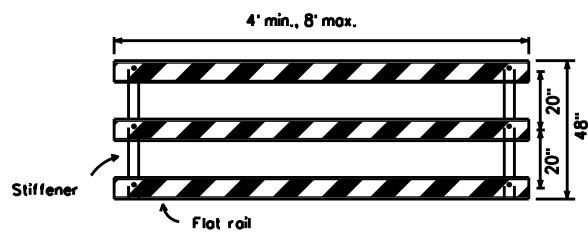
TYPE 3 BARRICADES

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

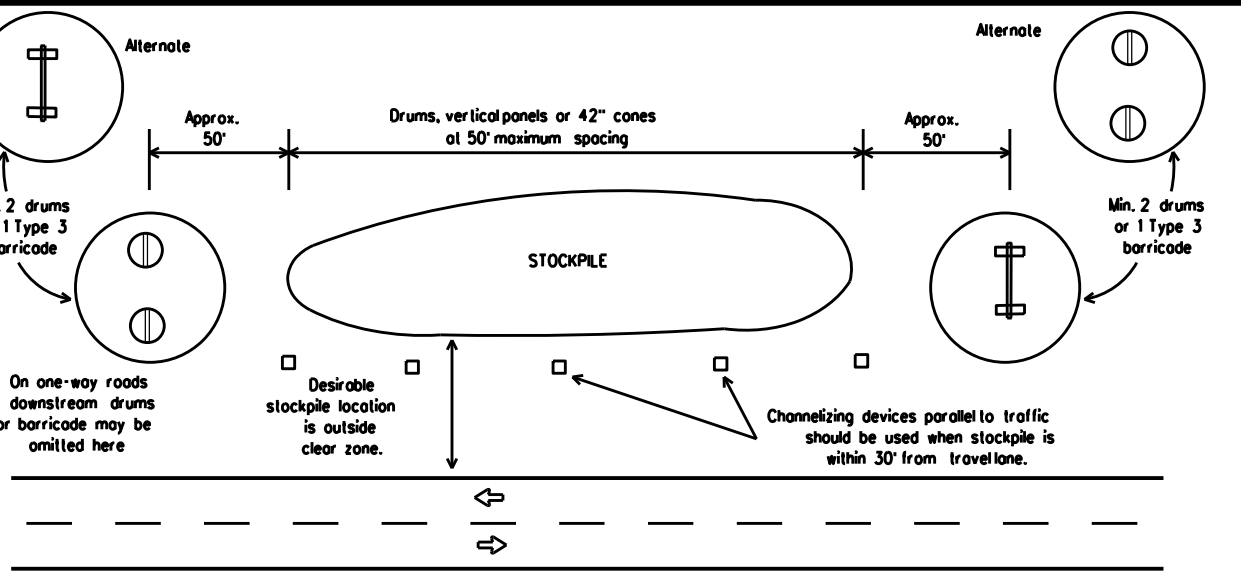
Barricades shall NOT be used as a sign support.



TYPICAL STRIPING DETAIL FOR BARRICADE RAIL

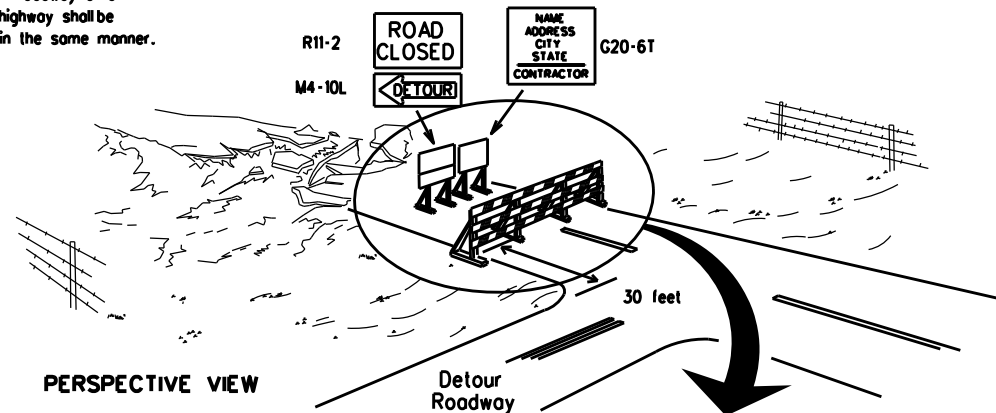


TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



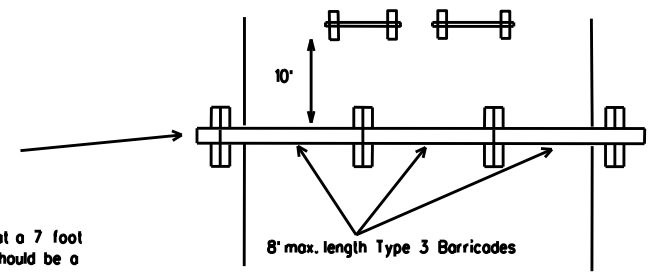
TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



PERSPECTIVE VIEW

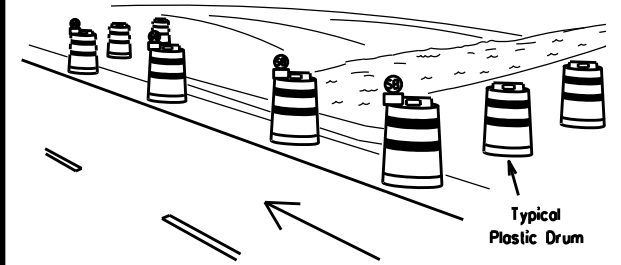
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



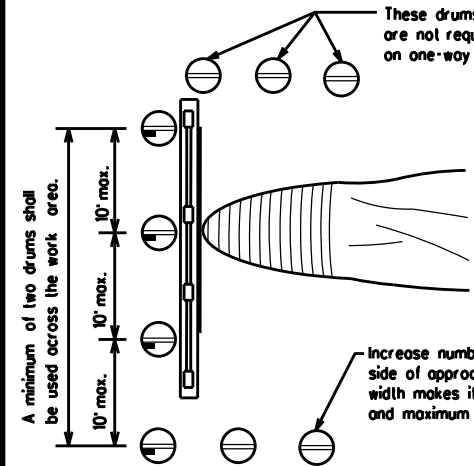
PLAN VIEW

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

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

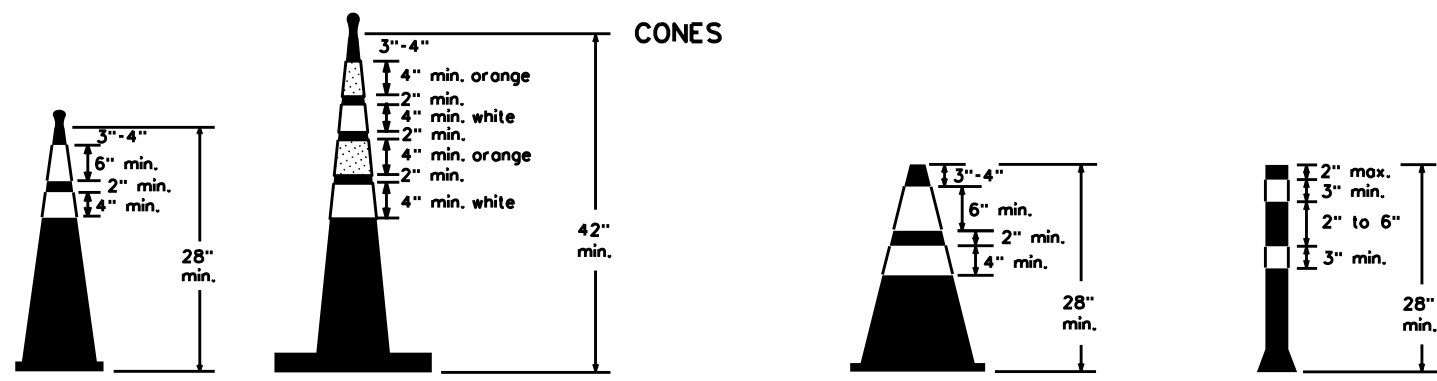


PLAN VIEW

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

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

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones

One-Piece cones

Tubular Marker

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

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 in BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086 09	042, ETC	SH359, ETC.	
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	LRO	DUVAL, ETC.	22	

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

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

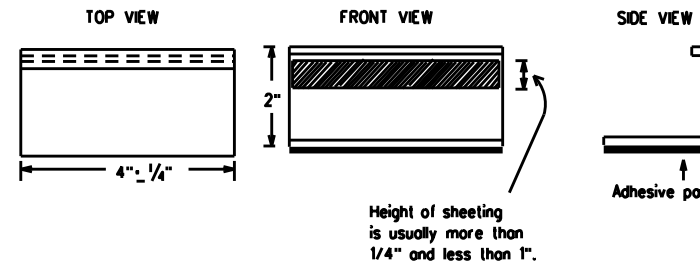
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

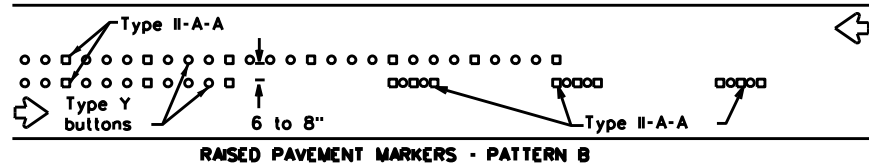
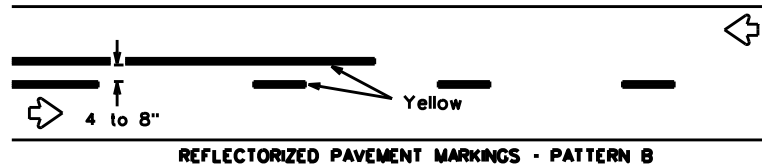
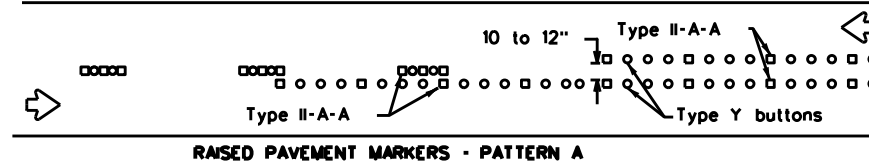
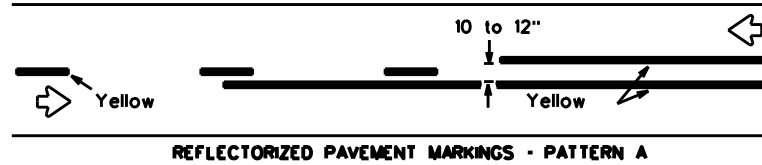
BC(11)-21

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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	LRD	DUVAL, ETC.	23	
11-02 8-14				

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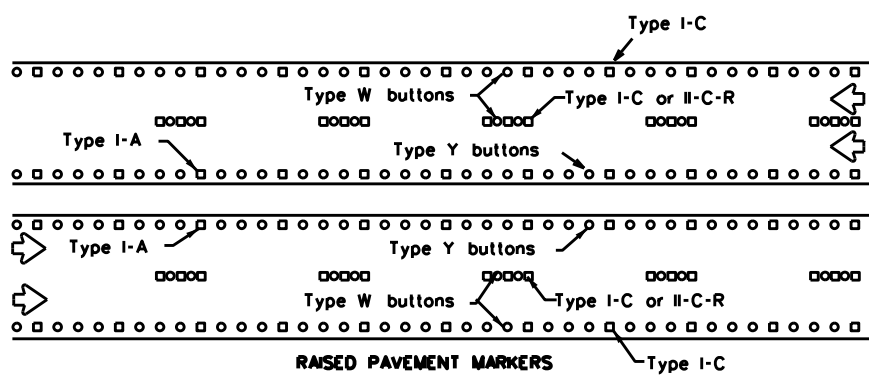
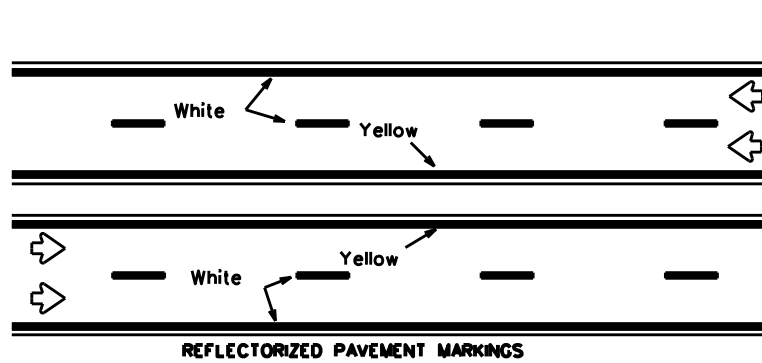
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PAVEMENT MARKING PATTERNS



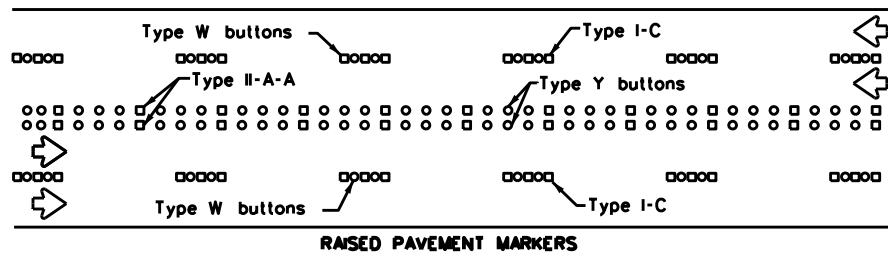
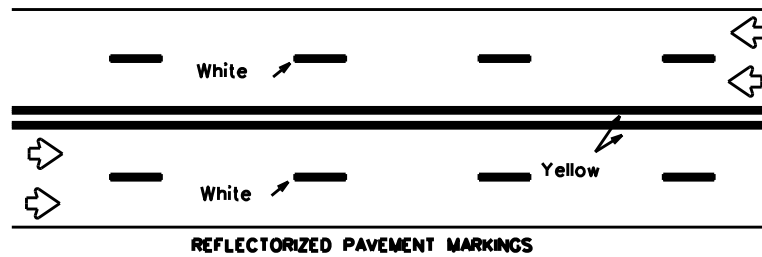
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

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



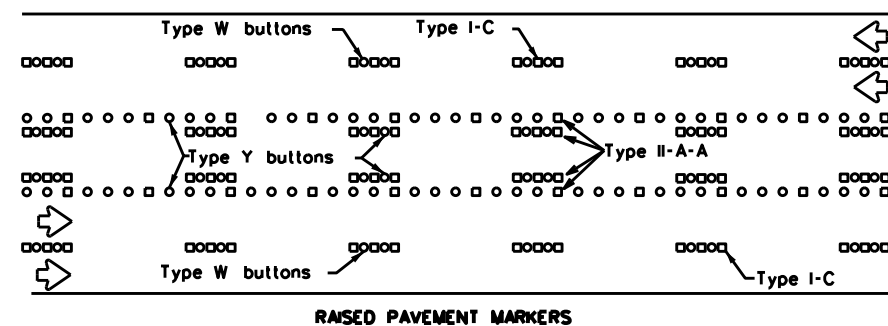
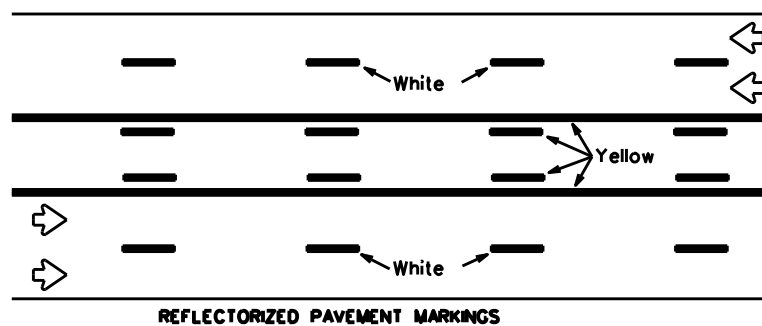
Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectorized pavement markings.

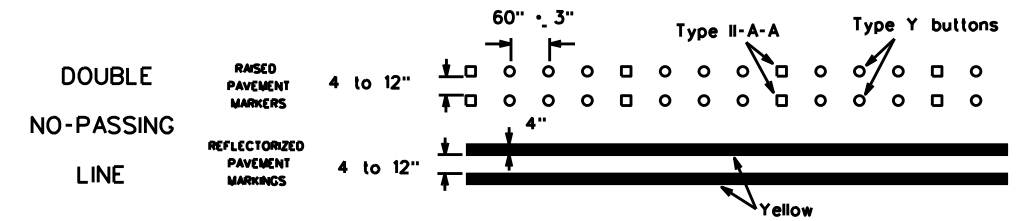
LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



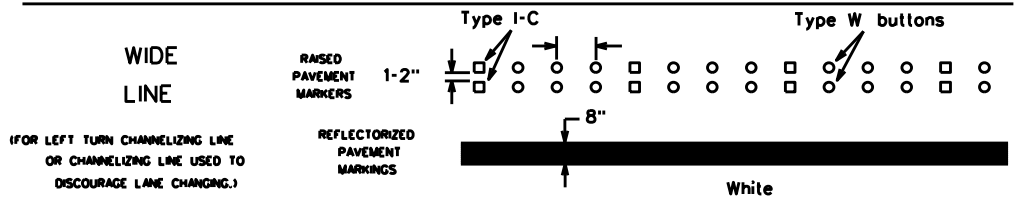
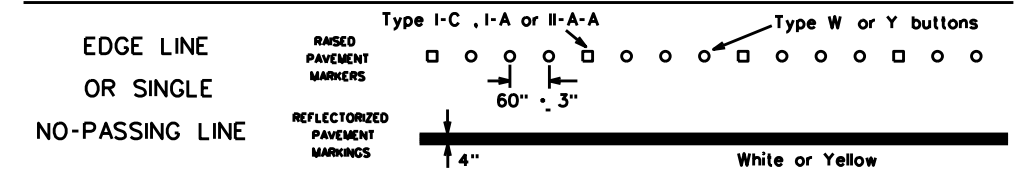
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

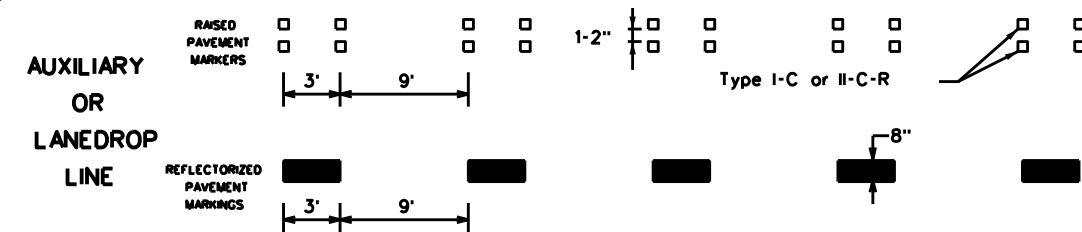
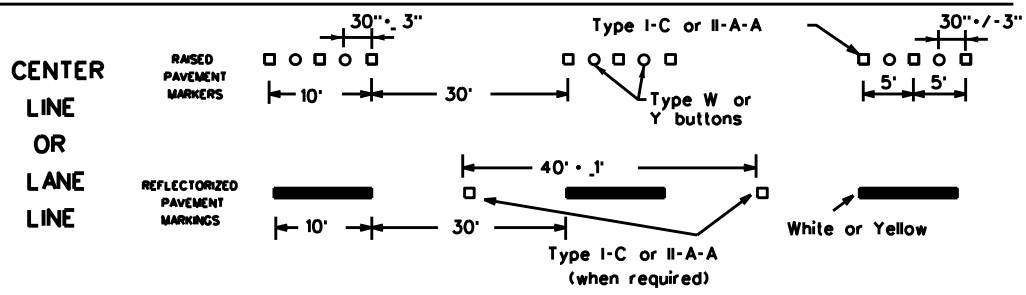
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

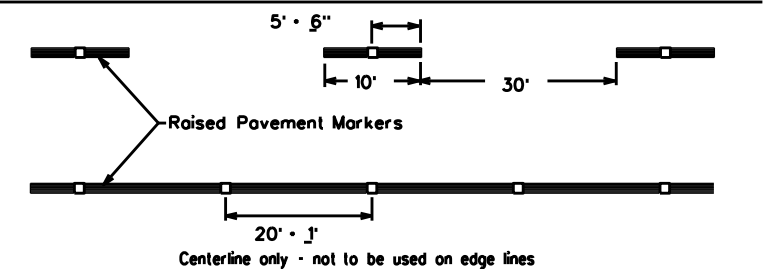


BROKEN LINES



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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

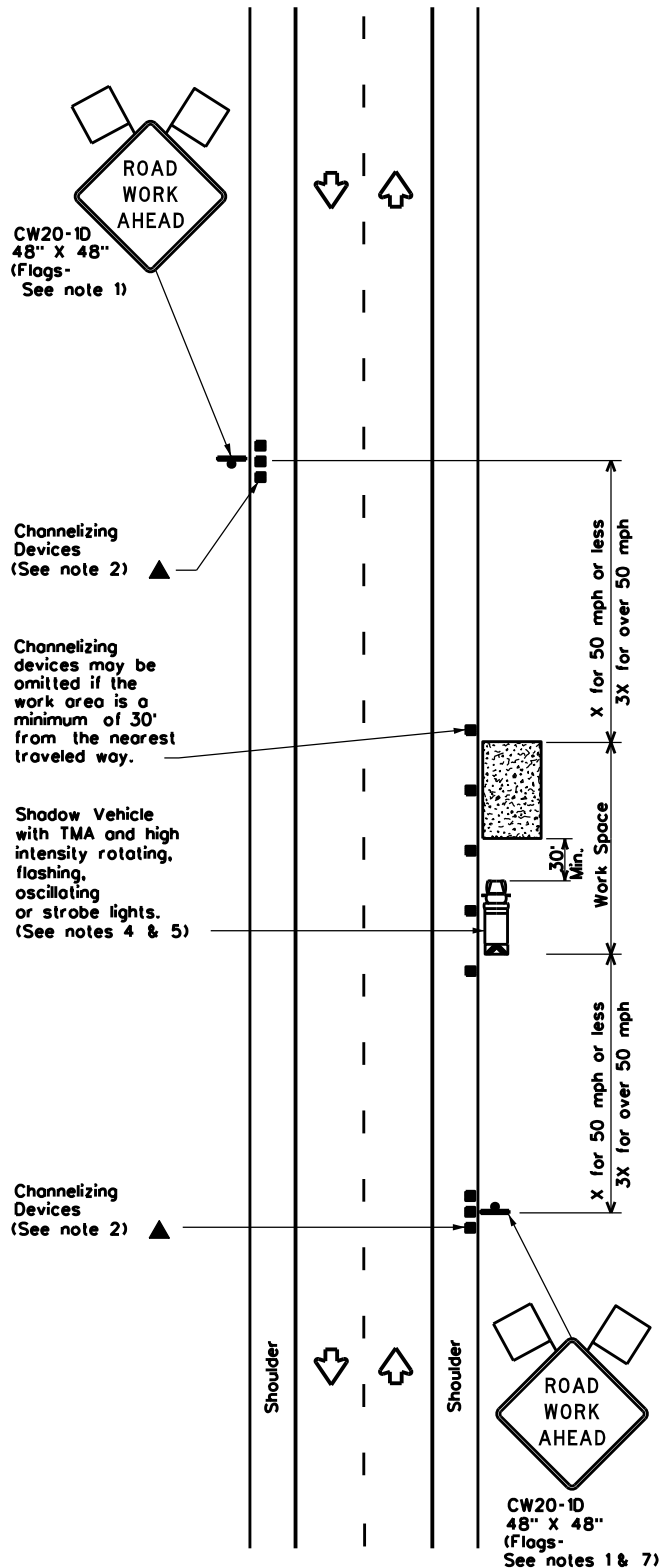
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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	LRO	DUVAL, ETC.	24	
11-02 8-14				

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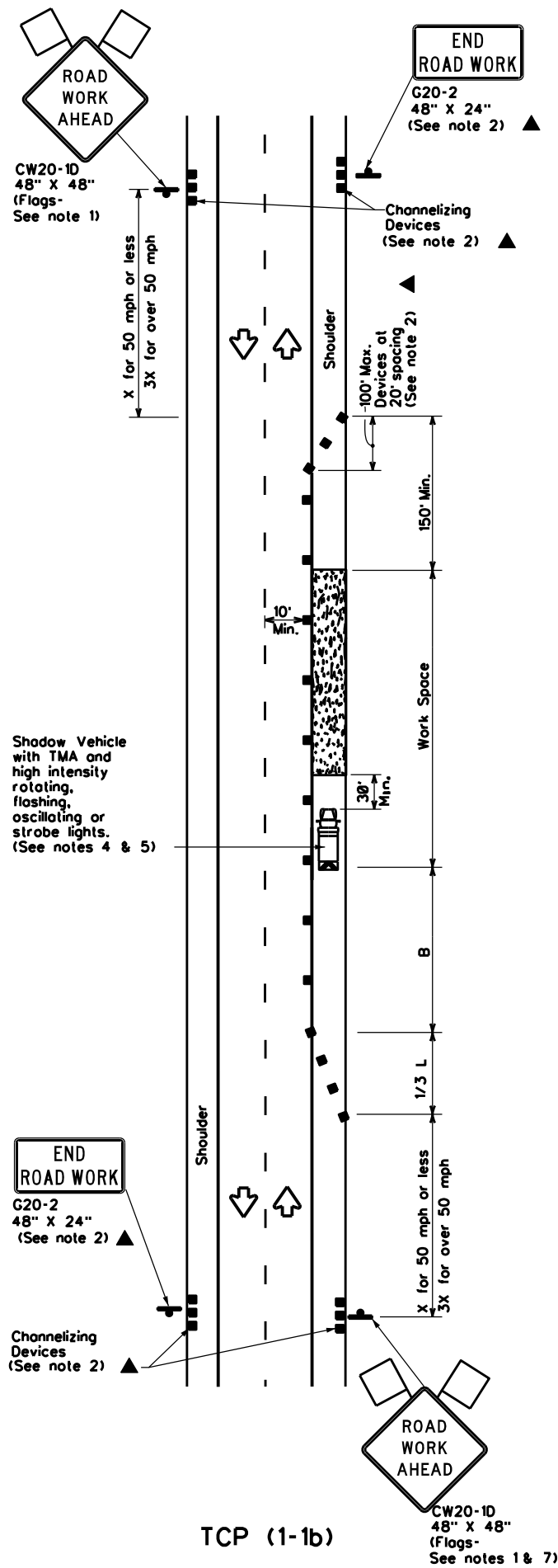
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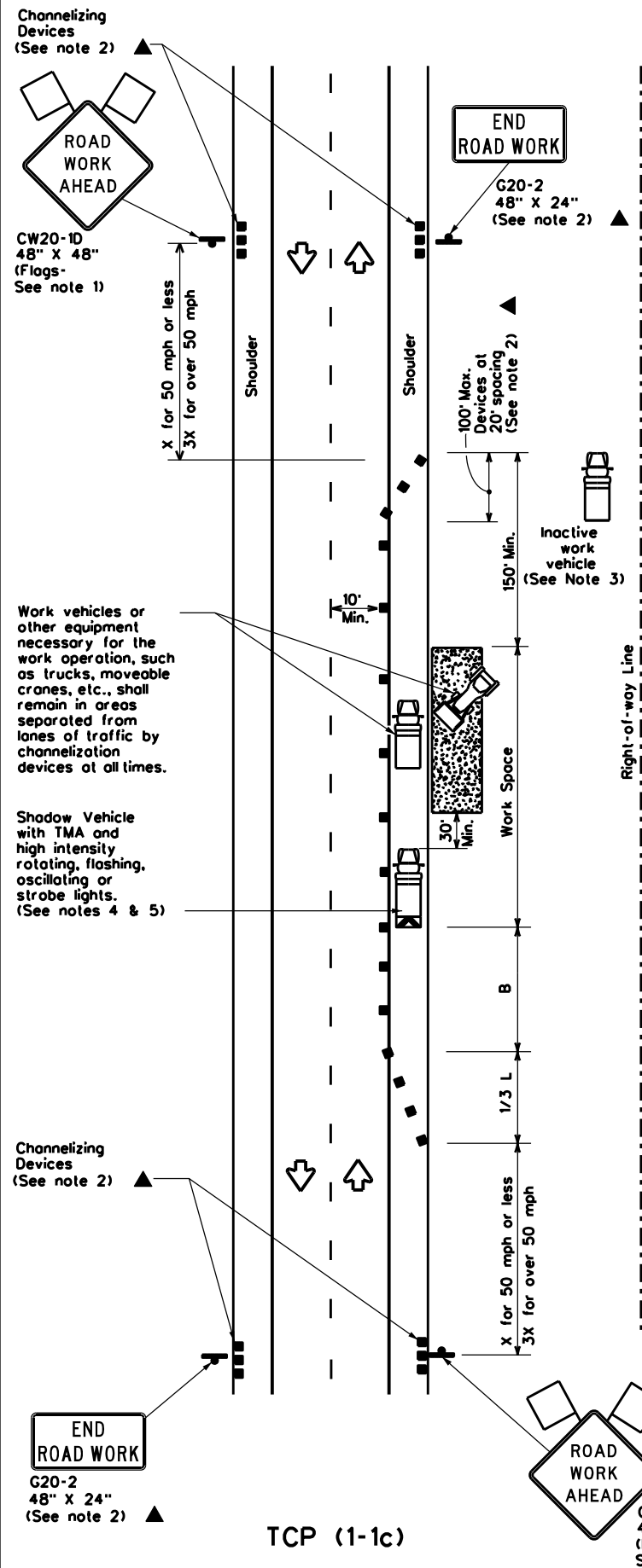
TCP (1-1a)

WORK SPACE NEAR SHOULDER
 Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
 Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
 Conventional Roads

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

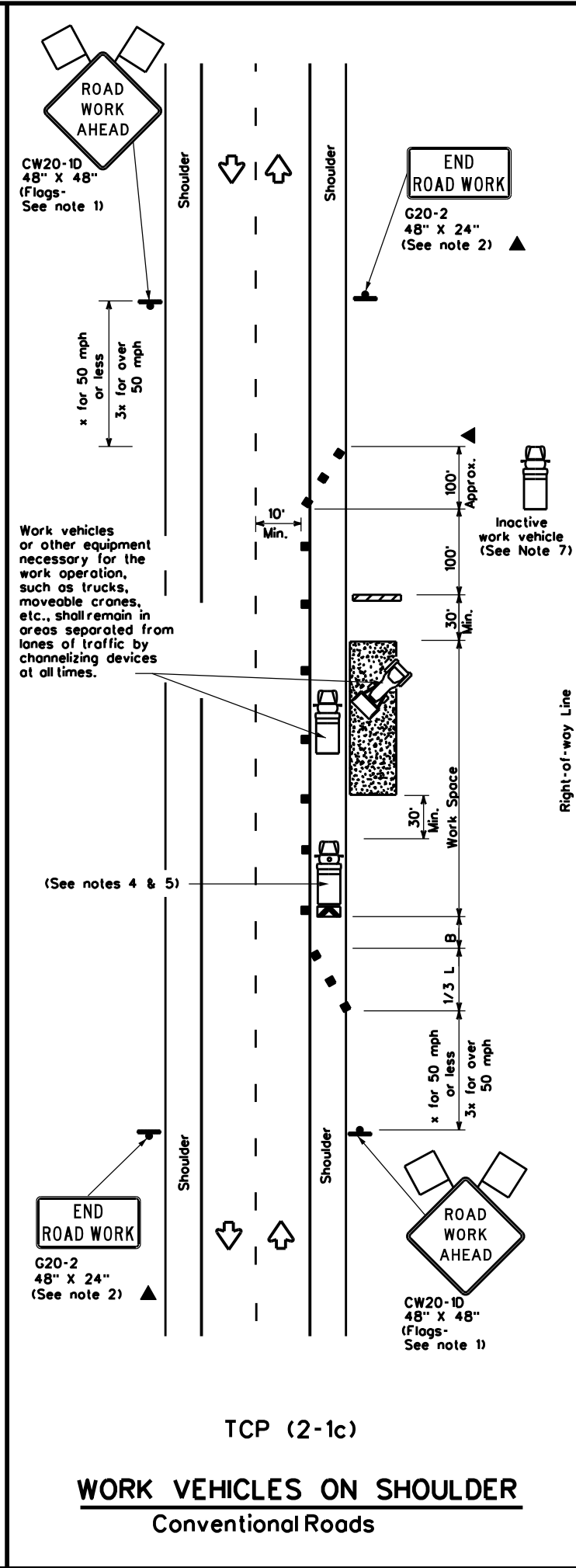
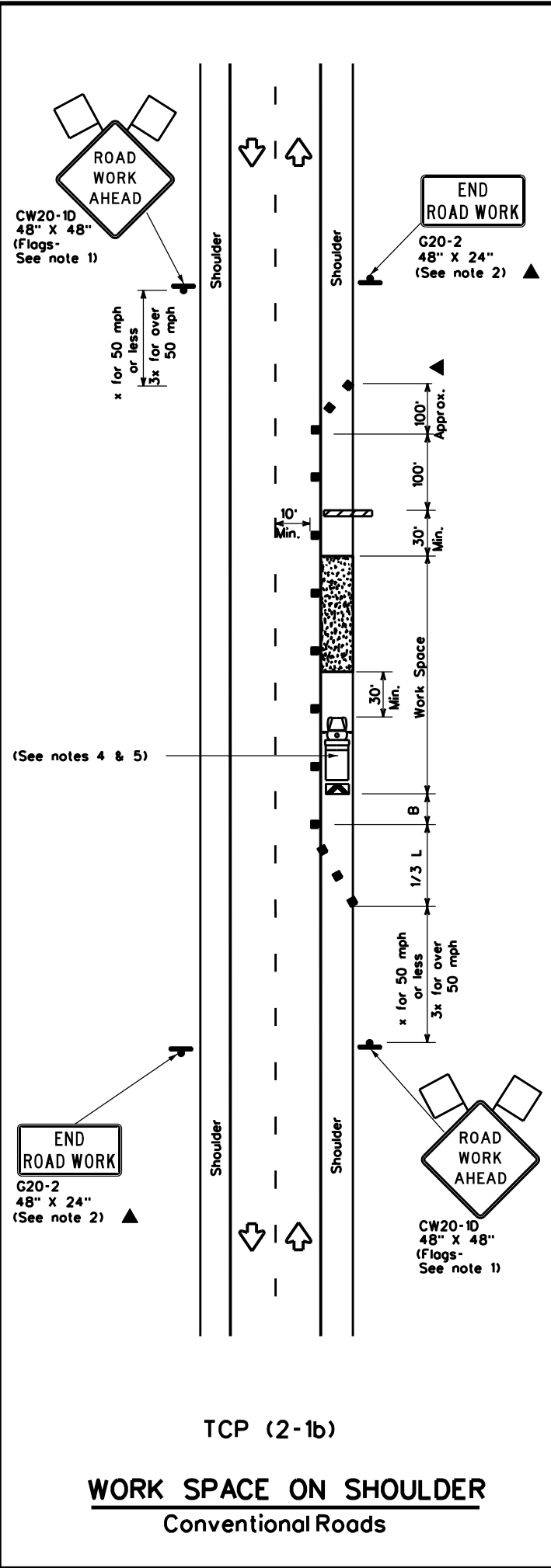
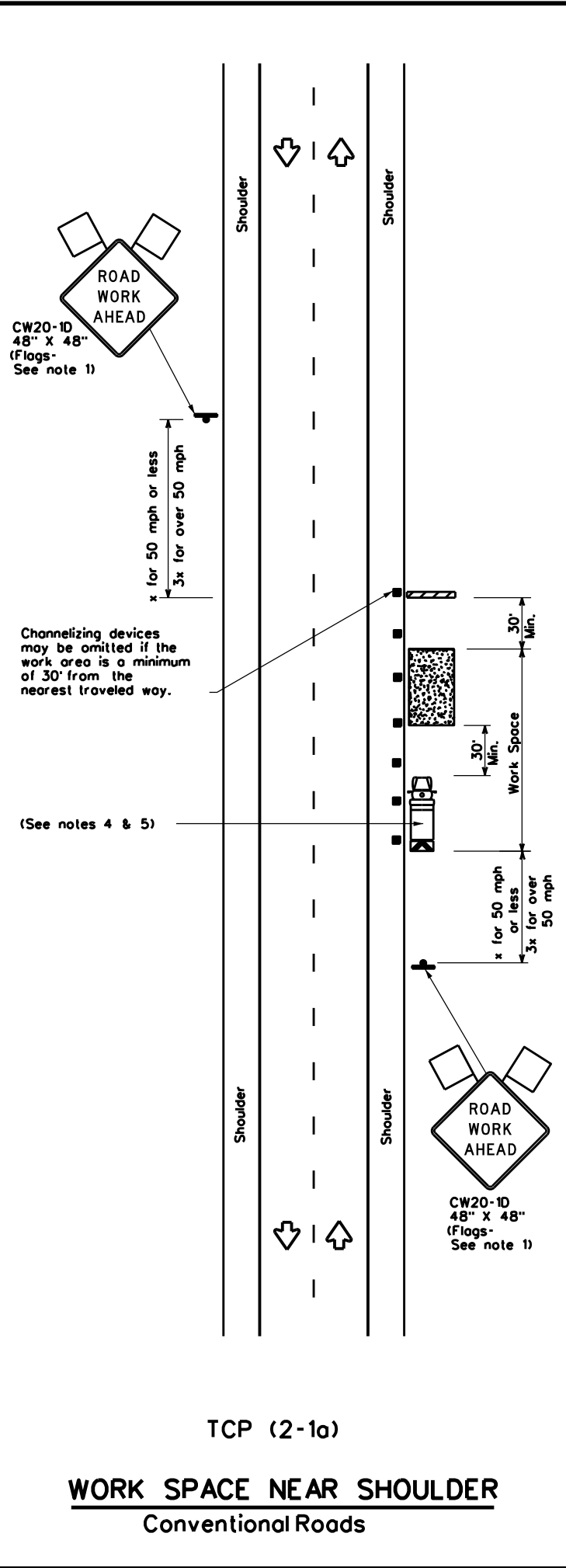
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP(1-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	LRD	DUVAL, ETC.	25	
1-97 2-18				

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

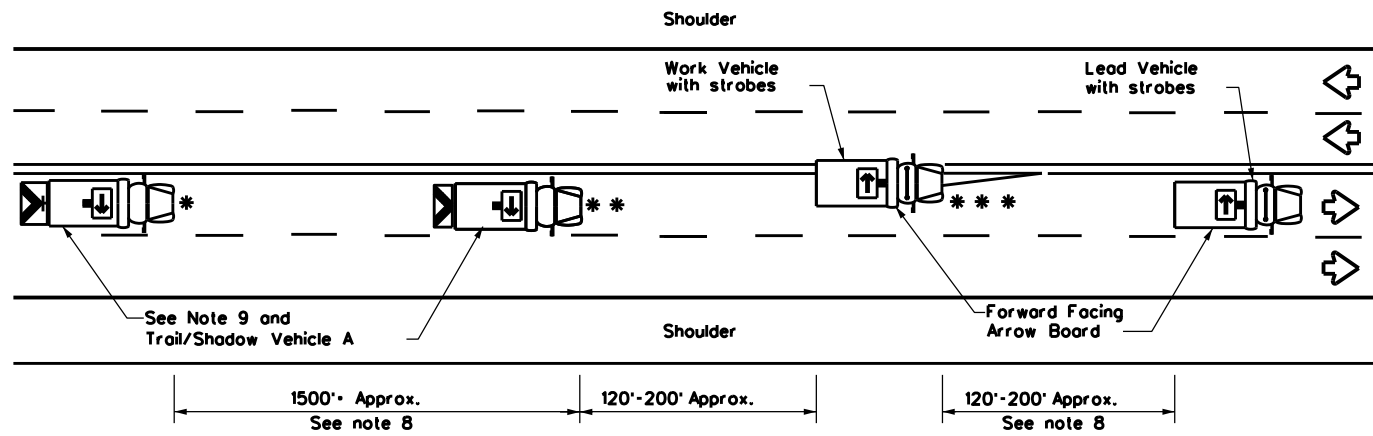
**TRAFFIC CONTROL PLAN
 CONVENTIONAL ROAD
 SHOULDER WORK**

TCP(2-1)-18

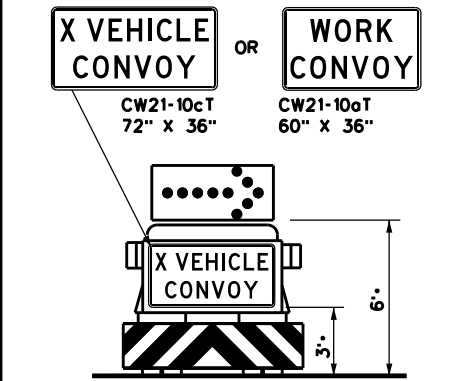
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© TxDOT December 1985	CON:	SECT:	JOB:	HIGHWAY:
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2-94 4-98	DIST:	COUNTY:	SHEET NO.	
8-95 2-12	LRD	DUVAL, ETC.	26	
1-97 2-18				

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DATE: 7/26/2024 11:50:21 AM
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TCP (3-1a)
 UNDIVIDED MULTILANE ROADWAY



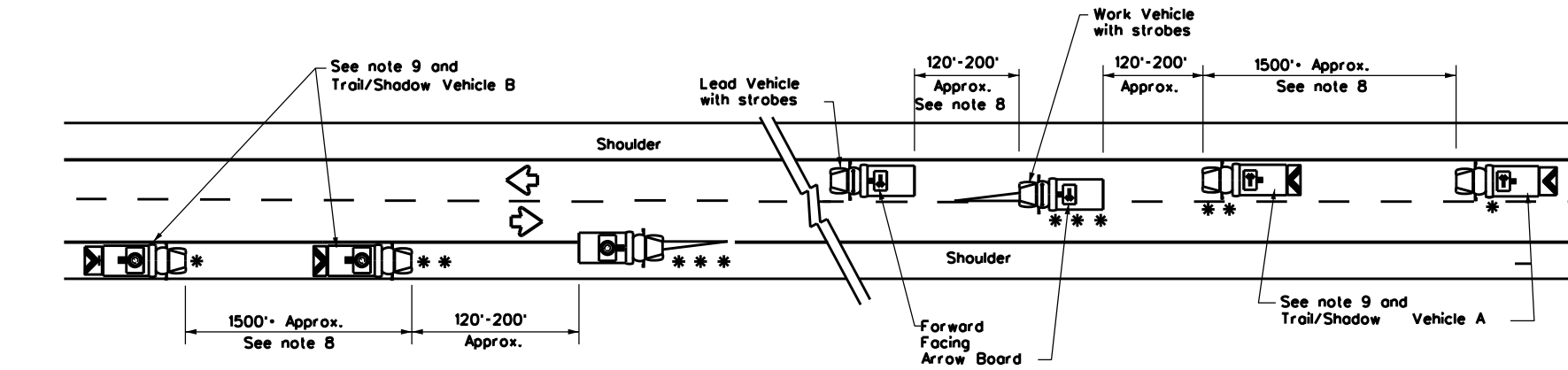
TRAIL/SHADOW VEHICLE A
 with RIGHT Directional display Flashing Arrow Board

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

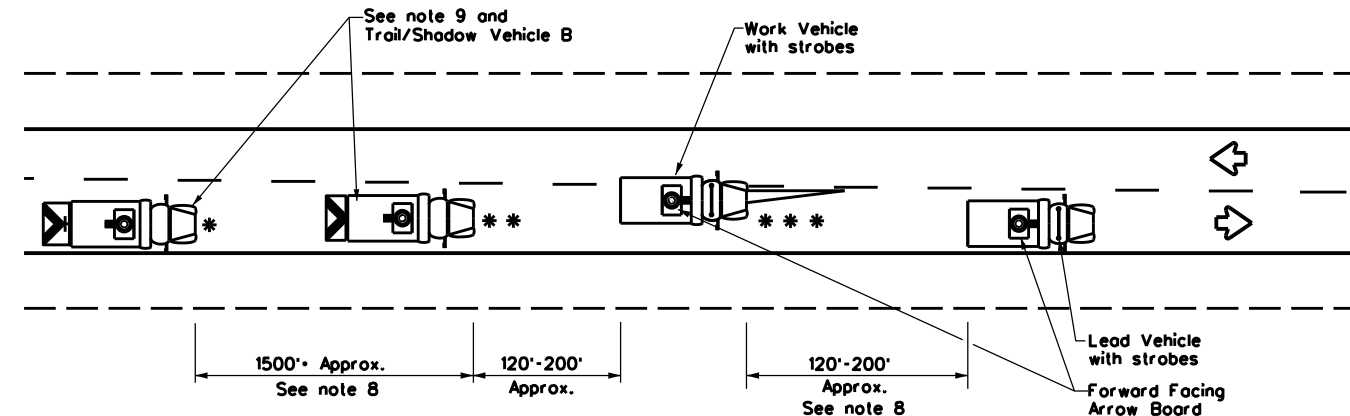
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
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GENERAL NOTES

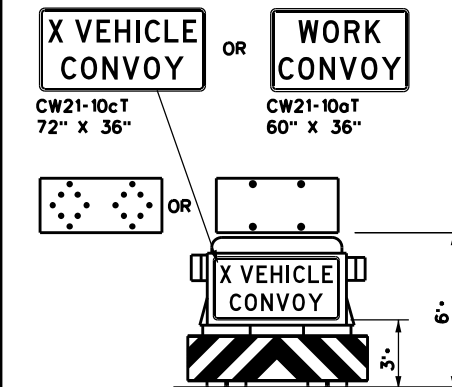
- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
- The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
- Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
- 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.
- On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



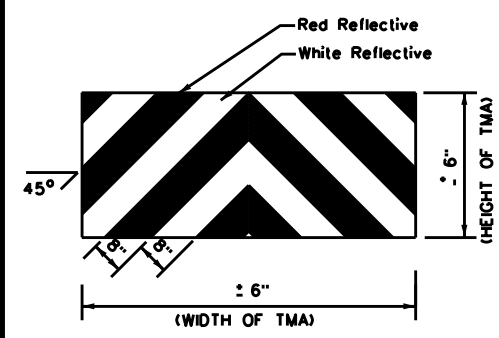
TCP (3-1b)
 TWO-WAY ROADWAY WITH PAVED SHOULDERS



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



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



STRIPING FOR TMA

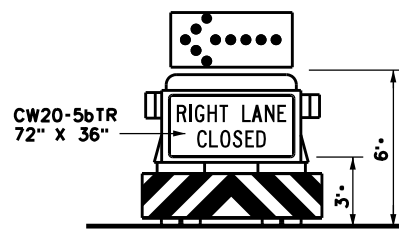
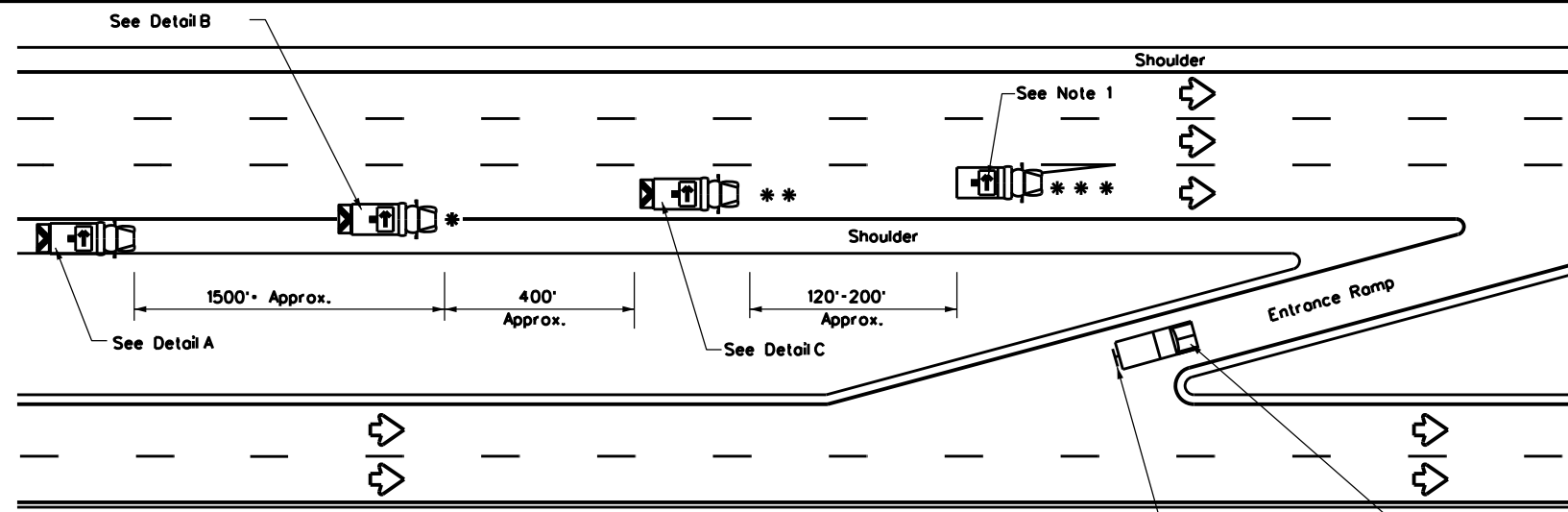
TRAFFIC CONTROL PLAN
 MOBILE OPERATIONS
 UNDIVIDED HIGHWAYS

TCP(3-1)-13

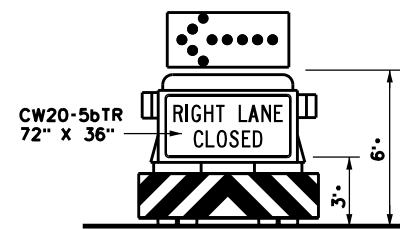
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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	LRD	DUVAL, ETC.	27	
1-97				

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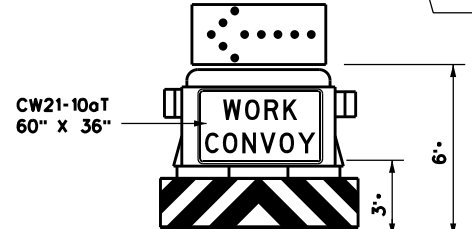
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A ADVANCE WARNING VEHICLE

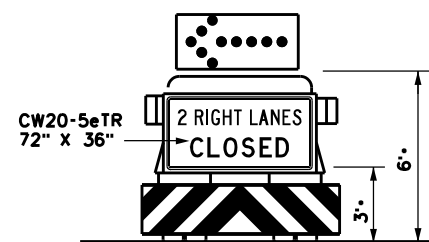
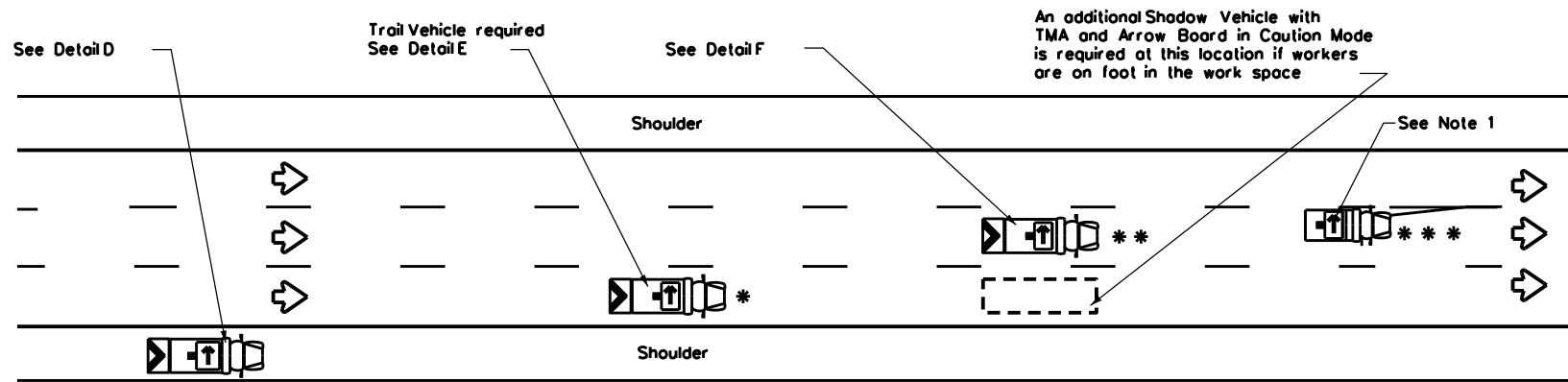


B TRAIL VEHICLE *
(See Note 2)

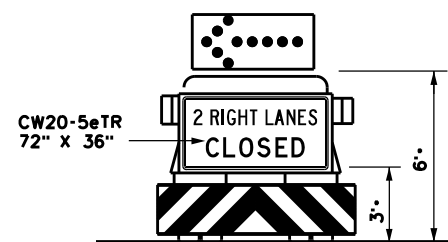


C SHADOW VEHICLE **

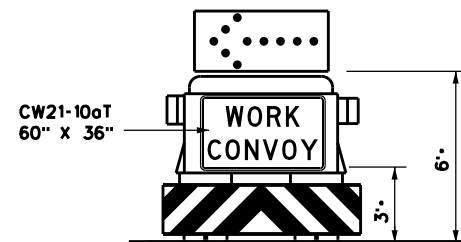
RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



D ADVANCE WARNING VEHICLE



E REQUIRED TRAIL VEHICLE *



F SHADOW VEHICLE **

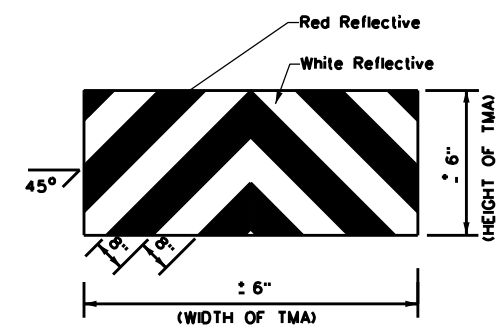
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
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GENERAL NOTES

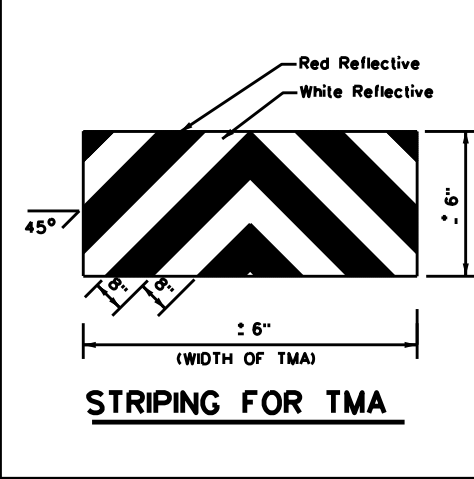
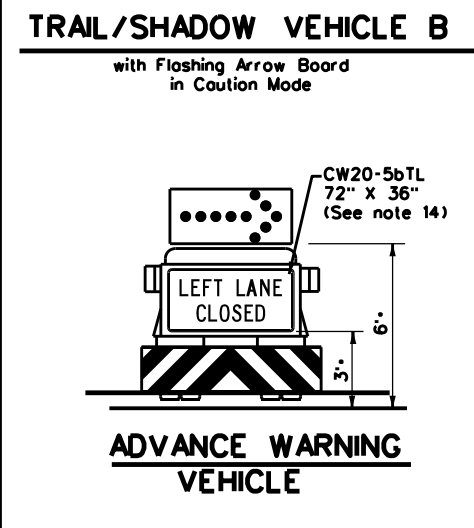
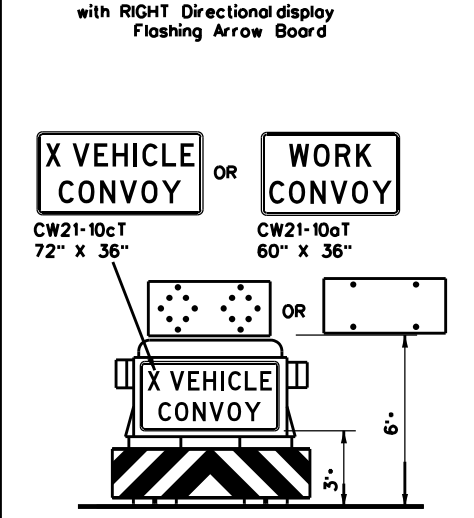
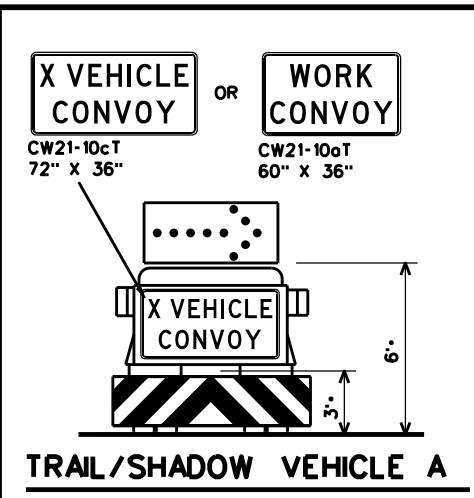
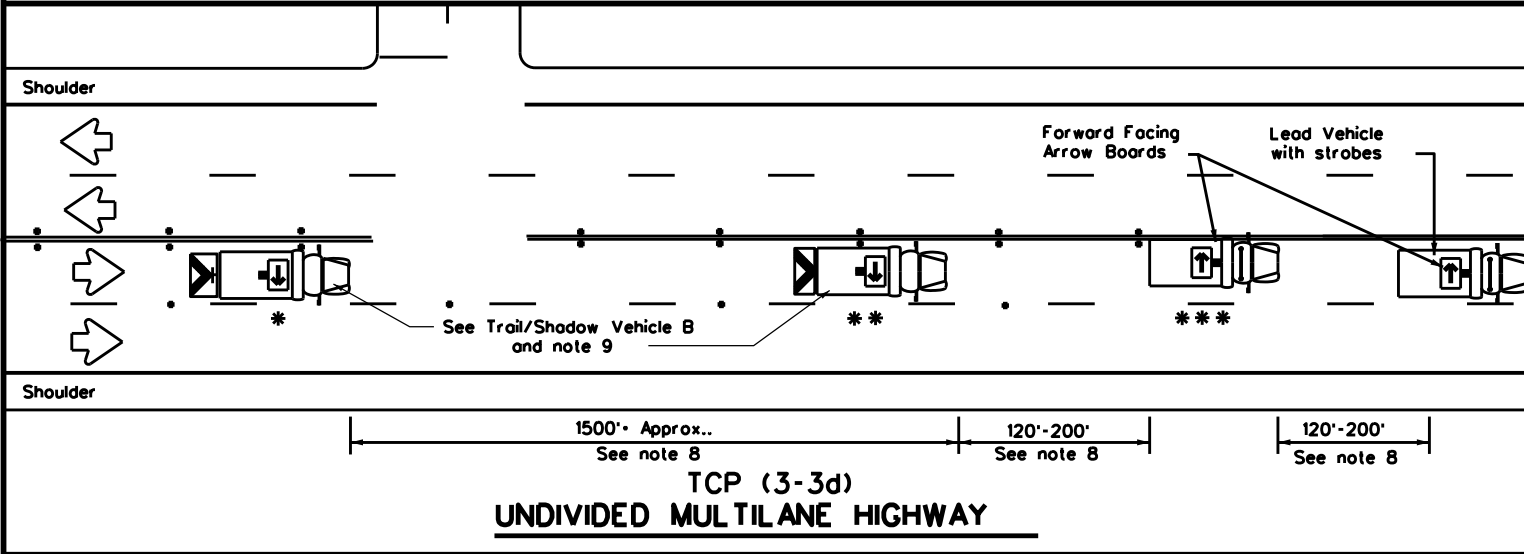
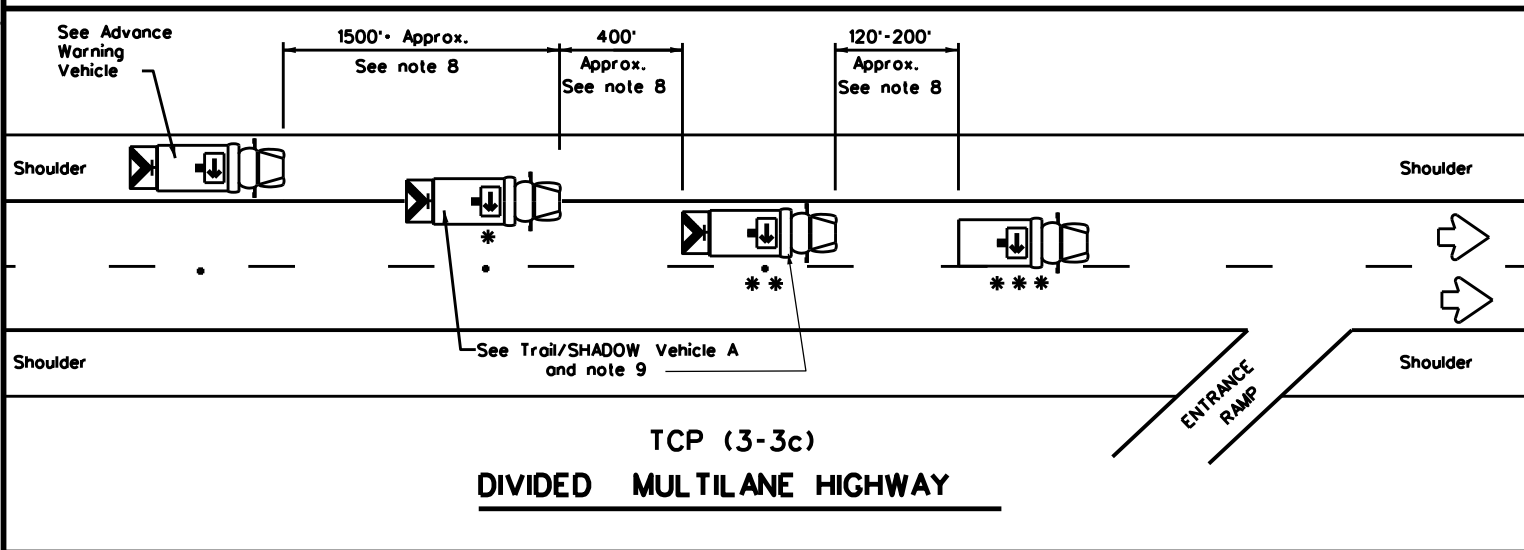
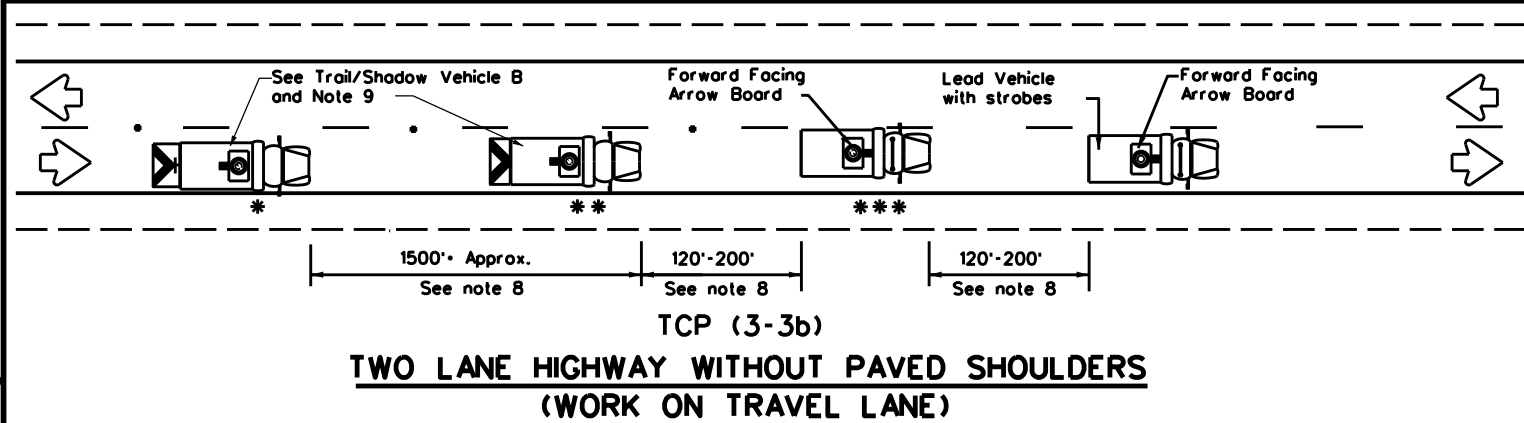
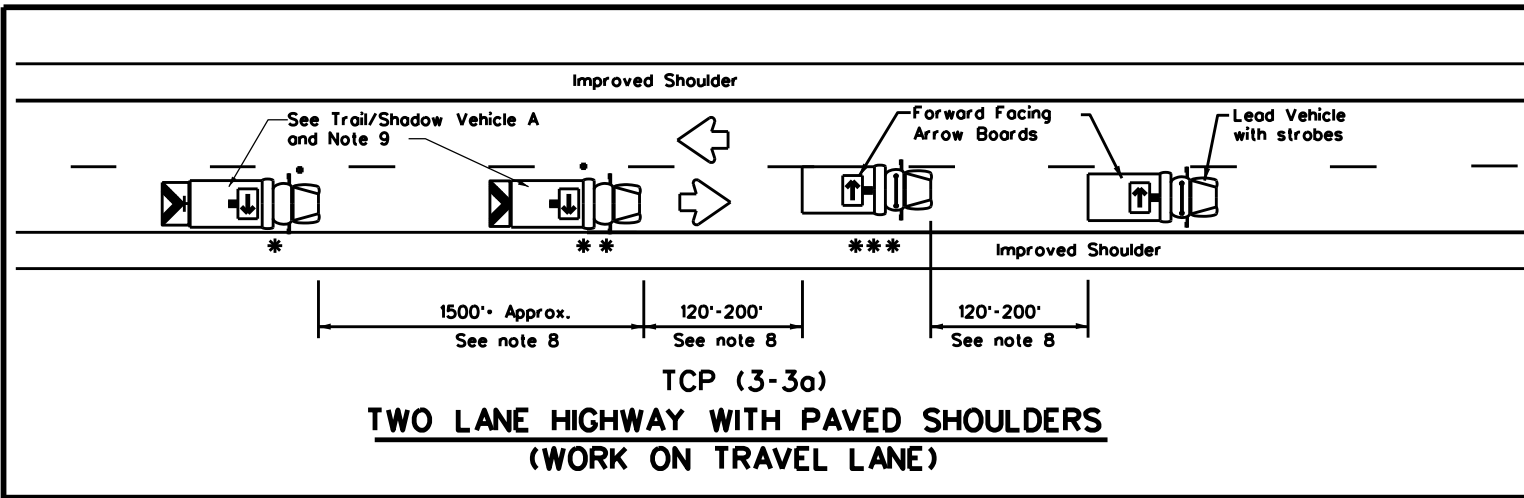
- ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the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



STRIPING FOR TMA

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS			
TCP(3-2)-13			
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT December 1985	CONT: 0086	SECT: 09	JOB: 042, ETC
REVISIONS:	2-94 4-98	8-95 7-13	SH359, ETC.
DIST: LRD	COUNTY: DUVAL, ETC.	SHEET NO.: 28	

DATE: 7/26/2024 11:50:22 AM
 FILE: T:\LRO\TRPR\1.Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Construction Signs and Arrow Boards for incorrect results or damages resulting from its use.
 DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats.



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

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

GENERAL NOTES

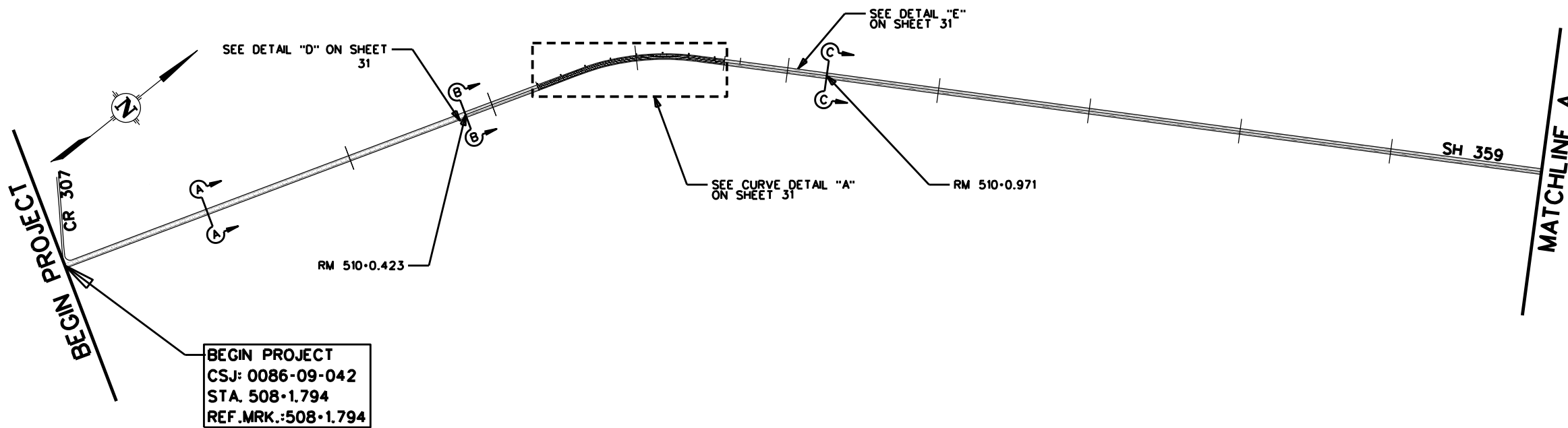
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
11. A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
12. For divided highways with three or four lanes in each direction, use TCP(3-2).
13. Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
14. The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
15. 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.

Texas Department of Transportation
 Traffic Operations Division Standard

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

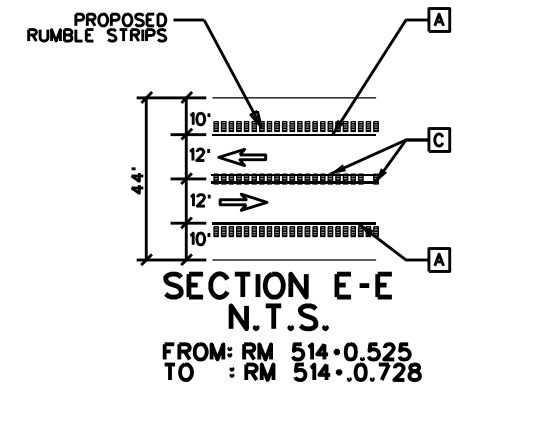
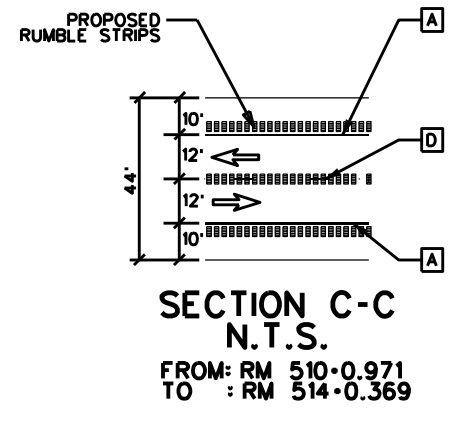
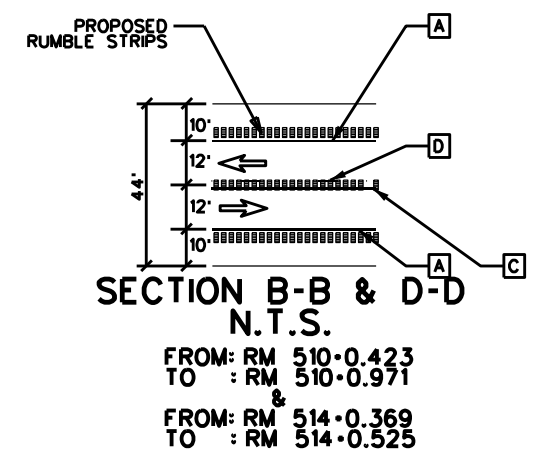
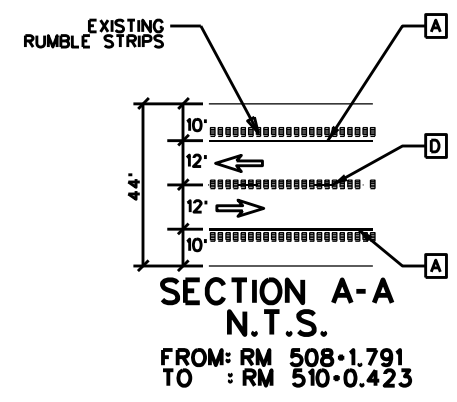
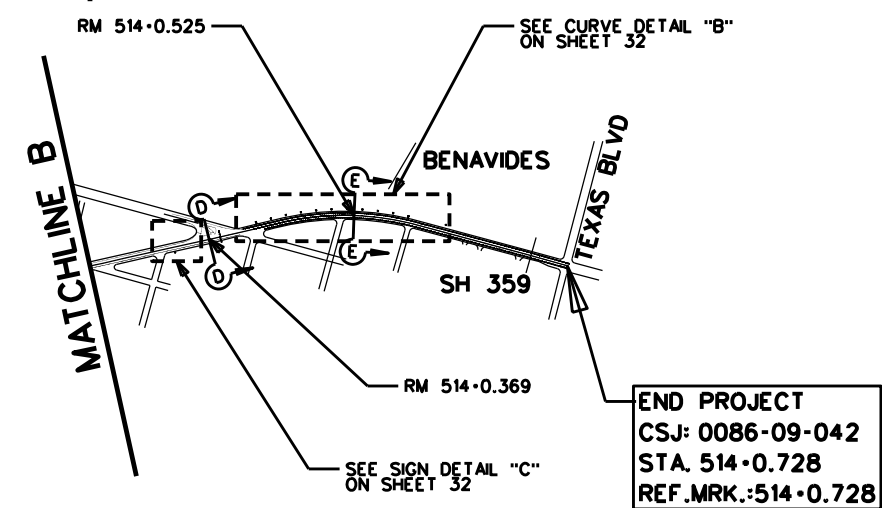
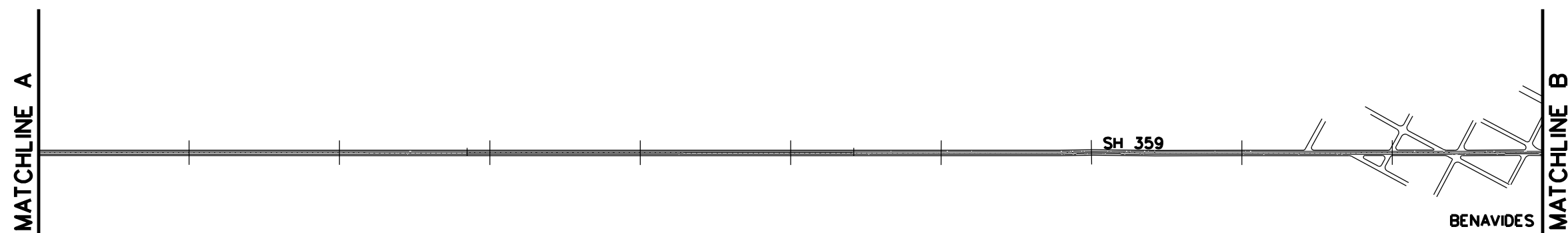
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© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086 09	042, ETC	SH359, ETC.	
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	LRO	DUVAL, ETC.	29	
1-97 7-14				

7/26/2024 JT0VIAS T:\LRDTR0PR\1_Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Curves\0086-09-042_sh359.dgn



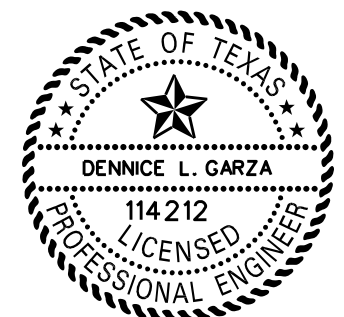
LEGEND

A	REFL PAV MRK TYI(W)6"(SLD)(060MIL)
B	REFL PAV MRK TYI(W)6"(BRK)(060MIL)
C	REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
D	REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
E	REFL PAV MRKR TY I-C
F	REFL PAV MRKR TY II-A-A
G	REFL PAV MRK TYI(W)8"(SLD)(060MIL)
H	REFL PAV MRK TYI(W)24"(SLD)(060MIL)
I	REFL PAV MRK TYI(Y)24"(SLD)(060MIL)
L	REFL PAV MRK TYI(W)(ARROW)(060MIL)
K	REFL PAV MRK TYI(W)(WORD)(060MIL)
←	DIRECTION OF TRAFFIC
▬▬▬	EXISTING RUMBLE STRIPS
▬▬▬	PROPOSED RUMBLE STRIPS



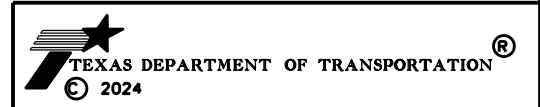
NOTES:

1. MATCH EXISTING PAVEMENT MARKINGS BEGIN AND END POINTS.
2. ALL PAVEMENT MARKINGS MUST COMPLY WITH ALL TXDOT STANDARDS AND THE TMUTCD, UNLESS OTHERWISE APPROVED BY ENGINEER.
3. REFER TO SHEET 31 FOR DETAILS ON THE INSTALLATION OF THE RPM'S AND RUMBLE STRIPS ON THE CURVES.



THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY DENNICE L. GARZA, P.E. 114212. ON 7/26/2024

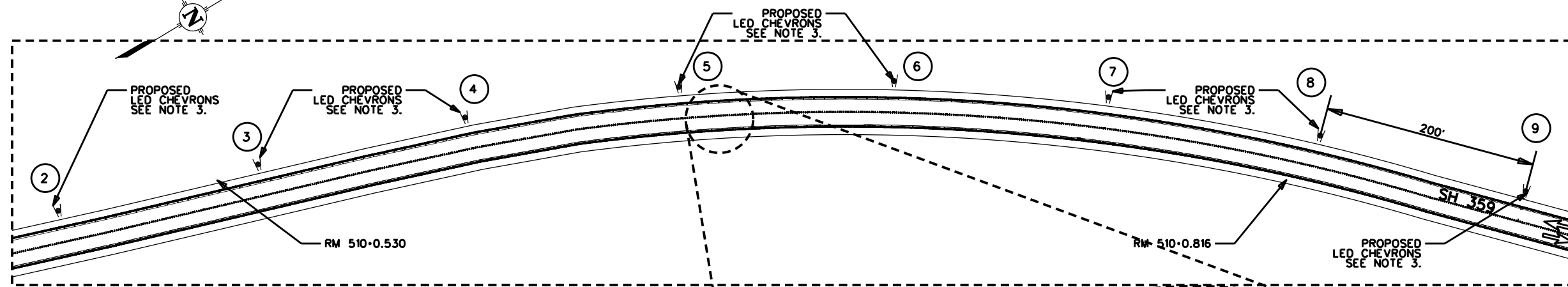
DocuSigned by:
Denise L. Garza
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SCALE: 1" = 100'



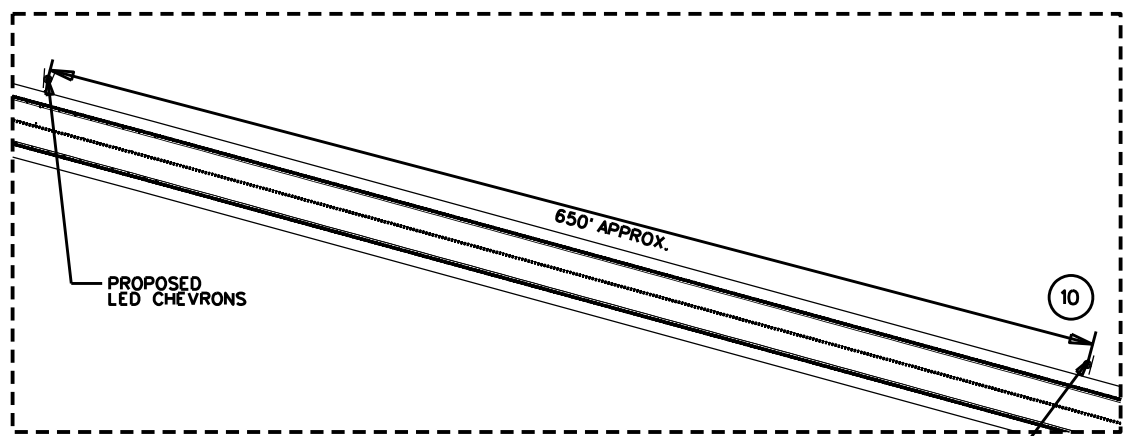
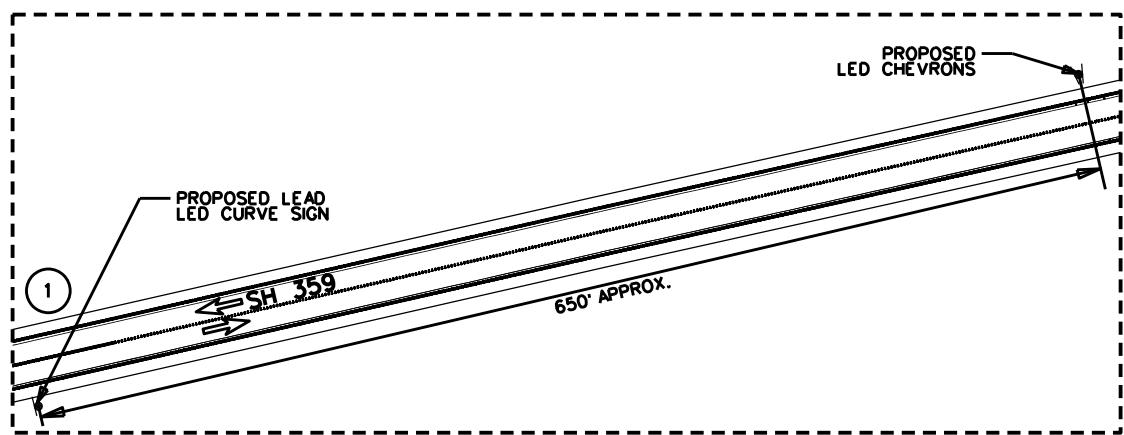
SH 359 LAYOUTS

DN: J.T.	DW: J.T.	STATE: TEXAS	SHEET NUMBER: SHEET 1 OF 1	SHEET NO.: 30
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FED. RD. DIV. NO.: 6	STATE DIST. NO.: LRD	COUNTY: DUVAL, ETC.	SECTION: 09 042, ETC	JOB: SH359, ETC.

DETAIL "A"
N.T.S.

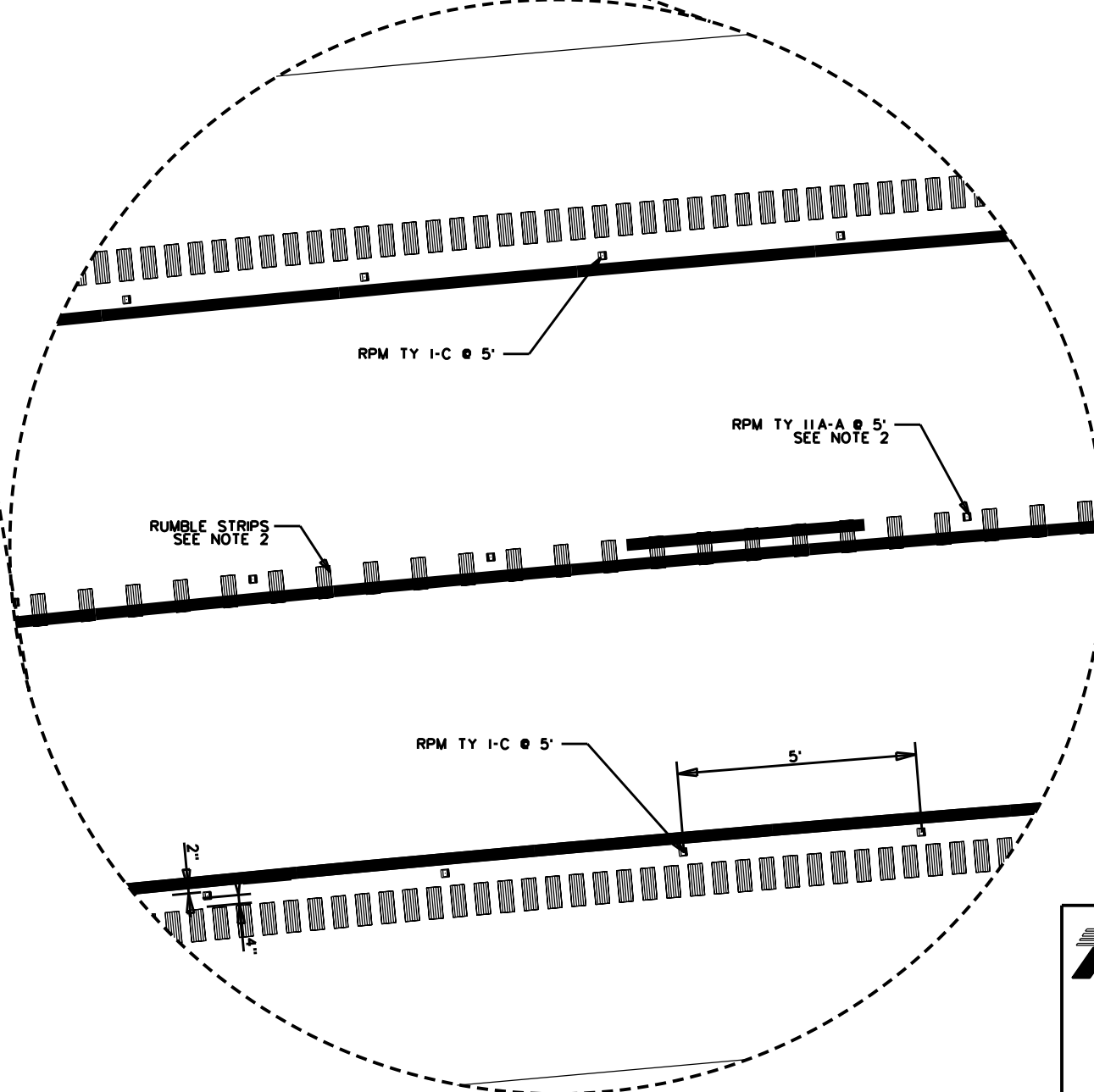


DETAIL "D"
N.T.S.



DETAIL "E"
N.T.S.

PROPOSED LEAD LED CURVE SIGN



LEGEND

A	REFL PAV MRK TYI(W)6"(SLD)(060MIL)
B	REFL PAV MRK TYI(W)6"(BRK)(060MIL)
C	REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
D	REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
E	REFL PAV MRKR TY I-C
F	REFL PAV MRKR TY II-A-A
G	REFL PAV MRK TYI(W)8"(SLD)(060MIL)
H	REFL PAV MRK TYI(W)24"(SLD)(060MIL)
I	REFL PAV MRK TYI(Y)24"(SLD)(060MIL)
J	REFL PAV MRK TYI(W)(ARROW)(060MIL)
K	REFL PAV MRK TYI(W)(WORD)(060MIL)
←	DIRECTION OF TRAFFIC
▤	EXISTING RUMBLE STRIPS
▤	PROPOSED RUMBLE STRIPS
1	PROPOSED SMALL SIGN



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DocuSigned by: *Denise Garza*
633630C5730C4A4...

NOT TO SCALE



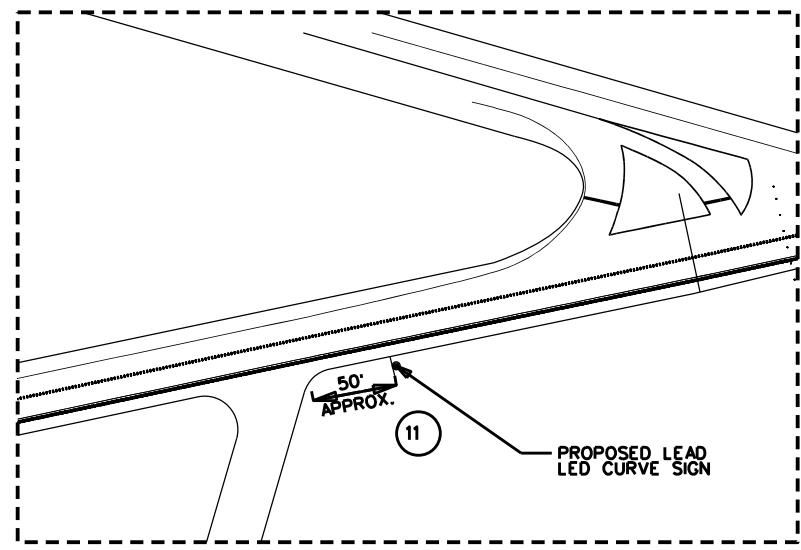
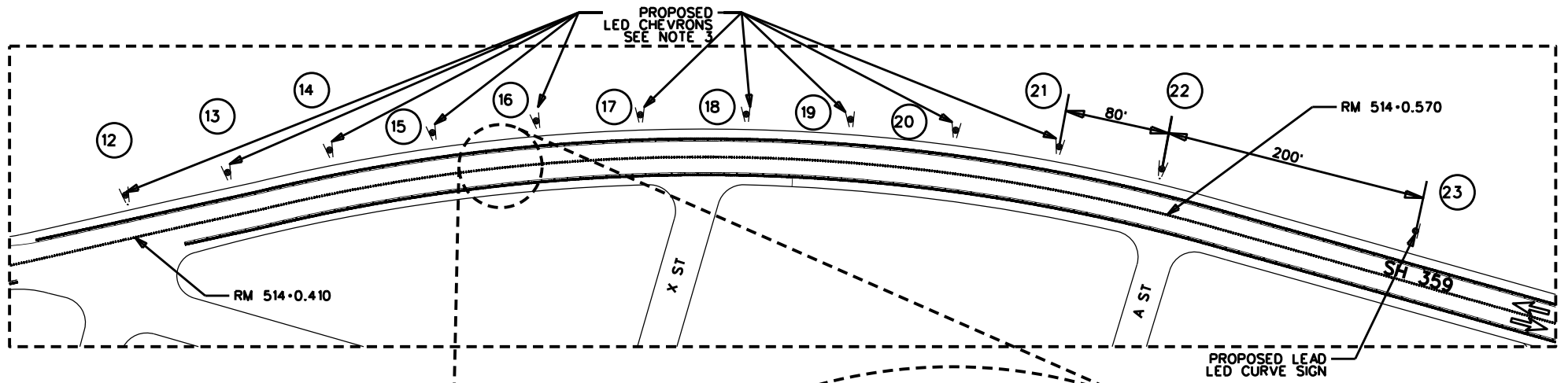
SH 359
CURVE DETAILS

- NOTES:**
- REFER TO STANDARDS RS-(2)-23 & RS(4)-23 FOR INSTALLATION OF RUMBLE STRIPS FOR CENTER LINE AND EDGE LINE.
 - RPM'S ON CENTER LINE SHALL BE INSTALLED BETWEEN THE RUMBLE STRIPS.
 - SIGNS W1-8R W1-8L TO BE INSTALLED BACK TO BACK.

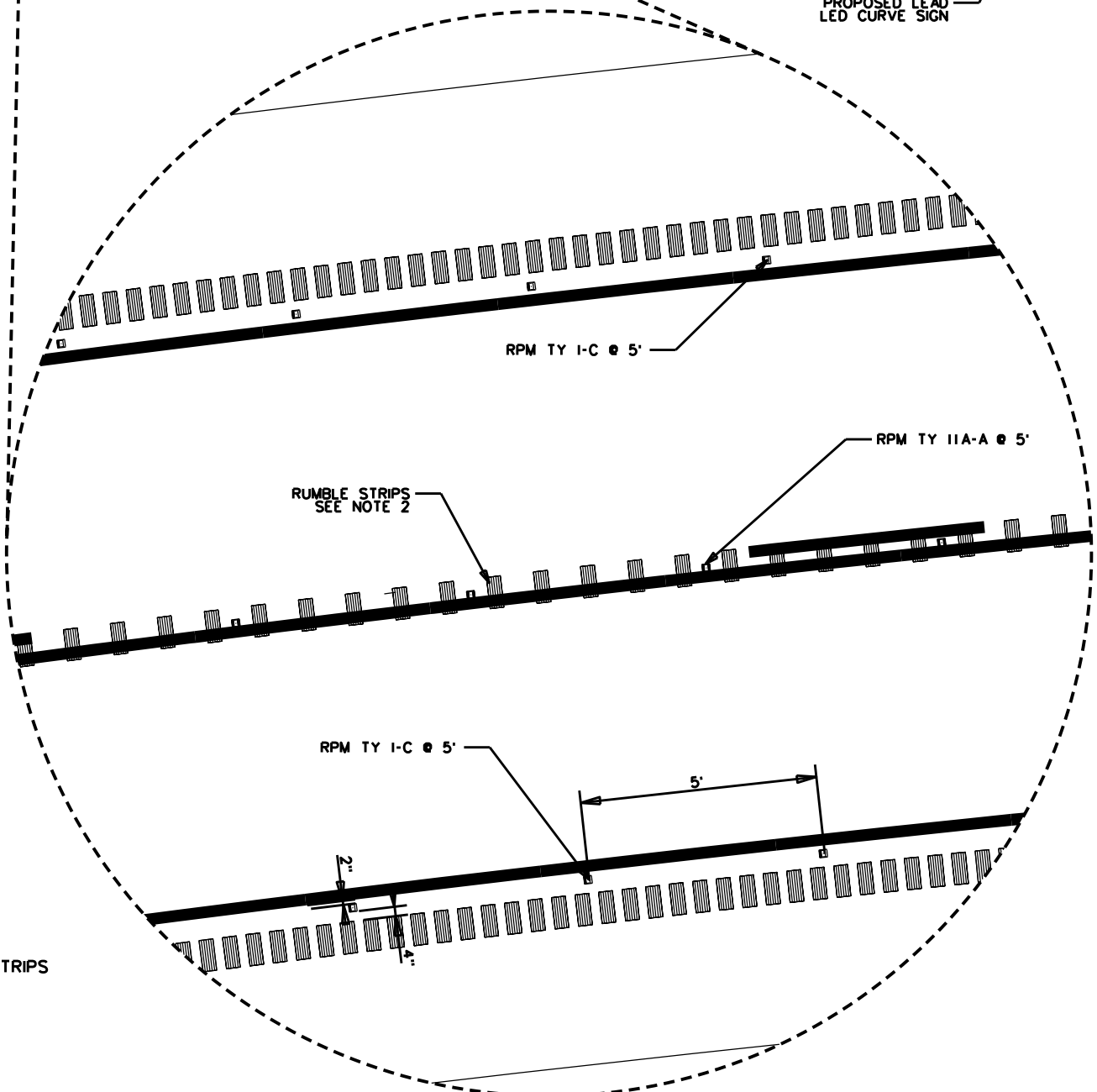
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CK: D.G.	CK: D.G.	TEXAS	SHEET 1 OF 2			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

7/26/2024 JTOVIAS T:\LRDTR\PR\1_Traffic Operations\Folders\PS&E\0086-09-042 -Districtwide Curves\0086-09-042 -SH359\CAD\0086-09-042_sh359.dgn

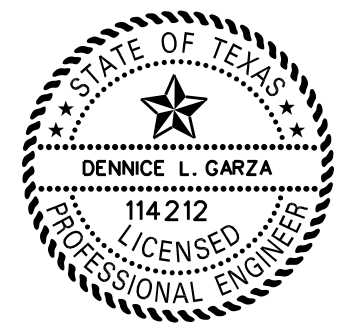
DETAIL "B"
N.T.S.



DETAIL "C"
N.T.S.



- LEGEND**
- A - REFL PAV MRK TYI(W)6"(SLD)(060MIL)
 - B - REFL PAV MRK TYI(W)6"(BRK)(060MIL)
 - C - REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
 - D - REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
 - E - REFL PAV MRKR TY I-C
 - F - REFL PAV MRKR TY II-A-A
 - G - REFL PAV MRK TYI(W)8"(SLD)(060MIL)
 - H - REFL PAV MRK TYI(W)24"(SLD)(060MIL)
 - I - REFL PAV MRK TYI(Y)24"(SLD)(060MIL)
 - J - REFL PAV MRK TYI(W)(ARROW)(060MIL)
 - K - REFL PAV MRK TYI(W)(WORD)(060MIL)
 - ← - DIRECTION OF TRAFFIC
 - ▤ - EXISTING RUMBLE STRIPS
 - ▤ - PROPOSED RUMBLE STRIPS
 - 1 - PROPOSED SMALL SIGN



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DocuSigned by:
Dennice L. Garza
633630C5730C4A4...

NOT TO SCALE



SH 359
CURVE DETAILS

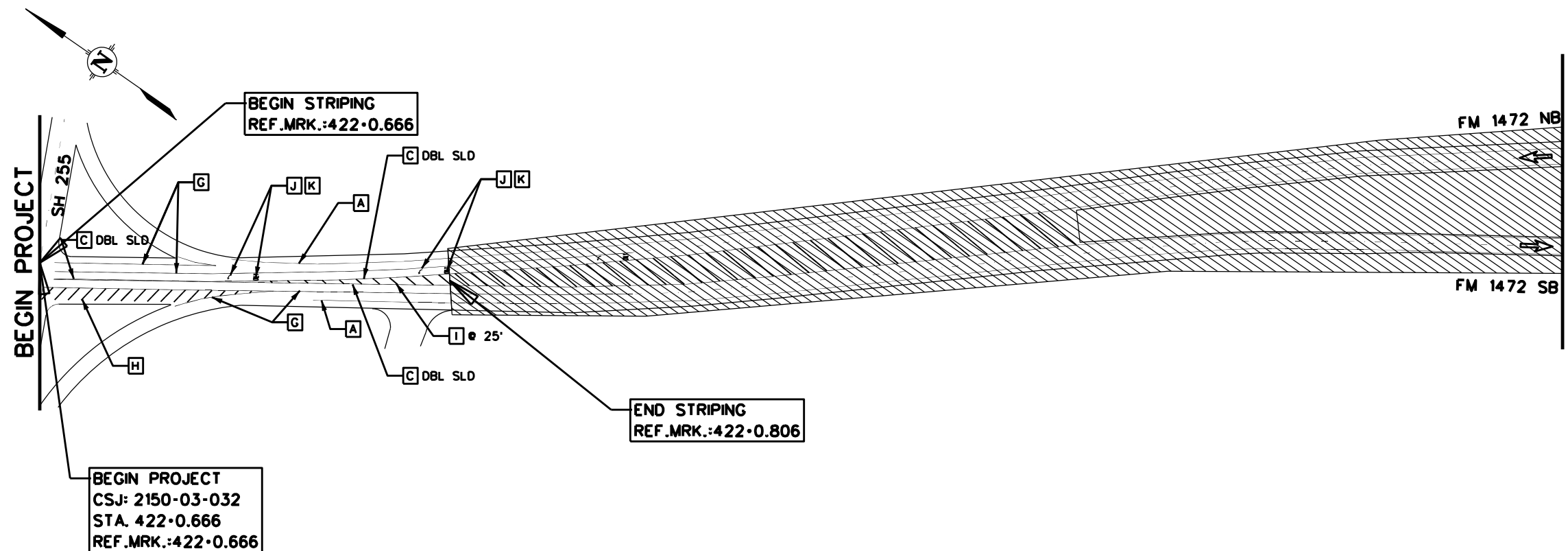
NOTES:

1. REFER TO STANDARDS RS-(2)-23 & RS(4)-23 FOR INSTALLATION OF RUMBLE STRIPS FOR CENTER LINE AND EDGE LINE.
2. RPM'S ON CENTER LINE SHALL BE INSTALLED BETWEEN THE RUMBLE STRIPS.
3. SIGNS W1-8R W1-8L TO BE INSTALLED BACK TO BACK.

DN: J.T.	DW: J.T.	STATE	SHEET NUMBER			SHEET NO.
CK: D.G.	CK: D.G.	TEXAS	SHEET 2 OF 2			
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

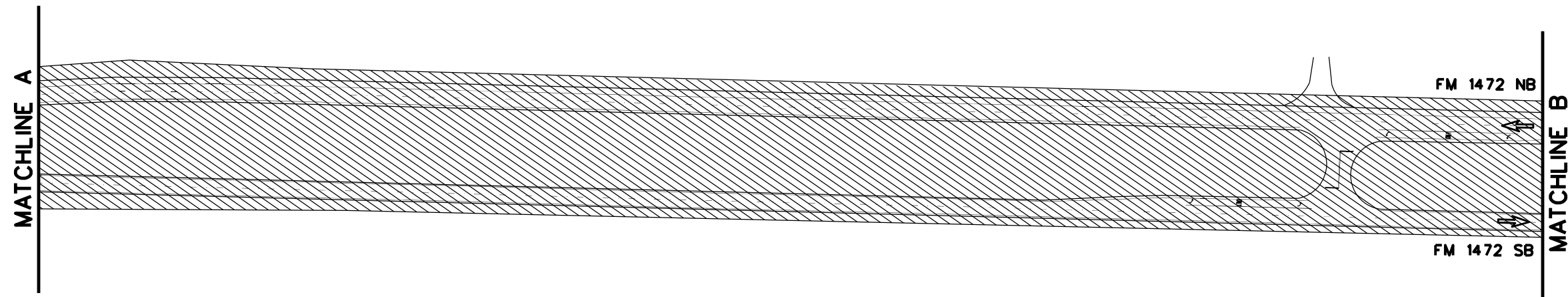
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7/26/2024 JTOVIAS T:\LRDTR0PR\1_Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Curves\2150-03-032 & 04-095- FM1472\CAD\2150-03-32_FM1472.dgn



LEGEND

A	- REFL PAV MRK TYI(W)6"(SLD)(060MIL)
B	- REFL PAV MRK TYI(W)6"(BRK)(060MIL)
C	- REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
D	- REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
E	- REFL PAV MRKR TY I-C
F	- REFL PAV MRKR TY II-A-A
G	- REFL PAV MRK TYI(W)8"(SLD)(060MIL)
H	- REFL PAV MRK TYI(W)24"(SLD)(060MIL)
I	- REFL PAV MRK TYI(Y)24"(SLD)(060MIL)
J	- REFL PAV MRK TYI(W)(ARROW)(060MIL)
K	- REFL PAV MRK TYI(W)(WORD)(060MIL)
↑	- DIRECTION OF TRAFFIC
▤	- EXISTING RUMBLE STRIPS
▥	- PROPOSED RUMBLE STRIPS
▨	- NO WORK TO BE DONE



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 63363006730C4A450
 SCALE: 1" = 200'

- NOTES:**
- MATCH EXISTING PAVEMENT MARKINGS BEGIN AND END POINTS.
 - ALL PAVEMENT MARKINGS MUST COMPLY WITH ALL TXDOT STANDARDS AND THE TMUTCD, UNLESS OTHERWISE APPROVED BY ENGINEER.

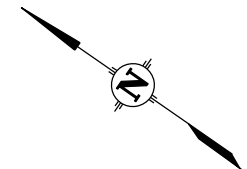
TEXAS DEPARTMENT OF TRANSPORTATION
 © 2024

FM 1472 LOCI LAYOUTS

DN: J.T.	DW: J.T.	STATE	SHEET NUMBER			SHEET NO.
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FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUVAL, ETC.	0086	09	042, ETC	SH359, ETC.

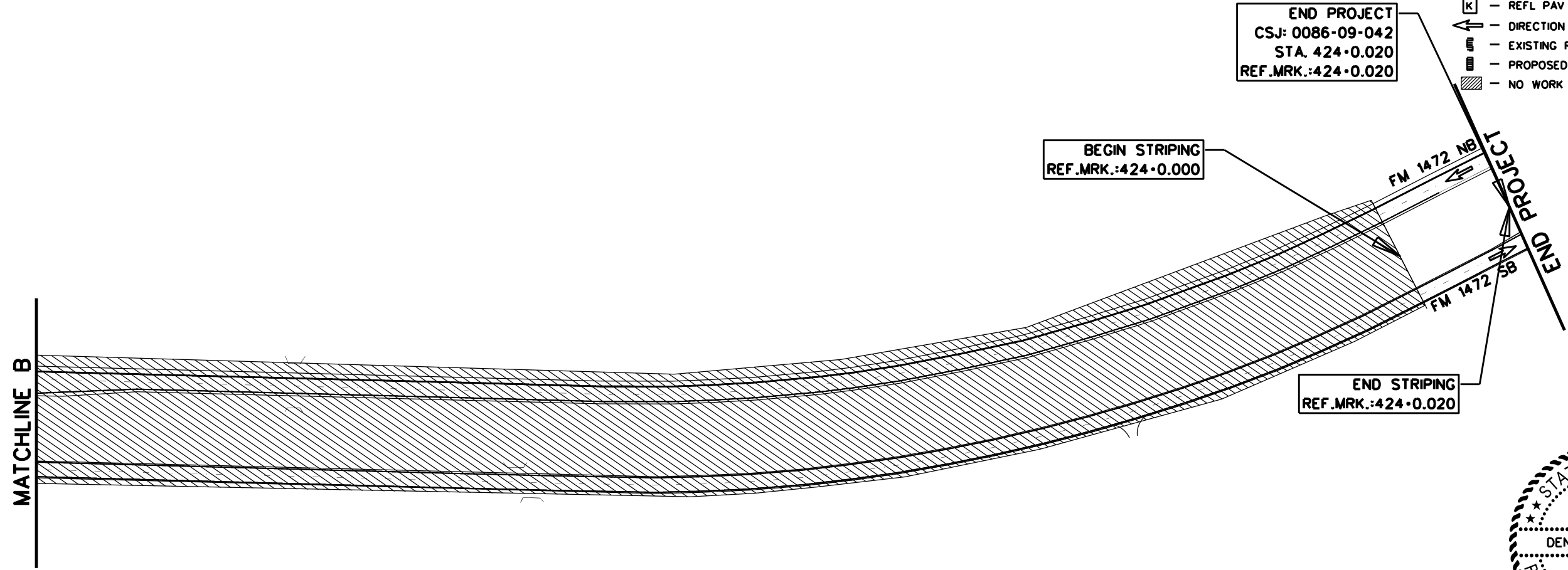
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7/26/2024 JTOVIAS T:\LRDTR0PR\1_Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Curves\2150-03-032 & 04-095- FM1472\CAD\2150-03-32_FM1472.dgn



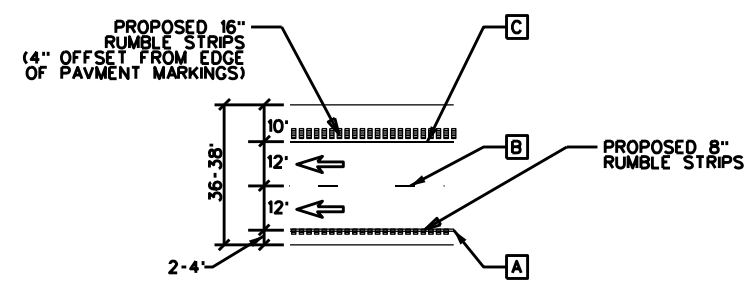
LEGEND

A	- REFL PAV MRK TYI(W)6"(SLD)(060MIL)
B	- REFL PAV MRK TYI(W)6"(BRK)(060MIL)
C	- REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
D	- REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
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I	- REFL PAV MRK TYI(Y)24"(SLD)(060MIL)
J	- REFL PAV MRK TYI(W)(ARROW)(060MIL)
K	- REFL PAV MRK TYI(W)(WORD)(060MIL)
	- DIRECTION OF TRAFFIC
	- EXISTING RUMBLE STRIPS
	- PROPOSED RUMBLE STRIPS
	- NO WORK TO BE DONE

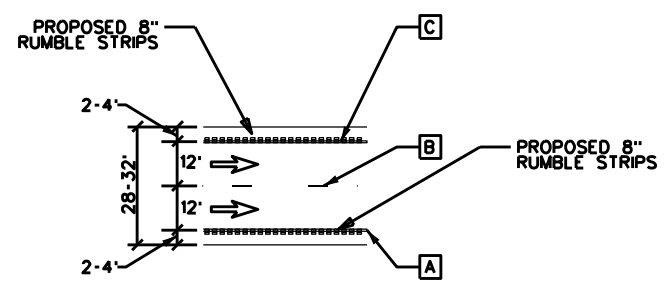


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DocuSigned by:
Anna H...
50 63363005730C4A50
SCALE: 1" = 200'



TYPICAL SECTION NORTH BOUND N.T.S.



TYPICAL SECTION SOUTH BOUND N.T.S.

- NOTES:**
- MATCH EXISTING PAVEMENT MARKINGS BEGIN AND END POINTS.
 - ALL PAVEMENT MARKINGS MUST COMPLY WITH ALL TXDOT STANDARDS AND THE TMUTCD, UNLESS OTHERWISE APPROVED BY ENGINEER.

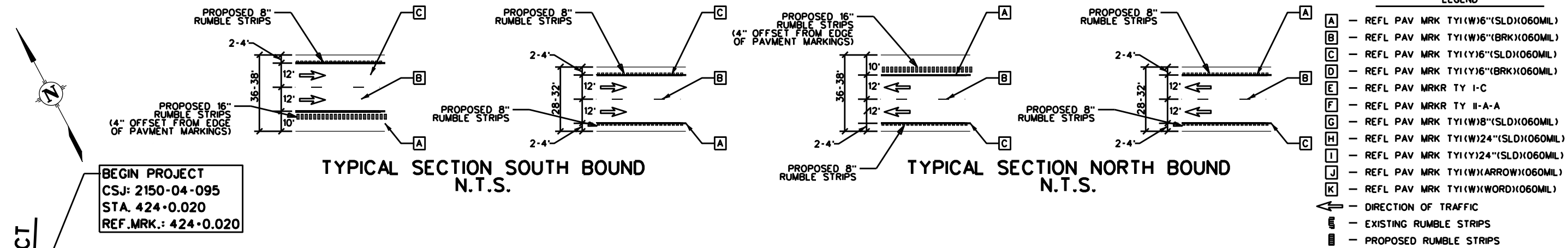
TEXAS DEPARTMENT OF TRANSPORTATION
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FM 1472 LOCI LAYOUTS

DW: J.T.	DW: J.T.	STATE	SHEET NUMBER		SHEET NO.
CK: D.G.	CK: D.G.	TEXAS	SHEET 2 OF 2		
FED. RD. DIV. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB
6	LRD	DUVALL, ETC.	0086	09	042, ETC SH359, ETC.

34

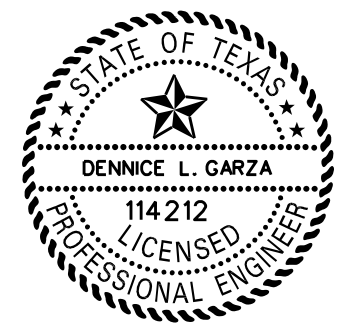
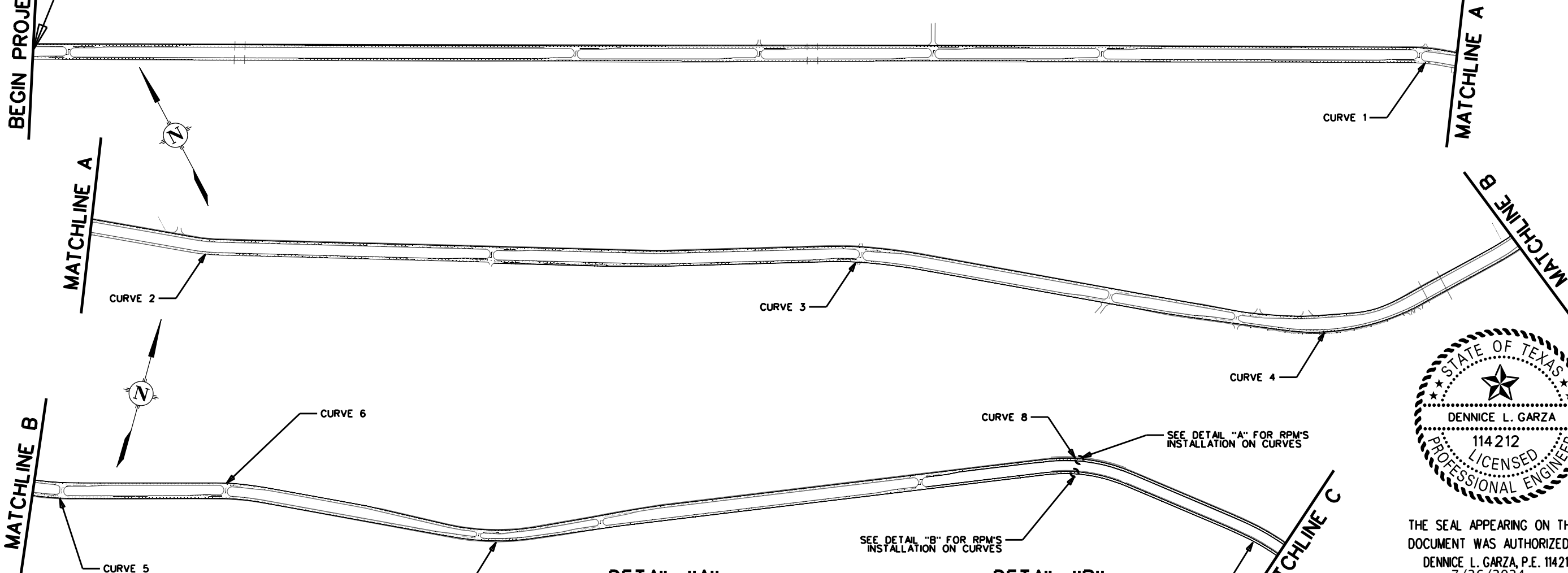
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LEGEND

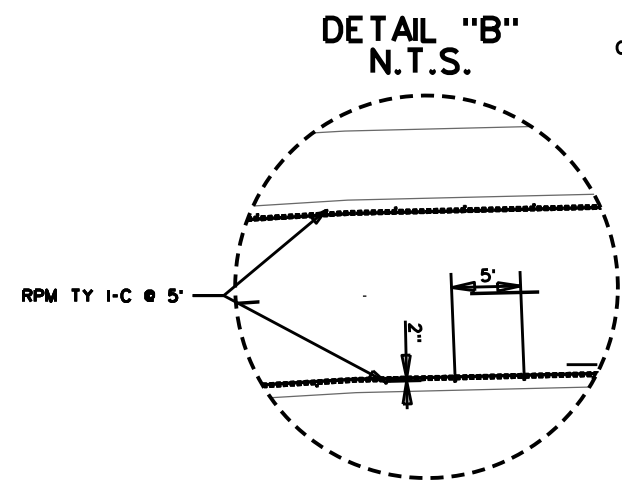
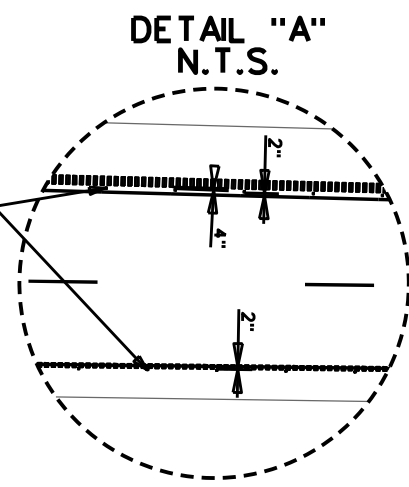
A	REFL PAV MRK TYI(W)6"(SLD)(060MIL)
B	REFL PAV MRK TYI(W)6"(BRK)(060MIL)
C	REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
D	REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
E	REFL PAV MRKR TY I-C
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K	REFL PAV MRK TYI(W)(WORD)(060MIL)
←	DIRECTION OF TRAFFIC
▨	EXISTING RUMBLE STRIPS
▩	PROPOSED RUMBLE STRIPS

BEGIN PROJECT
 CSJ: 2150-04-095
 STA. 424+0.020
 REF.MRK.: 424+0.020



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DocuSigned by:
 Dennice L. Garza
 750 6336 0C5730C4250
 SCALE: 1" = 1500'



- NOTES:**
- MATCH EXISTING PAVEMENT MARKINGS BEGIN AND END POINTS.
 - ALL PAVEMENT MARKINGS MUST COMPLY WITH ALL TXDOT STANDARDS AND THE TMUTCD, UNLESS OTHERWISE APPROVED BY ENGINEER.

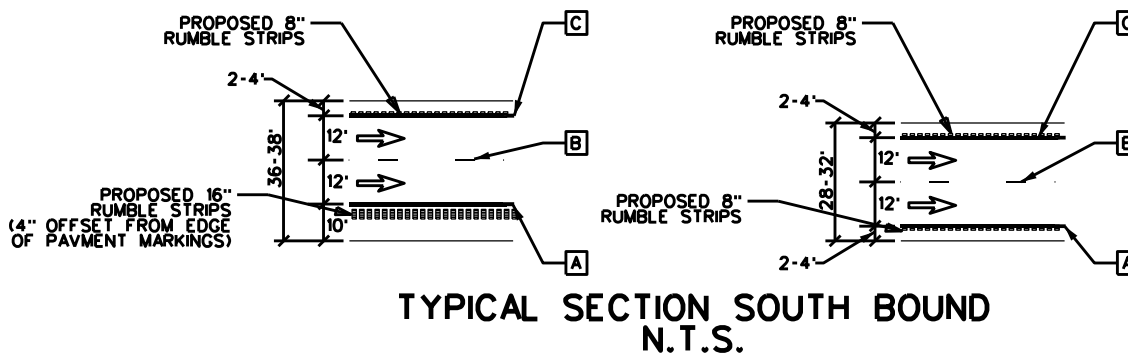
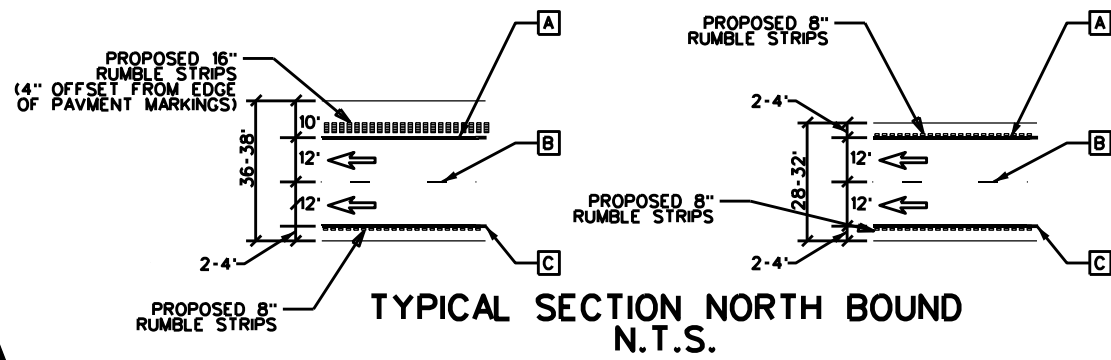
TEXAS DEPARTMENT OF TRANSPORTATION
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FM 1472 LOC2 LAYOUTS

DW: J.T.	DW: J.T.	STATE	SHEET NUMBER		SHEET NO.	
CK: D.G.	CK: D.G.	TEXAS	SHEET 1 OF 2			
FED. RD. DIST. NO.	STATE DIST. NO.	COUNTY	CONTROL	SECTION	JOB	HIGHWAY NO.
6	LRD	DUV/AL.ETC.	0086	09	042, ETC	SH359, ETC.

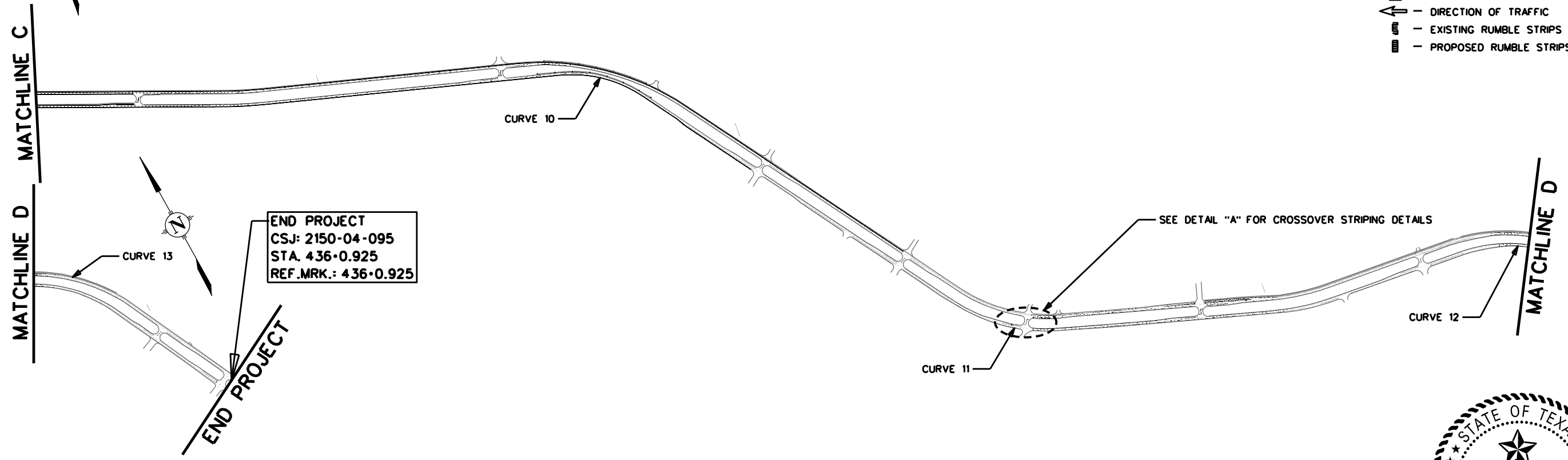
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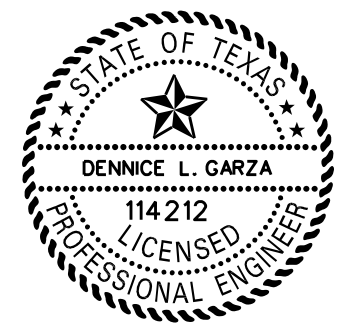
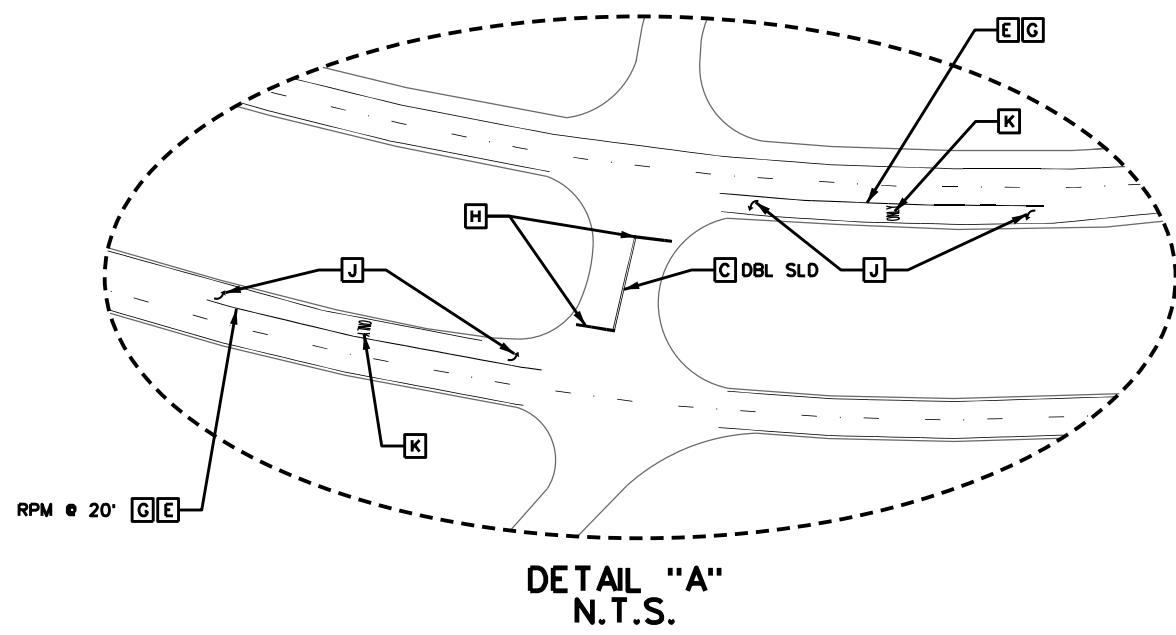
LEGEND

- [A] - REFL PAV MRK TYI(W)6"(SLD)(060MIL)
- [B] - REFL PAV MRK TYI(W)6"(BRK)(060MIL)
- [C] - REFL PAV MRK TYI(Y)6"(SLD)(060MIL)
- [D] - REFL PAV MRK TYI(Y)6"(BRK)(060MIL)
- [E] - REFL PAV MRKR TY I-C
- [F] - REFL PAV MRKR TY II-A-A
- [G] - REFL PAV MRK TYI(W)8"(SLD)(060MIL)
- [H] - REFL PAV MRK TYI(W)24"(SLD)(060MIL)
- [I] - REFL PAV MRK TYI(Y)24"(SLD)(060MIL)
- [J] - REFL PAV MRK TYI(W)(ARROW)(060MIL)
- [K] - REFL PAV MRK TYI(W)(WORD)(060MIL)
- [Arrow] - DIRECTION OF TRAFFIC
- [Dashed Line] - EXISTING RUMBLE STRIPS
- [Solid Line] - PROPOSED RUMBLE STRIPS



CURVE	LIMITS	
	FROM	TO
1	426 + 1.000	426 + 1.100
2	426 + 1.340	426 + 1.446
3	428 + 0.660	428 + 0.960
4	428 + 1.714	430 + 0.042
5	430 + 0.228	430 + 0.438
6	430 + 0.700	430 + 0.830
7	430 + 1.170	430 + 0.410
8	432 + 0.500	432 + 0.722
9	432 + 0.928	432 + 1.082
10	434 + 0.136	434 + 0.380
11	434 + 1.108	434 + 1.432
12	434 + 1.859	436 + 0.044
13	436 + 0.224	436 + 0.654

- NOTES:**
- MATCH EXISTING PAVEMENT MARKINGS BEGIN AND END POINTS.
 - ALL PAVEMENT MARKINGS MUST COMPLY WITH ALL TXDOT STANDARDS AND THE TMUTCD, UNLESS OTHERWISE APPROVED BY ENGINEER.



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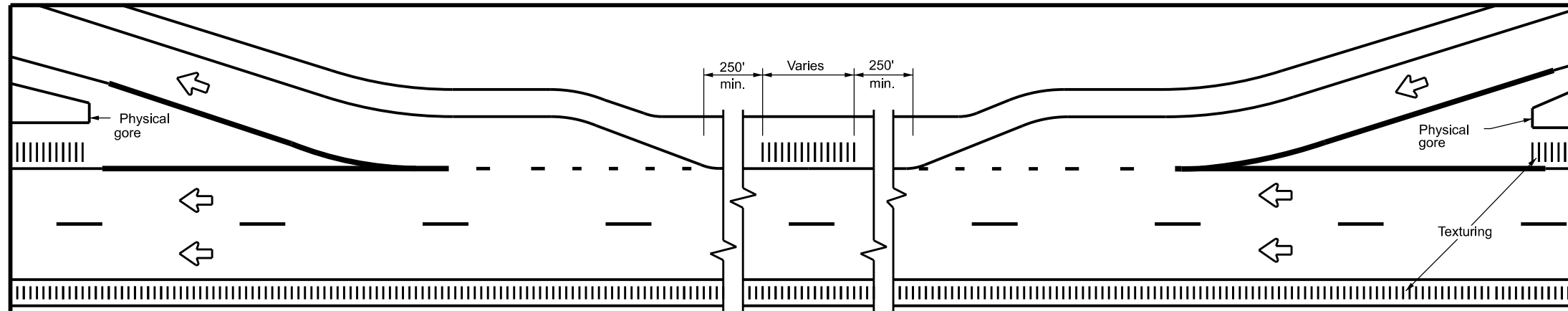
DocuSigned by:
DenGarza
750 6336 9057300 250
SCALE: 1" = 150'

TEXAS DEPARTMENT OF TRANSPORTATION
© 2024

FM 1472 LOC2 LAYOUTS

DN: J.T.	DW: J.T.	STATE: TEXAS	SHEET NUMBER: SHEET 1 OF 2	SHEET NO.:
CK: D.G.	CK: D.G.	CONTROL: 0086	JOB: 09 042, ETC	36
FED. RD. DIV. NO.:	STATE DIST. NO.:	COUNTY:	SECTION:	HIGHWAY NO.:
6	LRD	DUVAL, ETC.	0086	09 042, ETC SH359, ETC.

DATE: 7/26/2024 11:50:32 AM
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TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

GENERAL NOTES

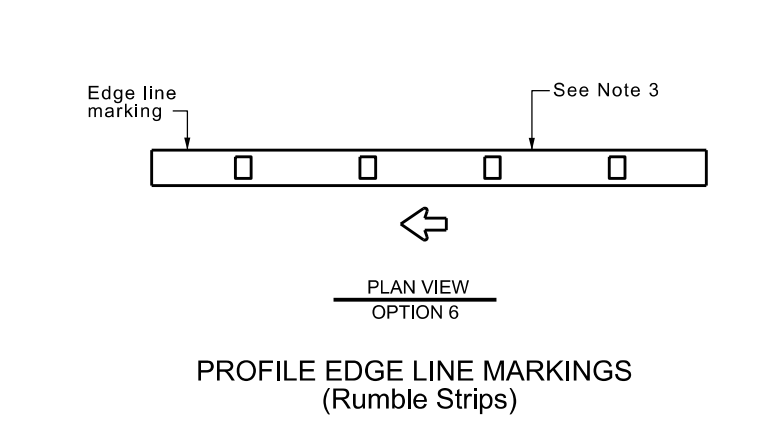
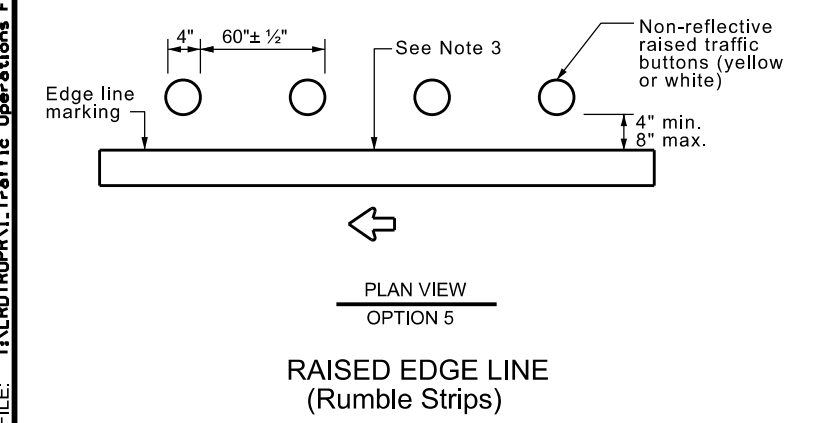
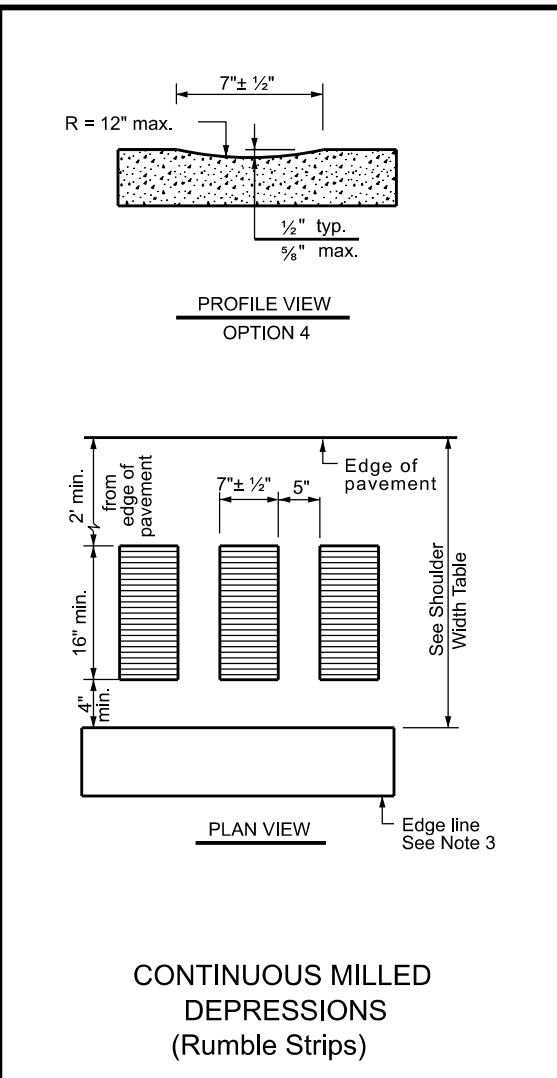
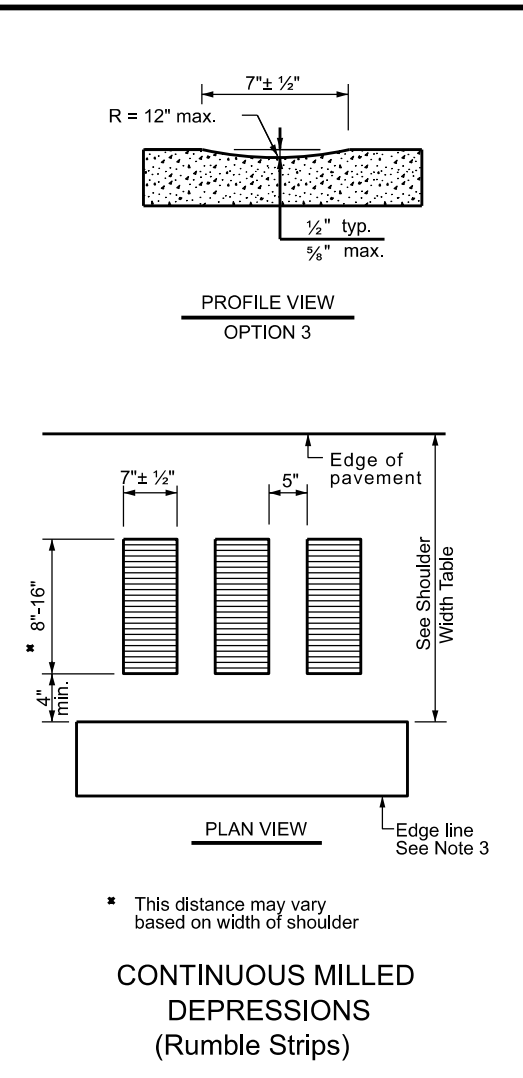
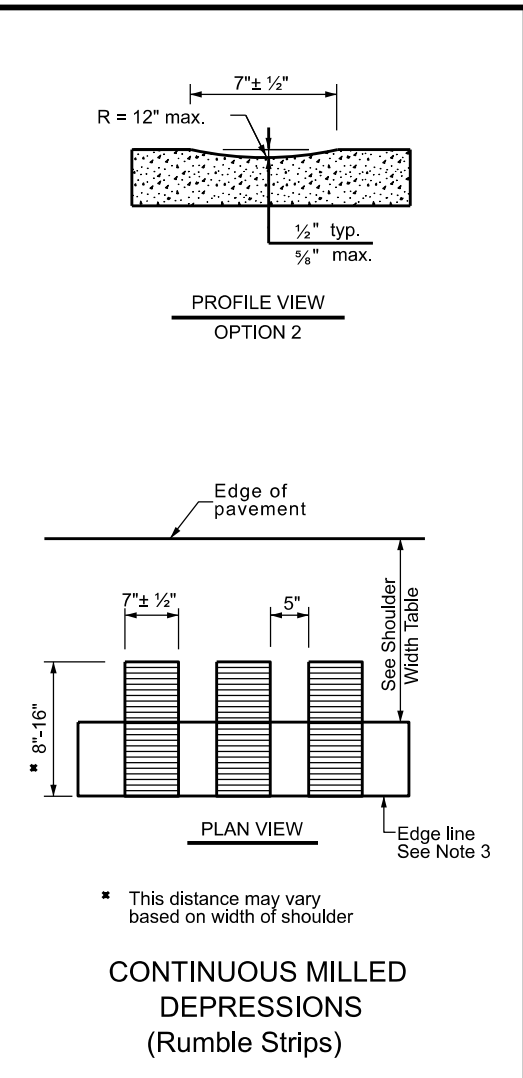
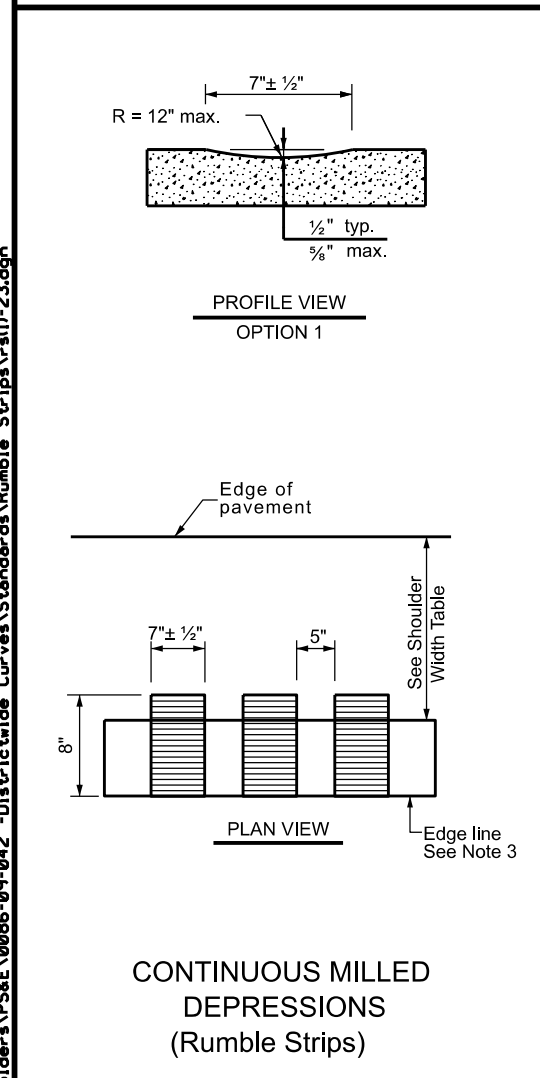
- Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
- Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
- Use standard sheets PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
- See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
- Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
- Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
- Consideration should be given to noise levels when edge line rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
- Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

- See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
- Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble stripe.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

- Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
- Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
- Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
- The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
- Raised profile thermoplastic markings used as edge lines may substitute for buttons.



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

Texas Department of Transportation

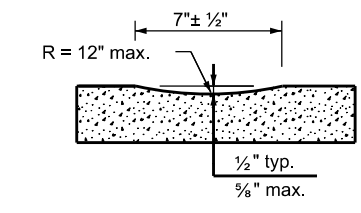
Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS

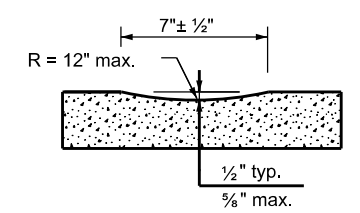
RS(1)-23

FILE: rs(1)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	January 2023	CONT	SECT	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
4-06 1-23	DIST	COUNTY	SHEET NO.	
2-10	LRD	DUVAL, ETC.	37	
10-13				

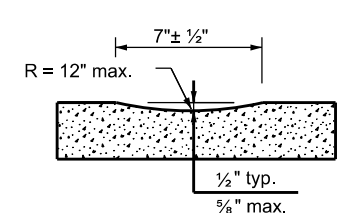
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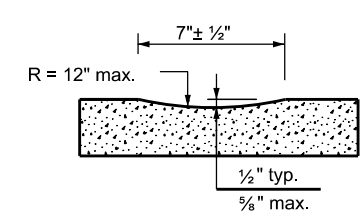
PROFILE VIEW
OPTION 1



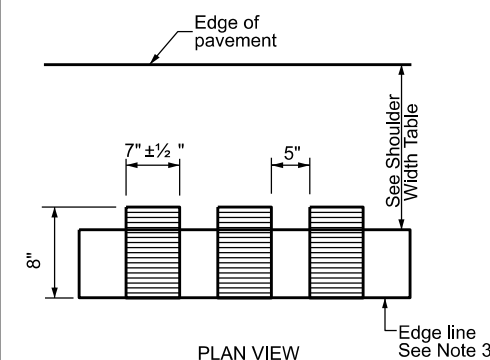
PROFILE VIEW
OPTION 2



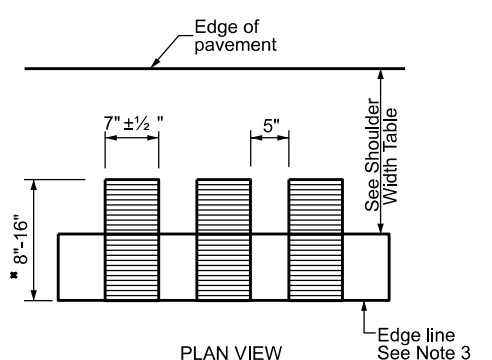
PROFILE VIEW
OPTION 3



PROFILE VIEW
OPTION 4

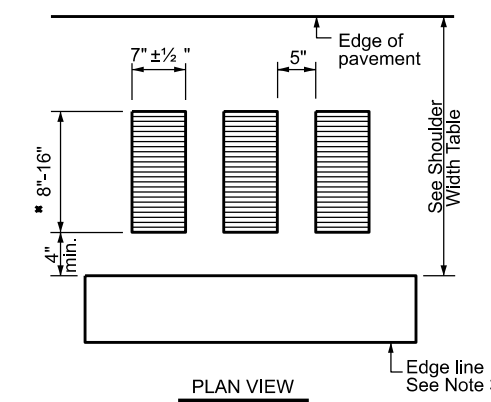


PLAN VIEW



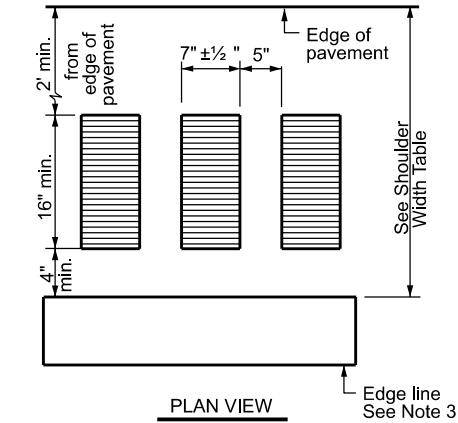
PLAN VIEW

▪ This distance may vary based on width of shoulder



PLAN VIEW

▪ This distance may vary based on width of shoulder



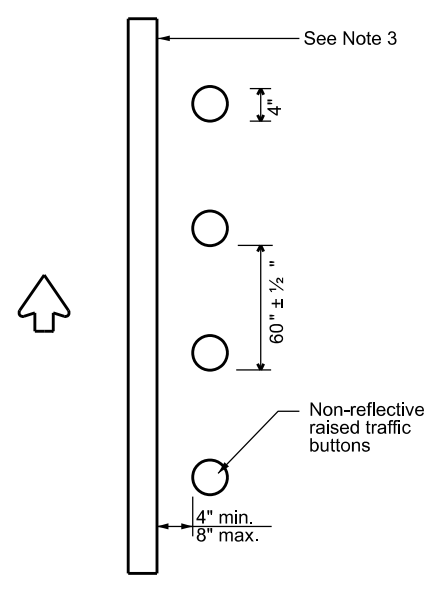
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

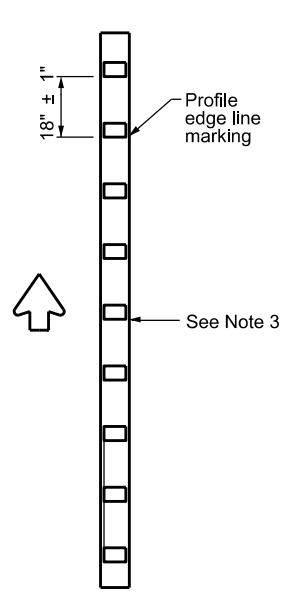
CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



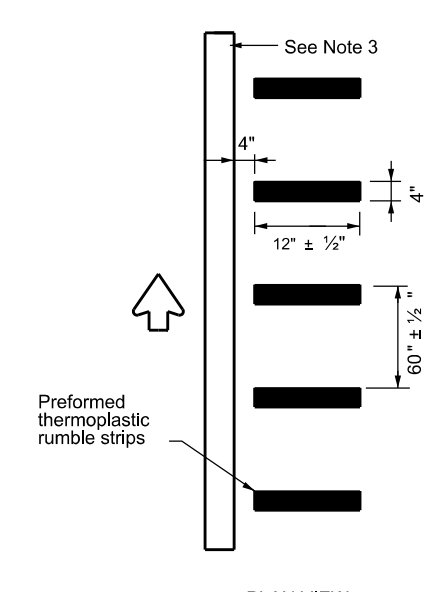
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



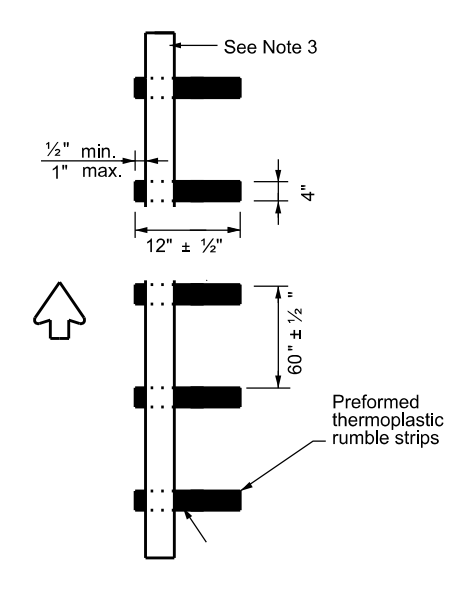
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

- Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
- Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
- Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
- See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
- Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
- Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
- Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
- Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

- See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
- Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

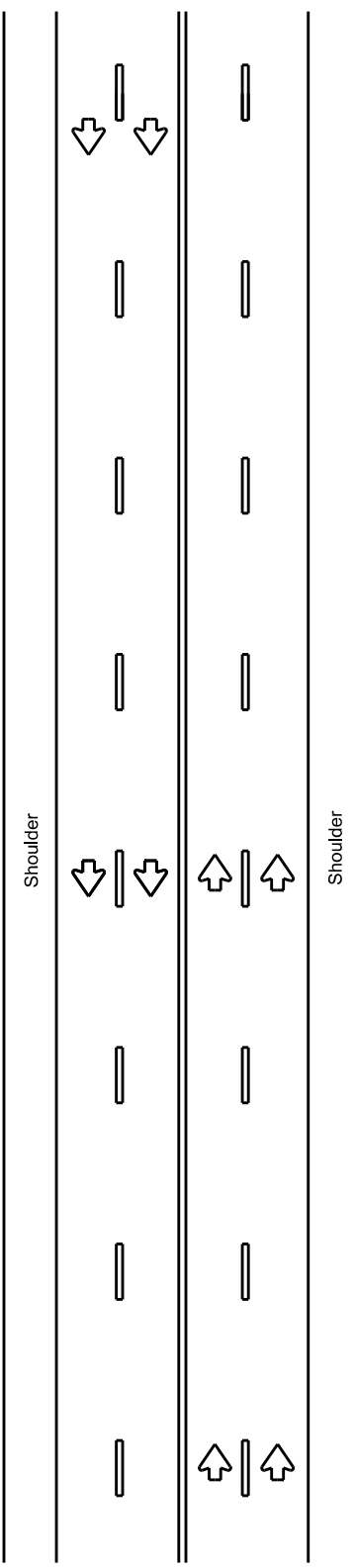
- Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
- Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
- Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
- The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
- Raised profile thermoplastic markings used as edge lines may substitute for buttons.

		Traffic Safety Division Standard	
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS			
RS(2)-23			
FILE: rs(2)-23.dgn	DWG: TxDOT	CHK: TxDOT	DATE: TxDOT
© TxDOT	January 2023	CONT: 0086	SECT: 09
REVISIONS		042, ETC	SH359, ETC.
10-13 1-23	DIST: LRD	COUNTY: DUVAL, ETC.	SHEET NO.: 38

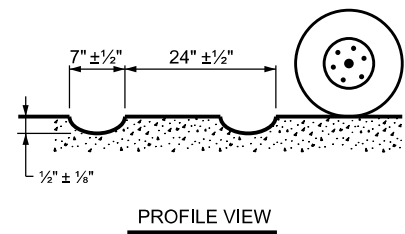
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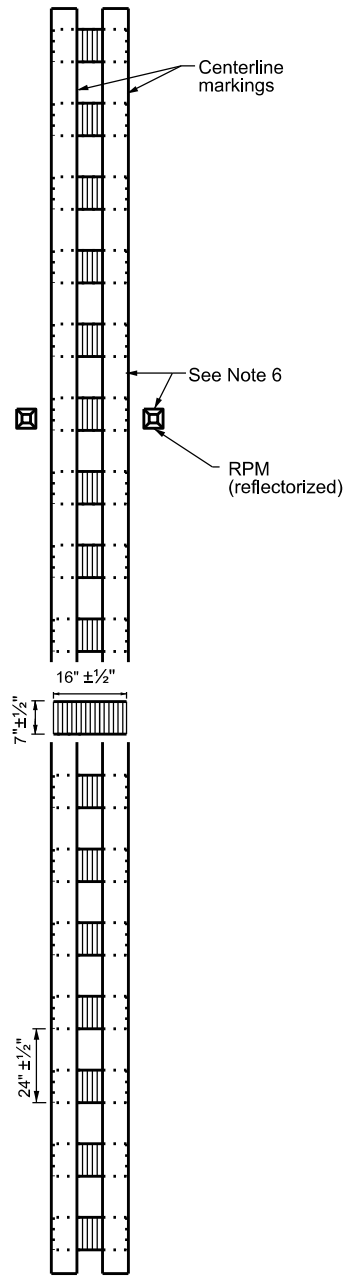
CENTERLINE RUMBLE STRIPS



MULTILANE UNDIVIDED
HIGHWAY WITH
SHOULDER

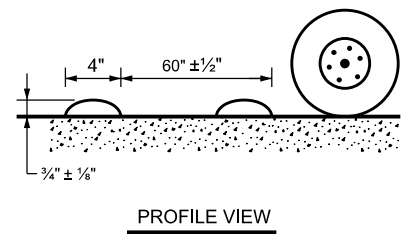


PROFILE VIEW

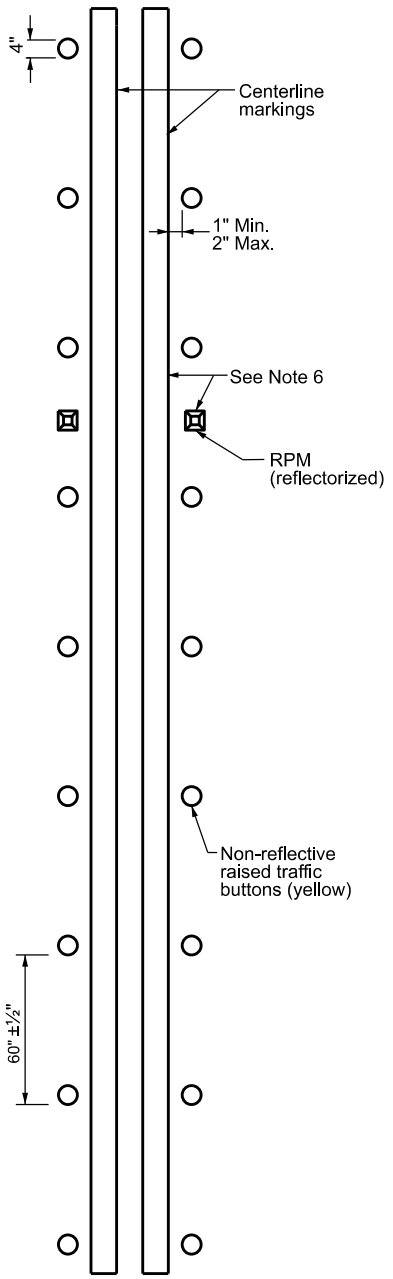


PLAN VIEW
OPTION 1

MILLED CENTERLINE
RUMBLE STRIPS

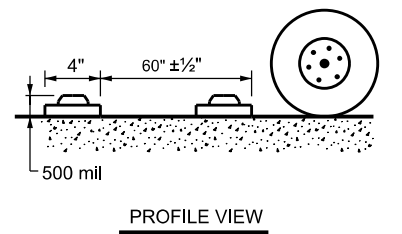


PROFILE VIEW

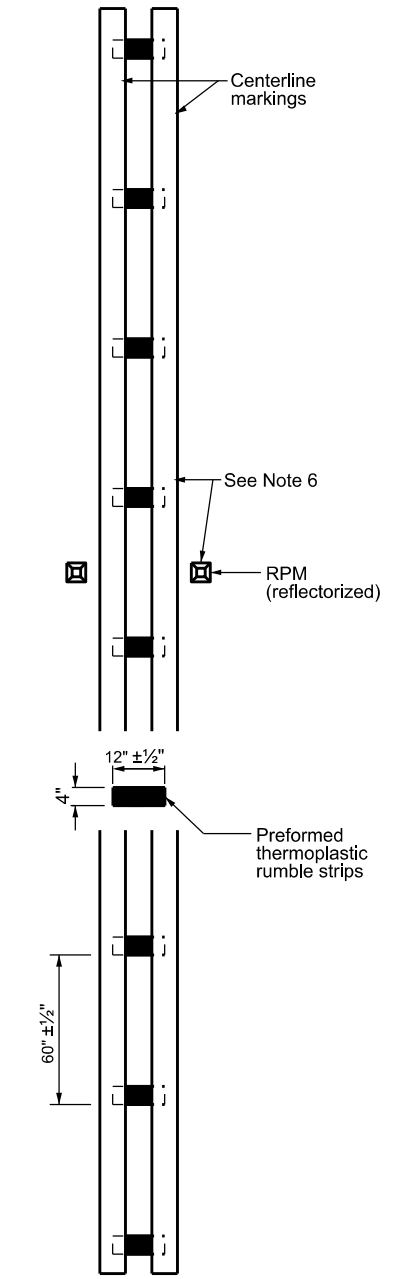


PLAN VIEW
OPTION 2

RAISED CENTERLINE
RUMBLE STRIPS

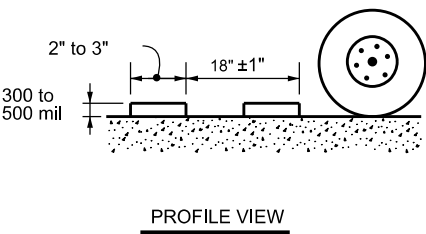


PROFILE VIEW

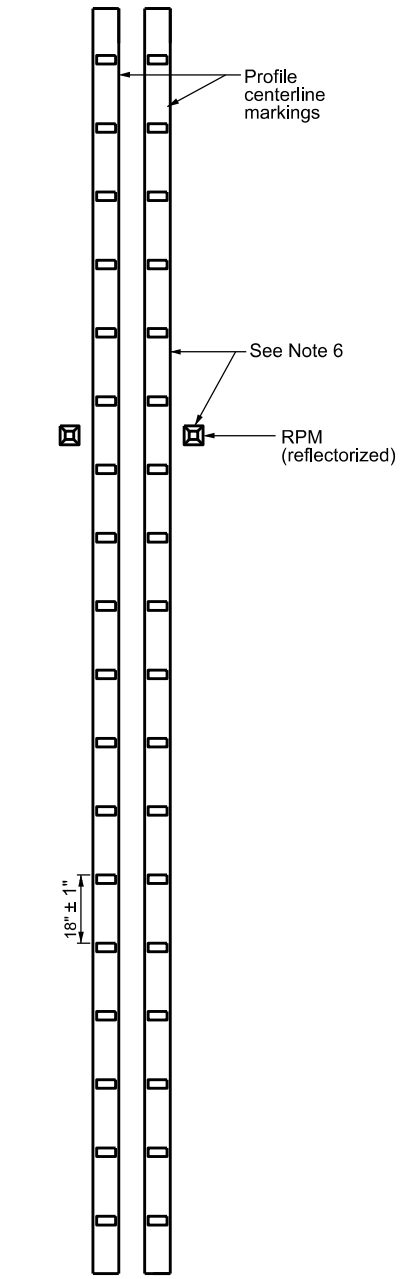


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC
RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE
MARKINGS

GENERAL NOTES

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

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

12. See standard sheet RS(2).



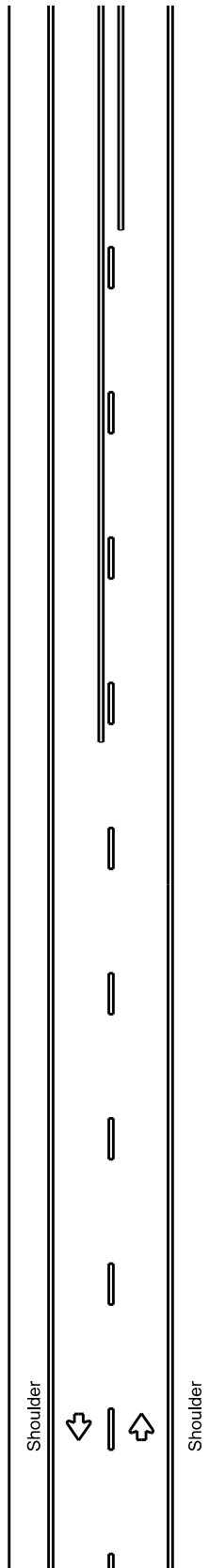
CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS RS(3)-23

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10-13	REVISIONS	DIST: LRD	COUNTY: DUVAL, ETC.	SHEET NO.: 39

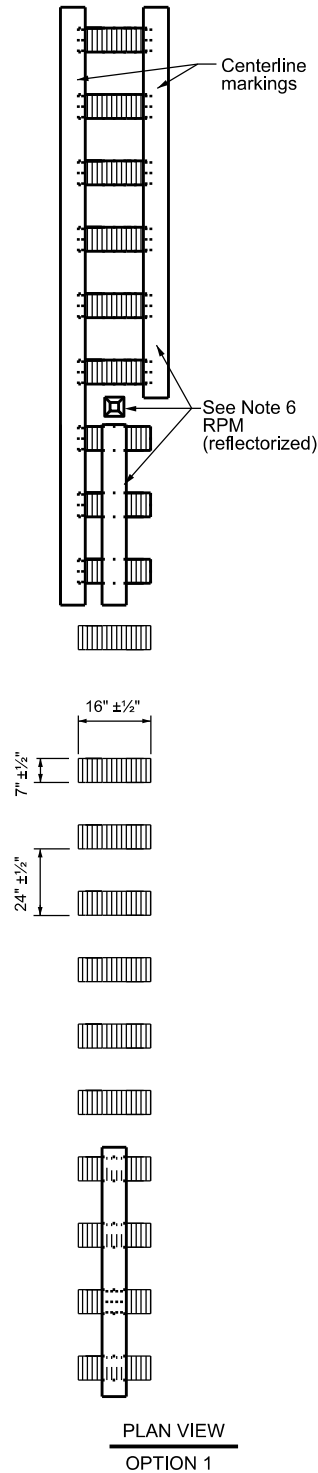
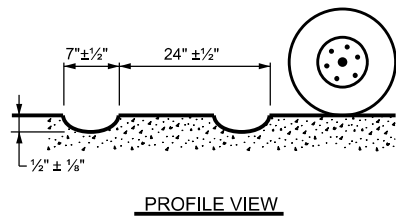
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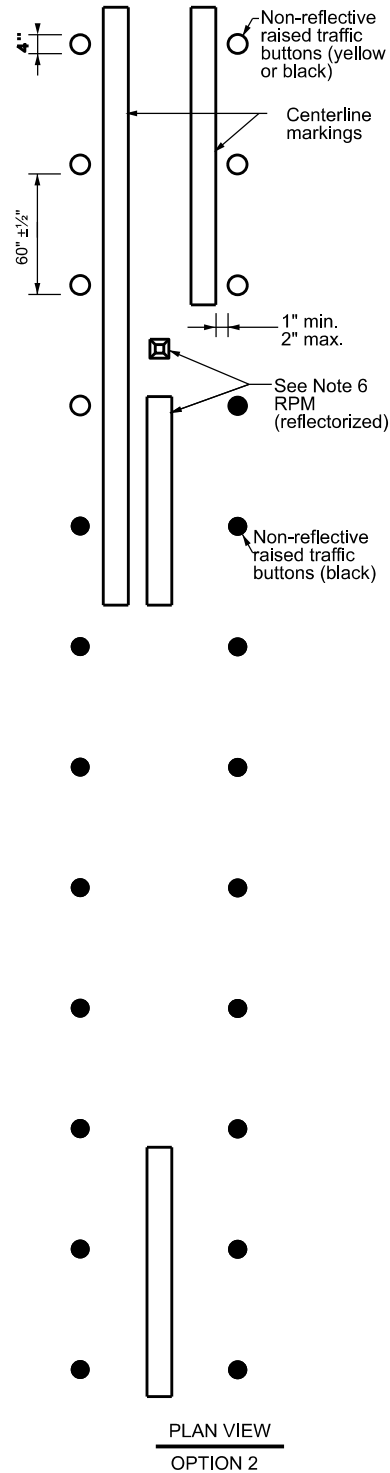
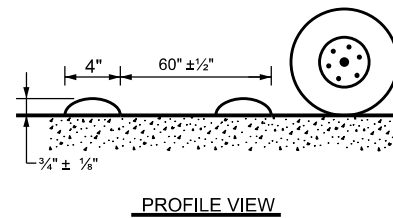
TWO LANE TWO-WAY HIGHWAYS



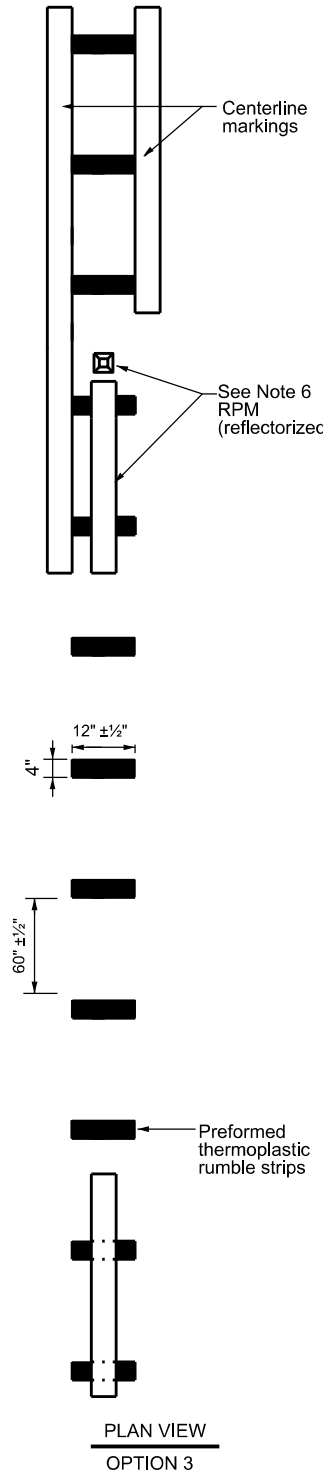
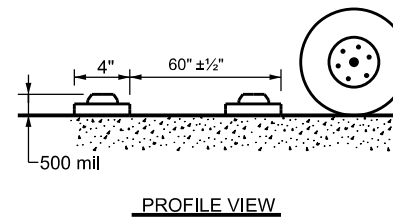
CENTERLINE RUMBLE STRIPS



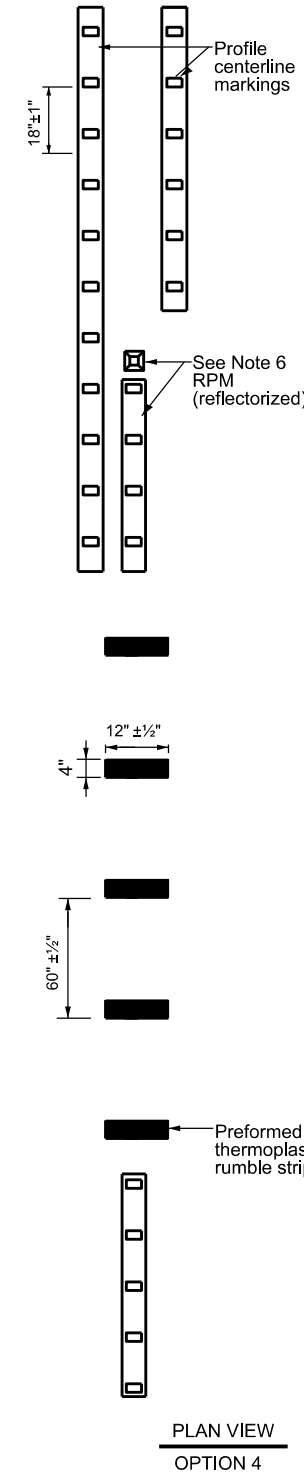
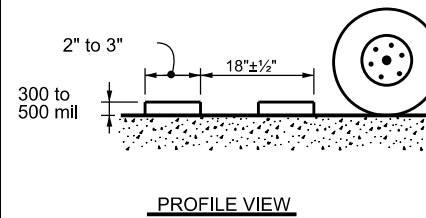
MILLED CENTERLINE RUMBLE STRIPS



RAISED CENTERLINE RUMBLE STRIPS



PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

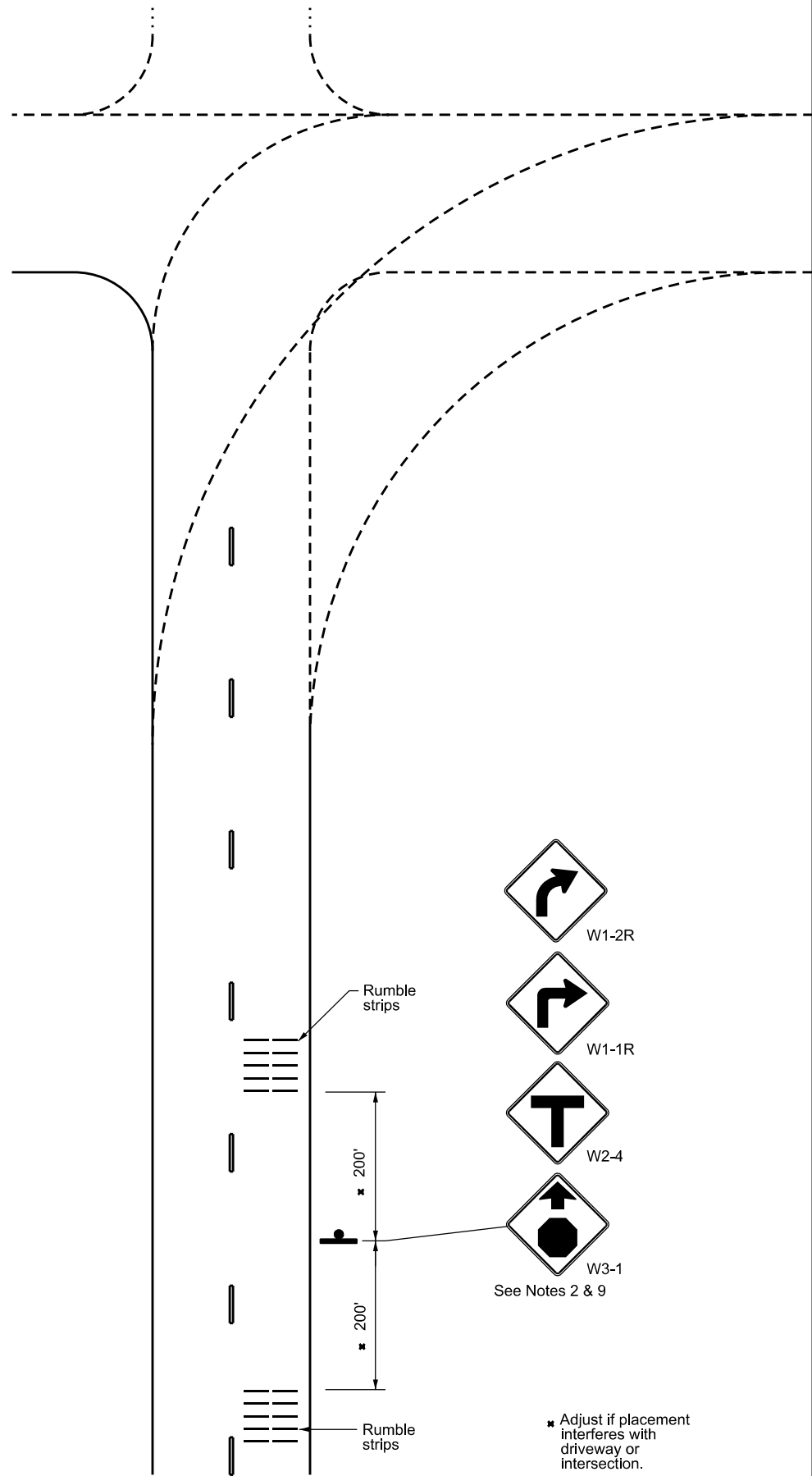
WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

<p>CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23</p>			
FILE:	rs(4)-23.dgn	DN:	TxDOT
© TxDOT	January 2023	CONT	SECT
REVISIONS	0086	09	042, ETC
10-13		DIST	COUNTY
1-23		LRD	DUVAL, ETC.
			SHEET NO.
			40

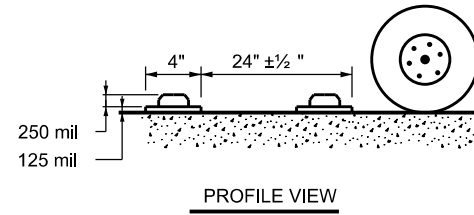
RUMBLE STRIP TYPICAL APPLICATION

See Note 1



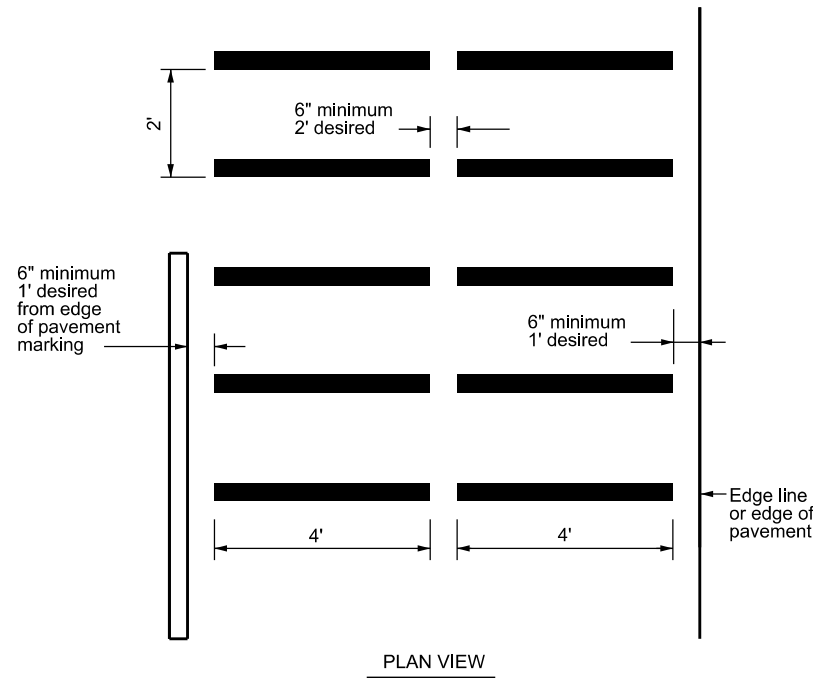
See Notes 2 & 9

* Adjust if placement interferes with driveway or intersection.



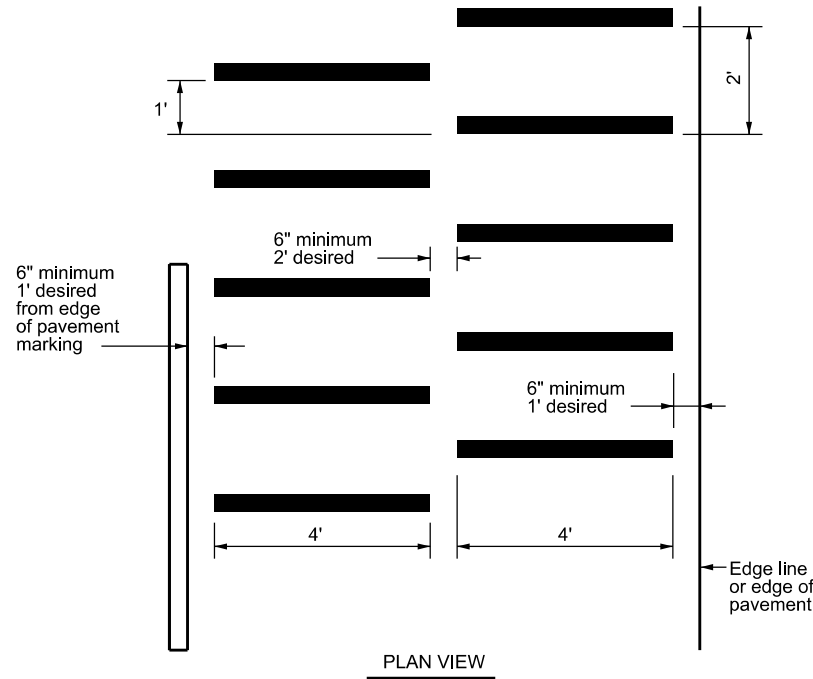
PROFILE VIEW

RUMBLE STRIP STANDARD PATTERN



PLAN VIEW

RUMBLE STRIP ALTERNATIVE PATTERN



PLAN VIEW

GENERAL NOTES

1. Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or stop-controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.
2. When used, the rumble strips shall be placed 200 feet upstream and downstream of the warning sign.
3. The use of rumble strips should not be widespread or indiscriminate.
4. Preformed black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.
5. Please reference the TxDOT Material Producers List for approved rumble strips (transverse); <http://www.txdot.gov/>
6. Consideration should be given to noise levels when in-lane or transverse rumble strips are to be installed near residential areas, schools, churches, etc.
7. The RUMBLE STRIPS AHEAD (W17-2T) sign may be used in advance of in-lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the Guidelines for Advance Placement of Warning Signs table of the Texas Manual on Uniform Traffic Control Devices.
8. Consideration shall be given to bicyclists. See RS(6).
9. Other signs can be used as conditions warrant.



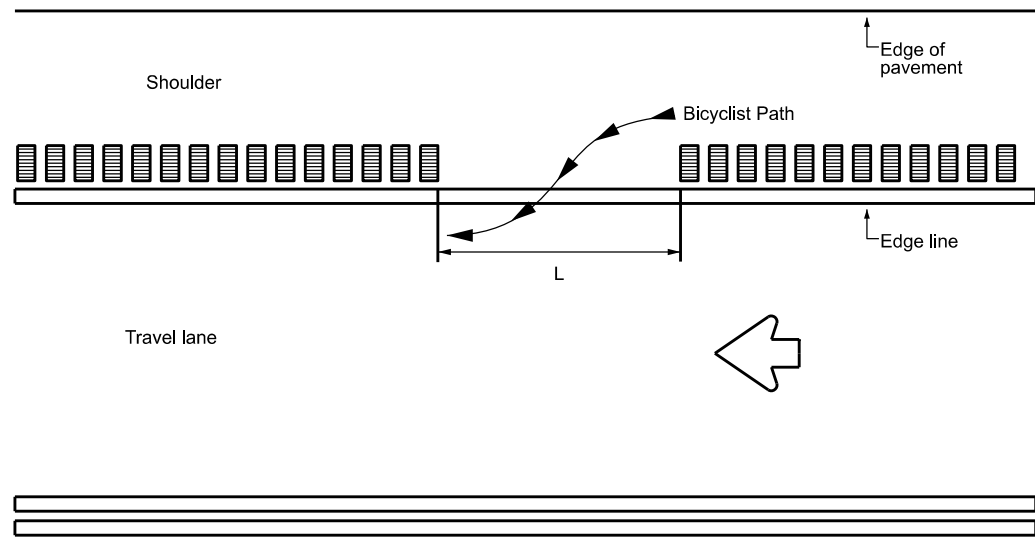
W17-2T

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		Traffic Safety Division Standard	
<h2>TRANSVERSE OR IN-LANE RUMBLE STRIPS</h2> <h3>RS(5)-23</h3>			
FILE: rs(5)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT	January 2023	CONT 0086	SECT 09
4-06	1-12	REVISIONS	
2-10		JOB 042, ETC	
10-13		HIGHWAY SH359, ETC.	
		DIST LRD	COUNTY DUVAL, ETC.
			SHEET NO. 41

DATE: 7/26/2024 11:50:35 AM
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RUMBLE STRIP GAP SPACING

GAP LENGTH TABLE (L)	
BICYCLISTS OPERATING ≤ 20 MPH	≥ 15 FEET
BICYCLISTS OPERATING > 20 MPH	≥ 20 FEET*
* Or the rumble strips should be located on the right side of the shoulder to allow bicyclists to avoid them if they encounter a need to enter the travel lane (e.g. a downhill location).	

GENERAL NOTES

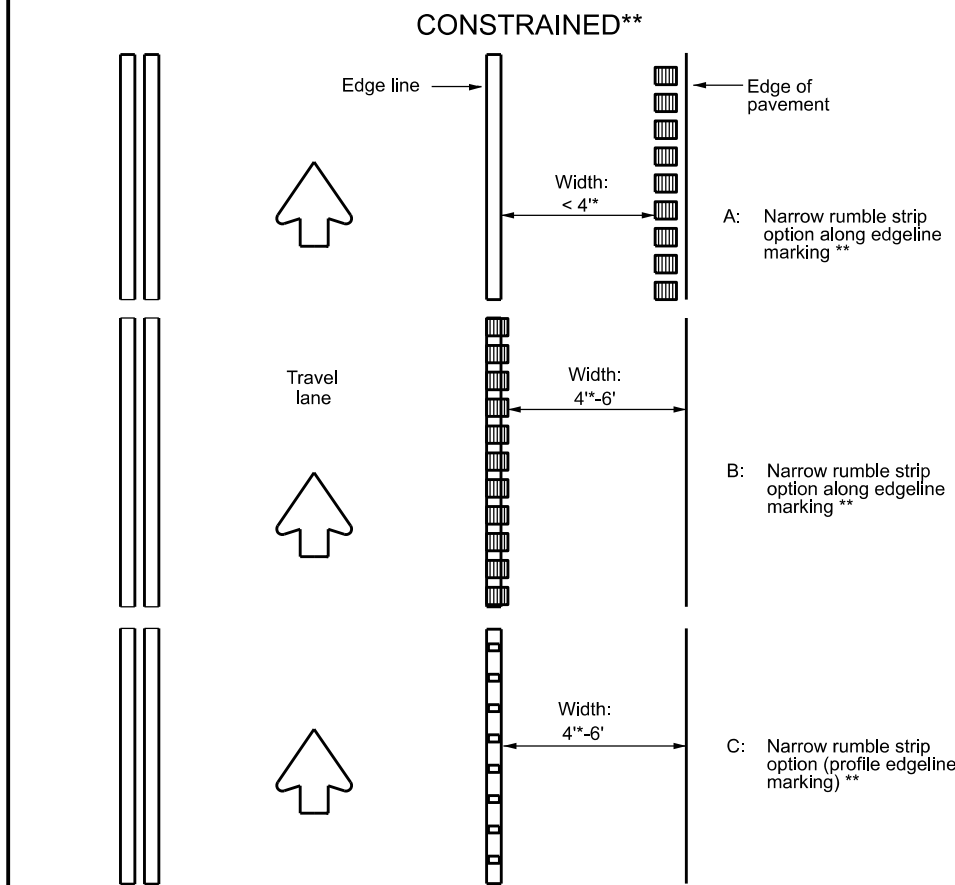
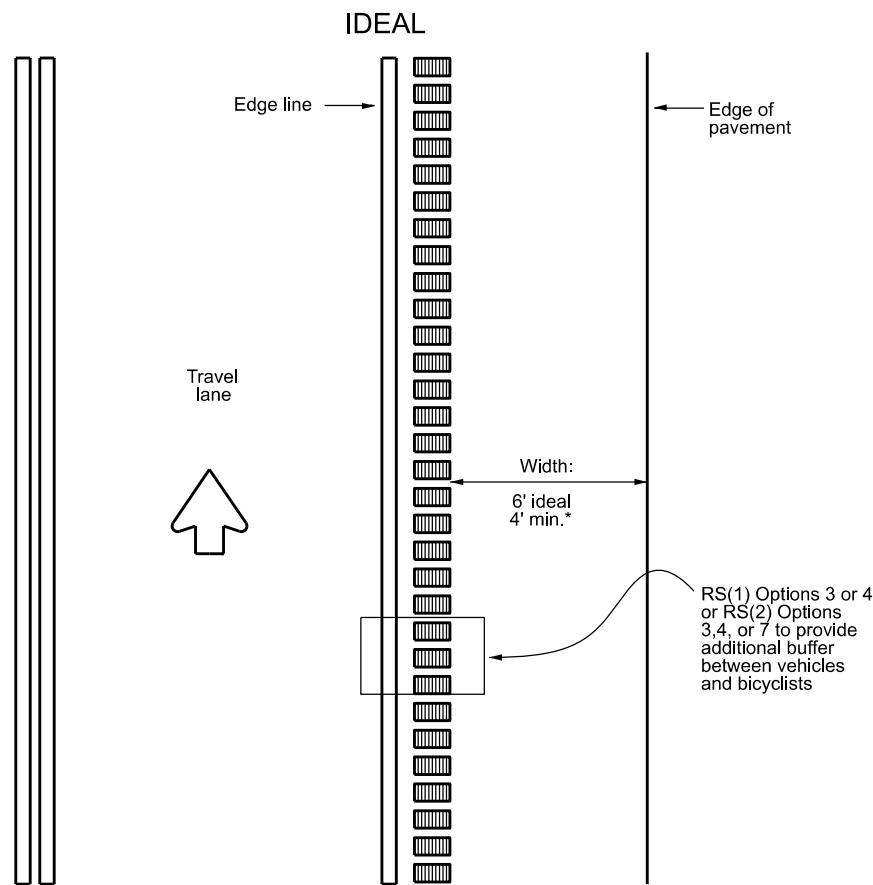
1. The Engineer must consider accommodating bicycles during the planning and implementation of all construction and rehabilitation projects. See the TxDOT Roadway Design Manual (RDM) Bicycle Facilities section for applicable policies, references, and guidance; including additional detail regarding rumble strip gap and horizontal placement, as well as explanation of desirable, minimum, and constrained values.
2. For non-freeway facilities with bike lanes, buffered bike lanes, or bike-accessible shoulders, the Engineer shall place rumble strips considering the safety of and crash risk for bicyclists. The Engineer shall include a detail of rumble strip gap spacing, horizontal spacing from the edge line, and material / installation method in the plans.
3. See RS(5) General Note 8 regarding bicycle safety with transverse (in-line rumble strips).

GAPS

4. Rumble strip gaps to allow bicyclists to safely enter or exit a shoulder, as needed. In addition to gaps provided for vehicles (e.g. at cross-streets), the Engineer shall ensure gaps are available every 40 to 60 feet. See Gap Spacing detail. The Engineer should consider significant grades as they affect bicycle speeds in applying the Gap Length Table, for example downhill versus uphill bicycle speeds.

HORIZONTAL SPACING

5. Rumble strip horizontal spacing considerations affect bicyclist safety and mobility. The Engineer shall consider desirable, minimum, and constrained widths, as shown in the horizontal placement detail. The Engineer shall apply engineering judgment to choose placement and material options in the Shoulder Width Tables on each RS sheet to optimize safety for all users. Horizontal width for bikes does not include standard drainage inlets, rumble strips, or raised pavement markers (RPMs).



* 5' minimum if adjacent to curb, guardrail, vertical element, or obstacle.
 ** Options A-C for consideration of horizontal placement using engineering judgment. See RS(1) and RS(2) for rumble strip device options. Care should be taken to consider bicycles in applying the tables by shoulder width. Narrow rumble strip options include RS(1) Options 1, 2, and 6 and RS(2) Options 1, 2, 6, and 8.

RUMBLE STRIP HORIZONTAL PLACEMENT

RUMBLE STRIP BICYCLE CONSIDERATIONS FOR NON-FREWAY FACILITIES RS(6)-23			
FILE: rs(6)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT	January 2023	CONT 0086	SECT 09
REVISIONS		JOB 042, ETC	HIGHWAY SH359, ETC.
1-23	DIST LRD	COUNTY DUVAL, ETC.	SHEET NO. 42

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

- FRP • Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
- TWT • Thin-Walled Tubing (see SMD(TWT))
- 10BWC • 10 BWC Tubing (see SMD(SLIP-1) to (SLIP-3))
- S80 • Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

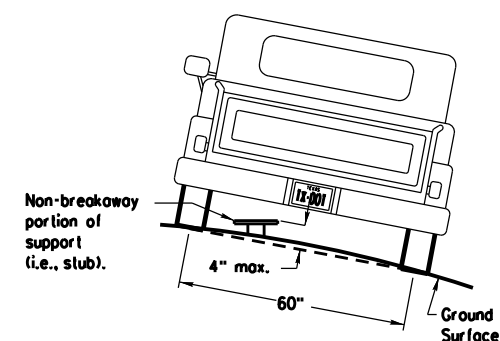
Anchor Type

- UA • Universal Anchor - Concreted (see SMD(FRP) and (TWT))
- UB • Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
- WS • Wedge Anchor Steel (see SMD(TWT))
- WP • Wedge Anchor Plastic (see SMD(TWT))
- SA • Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
- SB • Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

- P • Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
- T • Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
- U • Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
- IF REQUIRED
- TEXT or 2EXT • Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
- BM • Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
- WC • 1.12 "/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
- EXAL • Extruded Aluminum Sign Panels (see SMD(SLIP-3))

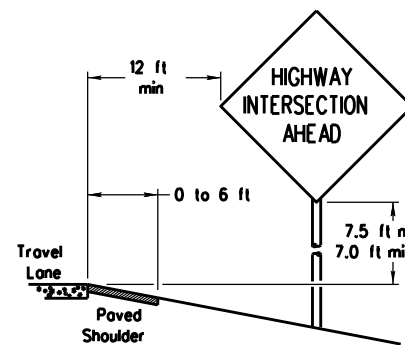
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheelpaths).

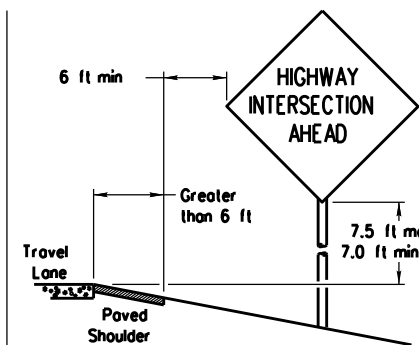
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

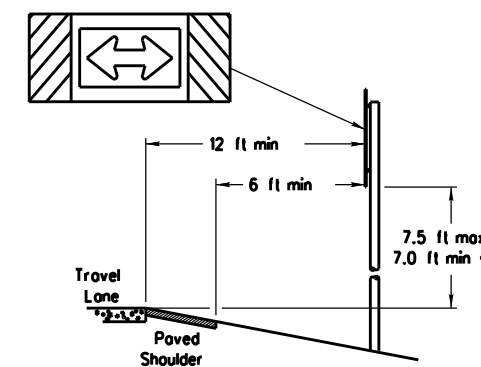
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

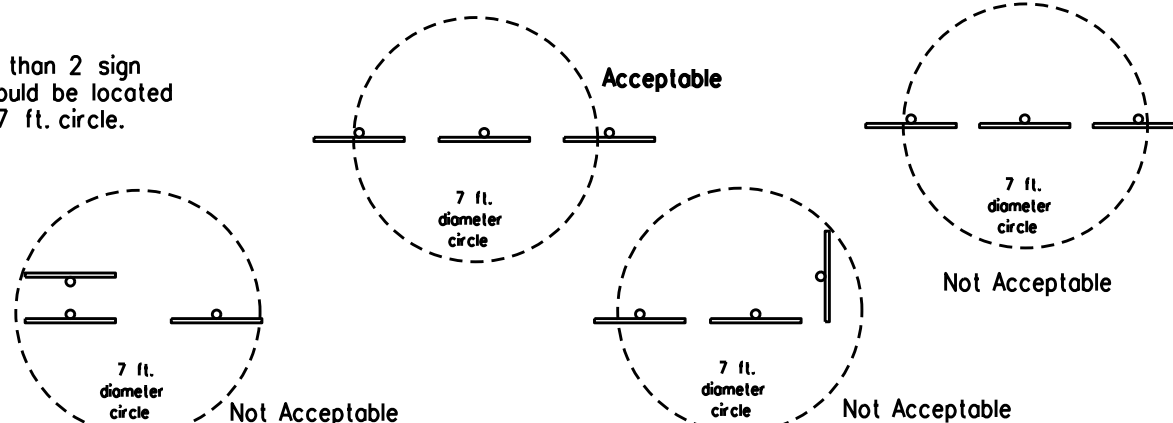
When the shoulder is greater than 6 ft. in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

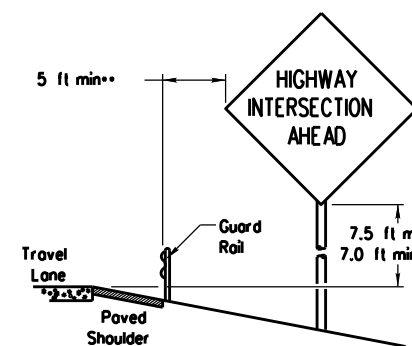


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

No more than 2 sign posts should be located within a 7 ft. circle.

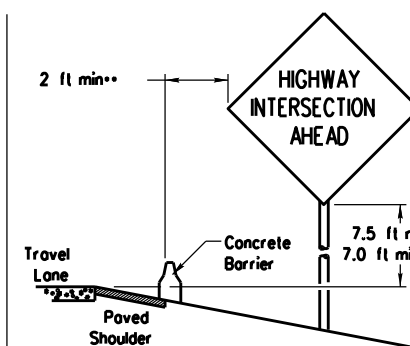


BEHIND BARRIER



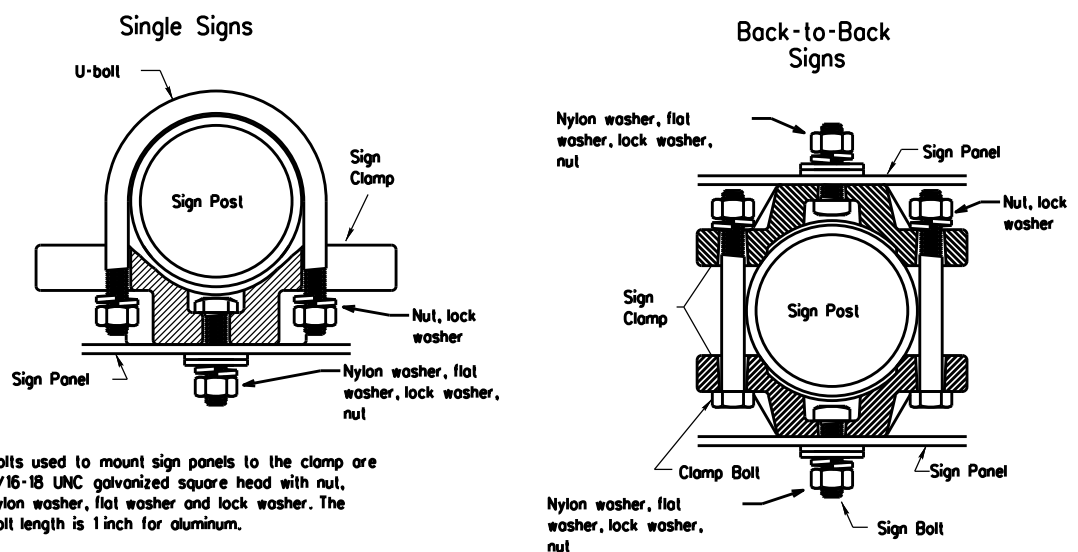
BEHIND GUARDRAIL

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.



BEHIND CONCRETE BARRIER

TYPICAL SIGN ATTACHMENT DETAIL



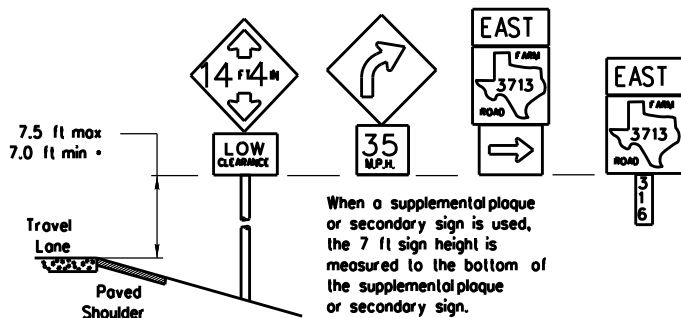
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

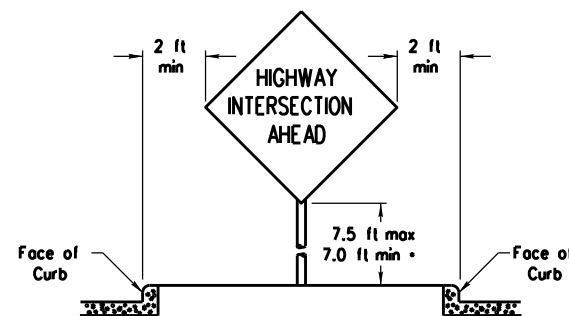
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



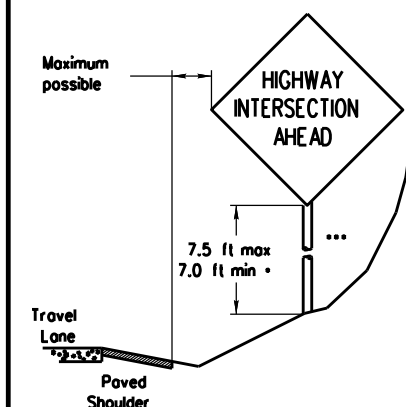
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

- Signs shall be mounted using the following condition that results in the greatest sign elevation:
 - (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
 - (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backstop.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
<http://www.txdot.gov/publications/traffic.htm>



SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

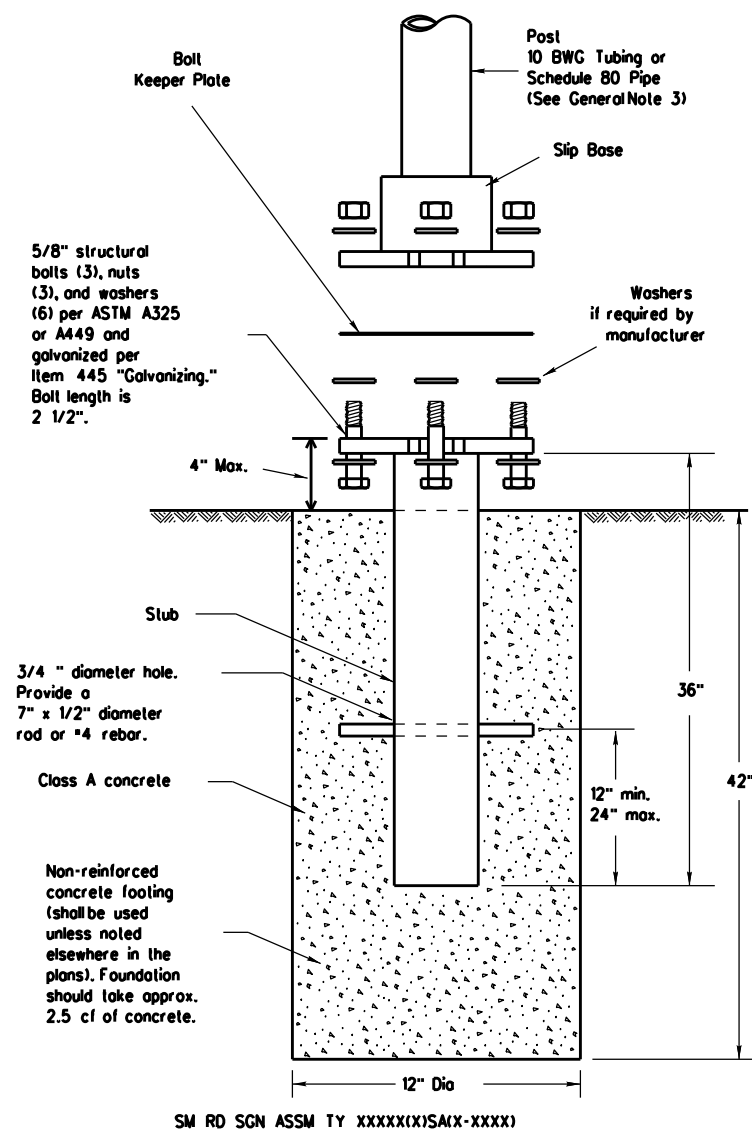
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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0086 09		042, ETC	SH359, ETC.
		DIST		COUNTY	SHEET NO.
		LRD		DUVAL, ETC.	43

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS

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NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
 - 10 BWG Tubing (2.875" outside diameter)
 - 0.134" nominal wall thickness
 - Seamless or electric-resistance welded steel tubing or pipe
 - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
 - Other steels may be used if they meet the following:
 - 55,000 PSI minimum yield strength
 - 70,000 PSI minimum tensile strength
 - 20% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
 - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
 - Galvanization per ASTM A123 or ASTM A653 G210. For pre-coated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
 - Schedule 80 Pipe (2.875" outside diameter)
 - 0.276" nominal wall thickness
 - Steel tubing per ASTM A500 Gr C
 - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
 - 46,000 PSI minimum yield strength
 - 62,000 PSI minimum tensile strength
 - 21% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
 - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
 - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

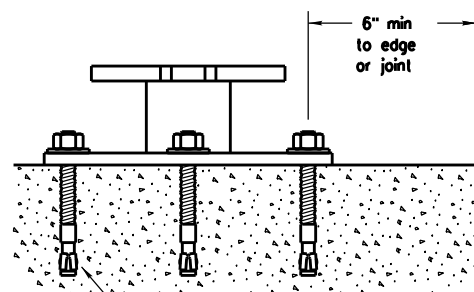
Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

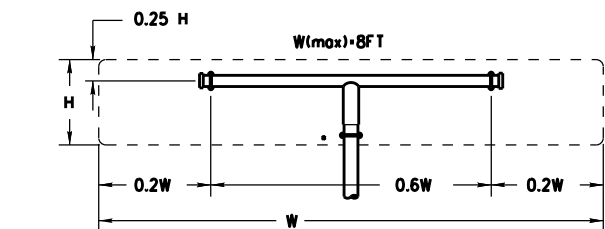
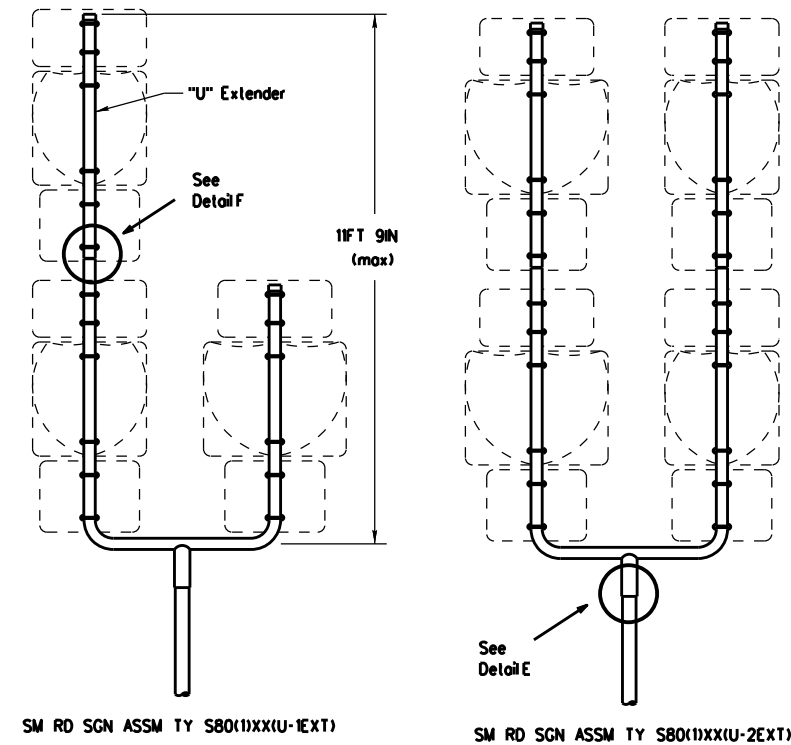
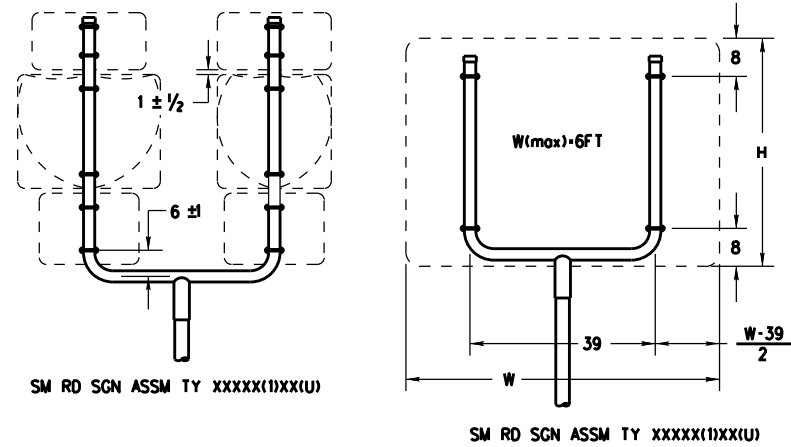
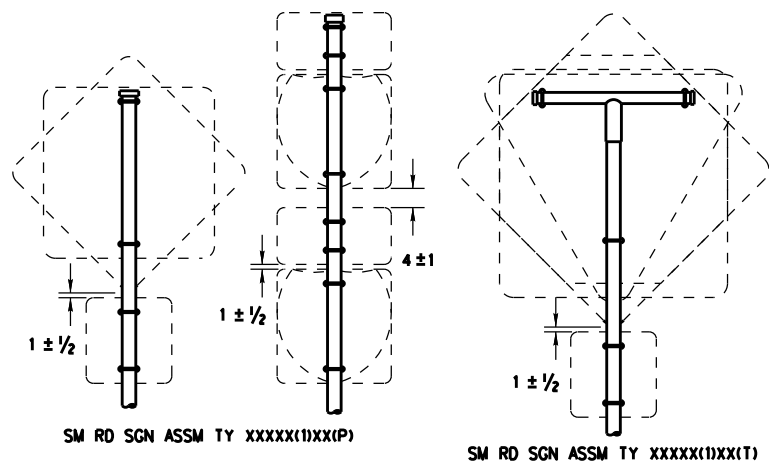
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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		DIST	COUNTY		SHEET NO.
		LRD	DUVAL, ETC.		44

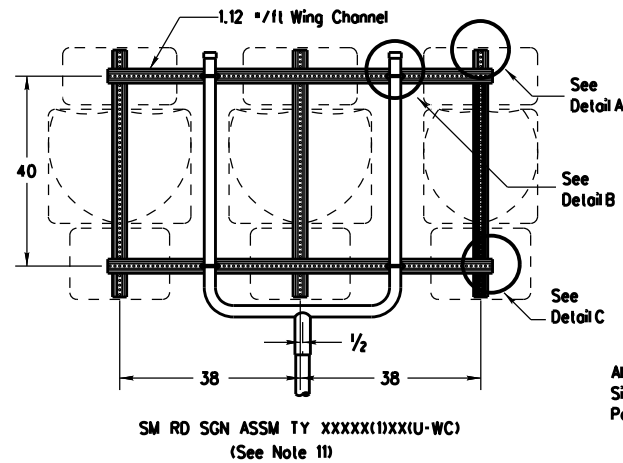
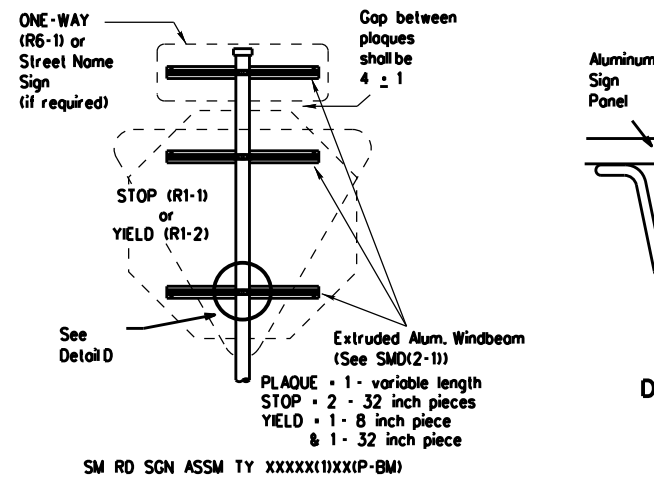
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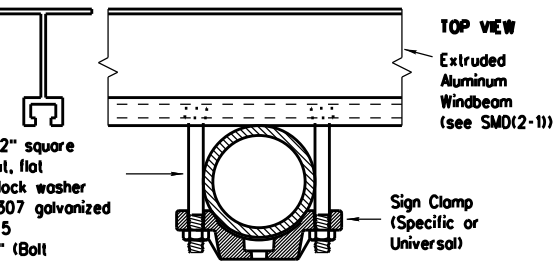
All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T) (* - See Note 12)



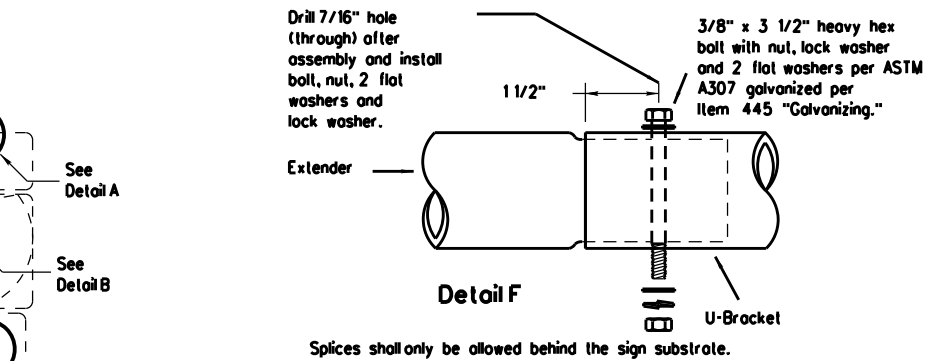
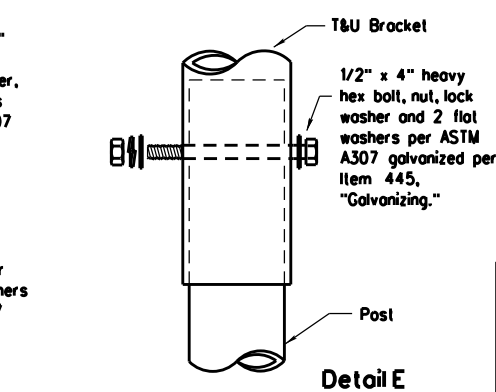
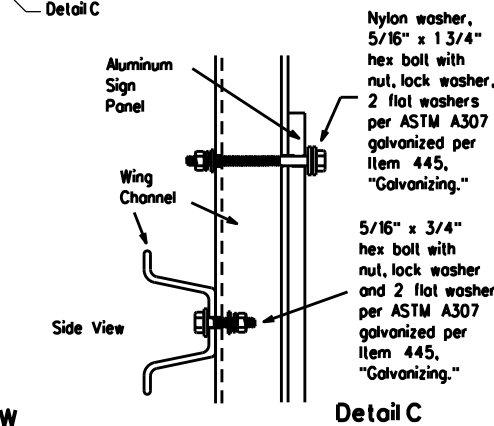
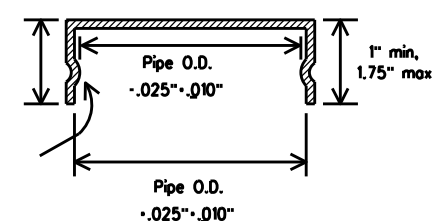
SIDE VIEW

3/8" x 3 1/2" square head bolt, nut, flat washer and lock washer per ASTM A307 galvanized per Item 445 "Galvanizing." (Bolt length may vary depending on sign clamp type and pipe diameter.)

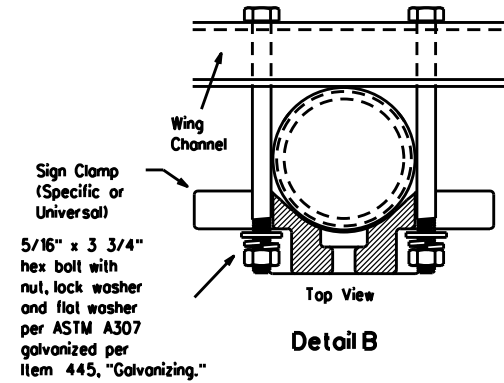


FRICION CAP DETAIL

±.05" Skirt Variation Depth
 Rolled Crimp to engage pipe O.D.



Splices shall only be allowed behind the sign substrate.



GENERAL NOTES:

SIGN SUPPORT	OF POSTS	MAX. SIGN AREA
10 BWC	1	16 SF
10 BWC	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

- The Engineer may require that a Schedule 80 post be used in place of a 10 BWC where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
- Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.
- Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT	
SIGN DESCRIPTION	SUPPORT
48-inch STOP sign (R1-1)	TY 10BWC(1)XX(T) TY 10BWC(1)XX(P-BM)
60-inch YIELD sign (R1-2)	TY 10BWC(1)XX(T) TY 10BWC(1)XX(P-BM)
48x16-inch ONE-WAY sign (R6-1)	TY 10BWC(1)XX(T) TY 10BWC(1)XX(P-BM)
36x48, 48x36, and 48x48-inch signs	TY 10BWC(1)XX(T)
48x60-inch signs	TY S80(1)XX(T)
48x48-inch signs (diamond or square)	TY 10BWC(1)XX(T)
48x60-inch signs	TY S80(1)XX(T)
48-inch Advance School X-ing sign (S1-1)	TY 10BWC(1)XX(T)
48-inch School X-ing sign (S2-1)	TY 10BWC(1)XX(T)
Large Arrow sign (W1-6 & W1-7)	TY 10BWC(1)XX(T)

Friction caps may be manufactured from hot rolled or cold rolled steelsheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

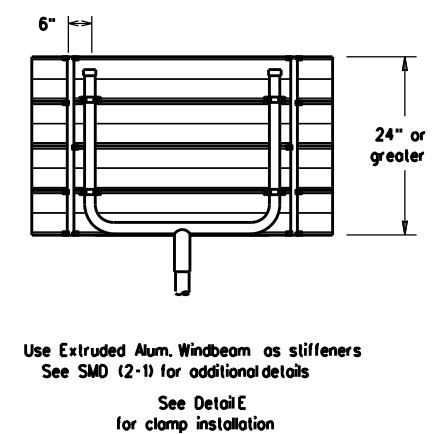
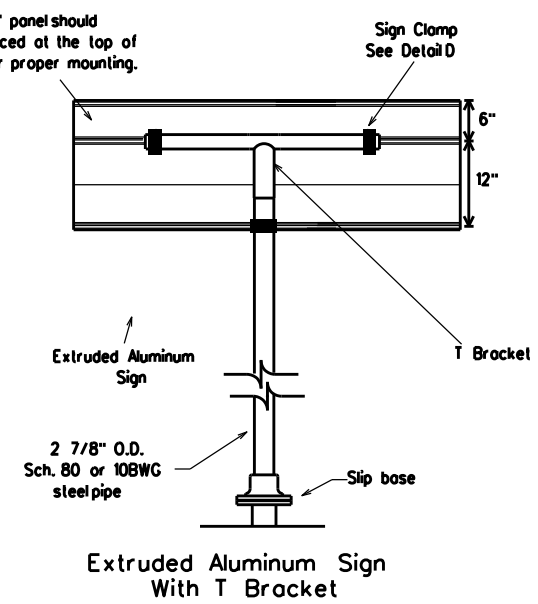
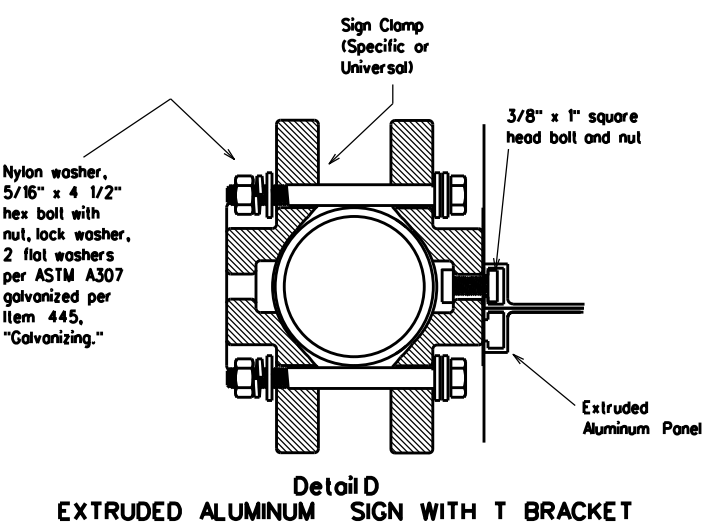
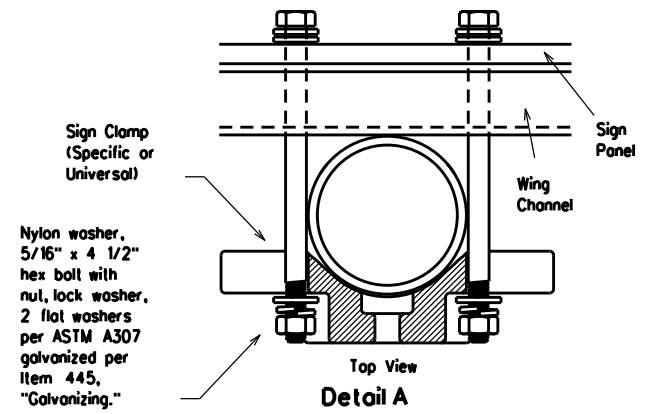
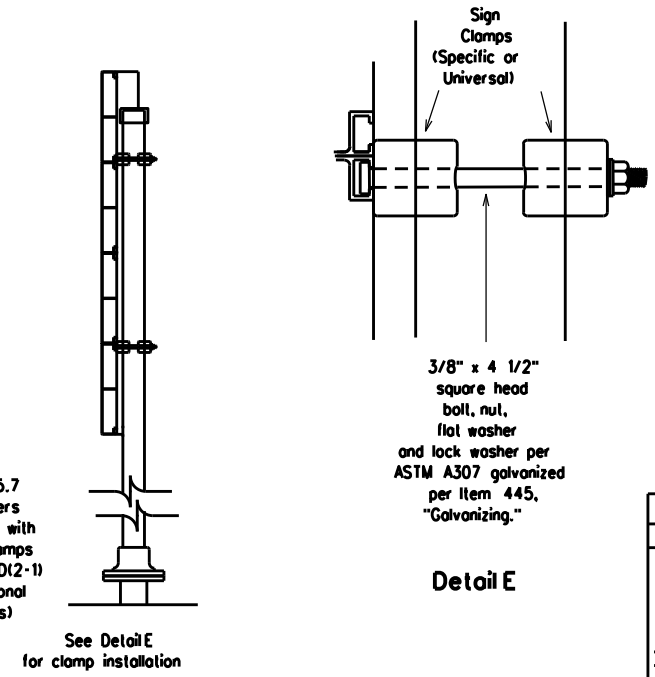
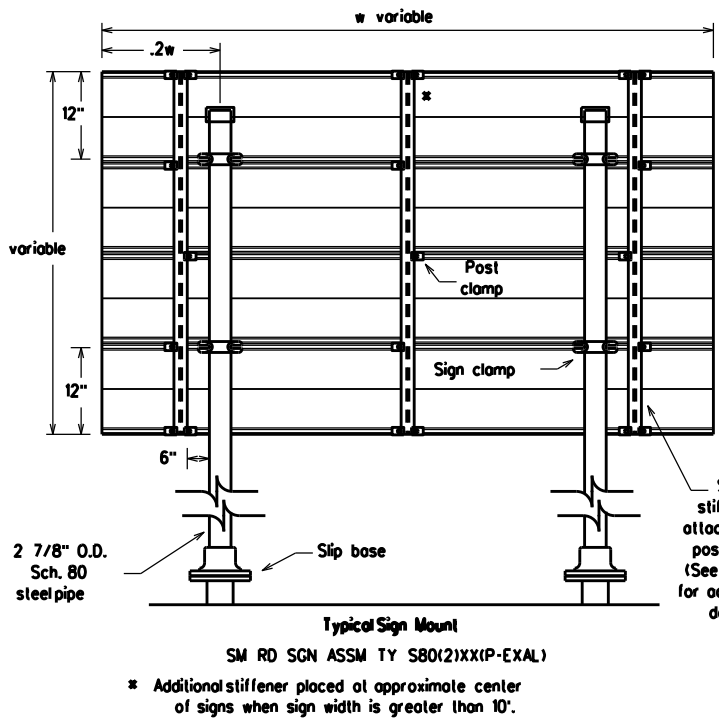
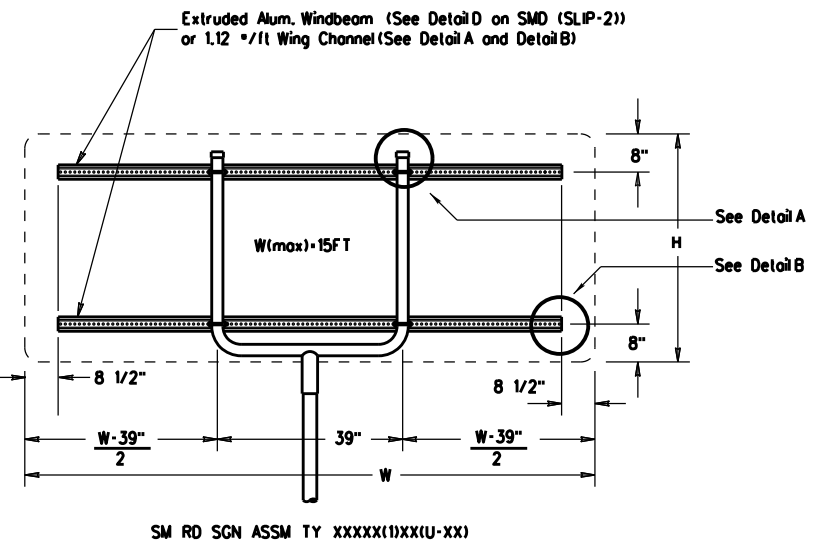
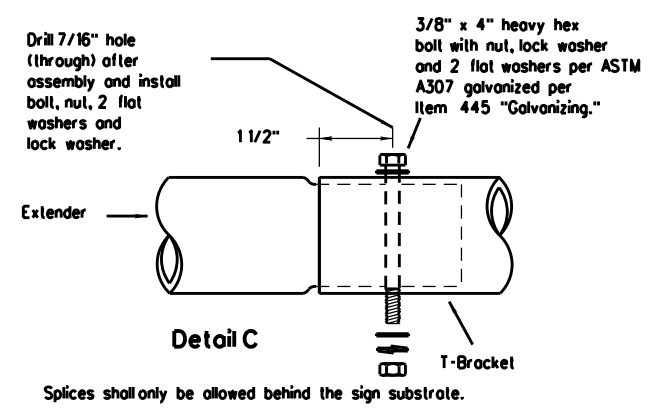
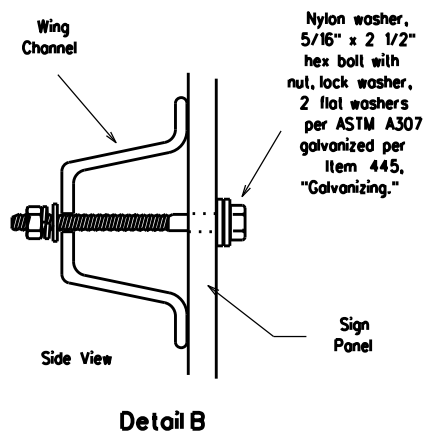
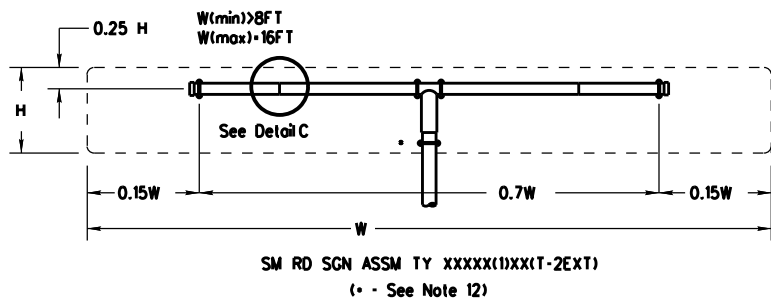
Texas Department of Transportation
 Traffic Operations Division

SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM
 SMD(SLIP-2)-08

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GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG | 1 | 16 SF |
| 10 BWG | 2 | 32 SF |
| Sch 80 | 1 | 32 SF |
| Sch 80 | 2 | 64 SF |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
SIGN DESCRIPTION	SUPPORT	
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	

Texas Department of Transportation
 Traffic Operations Division

**SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM**

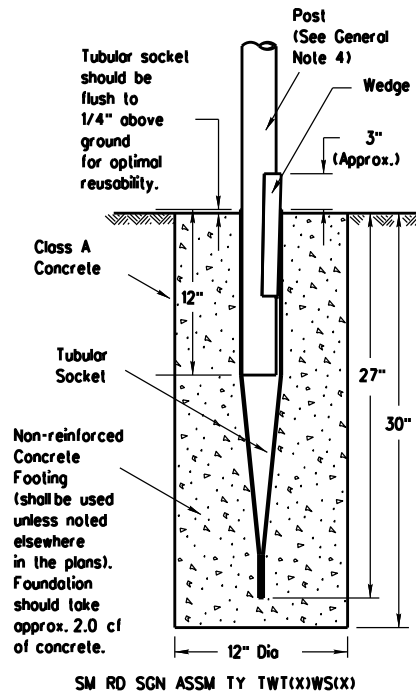
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	DIST	COUNTY	SHEET NO.	
	LRO	DUVAL, ETC.	46	

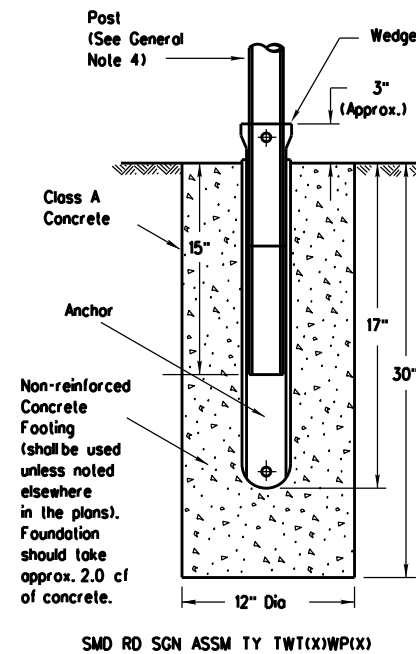
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DATE: 7/26/2024 11:50:37 AM
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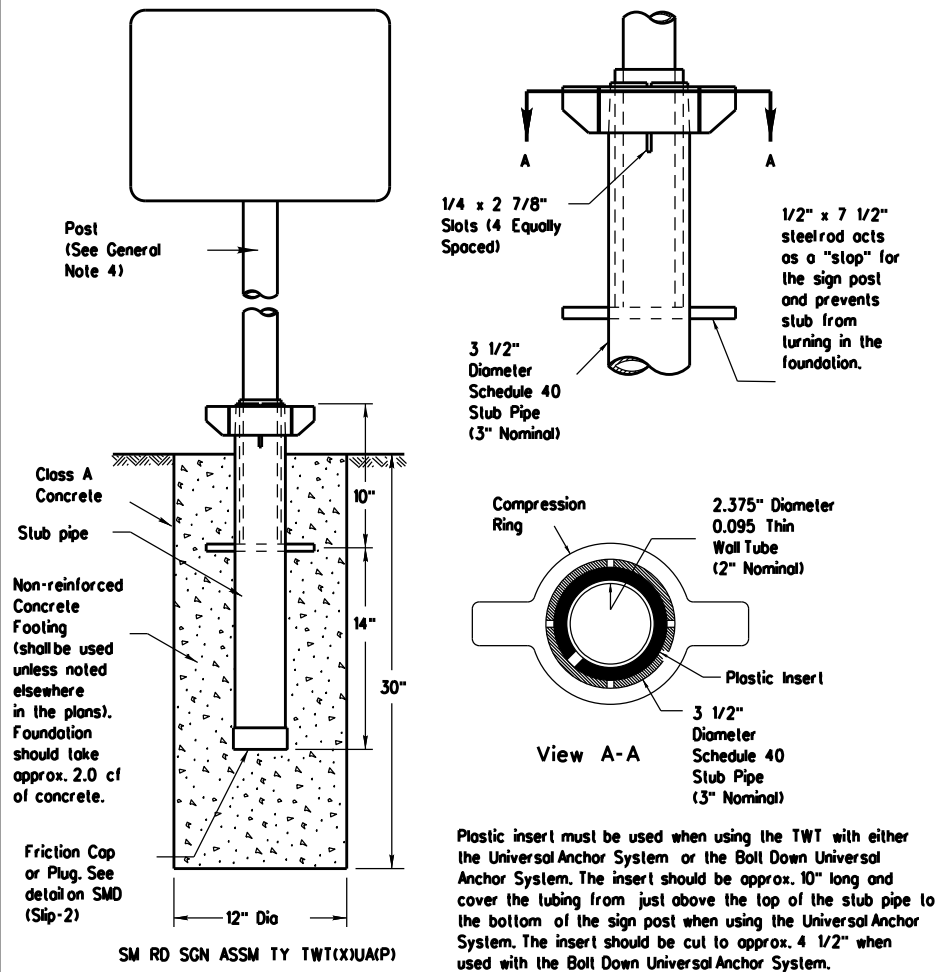
Wedge Anchor Steel System



Wedge Anchor High Density Polyethylene (HDPE) System

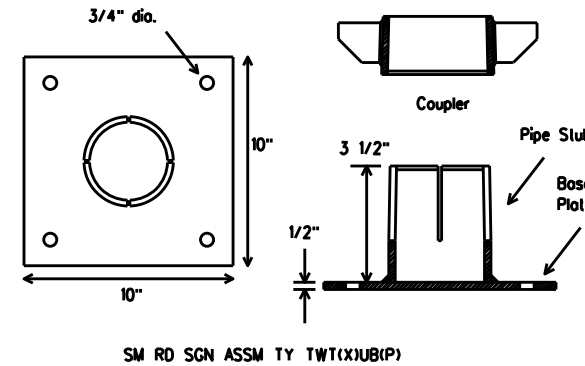


Universal Anchor System with Thin-Walled Tubing Post

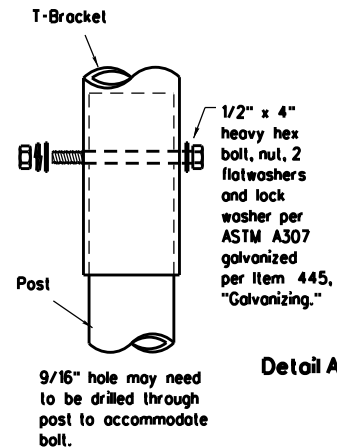
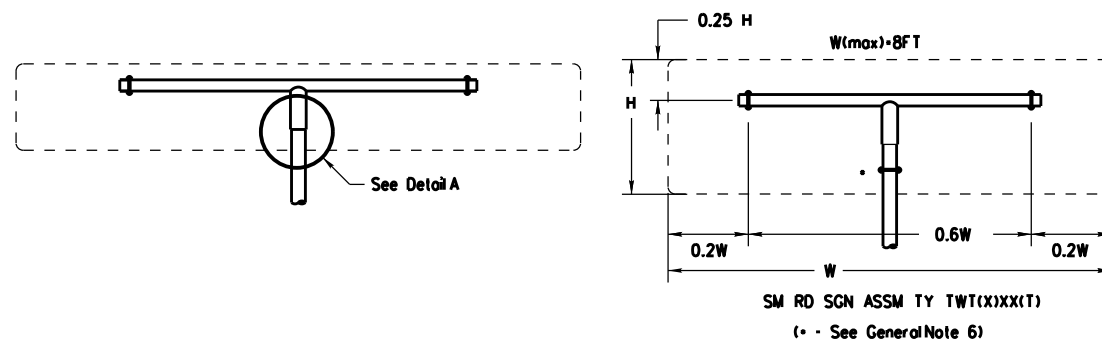


5/8" diameter Concrete Anchor - 4 places (embed a min. of 3 3/8" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.



Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post



NOTE

The devices shall be installed per manufacturer's recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

- The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
- The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer, Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
- Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer_list.htm
- Material used as post with this system shall conform to the following specifications:
 - 13 BWG Tubing (2.375" outside diameter) (TWT)
 - 0.095" nominal wall thickness
 - Seamless or electric-resistance welded steel tubing
 - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
 - Other steels may be used if they meet the following:
 - 55,000 PSI minimum yield strength
 - 70,000 PSI minimum tensile strength
 - 18% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of .083" to .099"
 - Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
 - Galvanization per ASTM 123 or ASTM A653 G210. For pre-coated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

- Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
- Insert tubular socket into concrete until top of socket is approximately 1/4" above the concrete footing.
- Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer.
- Attach the sign to the sign post.
- Insert the sign post into socket and align sign face with roadway.
- Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

- Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- Insert base post in hole to depths shown and backfill hole with concrete.
- Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
- Attach the sign to the sign post.
- Install plastic insert around bottom of post.
- Insert sign post into base post. Lower until the post comes to rest on steelrod.
- Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
- Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.



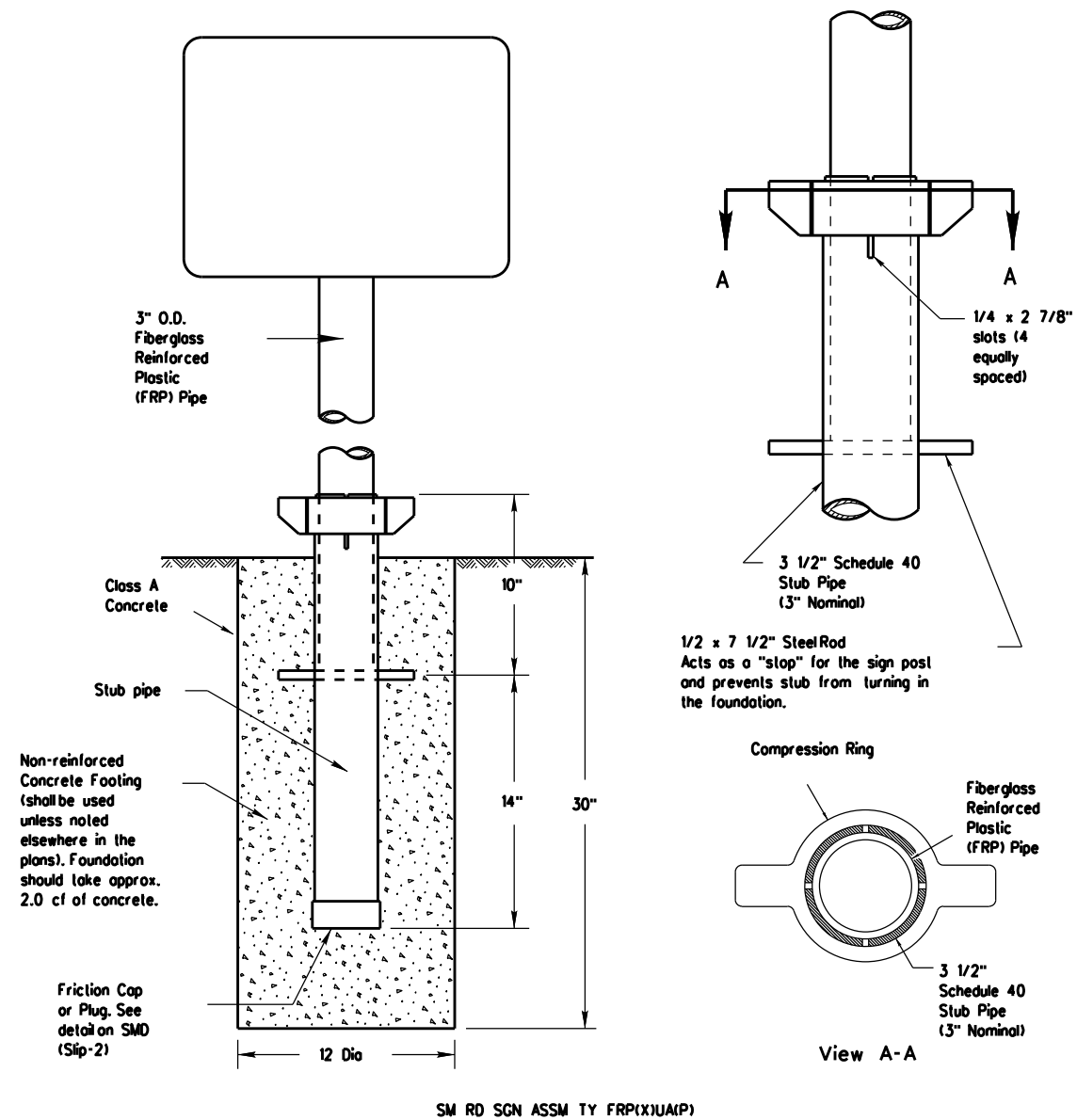
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST SMD(TWT)-08

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0086	09	042, ETC	SH359, ETC.
		DIST	COUNTY	SHEET NO.	
		LRD	DUVAL, ETC.	47	

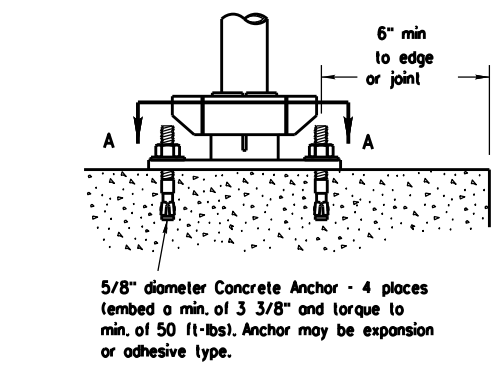
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post

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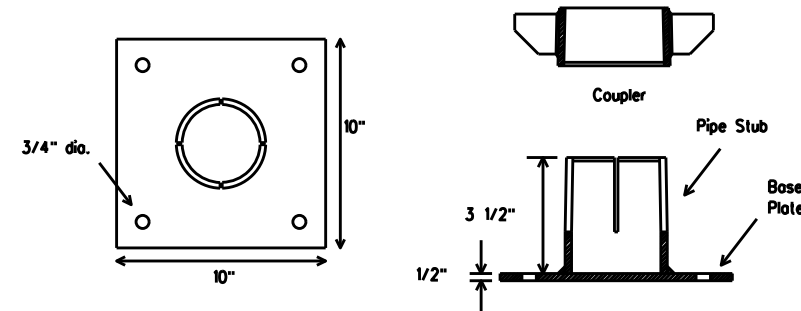


SM RD SGN ASSM TY FRP(X)U(A)(P)



Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxy and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations.

BOLT-DOWN DETAILS



SM RD SGN ASSM TY FRP(X)U(B)(P)

GENERAL NOTES:

- FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
- All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
- See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: <http://www.txdot.gov/publications/traffic.htm>

FRP POST REQUIREMENTS

- Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
- Thickness of FRP sign support is 0.125" ± 0.031", - 0.0".
- FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
Texas Department of Transportation
Traffic Operations Division
125 East 11th Street
Austin, Texas 78701-2483

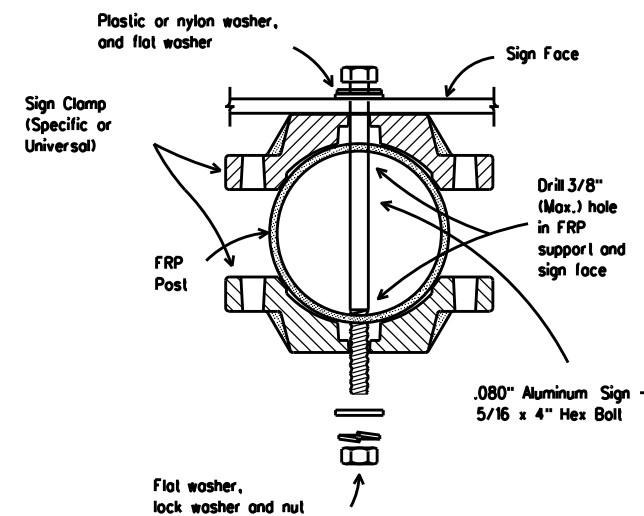
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

- Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
- Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
- Attach sign to FRP post.
- Insert sign post into base post. Lower until the post comes to rest on the steel rod.
- Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
- Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

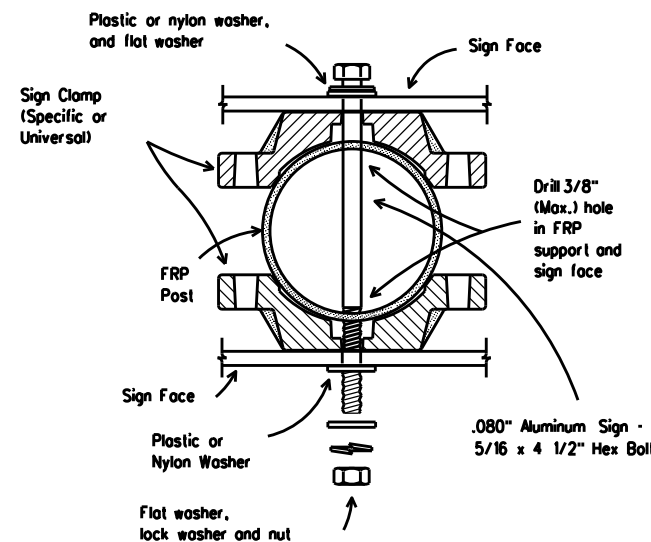
BOLT DOWN SIGN SUPPORT

- Position base plate with coupler on existing concrete.
- Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
- Attach sign to FRP post.
- Insert bottom of sign post into pipe stub.
- Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
- Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

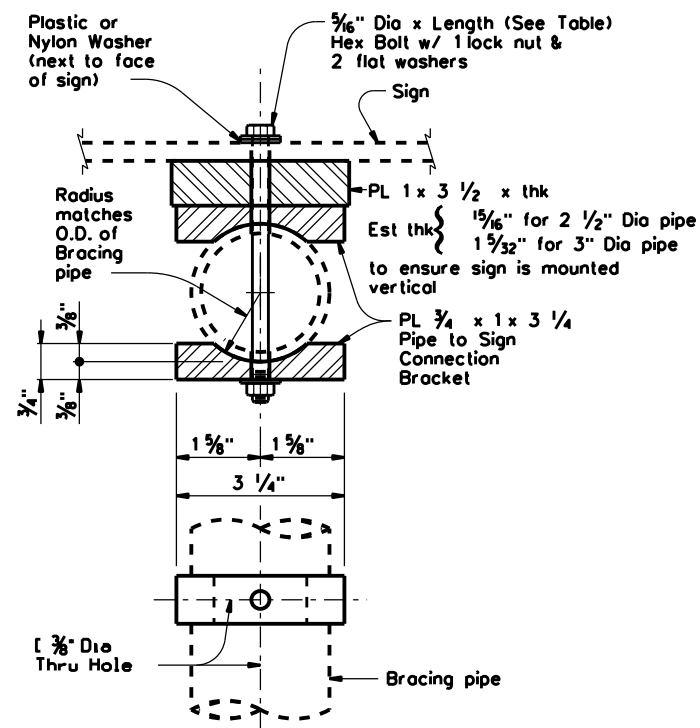
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

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		DIST	COUNTY		SHEET NO.
		LRO	DUVAL, ETC.		48

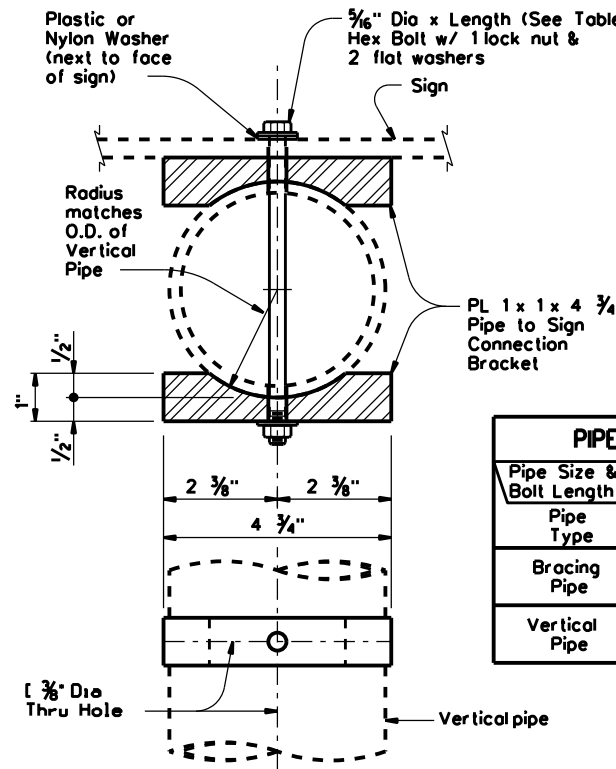
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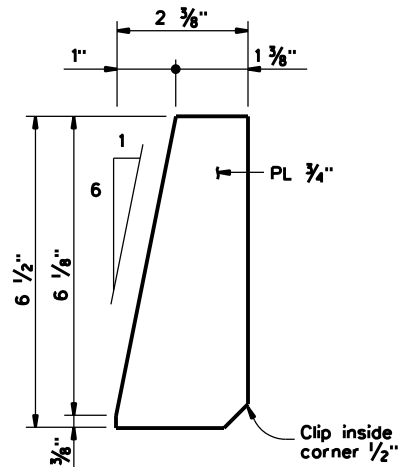
BRACING PIPE TO SIGN CONNECTION BRACKET DETAILS

(Showing T Mounting)

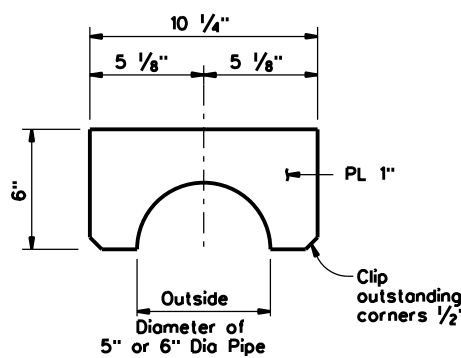


LARGE PIPE TO SIGN CONNECTION BRACKET DETAILS

(Showing P or T Mounting)

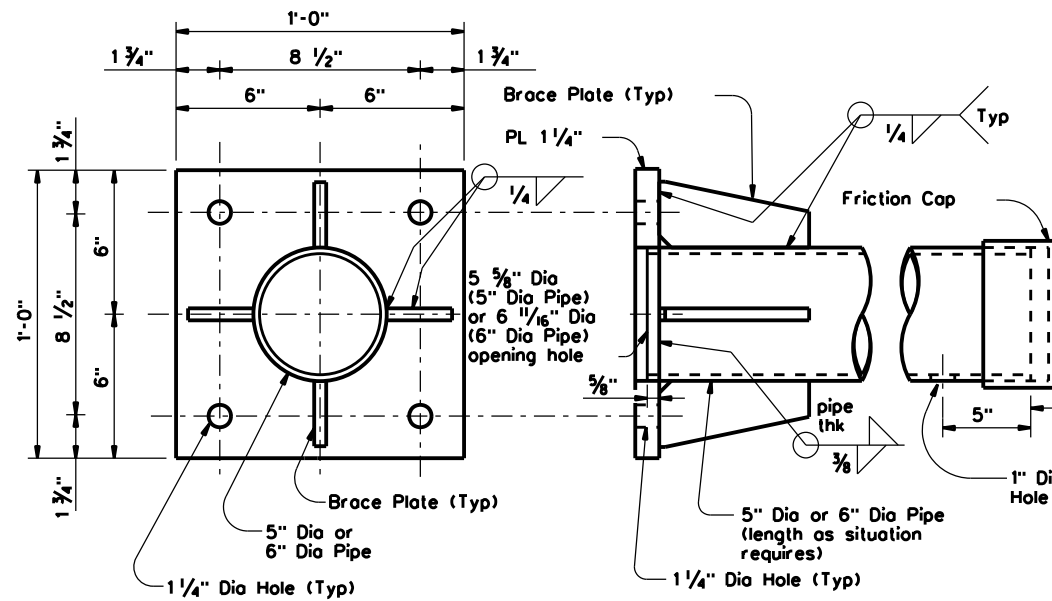


BRACE PLATE DETAILS

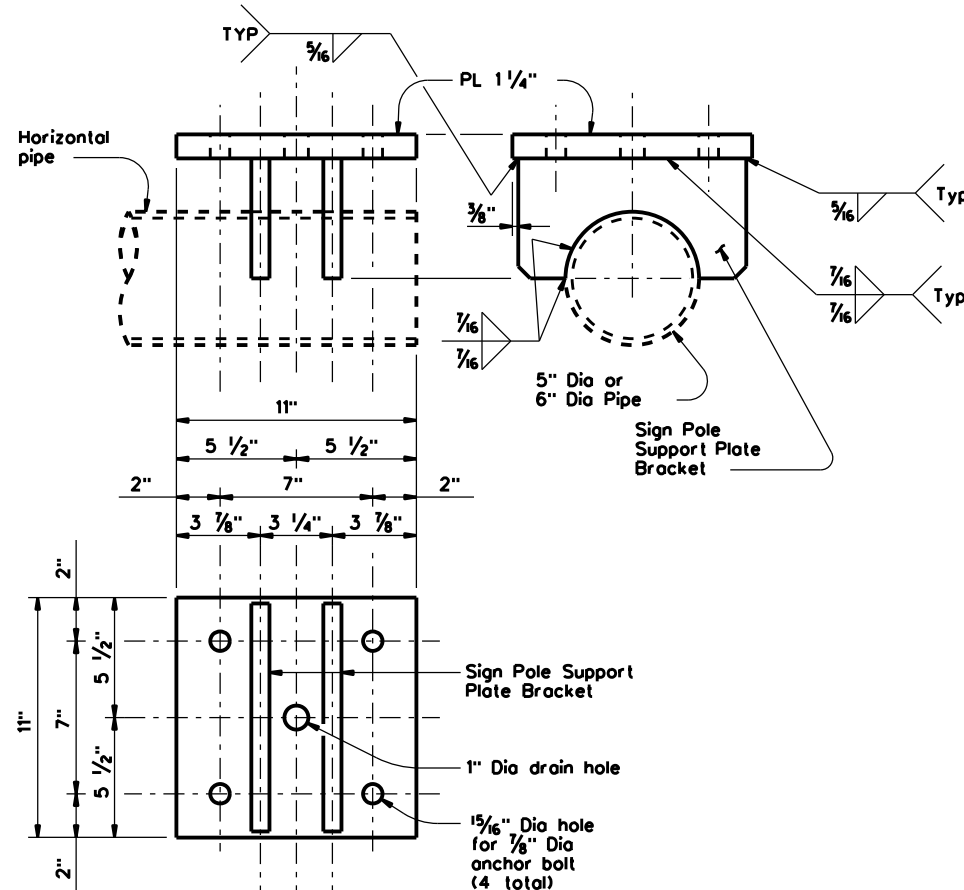


SIGN POLE SUPPORT PLATE BRACKET DETAILS

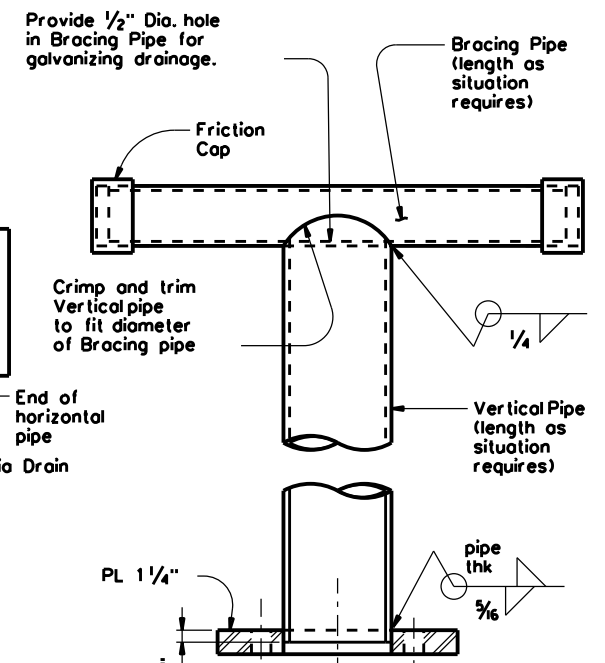
PIPE AND BOLT SPECIFICATIONS		
Pipe Size & Bolt Length	Nominal Pipe Dia (in.)	Bolt Length (in.)
Bracing Pipe	2 1/2	6
Vertical Pipe	3	7
Vertical Pipe	4	7
Vertical Pipe	5	8



BASE PLATE DETAILS



SIGN POLE SUPPORT PLATE DETAILS



SIGN POLE & POLE BASE PLATE DETAILS

(Showing only T Mounting)

SHEET 2 OF 3

Texas Department of Transportation
 Traffic Operations Division Standard

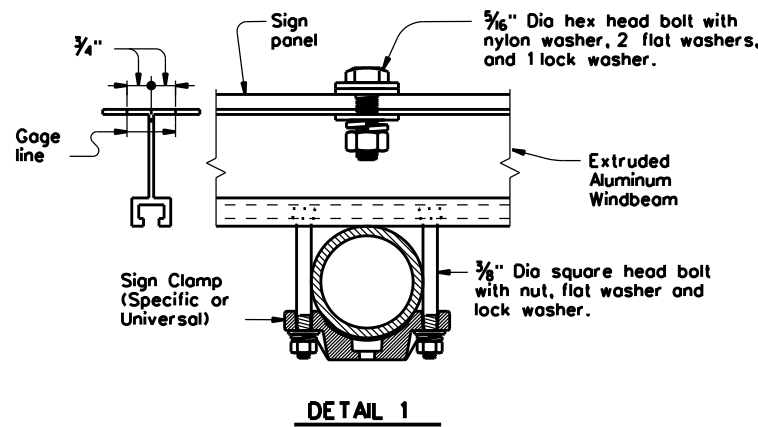
BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-2)-14

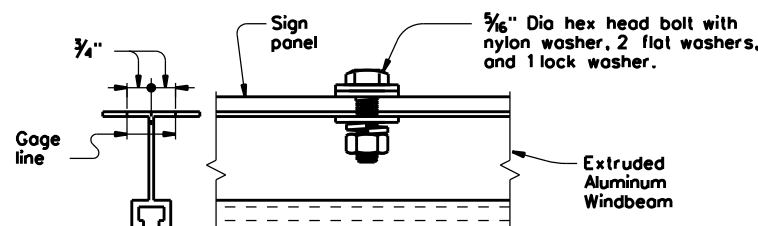
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© TxDOT August 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
DIST	COUNTY		SHEET NO.	
LRD	DUVAL, ETC.		50	

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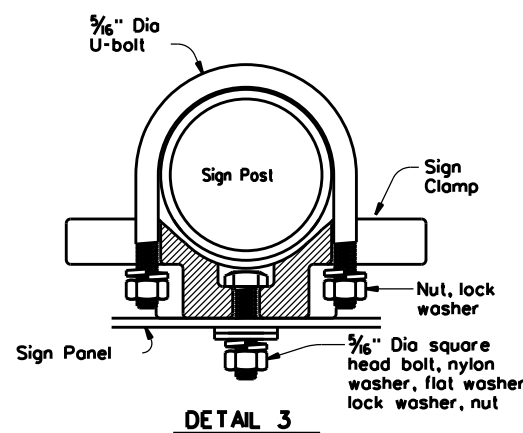
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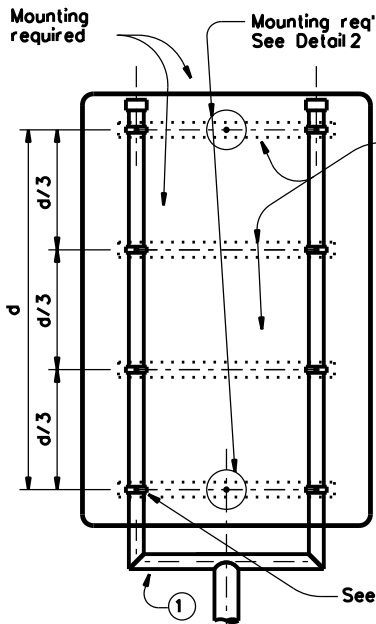
DETAIL 1



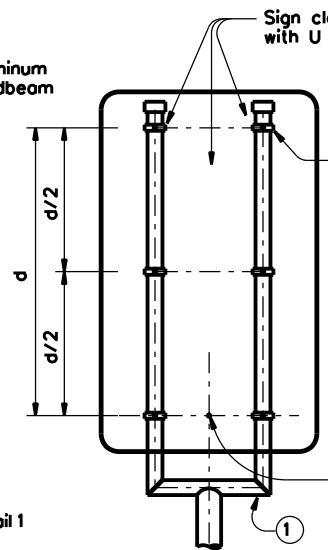
DETAIL 2



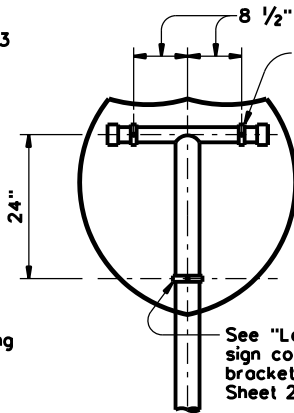
DETAIL 3



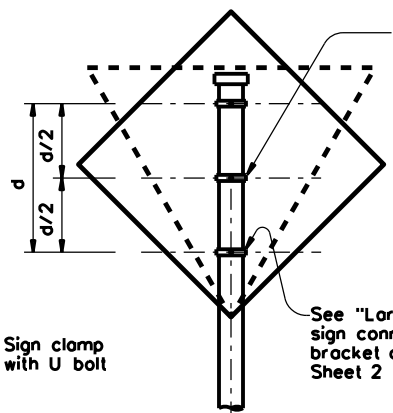
TYPE 4



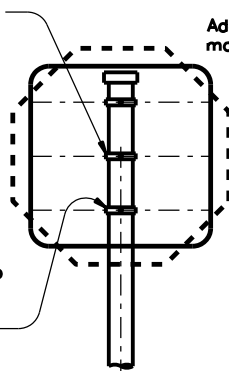
TYPE 32



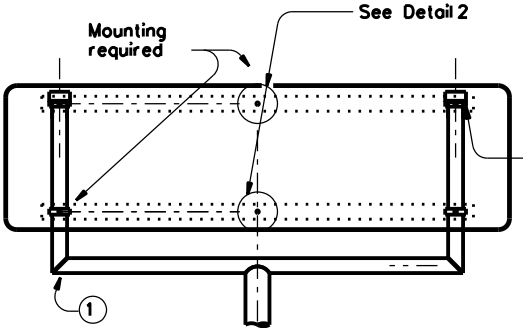
TYPE SPECIAL



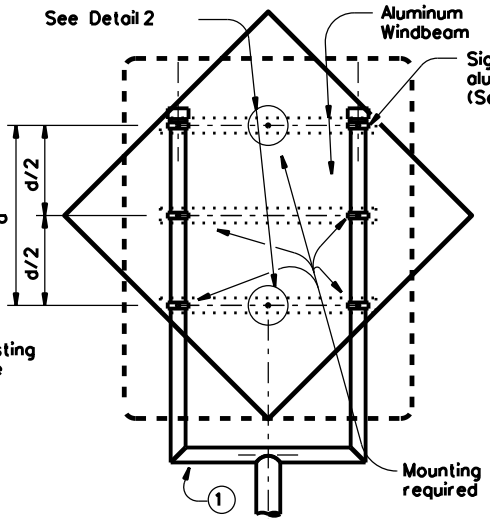
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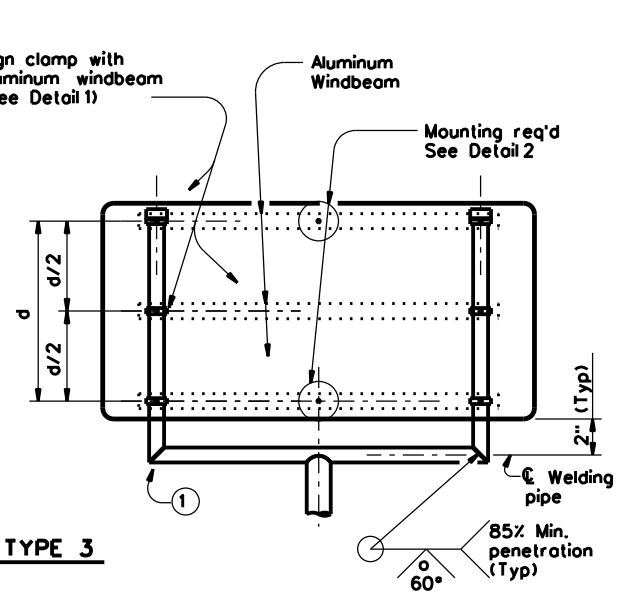
TYPE 2



TYPE 23



TYPE 3



SIGN SHAPE	SQUARE			HORIZONTAL RECTANGLE			VERTICAL RECTANGLE			DIAMOND			OCTAGON			EQUILATERAL TRIANGLE			INTERSTATE SHIELD			PENTAGON (SCHOOL)			
	Type of Sign Mounting on SHSD	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	T	U	P	P	T			
90 mph					(Type 23) 60"x48"				(Type 2) 36"x48"	(Type 32) 36"x60"										(Type 3) 60"x60"			(Type Special) 45"x36"		
130 mph	(Type 1) 30"x30"	(Type 3) 48"x48"		(Type 1) 36"x24"	(Type 1) 36"x30"	(Type 23) 48"x42"	(Type 3) 54"x42"	(Type 3) 60"x30"	(Type 3) 66"x36"	(Type 3) 84"x24"	(Type 3) 72"x36"	(Type 3) 78"x36"	(Type 1) 30"x36"	(Type 1) 30"x42"	(Type 3) 48"x60"	(Type 1) 36"x36"	(Type 3) 48"x48"	(Type 3) 60"x60"			(Type 1) 48"x48"			(Type Special) 36"x36"	(Type Special) 45"x36"
					(Type 3) 60"x48"				(Type 3) 72"x30"	(Type 3) 84"x24"				(Type 3) 36"x48"											

Notes: 1. Drillholes in addition to the hole pattern of the Standard Highway Sign Designs for Texas (SHSD) at specified locations to meet a stipulated-type mounting indicated in the parenthesis ().
 2. "Blank" in the above table indicates all other signs excluded from stipulated mounting shall be mounted in accordance with SHSD.

① In lieu of welding, the Fabricator may bend bracing pipe elbows if the following conditions are met:
 a. Spacing between vertical bracing pipes is equal to or greater than 2'-6".
 b. Bending radius is 12".
 c. The distance between the lowest clamp and centerline of horizontal bent pipe is 13" max.

SHEET 3 OF 3

Texas Department of Transportation
 Traffic Operations Division Standard

BRIDGE RAILING SIGN MOUNT DETAILS

SMD(BR-3)-14

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REVISIONS	0086	09	042, ETC	SH359, ETC.
DIST	COUNTY		SHEET NO.	
LRD	DUVAL, ETC.		51	

DATE: 7/26/2024 11:50:39 AM
 FILE: T:\LRD\TRORPR\1.Traffic Operations\Folders\PS&E\0806-09-042 -Districtwide Curbside Signage\0806-09-042.dwg
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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE		INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX) NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRFL = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount DIRECTION If Required Bi = Bi-Directional BR = Bi-Directional with red on back
SHEETING: Yellow, White or Red Type B or C reflective sheeting				SHEETING: Yellow, White or Red Type B or C Reflective Sheeting					
NOTE: 1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE: WC, YFLX, WFLX, GND				MOUNT TYPE: GND, SRF	

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

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

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.			
DEVICE	GF1	GF2	CTB	W1-8		W1-6						
SHEETING: Yellow, White, Red			NOTE: 1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.									
NOTE: 1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.			SIZE (W x L)		18" x 24" (Conventional)	24" x 30" (Conventional Oversize)	30" x 36" (Expressway)	36" x 48" (Freeway)	SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)	
			MOUNTING HEIGHT		4'-0" or 7'-0"		7'-0" Only		MOUNTING HEIGHT		7'-0"	
			NOTE: 1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).									

Texas Department of Transportation
 Traffic Safety Division Standard

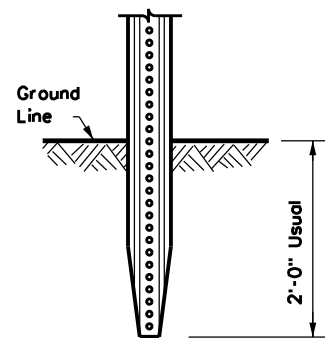
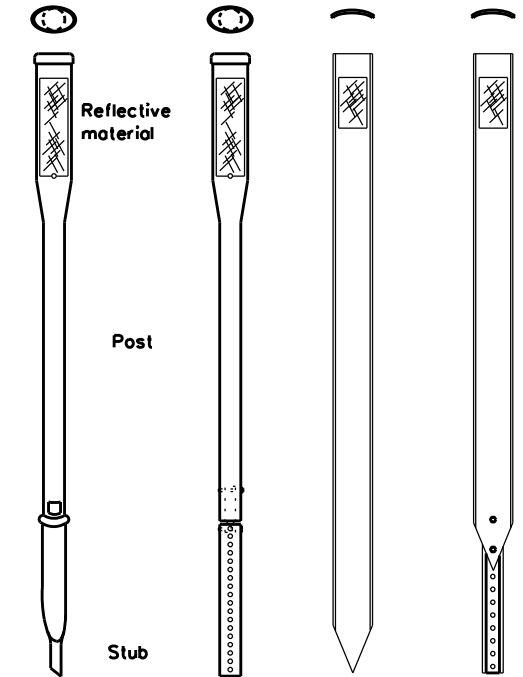
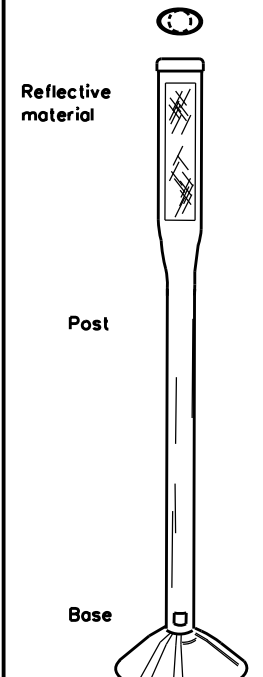
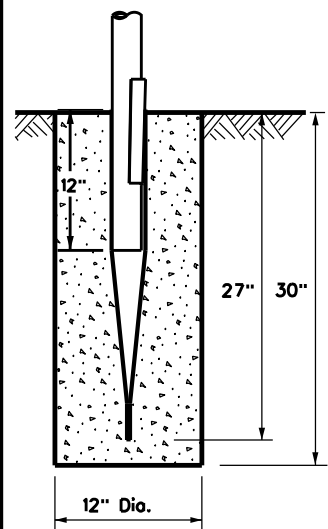
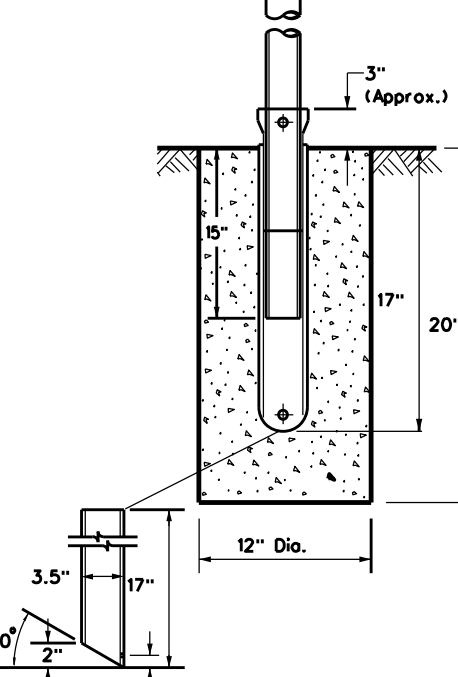
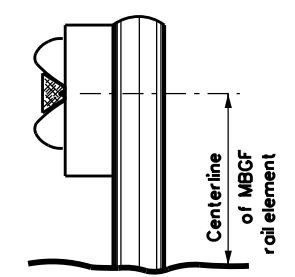
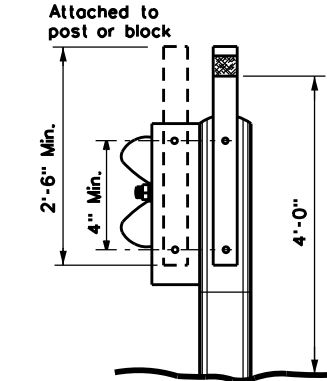
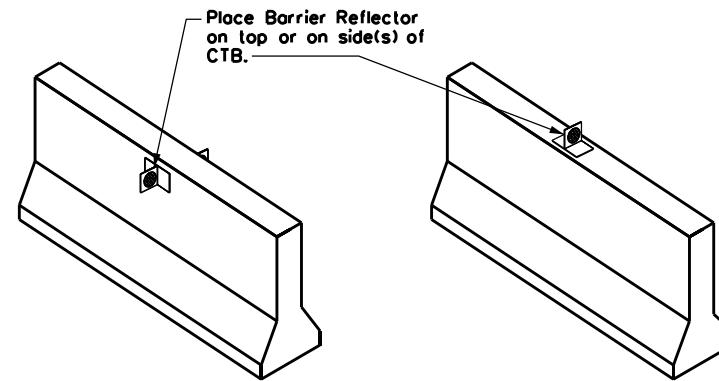
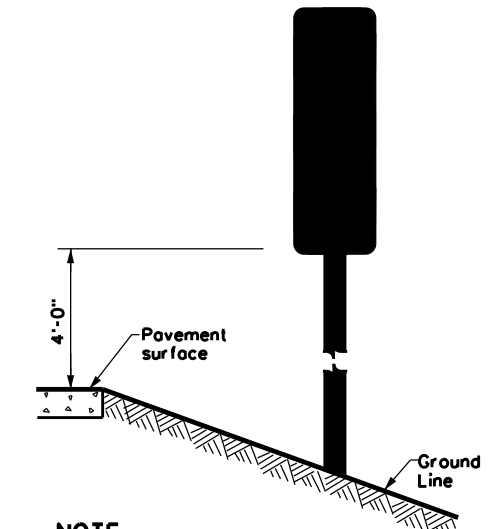
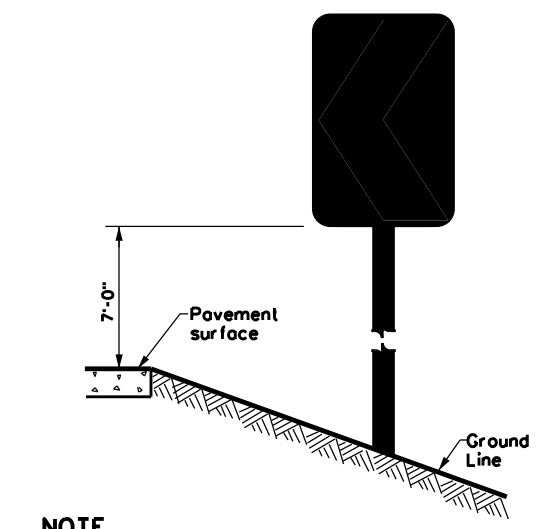
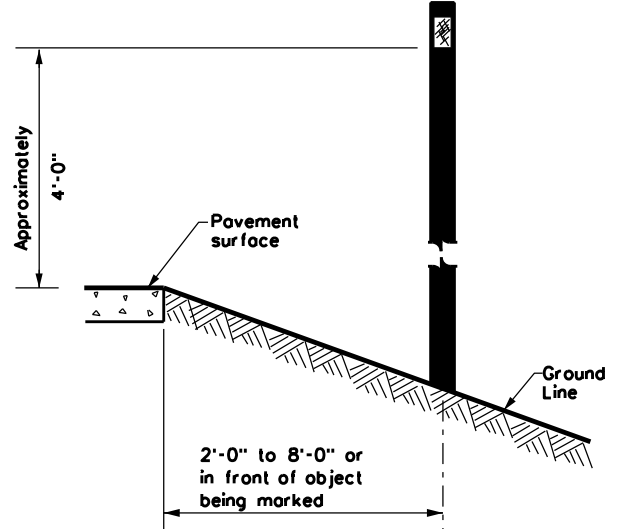
DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION


D & OM(1)-20

FILE: doml:20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042.ETC	SH359.ETC.
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	LRD	DUVAL.ETC.	52	

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POST TYPE AND SUPPORT FOUNDATION DETAILS				TYPE OF BARRIER MOUNTS		
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT	
GND	GND	SRF	WAS	WAP	GF1	
						
	EMBEDDED		SURFACE MOUNT	STEEL	PLASTIC	
NOTES 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only. 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.		NOTES 1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices. 2. Install per manufacturer's recommendations. 3. Post length may vary to meet field conditions. 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.		NOTE 1. Install per manufacturer's recommendations.		CONCRETE TRAFFIC BARRIER (CTB) GENERAL NOTES 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement. 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction. 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible. 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation. 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface. 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS		CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN		DELINEATORS AND TYPE 2 OBJECT MARKERS		
						
NOTE Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)		NOTE Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.		See general notes 1, 2 and 3.		



Texas Department of Transportation
Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

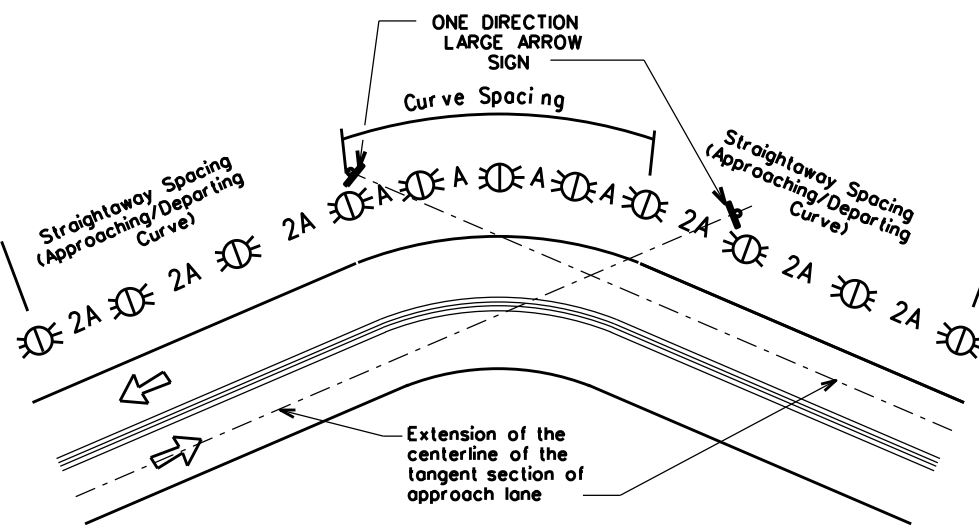
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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086 09	042 ETC	SH359 ETC	
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	LRO	DUVAL ETC	53	

DATE: 7/26/2024 11:50:40 AM
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MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

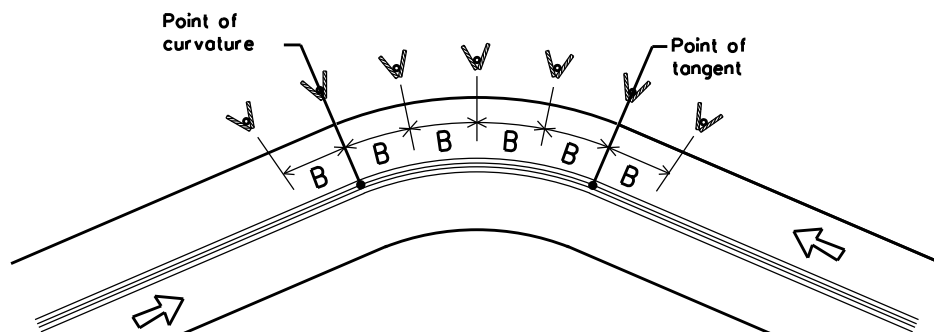
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

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

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

DELINEATOR AND CHEVRON SPACING

Advisory Speed (MPH)	WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN		
	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation
Traffic Safety Division Standard

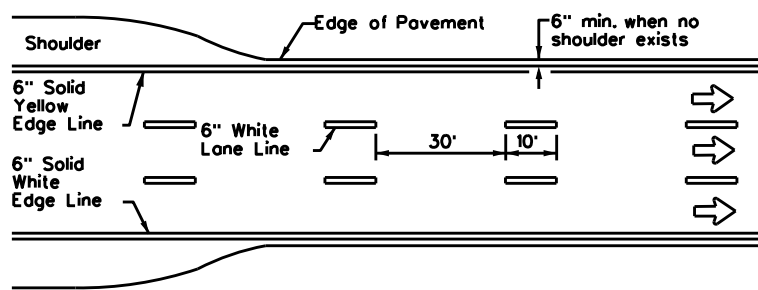
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

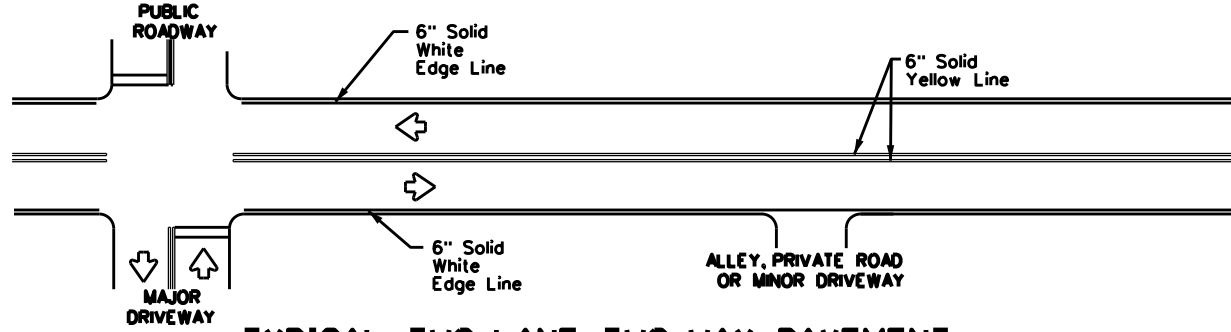
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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC.	SH359, ETC.
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	LRD	DUVAL, ETC.	54	

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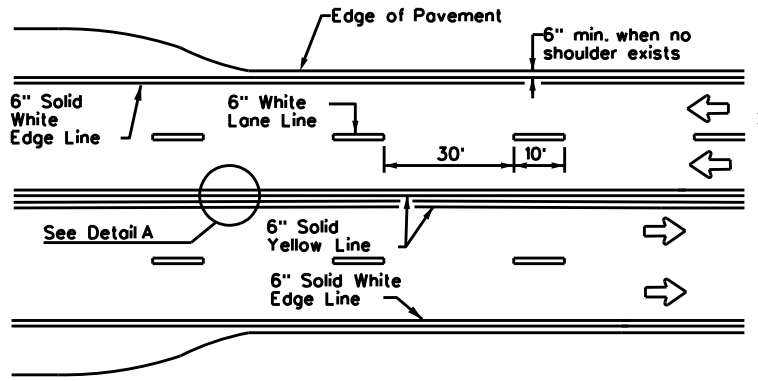
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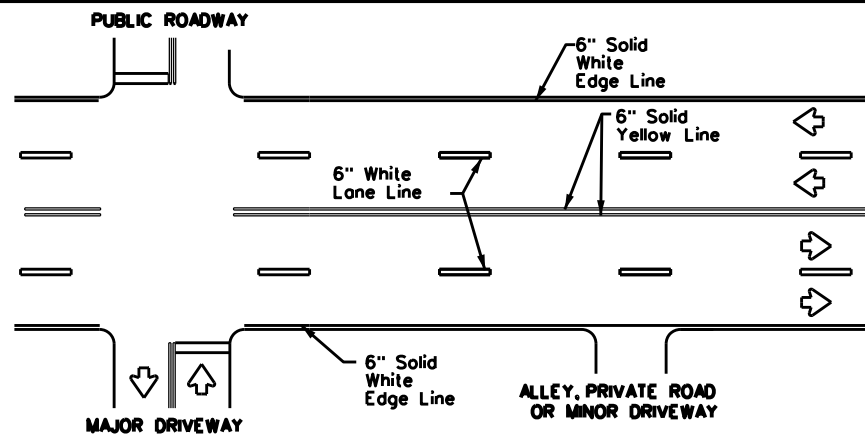
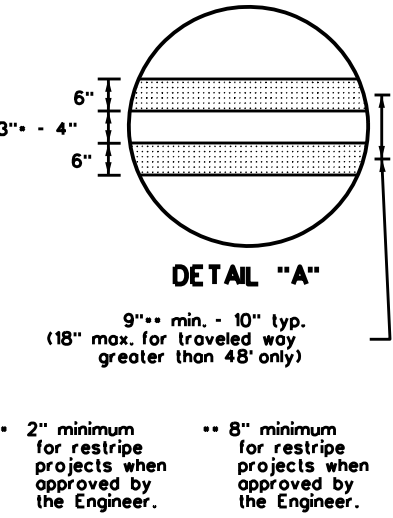
**EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



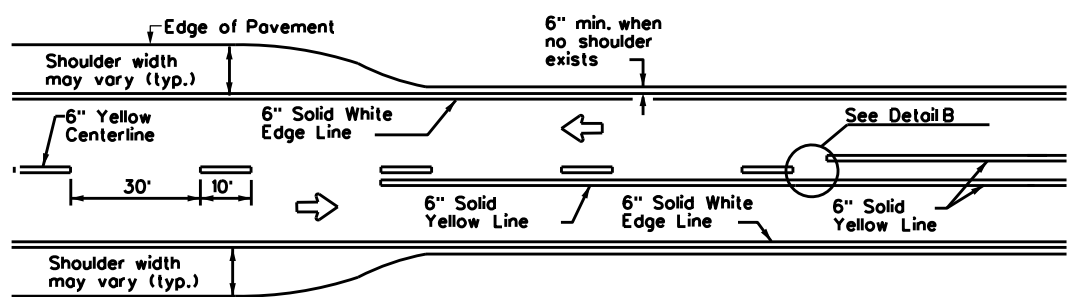
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



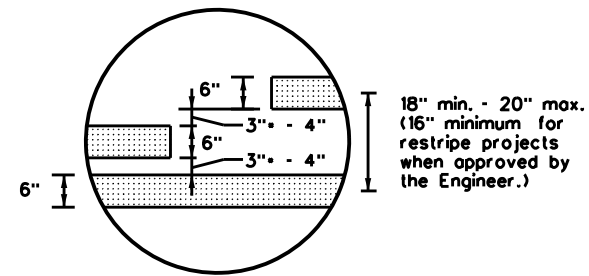
**CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



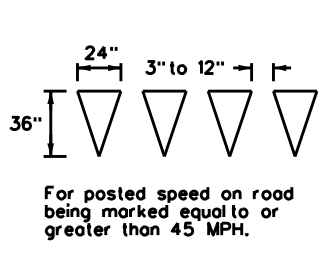
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



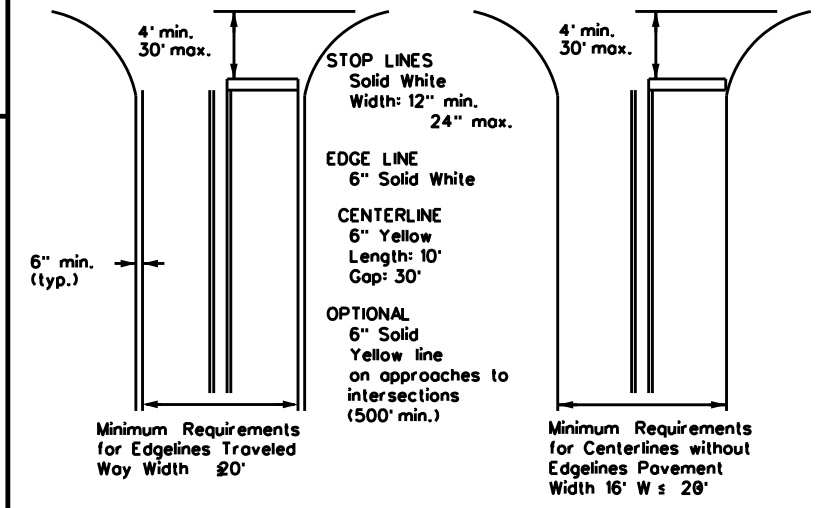
**TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



DETAIL "B"

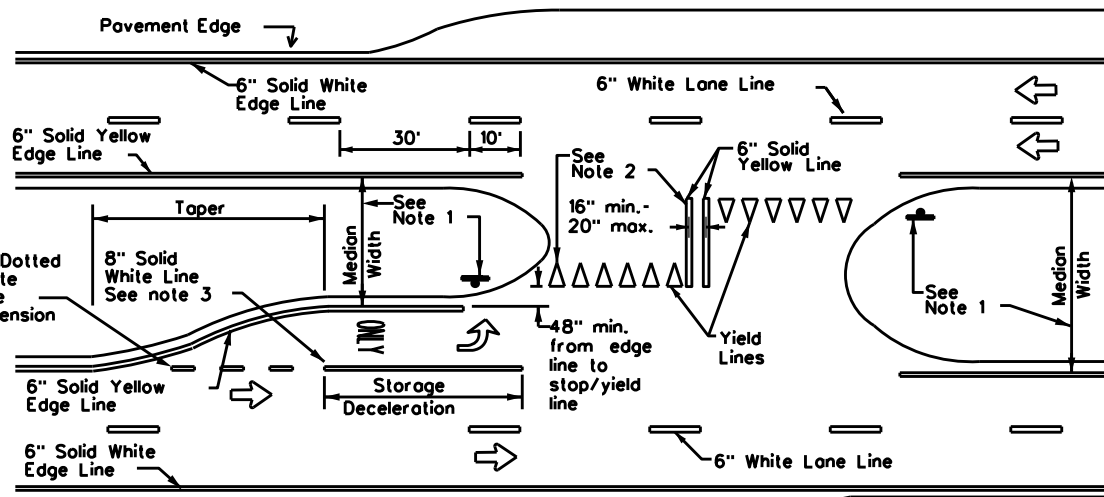


YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
- 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.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

- 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.
- 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.

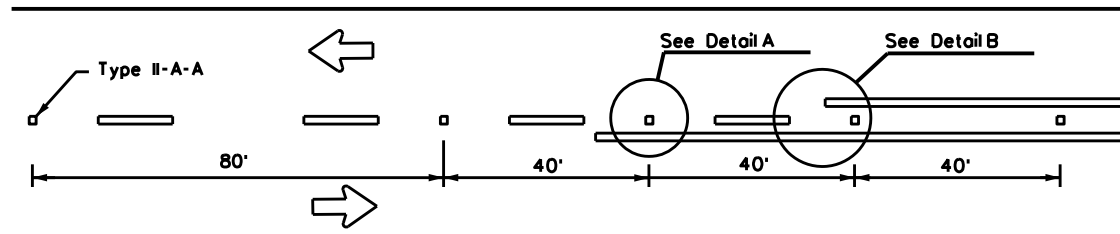
**TYPICAL STANDARD
PAVEMENT MARKINGS**

PM(1)-22

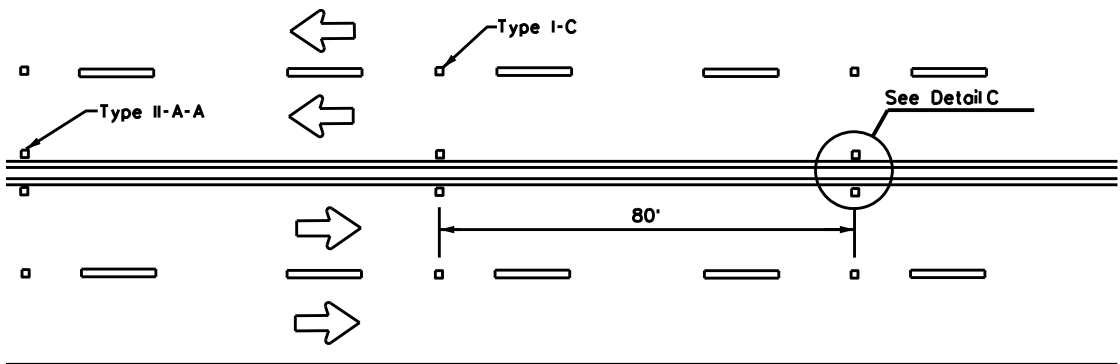
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© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
11-78 8-00 6-20	DIST	COUNTY	SHEET NO.	
8-95 3-03 12-22	LRD	DUVAL, ETC.	55	
5-00 2-12				

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

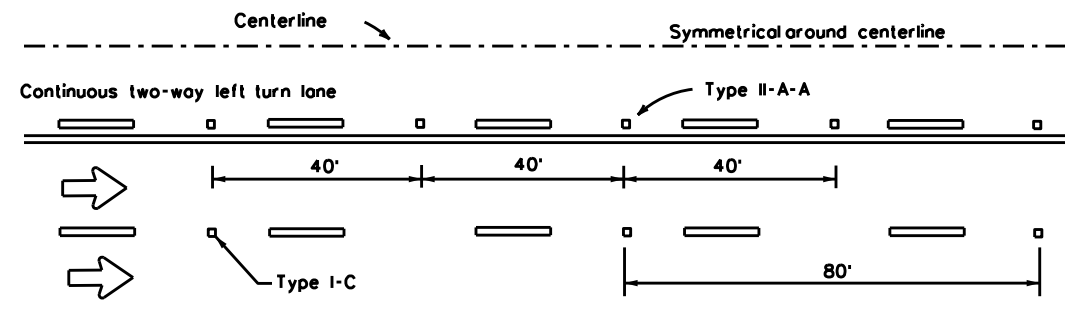
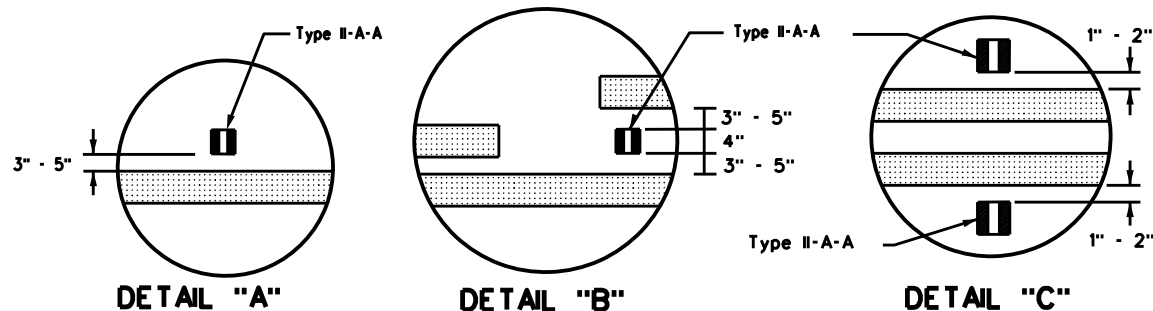
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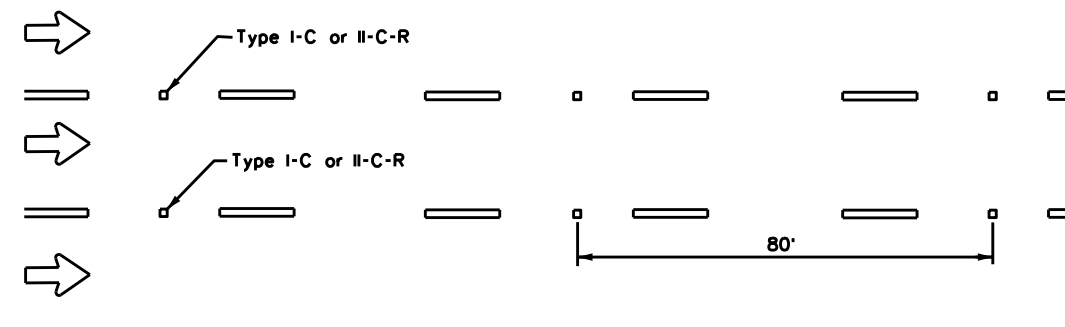
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



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

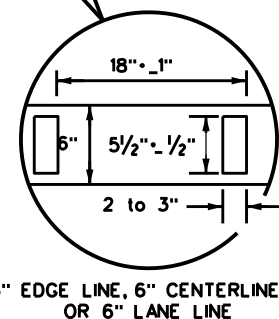
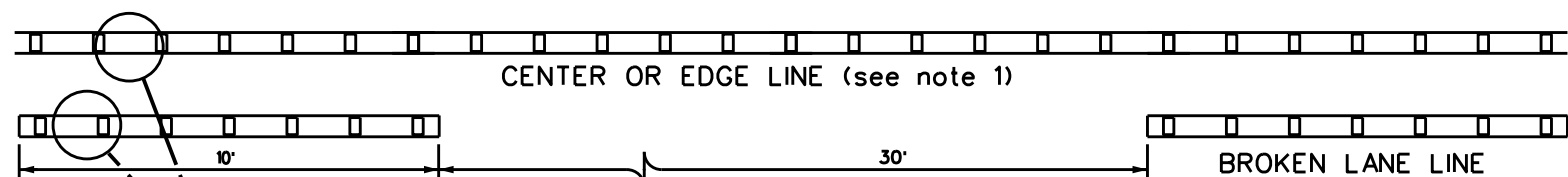


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

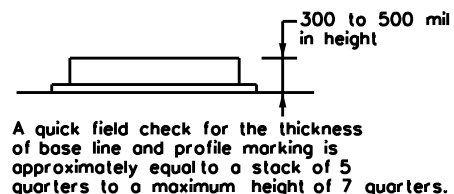


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



**REFLECTORIZED PROFILE
PATTERN DETAIL
USING REFLECTIVE PROFILE PAVEMENT MARKINGS**



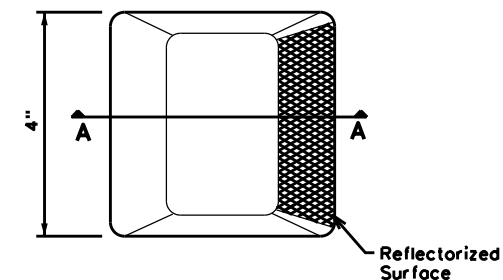
A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

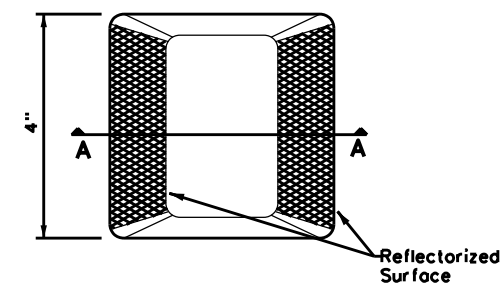
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

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

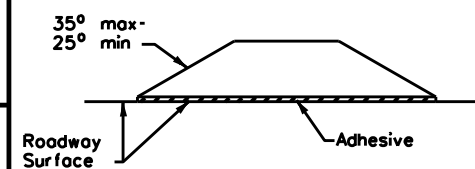
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

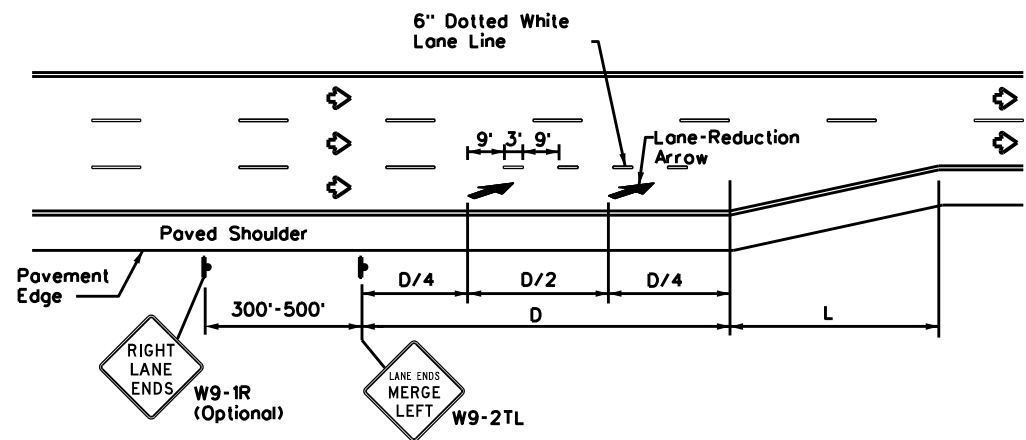


**POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2)-22**

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	LRD	DUVAL, ETC.	56	
5-00 2-12				

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DATE: 7/26/2024 11:50:46 AM
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LANE REDUCTION

NOTES

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.

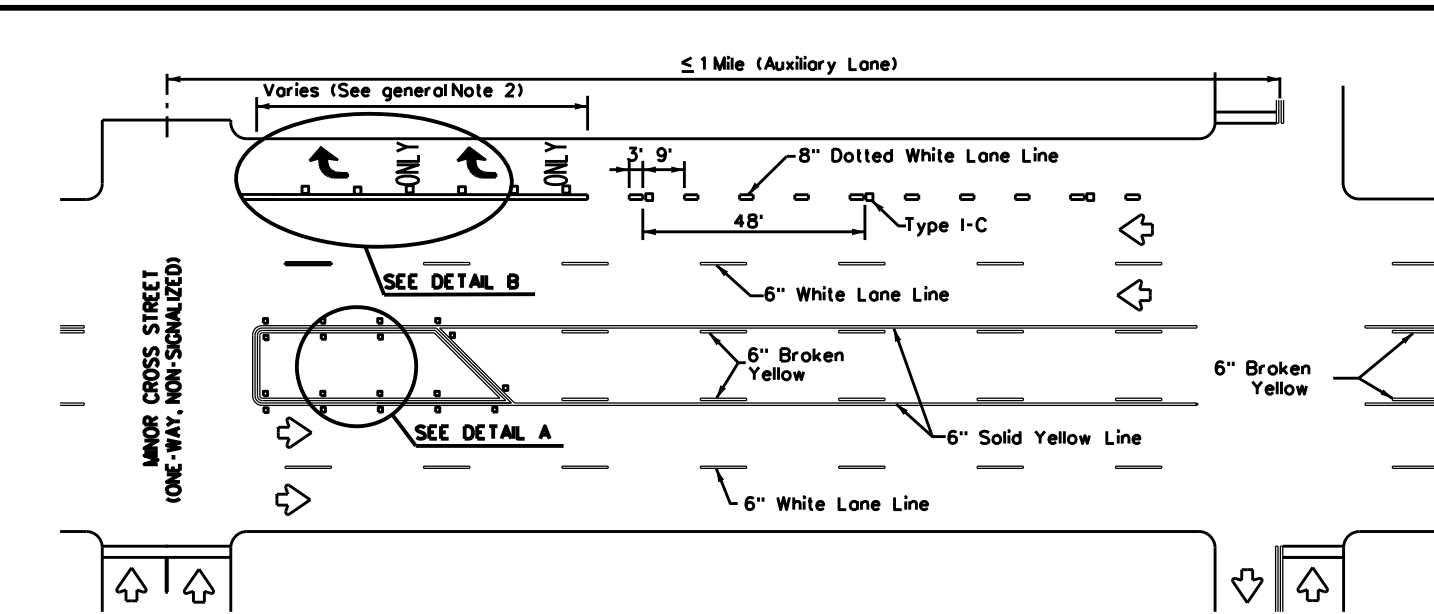
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	L = $\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	L = WS
45 MPH	775	
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

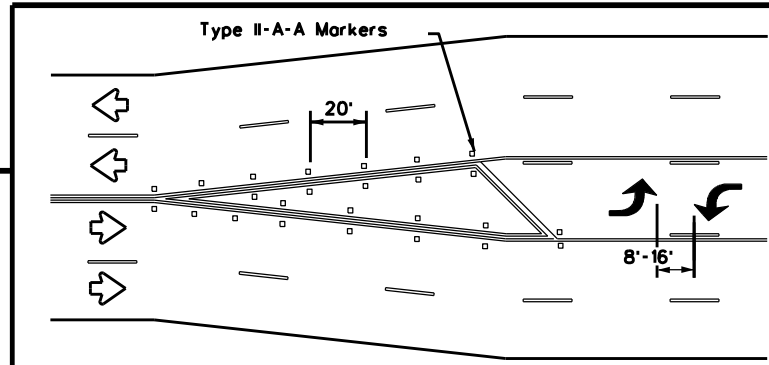
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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 lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

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

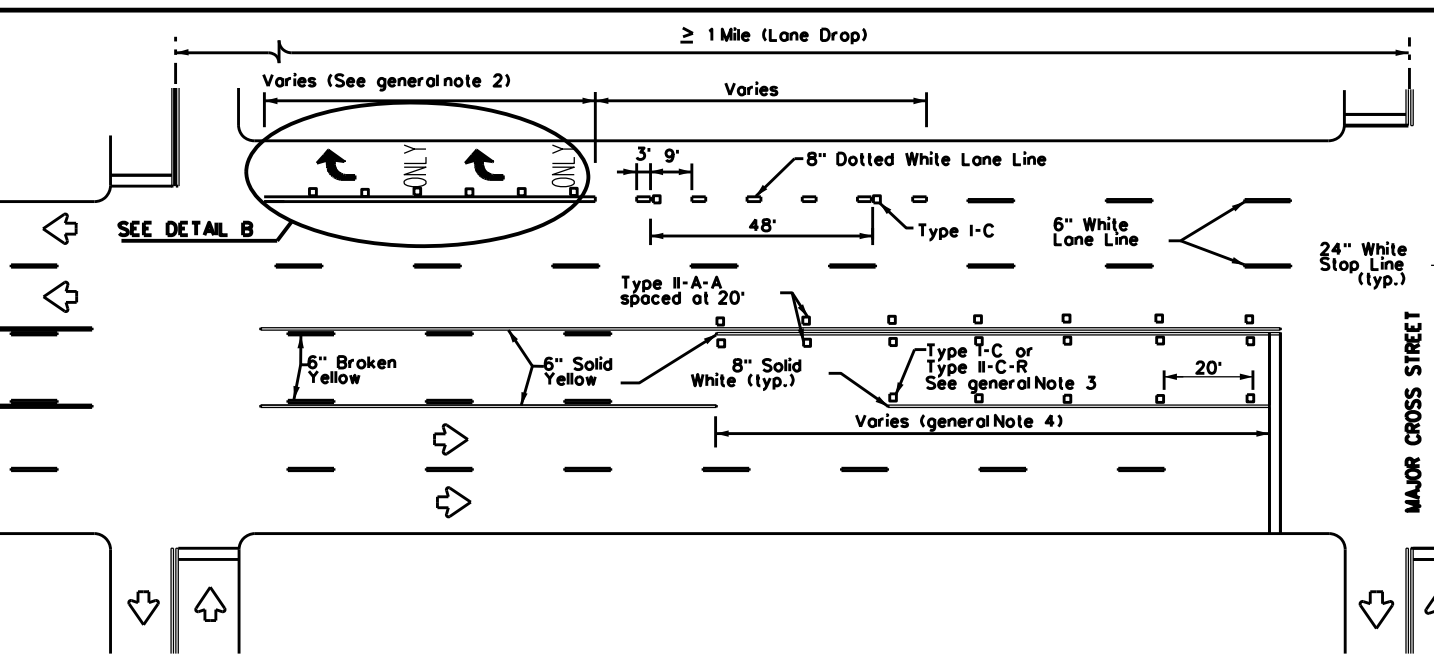


TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE

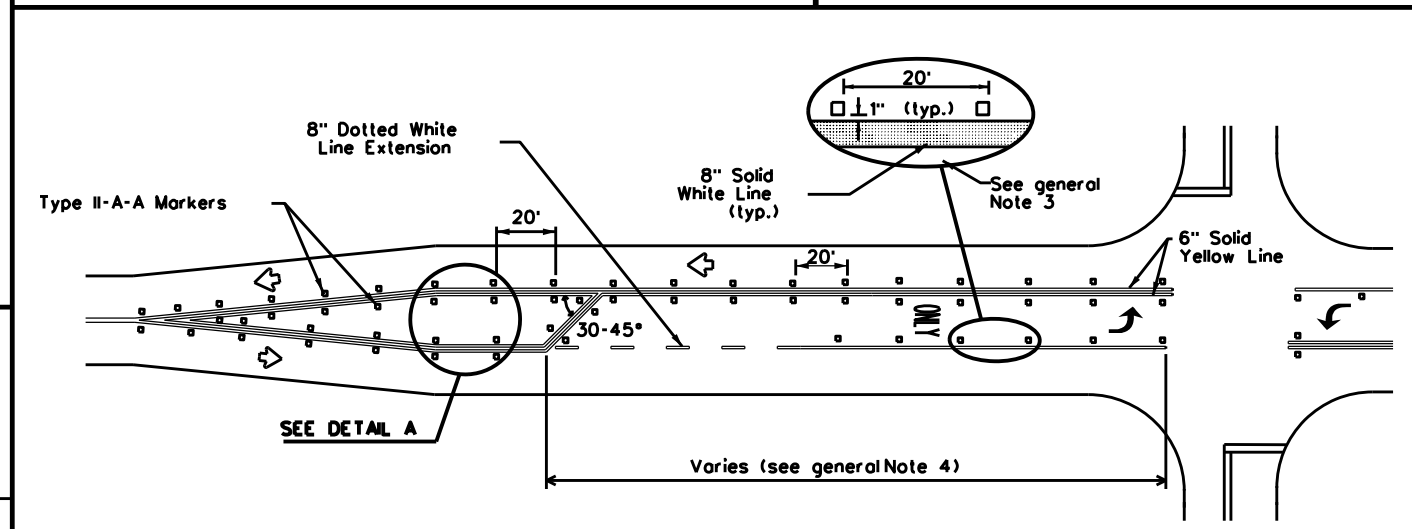


A two-way left-turn (TWL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

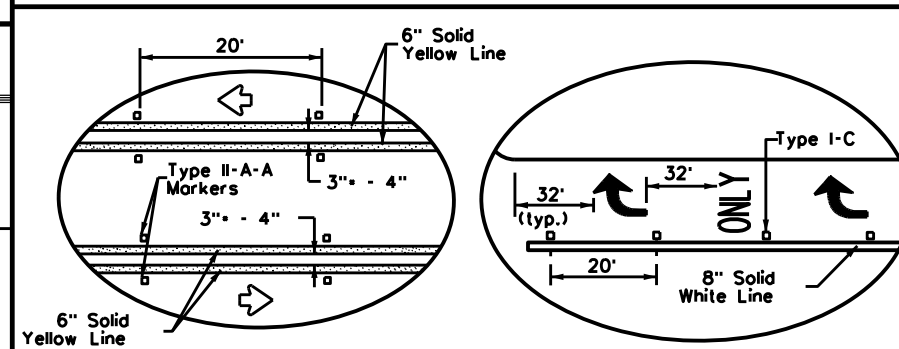
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A

DETAIL B

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

Texas Department of Transportation
 Traffic Safety Division Standard

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

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
4-98 3-03 6-20	DIST	COUNTY	SHEET NO.	
5-00 2-10 12-22	LRD	DUVAL, ETC.	57	
8-00 2-12				

DATE: 7/26/2024
 FILE: T:\LDR\TRPR\1.Traffic Operations Folders\PS&E\0086-09-042 -Districtwide Curves\Standards\EPIC.DGN
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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. City of Laredo

2. No Action Required Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

- No Permit Required
- Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
- Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
- Individual 404 Permit Required
- Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

- 1.
- 2.
- 3.
- 4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
<input type="checkbox"/> Temporary Vegetation	<input type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Mulching	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

No Action Required Required Action

Action No.

- 1.
- 2.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

No Action Required Required Action

Action No.

- 1.
- 2.
- 3.
- 4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

No Action Required Required Action

Action No.

1. Texas Horned Lizard - The Contractor will avoid harvester ant mound in the selection of PSLs where feasible
2. Texas Tortoise - The Contractor should cover utility trenches overnight, and should visually inspect all trenches before filling.
3. Reticulated Collared Lizard - This lizard may potentially occur in the project area. The Contractor shall avoid harming or handling this species.
4. Texas Indigo Snake - This snake may potentially occur in the project area. The Contractor shall avoid harming or handling this species.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If coves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP: Best Management Practice	SPOC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MSA: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOI: Notice of Intent	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NO: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labeling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

Yes No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

Yes No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

No Action Required Required Action

Action No.

- 1.
- 2.
- 3.


VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

No Action Required Required Action

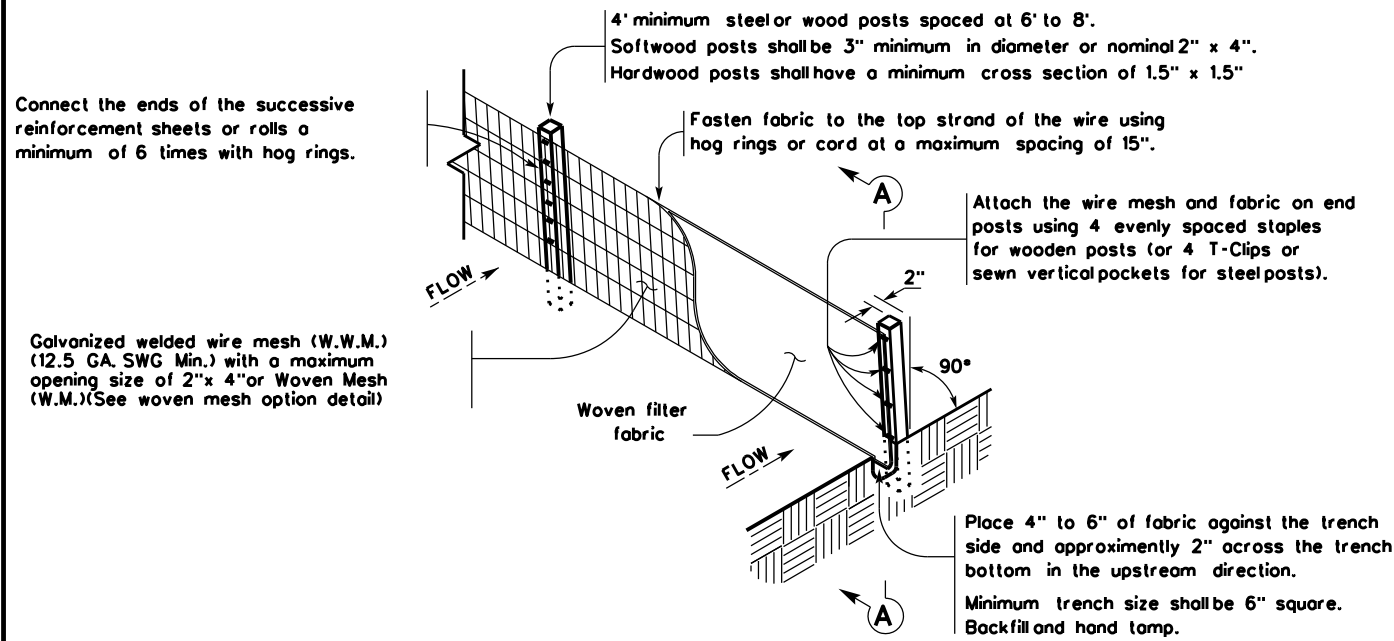
Action No.

- 1.
- 2.
- 3.

 Texas Department of Transportation		Design Division Standard		
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC				
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS	0086	09	042, ETC	SH359, ETC.
09-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.	
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	LRO	DUVAL, ETC.	58	

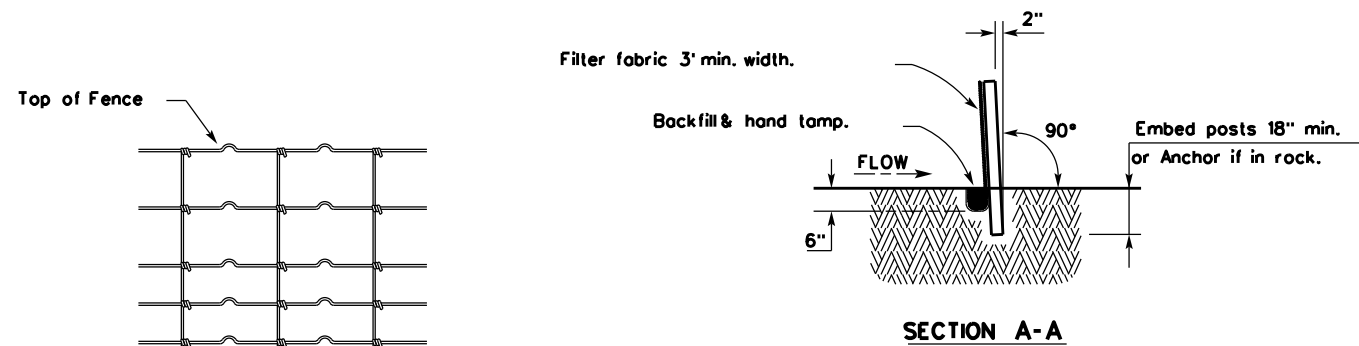
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TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA. SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

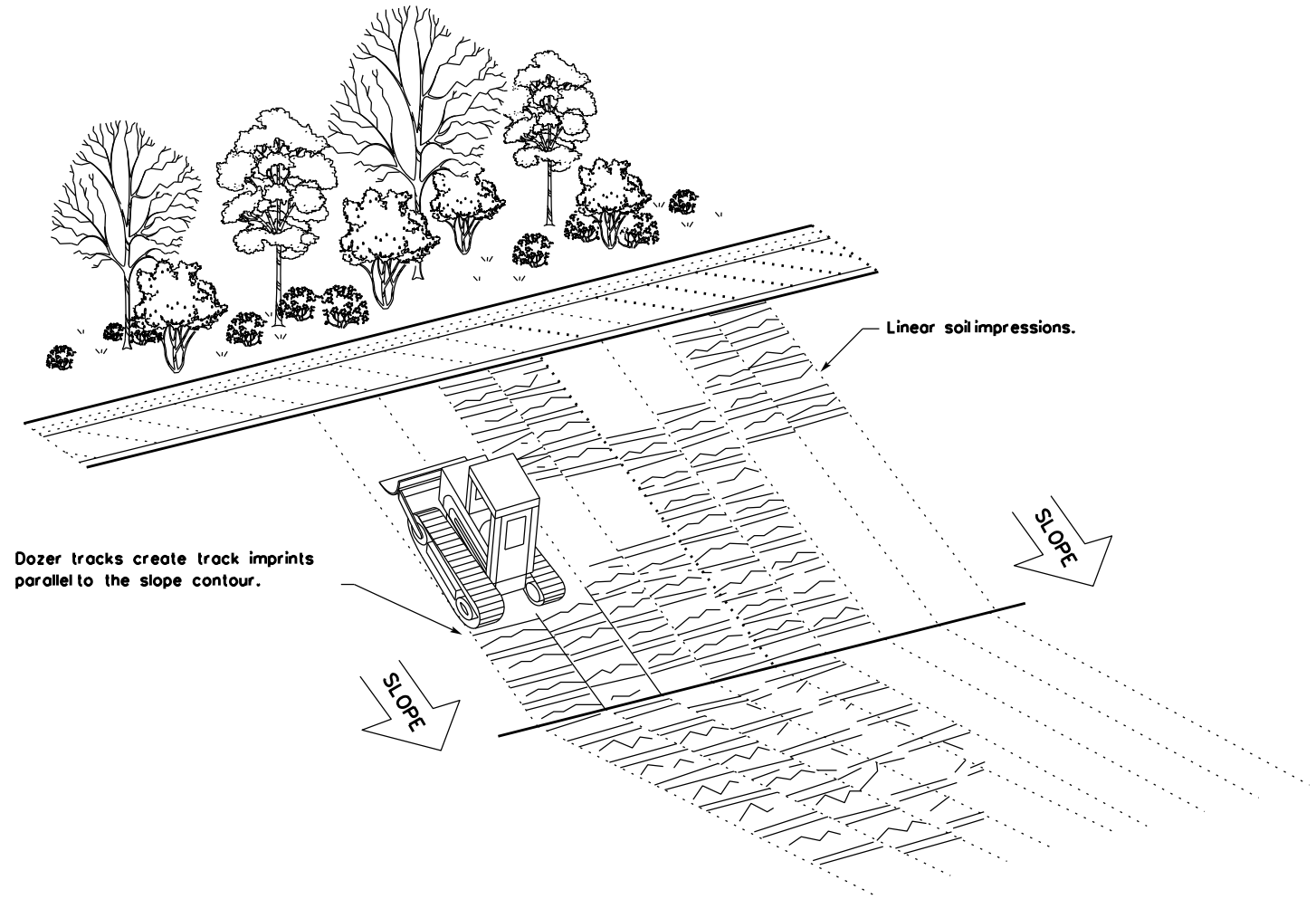
Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

LEGEND

Sediment Control Fence
 SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING



TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0086	09	042, ETC	SH359, ETC.
	DIST	COUNTY	SHEET NO.	
	LRO	DUVAL, ETC.	59	