

# STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

DESIGN SPEED = N/A  
 ADT (YR 2022) = 7,688 VPD  
 ADT (YR 2042) = 10,885 VPD

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	F 2022 (199)		1
STATE	DIST.	COUNTY	
TEXAS	HOU	FORT BEND	
CONT.	SECT.	JOB	HIGHWAY NO.
0543	02	076	FM 359

## INDEX OF SHEETS

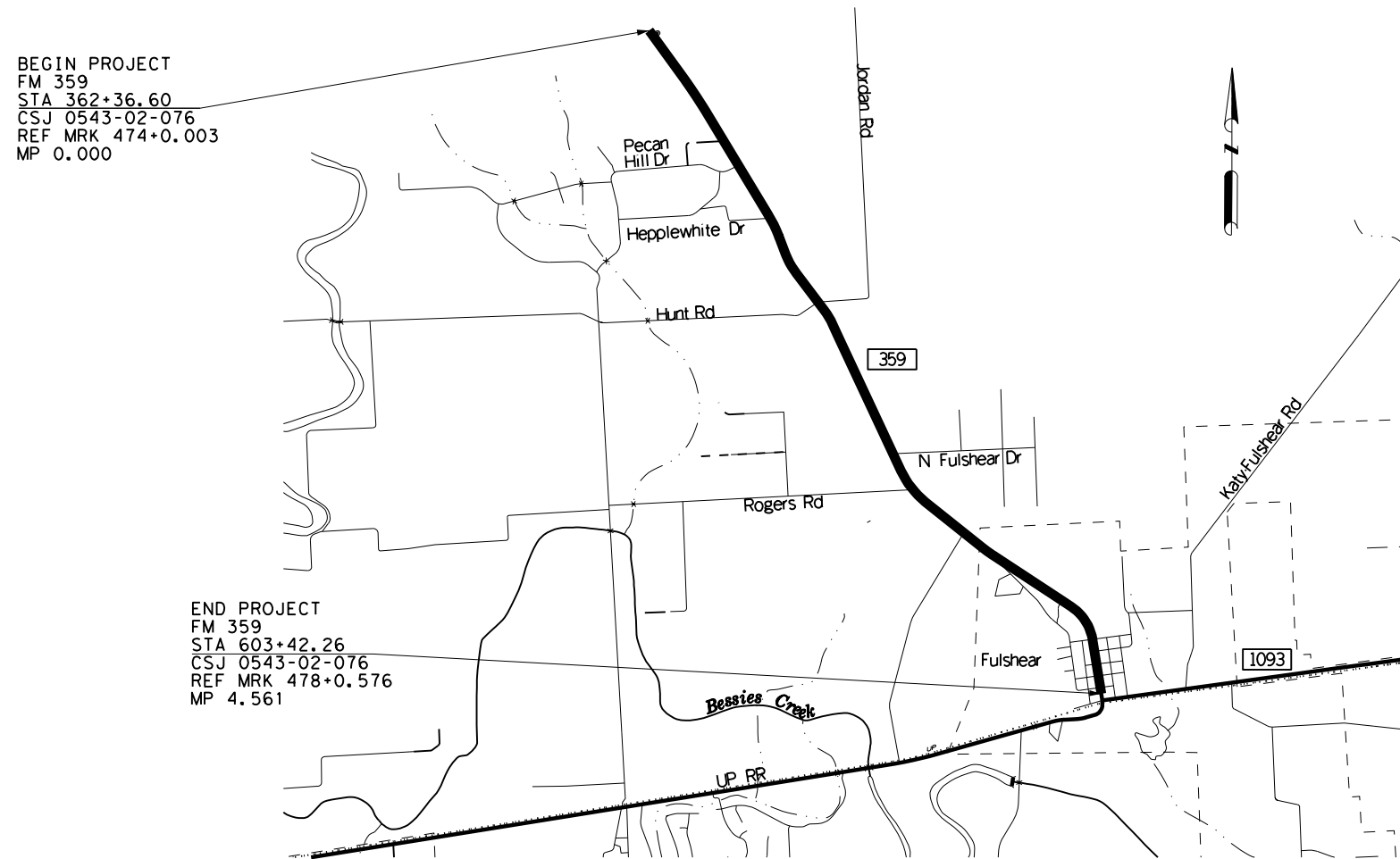
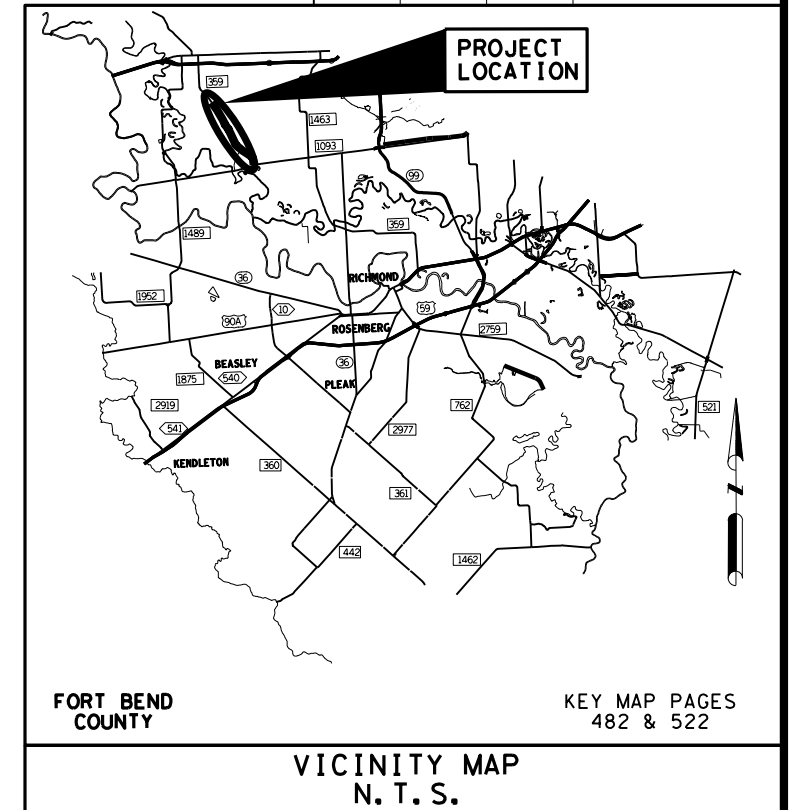
SEE SHEET 2 FOR INDEX OF SHEETS

## PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FORT BEND COUNTY  
 FM 359  
 LIMITS: WALLER COUNTY LINE TO NORTH OF FM 1093  
 PROJECT: F 2022 (199)  
 CONTROL 0543-02-076

FOR THE CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING OF  
 BASE REPAIR, 1.5" PLANING, 1.5" ACP OVERLAY,  
 MILLED RUMBLE STRIPS, SIGNING & PAVEMENT MARKINGS.

CSJ	ROADWAY LENGTH	BRIDGE LENGTH	TOTAL LENGTH
0543-02-076	24,105.66 FT / 4.565 MI	0.00 FT / 0.000 MI	24,105.66 FT / 4.565 MI



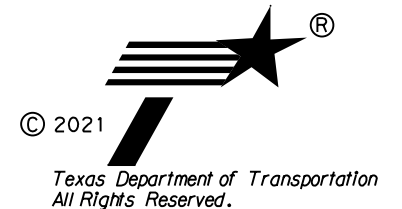
BEGIN PROJECT  
 FM 359  
 STA 362+36.60  
 CSJ 0543-02-076  
 REF MRK 474+0.003  
 MP 0.000

END PROJECT  
 FM 359  
 STA 603+42.26  
 CSJ 0543-02-076  
 REF MRK 478+0.576  
 MP 4.561

FORT BEND COUNTY  
 NO. 80

PROJECT LAYOUT MAP  
 N. T. S.

FUNCTIONAL CLASSIFICATION: RURAL MAJOR COLLECTOR



SUBMITTED FOR LETTING: 9/17/2021

DocuSigned by:  
*Carlos M. Zepeda, Jr., P.E.*  
 AREA ENGINEER  
 999EB2AF5ACE472...

APPROVED FOR LETTING: 9/22/2021

DocuSigned by:  
*Larry W. Blackburn, P.E.*  
 FORT BEND COUNTY ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND THE SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONTRACTS (FORM FHWA 1273, MAY 2012).

EQUATIONS: NONE  
 EXCEPTIONS: NONE  
 RR CROSSINGS: NONE

COUNTY FORT BEND PROJ. NO. F 2022 (199)  
 HWY. NO. FM 359 LETTING DATE 12/2021  
 DATE ACCEPTED

SHEET NO.    DESCRIPTION

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- 1    TITLE SHEET
- 2    INDEX OF SHEETS
- 3-4    PROPOSED TYPICAL SECTIONS
- 5    INTERNATIONAL ROUGHNESS INDEX DATA
- 6, 6A-6G    GENERAL NOTES
- 7, 7A    ESTIMATE & QUANTITY SHEETS
- 8    SUMMARY OF TRAFFIC CONTROL QUANTITIES
- 9    SUMMARY OF ROADWAY QUANTITIES
- 10-12    SUMMARY OF PAVEMENT MARKING QUANTITIES
- 13-14    SUMMARY OF SMALL SIGNS

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- \* 27    TRAFFIC CONTROL PLAN TYPICAL DETAILS WZ(TD)-17
- \* 28    WORK ZONE SHORT TERM PAVEMENT MARKINGS WZ(STPM)-13
- \* 29    SIGNING FOR UNEVEN LANES WZ(UL)-13
- \* 30    WORK ZONE "GIVE US A BRAKE" SIGNS WZ(BRK)-13
- \* 31    TEMPORARY RUMBLE STRIPS WZ(RS)-16
- \* 32    TCP CONVENTIONAL ROAD SHOULDER WORK TCP(1-1)-18
- 33    TCP ONE-LANE TWO-WAY TRAFFIC CONTROL TCP(1-2)-18 (MOD)
- \* 34    TCP TRAFFIC SHIFTS ON TWO LANE ROADS TCP(1-3)-18
- \* 35    TCP CONVENTIONAL ROAD SHOULDER WORK TCP(2-1)-18
- 36    TCP ONE-LANE TWO-WAY TRAFFIC CONTROL TCP(2-2)-18 (MOD)
- \* 37    TCP TRAFFIC SHIFTS ON TWO-LANE ROADS TCP(2-3)-18
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- \* 39    TCP MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/REMOVAL TCP(3-3)-14
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- 56-57    ROADWAY & DRIVEWAY DETAILS
- 58    MISCELLANEOUS DETAILS

SHEET NO.    DESCRIPTION

STANDARDS - ROADWAY

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- \* 60    GUIDELINE MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS MB-14(2)
- \* 61    MAILBOX MOUNTING AND ASSEMBLY MB(1)-21 (SHEET 1 OF 4)
- \* 62    XL AND LOCKABLE MAILBOX ASSEMBLY MB(2)-21 (SHEET 2 OF 4)
- \* 63    MAILBOX SUPPORT AND FOUNDATION MB(3)-21 (SHEET 3 OF 4)
- \* 64    NIGP PARTS LIST AND COMPATIBILITY MB(4)-21 (SHEET 4 OF 4)

**IV. TRAFFIC ITEMS**

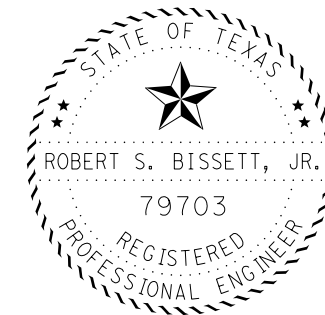
- 65    GUIDE SIGN DETAILS

STANDARDS - SIGNING & PAVEMENT MARKINGS

- \* 66-68    TYPICAL SIGN REQUIREMENT TSR(3)-13 THRU TSR(5)-13
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- \* 83    EROSION CONTROL LOG ECL-12 (HOU DIST)
- 84    ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

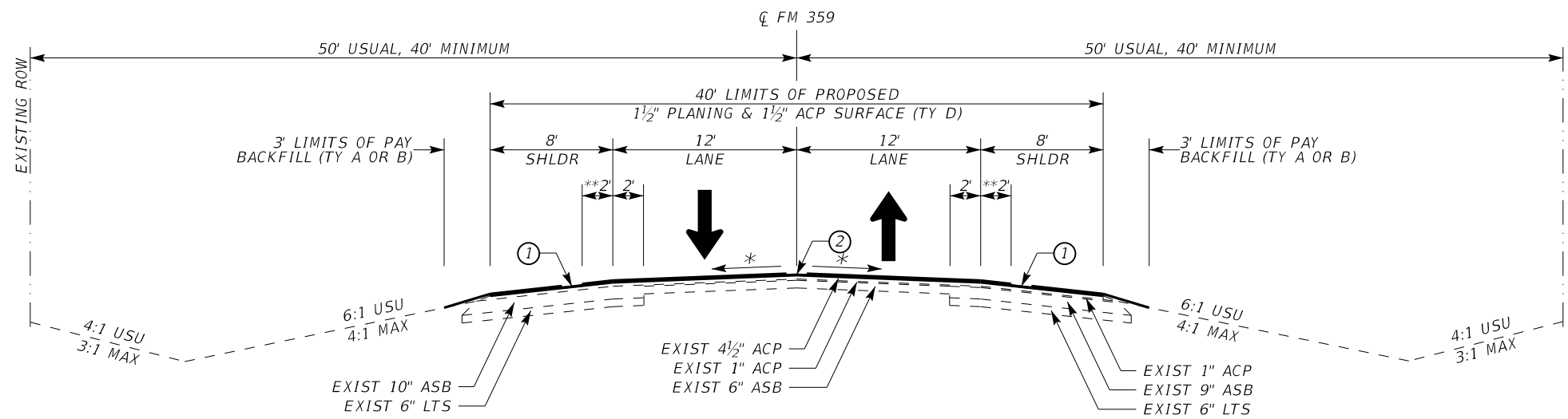


\* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

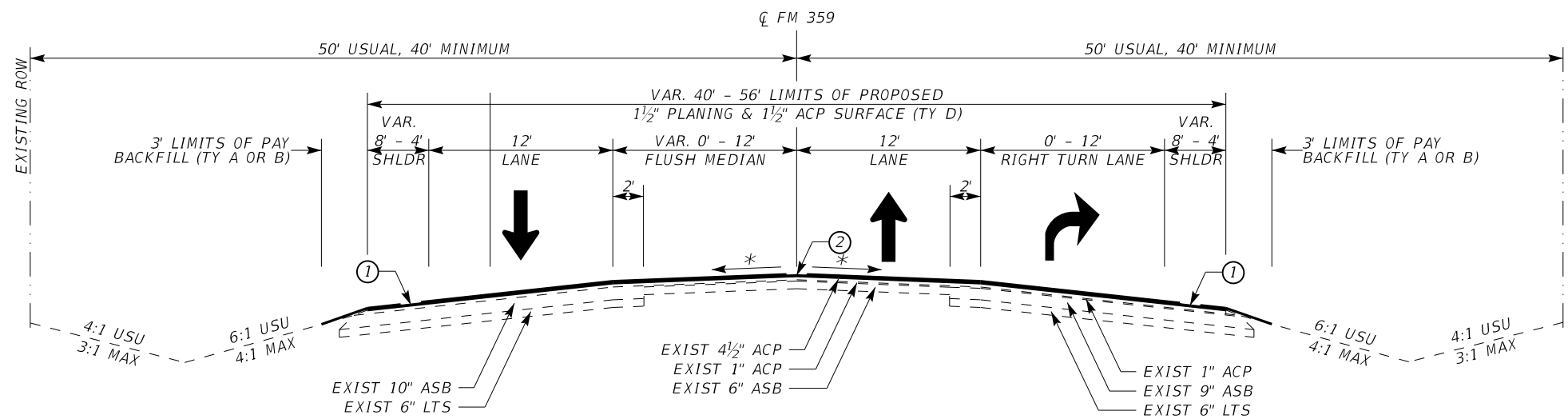
*Robert S. Bissett, Jr.* P.E.    09/21/21  
DATE

**INDEX OF SHEETS**

	CONT	SECT	JOB	HIGHWAY
	0543	02	076	FM 359
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		2



**PROPOSED TYPICAL SECTION**  
 STA 362+36.60 TO STA 437+42.00  
 STA 455+17.00 STA 587+00.00

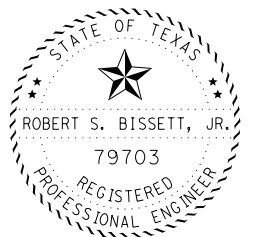


**PROPOSED TYPICAL SECTION**  
 STA 437+42.00 TO STA 455+17.00

- \* MATCH EXISTING SLOPE
- \*\* WHEN SHOULDERS ARE 8 FT
- ① EDGELINE MILLED RUMBLE STRIPS
- ② CENTERLINE MILLED RUMBLE STRIPS

**NOTES:**

1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.
2. SEE "ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT" SHEETS FOR LIMITS OF MILLED RUMBLE STRIPS.



*Robert S. Bissett, Jr.*

09/12/21

**PROPOSED TYPICAL SECTIONS**



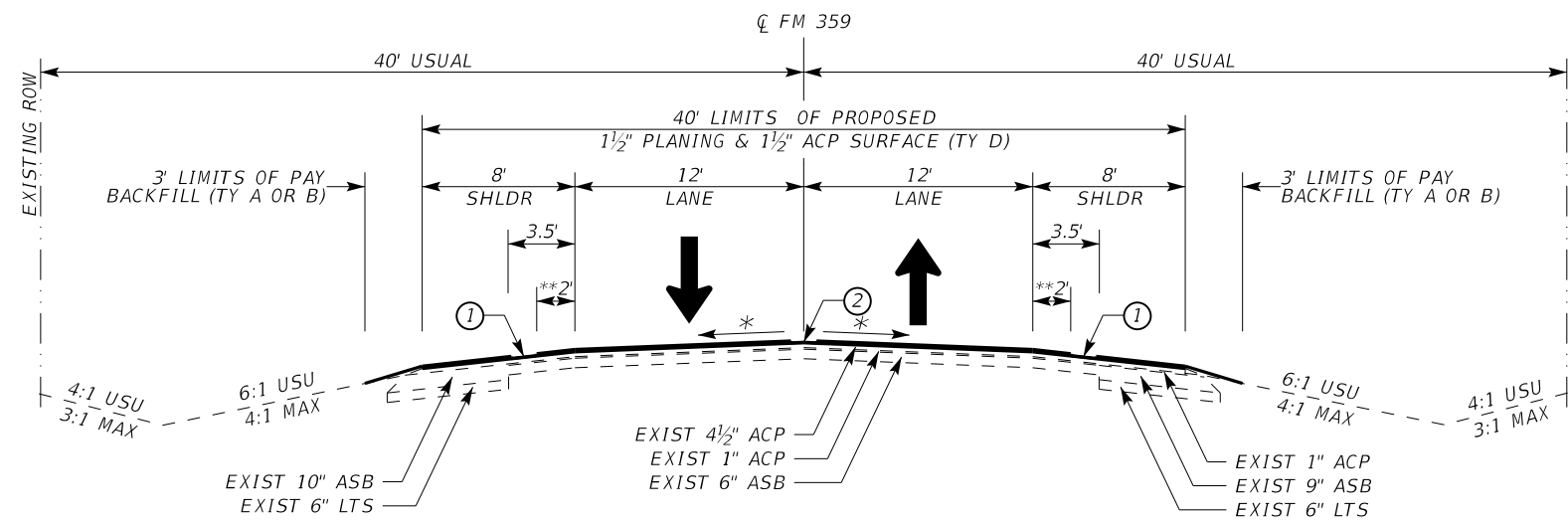
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SHEET 1 OF 2

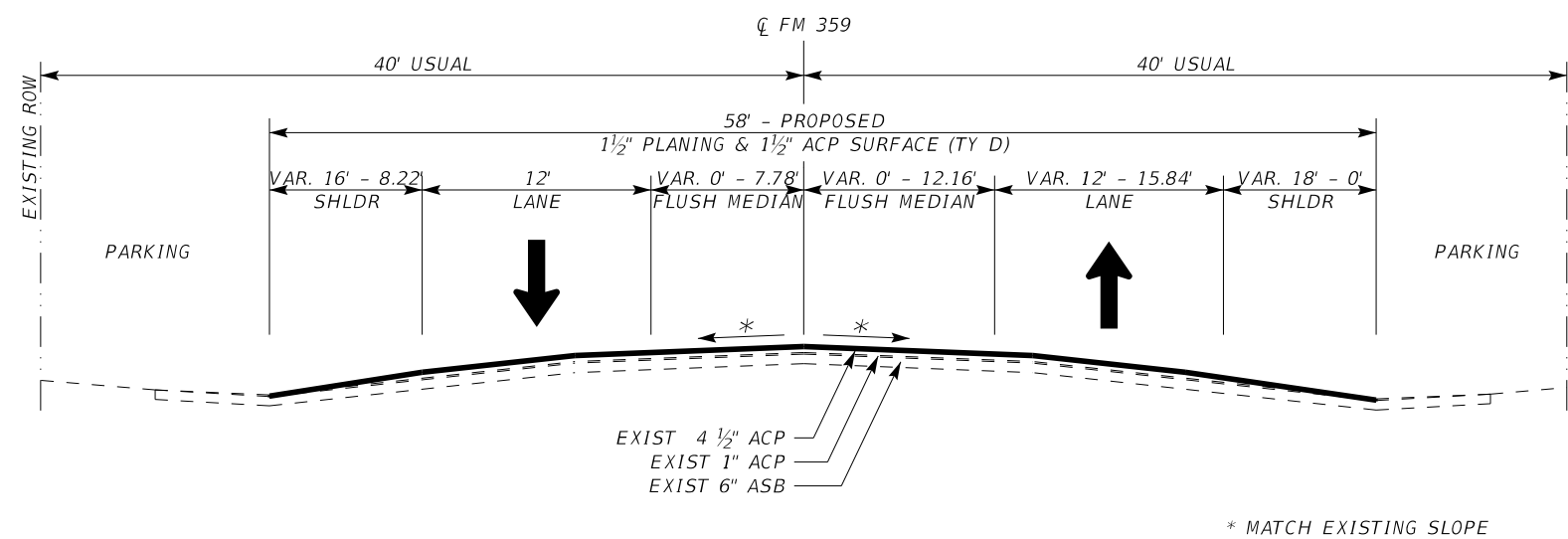
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	3

**NOTES:**

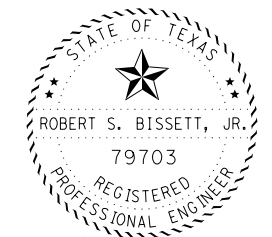
1. SURFACE TEST TYPE B, PAY ADJUSTMENT SCHEDULE 3.



**PROPOSED TYPICAL SECTION**  
STA 587+00.00 TO STA 601+63.00



**PROPOSED TYPICAL SECTION**  
STA 601+63.00 TO STA 603+42.26



*Robert S. Bissett, Jr.*

09/12/21

**PROPOSED TYPICAL SECTIONS**



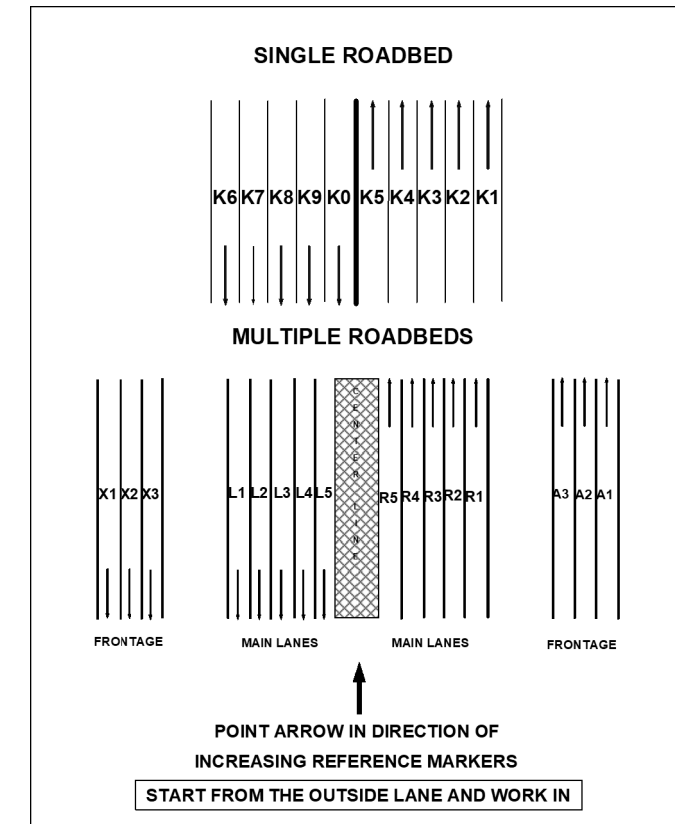
SHEET 2 OF 2

SCALE: 1"=10'H, 1"=10'V

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	4



F Y	E C	M S D R	R D B D	REFERENCE MARKERS				P Y P E	TEST MM/DD/YYYY	DIST TRAV	IRI(IN/MI)			COMMENTS
				BEGIN	END	LEN	LEFT				RIGHT	SI		
2019	04	FM0359	K	474	0.003	474	0.103	5	11/2/2018		84	100	3.8	
2019	04	FM0359	K	474	0.103	474	0.203	5	11/2/2018		88	99	3.8	
2019	04	FM0359	K	474	0.203	474	0.303	5	11/2/2018		70	76	4.2	
2019	04	FM0359	K	474	0.303	474	0.403	5	11/2/2018		97	108	3.6	
2019	04	FM0359	K	474	0.403	474	0.503	5	11/2/2018		107	99	3.6	
2019	04	FM0359	K	474	0.503	474	0.603	5	11/2/2018		64	77	4.3	
2019	04	FM0359	K	474	0.603	474	0.703	5	11/2/2018		97	101	3.7	
2019	04	FM0359	K	474	0.703	474	0.803	5	11/2/2018		97	107	3.6	
2019	04	FM0359	K	474	0.803	474	0.903	5	11/2/2018		99	92	3.7	
2019	04	FM0359	K	474	0.903	474	1.003	5	11/2/2018		93	86	3.9	
2019	04	FM0359	K	474	1.003	474	1.103	5	11/2/2018		75	106	3.8	
2019	04	FM0359	K	474	1.103	474	1.203	5	11/2/2018		85	76	4.0	
2019	04	FM0359	K	474	1.203	474	1.303	5	11/2/2018		61	75	4.3	
2019	04	FM0359	K	474	1.303	474	1.403	5	11/2/2018		112	109	3.5	
2019	04	FM0359	K	474	1.403	474	1.503	5	11/2/2018		83	86	4.0	
2019	04	FM0359	K	474	1.503	474	1.603	5	11/2/2018		60	66	4.4	
2019	04	FM0359	K	474	1.603	474	1.703	5	11/2/2018		60	53	4.6	
2019	04	FM0359	K	474	1.703	474	1.803	5	11/2/2018		88	89	3.9	
2019	04	FM0359	K	474	1.803	474	1.903	5	11/2/2018		86	102	3.8	
2019	04	FM0359	K	474	1.903	476	0.003	5	11/2/2018		87	78	4.0	
2019	04	FM0359	K	476	0.003	476	0.103	5	11/2/2018		79	90	4.0	
2019	04	FM0359	K	476	0.103	476	0.203	5	11/2/2018		102	97	3.7	
2019	04	FM0359	K	476	0.203	476	0.303	5	11/2/2018		95	88	3.8	
2019	04	FM0359	K	476	0.303	476	0.403	5	11/2/2018		98	79	3.9	
2019	04	FM0359	K	476	0.403	476	0.503	5	11/2/2018		84	71	4.1	
2019	04	FM0359	K	476	0.503	476	0.603	5	11/2/2018		65	56	4.5	
2019	04	FM0359	K	476	0.603	476	0.703	5	11/2/2018		88	80	4.0	
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2019	04	FM0359	K	476	0.803	476	0.903	5	11/2/2018		76	69	4.2	
2019	04	FM0359	K	476	0.903	476	1.003	5	11/2/2018		96	102	3.7	
2019	04	FM0359	K	476	1.003	476	1.103	5	11/2/2018		91	74	4.0	
2019	04	FM0359	K	476	1.103	476	1.203	5	11/2/2018		91	95	3.8	
2019	04	FM0359	K	476	1.203	476	1.303	5	11/2/2018		98	83	3.8	
2019	04	FM0359	K	476	1.303	476	1.403	5	11/2/2018		89	104	3.7	
2019	04	FM0359	K	476	1.403	476	1.503	5	11/2/2018		84	94	3.9	
2019	04	FM0359	K	476	1.503	476	1.603	5	11/2/2018		100	89	3.8	
2019	04	FM0359	K	476	1.603	476	1.703	5	11/2/2018		87	63	4.2	
2019	04	FM0359	K	476	1.703	476	1.803	5	11/2/2018		84	54	4.3	
2019	04	FM0359	K	476	1.803	476	1.903	5	11/2/2018		49	69	4.5	
2019	04	FM0359	K	476	1.903	478	0.011	5	11/2/2018		92	92	3.8	
2019	04	FM0359	K	478	0.011	478	0.111	5	11/2/2018		92	70	4.0	
2019	04	FM0359	K	478	0.111	478	0.211	5	11/2/2018		73	70	4.2	
2019	04	FM0359	K	478	0.211	478	0.311	5	11/2/2018		95	92	3.8	
2019	04	FM0359	K	478	0.311	478	0.411	5	11/2/2018		75	69	4.2	
2019	04	FM0359	K	478	0.411	478	0.511	5	11/2/2018		101	98	3.7	
2019	04	FM0359	K	478	0.511	478	0.611	5	11/2/2018		176	171	2.6	



**Pavement Types**

**Code**

**Description**

- 01 Continuously Reinforced Concrete Pavement
- 02 Jointed Reinforced Concrete Pavement
- 03 Jointed Plain Concrete Pavement
- 04 Thick Asphaltic Concrete Pavement (greater than 5-1/2")
- 05 Intermediate Thickness Asphaltic Concrete Pavement (2-1/2" to 5-1/2")
- 06 Thin Surfaced Flexible Base Pavement (less than 2-1/2")
- 07 Asphalt Surfacing with Heavily Stabilized Base
- 08 Overlaid and/or Widened Old Concrete Pavement
- 09 Overlaid and/or Widened Old Flexible Pavement
- 10 Thin Surfaced Flexible Base Pavement (Surface Treatment-Seal Coat Combination)

**INTERNATIONAL  
ROUGHNESS INDEX  
DATA**



SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		5

**General Notes:**

**General:**

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

*Carlos M Zepeda Jr at [Carlos.Zepeda@txdot.gov](mailto:Carlos.Zepeda@txdot.gov)  
Daniel Dvorak at [Daniel.Dvorak@txdot.gov](mailto:Daniel.Dvorak@txdot.gov)*

Contractor questions will be accepted through email, phone, and in person by the above individuals. Contractor questions will be reviewed by the Area Engineer or Assistant Area Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following address:

<https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/>

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

Unless otherwise shown on the plans, RAP generated by this project will become the property of the Contractor for use in the current construction project or in future projects.

If fixed features require, the governing slopes shown may vary between the limits shown and to the extent determined by the Engineer.

Superelevate the curves to match the existing surface.

Notify the Engineer immediately if discrepancies are discovered in the horizontal control or the benchmark data.

The following standard detail sheets are modified:

**Modified Standards**

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

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved, except for roadway illumination, electrical, and traffic signal items.

The cost for materials, labor, and incidentals to provide for traffic across the roadway and for ingress and egress to private property in accordance with Section 7.2.4 of the standard specifications is subsidiary to the various bid items. Restore access roadways to their original condition upon completing construction.

Grade street intersections and median openings for surface drainage.

If a foundation is to be placed where a riprap surface or an asphalt concrete surface presently exists, use caution in breaking out the existing surface for placement. Break out no greater area than is required to place the foundation. After placing the foundation, wrap the periphery with 0.5 in. pre-molded mastic expansion joint. Then replace the remaining portion of the broken out surface with Class A or Class C concrete or cold mix asphalt concrete to the exact slope, pattern, and thickness of the existing riprap or asphalt. Payment for breaking out the existing surface, wrapping the foundation, and replacing the surface is subsidiary to the various bid items.

The lengths of the posts for ground mounted signs are approximate. Verify the lengths before ordering these materials to meet the existing field conditions and to conform to the minimum sign mounting heights shown in the plans.

Furnish aluminum Type A signs instead of plywood signs for signs shown on the Summary of Small Signs sheet.

Clearly mark or highlight on the shop drawings, the items being furnished for this project. Submit required shop drawings in accordance with the shop drawing distribution list shown in the note for Item 5 for review and distribution.

Unless otherwise shown on the plans or otherwise directed, commence work after sunrise and ensure construction equipment is off the road by sunset.

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

Remove existing raised pavement markings. This work is subsidiary to various bid items.

The removal of newspaper boxes is subsidiary to the various bid items.

**General: Site Management**

Mow the grass and weeds within the project limits a maximum of 3 times a year as directed. This work is subsidiary to the various bid items.

Mark stations every 100 ft. and maintain the markings for the project duration. Remove the station markings at the completion of the project. This work is subsidiary to the various bid items.

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

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

Control the dust caused by construction operations. For sweeping the base material in preparation for laying asphalt and for sweeping the finished concrete pavement, use one of the following types of sweepers or approved equal:

**Tricycle Type**

Wayne Series 900  
Elgin White Wing  
Elgin Pelican

**Truck Type - 4 Wheel**

M-B Cruiser II  
Wayne Model 945  
Mobile TE-3  
Mobile TE-4  
Murphy 4042

**General: Traffic Control and Construction**

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

**General: Utilities**

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

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

At least 72 hours before starting work, make arrangements for locating existing Department-owned above ground and underground fiber optic, communications, power, illumination, and traffic signal cabling and conduit. Do this by calling the Department's Houston District Traffic Signal Operations Office at 713-802-5662, or by e-mailing the Department's Houston District Traffic Signal Operations Office at [locaterquest@txdot.gov](mailto:locaterquest@txdot.gov), to schedule marking of underground lines on the ground. Use caution if working in these areas to avoid damaging or interfering with existing facilities.

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

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

**Item 5: Control of Work**

Submit shop drawings electronically for the fabrication of items as documented in Table 1 below. Information and requirements for electronic submittals can be viewed in the "Guide to Electronic Shop Drawing Submittal" which can be accessed through the following web link, [ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e\\_submit\\_guide.pdf](ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf). References to

11 in. x 17 in. sheets in individual specifications for structural items imply electronic CAD sheets.

**Table 1**  
**2014 Construction Specification Required Shop/Working Drawing Submittals - TxDOT Generated Plans**

Spec Item No.'s	Product	Submittal Required	Approval Required (Y/N)	Contractor/Fabricator P.E. Seal Required	Reviewing Party	Shop or Working Drawing (Note 1)
7.16.1&.2	Construction Load Analyses	Y	Y	Y	B	WD
400	Excavation and Backfill for Structures (cofferdams)	Y	N	Y	A	WD
403	Temporary Special Shoring	Y	N	Y	C	WD
420	Formwork/Falsework	Y	N	Y	A	WD
423	Retaining Walls, (calcs req'd.)	Y	Y	Y	C	SD
425	Optional Design Calculations (Prstrs Bms)	Y	Y	Y	B	SD
425	Prestr Concr Sheet Piling	Y	Y	N	B	SD
425	Prestr Concr Beams	Y	Y	N	B	SD
425	Prestr Concr Bent	Y	Y	N	B	SD
426	Post Tension Details	Y	Y	N	B	SD
434	Elastomeric Bearing Pads (All)	Y	Y	N	B	SD
441	Bridge Protective Assembly	Y	Y	N	B	SD
441	Misc Steel (various steel assemblies)	Y	Y	N	B	SD
441	Steel Pedestals (bridge raising)	Y	Y	N	B	SD
441	Steel Bearings	Y	Y	N	B	SD
441	Steel Bent	Y	Y	N	B	SD
441	Steel Diaphragms	Y	Y	N	B	SD
441	Steel Finger Joint	Y	Y	N	B	SD
441	Steel Plate Girder	Y	Y	N	B	SD
441	Steel Tub-Girders	Y	Y	N	B	SD
441	Erection Plans, including Falsework	Y	N	Y	A	WD
449	Sign Structure Anchor Bolts	Y	Y	N	T	SD
450	Railing	Y	Y	N	A	SD
462	Concrete Box Culvert	Y	Y	N	C	SD
462	Concrete Box Culvert (Alternate Designs Only, calcs reqd.)	Y	Y	Y	B	SD
464	Reinforced Concrete Pipe (Jack and Bore only; ONLY when requested)	Y	Y	Y	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets	Y	Y	N	A	SD
465	Pre-cast Junction Boxes, Grates, and Inlets (Alternate Designs Only, calcs req'd.)	Y	Y	Y	B	SD
466	Pre-cast Headwalls and Wingwalls	Y	Y	N	A	SD
467	Pre-cast Safety End Treatments	Y	Y	N	A	SD
495	Raising Existing Structure (calcs reqd.)	Y	Y	Y	B	SD
610	Roadway Illumination Supports (Non-Standard only, calcs reqd.)	Y	Y	Y	BRG	SD
613	High Mast Illumination Poles (Non-standard only, calcs reqd.)	Y	Y	Y	BRG	SD
627	Treated Timber Poles	Y	Y	N	T	SD
644	Special Non-Standard Supports (Bridge Mounts, Barrier Mounts, Etc.)	Y	Y	Y	T	SD

647	Large Roadside Sign Supports	Y	Y	Y	T	SD
650	Cantilever Sign Structure Supports - Alternate Design Calcs.	Y	Y	Y	T	SD
650	Sign Structures	Y	Y	N	T	SD
680	Installation of Highway Traffic Signals	Y	Y	N	T	SD
682	Vehicle and Pedestrian Signal Heads	Y	Y	N	T	SD
684	Traffic Signal Cables	Y	Y	N	T	SD
685	Roadside Flashing Beacon Assemblies	Y	Y	N	T	SD
686	Traffic Signal Pole Assemblies (Steel) (Non-Standard only)	Y	Y	Y	T	SD
687	Pedestal Pole Assemblies	Y	Y	N	T	SD
688	Detectors	Y	Y	N	A	SD
784	Repairing Steel Bridge Members	Y	Y	Y	B	WD
SS	Prestr Concr Crown Span	Y	Y	N	B	SD
SS	Sound Barrier Walls	Y	Y	Y	A	SD
SS	Camera Poles	Y	Y	Y	TMS	SD
SS	Pedestrian Bridge (Calcs req'd.)	Y	Y	Y	B	SD
SS	Screw-In Type Anchor Foundations	Y	Y	N	T	SD
SS	Fiber Optic/Communication Cable	Y	Y	N	TMS	SD
SS	Spread Spectrum Radios for Signals	Y	Y	N	T	SD
SS	VIVDS System for Signals	Y	Y	N	T	SD
SS	CTMS Equipment	Y	Y	N	TMS	SD

Notes:

1. Document flow for Working Drawings differs from Shop Drawings in that Working Drawings must be submitted to the Engineer rather than the Engineer of Record and they are for the information of the Engineer only; an approval stamp and distribution to all project offices is not required.

Key to Reviewing Party

A - Area Office	
<b>Area Office</b>	<b>Email Address</b>
Fort Bend Area Office	<a href="mailto:HOU-FBAShpDrwgs@txdot.gov">HOU-FBAShpDrwgs@txdot.gov</a>
B - Houston Bridge Engineer	
Bridge Design (Houston TxDOT)	<a href="mailto:HOU-BrgShpDrwgs@txdot.gov">HOU-BrgShpDrwgs@txdot.gov</a>
BRG - Austin Bridge Division	
Bridge Design (Austin TxDOT)	<a href="mailto:BRG_ShopPlanReview@txdot.gov">BRG_ShopPlanReview@txdot.gov</a>
C - Construction Office	
Construction	<a href="mailto:HOU-ConstrShpDrwgs@txdot.gov">HOU-ConstrShpDrwgs@txdot.gov</a>
Laboratory	<a href="mailto:HOU-LabShpDrwgs@txdot.gov">HOU-LabShpDrwgs@txdot.gov</a>
T - Traffic Engineer	
Traffic Operations	<a href="mailto:HOU-TrfShpDrwgs@txdot.gov">HOU-TrfShpDrwgs@txdot.gov</a>
TMS - Traffic Management System	
Computerized Traffic Management Systems (CTMS)	<a href="mailto:HOU-CTMSShpDrwgs@txdot.gov">HOU-CTMSShpDrwgs@txdot.gov</a>

Item 7: Legal Relations and Responsibilities

Do not initiate activities in a Project Specific Location (PSL), associated with a U.S. Army Corps of Engineers (USACE) permit area, that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include those pertaining to, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The permit area includes the waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Assume responsibility for consultations with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of consultations or approvals from the USACE before 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 if 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 determinations that their activities do not affect a USACE permit area. Maintain copies of their determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, before hauling any excavation from or hauling any embankment to a USACE permit area by either 1 or 2 below:

1. **Restricted Use of Materials for the Previously Evaluated Permit Areas.**  
Document both the Project Specific Locations (PSL) and their authorization. Maintain copies for review by the Department 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:
  - a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in the Item, "Excavation" is used for permanent or temporary fill (under the Item, "Embankment") within a USACE permit area.
  - b. Suitable embankment (under the Item, "Embankment") from within the USACE permit area is used as fill within a USACE evaluated area.
  - c. Unsuitable excavation or excess excavation, "Waste" (under the Item, "Excavation"), that is disposed of at a location approved within a USACE evaluated area.
2. **Contractor Materials from Areas Other than Previously Evaluated Areas.**  
Provide the Department with a copy of 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:
  - a. The Item, "Embankment" used for temporary or permanent fill within a USACE permit area.
  - b. Unsuitable excavation or excess excavation, "Waste" (under the Item, "Excavation"), that is disposed of outside a USACE evaluated area.

This project does not require a U.S. Army Corps of Engineers (USACE) Section 404 Permit before letting, but if a permit is needed during construction, assume responsibility for preparing the permit application. Submit the permit application to the Department's District Environmental Section for approval. Once the permit application is approved, the Department will submit it to the USACE. Assume responsibility for the requested revisions, in coordination with the Department's District Environmental Section.

Maintain the roadway slope stability. Maintaining slope stability is subsidiary to the various bid items.

No significant traffic generator events have been identified.

**Item 8: Prosecution and Progress**

The Department will not adjust the number of days for the project and milestones, if any, due to differences in opinion regarding any assumptions made in the preparation of the schedule or for errors, omissions, or discrepancies found in the time determination schedule.

Working days will be computed and charged based on a *standard* workweek in accordance with Section 8.3.1.4.

The maximum number of days the time charges on this contract may be suspended due to contractor mobilization, and material fabrication/accumulation or processing delays is 60 days. The Engineer and the Contractor may mutually agree, in writing, to decrease this maximum number of days.

**Item 134: Backfilling Pavement Edges**

Quantity by station includes both sides of the roadway.

The Contractor has the option of selecting the type of backfill material consisting of Reclaimable Asphalt Pavement (RAP), Flex Base, or Crushed Concrete provided that it meets the requirements listed below.

For Permeable Friction Courses (PFC), the backfill material chosen must meet the requirements of Department Test Method Tex-246-F.

If using salvaged asphalt concrete pavement, size it so that all the material, passes the 2-in. sieve. Use RAP that does not contain deleterious material such as clay or organic material.

Flex Base must meet the requirements of Item 247, Type A, Grade 1-2. Department Test Method Tex-117-E will not be required.

Crushed concrete must meet the requirements of Item 247, Grade 1-2. Department Test Methods Tex-116-E and Tex-117-E will not be required.

Place emulsified asphalt (SS-1, CSS-1, or CSS-1H) at an application rate of 0.25 gal/sq. yard.

Blade back any sod and/or loose material prior to placement of the ACP overlay and shoulder up material. This work is subsidiary to Item 134.

**Item 204: Sprinkling**

Perform subsidiary sprinkling as required under various other items in accordance with the Item, "Sprinkling."

Sprinkling for dust control is subsidiary to the various bid items.

**Item 210: Rolling**

Use a medium pneumatic roller meeting the requirements of Item 210 as directed. This work is subsidiary to the various bid items. On every asphalt shot, use a minimum of 3 pneumatic rollers or as directed. Use approved rolling patterns. Successive asphalt shots will not be allowed until acceptable rolling has been accomplished on the preceding asphalt shot.

**Item 351: Flexible Pavement Structure Repair**

Use asphalt stabilized base for the base material.

For base repair, place the asphalt stabilized base in compacted lifts of 4 in. maximum, unless otherwise directed.

Existing material to be removed will become the property of the Contractor.

**Item 502: Barricades, Signs, and Traffic Handling**

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

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

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

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

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

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



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

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

Law enforcement assistance will be required for this project and is expected to be required for major traffic control changes and lane closures. Coordinate with local law enforcement and arrange for law enforcement as directed or agreed by the Engineer. Before payment will be made, complete the "Daily Report on Law Enforcement Force Account Work" (Form 318), provided by the Department and submit daily invoices that agree with this form for any day during the month in which approved services were provided.

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

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

#### **Item 504: Field Office and Laboratory**

Furnish one Type A structure for the laboratory. Ensure the windows for the structure have burglar bars.

Furnish a Type D structure for the asphalt mix control laboratory for the Engineer's exclusive use. In addition to the requirements of this Item, "Field Office and Laboratory," ensure this structure has a minimum height of 8 ft. Also ensure it has a minimum of 400 sq. ft. of gross floor area suitable for permanently located asphalt plants or 200 sq. ft. for temporarily located asphalt plants serving one project. Partition the floor area into a minimum of 2 interconnected rooms, and provide each room with an exterior door and a minimum of 2 windows. Construct the floor of sufficient strength to support the testing equipment and with an impervious covering.

Adequately air condition the Type D structure and furnish it with a minimum of one desk, 3 chairs, one file cabinet, a telephone, and one built-in equipment-storage cabinet suitable for storing nuclear equipment. Ensure the cabinet is a minimum of 3 ft. wide by 2 ft. deep by 3 ft. high and has a secure lock. Provide the structure with a 240-volt electrical service entrance. Use a licensed electrician to determine the service size and service entrance conductors. Provide a minimum service of four 120-volt circuits with 20 amp breakers, and a maximum of 2 grounded convenience outlets per circuit and a minimum of two 220-volt ovens with vents to the outside. Provide a structure with a minimum of 2 convenience outlets per wall and a utility sink with an

adequate, clean potable water supply for testing. Do not use space heaters to heat the structure. Use support blocks for the portable structures, tie them down, and securely attach them to the ground.

In addition, provide the following: One exterior door opening 48-inches minimum width. If steps are required to gain access to the facility's 48-inch door provide a landing dock with minimum dimensions of 60 inches wide by 60 inches deep. The strong floor and landing of the facility shall support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations, acceptable to the Engineer. This facility will be required with plant produced asphalt concrete pavement.

No direct payment will be made for Engineer field labs. All construction, maintenance, utilities, custodial services, security, and permits necessary to establish and maintain readiness of this facility will be the responsibility of the Contractor. This building/facility is required by the standard specifications and is considered a standard part of any asphalt concrete pavement plant producing materials for TxDOT projects.

The SuperPave Gyrotory Compactor will be furnished to the Engineer under the asphalt concrete pavement Item(s) of work.

Determine the asphalt content by the ignition method and meet the requirements of Section 504.2.2.4.1, "Asphalt Content by Ignition Method" except provide a NEMA 6-50R (204/240 volt, 50 A) outlet within 2.25 ft. of the ignition oven location.

If an asphalt mix plant is located at the project site, provide a Type D structure with the dimensions of a Type C structure, at the project site to perform the asphalt mix quality control tests.

If a commercial source is used for the asphalt mix, provide a Type D structure with the dimensions of a Type C structure, at the commercial source site to perform the asphalt mix quality control tests.

Equip each lab with a first aid kit and at least a 20 lb. ABC type fire extinguisher. Also equip the labs with an eye wash station. Provide equipment that meets the minimum OSHA requirements.

The above requirements are subsidiary to the various bid items.

Assume ownership of temporary chain link security fences.

#### **Item 506: Temporary Erosion, Sedimentation and Environmental Controls**

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

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



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

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

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

Implement temporary and permanent erosion control measures to comply with the National Pollution Discharge Elimination System (NPDES) general permit under the Clean Water Act.

**Item 585: Ride Quality for Pavement Surfaces**

To eliminate the need for corrective action due to excessive deviations in the final surface layers, exercise caution to ensure satisfactory profile results in the intermediate paving layers (mixture).

Milling will not be allowed as a corrective action for excessive deviations in the final surface layer of hot-mix asphalt.

For asphalt mainlanes, use Surface Test Type B and Pay Adjustment Schedule 3.

For all other roads (cross streets and intersections), use Surface Test Type A.

**Item 636: Signs**

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

**Item 644: Small Roadside Sign Assemblies**

Sign locations shown on the plans are approximate. Before placing them, obtain approval of and then stake the exact locations for these signs.

Use the Texas Universal Triangular Slip Base with the concrete foundation for small ground mounted signs, unless otherwise shown in the plans.

Remove existing street name signs from existing stop signs and re-install them above the new stop signs. Removing and re-installing existing street name signs is subsidiary to the Item, "Small Roadside Sign Assemblies."

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

Assume ownership of the removed existing signs.

**Item 662: Work Zone Pavement Markings**

At the end of each workday, mark roadways that remain open to traffic during construction operations with standard pavement markings, in accordance with the latest "Texas Manual on Uniform Traffic Control Devices."

Do not use raised pavement markers as optional work zone pavement markings on final asphalt surfaces.

For transition lane lines and detour lane lines, use raised pavement markers as shown for solid lines on the latest Barricade and Construction standard sheet for "Work Zone Pavement Marking Details."

**Item 662: Work Zone Pavement Markings**

**Item 666: Reflectorized Pavement Markings**

Use Type III glass beads for thermoplastic pavement markings.

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

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

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

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

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

Stripe all roadways before opening them to traffic.

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

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

County: Fort Bend

Highway: FM 359

Control: 0543-02-076

**Item 672: Raised Pavement Markers**

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

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

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

**Item 3076: Dense-Graded Hot Mix Asphalt**

Taper the asphalt concrete pavement at the beginning and ending points.

Use a maximum 6H:1V slope for the asphalt concrete pavement edge.

Where the 6H:1V ACP edge taper extends over onto the unsurfaced shoulders, blade off the loose existing shoulder material to provide a solid base for the outside taper edge. After placing the ACP overlay, blade this material back against the edge taper. This work is subsidiary to the various bid items.

The stockpile will be the point of sampling of coarse aggregate for test method TEX-217-F (Part II, decantation).

Place the asphalt concrete pavement in courses as shown on the typical sections.

Do not use petroleum-based solvents in the beds of hot mix asphalt delivery vehicles.

Dilution of tack coat is not allowed.

Do not use Surface Aggregate Classification (SAC) C for this project.

For determining the Asphalt Content, only ignition ovens will be allowed.

The tack coat rate shown on the "Basis of Estimate" is an average rate for calculating tack coat quantities. Vary the rate based on the pavement conditions and other factors such as manufacturer's recommendations and weather.

Take all necessary measures to minimize the number of working days between the planing operation and ACP overlay. If a planed section of roadway is not overlaid within 2 weeks, cease all construction activity for the project not affiliated with the overlay of the planed section of roadway until the overlay has been completed. Time charges will not be suspended or added to compensate for such an occurrence and no additional financial compensation provided.

Complete the overlay at intersections (such as left and right turn lanes and crossovers) in a timely manner. Do not leave the roadway surface at an intersection with uneven lanes for longer than two weeks.

County: Fort Bend

Highway: FM 359

Control: 0543-02-076

Sheet 6F

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

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

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

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

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

**Basis of Estimate**

<b>Item</b>	<b>Description</b>	<b>Limit and Rate</b>	<b>Unit</b>
134	Backfilling Pavement Edges <ul style="list-style-type: none"> <li>• Asphalt Emulsion</li> </ul>	0.25 Gal. / Sq. Yd.	STA
3076	Dense-Graded Hot Mix Asphalt <ul style="list-style-type: none"> <li>• Asphalt</li> <li>• Aggregate</li> </ul> Tack Coat <ul style="list-style-type: none"> <li>• Applied on new HMA</li> <li>• Applied on Existing HMA</li> <li>• Applied on Milled HMA</li> </ul>	110 Lb. / Sq. Yd.-In. 6 % by weight 94 % by weight  0.06 Gal. / Sq. Yd. 0.09 Gal. / Sq. Yd. 0.11 Gal. / Sq. Yd.	TON



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0543-02-076

DISTRICT Houston  
HIGHWAY FM 359

COUNTY Fort Bend

CONTROL SECTION JOB				0543-02-076		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00124514			
COUNTY				Fort Bend			
HIGHWAY				FM 359			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	134-6004	BACKFILL (TY A OR B)	STA	237.660		237.660	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY	5,000.000		5,000.000	
	354-6041	PLANE ASPH CONC PAV (1.5")	SY	110,491.000		110,491.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3.000		3.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	40,164.000		40,164.000	
	533-6004	RUMBLE STRIPS (CENTERLINE) ASPHALT	LF	19,780.000		19,780.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA	14.000		14.000	
	560-6012	MAILBOX INSTALL-D (TWW-POST) TY 4	EA	2.000		2.000	
	560-6013	MAILBOX INSTALL-M (TWW-POST) TY 4	EA	1.000		1.000	
	636-6007	REPLACE EXISTING ALUMINUM SIGNS(TY A)	SF	16.000		16.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	41.000		41.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	10.000		10.000	
	644-6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	1.000		1.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	9.000		9.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	57.000		57.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA	26.000		26.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	EA	27.000		27.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	48,172.000		48,172.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	48,172.000		48,172.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	2,064.000		2,064.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	510.000		510.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	8.000		8.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	8.000		8.000	
	662-6032	WK ZN PAV MRK NON-REMOV (Y)4"(BRK)	LF	4,680.000		4,680.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	14,906.000		14,906.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	4,680.000		4,680.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	14,906.000		14,906.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	1,032.000		1,032.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	255.000		255.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	4.000		4.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	4.000		4.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	48,172.000		48,172.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	4,680.000		4,680.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	14,906.000		14,906.000	
	672-6007	REFL PAV MRKR TY I-C	EA	53.000		53.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	647.000		647.000	

DISTRICT	COUNTY	CCSJ	SHEET
Houston	Fort Bend	0543-02-076	7



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0543-02-076

DISTRICT Houston  
HIGHWAY FM 359

COUNTY Fort Bend

CONTROL SECTION JOB				0543-02-076		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00124514			
COUNTY				Fort Bend			
HIGHWAY				FM 359			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	3076-6041	D-GR HMA TY-D SAC-A PG70-22	TON	9,206.460		9,206.460	
	3076-6066	TACK COAT	GAL	12,363.000		12,363.000	
	6185-6002	TMA (STATIONARY)	DAY	14.000		14.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	110.000		110.000	
	18	SAFETY CONTINGENCY	LS	1.000		1.000	
		SWP3: INSTALL, MAINTAIN, REMOVE	LS	1.000		1.000	
		LAW ENFORCEMENT PERSONNEL	LS	1.000		1.000	

SUMMARY OF TRAFFIC CONTROL QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0662 WK ZN PAV MRK NON-REMOV							6185-6002	6185-6005
	-6004 (W) 4" (SLD)	-6012 (W) 8" (SLD)	-6016 (W) 24" (SLD)	-6017 (W) (ARROW)	-6029 (W) (WORD)	-6032 (Y) 4" (BRK)	-6034 (Y) 4" (SLD)	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	LF	LF	LF	EA	EA	LF	LF	DAY	DAY
1	3,806					463			
2	4,400					540			
3	4,421		10			540			
4	4,390	925	101	3	3	247	3,955		
5	4,466	107	26	1	1	360	2,254		
6	4,400					550			
7	4,419		11			550			
8	4,453					540			
9	4,415					540	1,540		
10	4,400					350	2,965		
11	4,517		107				4,021		
12	85						171		
<b>TOTAL</b>	<b>48,172</b>	<b>1,032</b>	<b>255</b>	<b>4</b>	<b>4</b>	<b>4,680</b>	<b>14,906</b>	<b>14</b>	<b>110</b>

SUMMARY OF TRAFFIC CONTROL QUANTITIES

SHEET 1 OF 1



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		8



SUMMARY OF ROADWAY QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0134-6004	0351-6002 ①	0354-6041	0560-6011	0560-6012	0560-6013	0644-6076	3076-6041	3076-6041 ②	3076-6066	3076-6066 ②
	BACKFILL (TY A OR B)	FLEXIBLE PAVEMENT STRUCTURE REPAIR (6")	PLANE ASPH CONC PAV (1.5")	MAILBOX INSTALL-S (TWW-POST) TY 4	MAILBOX INSTALL-D (TWW-POST) TY 4	MAILBOX INSTALL-M (TWW-POST) TY 4	REMOVE SM RD SN SUP&AM	D-GR HMA TY-D SAC-A PG70-22	D-GR HMA TY-D SAC-A PG70-22	TACK COAT	TACK COAT
	STA	SY	SY	EA	EA	EA	EA	TON	TON	GAL	GAL
1	19.03		8,458				4	697.79	0.86	931	2
2	22.00		9,924			1		818.73	1.82	1,092	4
3	22.00		9,888				3	815.76	4.93	1,088	11
4	22.00		11,511				4	949.66	1.41	1,267	4
5	22.00		10,466				4	863.45	13.18	1,152	29
6	22.00		9,778	3	1			806.69	9.82	1,076	22
7	22.00		9,899	4			5	816.67	4.39	1,089	10
8	22.00		9,947	1	1		6	820.63	4.34	1,095	10
9	22.00		9,856	4			4	813.12	9.88	1,085	22
10	22.00		9,778	1			5	806.69	13.37	1,076	30
11	20.63		10,713	1			21	883.82	26.98	1,179	59
12			273				1	22.47		30	
<b>TOTAL</b>	<b>237.66</b>	<b>5,000</b>	<b>110,491</b>	<b>14</b>	<b>2</b>	<b>1</b>	<b>57</b>	<b>9,115.48</b>	<b>90.98</b>	<b>12,160</b>	<b>203</b>

① LOCATIONS OF BASE REPAIR HAVE NOT BEEN SHOWN ON THE LAYOUTS BUT WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.

② THIS QUANTITY IS FOR DRIVEWAYS IF NEEDED.

SUMMARY OF  
ROADWAY  
QUANTITIES

SHEET 1 OF 1



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		9

**SUMMARY OF PAVEMENT MARKING QUANTITIES**

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0533-6003	0533-6004	0636-6007	0658-6047	0658-6081
	RUMBLE STRIPS (EDGELINE) ASPHALT	RUMBLE STRIPS (CENTERLINE) ASPHALT	REPLACE EXISTING ALUMINUM SIGNS (TY A)	INSTL OM ASSM (OM-2Y)(WC) GND	INSTL DEL ASSM (D-SW)SZ 1 (WFLX)GND(BI)
	LF	LF	SF	EA	EA
1	3,806	1,903		2	
2	4,400	2,200		2	
3	4,158	2,079		2	
4	3,992	1,904		2	
5	4,100	2,050		3	
6	4,400	2,200		2	
7	4,253	2,053		2	
8	4,255	2,056		2	
9	4,270	2,070		2	
10	2,530	1,265		4	17
11			16	3	10
12					
<b>TOTAL</b>	<b>40,164</b>	<b>19,780</b>	<b>16</b>	<b>26</b>	<b>27</b>

**SUMMARY OF  
PAVEMENT MARKING  
QUANTITIES**

SHEET 1 OF 3



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		10

SUMMARY OF PAVEMENT MARKING QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0662 WK ZN PAV MRK NON-REMOV						
	-6008 (W) 6" (SLD)	-6012 (W) 8" (SLD)	-6016 (W) 24" (SLD)	-6017 (W) (ARROW)	-6029 (W) (WORD)	-6035 (Y) 6" (BRK)	-6037 (Y) 6" (SLD)
	LF	LF	LF	EA	EA	LF	LF
1	3,806					463	
2	4,400					540	
3	4,421		10			540	
4	4,390	925	101	3	3	247	3,955
5	4,466	107	26	1	1	360	2,254
6	4,400					550	
7	4,419		11			550	
8	4,453					540	
9	4,415					540	1,540
10	4,400					350	2,965
11	4,517		107				4,021
12	85						171
<b>TOTAL</b>	<b>48,172</b>	<b>1,032</b>	<b>255</b>	<b>4</b>	<b>4</b>	<b>4,680</b>	<b>14,906</b>

SUMMARY OF  
PAVEMENT MARKING  
QUANTITIES

SHEET 2 OF 3



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		11

SUMMARY OF PAVEMENT MARKING QUANTITIES

ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT SHEETS	0666 REFL PAV MRK TY I				0666 RE PM W/RET REQ TY I			0672 REFL PAV MRKR	
	-6036 (W) 8" (SLD) (100MIL)	-6048 (W) 24" (SLD) (100MIL)	-6054 (W) (ARROW) (100MIL)	-6078 (W) (WORD) (100MIL)	-6309 (W) 6" (SLD) (100MIL)	-6318 (Y) 6" (BRK) (100MIL)	-6321 (Y) 6" (SLD) (100MIL)	-6007 TY I-C	-6009 TY II-A-A
	LF	LF	EA	EA	LF	LF	LF	EA	EA
1					3,806	463			24
2					4,400	540			27
3		10			4,421	540			27
4	925	101	3	3	4,390	247	3,955	47	184
5	107	26	1	1	4,466	360	2,254	6	128
6					4,400	550			28
7		11			4,419	550			27
8					4,453	540			26
9					4,415	540	1,540		46
10					4,400	350	2,965		55
11		107			4,517		4,021		67
12					85		171		8
<b>TOTAL</b>	<b>1,032</b>	<b>255</b>	<b>4</b>	<b>4</b>	<b>48,172</b>	<b>4,680</b>	<b>14,906</b>	<b>53</b>	<b>647</b>



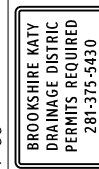


SUMMARY OF  
PAVEMENT MARKING  
QUANTITIES

SHEET 3 OF 3



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		12

# SUMMARY OF SMALL SIGNS

LAYOUT SHEET NO.	SIGN SHEET NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS (IN)	PLYWOOD SIGNS	ALUMINUM SIGNS TYPE A	TYPE OF MOUNT															
							6001	6002	6004	6005	6007	6017	6019	6027	6028	6030	6031	6033	6034	6035	6036	6037
1	1	I-2dT		48x24	X	X																
	2	I-2dT		66x24	X	X		(BACK-TO-BACK)					X									
	3	R12-1T	WEIGHT LIMIT GROSS 58420 LBS	24x36	X							X										
	4	R2-1	SPEED LIMIT 60 	42x24	X	X		X														
	1	W2-2R	INTERSECTION WARNING (SYMBOL)	36x36	X	X																
		W16-8P	Pecan Hill Dr	36x8	X	X																
	1	R1-1	STOP	30x30	X	X																
	1	W2-2L	INTERSECTION WARNING (SYMBOL)	36x36	X	X																
	2	W16-8P	Pecan Hill Dr	36x8	X	X																
		W1-4L	CURVE AHEAD (SYMBOL)	36x36	X	X																
		W13-1P	50 MPH	18x18	X	X																
		R1-1	STOP	30x30	X	X																
		D7-7aTR	HISTORICAL MARKER 16356 ↑	48x48	X	X			(BACK-TO-BACK)				X									
		D7-7aTL	HISTORICAL MARKER 16356 ↓	48x48	X	X																
	5	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36	X	X																
	6	R3-7R	RIGHT LANE MUST TURN RIGHT	36x36	X	X																
	7	W1-4L	CURVE AHEAD (SYMBOL)	36x36	X	X																
		W13-1P	50 MPH	18x18	X	X																
	1	R2-1	SPEED LIMIT 60	48x60	X	X																
	2	M3-1	NORTH	24x12	X	X																
		M1-6F	FARM ROAD 359	24x24	X	X																
		R1-1	STOP	30x30	X	X																
		R1-1	STOP	36x36	X	X																
		M3-3	SOUTH	24x12	X	X																
		M1-6F	FARM ROAD 359	24x24	X	X																
		R2-1	SPEED LIMIT 60	48x60	X	X																
	7	M3-1	NORTH	24x12	X	X																
		M1-6F	FARM ROAD 359	24x24	X	X																
		D10-7aT	476	3x10	X	X			(FRONT AND BACK)													
	1	W2-7L	INTERSECTION WARNING (SYMBOL)	36x36	X	X																
	1	D21-1aTL		66x24	X	X																
	2	R1-1	STOP	36x36	X	X																
	3	W1-7	TWO-DIRECTION LARGE ARROW	48x24	X	X																
	4	W1-2L	CURVE AHEAD (SYMBOL)	36x36	X	X																
		W13-1P	50 MPH	18x18	X	X																
	5	D21-1aTR		66x24	X	X																

**GENERAL NOTES:**  
 ALL SIGNS SHALL BE ERECTED ACCORDING TO THE LOCATION SHOWN ON THE LAYOUT SHEETS EXCEPT THAT THE ENGINEER MAY SHIFT A SIGN IN ORDER TO SECURE A MORE DESIRABLE LOCATION. THE CONTRACTOR WILL STAKE ALL SIGN LOCATIONS, AND NO CHANGES IN THOSE LOCATIONS SHALL BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.

ALUMINUM SIGN BLANKS(TY A)

Square Ft.	Min. Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

## SUMMARY OF SMALL SIGNS

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	
HOU		FORT BEND	
			SHEET NO.
			13





**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.

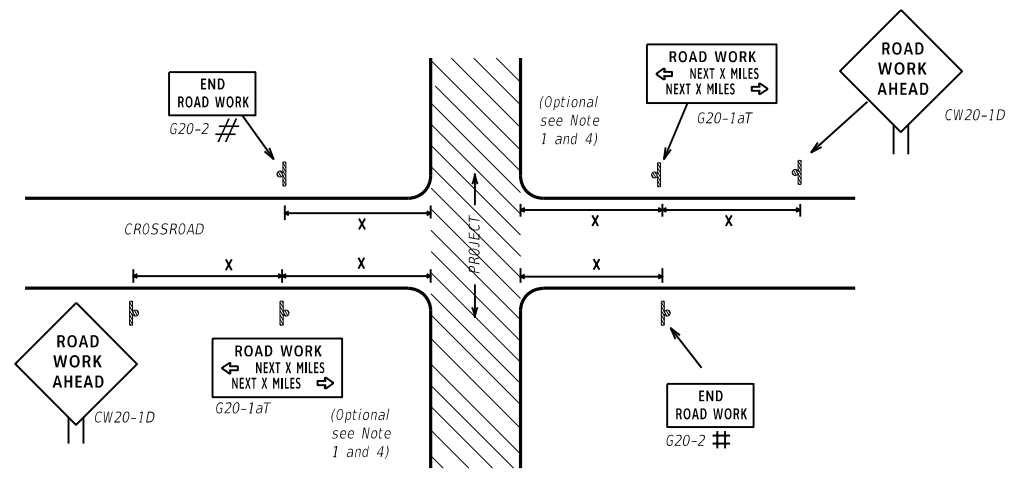
**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

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).

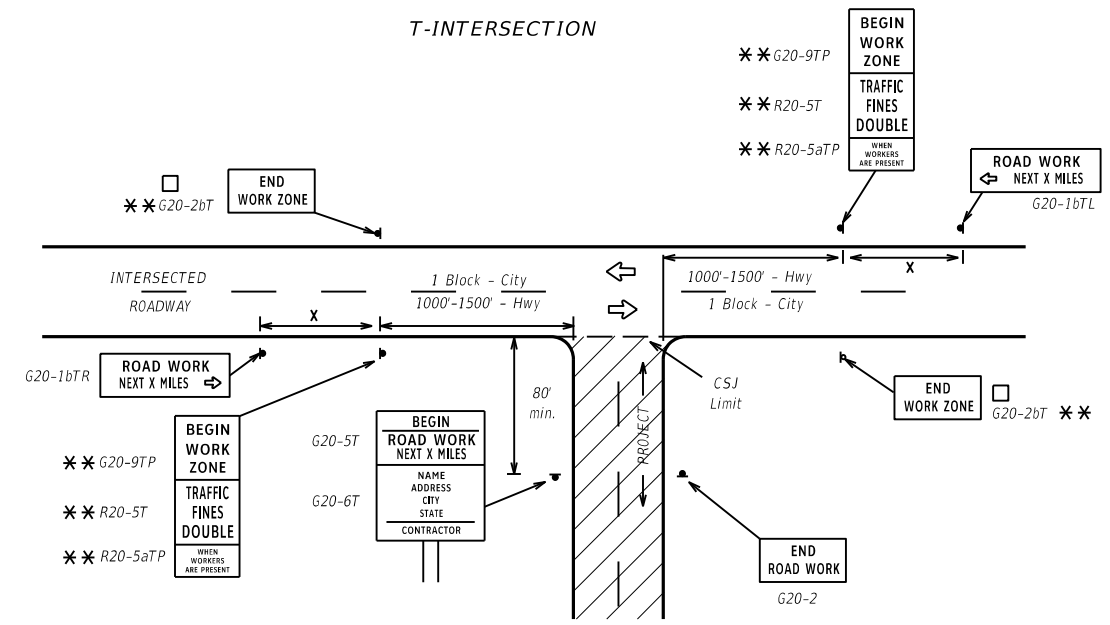
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT <a href="http://www.txdot.gov">http://www.txdot.gov</a>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY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

SHEET 1 OF 12

 <b>Texas Department of Transportation</b>		<b>Traffic Safety Division Standard</b>	
<b>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</b>			
<b>BC(1)-21</b>			
FILE:	bc-21.dgn	DN:	TxDOT
CONT:	November 2002	CK:	TxDOT
SECT:	0543	DW:	TxDOT
JOB:	02	CK:	TxDOT
HIGHWAY:	076		
REVISIONS:			
4-03	7-13		
9-07	8-14		
5-10	5-21		
DIST:	COUNTY:	SHEET NO.:	
HOU	FORT BEND	15	



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



**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 <sup>4</sup>	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25	36" x 36"	48" x 48"	50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14			55	500 <sup>2</sup>
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12			60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			75	900 <sup>2</sup>
	80	1000 <sup>2</sup>		
	*	*	*	* <sup>3</sup>

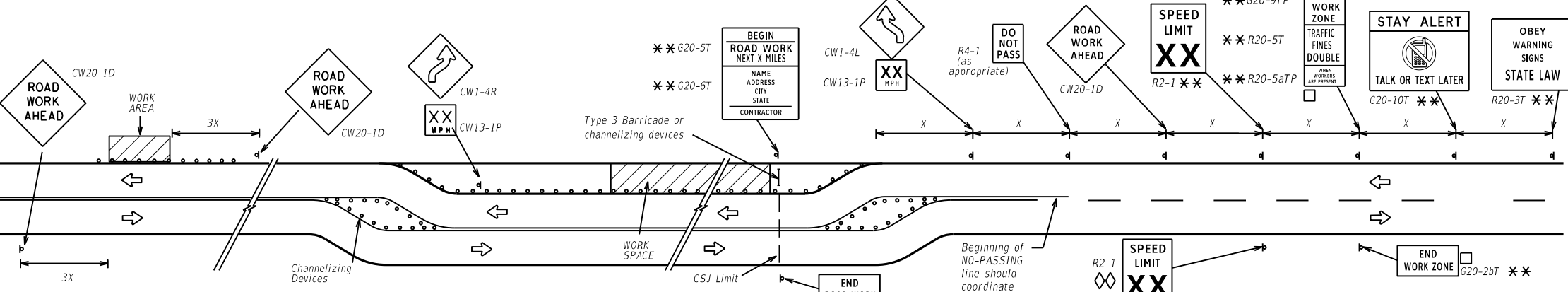
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

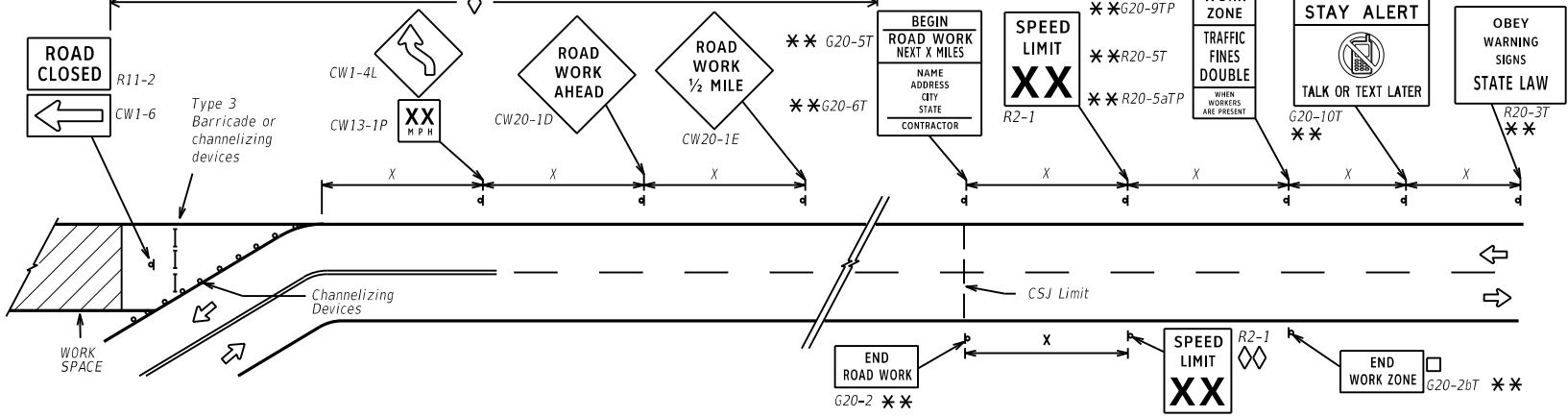
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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**

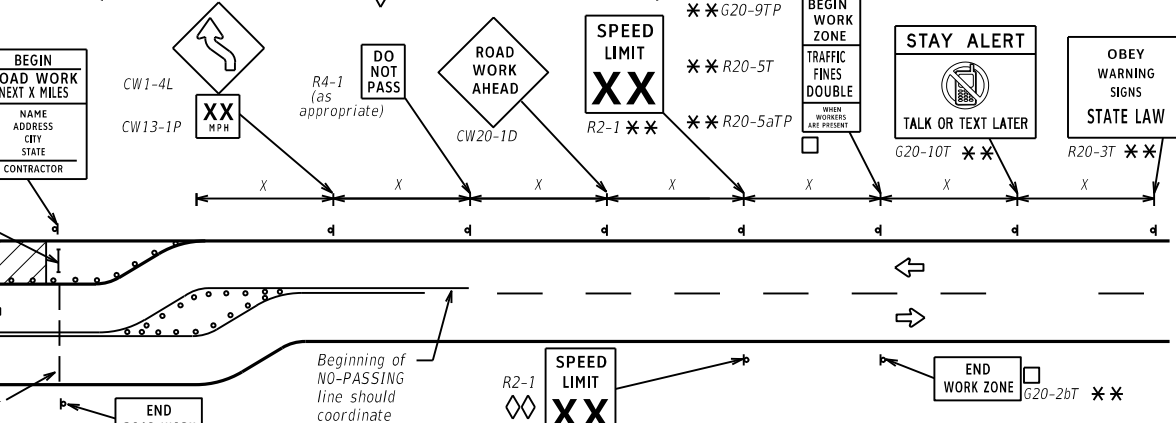


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing 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"(G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
  - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
  - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
  - Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

BC(2)-21

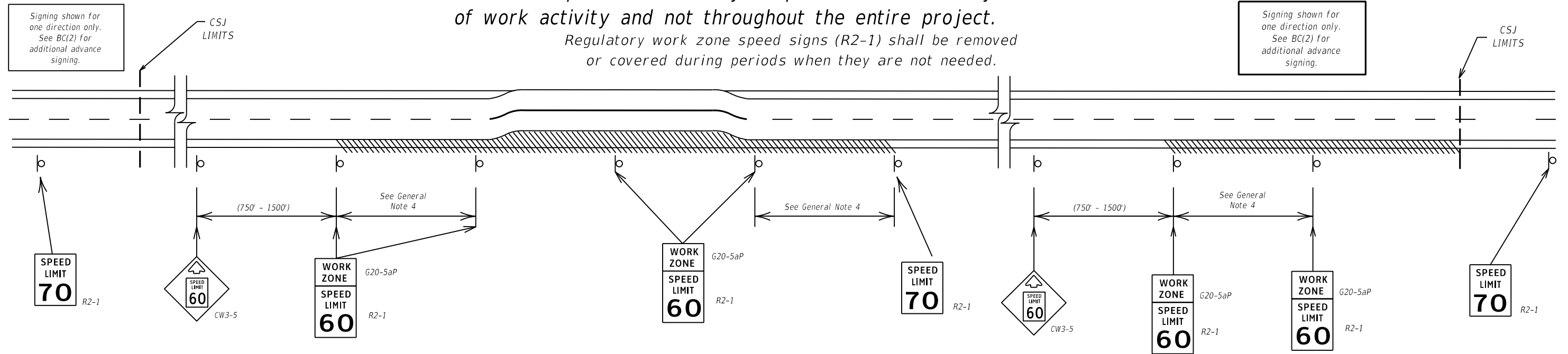
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	HOU	FORT BEND	16	

# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

## GENERAL NOTES

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

SHEET 3 OF 12

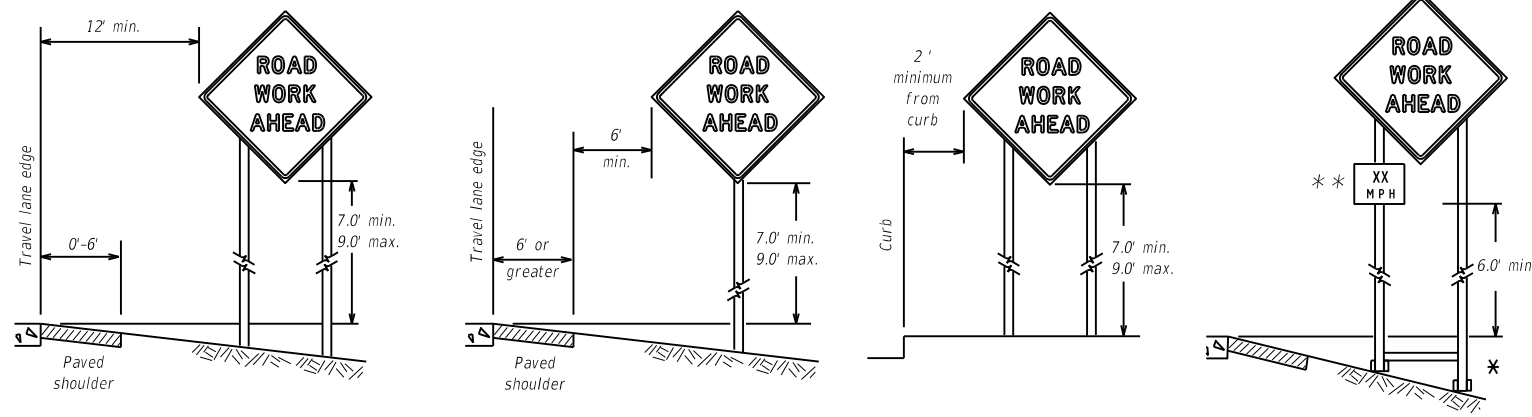


## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

### BC(3)-21

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©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
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REVISIONS					
9-07	8-14				
7-13	5-21				
		DIST	COUNTY		SHEET NO.
		HOU	FORT BEND		17

**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.

**GENERAL NOTES FOR WORK ZONE SIGNS**

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

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

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

**SIGN MOUNTING HEIGHT**

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

**SIZE OF SIGNS**

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

**SIGN SUBSTRATES**

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

**REFLECTIVE SHEETING**

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

**SIGN LETTERS**

- All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

**REMOVING OR COVERING**

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
- Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
- When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
- Burlap shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

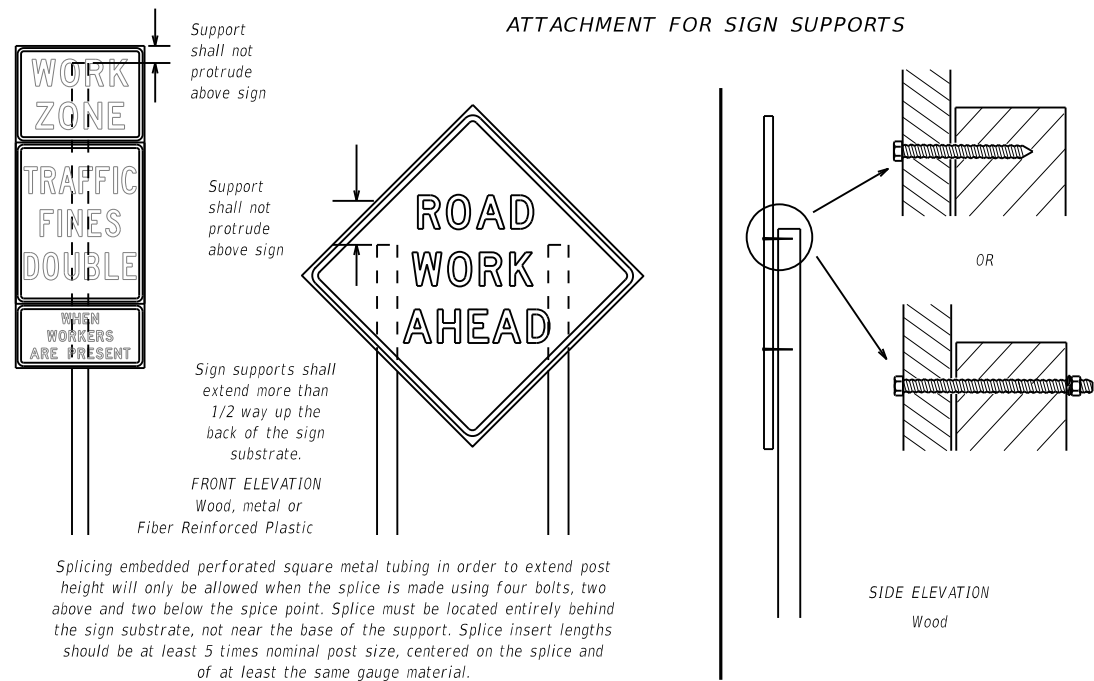
**SIGN SUPPORT WEIGHTS**

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

**FLAGS ON SIGNS**

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

**ATTACHMENT FOR SIGN SUPPORTS**

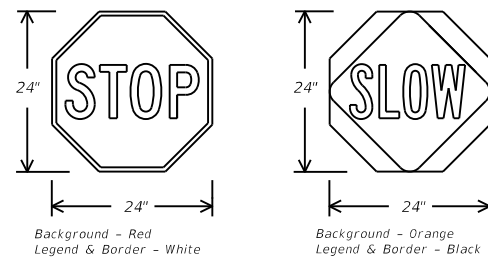


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

**STOP/SLOW PADDLES**

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

**CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS**

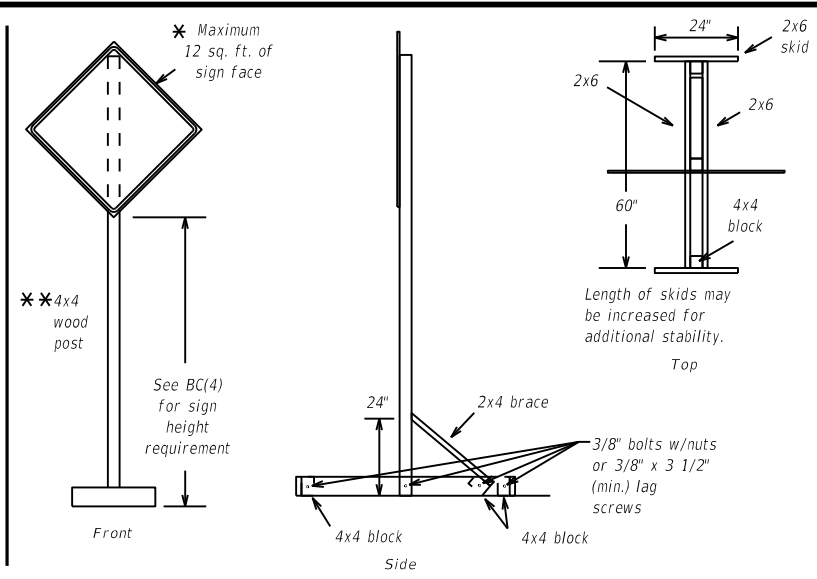
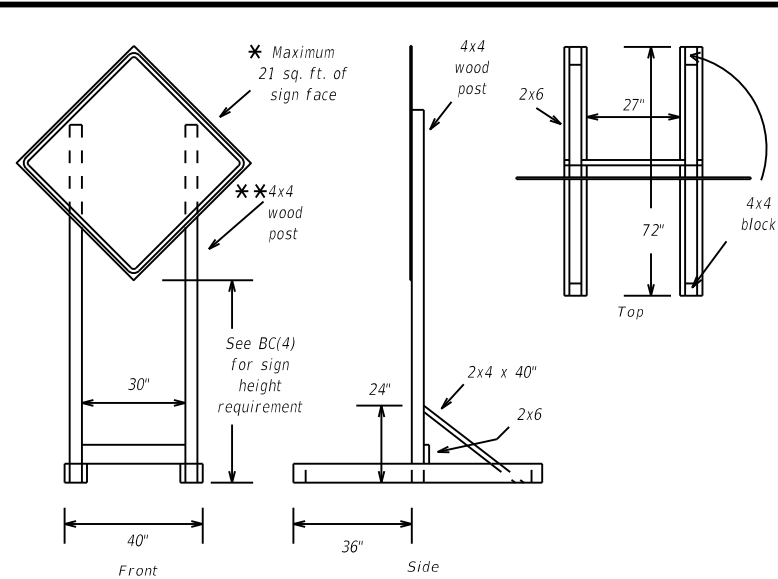
- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service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



**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

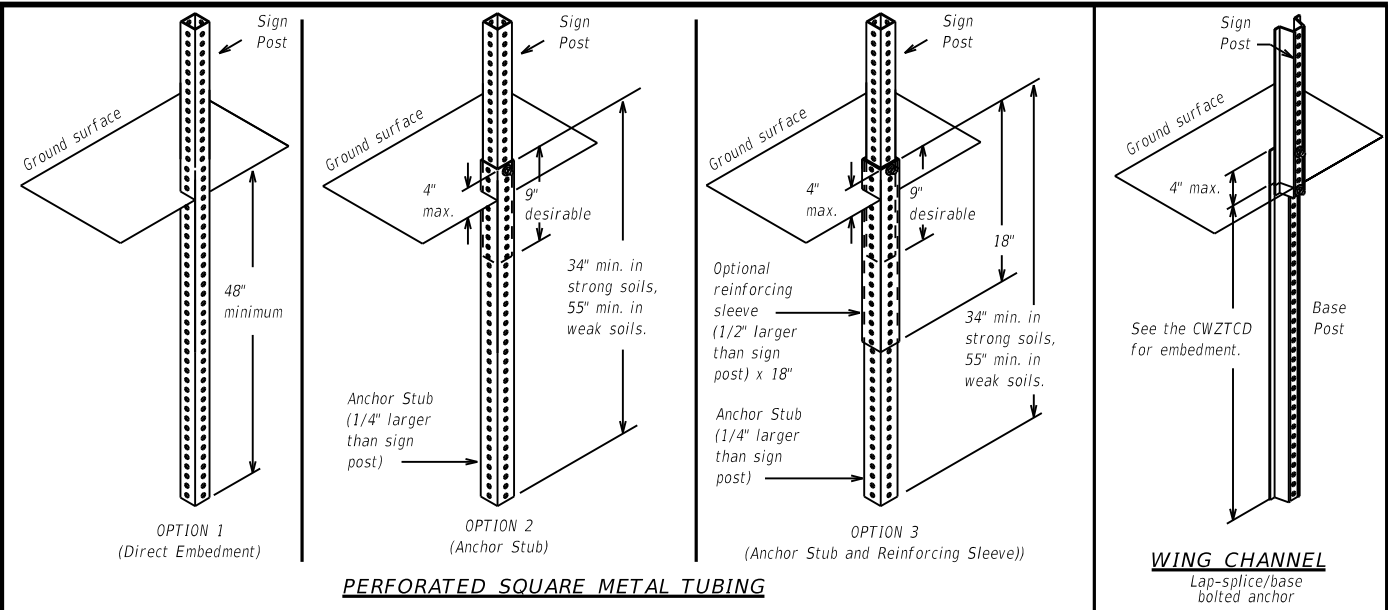
**BC(4)-21**

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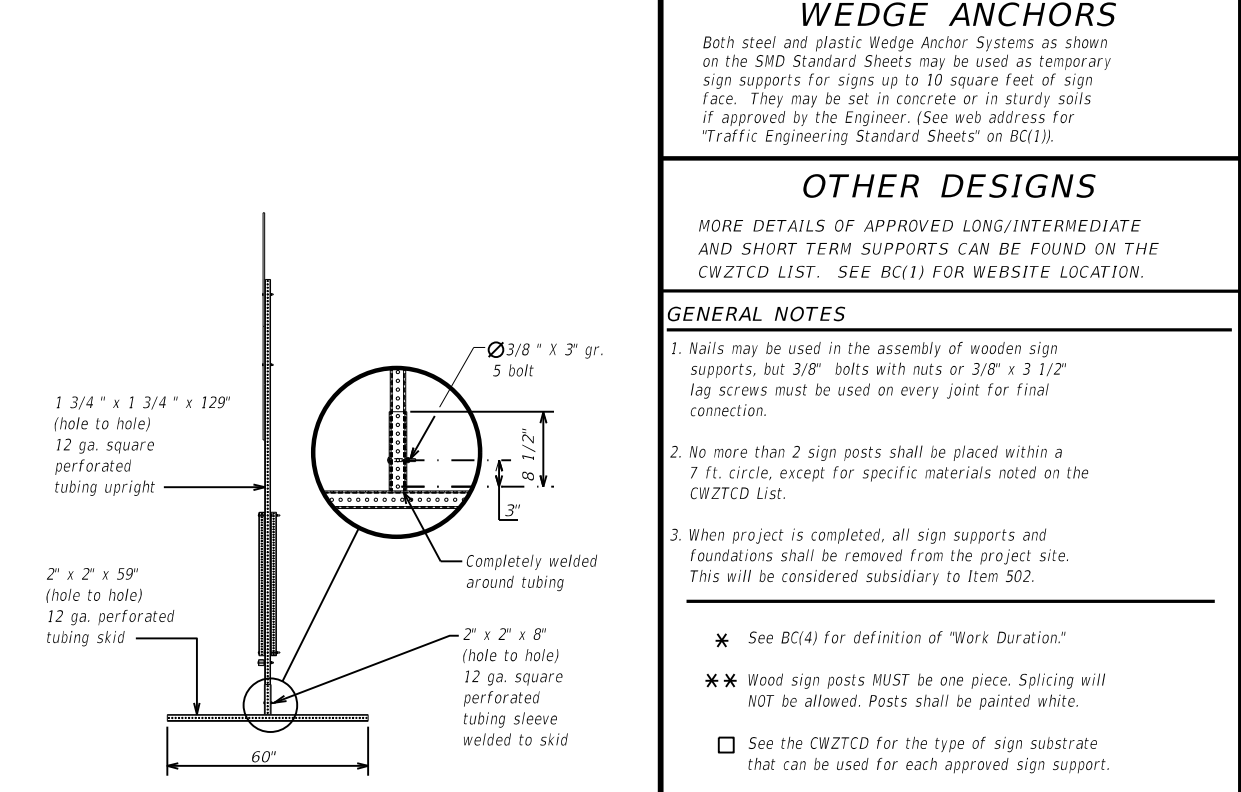
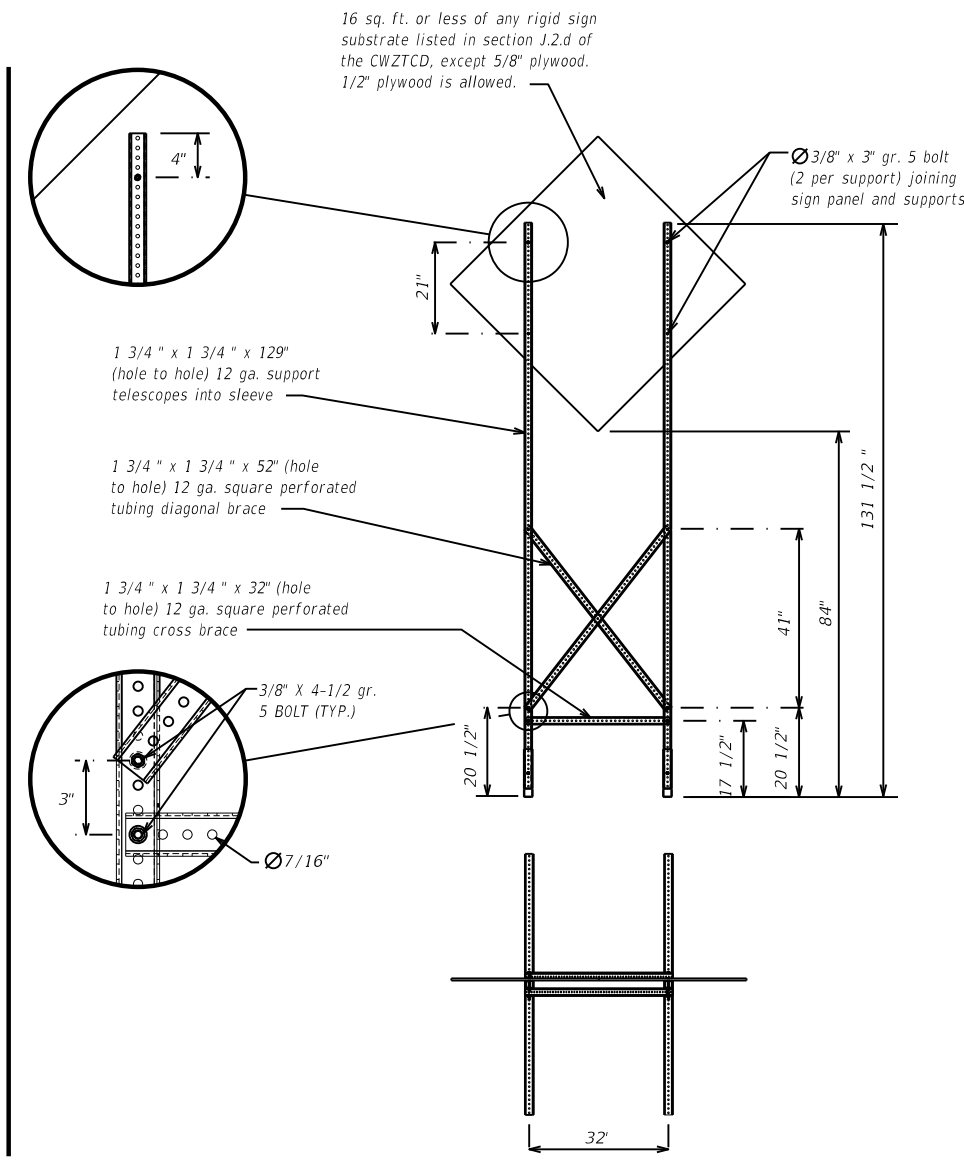
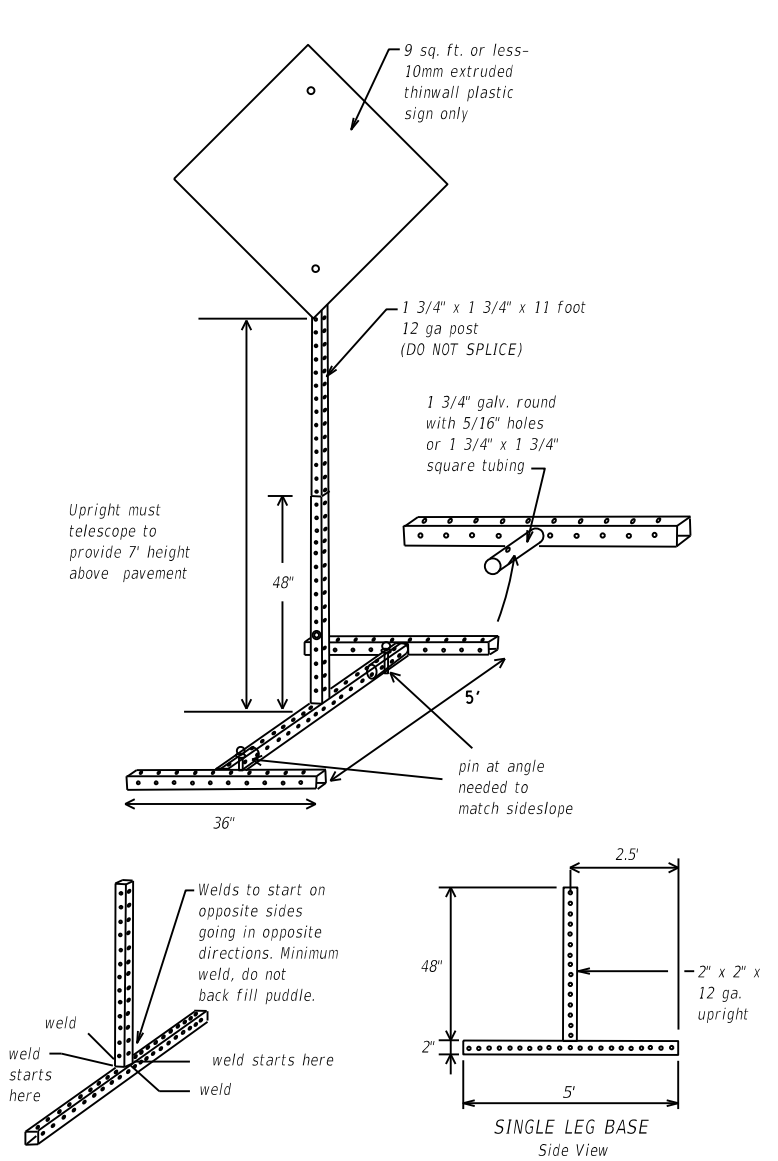
**SKID MOUNTED WOOD SIGN SUPPORTS**

\* 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.



**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 inch bolts with nuts or 3/8 inch x 3 1/2 inch 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.

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**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**

BC(5)-21

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**SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS**

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

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

# 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.

WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
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
XXX Feet	XXX 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		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

\* 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	Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	SPEED LIMIT XX MPH	TUE-FRI XX AM - X PM
DETOUR NEXT X EXITS	USE XXXX RD EXIT	MAXIMUM SPEED XX MPH	APR XX - X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP	DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE	DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS		TONIGHT XX PM - XX AM
STAY IN LANE *			

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

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

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

## FULL MATRIX PCMS SIGNS

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

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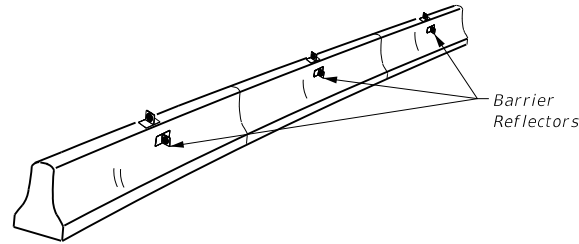
## BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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REVISIONS									
9-07	8-14								
7-13	5-21	DIST:	HOU	COUNTY:	FORT BEND	SHEET NO.:	20		

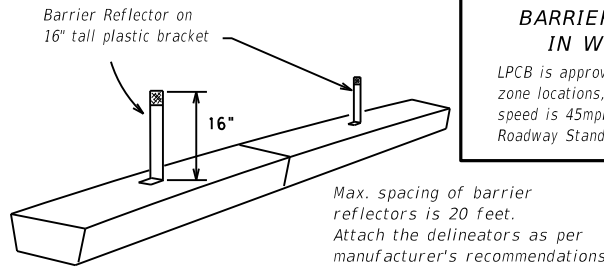


- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



**CONCRETE TRAFFIC BARRIER (CTB)**

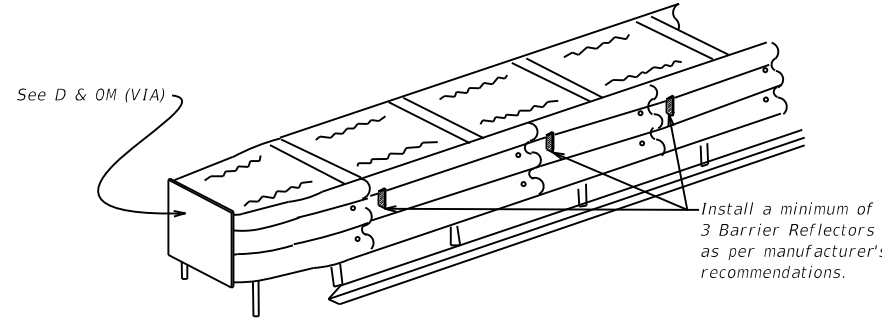
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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



**LOW PROFILE CONCRETE BARRIER (LPCB)**

**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.



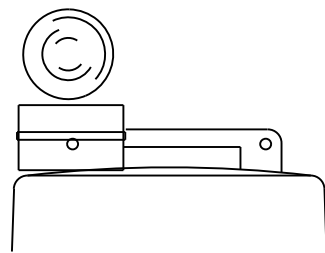
**DELINEATION OF END TREATMENTS**

**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**



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

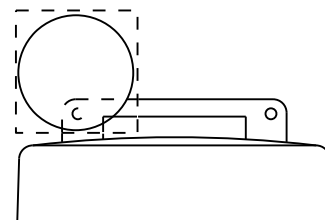
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

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

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

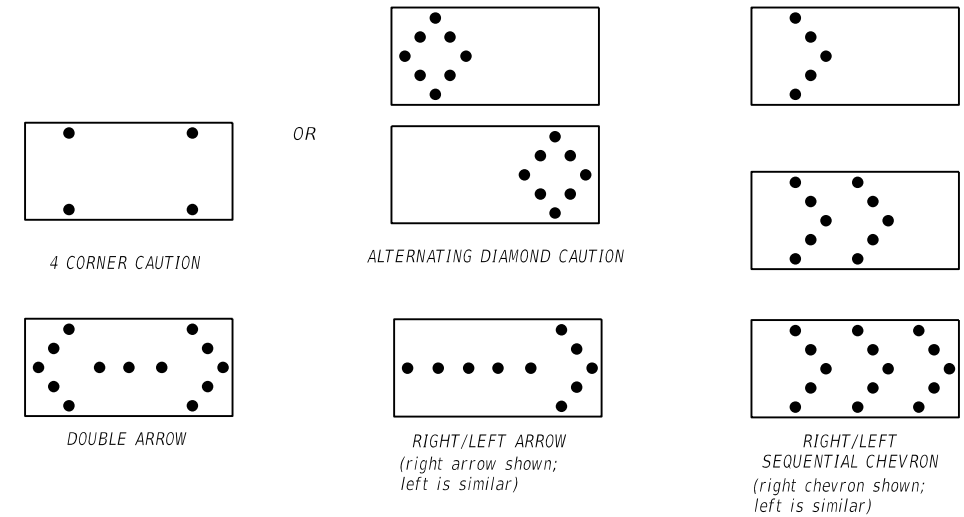
- A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
- The warning reflector shall be yellow in color and shall be manufactured using a sign substrate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



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

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**

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0543	02	076	FM 359				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	HOU	FORT BEND	21					

**GENERAL NOTES**

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

**GENERAL DESIGN REQUIREMENTS**

Pre-qualified plastic drums shall meet the following requirements:

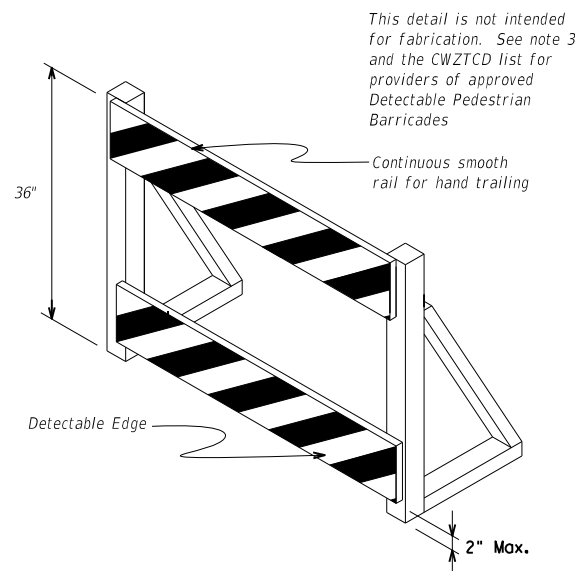
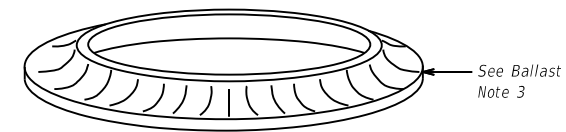
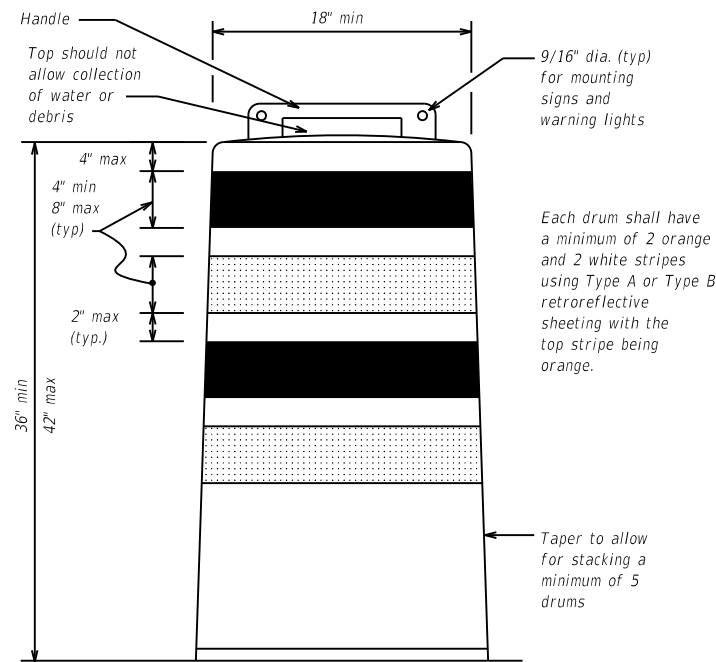
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

**RETROREFLECTIVE SHEETING**

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

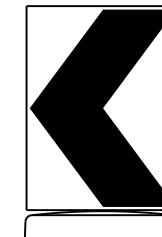
**BALLAST**

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

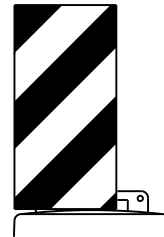


**DETECTABLE PEDESTRIAN BARRICADES**

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



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



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

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

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

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

SHEET 8 OF 12

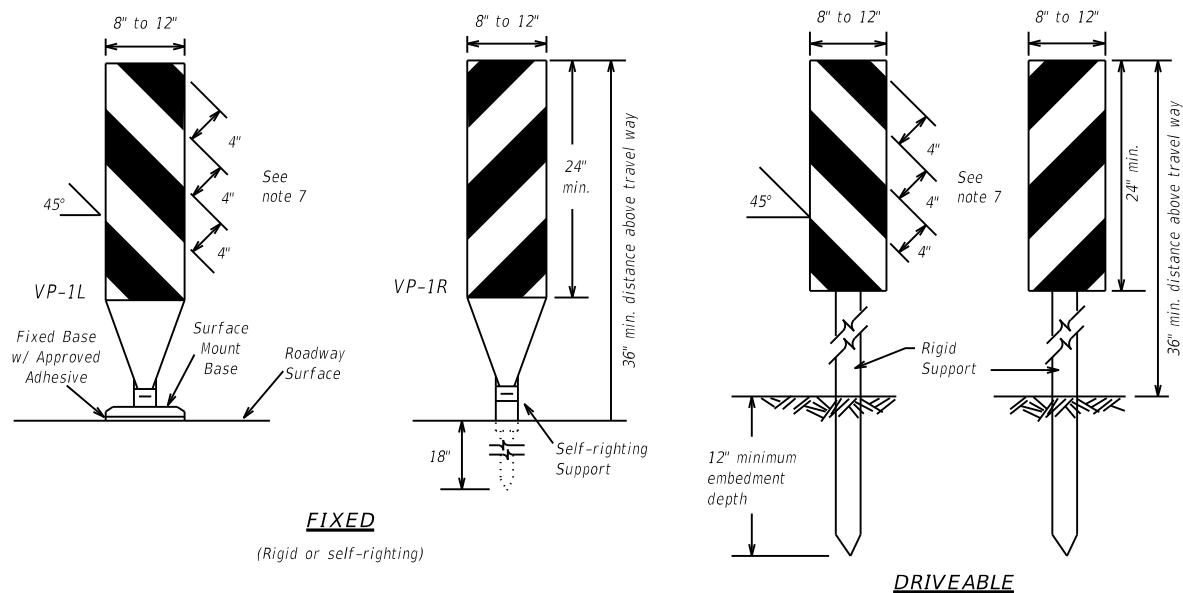


**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

BC(8)-21

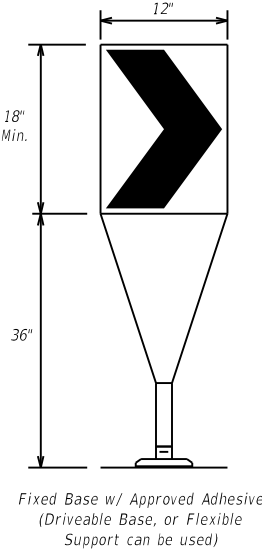
FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0543	02	076	FM 359				
4-03	8-14	DIST	COUNTY	SHEET NO.					
9-07	5-21	HOU	FORT BEND	22					
7-13									





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

**DRIVEABLE**



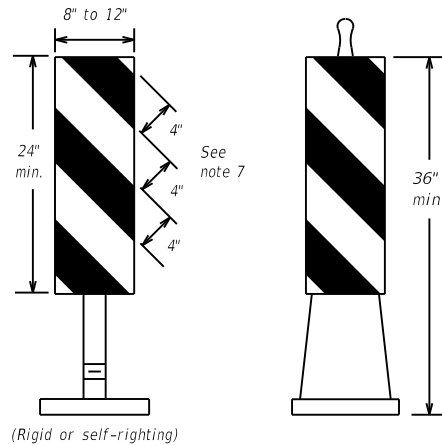
Fixed Base w/ Approved Adhesive  
(Driveable Base, or Flexible Support can be used)

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

**CHEVRONS**

**GENERAL NOTES**

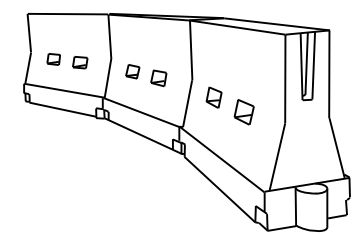
1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control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



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

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

**VERTICAL PANELS (VPs)**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

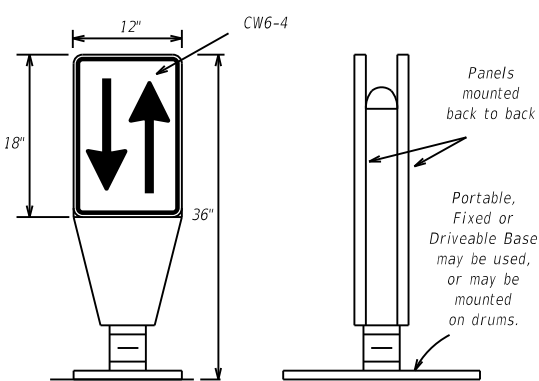
1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application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

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

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

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

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



**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

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

Posted Speed	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	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'

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

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

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

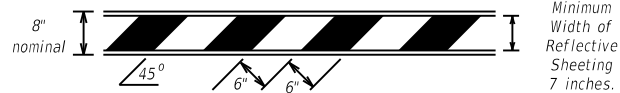
**BC(9)-21**

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	November 2002	CONT:	SECT:	JOB:	0543	02	076	HIGHWAY:	FM 359
REVISIONS:		DIST:	COUNTY:	SHEET NO.:					
9-07	8-14	HOU	FORT BEND						23
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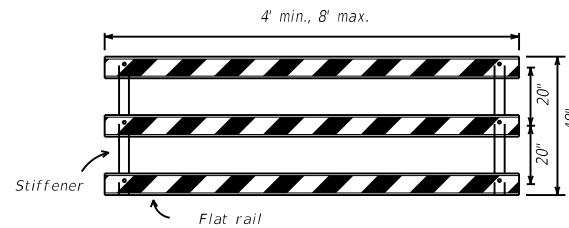
**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

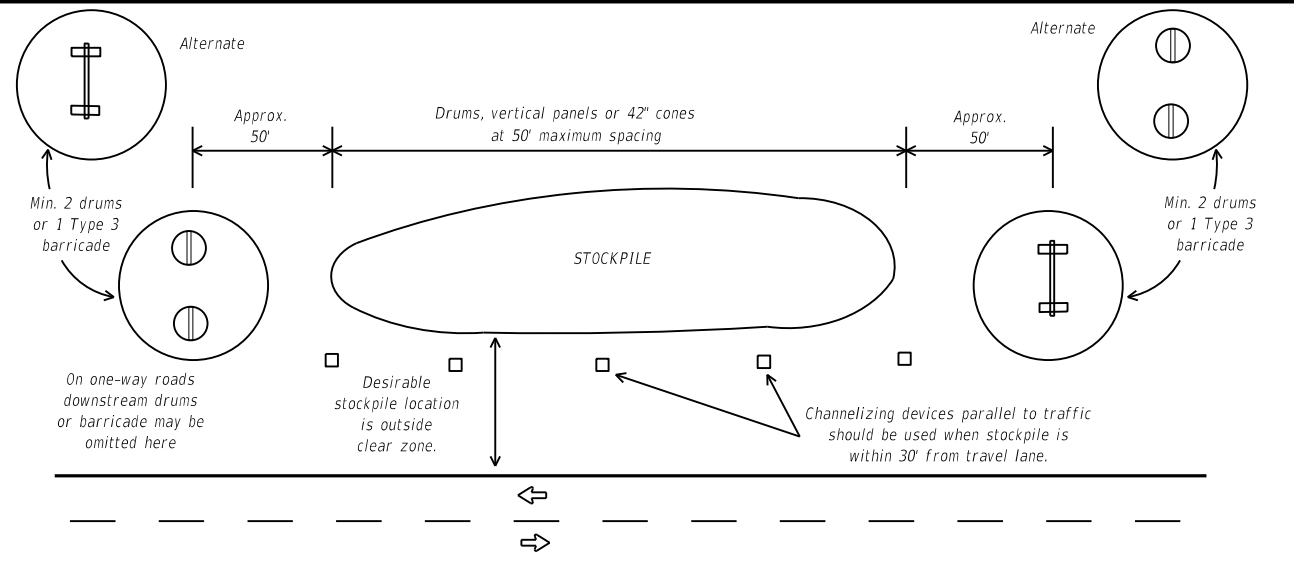


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



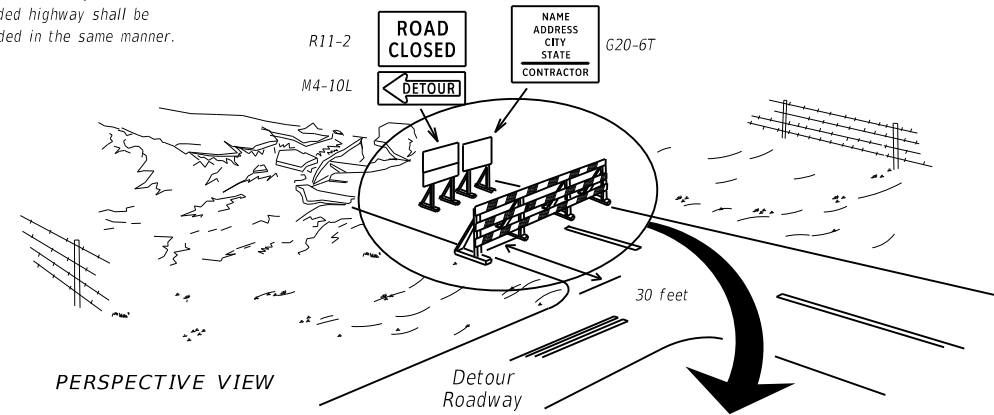
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

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



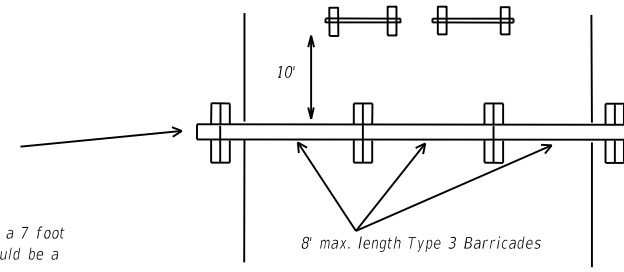
**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

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



**PERSPECTIVE VIEW**

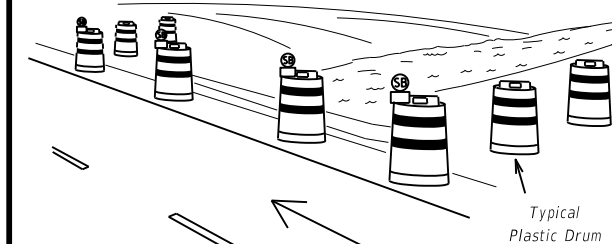
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



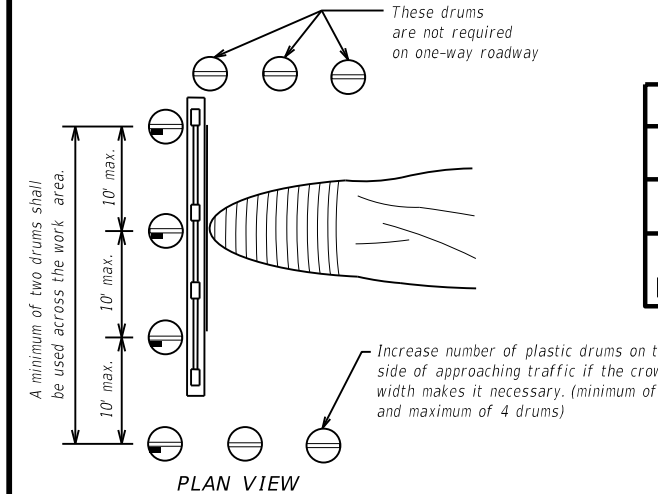
**PLAN VIEW**

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**



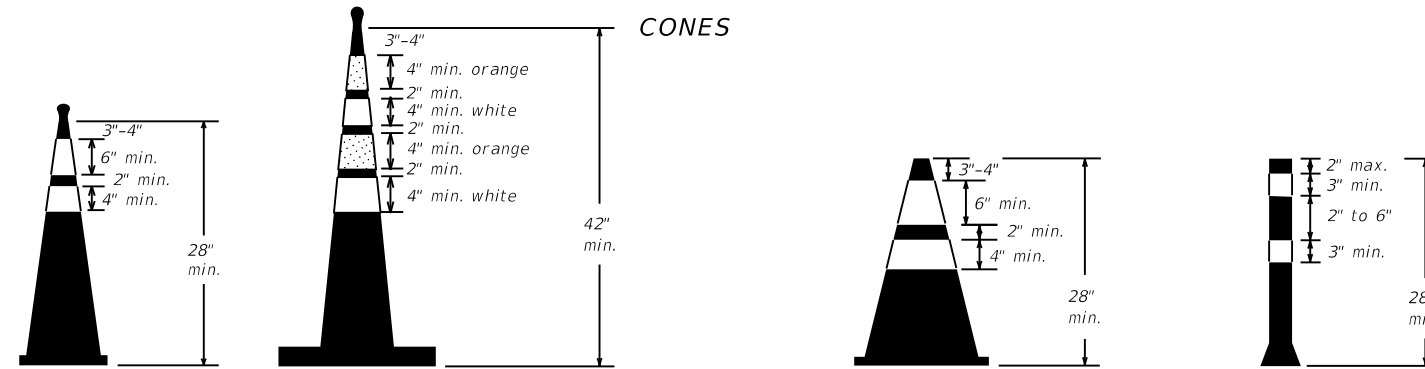
**PLAN VIEW**

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

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

**CONES**



**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
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## WORK ZONE PAVEMENT MARKINGS

### GENERAL

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

### RAISED PAVEMENT MARKERS

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

### PREFABRICATED PAVEMENT MARKINGS

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

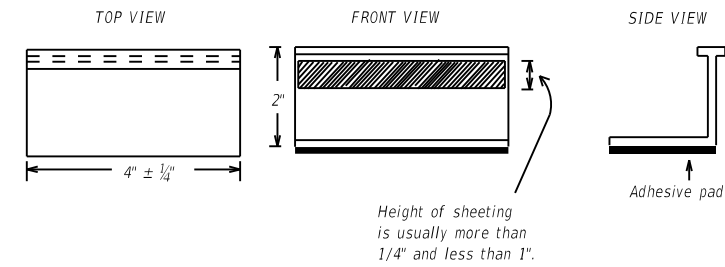
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

### REMOVAL OF PAVEMENT MARKINGS

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

## Temporary Flexible-Reflective Roadway Marker Tabs



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

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

### RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

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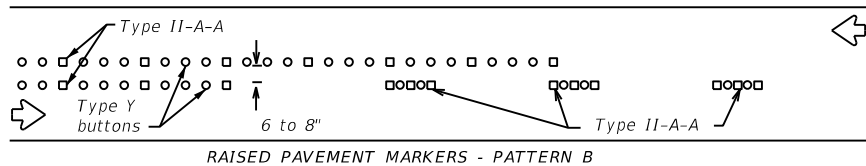
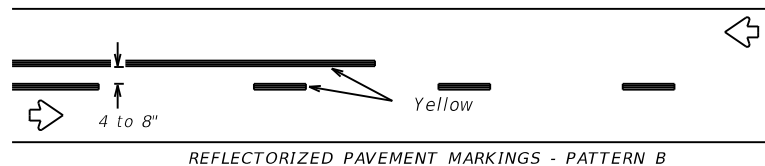
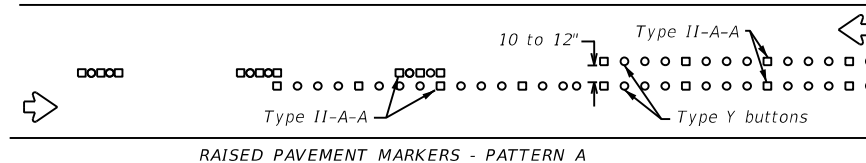


## BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

**BC(11)-21**

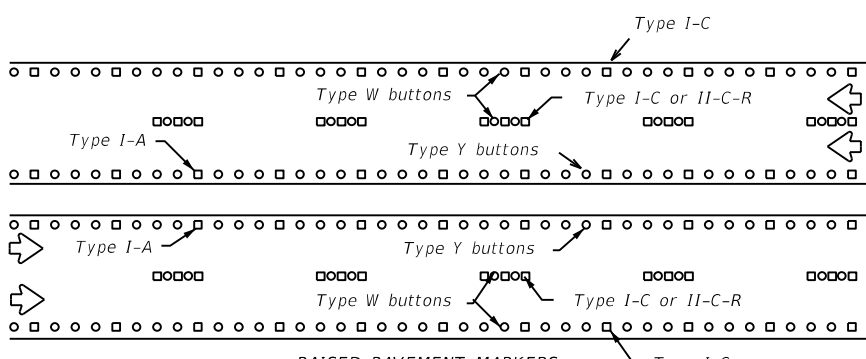
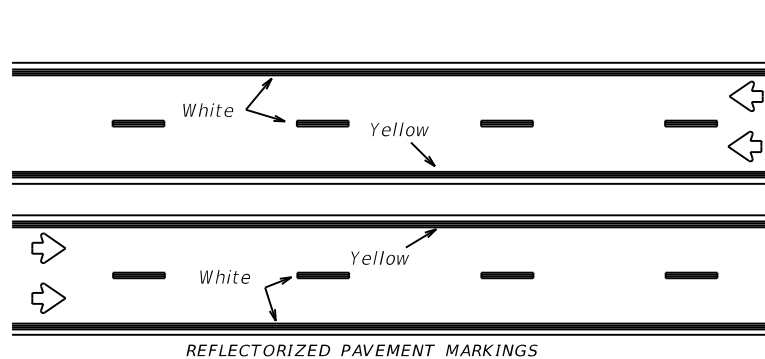
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 9-07 5-21	HOU	FORT BEND	25	
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11-02 8-14				

## PAVEMENT MARKING PATTERNS



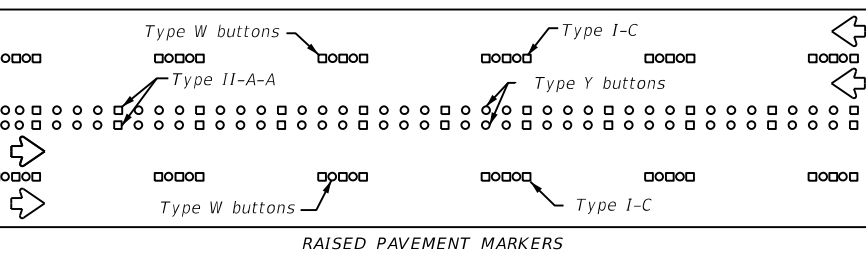
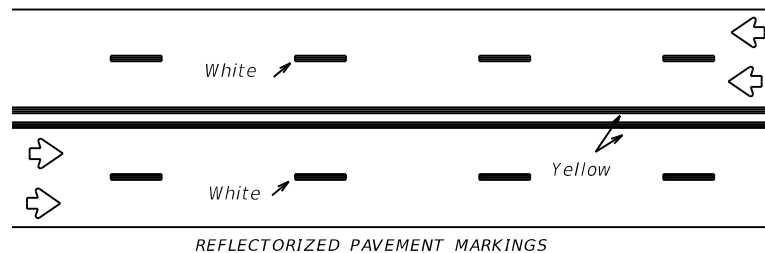
Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectorized pavement markings.

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



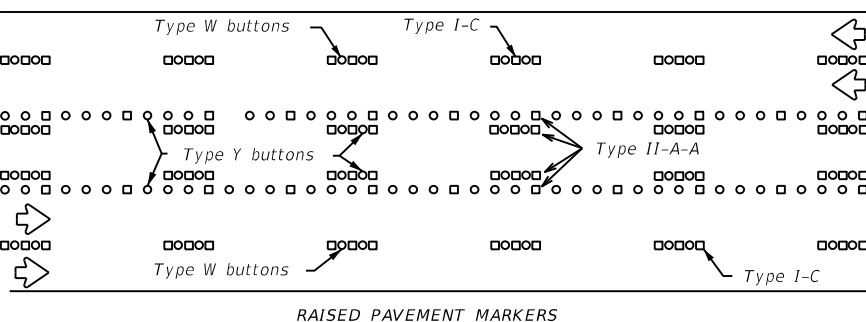
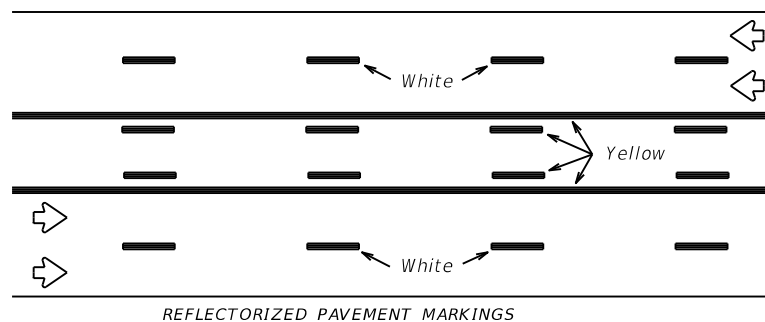
Prefabricated markings may be substituted for reflectorized pavement markings.

### EDGE & LANE LINES FOR DIVIDED HIGHWAY



Prefabricated markings may be substituted for reflectorized pavement markings.

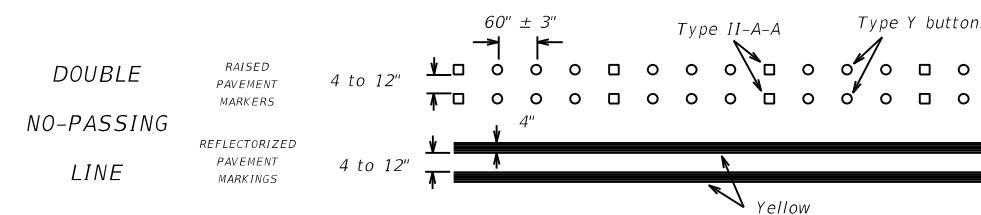
### LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



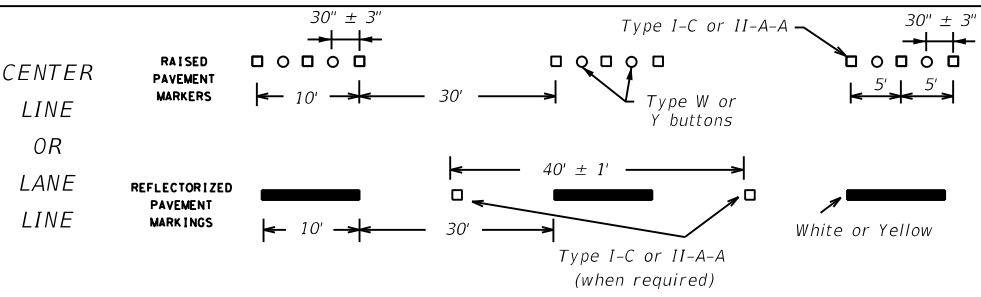
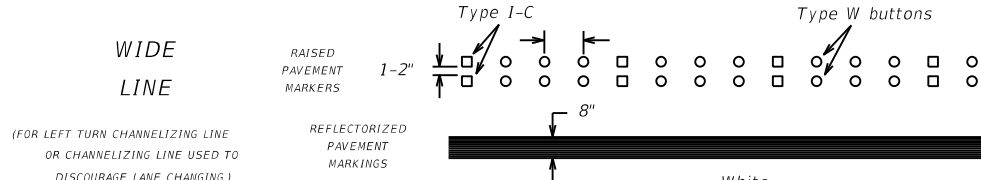
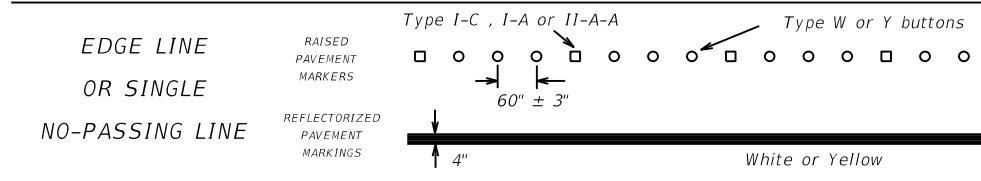
Prefabricated markings may be substituted for reflectorized pavement markings.

### TWO-WAY LEFT TURN LANE

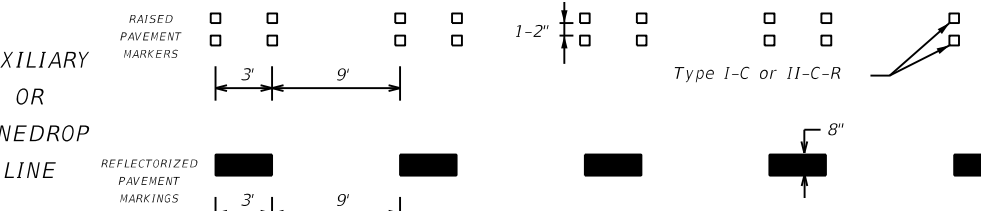
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

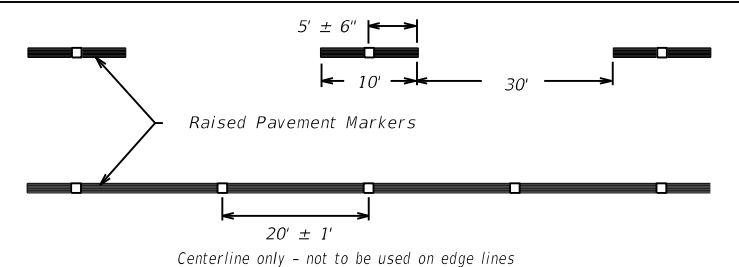


### BROKEN LINES



### 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.



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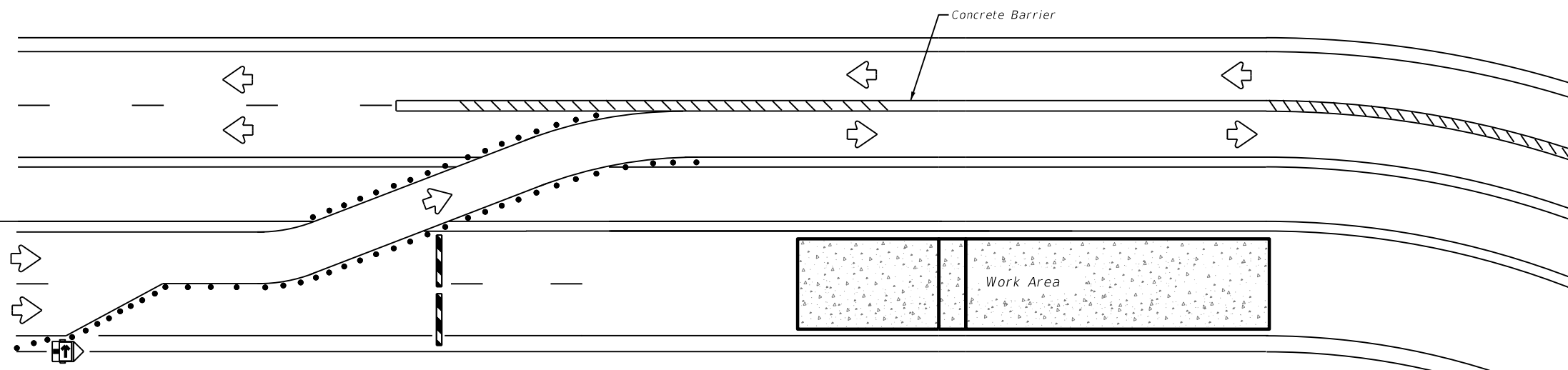


## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

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."

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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11-02 8-14				



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

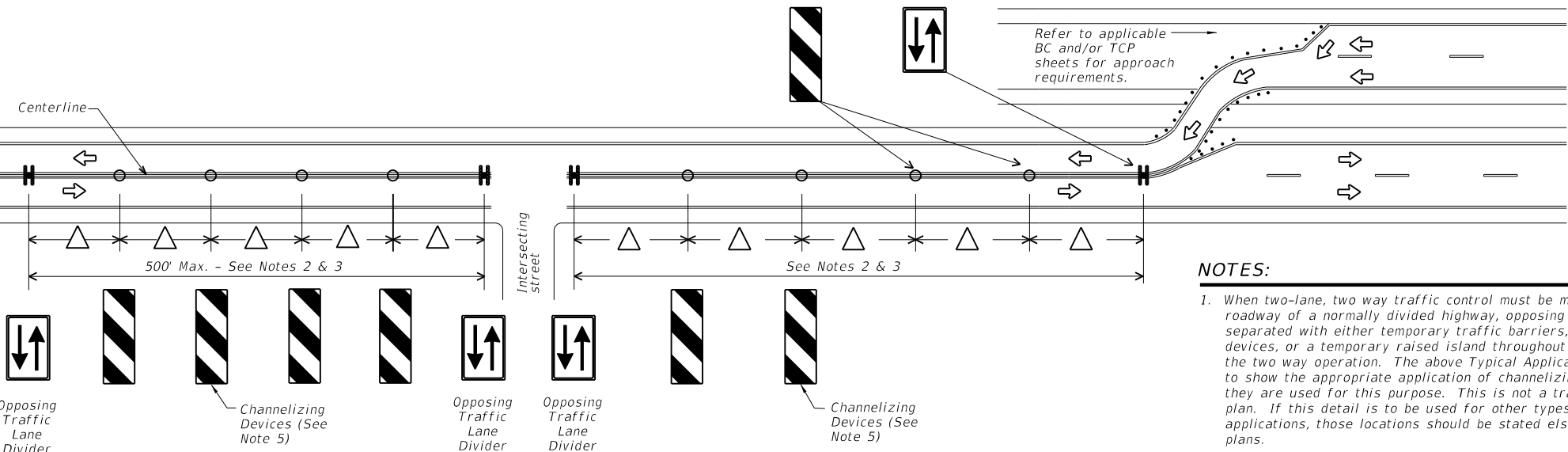
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

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

**NOTES:**

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

**BARRIER DELINEATION WITH MODULAR GLARE SCREENS**



**NOTES:**

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

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

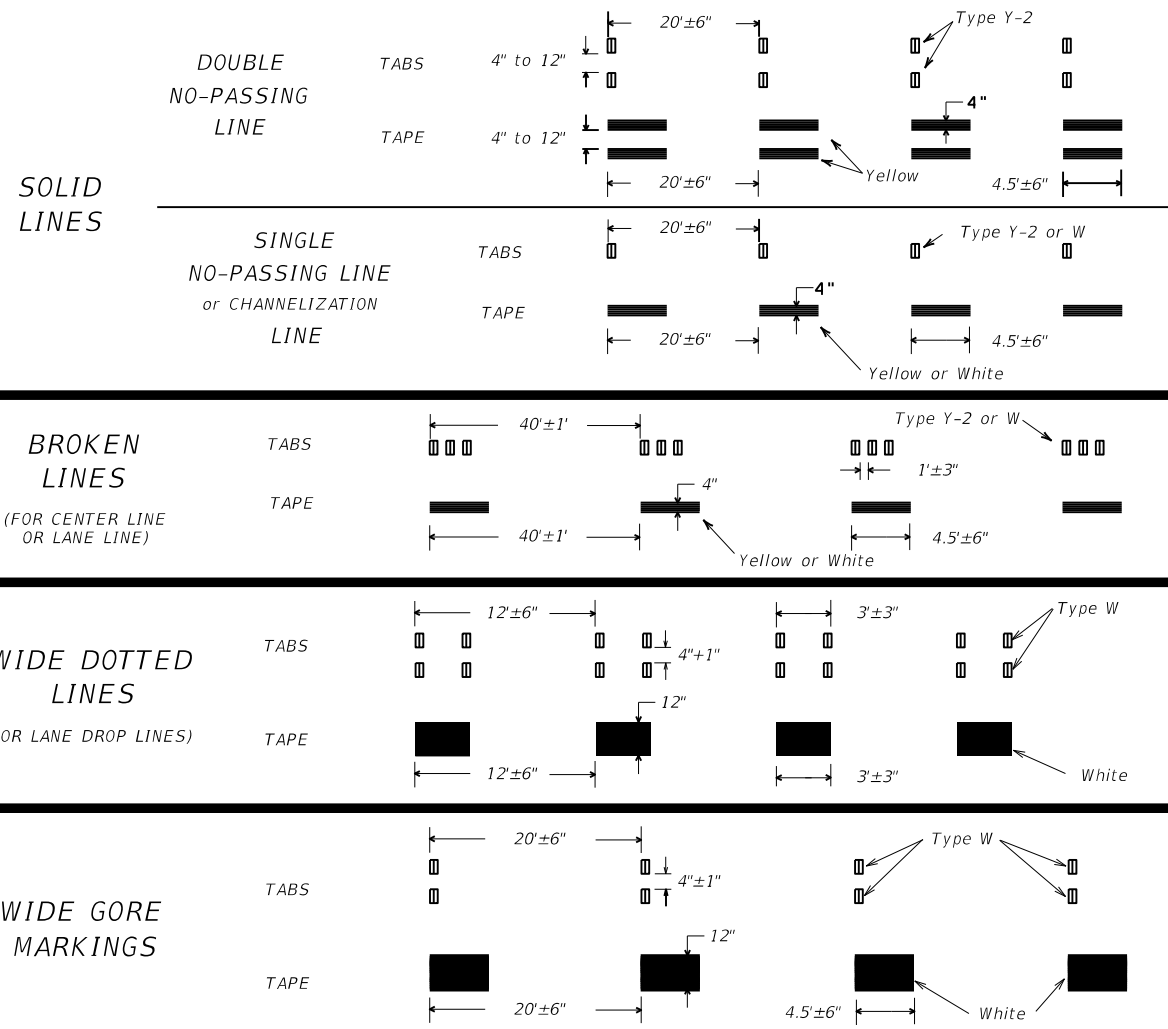


**TRAFFIC CONTROL PLAN TYPICAL DETAILS**

**WZ(TD)-17**

FILE: wztld-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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3-03	HOU	FORT BEND	27	
7-13				

## WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



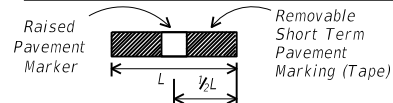
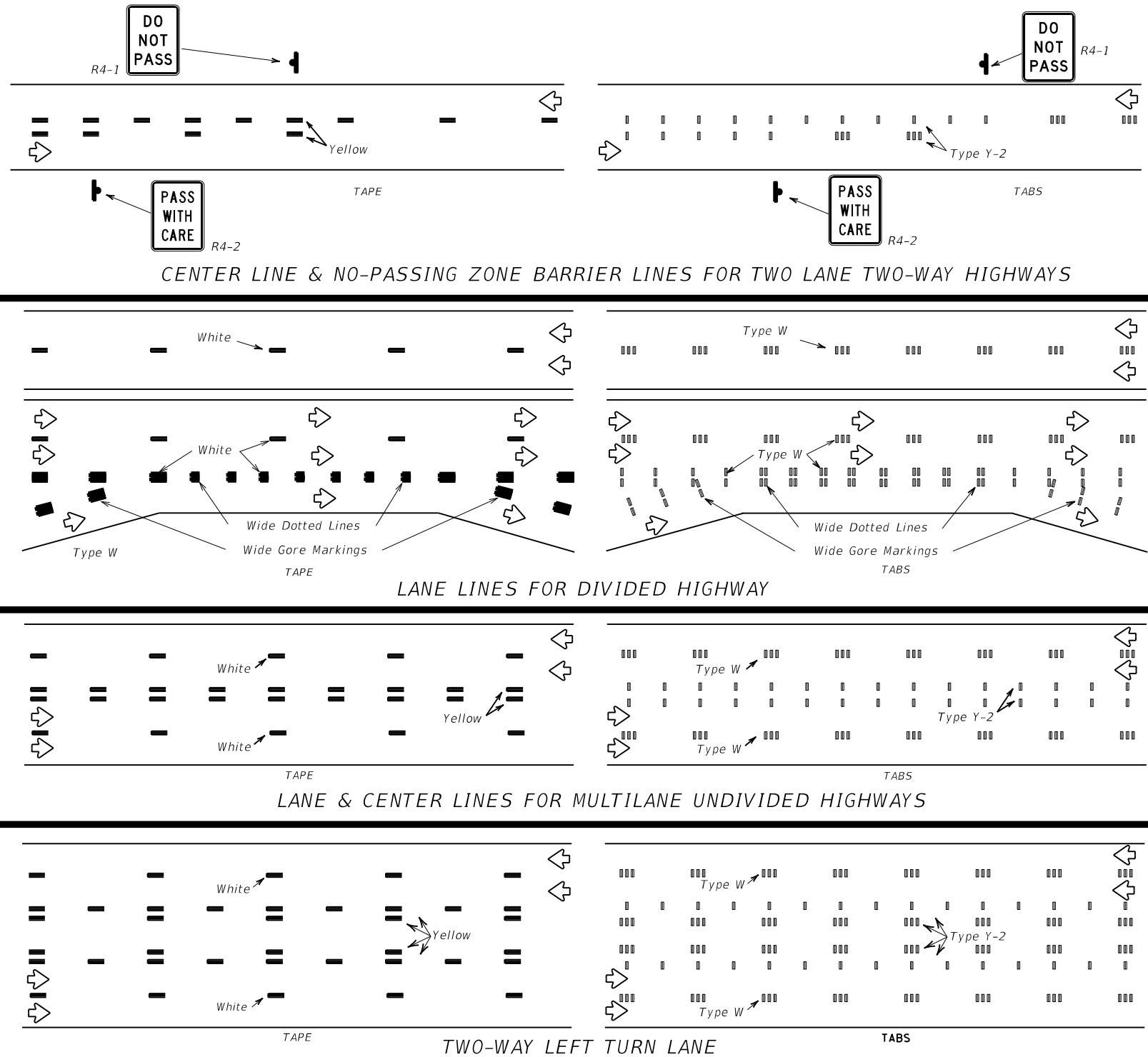
### NOTES:

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

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

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

## WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



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

### PREFABRICATED PAVEMENT MARKINGS

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

### RAISED PAVEMENT MARKERS

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

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

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



## WORK ZONE SHORT TERM PAVEMENT MARKINGS

### WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
©TxDOT	April 1992	CONT:	0543	SECT:	02	JOB:	076	HIGHWAY:	FM 359
REVISIONS		DIST:	HOU	COUNTY:	FORT BEND	SHEET NO.:	28		

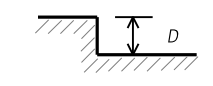
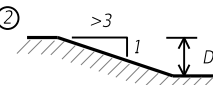
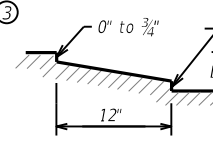
**DEPARTMENTAL MATERIAL SPECIFICATIONS**

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

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

**GENERAL NOTES**

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

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

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

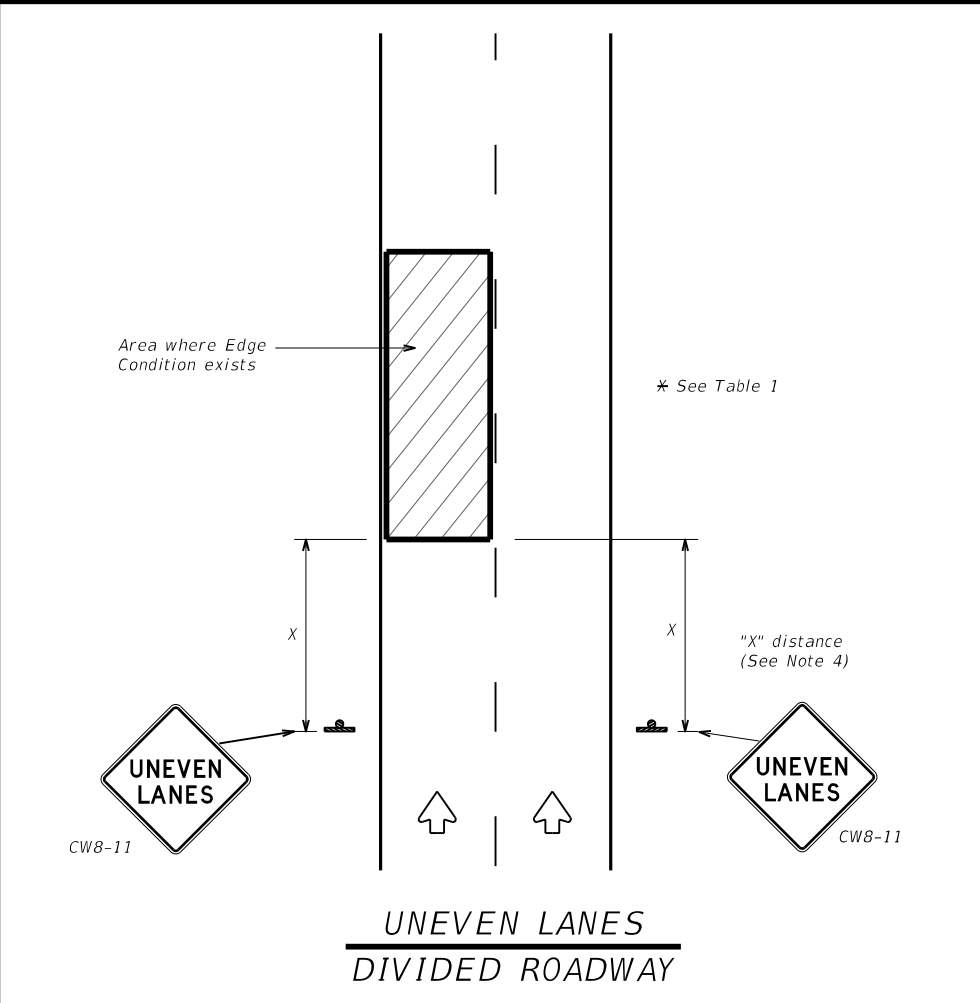
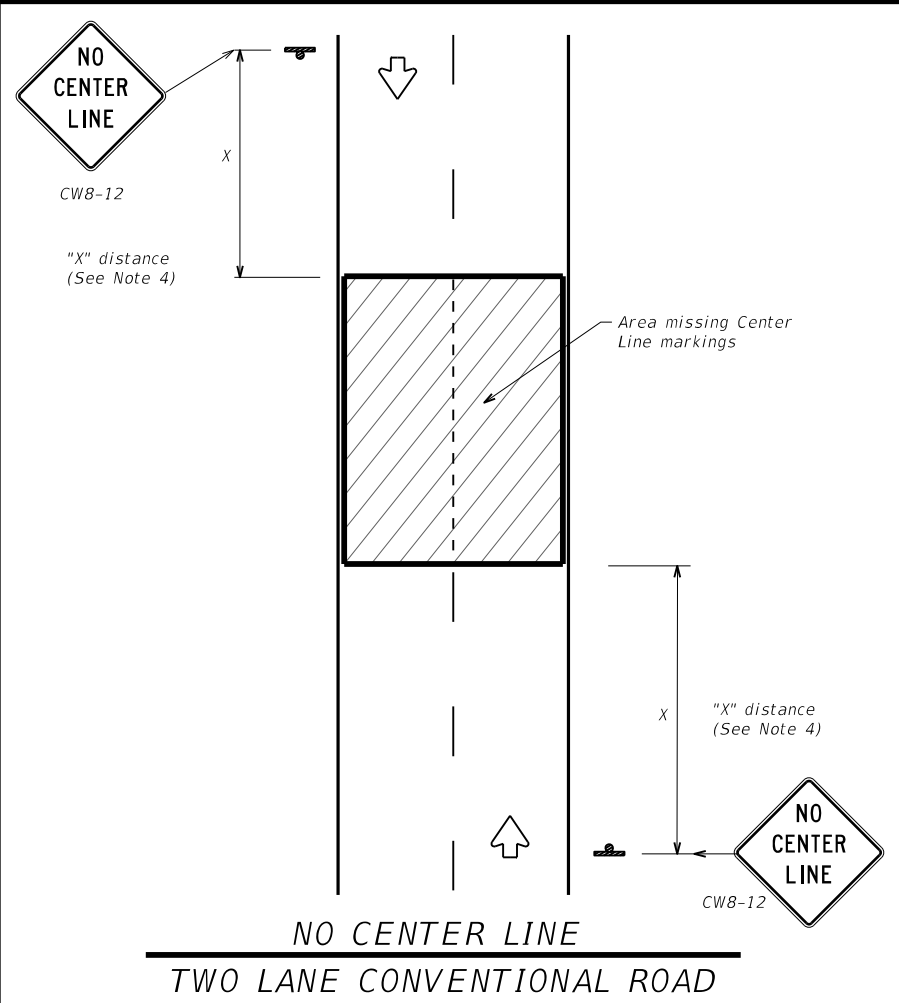
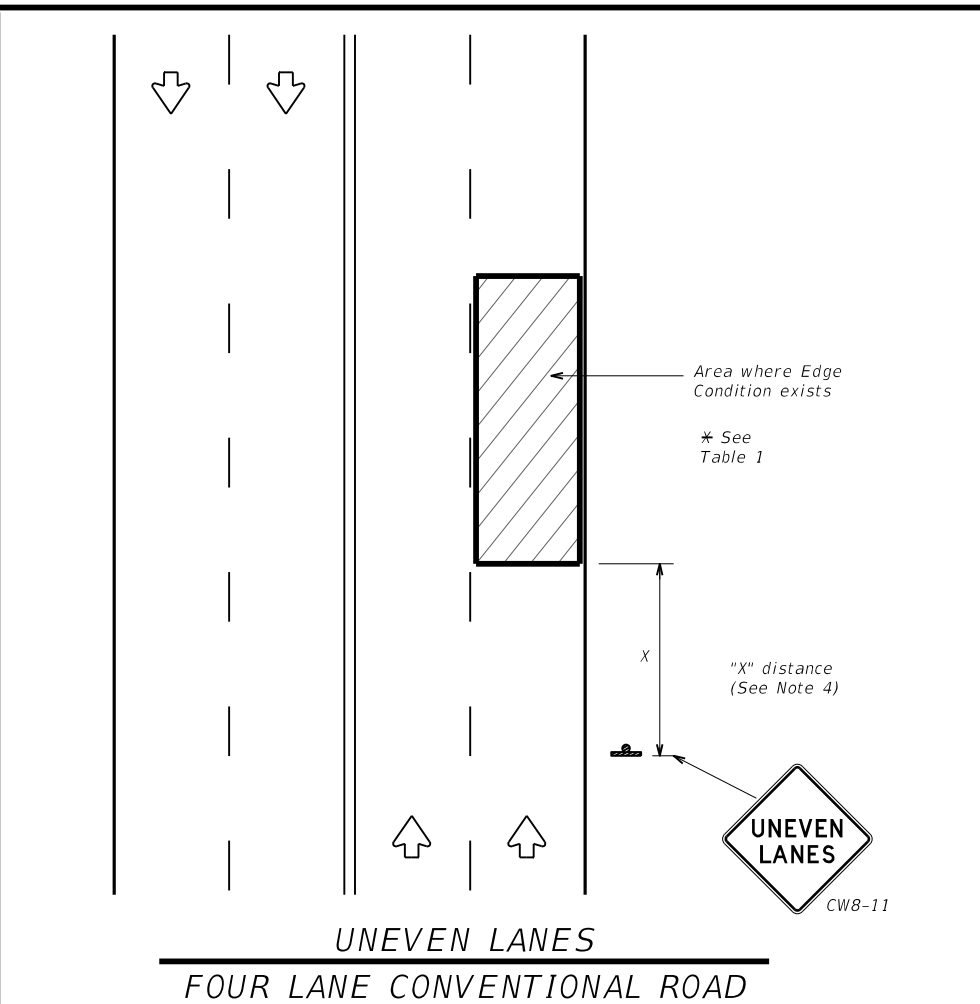
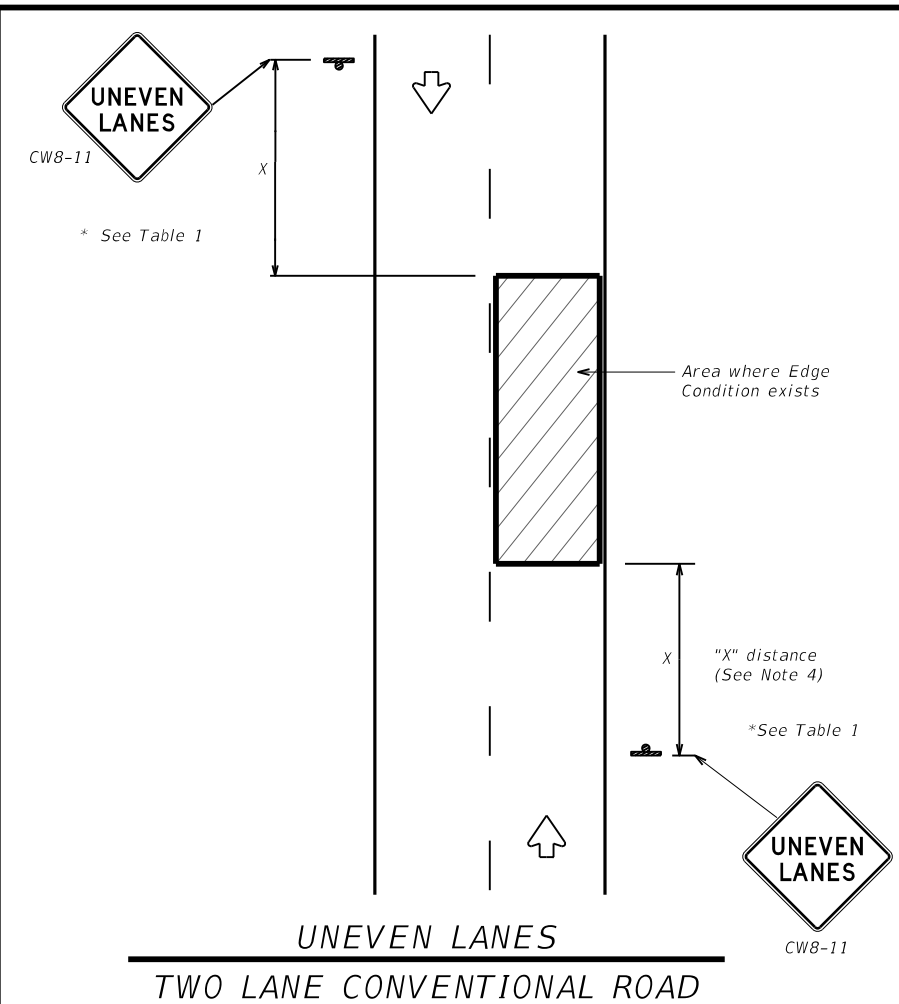
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"



**SIGNING FOR UNEVEN LANES**

**WZ(UL)-13**

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
8-95 2-98 7-13	DIST	COUNTY	SHEET NO.	
1-97 3-03	HOU	FORT BEND	29	



SUMMARY OF LARGE SIGNS									
BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL		DRILLED SHAFT	
						Size	(LF)		
							①	②	24" DIA. (LF)
Orange	G20-7T		96" X 48"	Type B <sub>FL</sub> or C <sub>FL</sub>	32	▲	▲	▲	▲
Orange	G20-7T		192" X 96"	Type B <sub>FL</sub> or C <sub>FL</sub>	128	W8x18	16	17	12

▲ See Note 6 Below

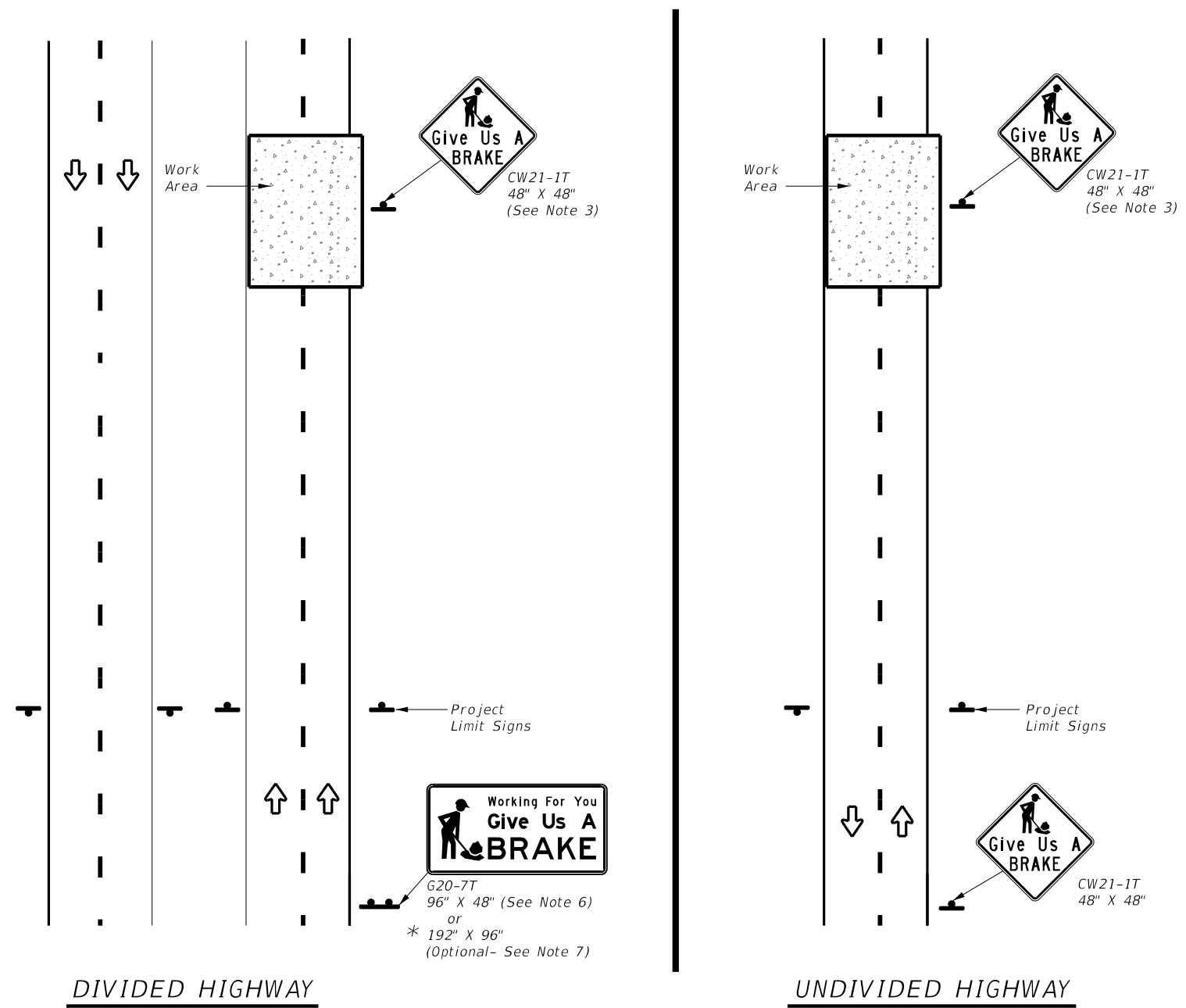
LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

**GENERAL NOTES**

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:  
 Item 636 - Aluminum Signs  
 Item 647 - Large Roadside Sign Supports and Assemblies.  
 Item 416 - Drilled Shaft Foundations
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.



SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

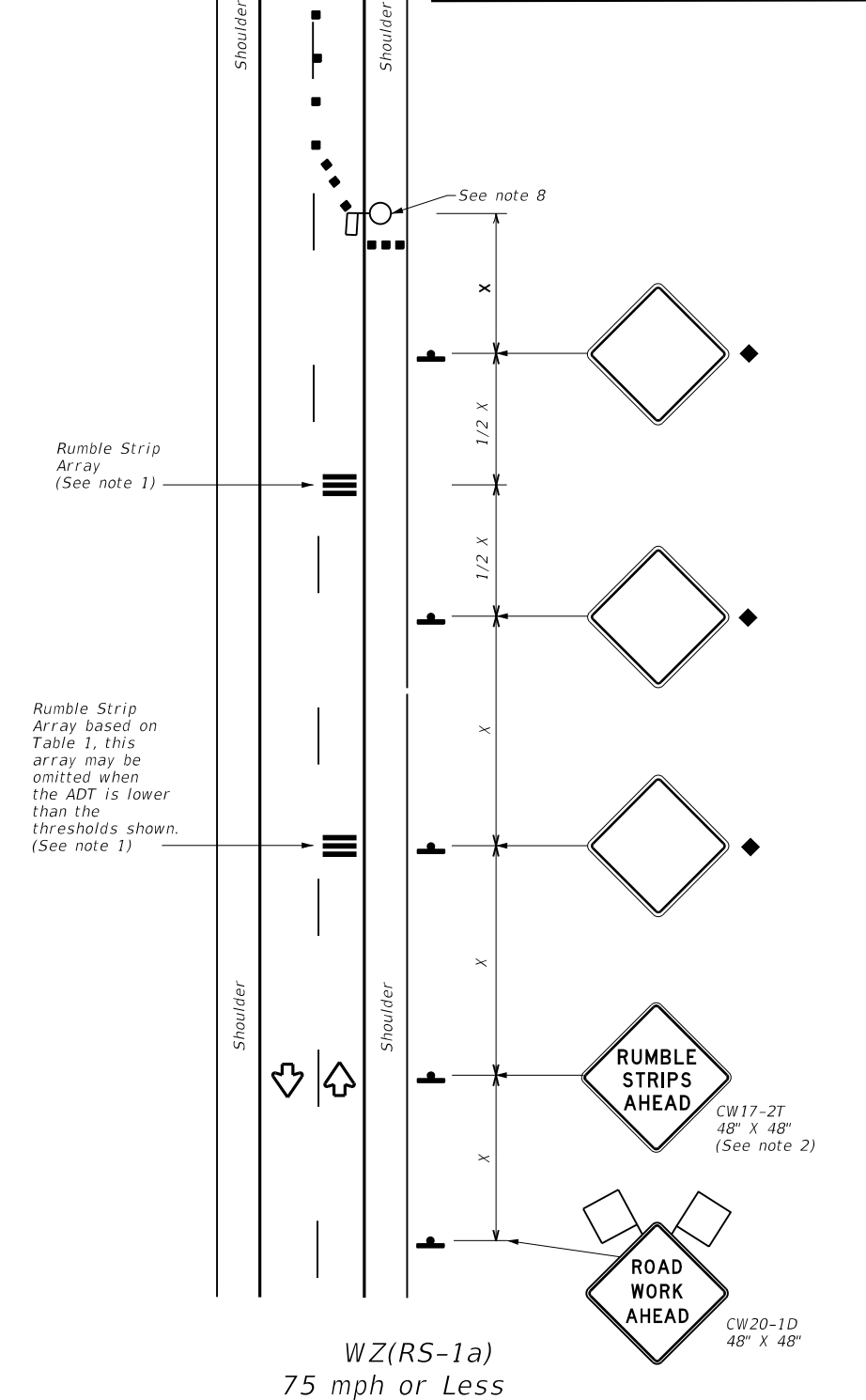
\* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

				<b>Traffic Operations Division Standard</b>	
<p><b>WORK ZONE</b>  <b>"GIVE US A BRAKE"</b>  <b>SIGNS</b></p> <p><b>WZ(BRK)-13</b></p>					
FILE:	wzbrk-13.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	August 1995	CONT:	SECT:	JOB:	HIGHWAY:
REVISIONS		0543	02	076	FM 359
6-96	5-98	7-13			
8-96	3-03				
DIST:	COUNTY:	SHEET NO.			
HOU	FORT BEND	30			



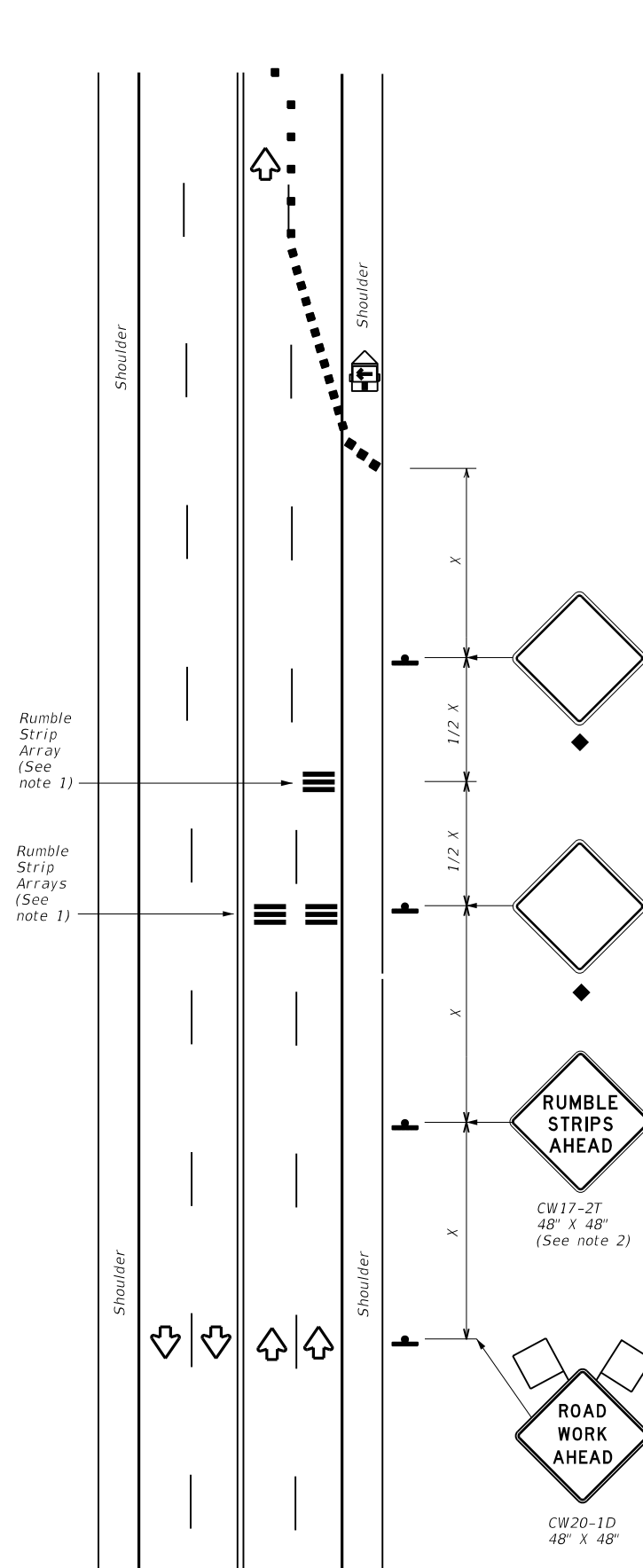
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)  
75 mph or Less

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



WZ(RS-1b)  
75 mph or Less

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

**GENERAL NOTES**

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

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

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

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

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

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

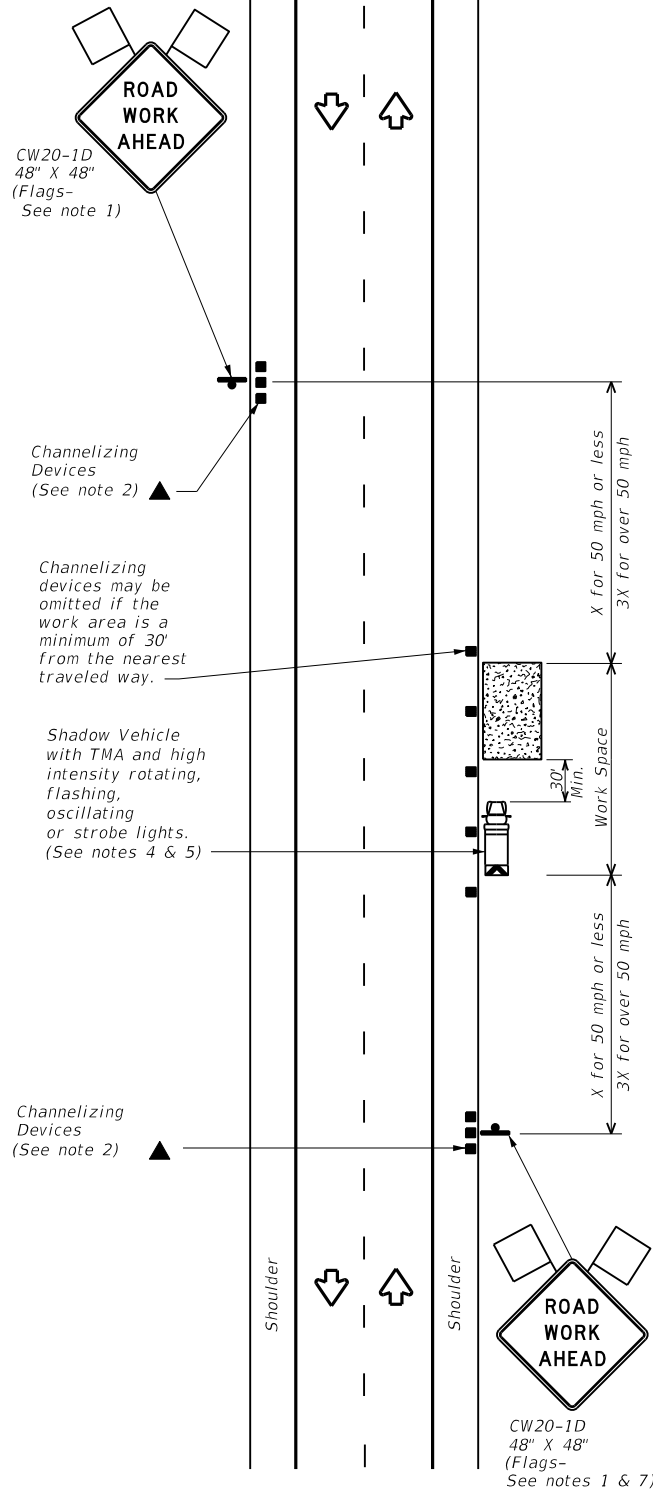
◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

Texas Department of Transportation  
 Traffic Operations Division Standard

**TEMPORARY RUMBLE STRIPS**

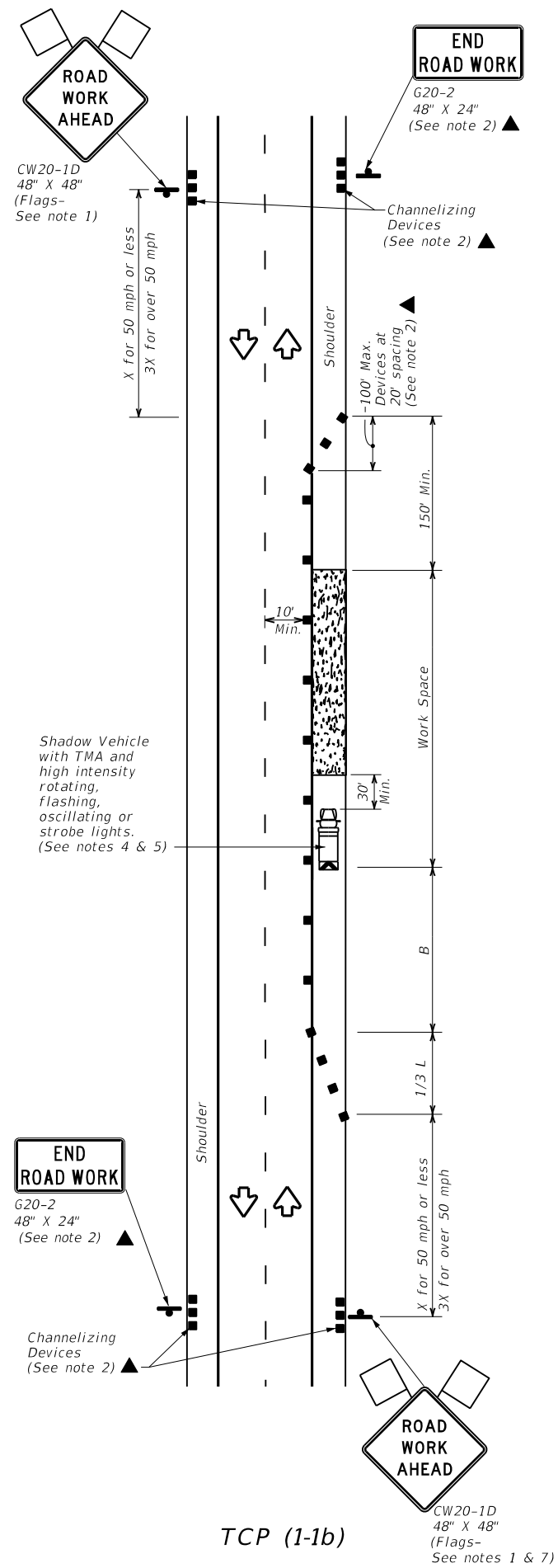
WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CON: 0543	SECT: 02	JOB: 076	HIGHWAY: FM 359
REVISIONS	DIST: HOU	COUNTY: FORT BEND	SHEET NO. 31	



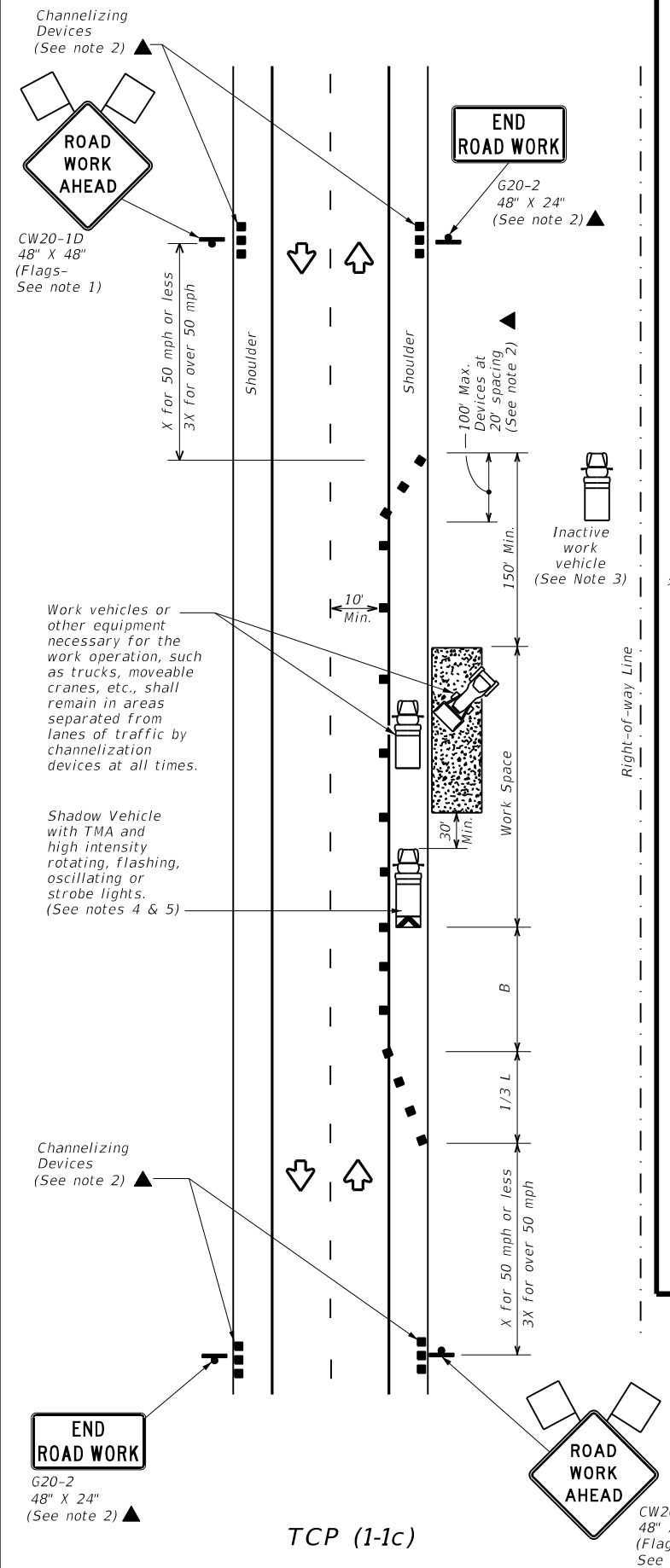
TCP (1-1a)

**WORK SPACE NEAR SHOULDER**  
Conventional Roads



TCP (1-1b)

**WORK SPACE ON SHOULDER**  
Conventional Roads



TCP (1-1c)

**WORK VEHICLES ON SHOULDER**  
Conventional Roads

**LEGEND**

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

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

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

**TYPICAL USAGE**

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

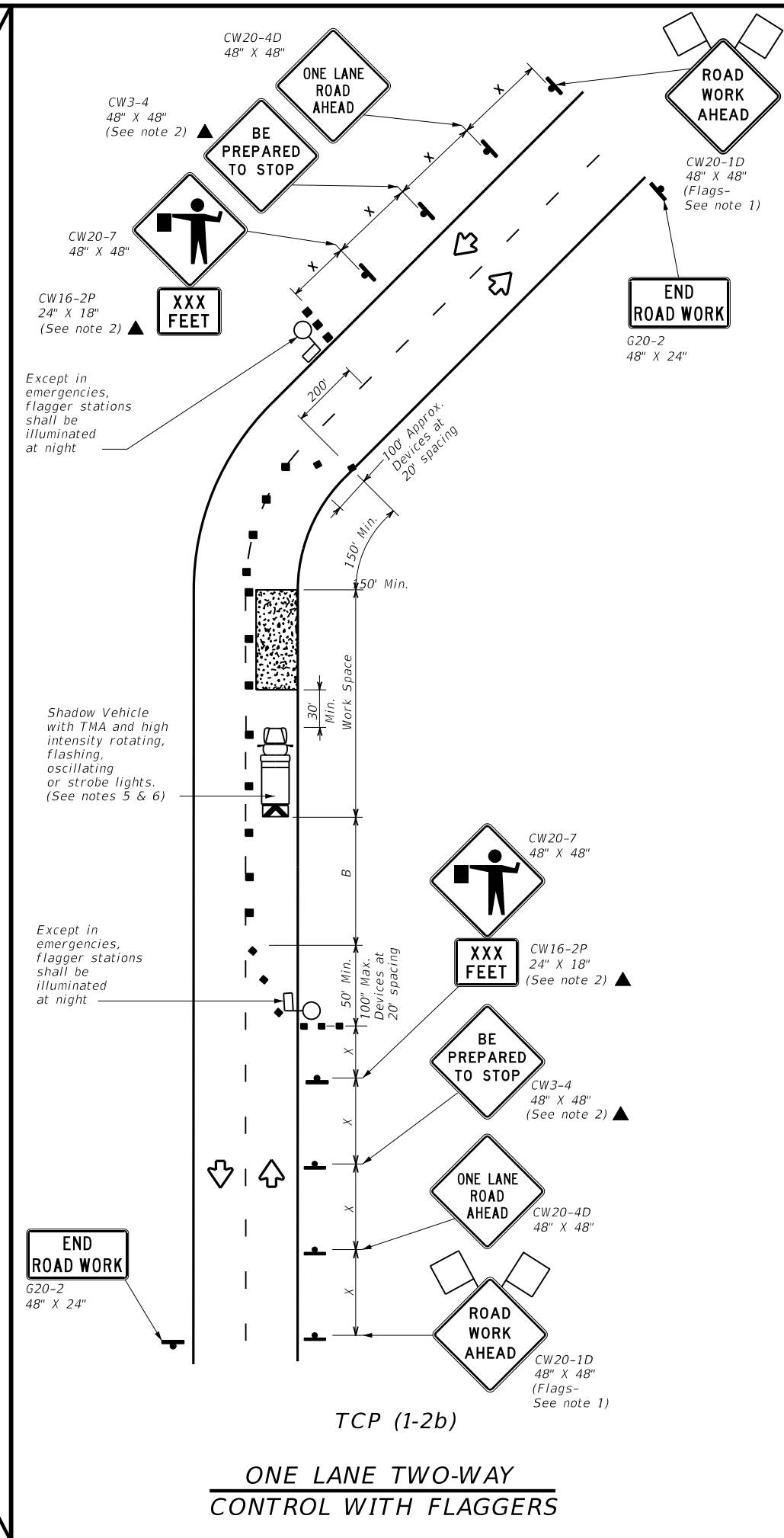
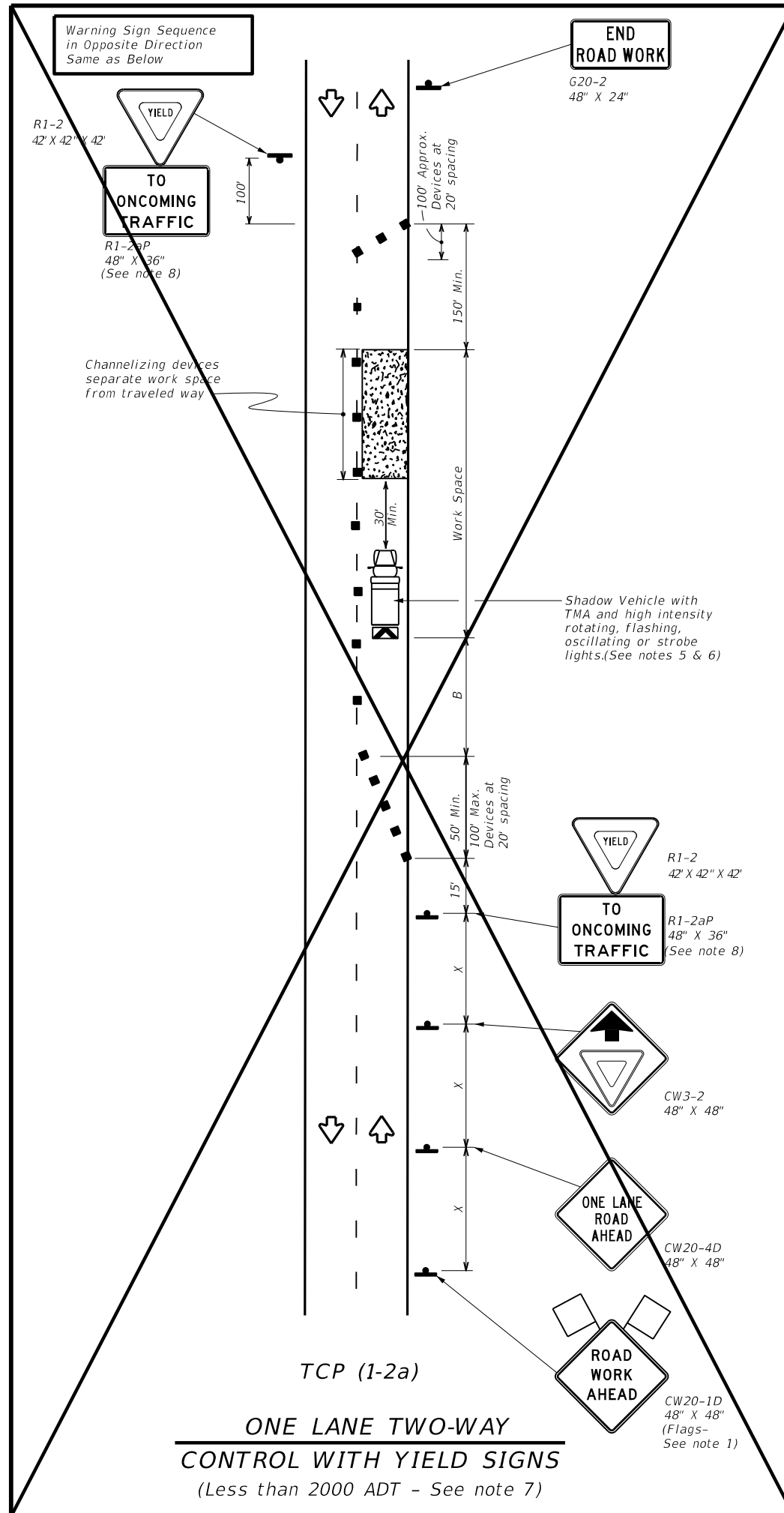
- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - Inactive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



**TRAFFIC CONTROL PLAN  
CONVENTIONAL ROAD  
SHOULDER WORK**

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	HOU	FORT BEND	32	
1-97 2-18				



**LEGEND**

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

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

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

**TYPICAL USAGE**

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

**GENERAL NOTES**

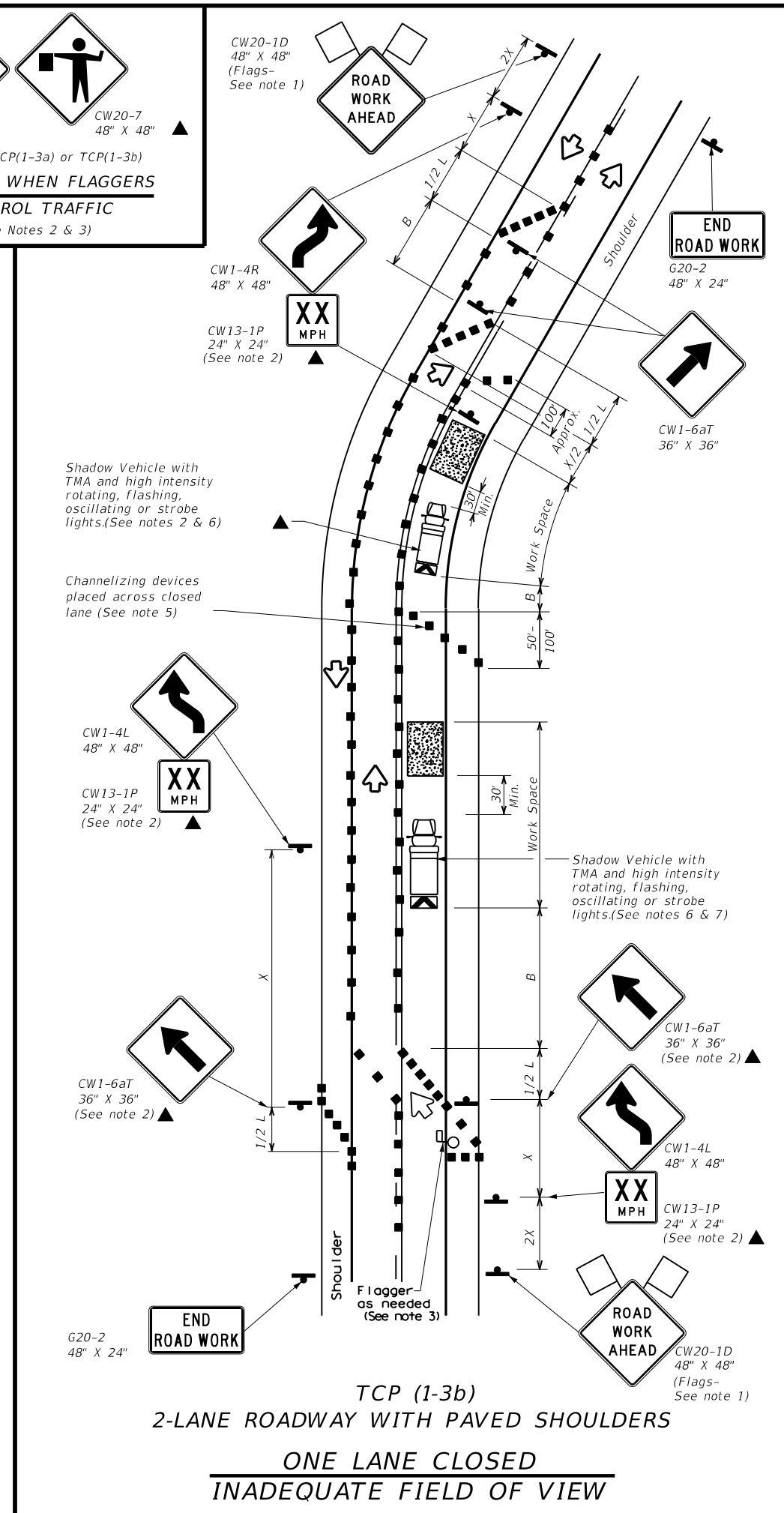
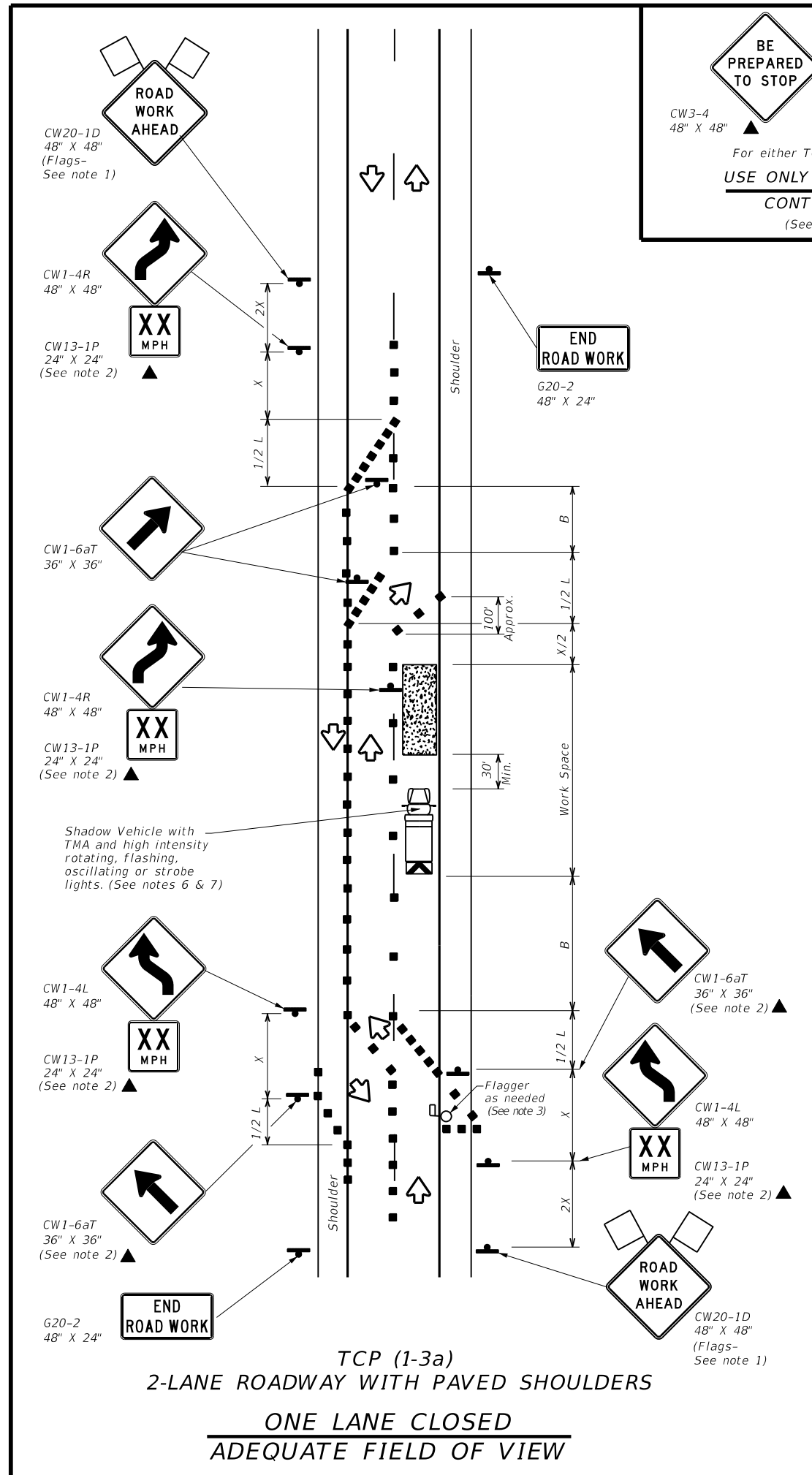
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - The CW3-4 "BE PREPARED TO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

STATE OF TEXAS  
 REGISTERED PROFESSIONAL ENGINEER  
 ROBERT S. BISSETT, JR.  
 79703  
 Robert S. Bissett, Jr.  
 09/12/21

Texas Department of Transportation  
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN**  
**ONE-LANE TWO-WAY**  
**TRAFFIC CONTROL**  
**TCP(1-2)-18 (MOD)**

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
4-90 4-98	DIST	COUNTY	SHEET NO.	
2-94 2-12	HOU	FORT BEND	33	
1-97 2-18				



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

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

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

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

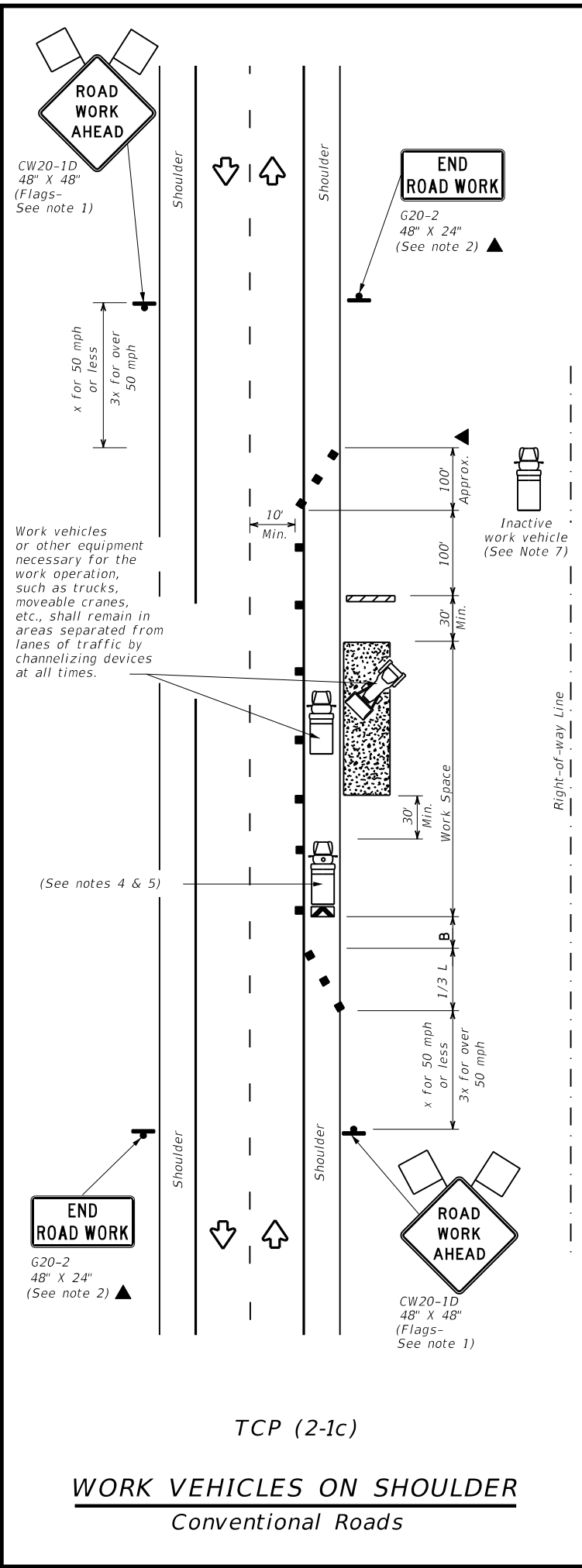
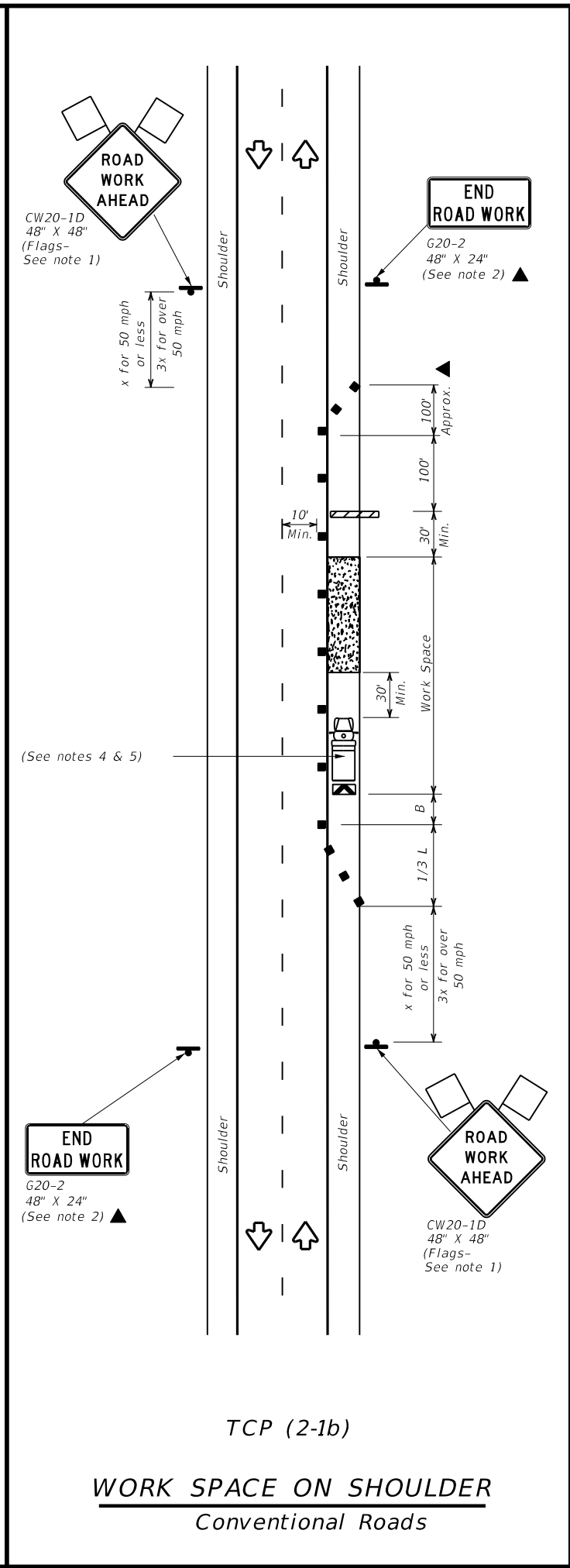
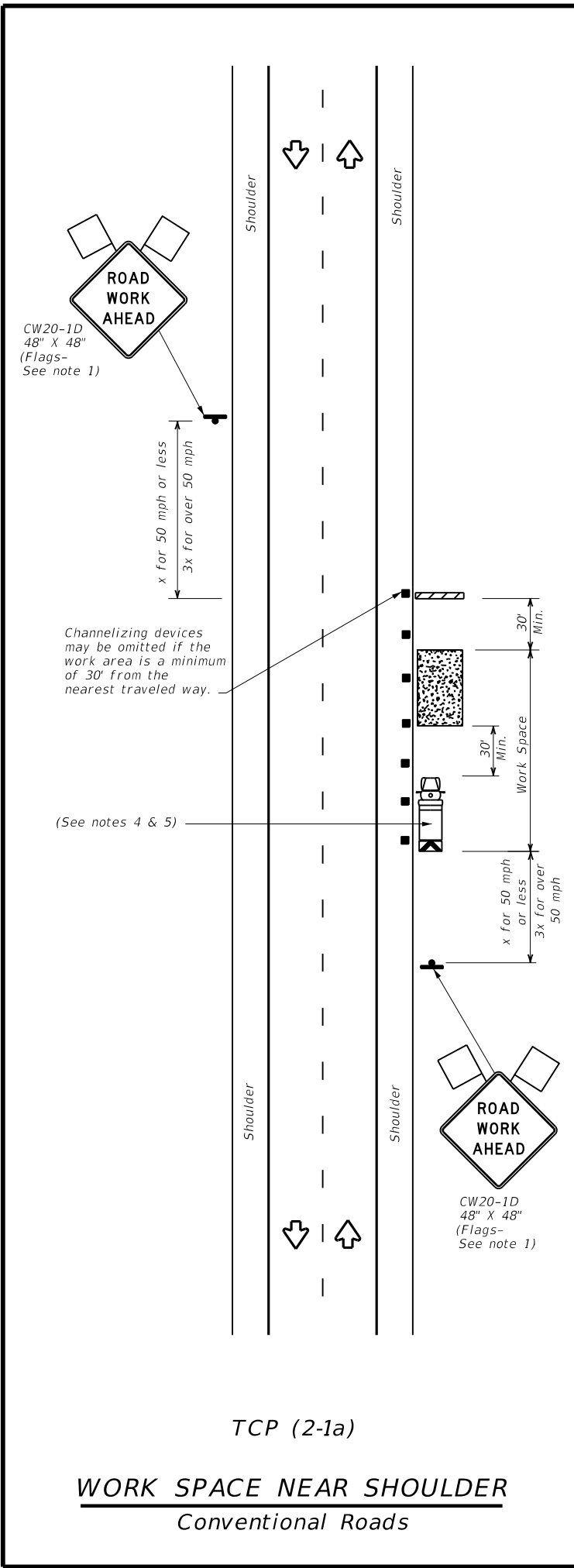
- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
  - DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
  - When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
  - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
  - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
  - Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

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

### TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO LANE ROADS

#### TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	HOU	FORT BEND	34	
1-97 2-18				



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35		205'	225'	245'	35'	70'	160'	120'
40	$L = WS$	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'

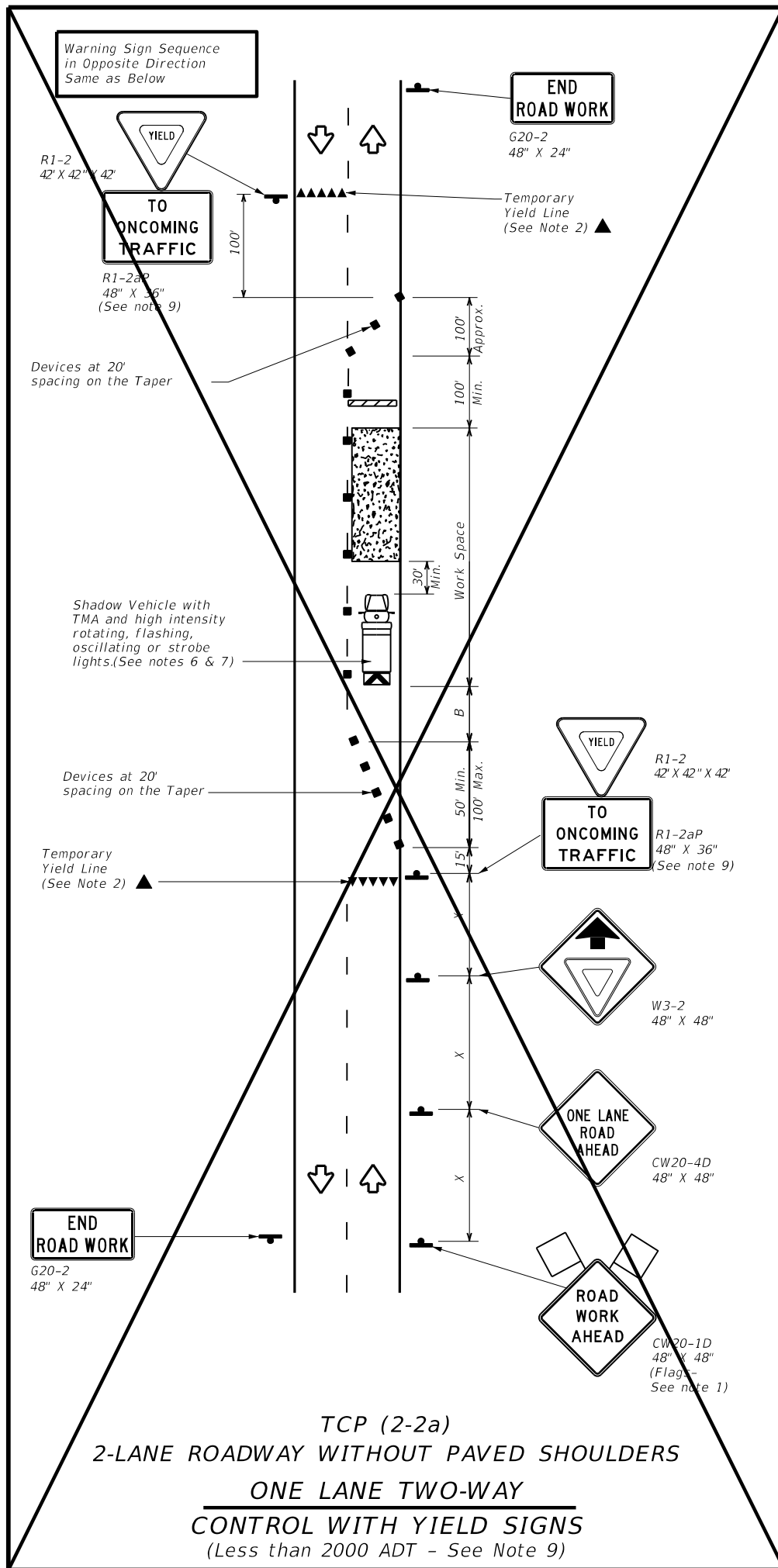
\* Conventional Roads Only  
 \*\* Taper lengths have been rounded off.  
 L=Length of Taper(FT) W=Width of Offset(FT) S=Posted Speed(MPH)

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

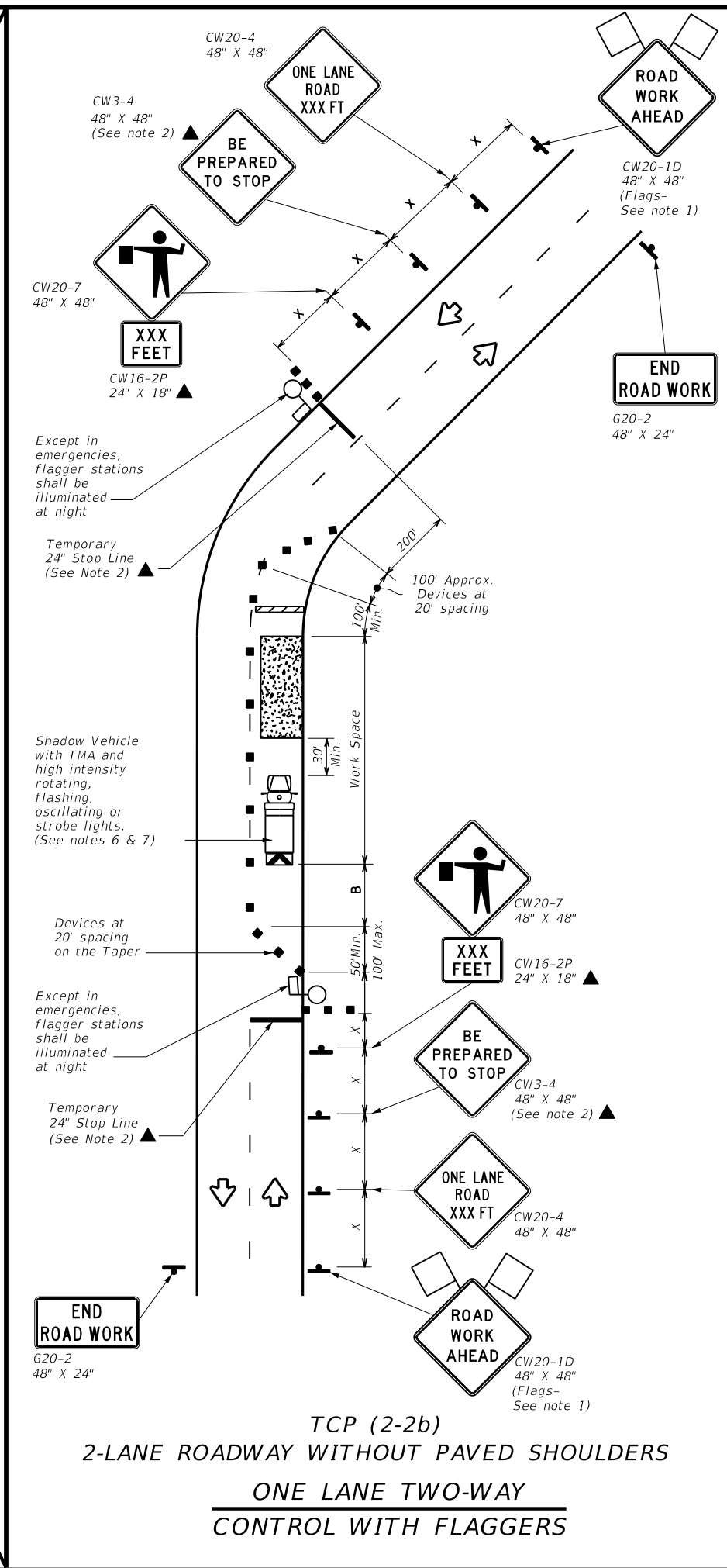
- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
  - Stockpiled material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

				Traffic Operations Division Standard	
<b>TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK</b>					
<b>TCP(2-1)-18</b>					
FILE:	tcp2-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT	December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS		0543	02	076	FM 359
2-94	4-98			DIST	COUNTY
8-95	2-12			HOU	FORT BEND
1-97	2-18				SHEET NO. 35





TCP (2-2a)  
 2-LANE ROADWAY WITHOUT PAVED SHOULDERS  
 ONE LANE TWO-WAY  
 CONTROL WITH YIELD SIGNS  
 (Less than 2000 ADT - See Note 9)



TCP (2-2b)  
 2-LANE ROADWAY WITHOUT PAVED SHOULDERS  
 ONE LANE TWO-WAY  
 CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

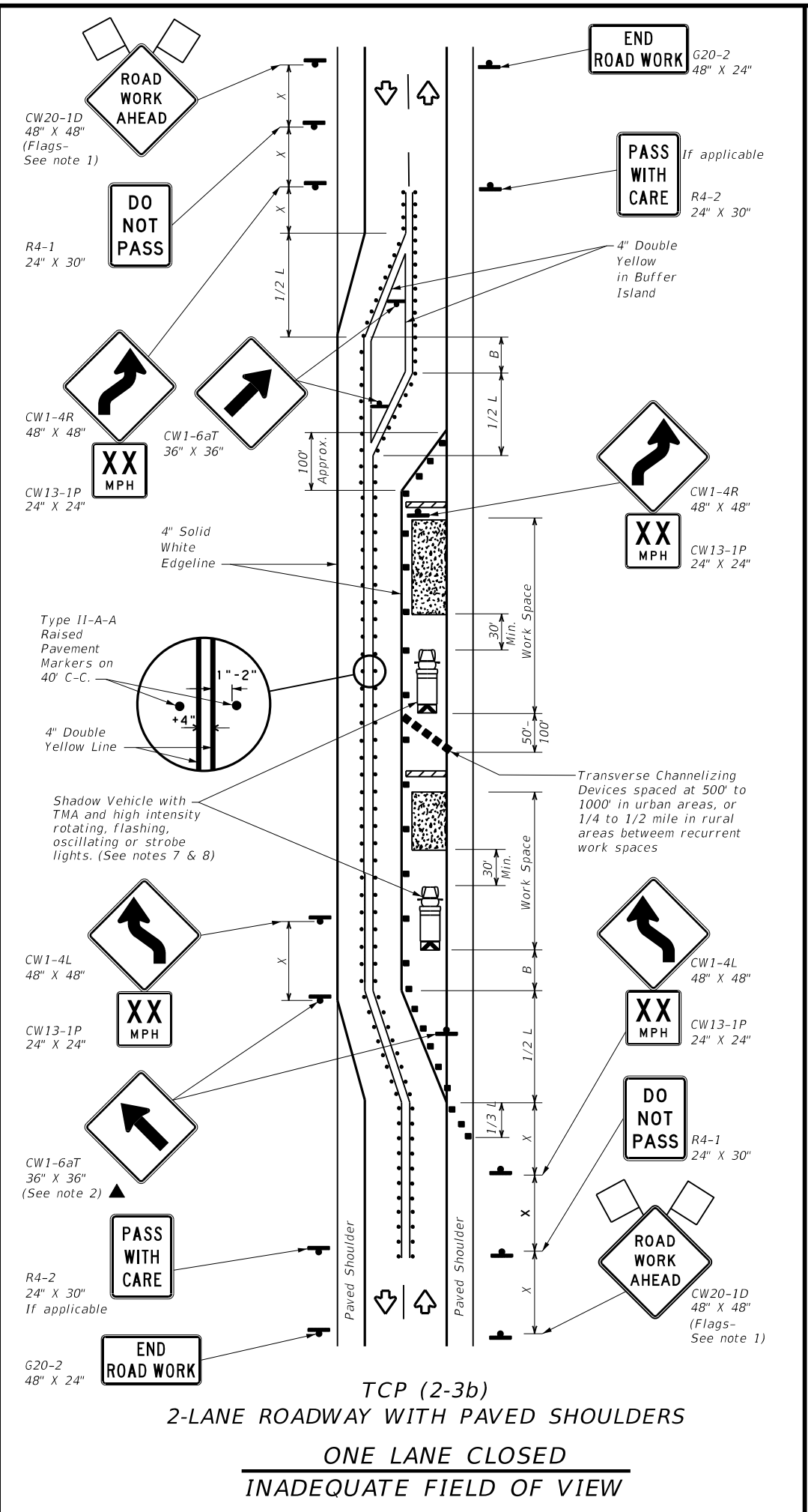
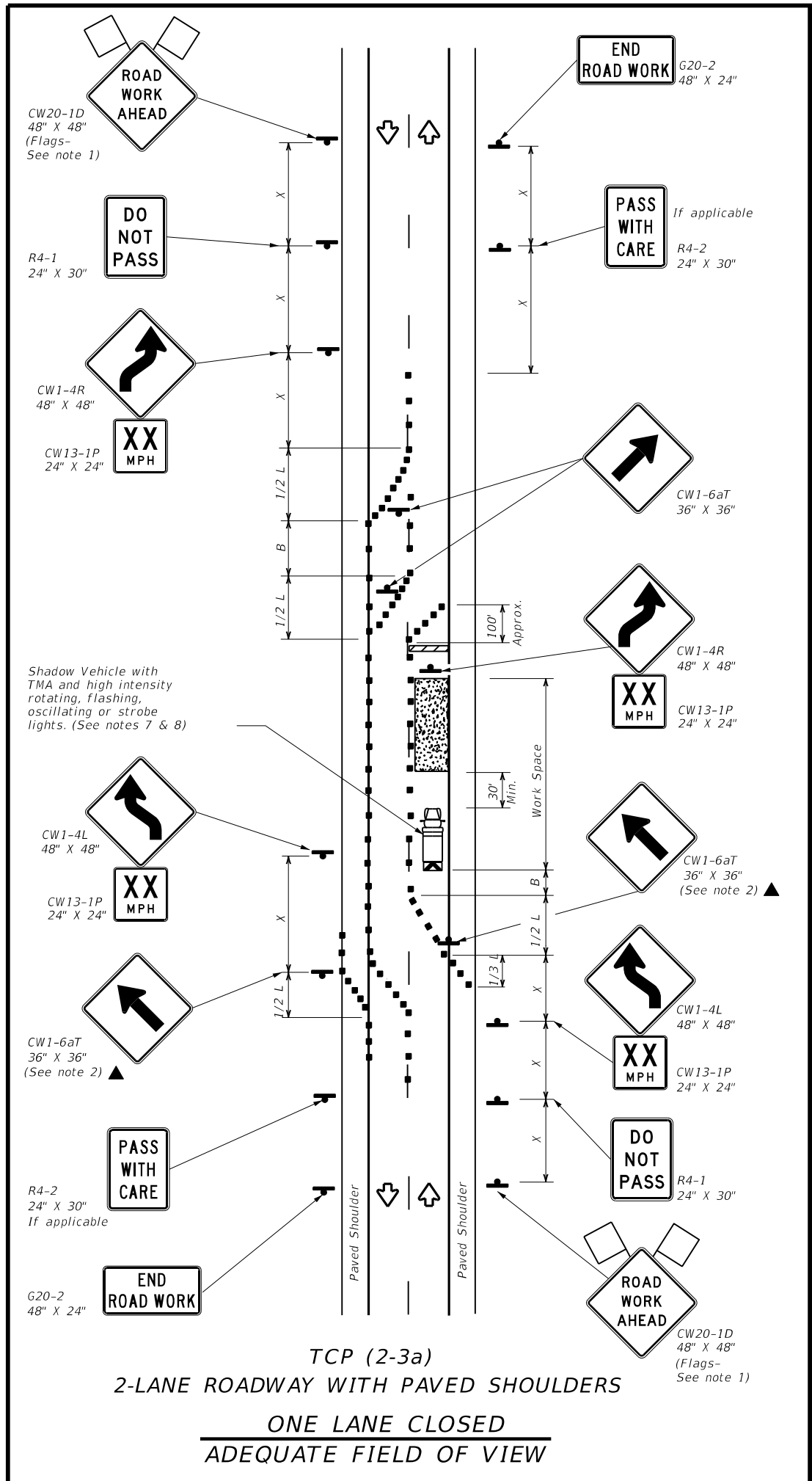
- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
  - The CW3-4 "BE PREPARED TO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

STATE OF TEXAS  
 REGISTERED PROFESSIONAL ENGINEER  
 ROBERT S. BISSETT, JR.  
 79703  
 Robert S. Bissett, Jr.  
 09/12/21

Texas Department of Transportation  
 Traffic Operations Division Standard

TRAFFIC CONTROL PLAN  
 ONE-LANE TWO-WAY  
 TRAFFIC CONTROL  
 TCP(2-2)-18 (MOD)

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT	December 1985	CONV	SECT	JOB
REVISIONS	0543	02	076	FM 359
8-95 3-03				
1-97 2-12				
4-98 2-18				
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	36	



**LEGEND**

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

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

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

**TYPICAL USAGE**

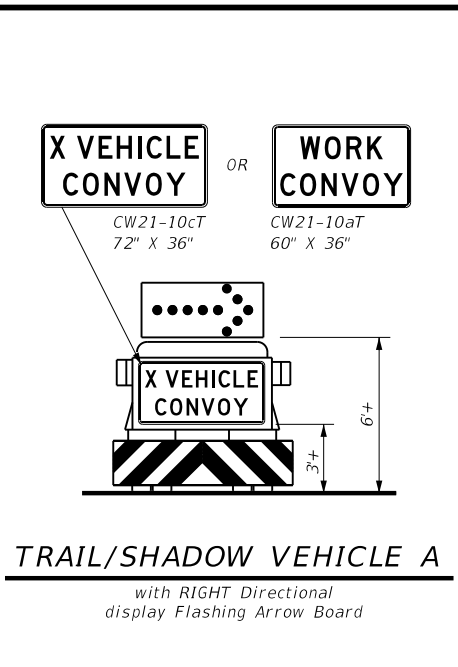
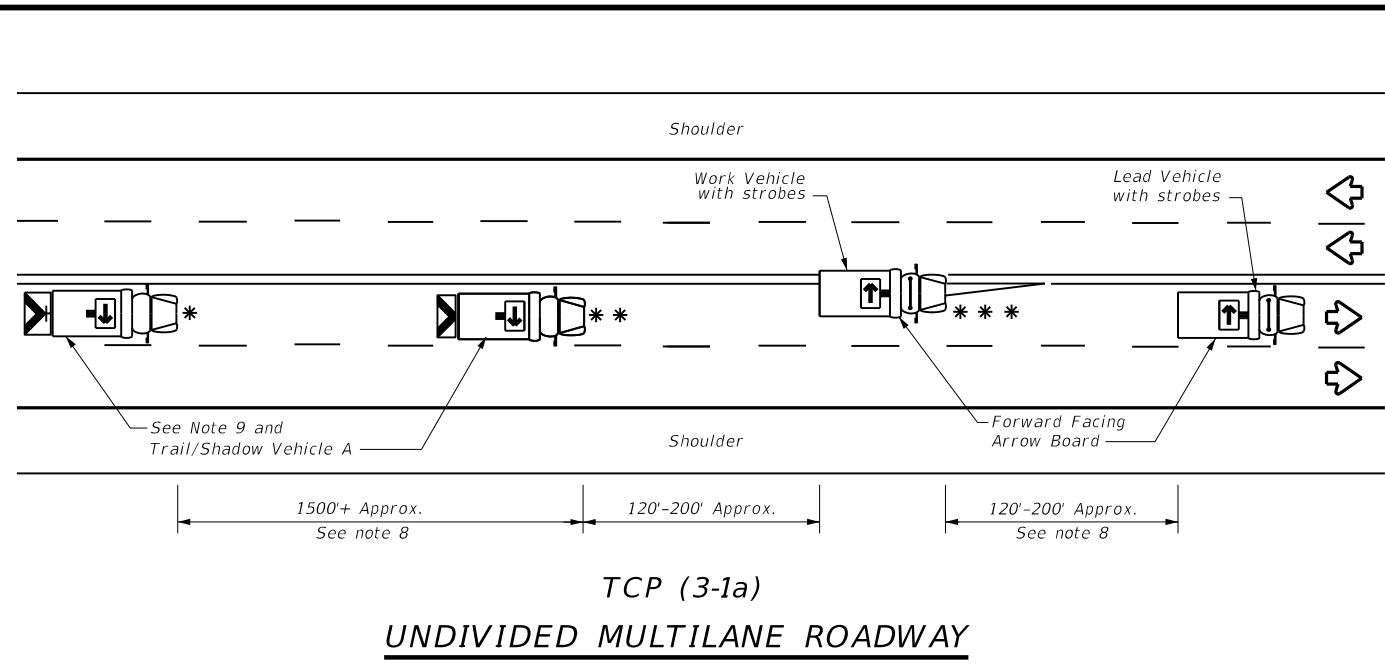
	MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				✓	✓

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

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

**TRAFFIC CONTROL PLAN**  
TRAFFIC SHIFTS ON TWO-LANE ROADS  
TCP(2-3)-18

FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONV	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	HOU	FORT BEND	37	
4-98 2-18				

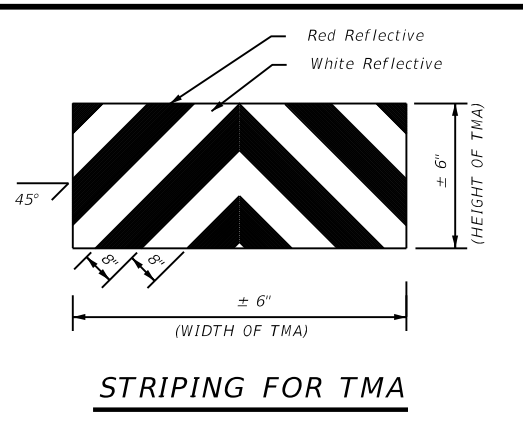
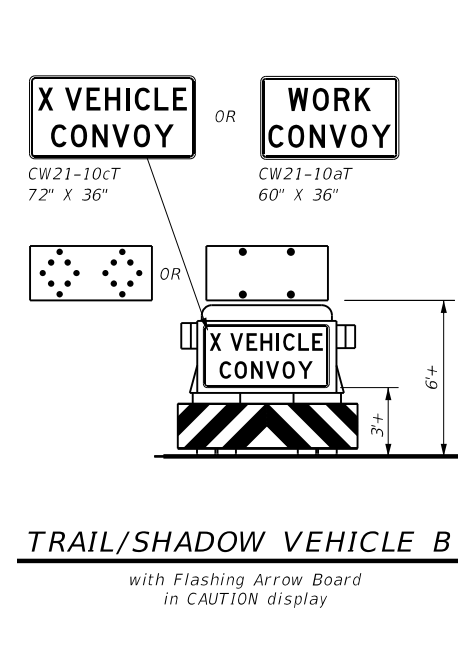
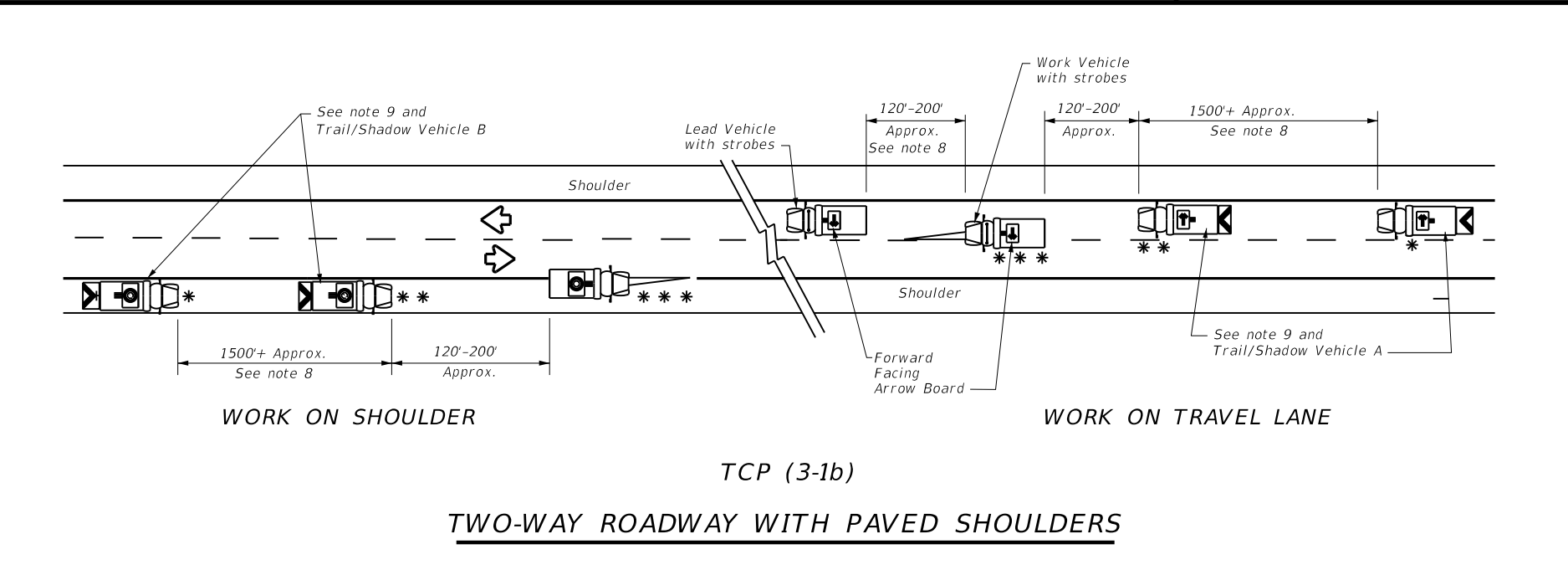


LEGEND			
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

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

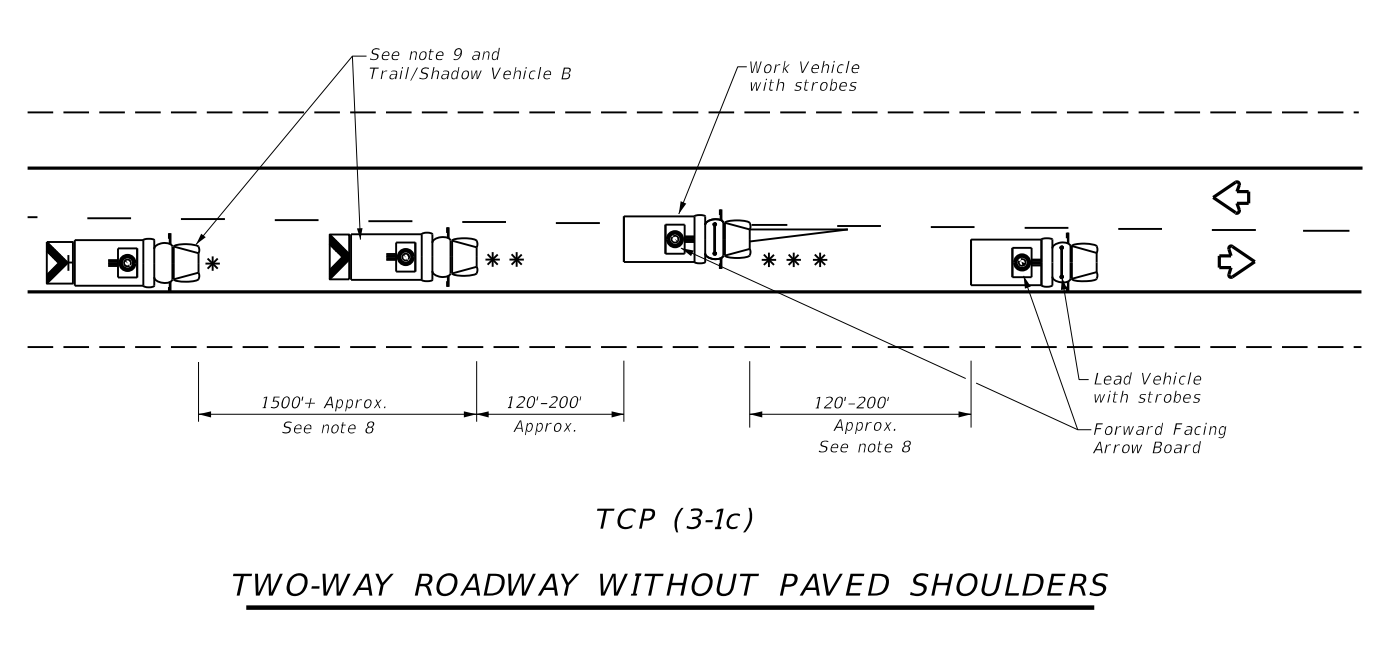


Texas Department of Transportation  
Traffic Operations Division Standard

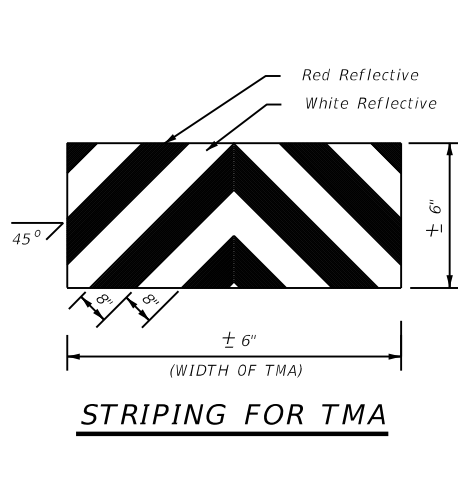
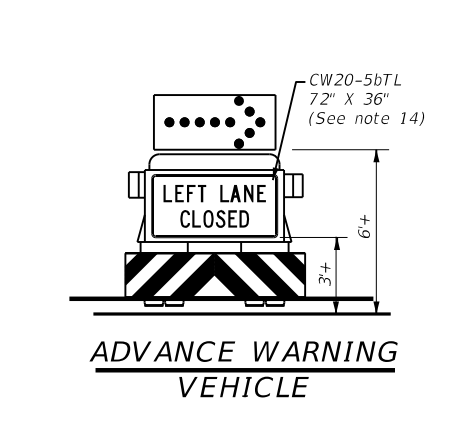
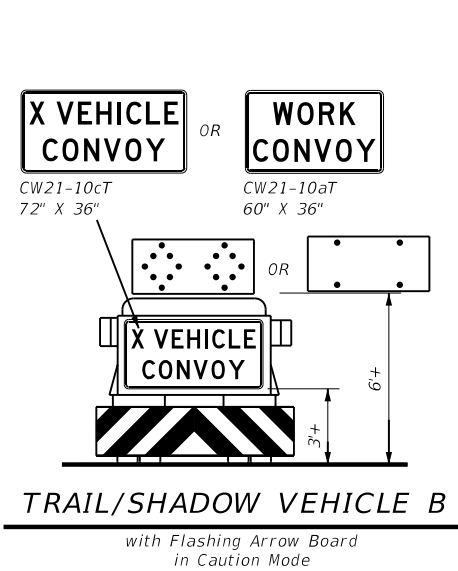
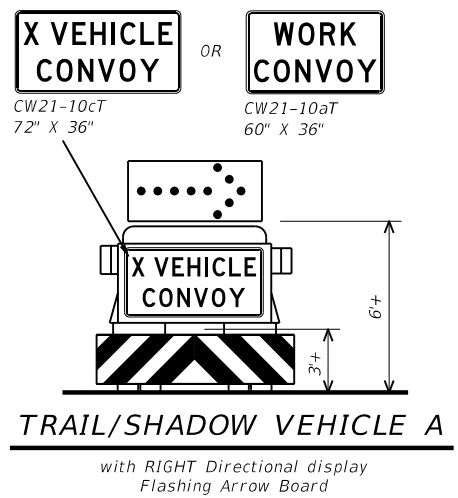
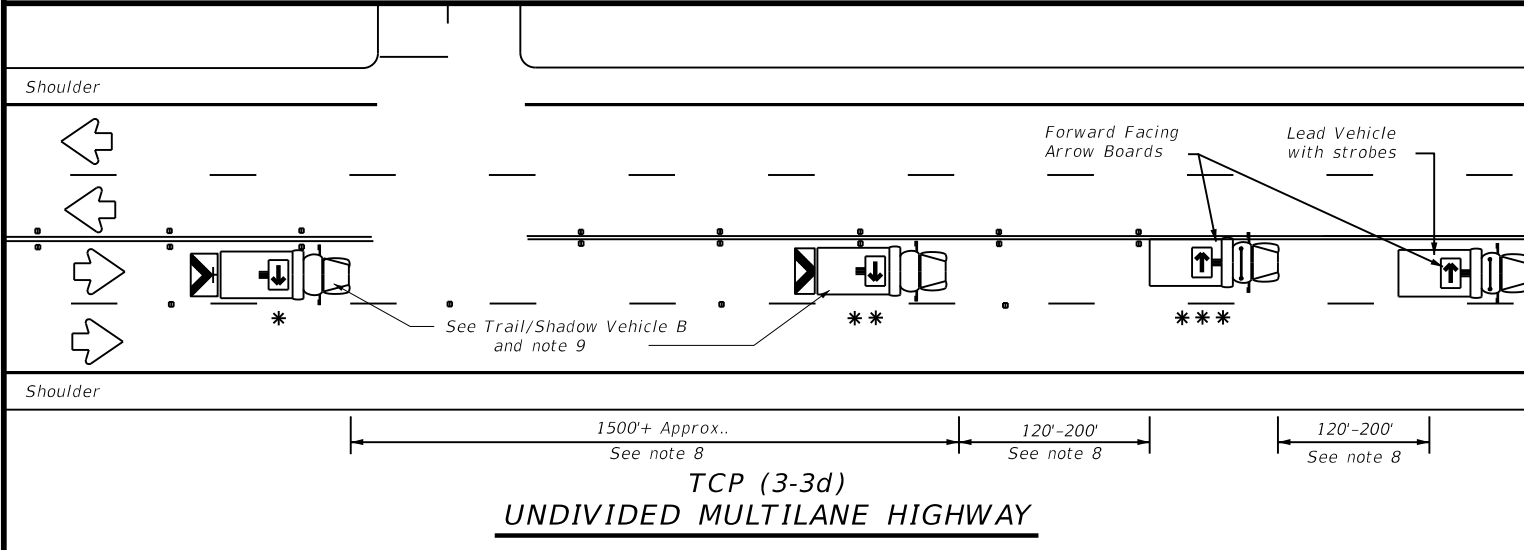
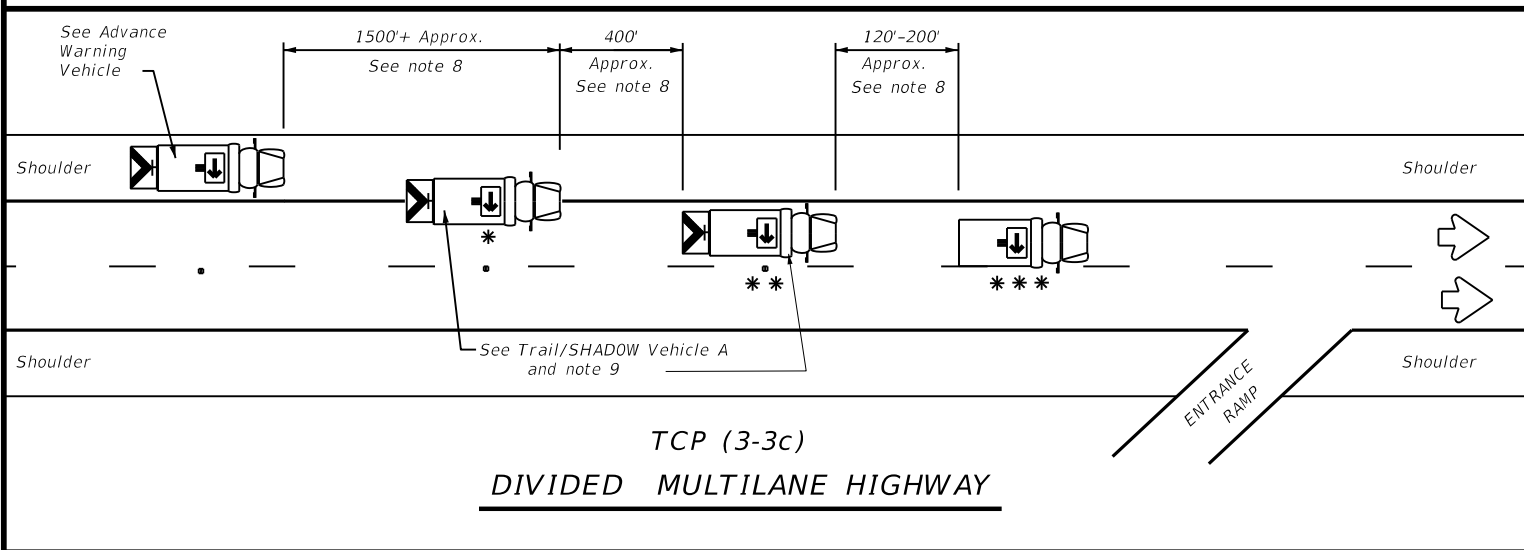
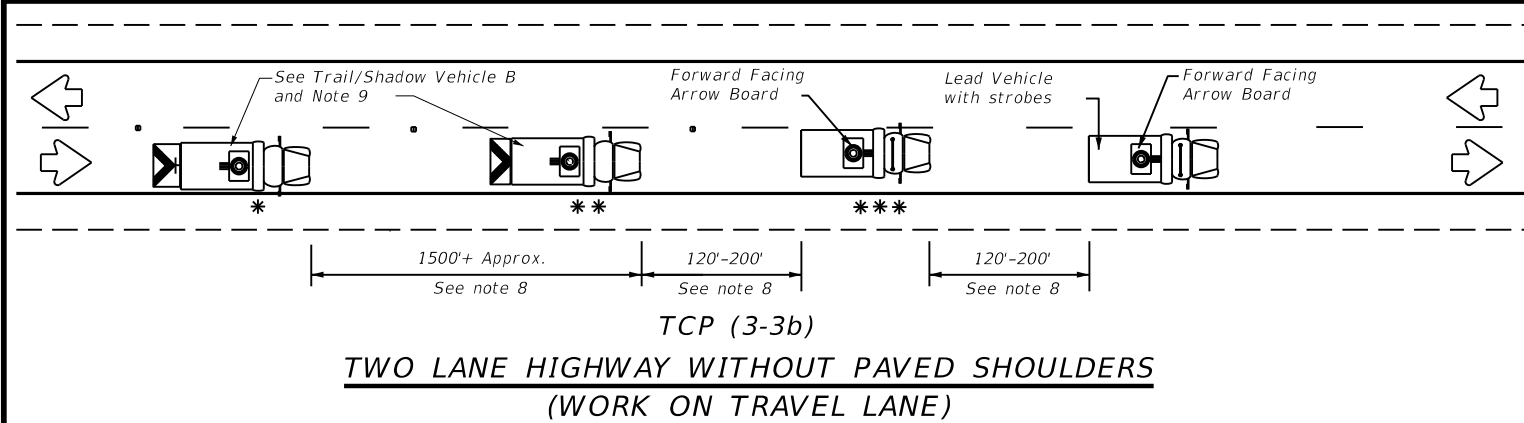
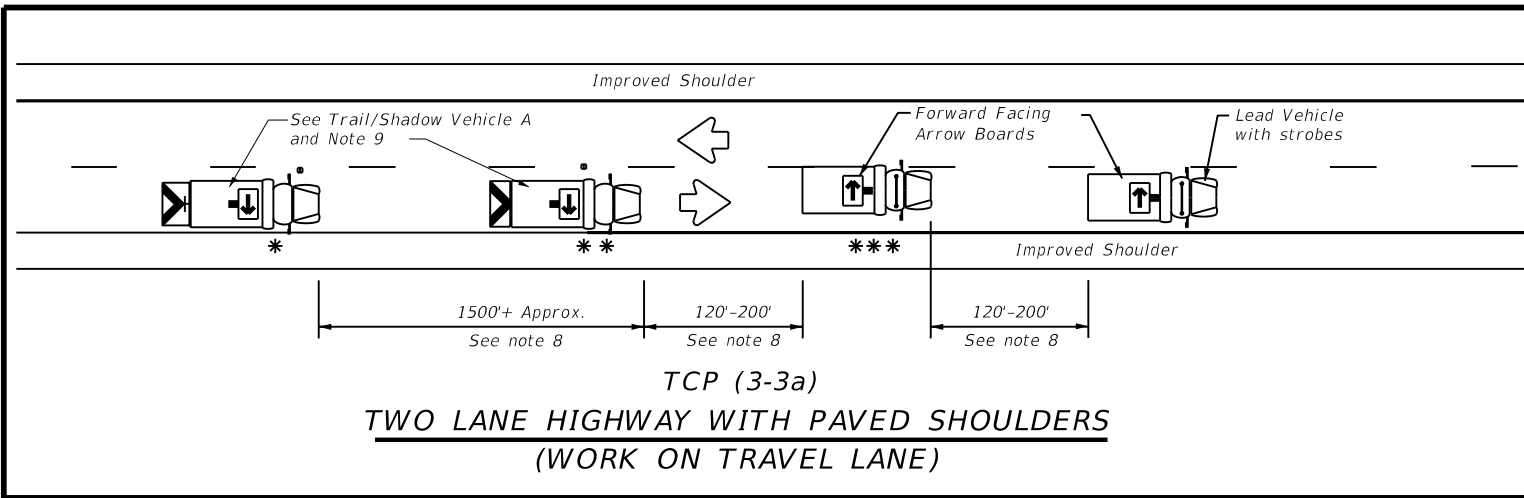
**TRAFFIC CONTROL PLAN  
MOBILE OPERATIONS  
UNDIVIDED HIGHWAYS**

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

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	HOU	FORT BEND	38	
1-97				







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

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

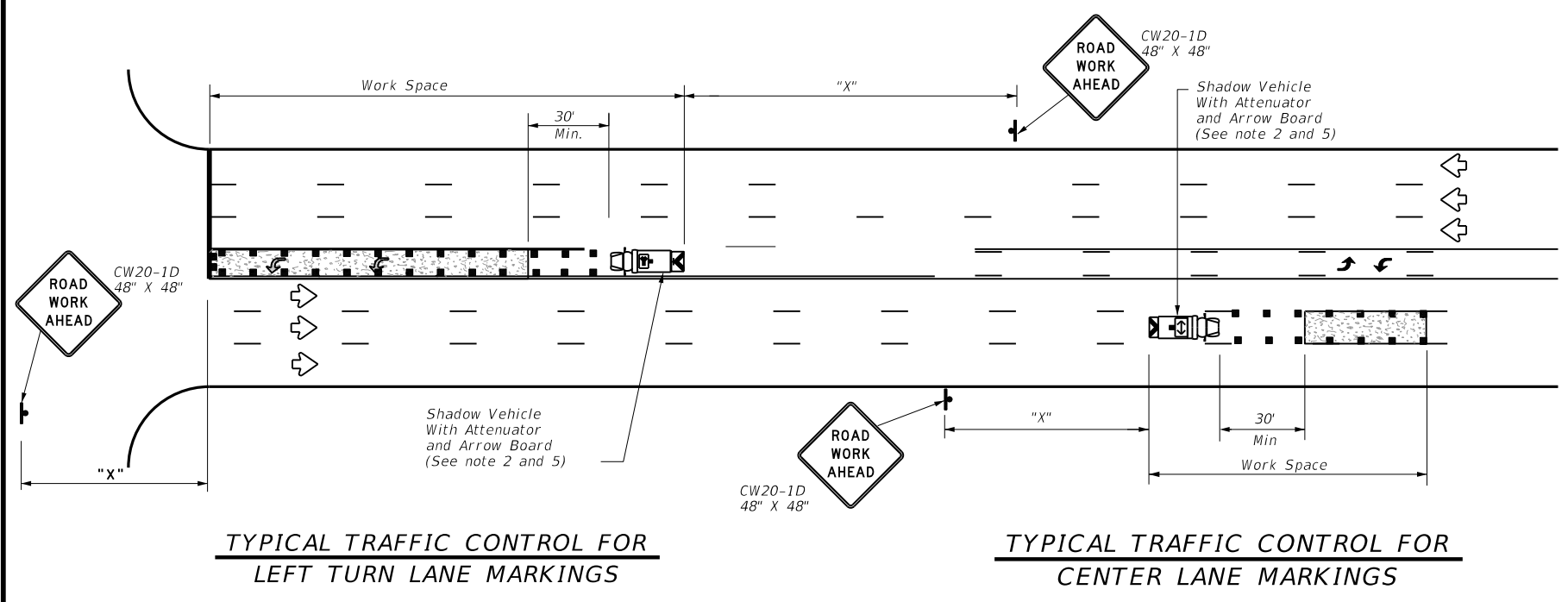
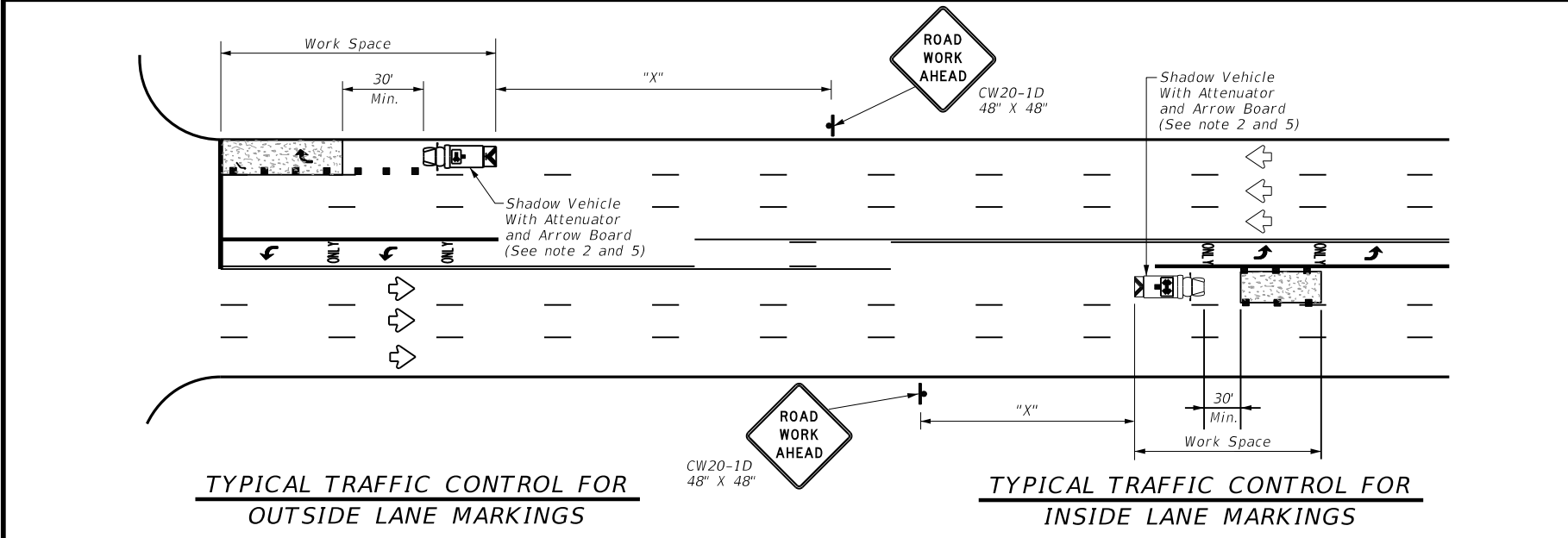
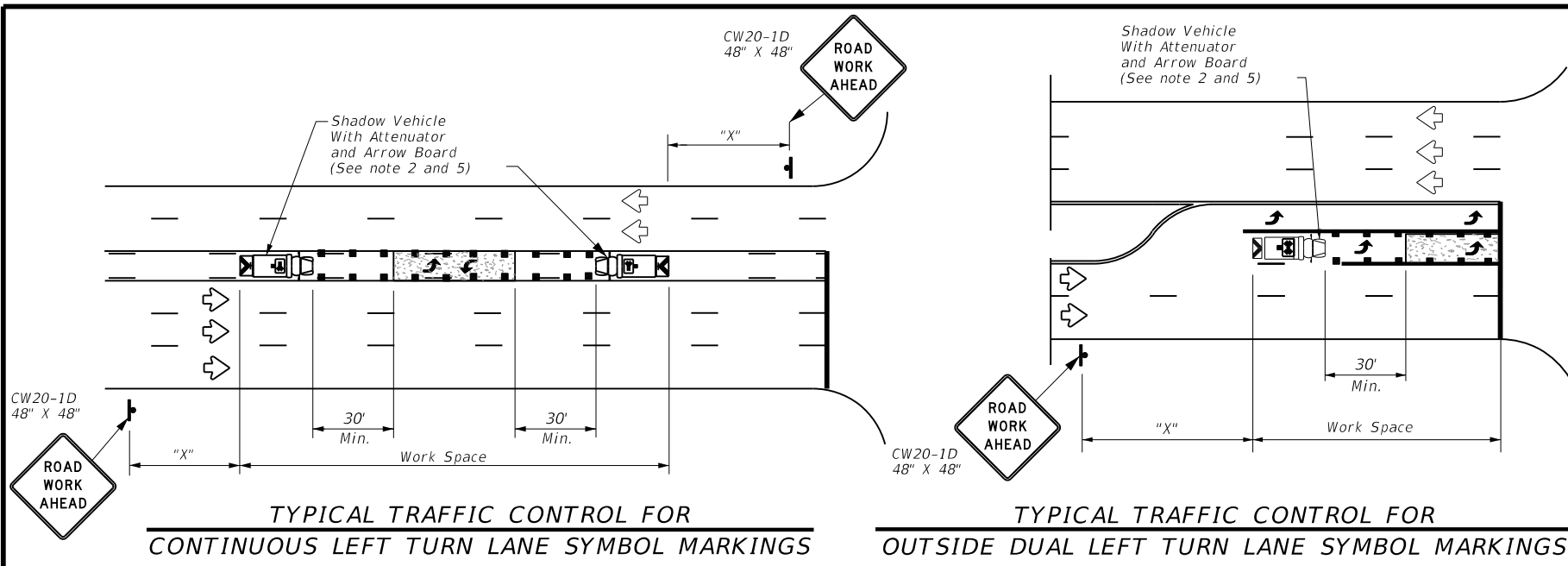
**GENERAL NOTES**

- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer will determine if the LEAD vehicle and/or TRAIL vehicle are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
- The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating, or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
- Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
- X VEHICLE CONVOY (CW21-10cT) or WORK CONVOY (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" x 48" diamond shaped WORK CONVOY (CW21-10T) or X VEHICLE CONVOY (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The X VEHICLE CONVOY sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
- For divided highways with two or three lanes in one direction, the appropriate LEFT LANE CLOSED (CW20-5bTL), RIGHT LANE CLOSED (CW20-5bTR), or CENTER LANE CLOSED (CW20-5dT) sign should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board may be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
- A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
- For divided highways with three or four lanes in each direction, use TCP(3-2).
- Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- The Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
- On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a DO NOT PASS (R4-1) sign should be placed on the back of the rearmost protection vehicle.

**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	0543	02	076	FM 359
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	HOU	FORT BEND	39	
1-97 7-14				



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

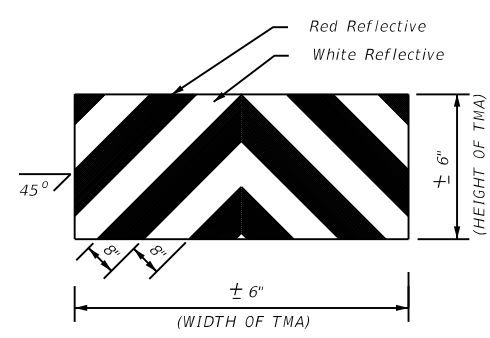
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'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

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

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

**GENERAL NOTES**

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

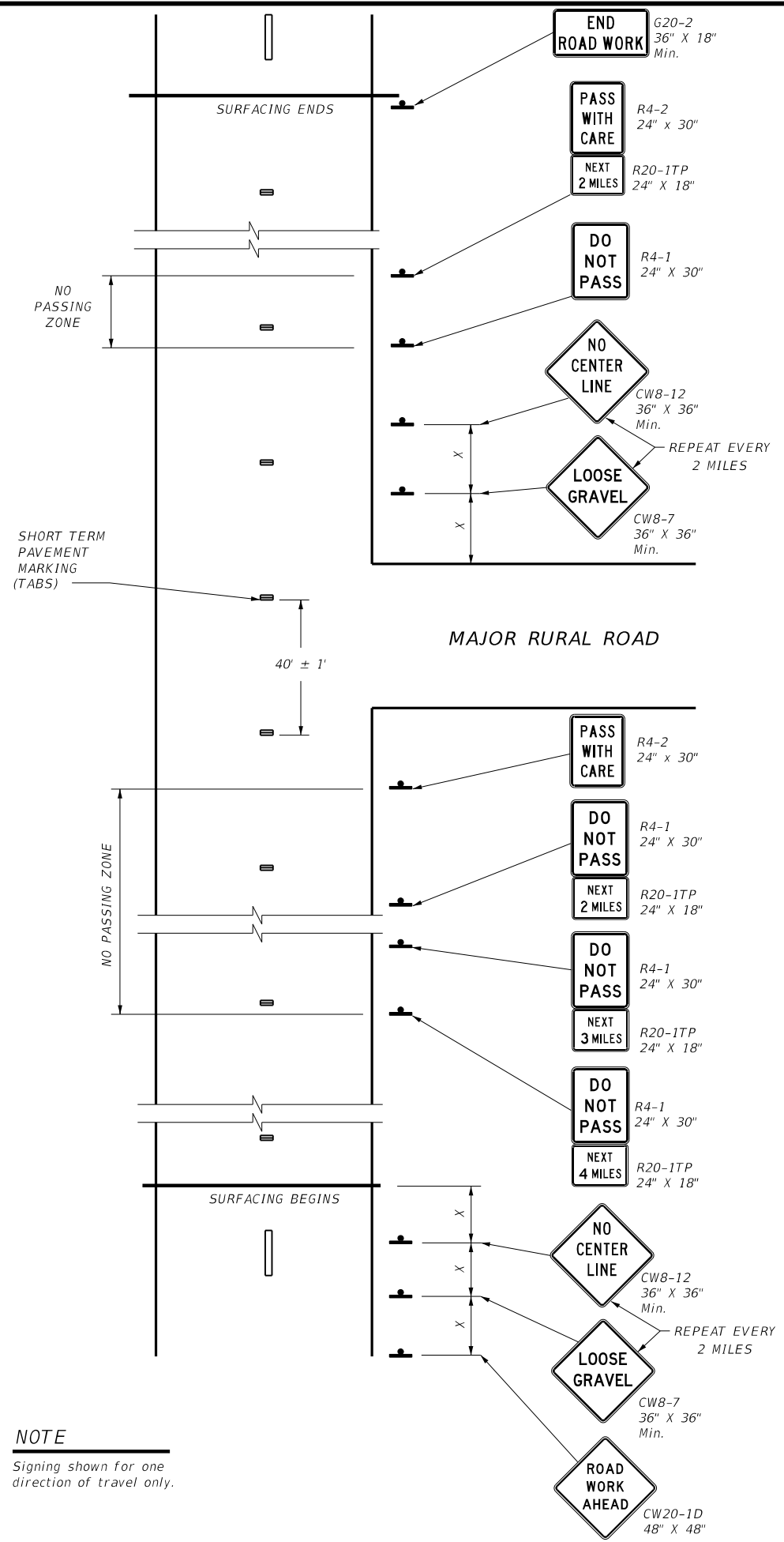


**Texas Department of Transportation** Traffic Operations Division Standard

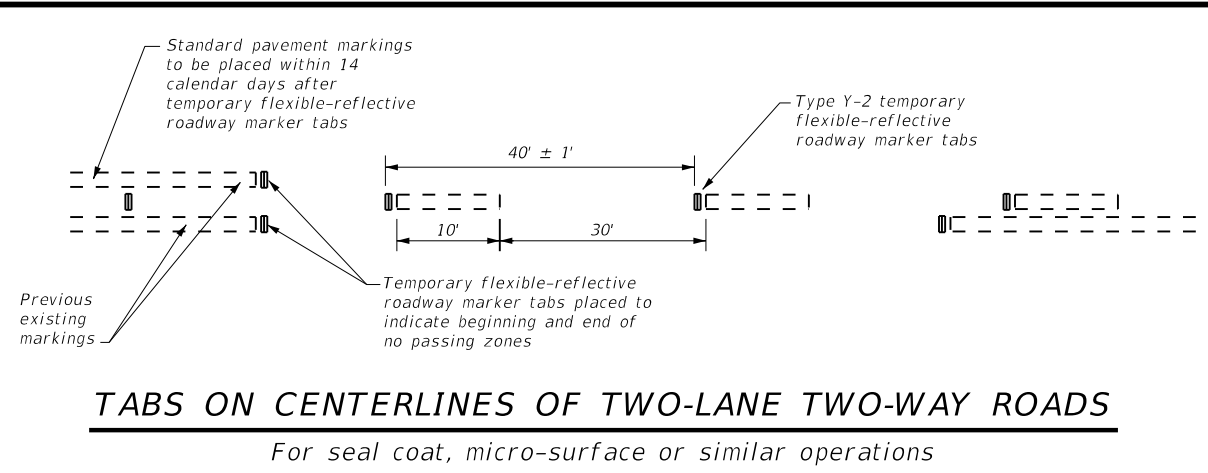
**TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS**

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

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
DIST	COUNTY	SHEET NO.		
HOU	FORT BEND	40		



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



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

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

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

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

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

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

**PAVEMENT MARKINGS**

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

**COORDINATION OF SIGN LOCATIONS**

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

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

\* Conventional Roads Only

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

**GENERAL NOTES**

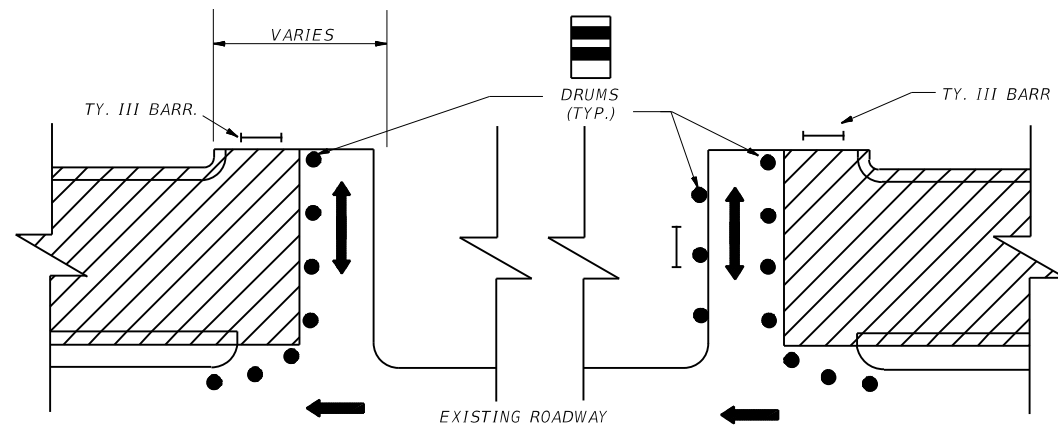
1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be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



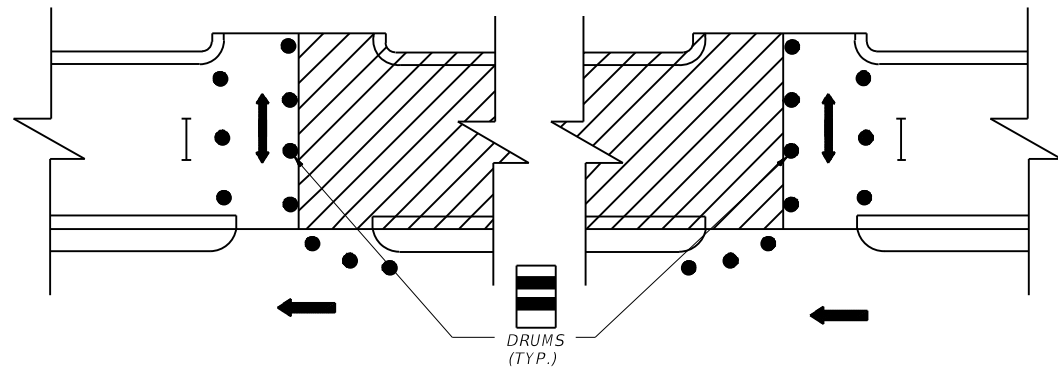
**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**

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

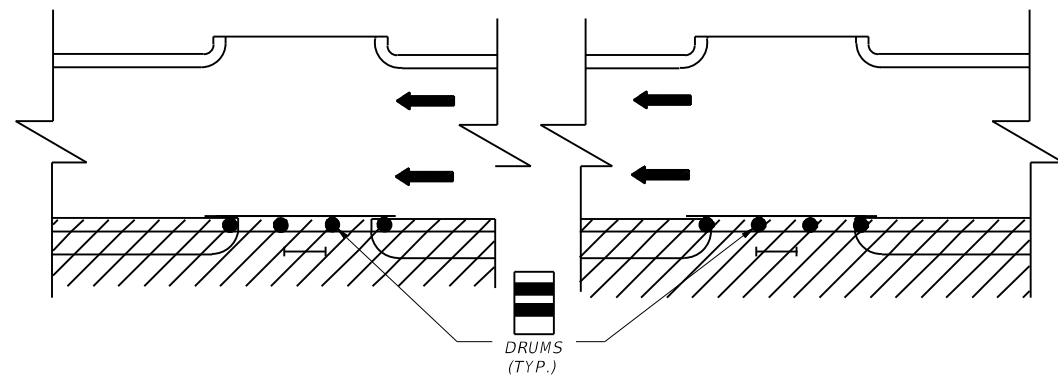
FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
4-92 4-98	DIST	COUNTY	SHEET NO.	
1-97 7-13	HOU	FORT BEND	41	



- 1) WITH TRAFFIC ON EXISTING BUILD ONE-HALF OF DRIVE.
- 2) BUILD OTHER HALF OF DRIVE

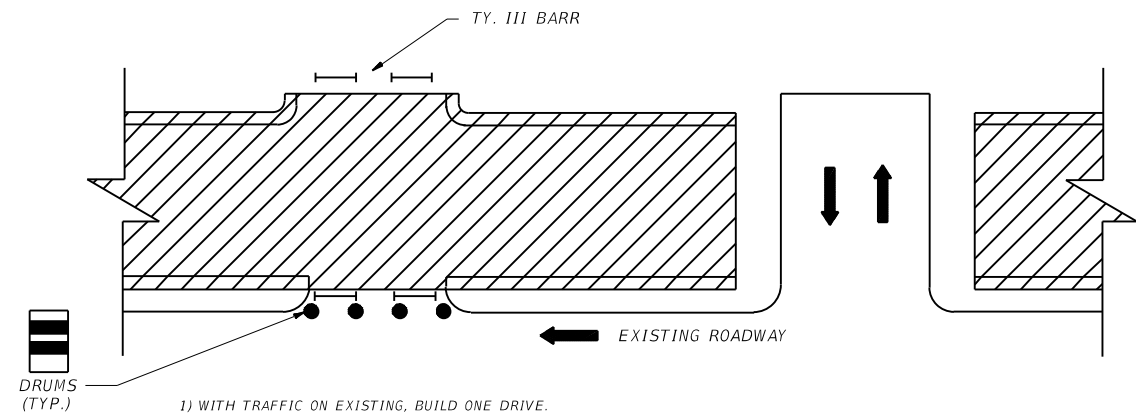


- 2) BUILD OTHER HALF OF DRIVE

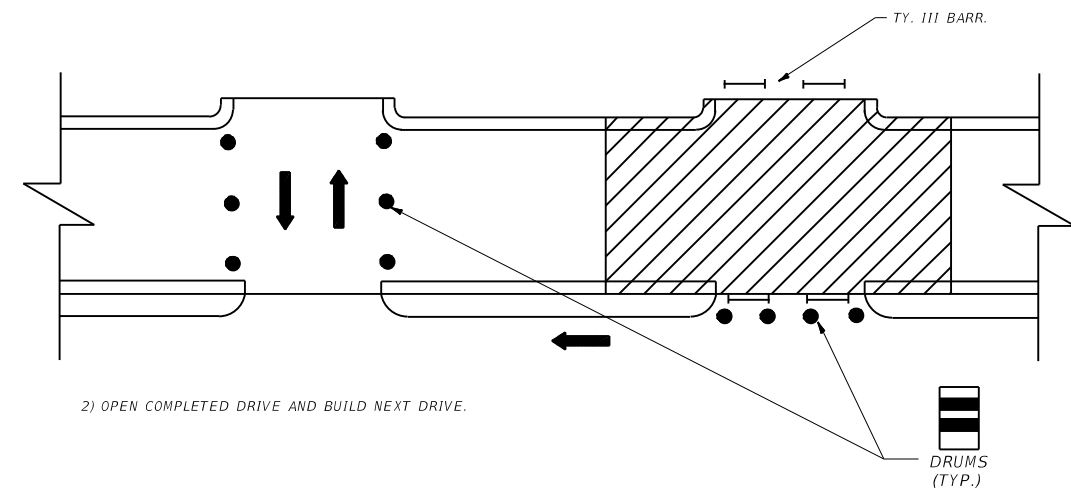


- 3) OPEN DRIVE
- 4) AFTER TRAFFIC MOVES TO NEW ROADWAY, BUILD REMAINING CURB.

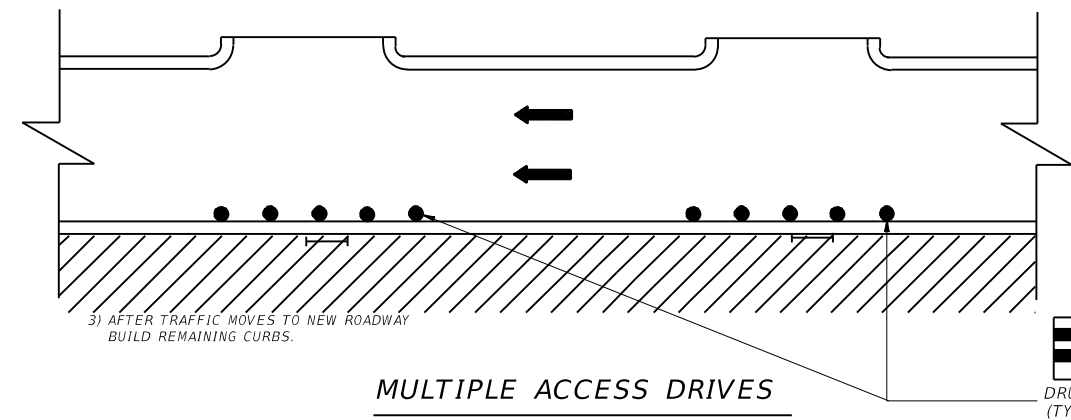
SINGLE ACCESS DRIVES



- 1) WITH TRAFFIC ON EXISTING, BUILD ONE DRIVE.



- 2) OPEN COMPLETED DRIVE AND BUILD NEXT DRIVE.



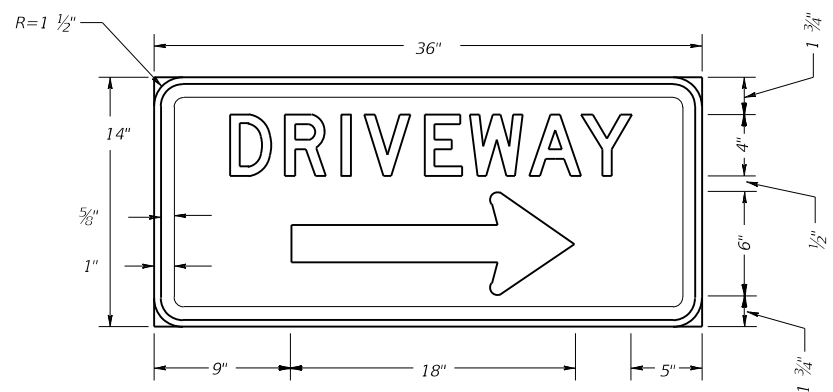
- 3) AFTER TRAFFIC MOVES TO NEW ROADWAY BUILD REMAINING CURBS.

MULTIPLE ACCESS DRIVES

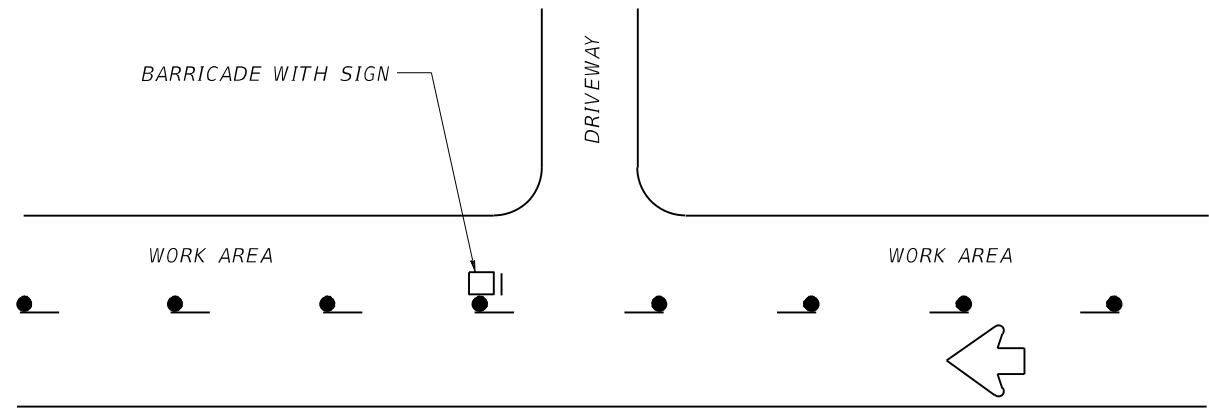
**CONSTRUCTION SEQUENCE  
FOR MISCELLANEOUS DRIVES**

CSMD TC8010-2020

FILE: STDH29.DGN	DN:	CK:	DW:	CK:
©TxDOT 2020	CONT	SECT	JOB	HIGHWAY
	0543	02	076	FM 359
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	42	



LETTERS: WHITE  
 BORDER: WHITE  
 BACKGROUND: BLUE



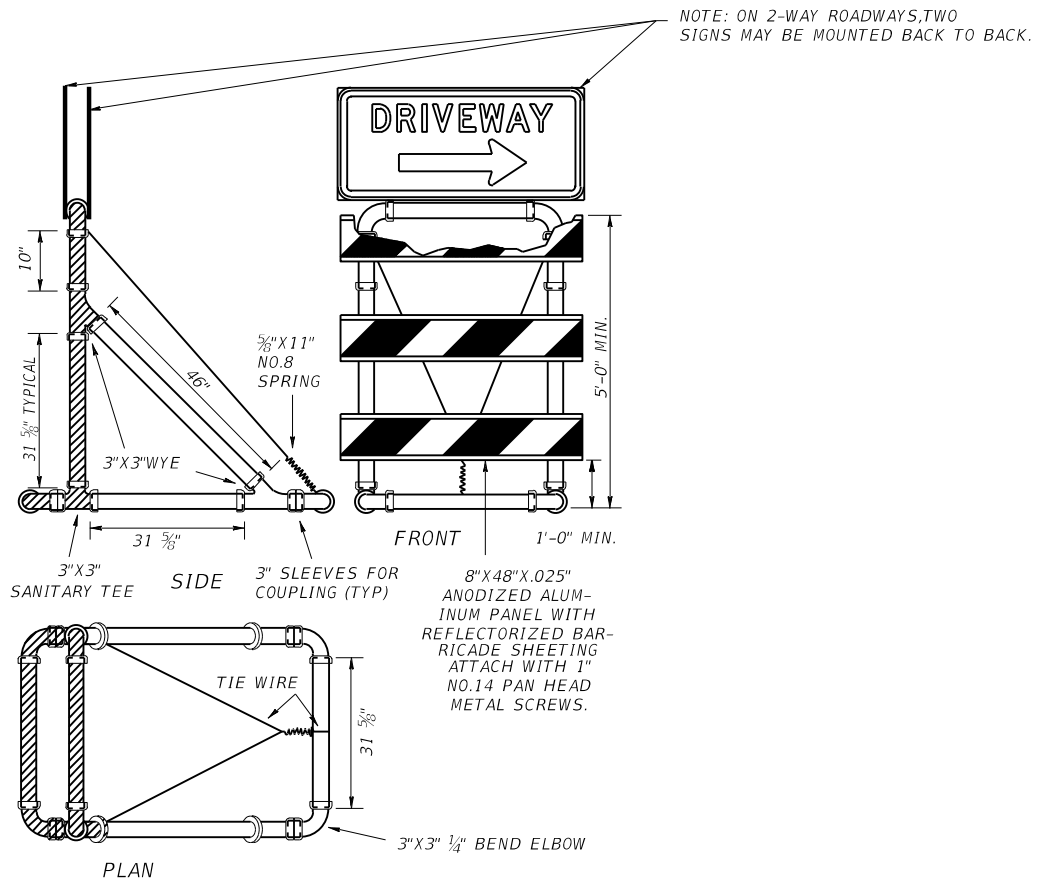
TYPICAL LOCATION OF DRIVEWAY SIGN

**TYPE III PVC BARRICADES  
 TYPICAL DESIGN DETAILS**

MAY BE USED AT THE OPTION OF THE CONTRACTOR.

NOTES:

1. ALL PIPE SHALL BE POLYVINYL CHLORIDE (PVC) PRESSURE RATED PIPE SDR 21 OR SDR 26 ASTM D2241.
2. JOINT FITTINGS MAY BE PVC-ASTM D2665 OR ACRYLONITRILE BUTADIENE STYRENE (ABS) ASTM D2661 (DRAINAGE WASTE AND VENT).
3. ALL PIPE AND FITTINGS SHALL BE WHITE.
4. ALL JOINTS SHALL BE FREE TO SEPARATE UPON VEHICLE IMPACT.
5. CROSS HATCHED CONDUIT TO BE TIED TOGETHER WITH ROPE THREADED INTO PIPE INTERIOR. USE 3/16" NO. 6 SOLID BRAIDED NYLON OR EQUIVALENT.
6. A FIXED FRANGIBLE PAVEMENT CONNECTION IS PREFERRED. SAND BAGS MAY BE SUBSTITUTED.



**CONSTRUCTION SIGN NOTES**

MATERIALS

CONSTRUCTION SIGNS SHALL BE MADE FROM APPROVED FIBERGLASS OR HIGH IMPACT PLASTIC AS PRIMARY MATERIALS.

SIGN SHEETING

REFLECTORIZED SIGN SHALL BE CONSTRUCTED OF RETRO REFLECTIVE SHEETING MEETING THE COLOR AND REFLECTIVITY REQUIREMENTS OF MATERIAL SPECIFICATIONS, DMS-8300.

TYPE C SHEETING SHALL BE USED FOR THIS APPLICATION.

SIGN LETTERS

ALL SIGNS LETTERING SHALL BE CLEAR, OPEN ROUNDED TYPE CAPITAL LETTERS AS APPROVED BY AND AS PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION. SIGNS AND LETTERING SHALL BE OF FIRST CLASS WORKMANSHIP EQUIVALENT TO THAT OF THE DEPARTMENT'S STANDARD SIGNS.



**DRIVEWAY SIGNING**

DS TC8020-04

FILE: STD H-30	DN:	CK:	DW:	CK:
©TxDOT 2004	CONT	SECT	JOB	HIGHWAY
	0543	02	076	FM 359
	DIST COUNTY		SHEET NO.	
	HOU FORT BEND		43	

EXISTING SIGN TO REMAIN  
**ADOPT A HIGHWAY**  
 NEXT 2 MILES  
 EMPLOYEES OF  
 OLDCASTLE  
 PRECAST  
 D14-4T  
 48x48



CW21-1aT  
 48x48

STA 363+97  
 BEG (E, F, I)  
 BEG 1 1/2" PLANING  
 BEG 1 1/2" ACP OVERLAY  
 BEG EDGELINE RUMBLE STRIPS  
 BEG CENTERLINE RUMBLE STRIPS

STA 367+85  
 BROOKSHIRE KATY  
 DRAINAGE DISTRIC  
 PERMITS REQUIRED  
 281-375-5430  
 42x24

1 STA 364+00  
**Waller**  
 COUNTY LINE  
 1-20T  
 48x24

2 STA 364+00  
**Fort Bend**  
 COUNTY LINE  
 1-20T  
 66x24

WEIGHT  
 LIMIT  
 GROSS  
 58420  
 LBS  
 R12-1T  
 24x36

**SPEED  
 LIMIT**  
 60  
 R2-1  
 48x60

3 STA 365+20

- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
  - (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
  - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
  - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
  - (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
  - (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
  - (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
  - (H) REFL PAV MRK TY I-C
  - (I) REFL PAV MRK TY II-A-A

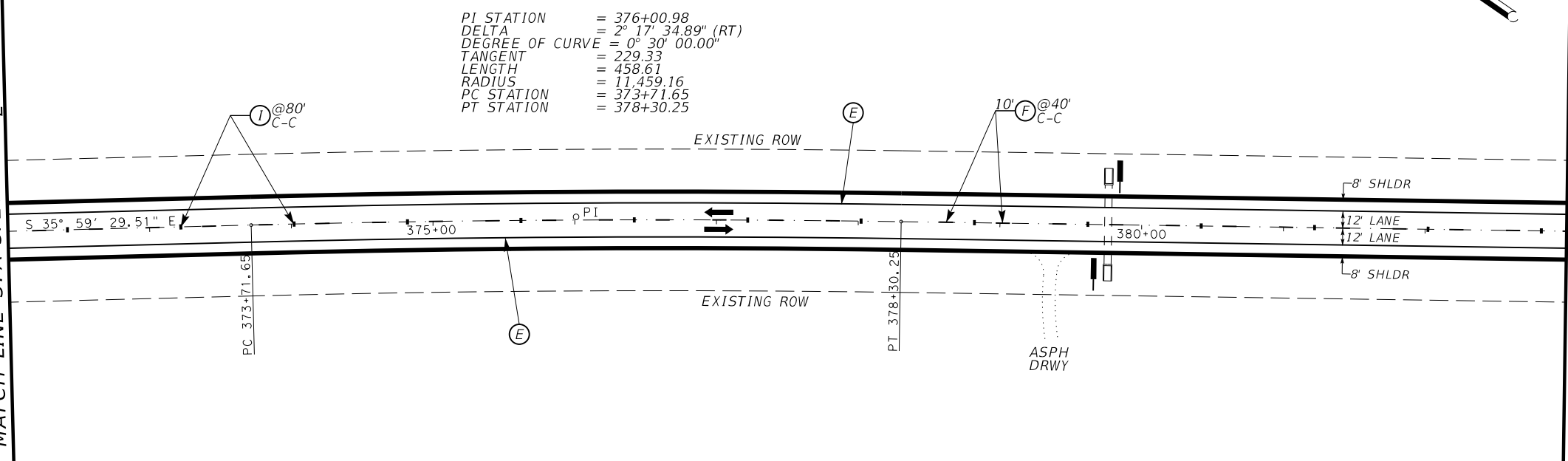
- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTL OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY

BEGIN PROJECT  
 STA 362+36.60

**SOUTH**  
 FARM  
 359  
 M3-3  
 24x12  
 M1-6F  
 24x24  
 D10-7aT  
 10x3

EXISTING SIGN  
 TO REMAIN

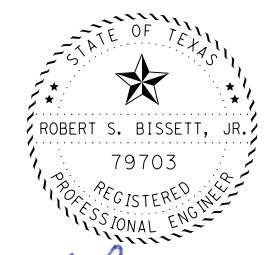
MATCH LINE STA 372+00.00 Q FM 359



PI STATION = 376+00.98  
 DELTA = 2° 17' 34.89" (RT)  
 DEGREE OF CURVE = 0° 30' 00.00"  
 TANGENT = 229.33  
 LENGTH = 458.61  
 RADIUS = 11,459.16  
 PC STATION = 373+71.65  
 PT STATION = 378+30.25

MATCH LINE STA 372+00.00 Q FM 359

MATCH LINE STA 383+00.00 Q FM 359

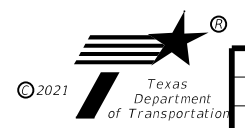


*Robert S. Bissett, Jr.*  
 09/12/21

**ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT**

FM 359  
 BEGIN PROJECT TO STA 383+00

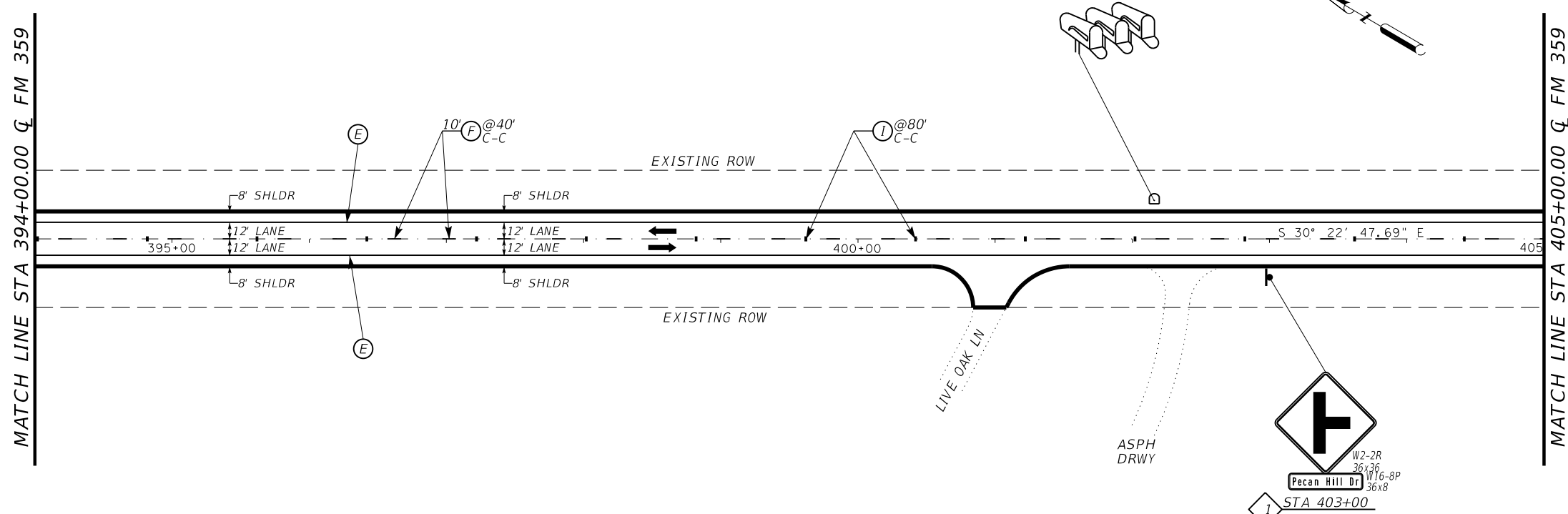
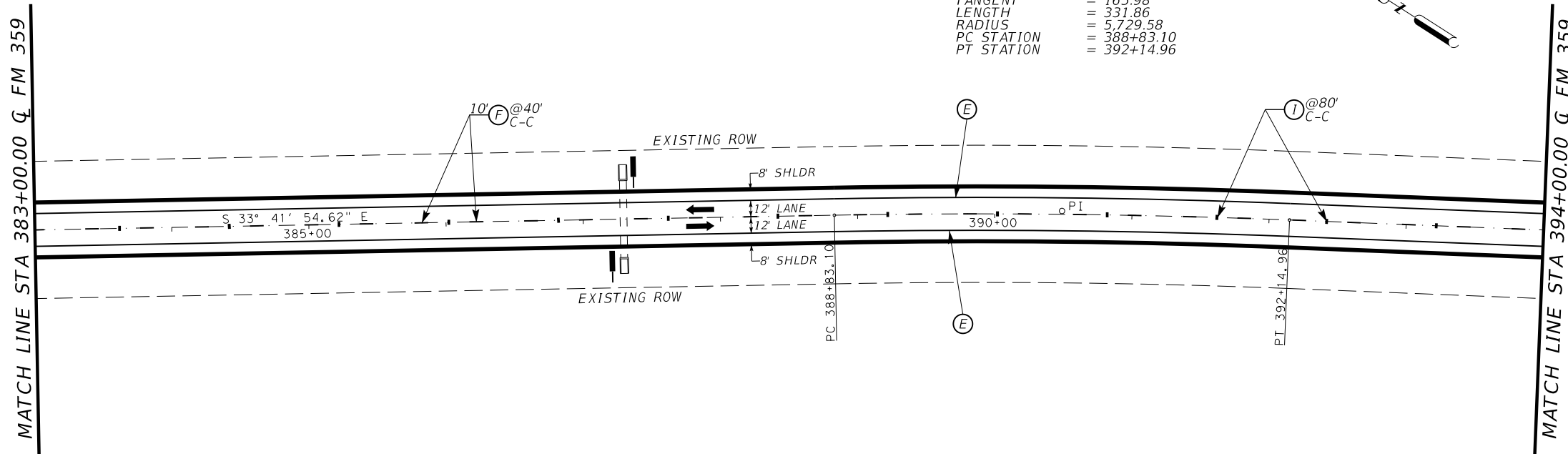
SHEET 1 OF 12



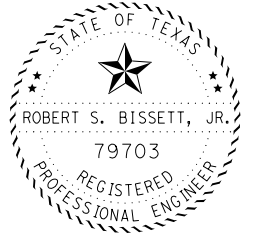
SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	44

PI STATION = 390+49.08  
 DELTA = 3° 19' 06.93" (RT)  
 DEGREE OF CURVE = 1° 00' 00.00"  
 TANGENT = 165.98  
 LENGTH = 331.86  
 RADIUS = 5,729.58  
 PC STATION = 388+83.10  
 PT STATION = 392+14.96



- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
  - (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
  - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
  - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
  - (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
  - (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
  - (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
  - (H) REFL PAV MRK TY I-C
  - (I) REFL PAV MRK TY II-A-A
- ◆ PROPOSED SMALL SIGN NUMBER
  - PROPOSED SMALL SIGN
  - TRAFFIC DIRECTION
  - MAILBOX - S/D/M (TWW-POST) TY 4
  - ⊗ INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
  - ⊖ INSTL OM ASSM (OM-2Y)(WC)GND
  - ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY

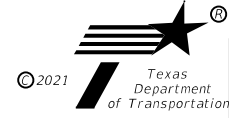


*Robert S. Bissett, Jr.*  
 09/12/21

**ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT**

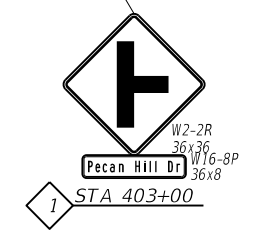
FM 359  
 STA 383+00 TO STA 405+00

SHEET 2 OF 12

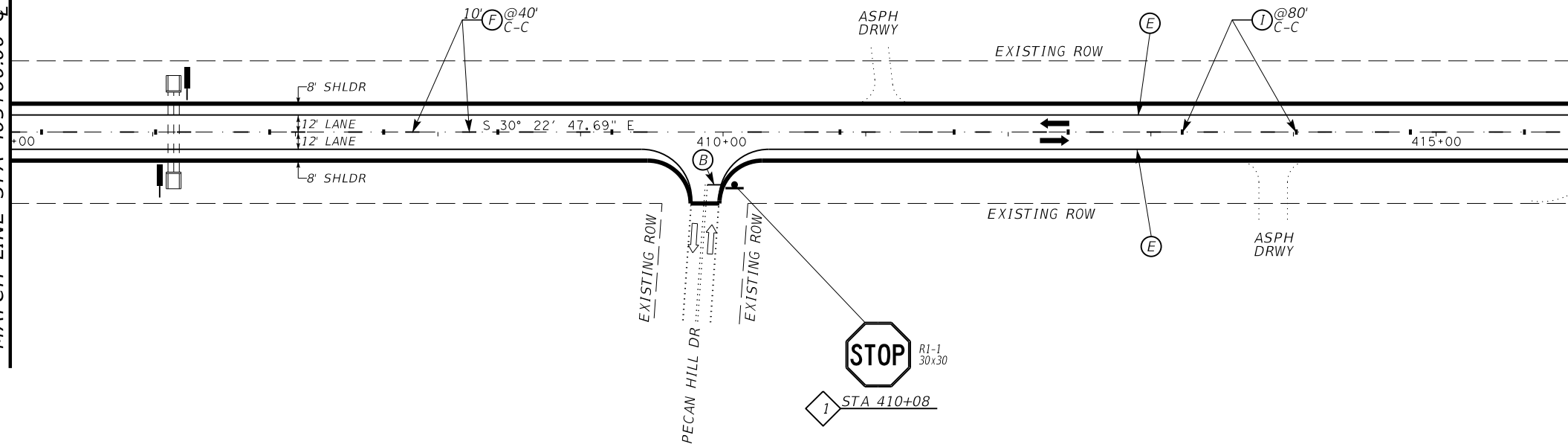


SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	45

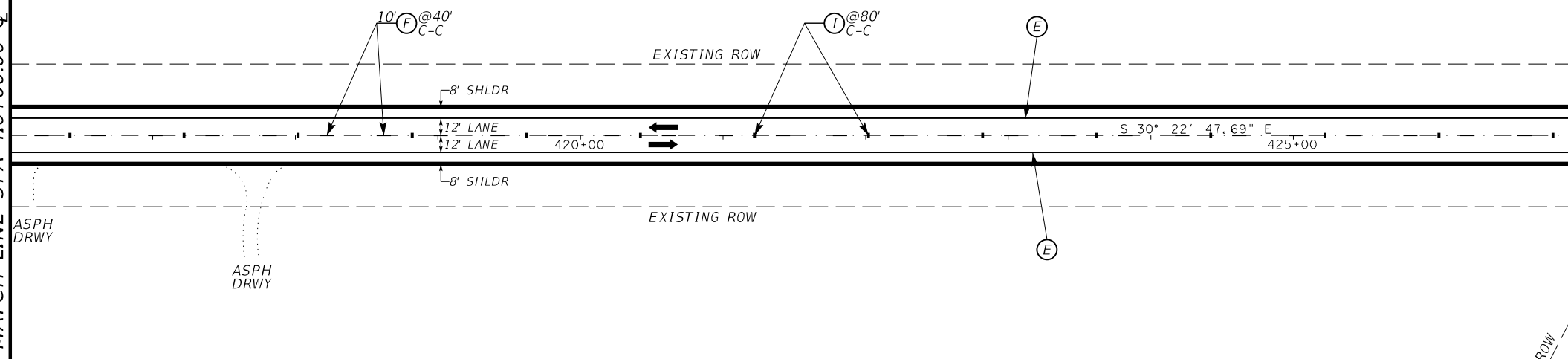


MATCH LINE STA 405+00.00 Q FM 359



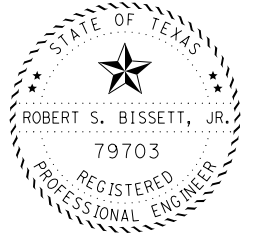
MATCH LINE STA 416+00.00 Q FM 359

MATCH LINE STA 416+00.00 Q FM 359



MATCH LINE STA 427+00.00 Q FM 359

- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
  - (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
  - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
  - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
  - (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
  - (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
  - (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
  - (H) REFL PAV MRK TY I-C
  - (I) REFL PAV MRK TY II-A-A
- ◆ PROPOSED SMALL SIGN NUMBER
  - PROPOSED SMALL SIGN
  - ➔ TRAFFIC DIRECTION
  - ☐ MAILBOX - S/D/M (TWW-POST) TY 4
  - ⊗ INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
  - ⊖ INSTL OM ASSM (OM-2Y)(WC)GND
  - ▭ LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY

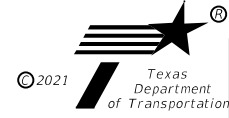


*Robert S. Bissett, Jr.*  
09/12/21

**ROADWAY, SIGNING  
& PAVEMENT  
MARKING LAYOUT**

FM 359  
STA 405+00 TO STA 427+00

SHEET 3 OF 12



SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	46



PI STATION = 430+57.43  
 DELTA = 9° 55' 45.70" (RT)  
 DEGREE OF CURVE = 2° 00' 00.00"  
 TANGENT = 248.86  
 LENGTH = 496.47  
 RADIUS = 2,864.79  
 PC STATION = 428+08.57  
 PT STATION = 433+05.04

4 STA 435+00  
 BACK-TO-BACK

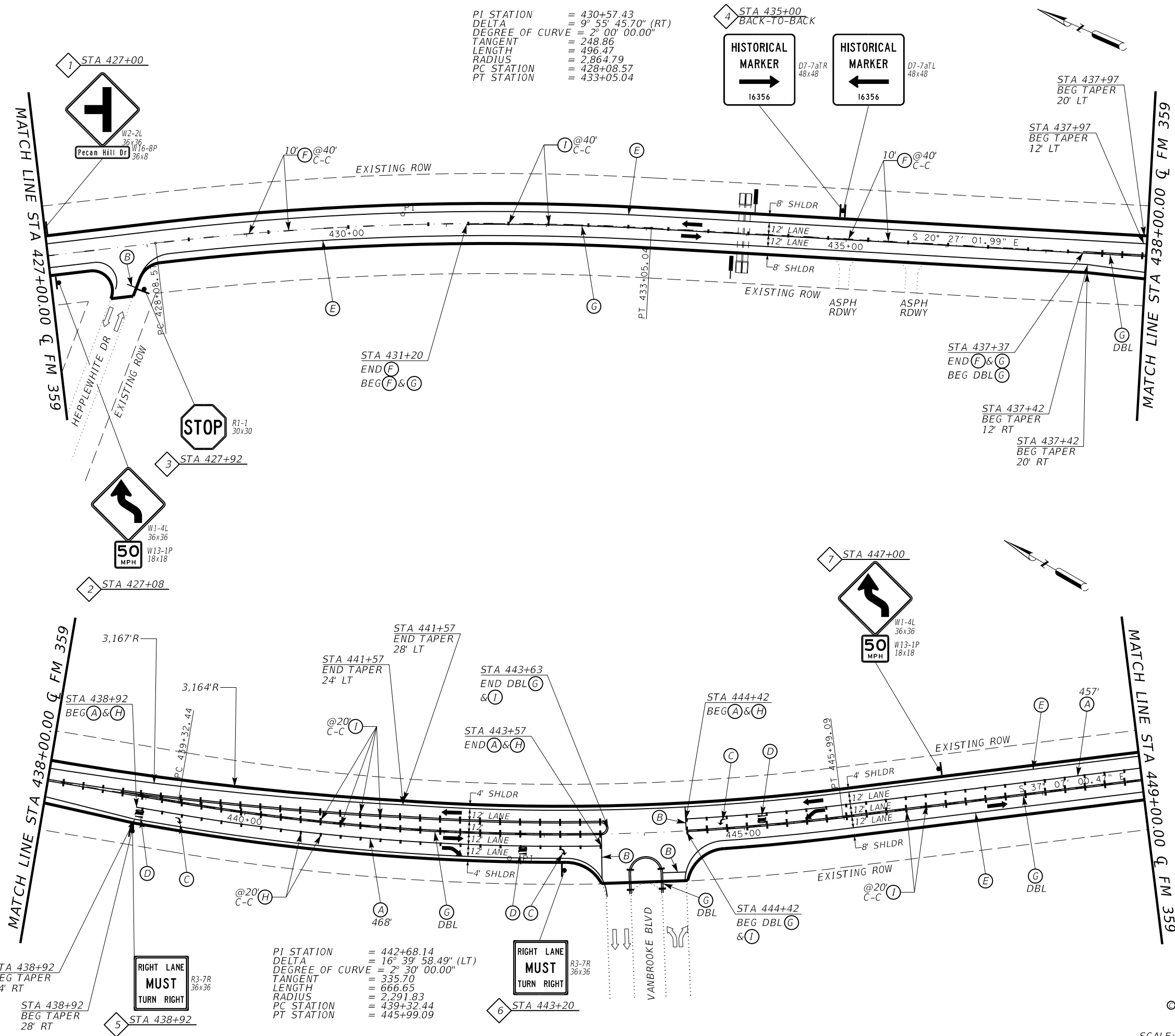
HISTORICAL MARKER  
 16356

HISTORICAL MARKER  
 16356

**LEGEND**

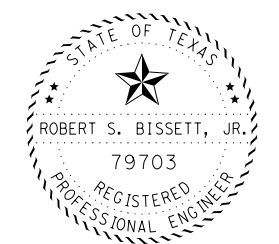
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (H) REFL PAV MRK TY I-C
- (I) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTR DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTR OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY



PI STATION = 442+68.14  
 DELTA = 16° 39' 58.49" (LT)  
 DEGREE OF CURVE = 2° 30' 00.00"  
 TANGENT = 335.70  
 LENGTH = 666.65  
 RADIUS = 2,291.83  
 PC STATION = 439+32.44  
 PT STATION = 445+99.09

RIGHT LANE  
 MUST  
 TURN RIGHT  
 R3-7R  
 36x36



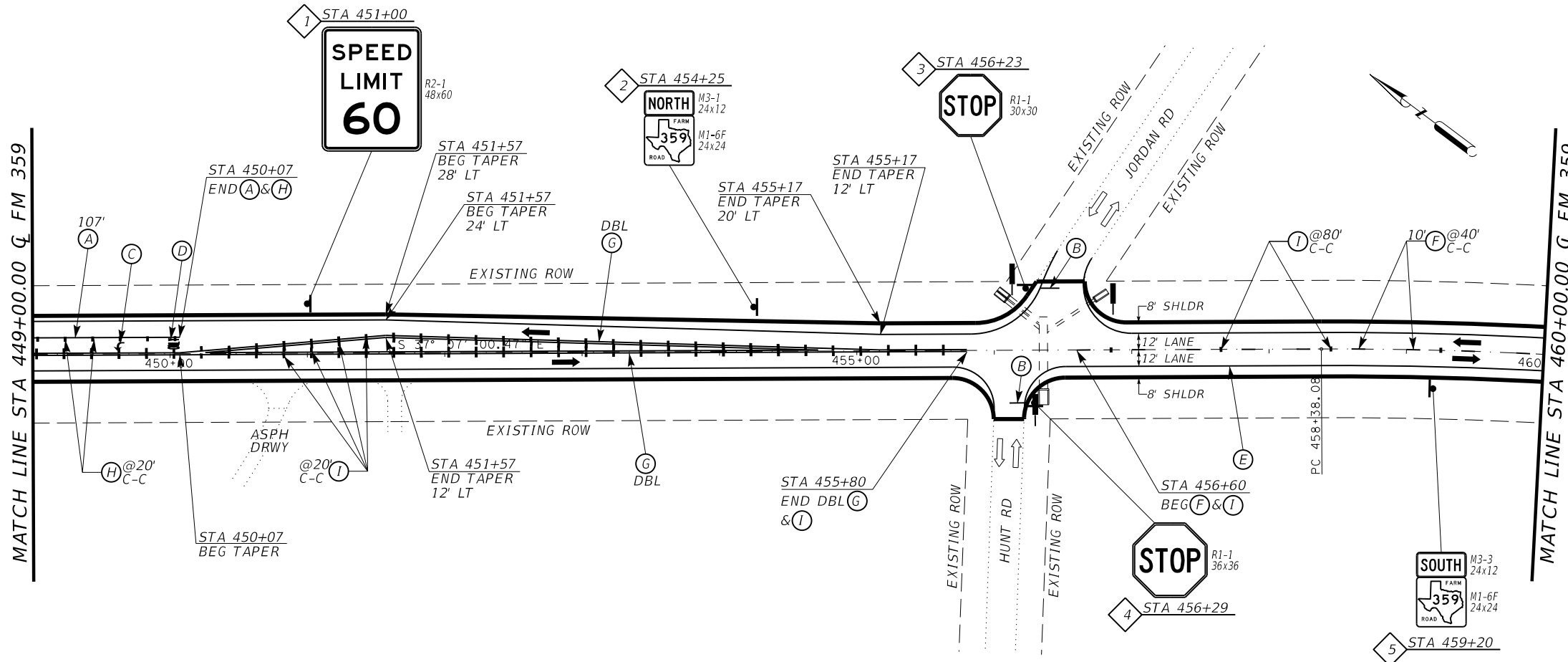
*Robert S. Bissett, Jr.*  
 09/12/21  
 ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT

FM 359  
 STA 427+00 TO STA 449+00

SHEET 4 OF 12

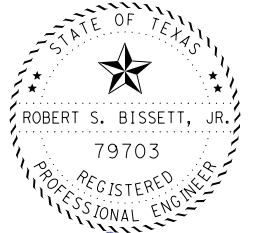
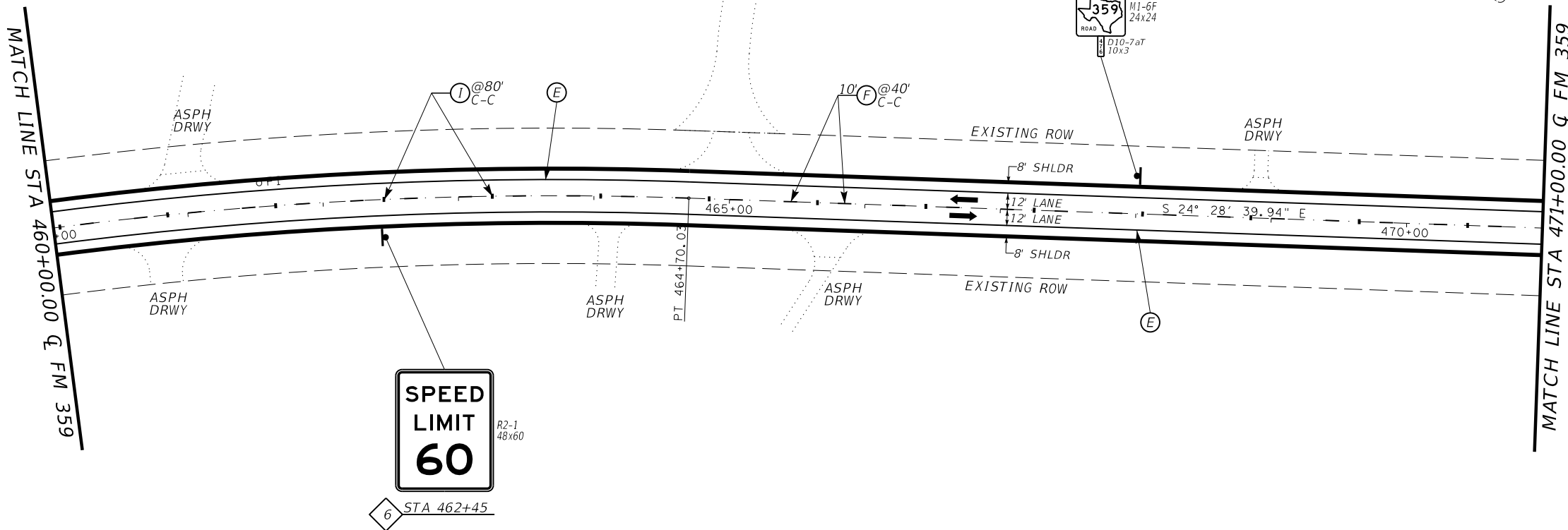
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	47

© 2021 Texas Department of Transportation  
 SCALE: 1"=100'



PI STATION = 461+55.34  
 DELTA = 12° 38' 20.54" (RT)  
 DEGREE OF CURVE = 2° 00' 00.00"  
 TANGENT = 317.26  
 LENGTH = 631.95  
 RADIUS = 2,864.79  
 PC STATION = 458+38.08  
 PT STATION = 464+70.03

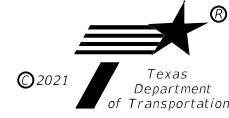
- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
  - (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
  - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
  - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
  - (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
  - (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
  - (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
  - (H) REFL PAV MRK TY I-C
  - (I) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
  - PROPOSED SMALL SIGN
  - TRAFFIC DIRECTION
  - MAILBOX - S/D/M (TWW-POST) TY 4
  - INSTR DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
  - INSTR OM ASSM (OM-2Y)(WC)GND
  - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY



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 09/12/21  
 ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT

FM 359  
 STA 449+00 TO STA 471+00

SHEET 5 OF 12



SCALE: 1"=100'

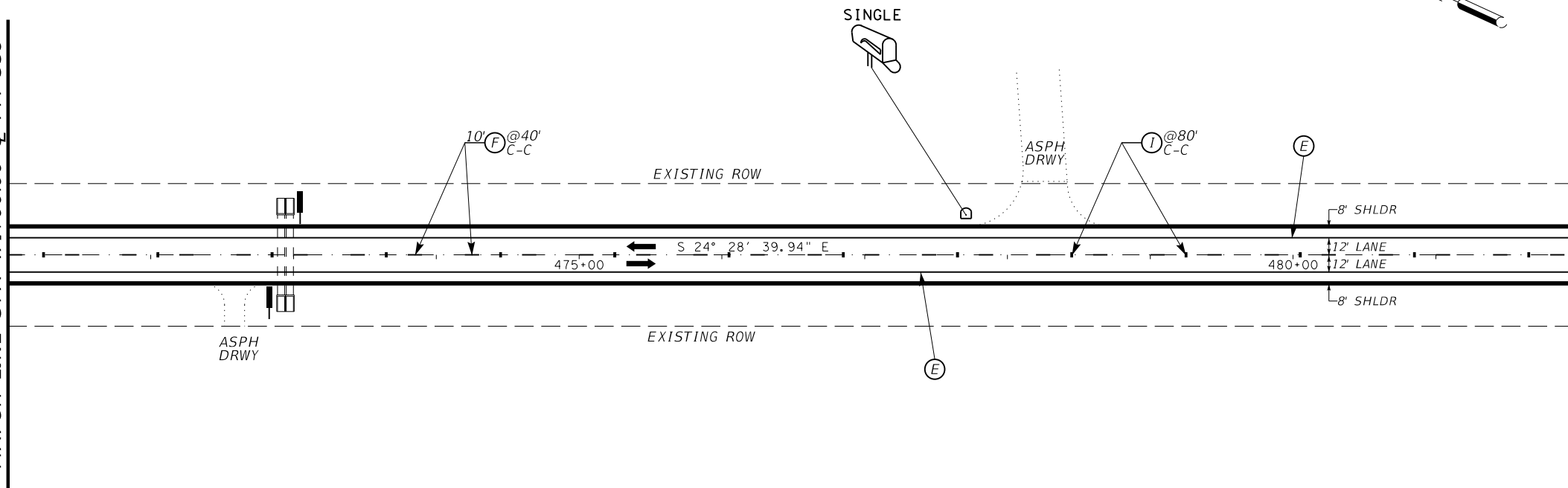
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	48

MATCH LINE STA 471+00.00 Q FM 359

MATCH LINE STA 482+00.00 Q FM 359

MATCH LINE STA 482+00.00 Q FM 359

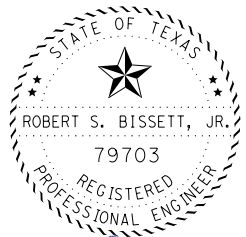
MATCH LINE STA 493+00.00 Q FM 359



LEGEND

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)ARROW(100MIL)
- (D) REFL PAV MRK TY I (W)WORD(100MIL)
- (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (H) REFL PAV MRK TY I-C
- (I) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTL OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY

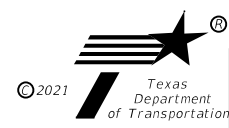


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**ROADWAY, SIGNING  
& PAVEMENT  
MARKING LAYOUT**

FM 359  
STA 471+00 TO STA 493+00

SHEET 6 OF 12



SCALE: 1"=100'

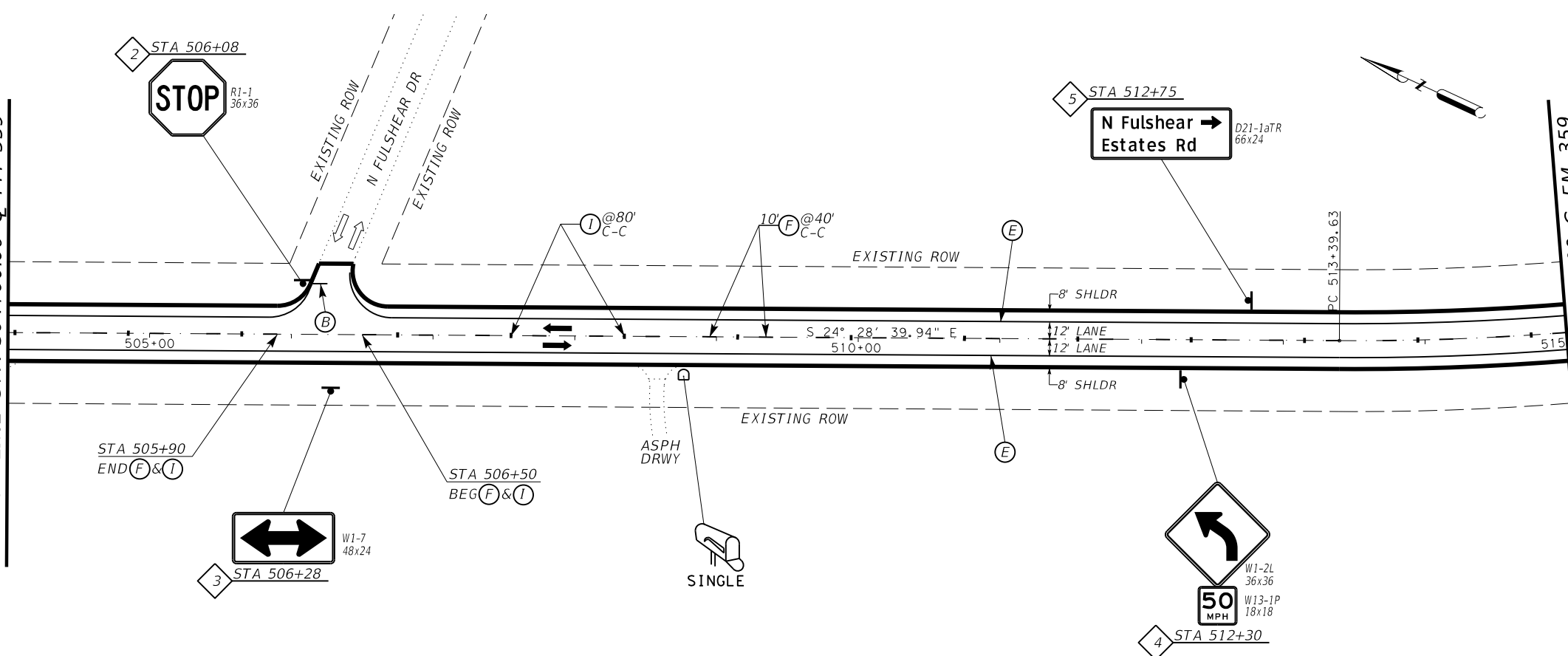
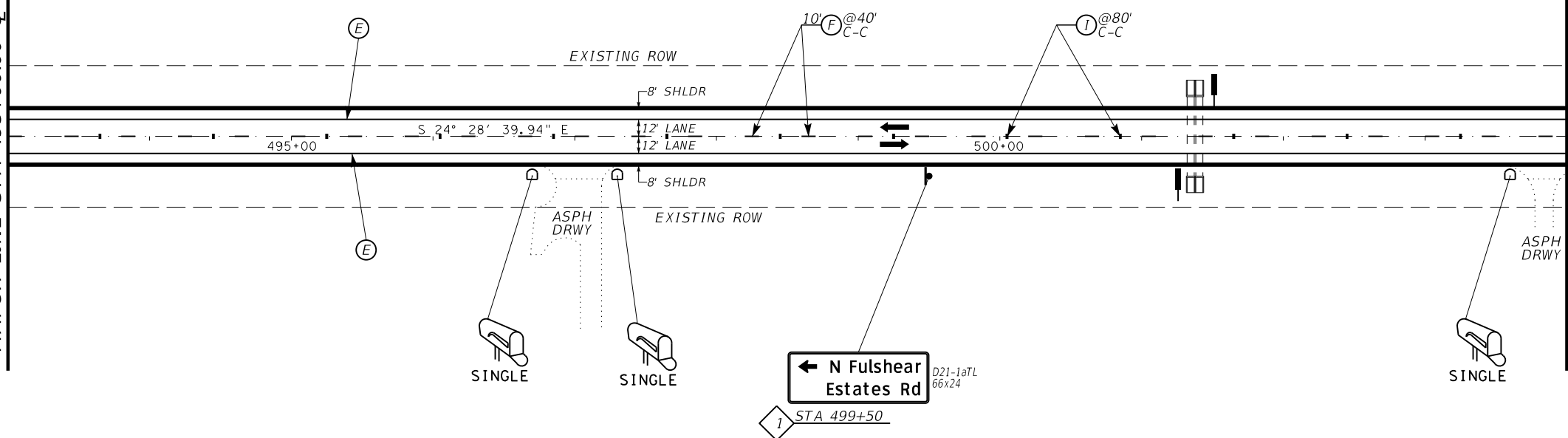
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	49

MATCH LINE STA 493+00.00 Q FM 359

MATCH LINE STA 504+00.00 Q FM 359

MATCH LINE STA 504+00.00 Q FM 359

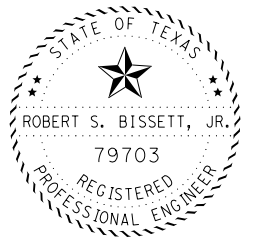
MATCH LINE STA 515+00.00 Q FM 359



LEGEND

- (A) REFL PAV MRK TY I (W)8\"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)24\"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (E) RE PM W/RET REQ TY I (W)6\"(SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y)6\"(BRK)(100MIL)
- (G) RE PM W/RET REQ TY I (Y)6\"(SLD)(100MIL)
- (H) REFL PAV MRK TY I-C
- (I) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTL OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2\" PLANING & 1 1/2\" ACP OVERLAY

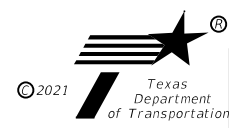


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 09/12/21

ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT

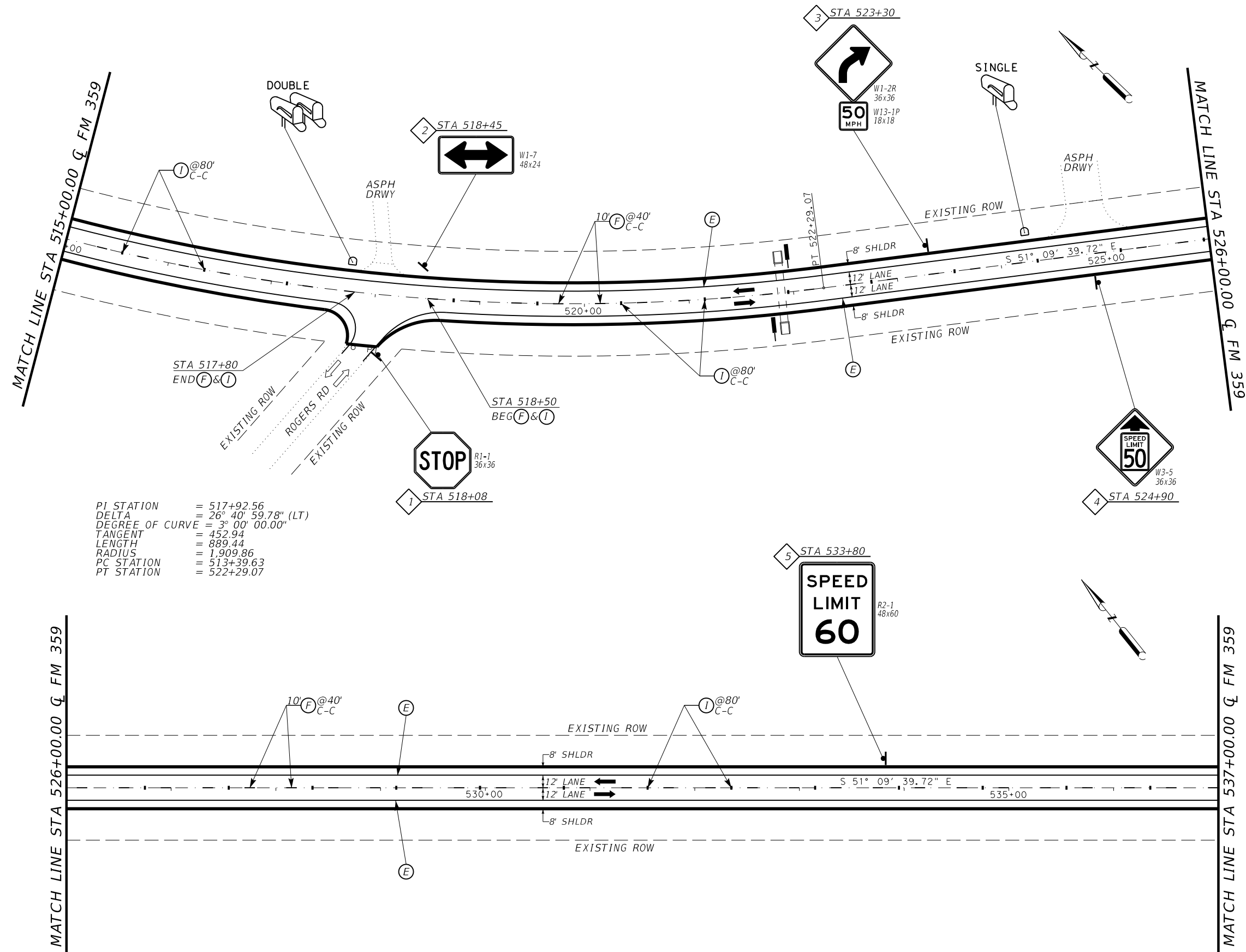
FM 359  
 STA 493+00 TO STA 515+00

SHEET 7 OF 12



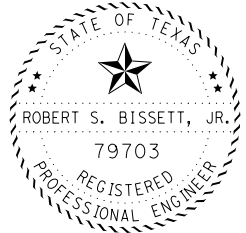
SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	50



PI STATION = 517+92.56  
 DELTA = 26° 40' 59.78" (LT)  
 DEGREE OF CURVE = 3° 00' 00.00"  
 TANGENT = 452.94  
 LENGTH = 889.44  
 RADIUS = 1,909.86  
 PC STATION = 513+39.63  
 PT STATION = 522+29.07

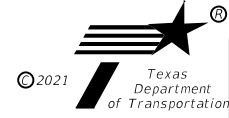
- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
  - (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
  - (C) REFL PAV MRK TY I (W)ARROW(100MIL)
  - (D) REFL PAV MRK TY I (W)WORD(100MIL)
  - (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
  - (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
  - (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
  - (H) REFL PAV MRK TY I-C
  - (I) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
  - PROPOSED SMALL SIGN
  - TRAFFIC DIRECTION
  - MAILBOX - S/D/M (TWW-POST) TY 4
  - INSTR DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
  - INSTR OM ASSM (OM-2Y)(WC)GND
  - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY



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 ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT

FM 359  
 STA 515+00 TO STA 537+00

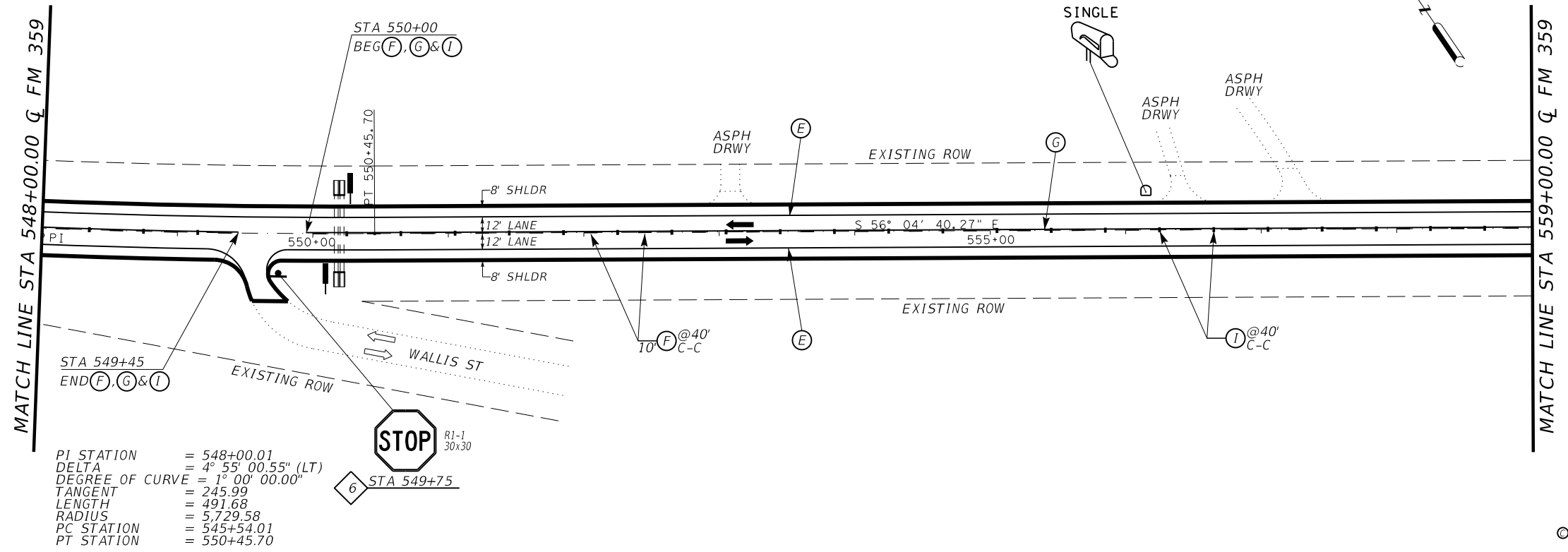
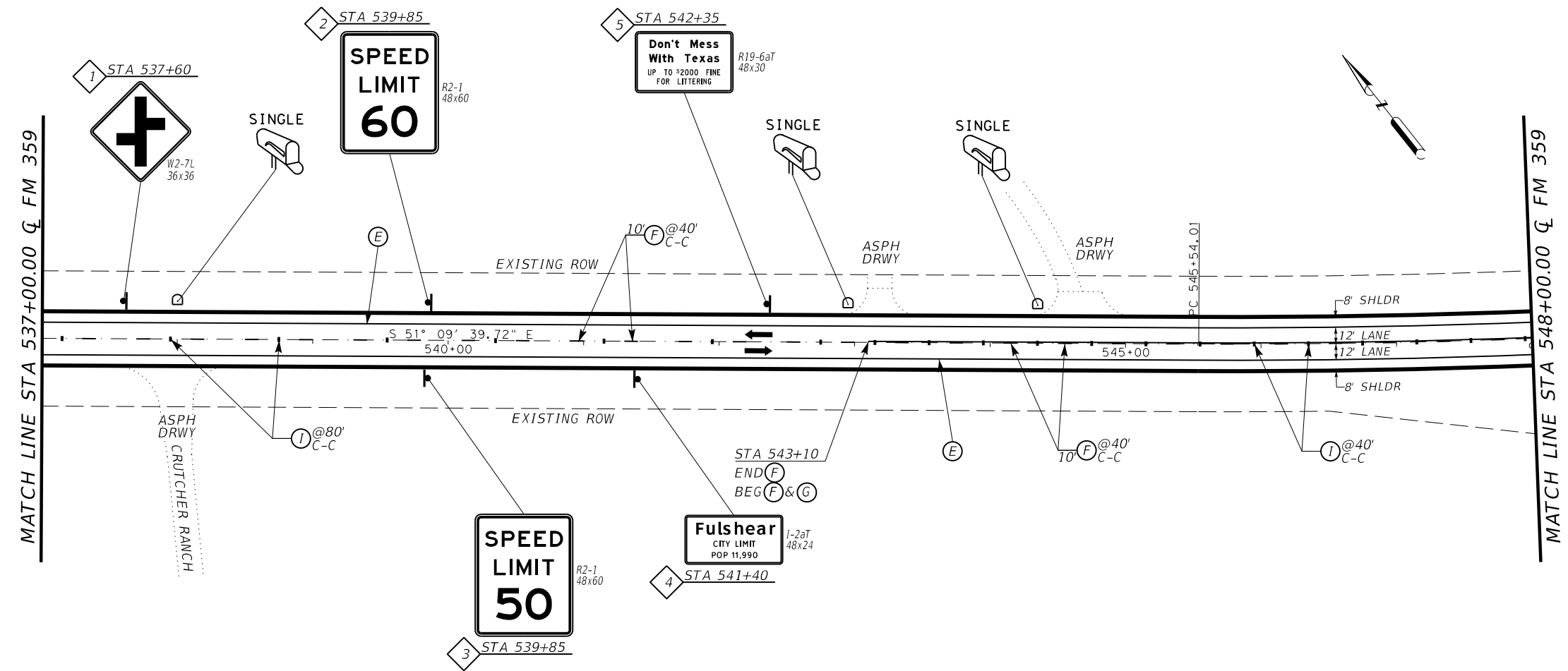
SHEET 8 OF 12



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	51

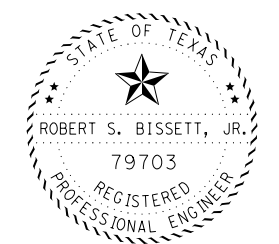
SCALE: 1"=100'





PI STATION = 548+00.01  
 DELTA = 4° 55' 00.55" (LT)  
 DEGREE OF CURVE = 1° 00' 00.00"  
 TANGENT = 245.99  
 LENGTH = 491.68  
 RADIUS = 5,729.58  
 PC STATION = 545+54.01  
 PT STATION = 550+45.70

- LEGEND**
- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
  - (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
  - (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
  - (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
  - (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
  - (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
  - (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
  - (H) REFL PAV MRK TY I-C
  - (I) REFL PAV MRK TY II-A-A
- # PROPOSED SMALL SIGN NUMBER
  - PROPOSED SMALL SIGN
  - TRAFFIC DIRECTION
  - MAILBOX - S/D/M (TWW-POST) TY 4
  - INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
  - INSTL OM ASSM (OM-2Y)(WC)GND
  - LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY

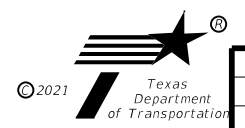


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 09/12/21

**ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT**

FM 359  
 STA 537+00 TO STA 559+00

SHEET 9 OF 12



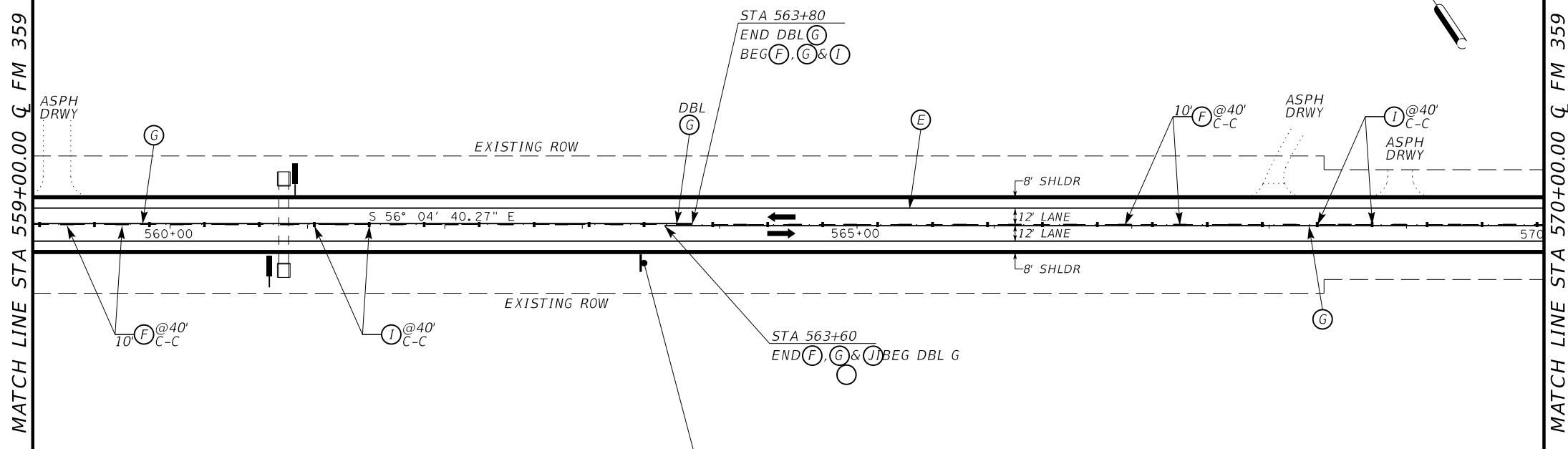
SCALE: 1"=100'

CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	52

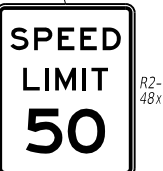
**LEGEND**

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (H) REFL PAV MRK TY I-C
- (I) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTL OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY

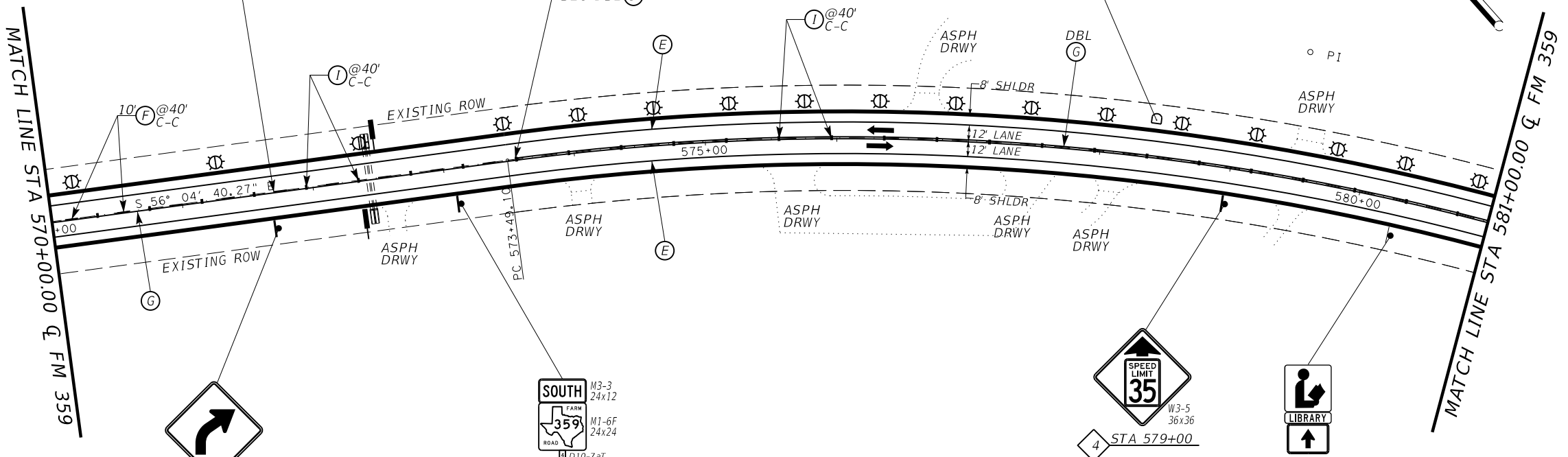


PI STATION = 579+64.26  
 DELTA = 35° 42' 25.78" (RT)  
 DEGREE OF CURVE = 3° 00' 00.00"  
 TANGENT = 615.16  
 LENGTH = 1,190.24  
 RADIUS = 1,909.86  
 PC STATION = 573+49.10  
 PT STATION = 585+39.34



1 STA 563+45

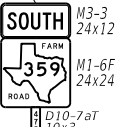
STA 571+70  
 END EDGELINE RUMBLE STRIPS  
 END CENTERLINE RUMBLE STRIPS



4 STA 579+00



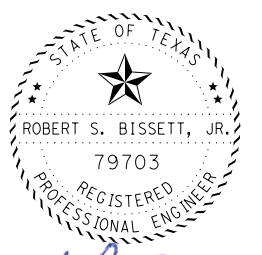
2 STA 571+70



3 STA 573+10



EXISTING SIGN TO REMAIN



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 09/12/21

**ROADWAY, SIGNING  
 & PAVEMENT  
 MARKING LAYOUT**

FM 359  
 STA 559+00 TO STA 581+00

SHEET 10 OF 12



SCALE: 1"=100'

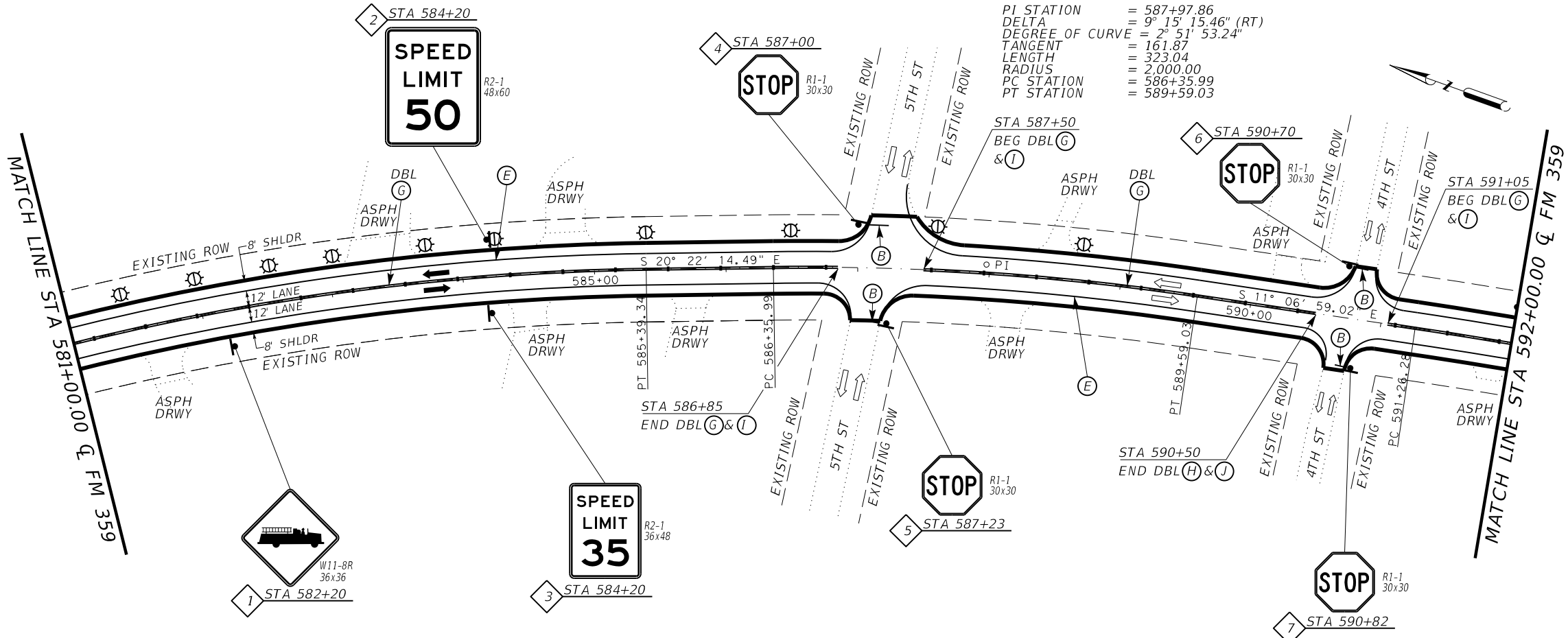
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST	COUNTY		SHEET NO.
HOU	FORT BEND		53

PI STATION = 587+97.86  
 DELTA = 9° 15' 15.46" (RT)  
 DEGREE OF CURVE = 2° 51' 53.24"  
 TANGENT = 161.87  
 LENGTH = 323.04  
 RADIUS = 2,000.00  
 PC STATION = 586+35.99  
 PT STATION = 589+59.03

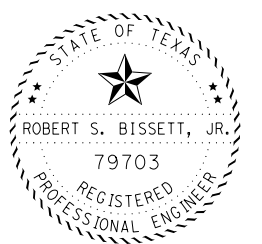
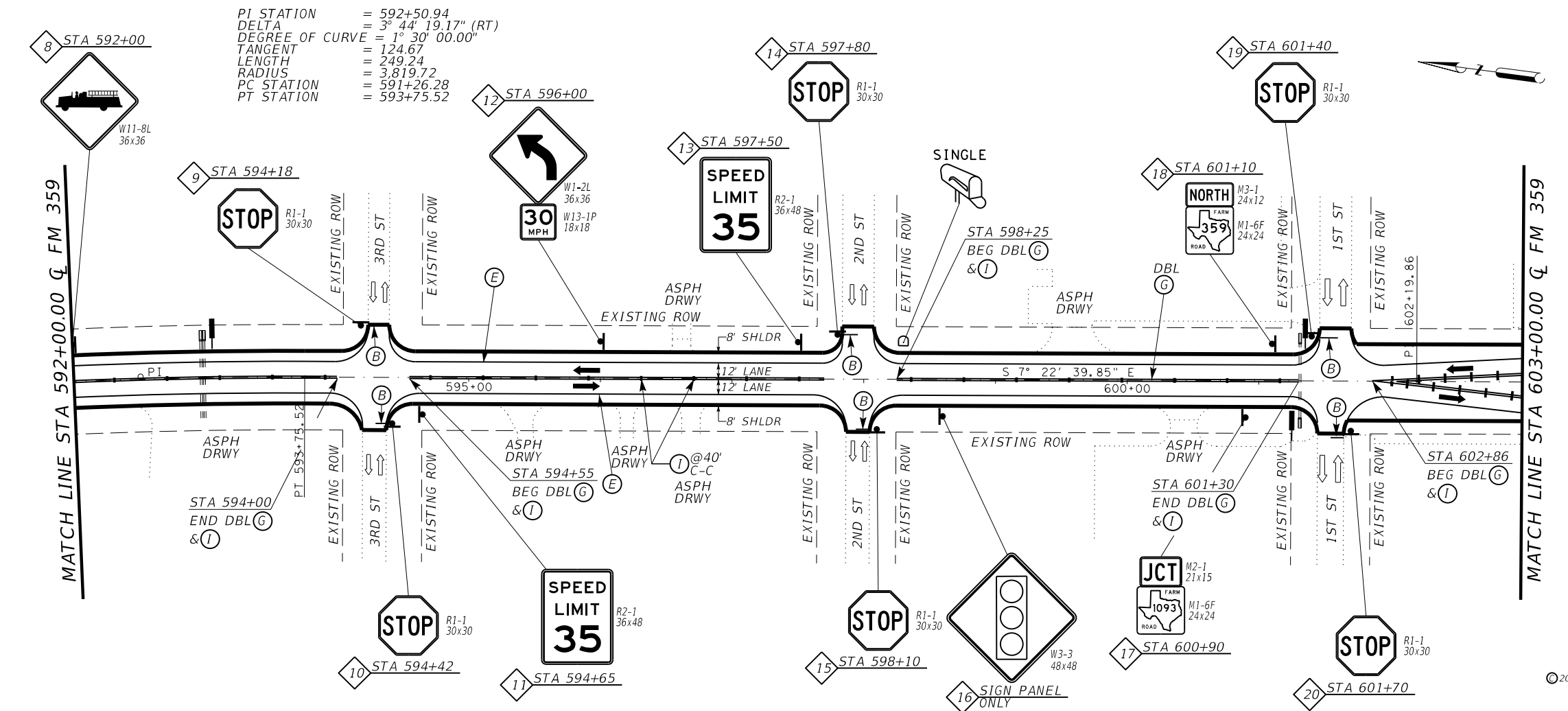
**LEGEND**

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)ARROW(100MIL)
- (D) REFL PAV MRK TY I (W)WORD(100MIL)
- (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (H) REFL PAV MRK TY I-C
- (I) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTL OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY



PI STATION = 592+50.94  
 DELTA = 3° 44' 19.17" (RT)  
 DEGREE OF CURVE = 1° 30' 00.00"  
 TANGENT = 124.67  
 LENGTH = 249.24  
 RADIUS = 3,819.72  
 PC STATION = 591+26.28  
 PT STATION = 593+75.52

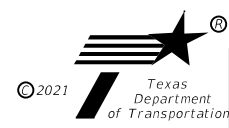


*Robert S. Bissett, Jr.*  
 09/12/21

**ROADWAY, SIGNING & PAVEMENT MARKING LAYOUT**

FM 359  
 STA 581+00 TO STA 603+00

SHEET 11 OF 12



SCALE: 1"=100'

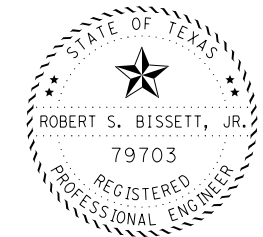
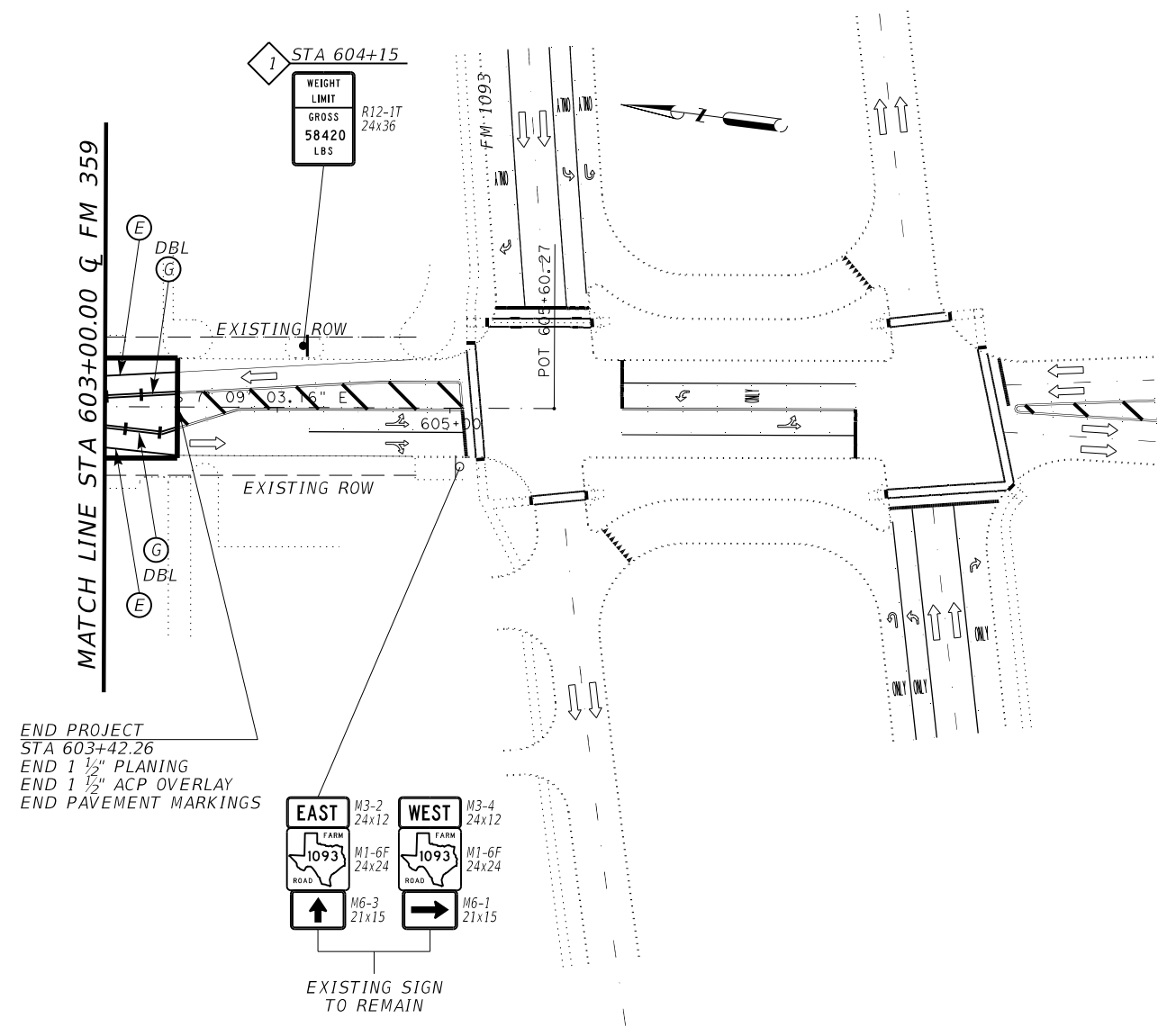
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	54



**LEGEND**

- (A) REFL PAV MRK TY I (W)8"(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)24"(SLD)(100MIL)
- (C) REFL PAV MRK TY I (W)(ARROW)(100MIL)
- (D) REFL PAV MRK TY I (W)(WORD)(100MIL)
- (E) RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)
- (G) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (H) REFL PAV MRK TY I-C
- (I) REFL PAV MRK TY II-A-A

- # PROPOSED SMALL SIGN NUMBER
- PROPOSED SMALL SIGN
- TRAFFIC DIRECTION
- MAILBOX - S/D/M (TWW-POST) TY 4
- INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)
- INSTL OM ASSM (OM-2Y)(WC)GND
- LIMITS OF 1 1/2" PLANING & 1 1/2" ACP OVERLAY



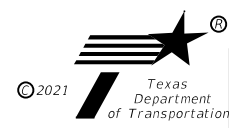
*Robert S. Bissett, Jr.*

09/12/21

**ROADWAY, SIGNING  
& PAVEMENT  
MARKING LAYOUT**

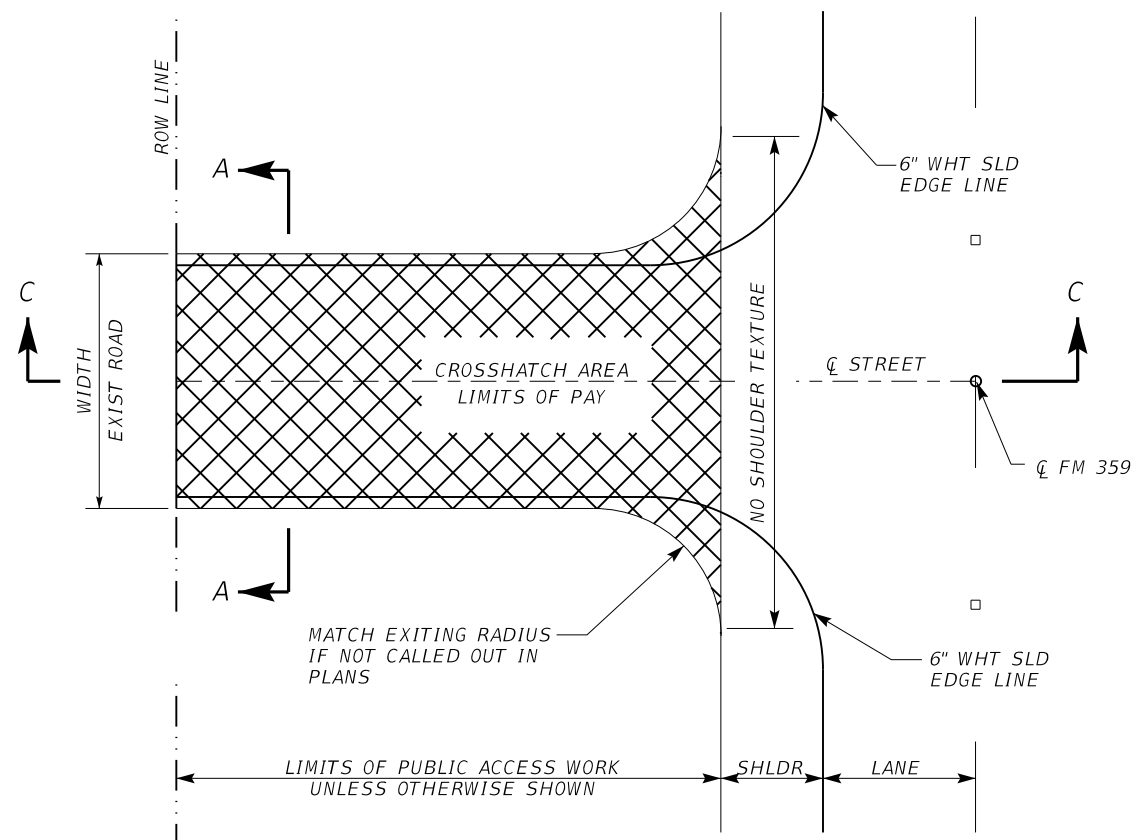
FM 359  
STA 603+00 TO END PROJECT

SHEET 12 OF 12

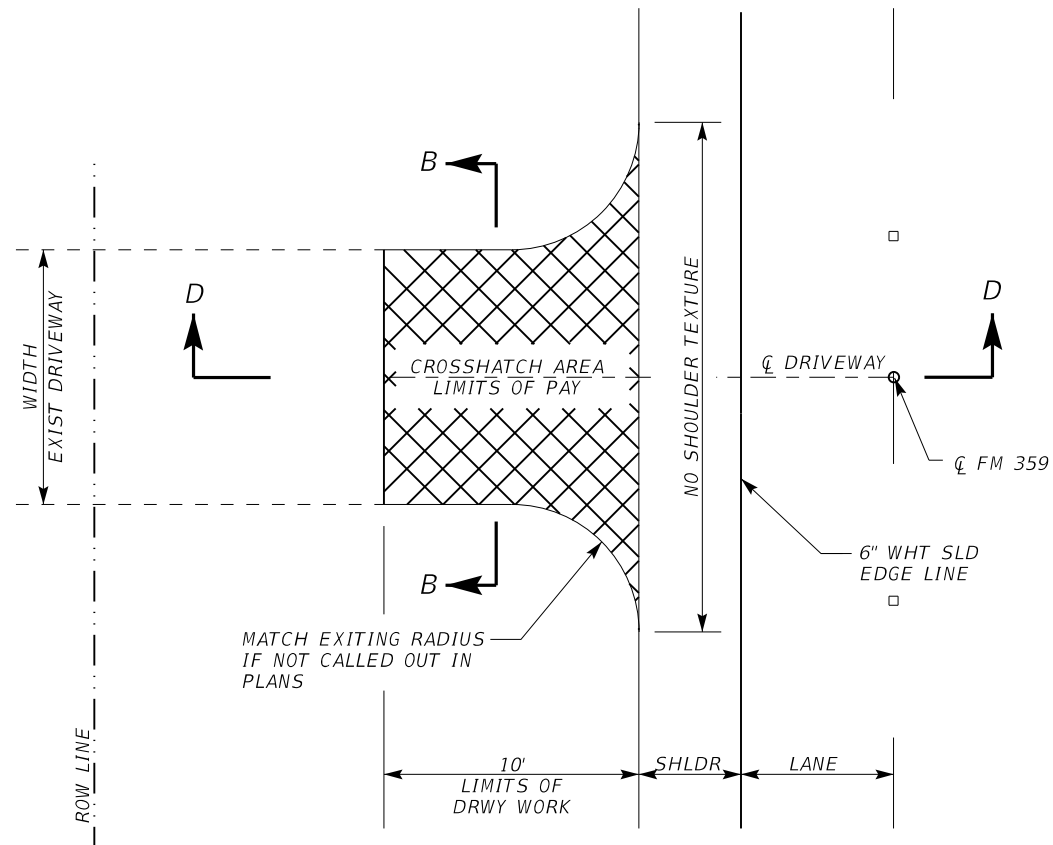


SCALE: 1"=100'

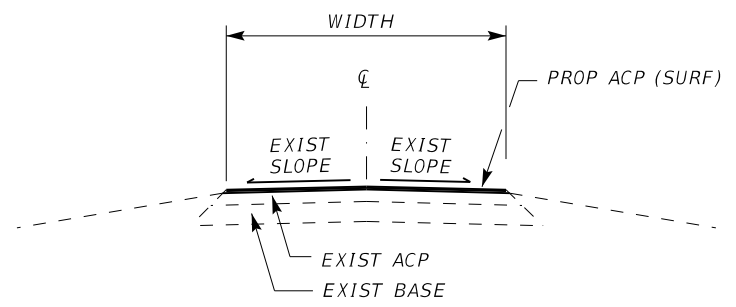
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	55



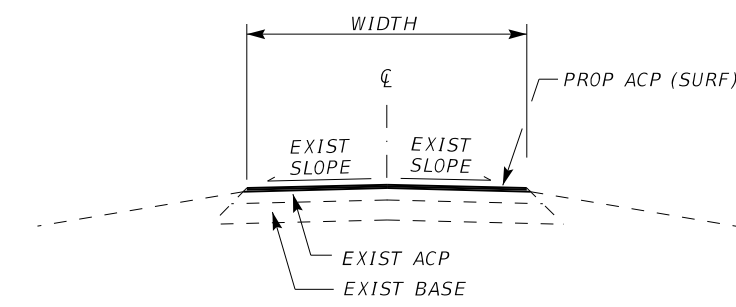
**PLAN**  
PUBLIC ACCESS DRIVEWAYS  
OR INTERSECTING STREETS



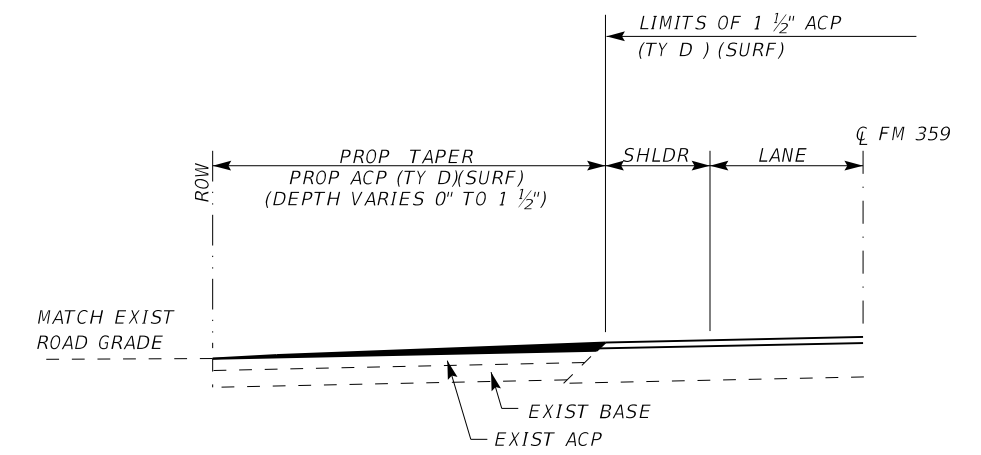
**PLAN**  
PRIVATE DRIVEWAYS



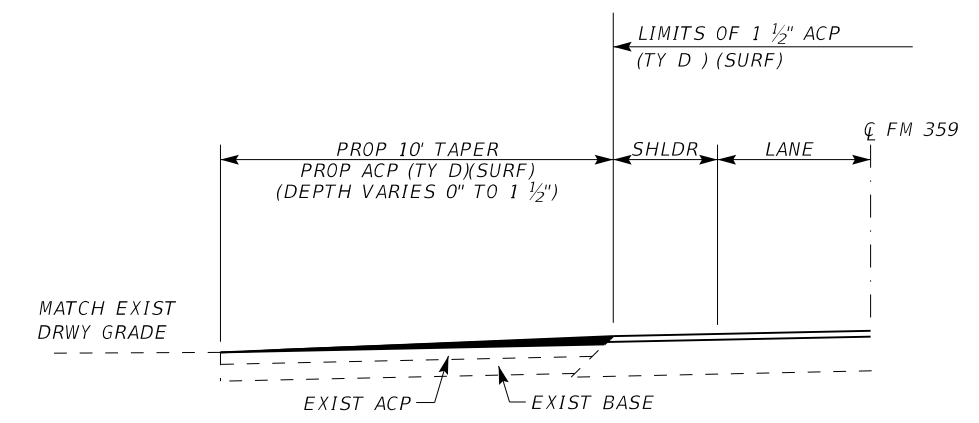
**SECTION A-A**  
EXIST ACP STREET



**SECTION B-B**  
EXIST ACP DRIVEWAY



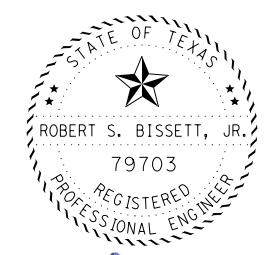
**SECTION C-C**



**SECTION D-D**

**NOTES:**

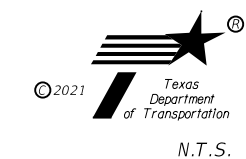
1. A PUBLIC ACCESS DRIVEWAY INCLUDES ALL APPROACHES TO A STATE HIGHWAY FROM COUNTY OR CITY MAINTAINED ROADS AND STREETS, AND APPROACHES TO SCHOOLS, CHURCHES, CEMETERIES AND OTHER PUBLIC PLACES OR BUILDINGS OF A LIKE CHARACTER.
2. AT EXISTING DIRT/GRAVEL DRIVEWAYS, PLACE FLEXIBLE BASE AT A 6:1 TAPER TO SHOULDER UP THE ROADWAY EDGE WHERE INSUFFICIENT MATERIAL EXISTS AS DIRECTED. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO THE BID ITEMS OF THE CONTRACT.



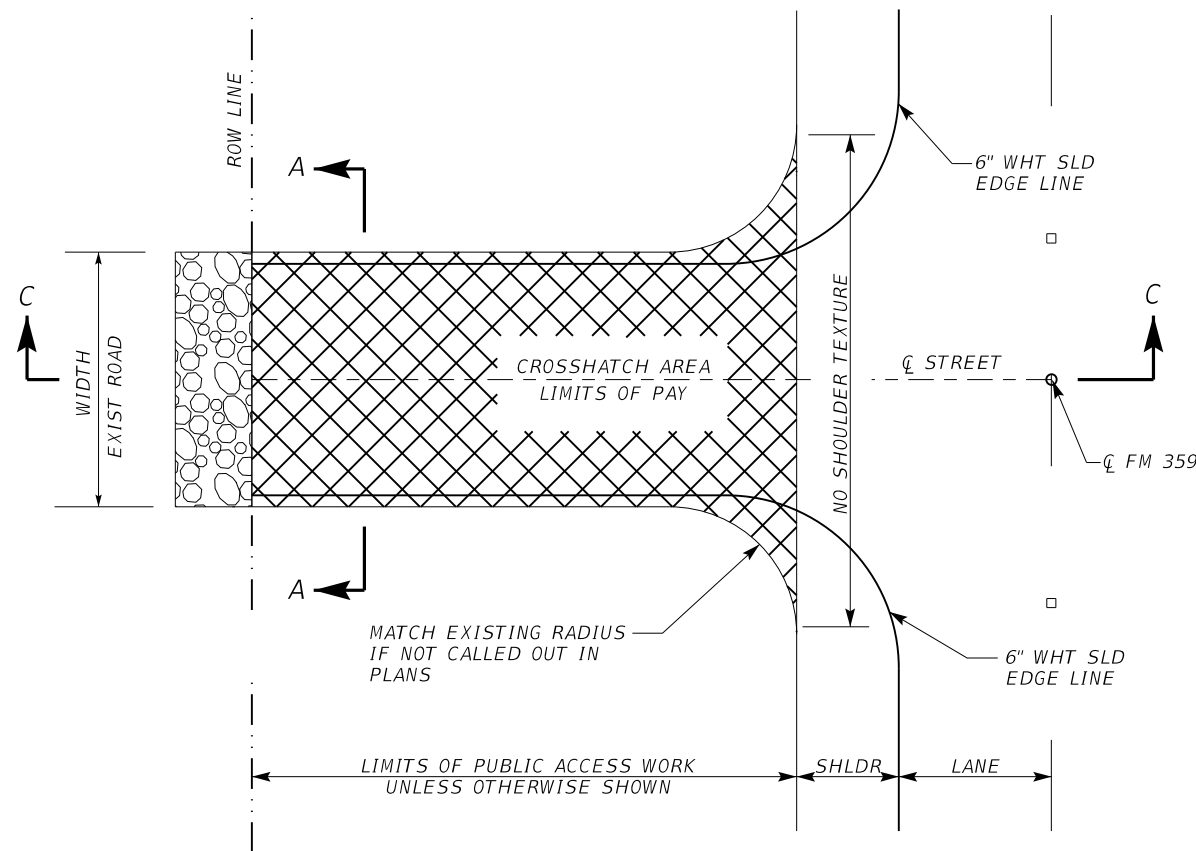
*Robert S. Bissett, Jr.*  
09/12/21

**ROADWAY & DRIVEWAY  
DETAILS**

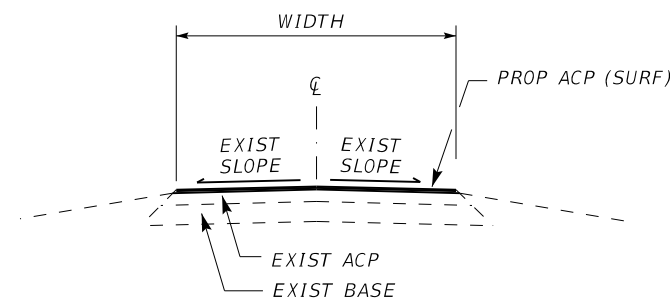
SHEET 1 OF 2



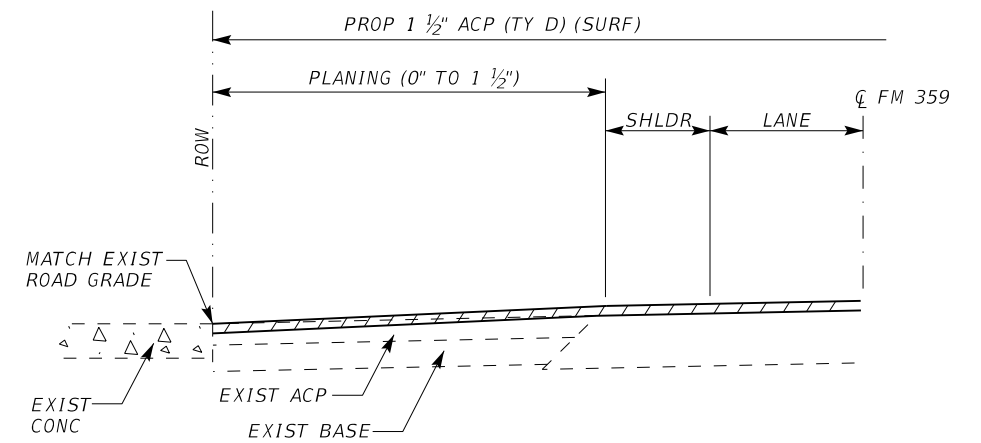
CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST COUNTY			SHEET NO.
HOU FORT BEND			56



**PLAN**  
PUBLIC ACCESS DRIVEWAYS  
OR INTERSECTING STREETS



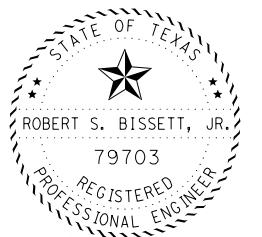
**SECTION A-A**  
EXIST ACP STREET



**SECTION C-C**

**NOTES:**

1. FOR USE AT PUBLIC ACCESS DRIVEWAYS OR INTERSECTING STREETS WHEN PAVEMENT OUTSIDE OF RIGHT-OF-WAY IS CONCRETE WITH ACP TAPER WITHIN THE RIGHT-OF-WAY.
2. A PUBLIC ACCESS DRIVEWAY INCLUDES ALL APPROACHES TO A STATE HIGHWAY FROM COUNTY OR CITY MAINTAINED ROADS AND STREETS, AND APPROACHES TO SCHOOLS, CHURCHES, CEMETERIES AND OTHER PUBLIC PLACES OR BUILDINGS OF A LIKE CHARACTER.
3. AT EXISTING DIRT/GRAVEL DRIVEWAYS, PLACE FLEXIBLE BASE AT A 6:1 TAPER TO SHOULDER UP THE ROADWAY EDGE WHERE INSUFFICIENT MATERIAL EXISTS AS DIRECTED. THIS WORK SHALL BE CONSIDERED SUBSIDIARY TO THE BID ITEMS OF THE CONTRACT.

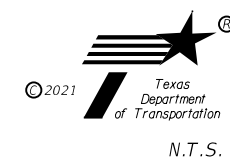


*Robert S. Bissett, Jr.*

09/12/21

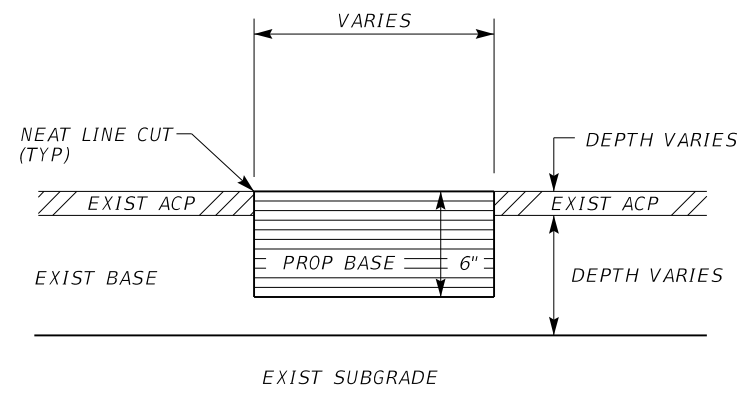
**ROADWAY & DRIVEWAY  
DETAILS**

SHEET 2 OF 2



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST COUNTY			SHEET NO.
HOU FORT BEND			57

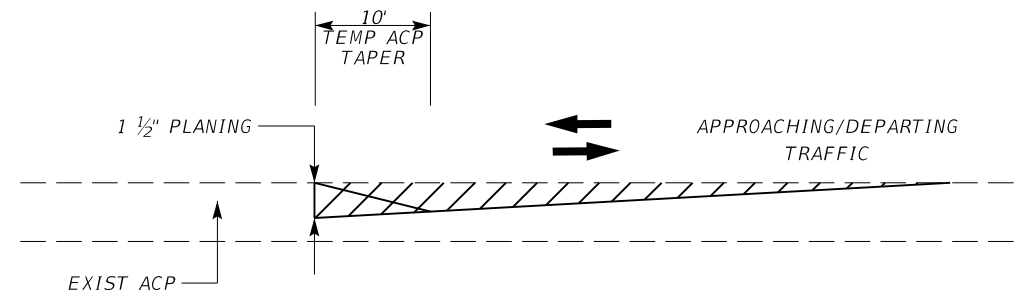
N.T.S.



**FULL DEPTH BASE REPAIR DETAIL**  
ITEM 351

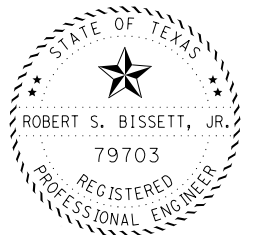
NOTES:

1. THE BASE WILL MEET THE MIX REQUIREMENTS OF ITEM 340-6011 D-GR HMA(SQ) TY-B PG64-22.
2. NEAT LINE CUT IS SUBSIDIARY TO PAY ITEM 351.



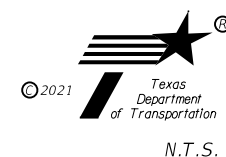
**TEMPORARY PAVEMENT TRANSITION DETAIL**

PLACE A TEMPORARY ACP TAPER AT ALL LOCATIONS WHERE A DROPOFF EXISTS AT THE END OF DAY AS DIRECTED BY THE ENGINEER. REMOVE TAPER PRIOR TO THE ACP OVERLAY. THE PLACEMENT AND REMOVAL OF THE TAPER IS CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.



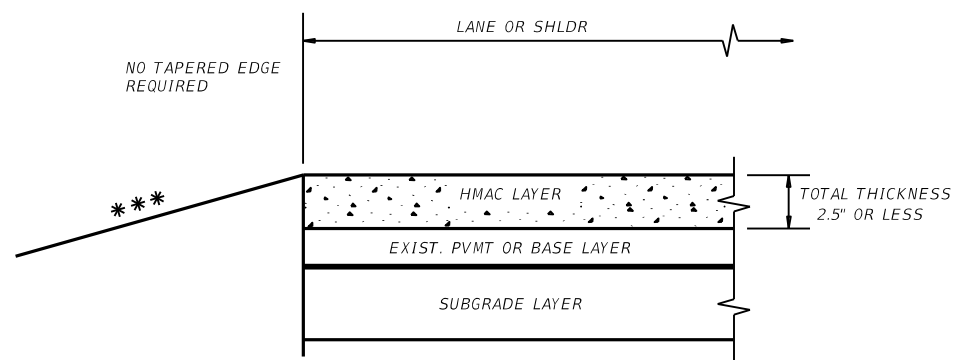
*Robert S. Bissett, Jr.*  
09/12/21

MISCELLANEOUS  
DETAILS



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST			SHEET NO.
HOU			58

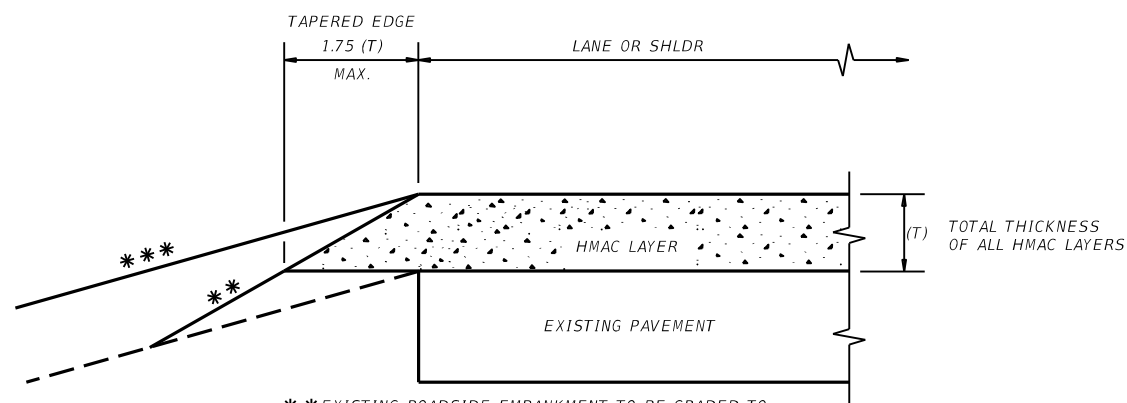
N.T.S.



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 1**

THIN HMAC SURFACES OR HMAC OVERLAY  
WITH THICKNESS OF 2.5" OR LESS

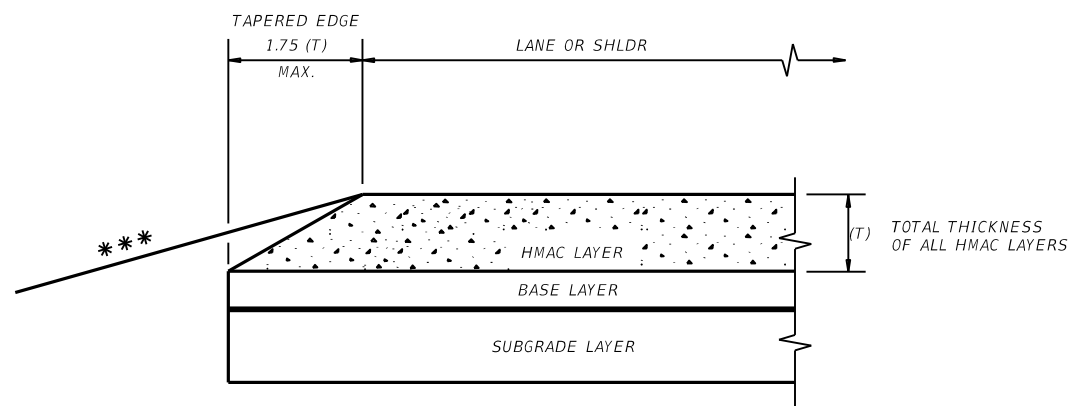


\*\*\* EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 2**

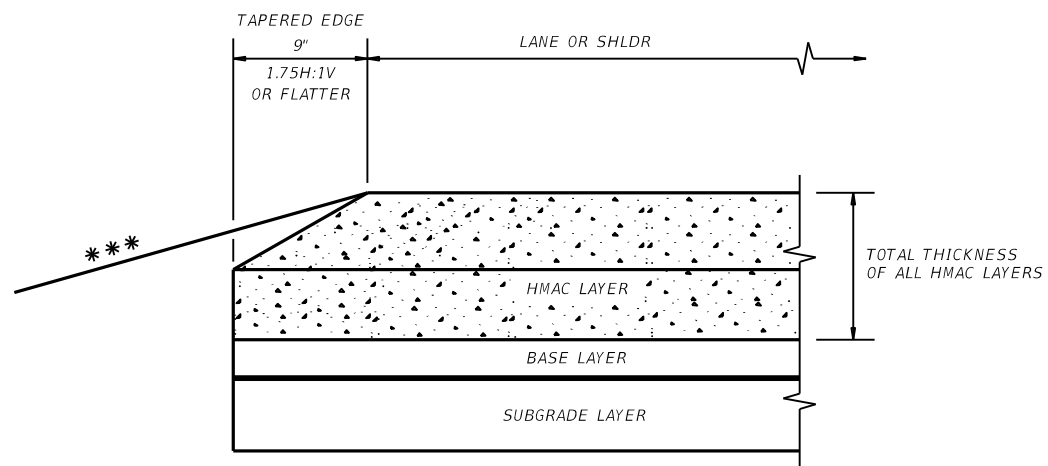
OVERLAY OF EXISTING PAVEMENT  
HMAC THICKNESS 2.5" TO 5"



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 3**

NEW OR RECONSTRUCTED PAVEMENT  
HMAC THICKNESS 2.5" TO 5"



\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 4**

NEW OR RECONSTRUCTED PAVEMENT  
HMAC THICKNESS 5" OR GREATER

**GENERAL NOTES**

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

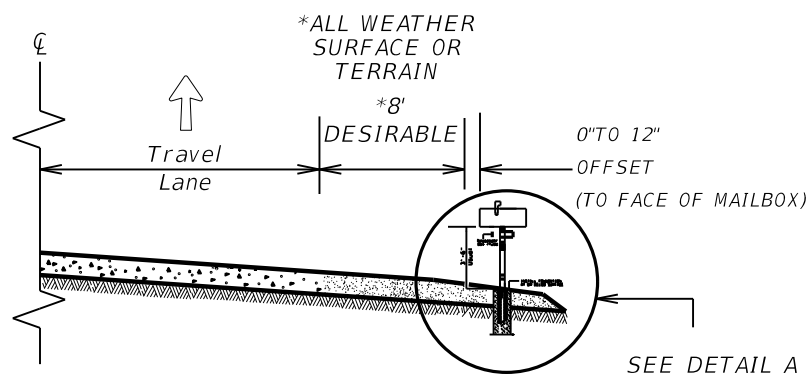
(NOT TO SCALE)



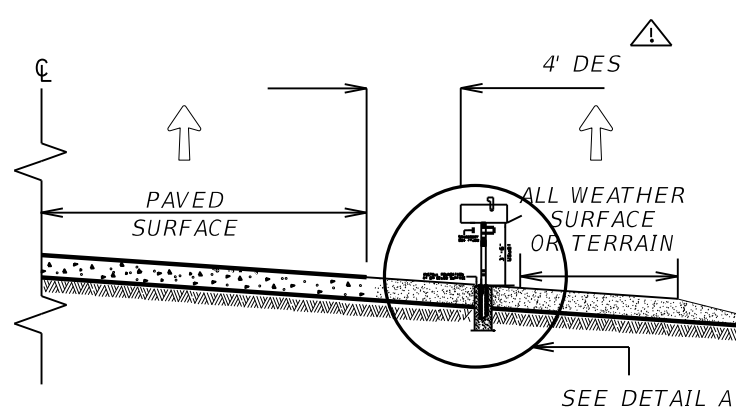
**TAPERED EDGE DETAILS  
HMAC PAVEMENT**

**TE(HMAC)-11**

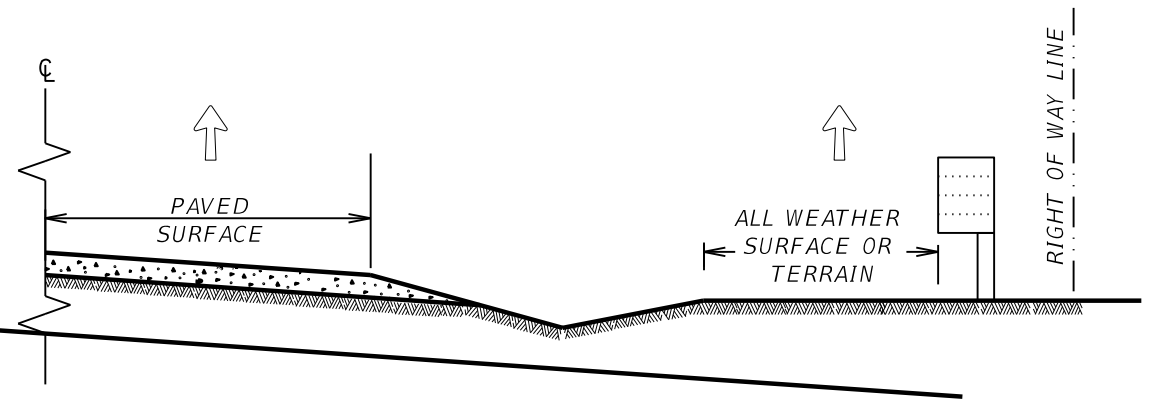
FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	59	



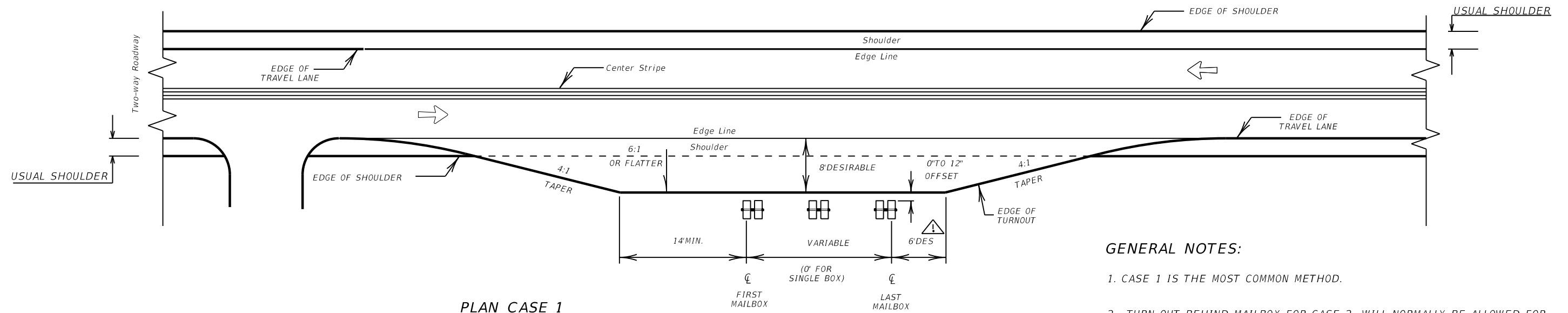
CASE 1. OFF TRAVEL WAY DELIVERY



CASE 2. BACK SIDE DELIVERY



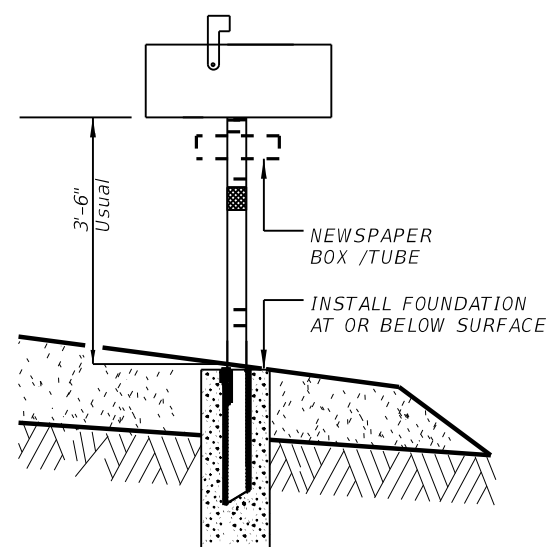
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



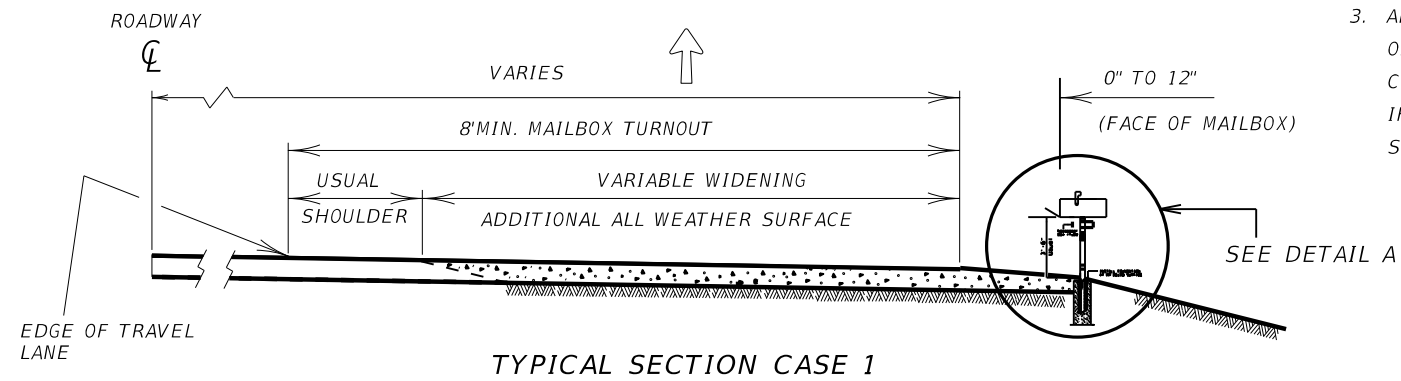
PLAN CASE 1

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. IF THE NUMBER OF MAILBOXES EXCEEDS FOUR, A COMMUNITY MAIL BOX SHOULD BE ENCOURAGED AT THESE LOCATIONS.



DETAIL A

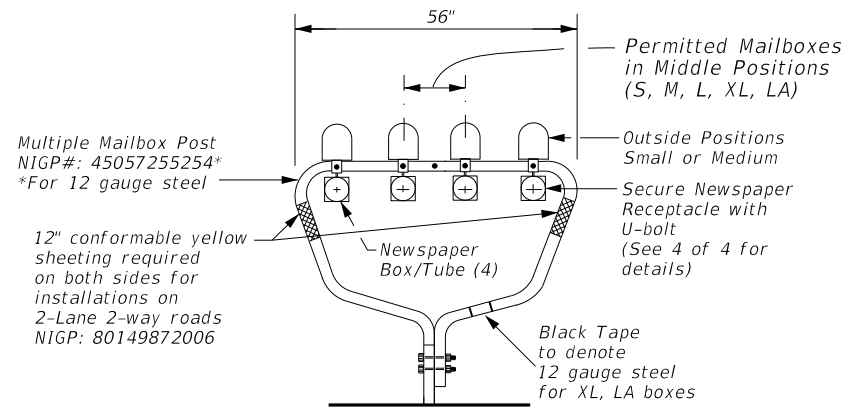


TYPICAL SECTION CASE 1

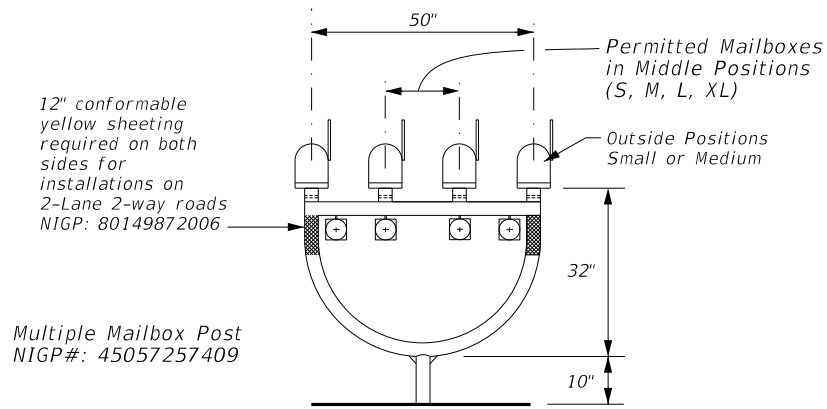
↑ MAIL DELIVERY VEHICLE TRAVEL DIRECTION

				Maintenance Division Standard	
<i>Guideline</i> <b>MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS</b> <b>MB-14(2)</b>					
FILE:MB14(2).DGN	DN:JEO	CK:	DW:JEO	CK:	
©TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0543	02	076	FM 359	
DECEMBER 2012-NEW TxDOT TITLE BLOCK	DIST	COUNTY	SHEET NO.		
	HOU	FORT BEND	60		

**TYPE 1 - MULTIPLE**



**TYPE 4 - MULTIPLE**



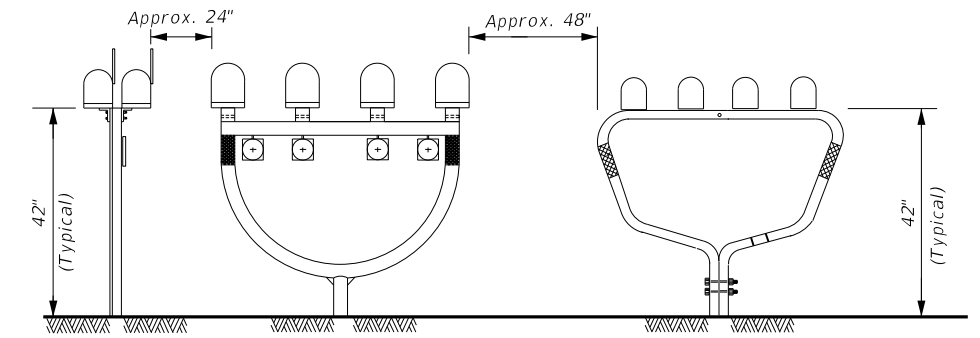
**MAILBOX SIZES**

MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

- GENERAL NOTES:**
- Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
  - Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.

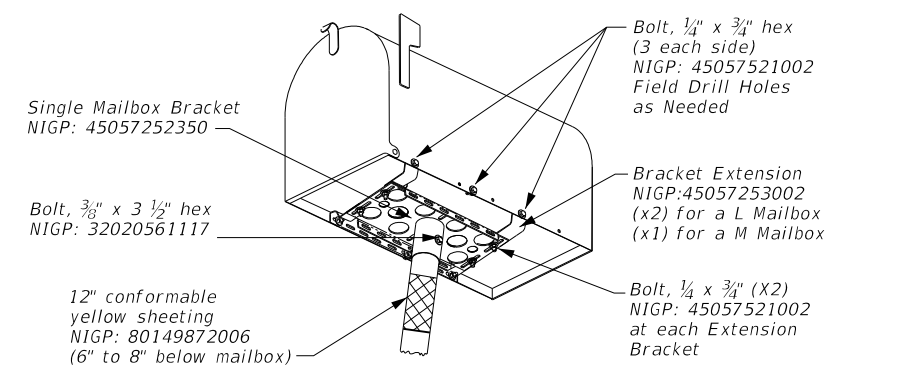
\* See Note 1.  
\*\* Excluding Molded Plastic on 4 X 4 Post

**TYPICAL INSTALLATION MEASUREMENTS**

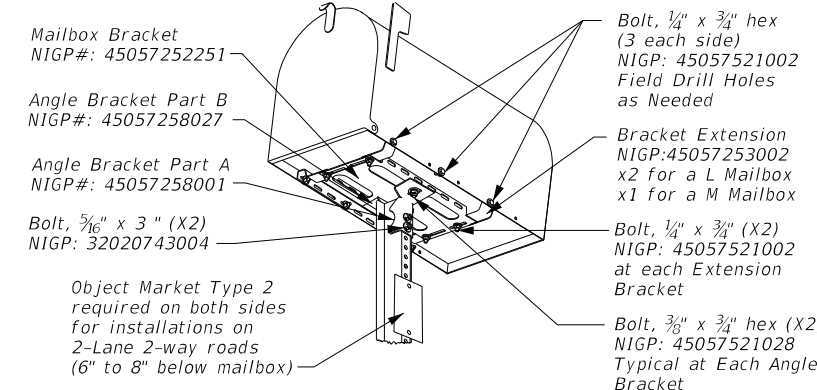


**NOTE:**  
Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

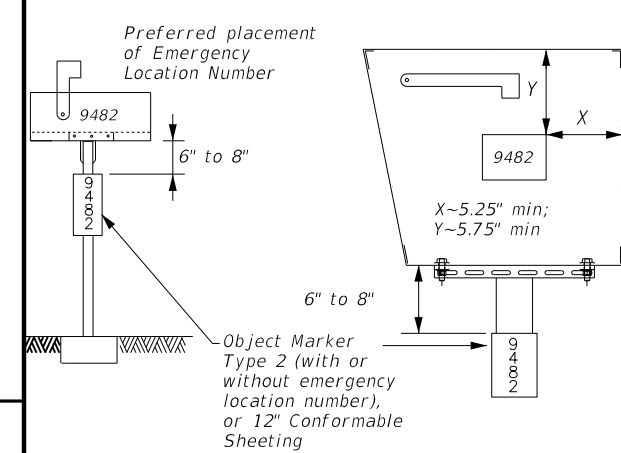
**TYPE 2 and 4 - SINGLE/DOUBLE**



**TYPE 3 - SINGLE/DOUBLE**

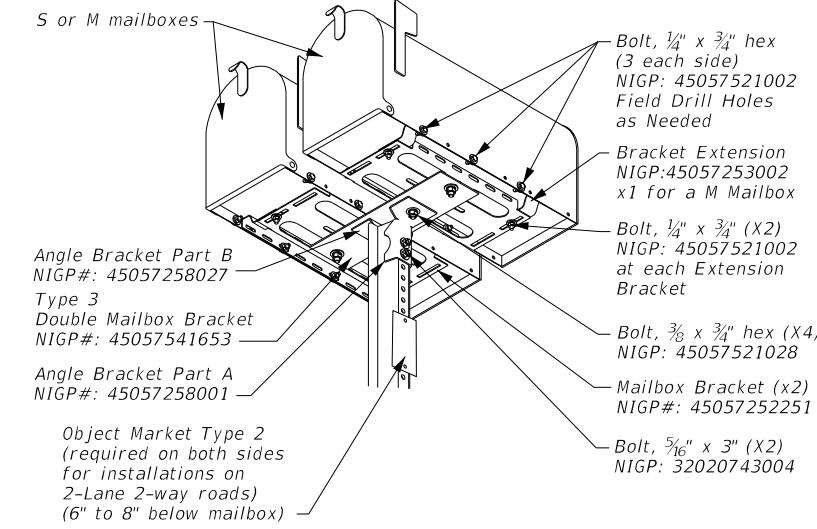
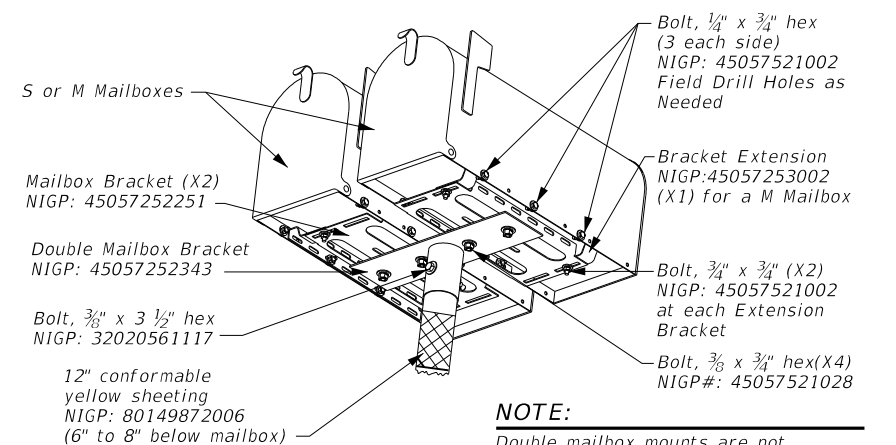


**PLACEMENT OF EMERGENCY LOCATION NUMBER**

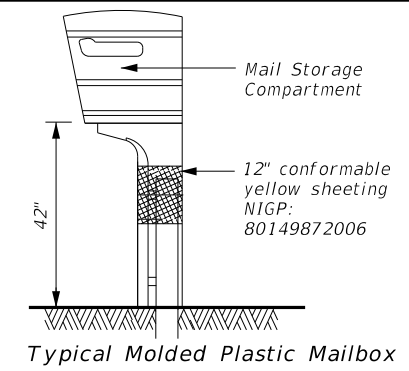


- NOTES:**
- Location numbers are provided by homeowner. Minimum size 1" height.
  - Location number is typically placed on the mailbox in a contrasting color.
  - Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
  - Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
  - See 3 of 4 for Foundation details.
  - See 4 of 4 for Hardware details.

SHEET 1 OF 4



**TYPE 5**

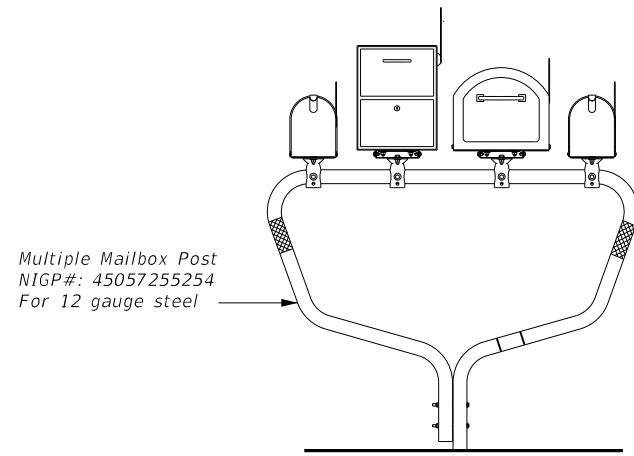


**MAILBOX MOUNTING AND ASSEMBLY**

**MB(1)-21**

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONTRACT	SECTION	JOB	HIGHWAY
2/2005	0543	02	076	FM 359
6/2005	DIST	COUNTY	SHEET NO.	
11/2006	HOU	FORT BEND	61	

**TYPE 1 - MULTI LOCKABLE AND XL MAILBOX**



Multiple Mailbox Post  
NIGP#: 45057255254  
For 12 gauge steel

**TYPE 2/4 - SINGLE LOCKABLE MAILBOX**

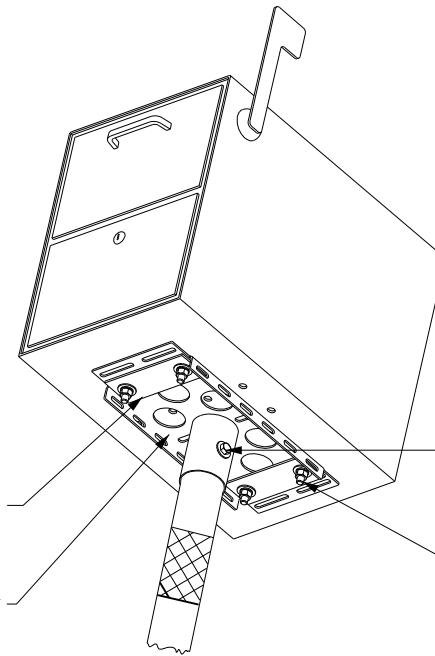


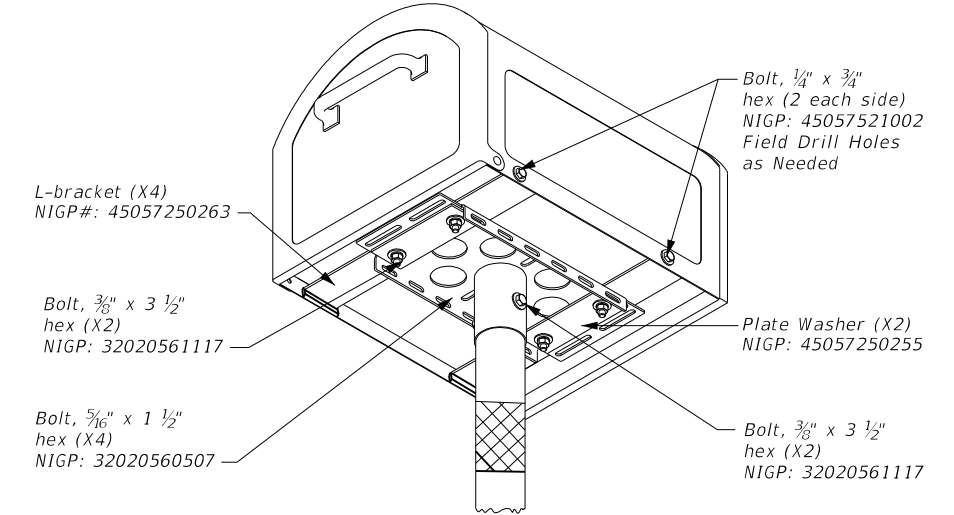
Plate Washer (X2)  
NIGP: 45057250255

Single Mailbox Bracket  
NIGP: 45057252350

Bolt, 3/8" x 3 1/2"  
hex (X2)  
NIGP: 32020561117

Bolt, 5/16" x 1 1/4"  
hex (X4)  
NIGP: 32020681246

**TYPE 2/4 - SINGLE XL MAILBOX**



L-bracket (X4)  
NIGP#: 45057250263

Bolt, 3/8" x 3 1/2"  
hex (X2)  
NIGP: 32020561117

Bolt, 5/16" x 1 1/2"  
hex (X4)  
NIGP: 32020560507

Single Mailbox Bracket  
NIGP: 45057252350

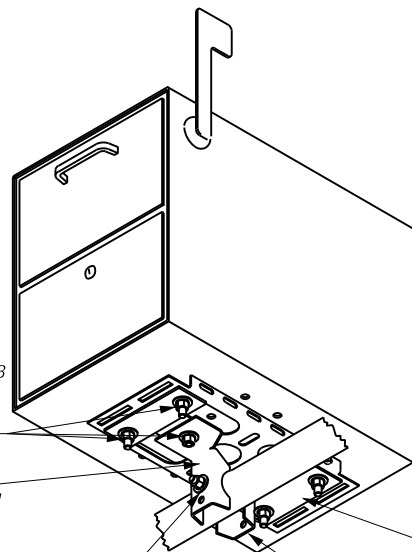
Bolt, 1/4" x 3/4"  
hex (2 each side)  
NIGP: 45057521002  
Field Drill Holes  
as Needed

Plate Washer (X2)  
NIGP: 45057250255

Bolt, 3/8" x 3 1/2"  
hex (X2)  
NIGP: 32020561117

**NOTE:**  
Follow same configuration when mounting an  
XL mailbox on a Type 4 multi post.

**TYPE 1 MULTI - LOCKABLE ARCHITECTURAL (LA)**



Bolt, 3/8" x 3/4"  
hex (X6)  
NIGP: 45057521028  
Typical at Each  
Angle Bracket  
and plate washer

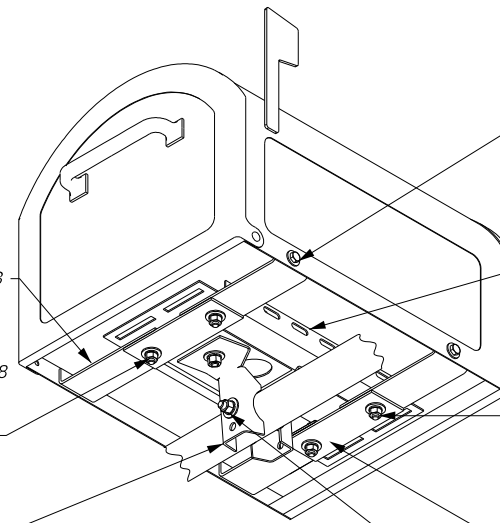
Mailbox Bracket  
NIGP: 45057252251  
(Inverted)

Bolt, 3/8" x 4 1/2" hex  
NIGP: 32020561133  
Drill 7/8" hole in Post

Plate Washer (X2)  
NIGP: 45057250255

Angle Bracket  
Part A (X2)  
NIGP: 45057258001

**TYPE 1 MULTI - XL MAILBOX**



L-bracket (X4)  
NIGP# 45057250263

Bolt, 3/8" x 3/4"  
hex (X6)  
NIGP: 45057521028  
Typical at Each  
Angle Bracket  
and plate washer

Angle Bracket  
Part A (X2)  
NIGP: 45057258001

Bolt, 1/4" x 3/4" hex  
(2 each side)  
NIGP: 45057521002  
Field Drill Holes  
as Needed

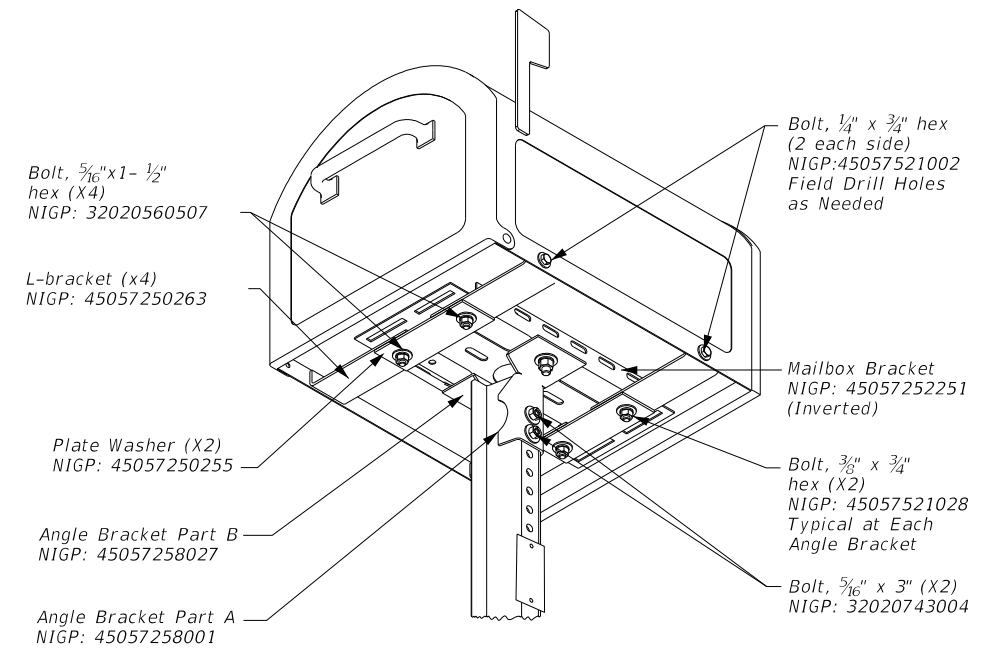
Mailbox Bracket  
NIGP#: 45057252251  
(Inverted)

Bolt, 5/16" x 2 1/2" hex (X4)  
NIGP: 32020220938  
Use existing  
hole in mailbox

Plate Washer (x2)  
NIGP#: 45057250255

Bolt, 3/8" x 4 1/2" hex  
NIGP: 32020561133  
Drill 7/8" hole  
in Post

**TYPE 3 - XL MAILBOX MOUNTING**



Bolt, 5/16" x 1- 1/2"  
hex (X4)  
NIGP: 32020560507

L-bracket (x4)  
NIGP: 45057250263

Plate Washer (X2)  
NIGP: 45057250255

Angle Bracket Part B  
NIGP: 45057258027

Angle Bracket Part A  
NIGP: 45057258001

Bolt, 1/4" x 3/4" hex  
(2 each side)  
NIGP: 45057521002  
Field Drill Holes  
as Needed

Mailbox Bracket  
NIGP: 45057252251  
(Inverted)

Bolt, 3/8" x 3/4"  
hex (X2)  
NIGP: 45057521028  
Typical at Each  
Angle Bracket

Bolt, 5/16" x 3" (X2)  
NIGP: 32020743004

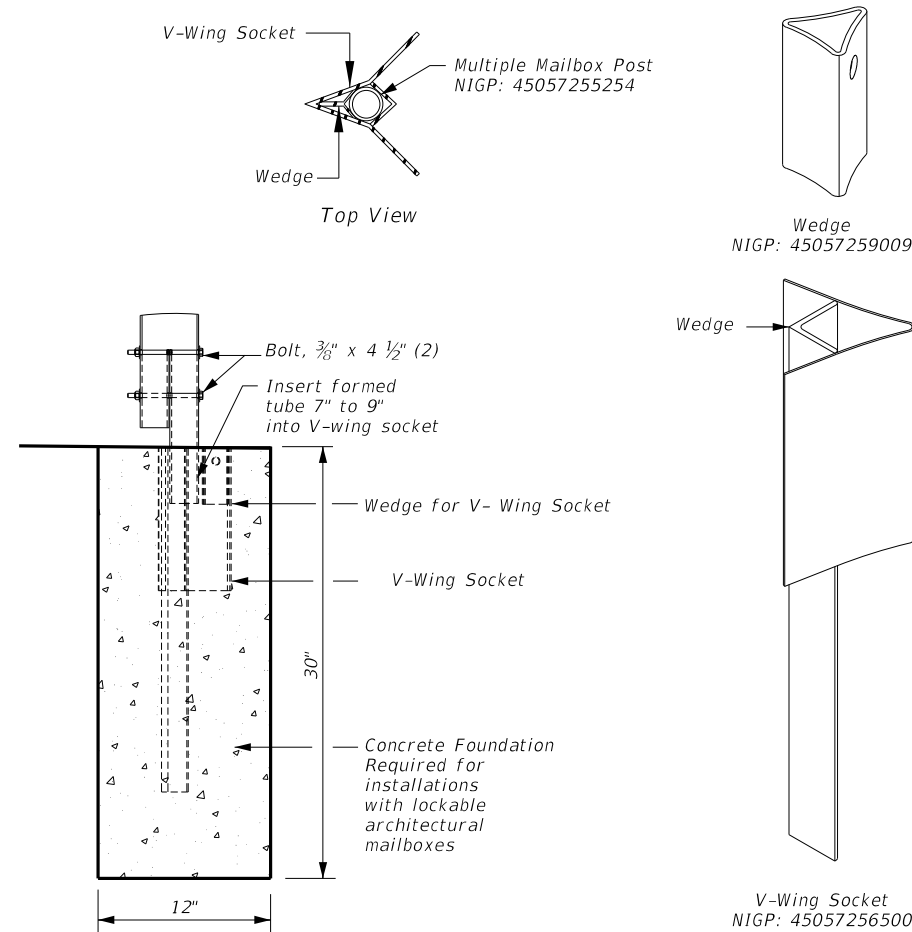
SHEET 2 OF 4

		<b>Maintenance Division Standard</b>	
<p><b>XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY</b></p> <p><b>MB(2)-21</b></p>			
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT March 2004	CONT	SECT	JOB
2/2005	0543	02	076
6/2005	REVISIONS		FM 359
11/2006	11/2009	4/2015	
	1/2011		
	7/2014		
	DIST	COUNTY	SHEET NO.
	HOU	FORT BEND	62

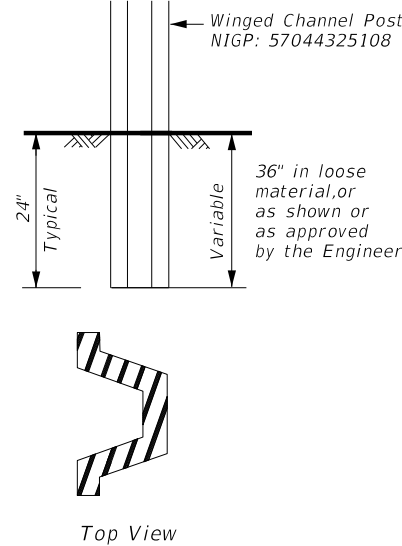


**TYPE 1 - SUPPORT/FOUNDATION**

Thin Wall Tube w/ V-LOC Anchorage



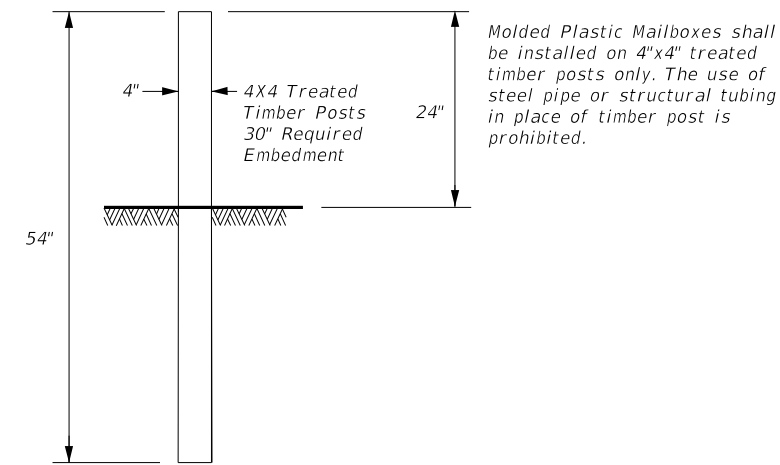
**TYPE 3 - SUPPORT/FOUNDATION**



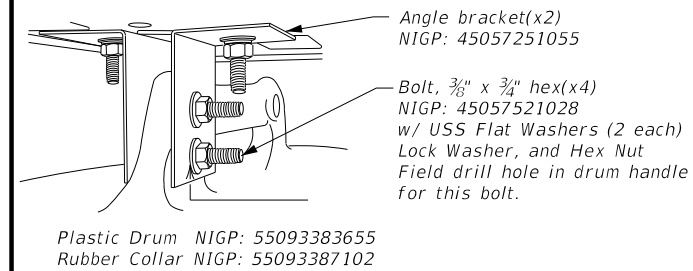
**NOTES:**

1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

**TYPE 5 - SUPPORT/FOUNDATION**



**TYPE 6 - TEMPORARY MAILBOX SUPPORT**

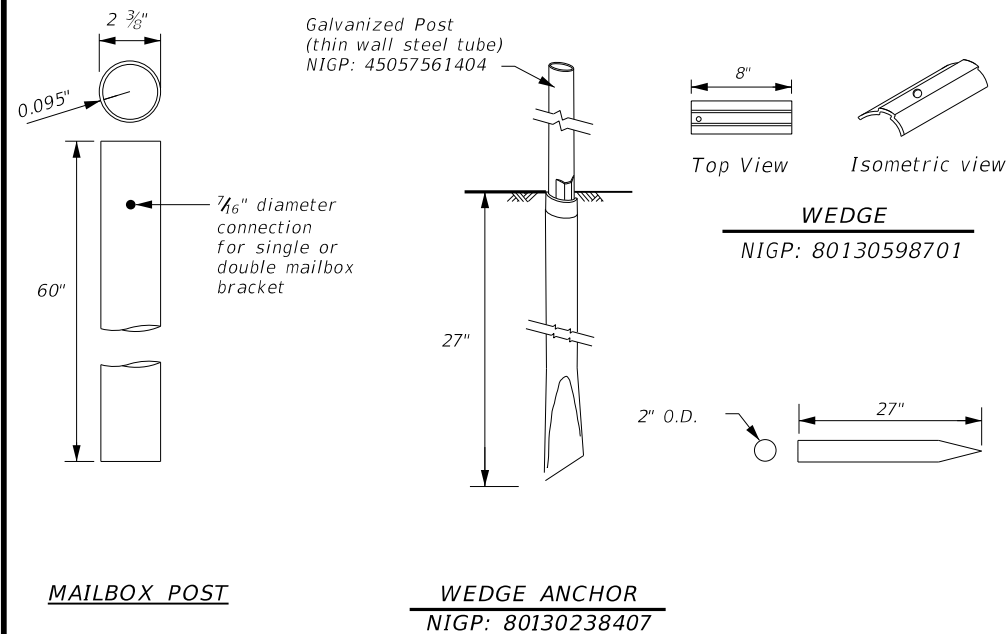


**NOTES:**

1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

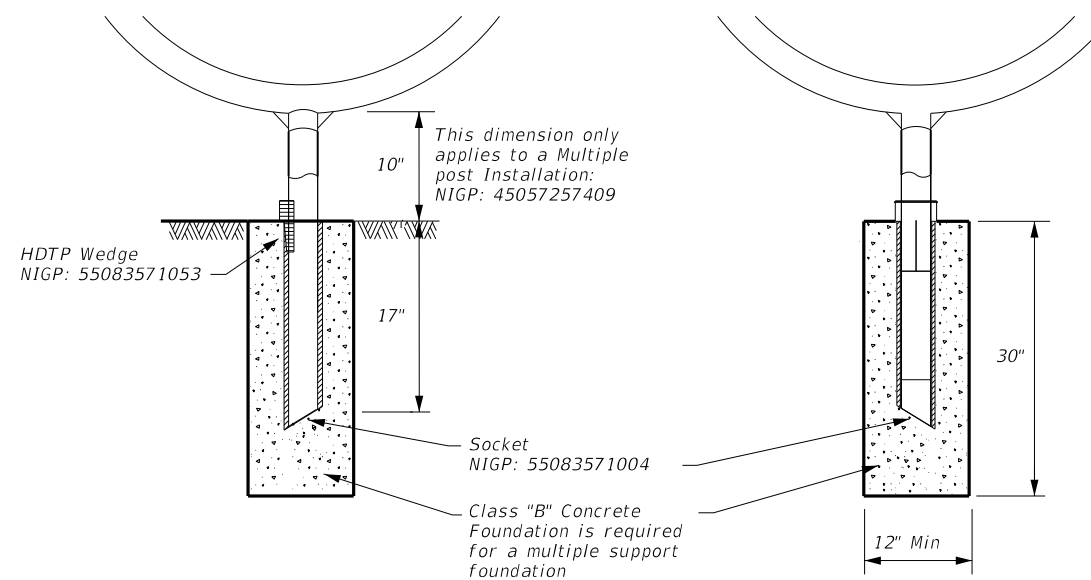
**TYPE 2 - SUPPORT/FOUNDATION**

Thin Wall Steel Tube w/Wedge Anchor System



**TYPE 4 - SUPPORT/FOUNDATION**

Whitecoated steel post NIGP: 45057561107  
Multiple post NIGP: 45057257409  
Recycled Rubber post (RR) NIGP: 45057561057



**GENERAL NOTES:**

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

SHEET 3 OF 4

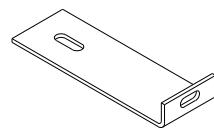
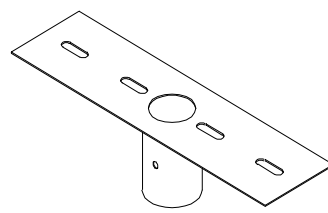
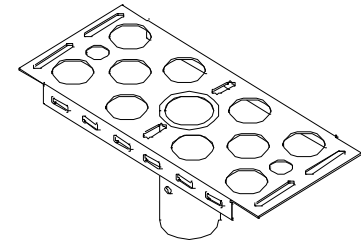
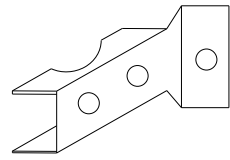
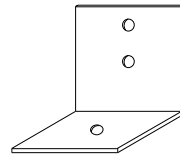
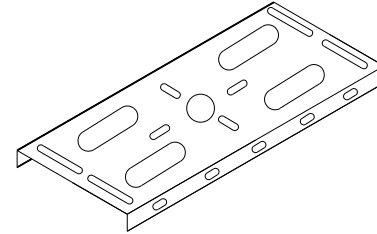
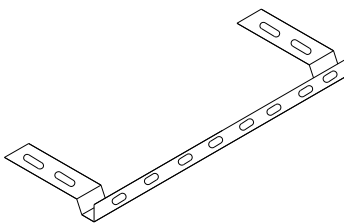
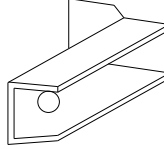
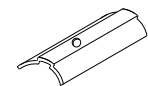


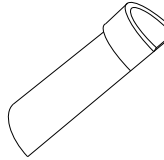
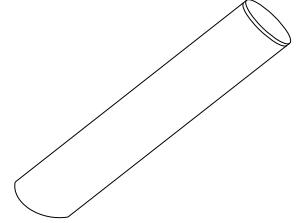

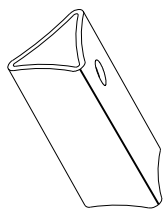
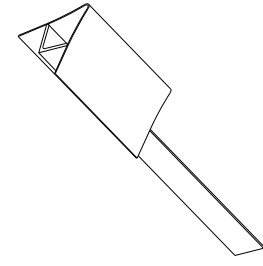


**MAILBOX SUPPORT AND FOUNDATION**

**MB(3)-21**

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
2/2005 6/2005 11/2006	REVISIONS	0543	02	076 FM 359
11/2009 1/2011 7/2014	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	63	

TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete None

 <b>NIGP: 45057250263</b> L-Bracket x4 for XL sized mailboxes	 <b>NIGP: 45057252343</b> Double Mailbox Bracket For Type 2 and Type 4 double mount	 <b>NIGP: 45057252350</b> Single Mailbox Bracket For Type 2 single and for Type 4 single and multi mount	 <b>NIGP: 45057258001</b> Part "A" Angle Bracket For Type 1 multi (2 per mailbox) and Type 3 single and double
 <b>NIGP: 45057251055</b> Type 6 Angle Bracket (2 per mailbox)	 <b>NIGP: 45057252251</b> Mailbox Bracket For Type 1 multi and any double mount (use 2)	 <b>NIGP: 45057253002</b> Bracket Extension Use 1 for a medium Mailbox Use 2 for a Large Mailbox	 <b>NIGP: 45057258027</b> Part "B" Angle Bracket For Type 3 single and double
 <b>NIGP: 80130598701</b> Wedge for Type 2	 <b>NIGP: 45057250255</b> Plate Washer for Architectural and XL Mailboxes	 <b>NIGP: 45057541653</b> Type 3 double mailbox bracket	 <b>NIGP: 55083571053</b> Type 4 Mailbox Wedge
 <b>NIGP: 55083571004</b> Type 4 Mailbox Socket	 <b>NIGP: 80130238407</b> Type 2 Wedge Anchor	 <b>NIGP: 45057259009</b> Wedge for Type 1 V-wing Socket	 <b>NIGP: 45057256500</b> V-wing Socket for Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 0M 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 0M 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

- NOTES:**
- Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
  - A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

**BID CODES FOR CONTRACTS**

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox \_\_\_\_\_

S = Single  
 D = Double  
 M = Multiple  
 MP = Molded Plastic


Type of Post \_\_\_\_\_

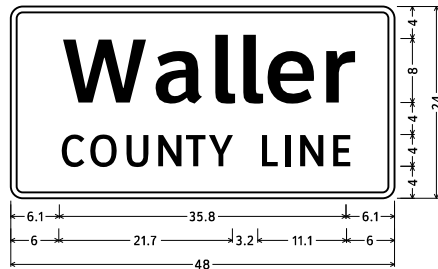
WC = Winged Channel Post  
 RR = Recycled Rubber  
 TWW = Thin Walled White Tubing  
 TWG = Thin Walled Galvanized Tubing  
 TIM = Timber

Type of Foundation \_\_\_\_\_

Ty 1 = V-Loc  
 Ty 2 = Wedge Anchor Steel System  
 Ty 3 = Winged Channel post  
 Ty 4 = Wedge Anchor Plastic System  
 Ty 5 = 4 X 4 Post

SHEET 4 OF 4

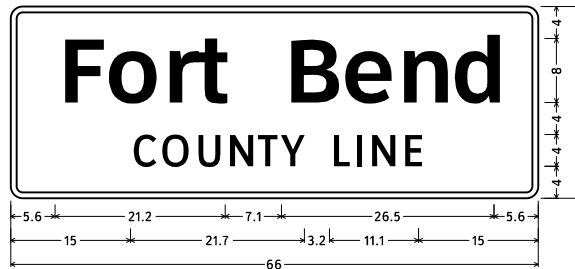
 <b>Texas Department of Transportation</b>				<b>Maintenance Division Standard</b>	
<h2>NIGP PARTS LIST AND COMPATIBILITY</h2> <h3>MB(4)-21</h3>					
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT March 2004	CONTRACT	SECTION	JOB	HIGHWAY	
2/2005	0543	02	076	FM 359	
6/2005	REVISIONS				
11/2009	1/2011	4/2015			
11/2006	DIST	COUNTY	SHEET NO.		
	HOU	FORT BEND	64		



Identifier : I-2dT 8In;  
 1.5" Radius, 0.8" Border, White on Green;  
 [Waller] ClearviewHwy-5-W-R 50) spacing;  
 [COUNTY LINE] ClearviewHwy-3-W;  
 Table of letter and object lefts.

W	a	l	l	e	r				
6.1	17.3	24.3	27.8	31.2	38.2				
C	O	U	N	T	Y	L	I	N	E
6.0	9.6	13.9	17.9	21.7	24.6	30.9	33.8	35.6	39.8

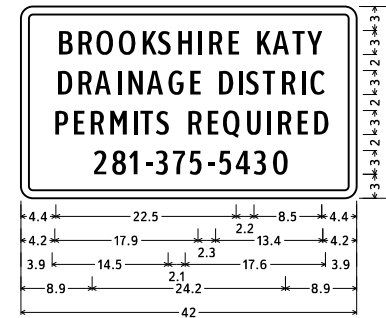
SIGN NO. 1: STA 364+00; SHEET 1 OF 12



Identifier : I-2dT 8In;  
 1.5" Radius, 0.8" Border, White on Green;  
 [Fort Bend] ClearviewHwy-5-W-R 50) spacing;  
 [COUNTY LINE] ClearviewHwy-3-W;  
 Table of letter and object lefts.

F	o	r	t	B	e	n	d		
5.6	11.4	18.6	22.9	33.9	40.9	47.9	54.6		
C	O	U	N	T	Y	L	I	N	E
15.0	18.6	22.9	26.9	30.7	33.6	39.9	42.8	44.6	48.8

SIGN NO. 2: STA 364+00; SHEET 1 OF 12



1.5" Radius, 1.0" Border, Black on White;  
 [BROOKSHIRE KATY] White ClearviewHwy-2-W;  
 [DRAINAGE DISTRICT] White ClearviewHwy-2-W;  
 [PERMITS REQUIRED] White ClearviewHwy-2-W;  
 [281-375-5430] White ClearviewHwy-2-W;  
 Table of letter and object lefts.

B	R	O	O	K	S	H	I	R	E
4.4	6.8	9.2	12.0	14.8	17.0	19.3	21.8	23.1	25.6

K	A	T	Y								
29.1	31.3	33.8	35.7								
D	R	A	I	N	A	G	E				
4.2	6.8	9.0	11.7	13.0	15.5	18.1	20.8				
D	I	S	T	R	I	C					
24.4	26.9	28.0	30.1	32.3	34.7	35.9					
P	E	R	M	I	T	S					
3.9	6.2	8.3	10.8	13.7	14.8	16.7					
R	E	Q	U	I	R	E	D				
20.5	23.0	25.0	27.9	30.5	31.8	34.2	36.3				
2	8	1	-	3	7	5	-	5	4	3	0
8.9	11.1	13.4	15.3	16.7	18.8	20.9	23.1	24.6	26.6	28.9	31.2

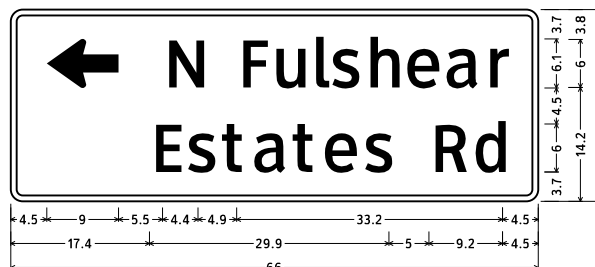
SIGN NO. 4: STA 367+85; SHEET 1 OF 12



Identifier : W16-BP;  
 1.5" Radius, 0.4" Border, 0.4" Indent, Black on Yellow;  
 [Pecan Hill Dr] B specified length;  
 Table of letter and object lefts.

P	e	c	a	n	H	i	l	l
2.0	4.6	7.1	9.6	12.7	18.4	21.5	23.4	25.3
D	r							
29.8	32.7							

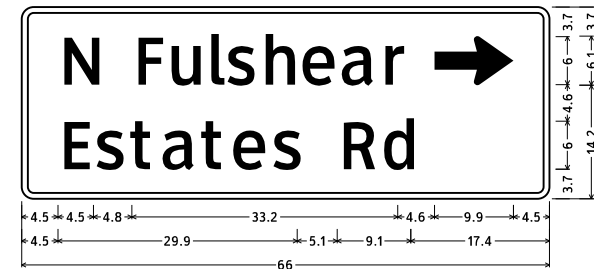
SIGN NO. 1: STA 403+00; SHEET 2 OF 12  
 SIGN NO. 1: STA 427+00; SHEET 4 OF 12



Identifier : D21-1aTL 6in LT;  
 1.5" Radius, 0.8" Border, White on Green;  
 Standard Arrow Custom 9.0" X 6.1" 180°;  
 [N Fulshear] ClearviewHwy-3-W 70) spacing; [Estates Rd] ClearviewHwy-3-W;  
 Table of letter and object lefts.

N	F	u	l	s	h	e	a	r	
4.5	19.0	28.3	32.4	37.4	39.7	44.2	49.0	53.9	59.0
E	s	t	a	t	e	s	R	d	
17.4	21.7	26.1	29.9	34.9	38.7	43.8	52.3	57.6	

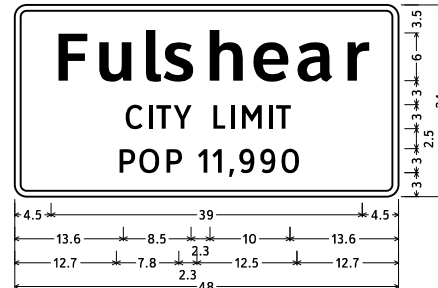
SIGN NO. 1: STA 499+50; SHEET 7 OF 12



Identifier : D21-1aTR 6in RT;  
 1.5" Radius, 0.8" Border, White on Green;  
 [N Fulshear] ClearviewHwy-3-W 70) spacing;  
 Standard Arrow Custom 9.9" X 6.1" 0°; [Estates Rd] ClearviewHwy-3-W;  
 Table of letter and object lefts.

N	F	u	l	s	h	e	a	r	⇨
4.5	13.8	17.9	22.9	25.2	29.7	34.5	39.4	44.5	51.6
E	s	t	a	t	e	s	R	d	
4.5	8.9	13.2	17.0	22.1	25.9	31.0	39.5	44.7	

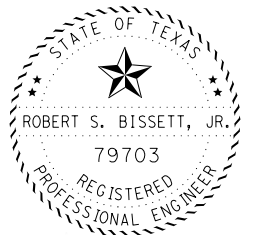
SIGN NO. 5: STA 512+75; SHEET 7 OF 12



Identifier : I-2aT 6in;  
 1.5" Radius, 0.8" Border, White on Green;  
 [Fulshear] ClearviewHwy-5-W-R 92) spacing;  
 [CITY LIMIT] ClearviewHwy-3-W;  
 [POP 11,990] ClearviewHwy-3-W;  
 Table of letter and object lefts.

F	u	l	s	h	e	a	r	
4.5	9.6	15.5	18.2	23.5	29.2	34.8	40.7	
C	I	T	Y	L	I	M	I	T
13.6	16.4	17.5	19.8	24.4	26.6	28.0	31.4	32.5
P	O	P	1	1	9	9	0	
12.7	15.3	18.6	22.8	24.6	26.5	27.8	30.4	33.1

SIGN NO. 4: STA 541+40; SHEET 9 OF 12



*Robert S. Bissett, Jr.*

09/12/21

GUIDE SIGN DETAILS

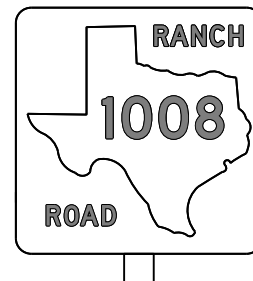
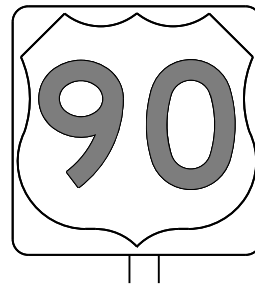
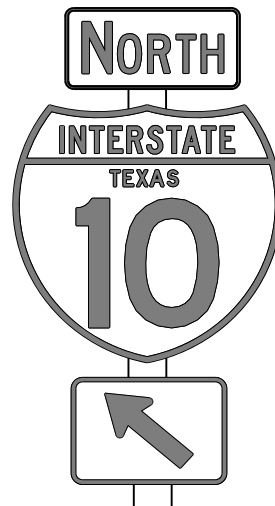
SHEET 1 OF 1



CONT	SECT	JOB	HIGHWAY
0543	02	076	FM 359
DIST		COUNTY	SHEET NO.
HOU		FORT BEND	65

## REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

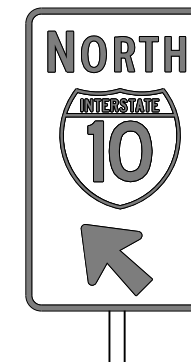
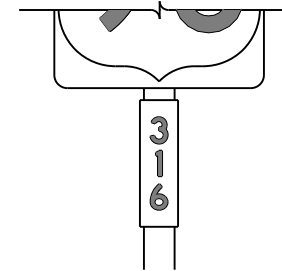
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

## REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

### GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

- Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
- Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

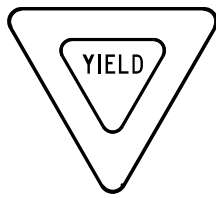
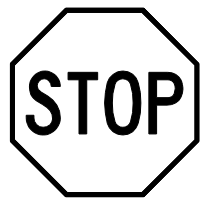
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

<http://www.txdot.gov/>

Texas Department of Transportation				Traffic Operations Division Standard	
<b>TYPICAL SIGN REQUIREMENTS</b>					
<b>TSR(3)-13</b>					
FILE: tsf3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0543	02	076	FM 359	
12-03 7-13	DIST	COUNTY	SHEET NO.		
9-08	HOU	FORT BEND	66		

**REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS**

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

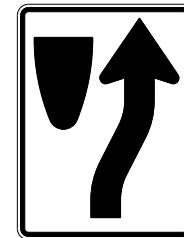


REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

**REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS**

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

**GENERAL NOTES**

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

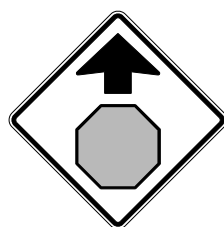
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

<http://www.txdot.gov/>

**REQUIREMENTS FOR WARNING SIGNS**



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

**REQUIREMENTS FOR SCHOOL SIGNS**



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B <sub>FL</sub> OR C <sub>FL</sub> SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

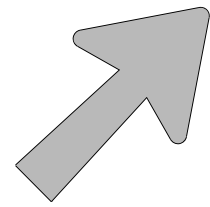
**TYPICAL SIGN REQUIREMENTS**

TSR(4)-13

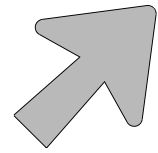
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
12-03 7-13 9-08	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	67	

### ARROW DETAILS

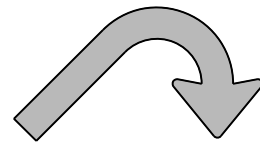
for Large Ground-Mounted and Overhead Guide Signs



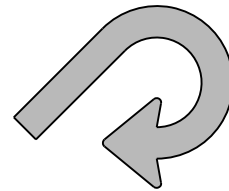
Type A



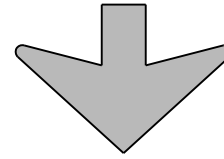
Type B



E-3



E-4



Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

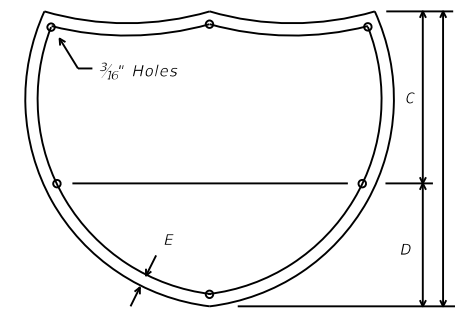
**NOTE**

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

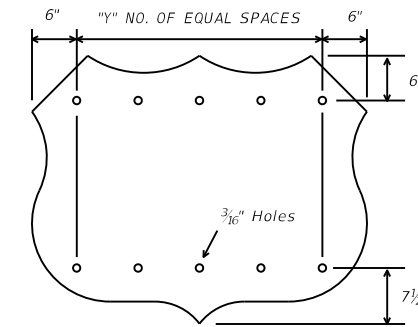
<http://www.txdot.gov/>

### SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)



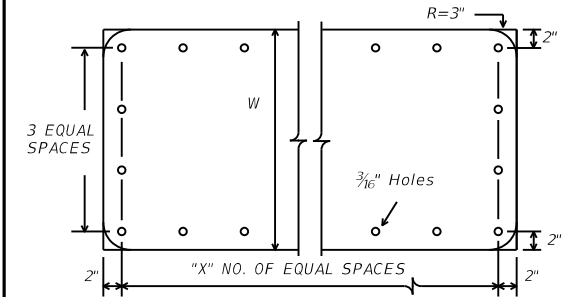
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



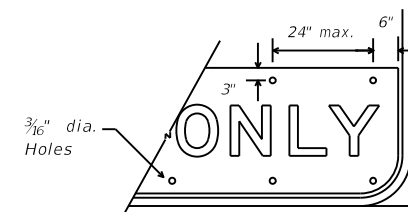
U.S. ROUTE MARKERS

Sign Size	"Y" NO. OF EQUAL SPACES
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



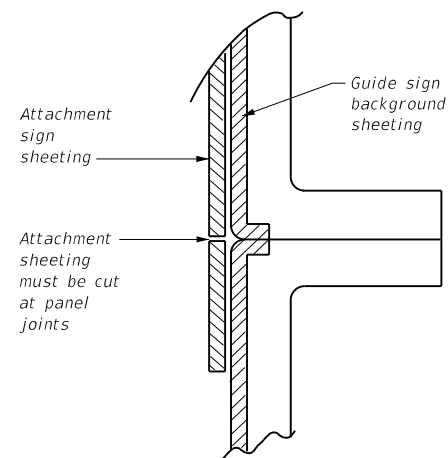
STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5



EXIT ONLY PANEL

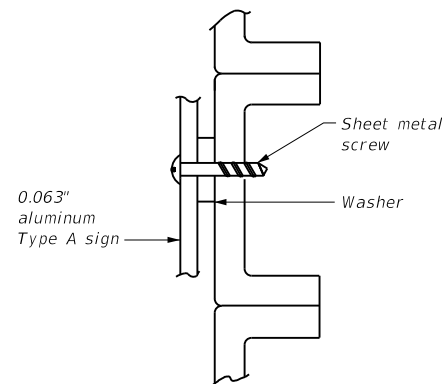
### MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



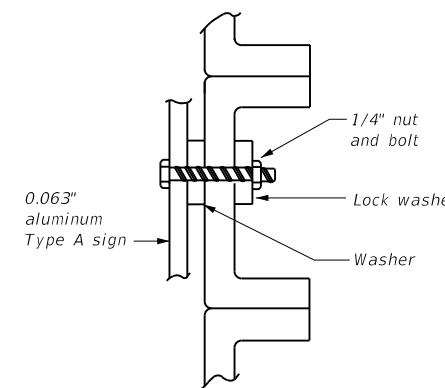
DIRECT APPLIED ATTACHMENT

**NOTE:**

- Sheeting for legend, symbols, and borders must be cut at panel joints.
- Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



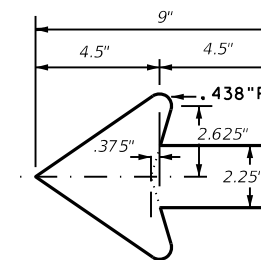
NUT/BOLT ATTACHMENT

**NOTE:**

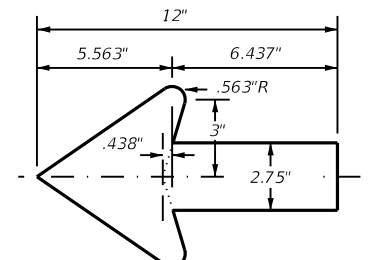
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

### ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.



## TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: lsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	HOU	FORT BEND	68	

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES		
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE			
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	WC	YFLX, WFLX	<b>INSTL DEL ASSM</b> (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 TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount <b>DIRECTION</b> If Required BI = Bi-Directional BR = Bi-Directional with red on back
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF	

OBJECT MARKERS								D & OM DESCRIPTIVE CODES							
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	<b>INSTL OM ASSM</b> (OM-XX) (XXXX)XXX(XX) TYPE OF OBJECT MARKER 1, 2, 3, or 4 NUMBER OF REFLECTORS OR DIRECTION X = 3-Size 2 reflector units (Type 2 only) Y = 1-Size 3 reflector unit (Type 2 only) Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only) L = Left Side (Type 3 Object Marker only) R = Right Side (Type 3 Object Marker only) C = Center (Type 3 Object Marker only) TYPE OF POST WC = Wing Channel Post WFLX = White Flexible Post TWT = Thin Walled Tubing TYPE OF MOUNT GND = Embedded (drivable) SRF = Surface Mount WAS = Wedge Anchor Steel WAP = Wedge Anchor Plastic <b>DIRECTION</b> If Required BI = Bi-Directional						
		OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C		OM-4	<b>DEPARTMENTAL MATERIAL SPECIFICATIONS</b> <table border="1"> <tr> <td>FLEXIBLE DELINEATOR &amp; OBJECT MARKER POSTS (EMBEDDED &amp; SURFACE MOUNT TYPES)</td> <td>DMS-4400</td> </tr> <tr> <td>SIGN FACE MATERIALS</td> <td>DMS-8300</td> </tr> <tr> <td>DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS</td> <td>DMS-8600</td> </tr> </table>	FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400	SIGN FACE MATERIALS	DMS-8300
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400														
SIGN FACE MATERIALS	DMS-8300														
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600														
SHEETING	Yellow-Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting			Red -Type B <sub>FL</sub> or C <sub>FL</sub> Sheeting							
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT							
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP							

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		<b>NOTE:</b> 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		<b>Texas Department of Transportation</b> <b>DELINEATOR &amp; OBJECT MARKER MATERIAL DESCRIPTION</b> <b>D &amp; OM(1)-20</b>																										
SHEETING	Yellow, White, Red			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)																								
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.			MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only		MOUNTING HEIGHT	7'-0"																										
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.			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).						<table border="1"> <tr> <td>FILE: dom1-20.dgn</td> <td>DN: TXDOT</td> <td>CK: TXDOT</td> <td>DW: TXDOT</td> <td>CK: TXDOT</td> </tr> <tr> <td>©TXDOT August 2004</td> <td>CONT</td> <td>SECT</td> <td>JOB</td> <td>HIGHWAY</td> </tr> <tr> <td>REVISIONS</td> <td>0543</td> <td>02</td> <td>076</td> <td>FM 359</td> </tr> <tr> <td>10-09 3-15</td> <td>DIST</td> <td colspan="2">COUNTY</td> <td>SHEET NO.</td> </tr> <tr> <td>4-10 7-20</td> <td>HOU</td> <td colspan="2">FORT BEND</td> <td>69</td> </tr> </table>	FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	©TXDOT August 2004	CONT	SECT	JOB	HIGHWAY	REVISIONS	0543	02	076	FM 359	10-09 3-15	DIST	COUNTY		SHEET NO.	4-10 7-20	HOU	FORT BEND		69
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT																																
©TXDOT August 2004	CONT	SECT	JOB	HIGHWAY																																
REVISIONS	0543	02	076	FM 359																																
10-09 3-15	DIST	COUNTY		SHEET NO.																																
4-10 7-20	HOU	FORT BEND		69																																

**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

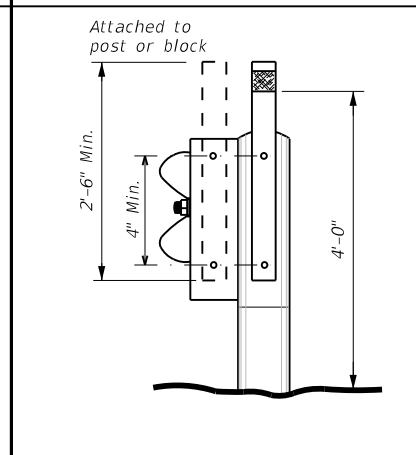
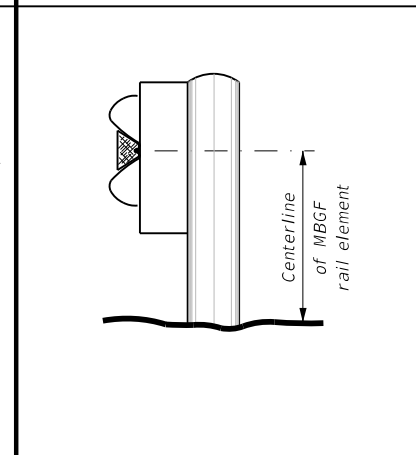
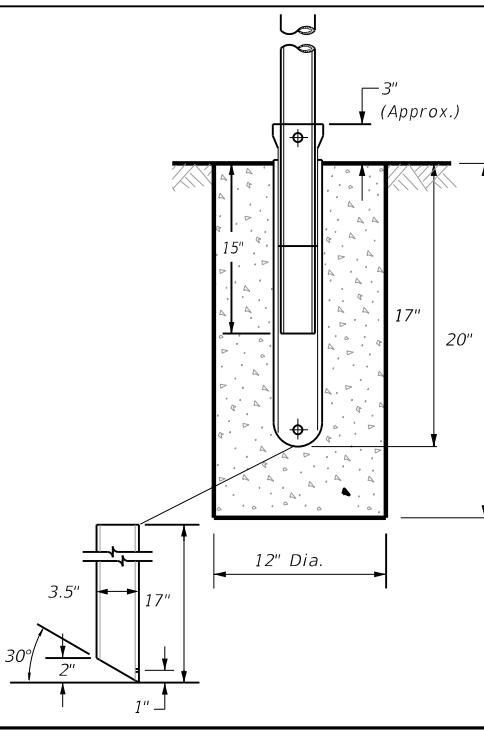
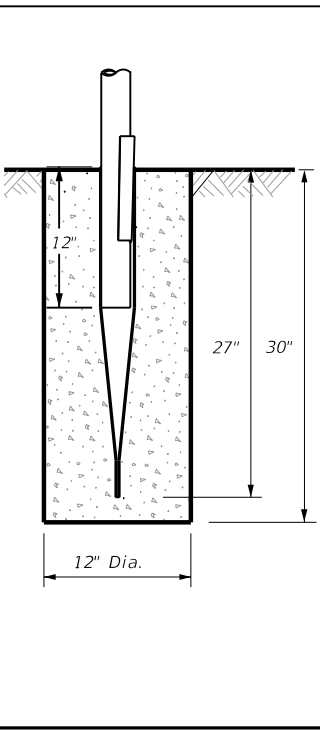
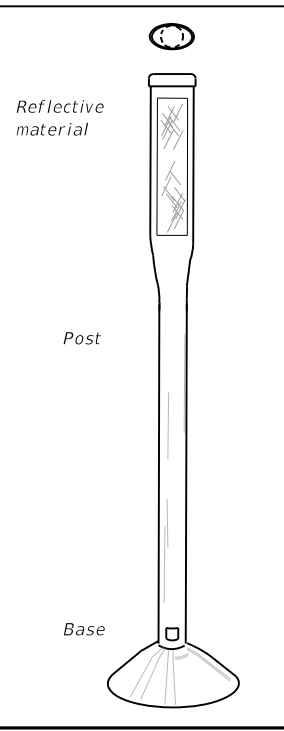
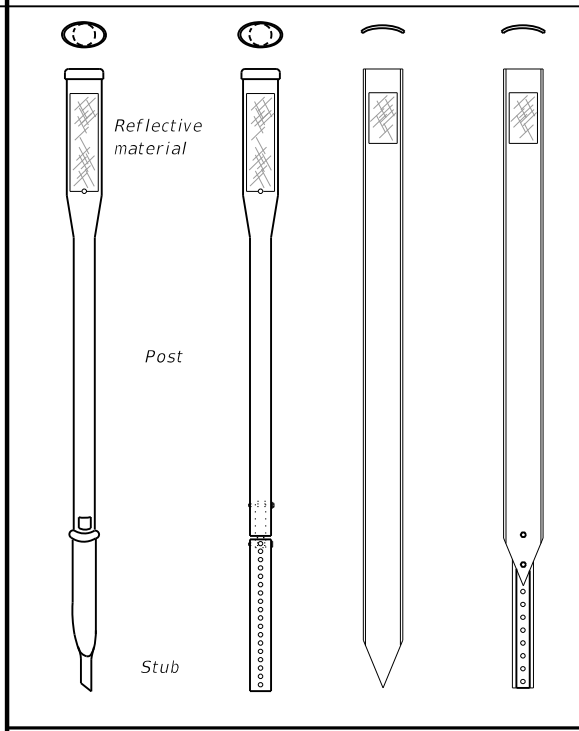
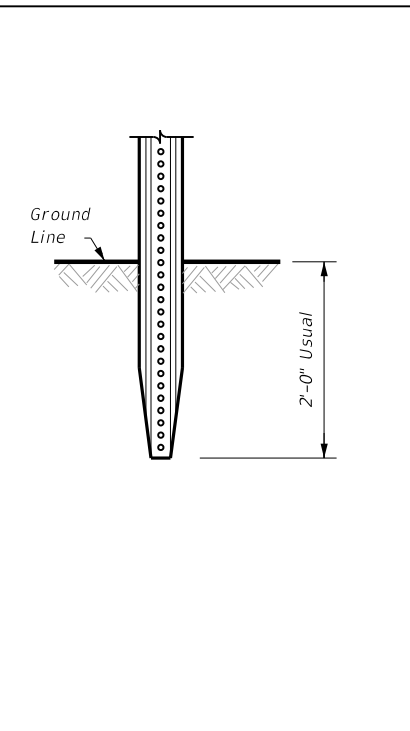
SRF

WAS

WAP

GF1

GF2



**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 55 Gr. 50, or ASTM A499.

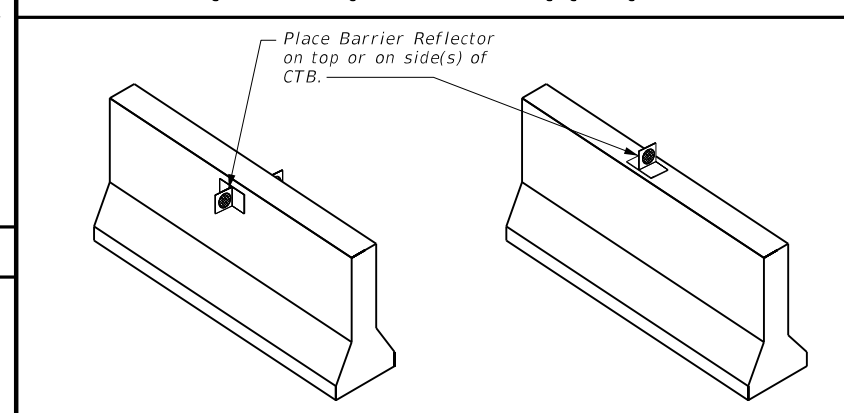
**NOTES**

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)**



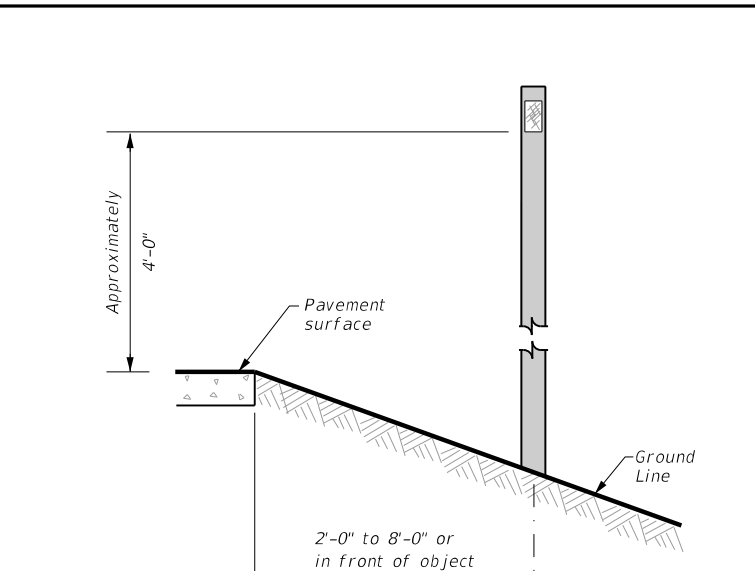
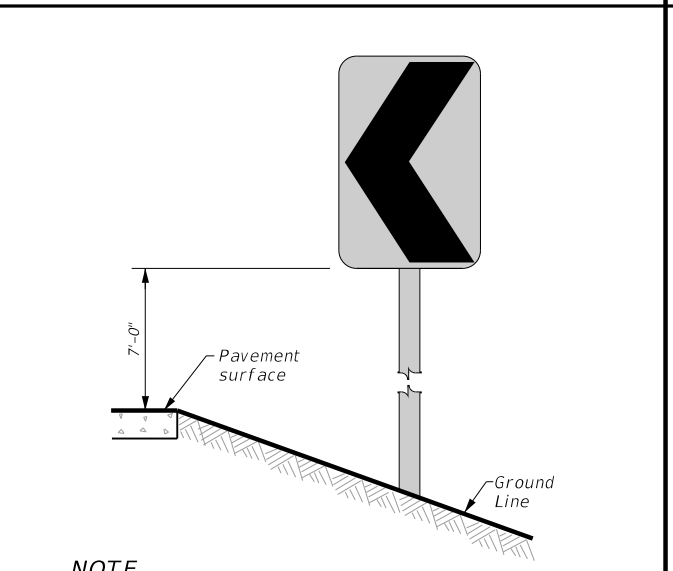
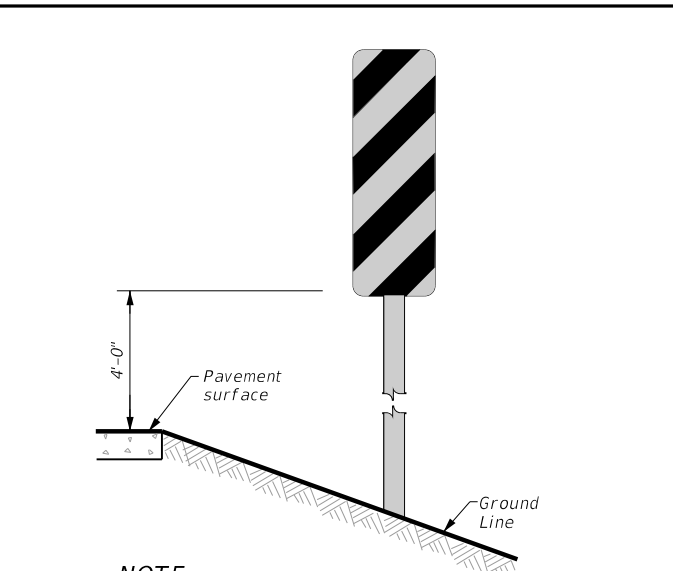
**GENERAL NOTES**

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**

FILE: ddm2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	HOU	FORT BEND	70	

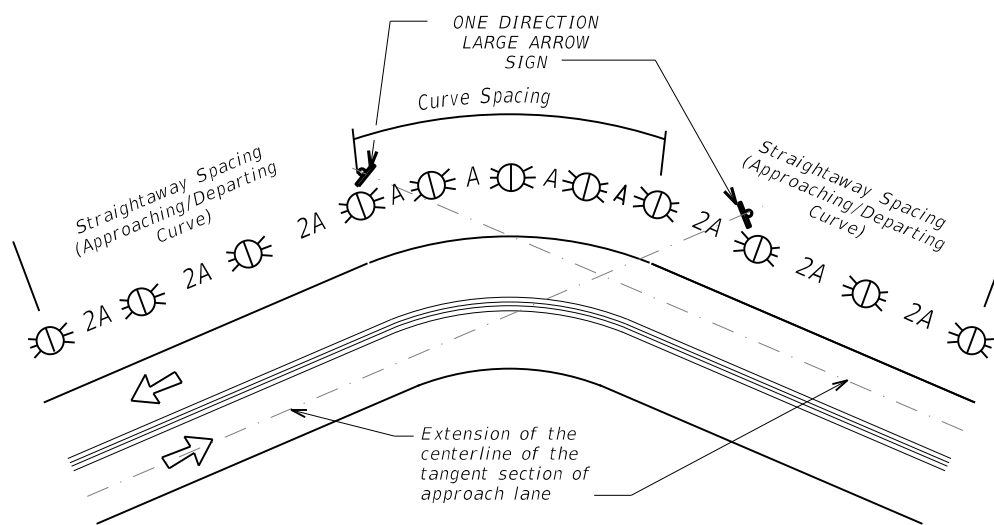
20B



### 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

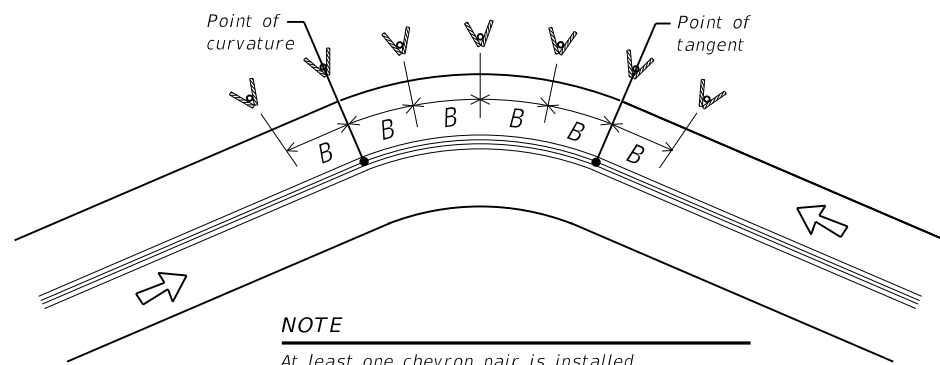
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**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

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN				
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

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN			
Advisory Speed (MPH)	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

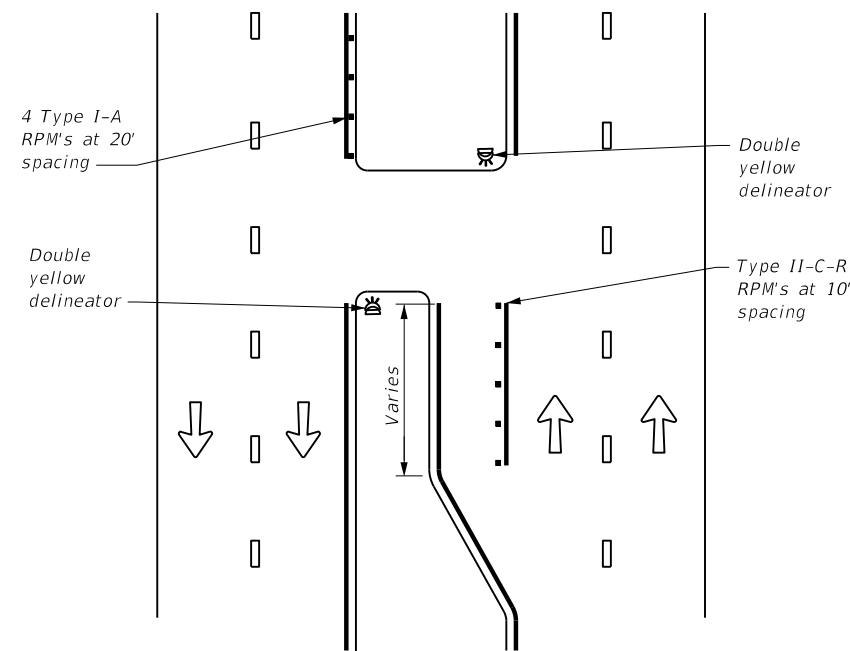


### DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

#### D & OM(3)-20

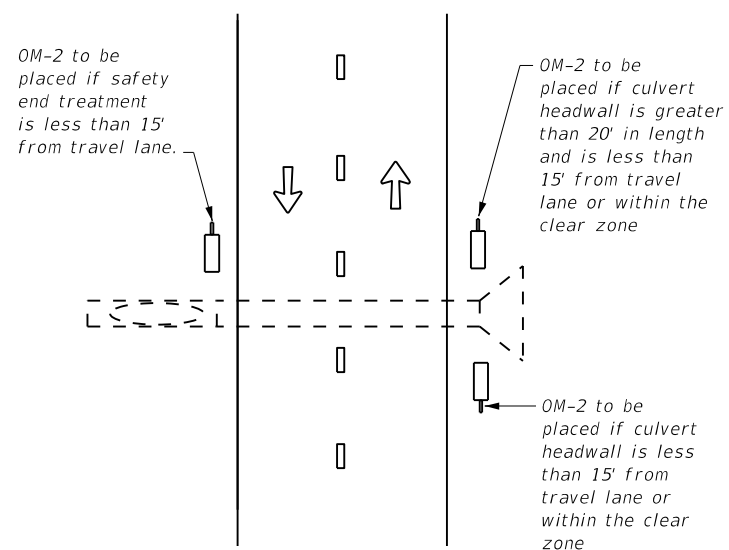
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	HOU	FORT BEND	71	

**CROSSOVERS**



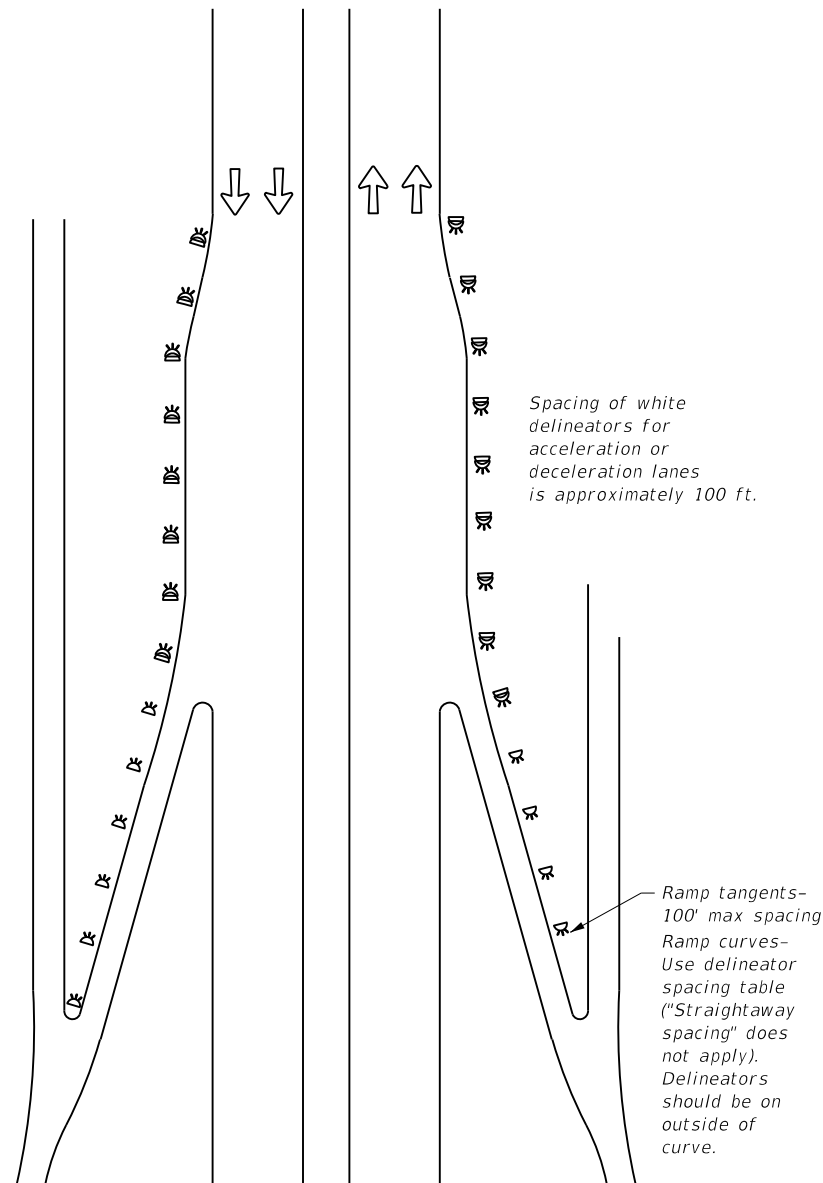
**DETAIL 1**

**FOR CULVERTS WITHOUT MBGF**



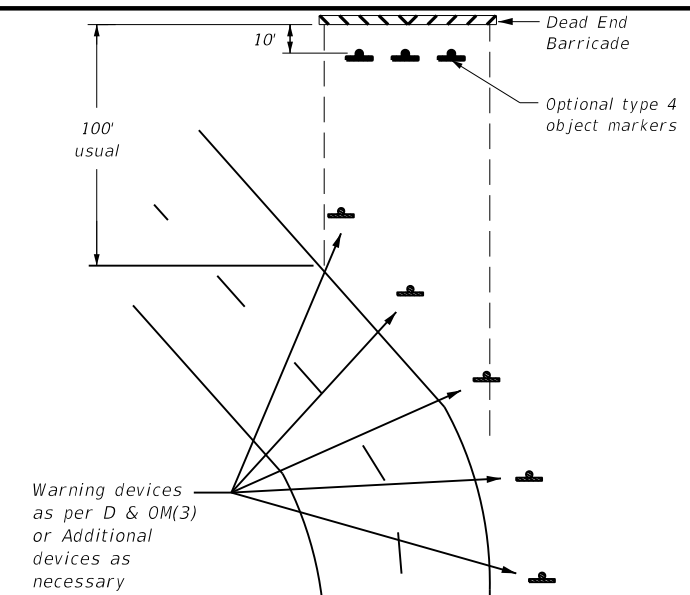
**DETAIL 2**

**FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES**



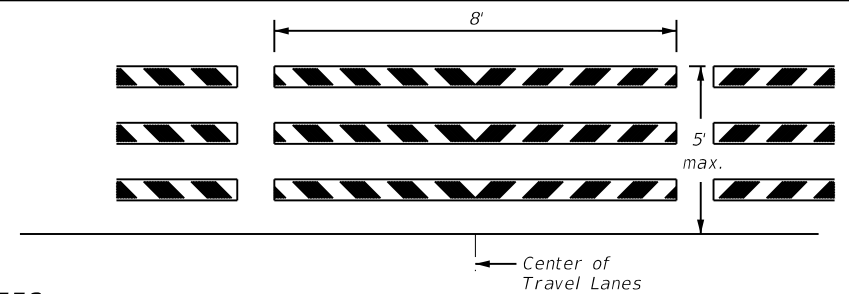
**DETAIL 3**

**TYPICAL APPLICATION OF DEAD END BARRICADE**



**DETAIL 4**

**TYPICAL DEAD END BARRICADE INSTALLATION**



**NOTES**

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

**DETAIL 5**

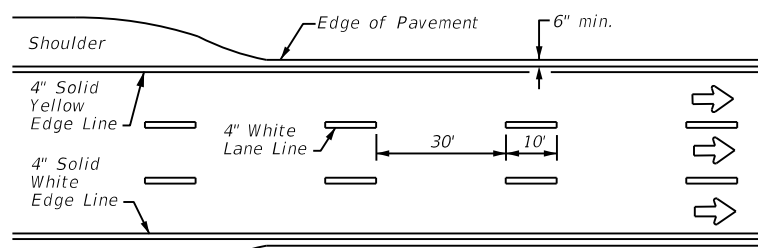
LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator



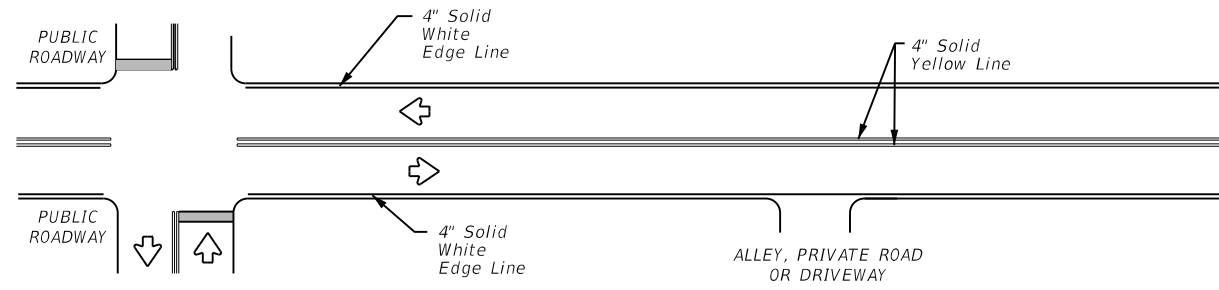
**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

**D & OM(4)-20**

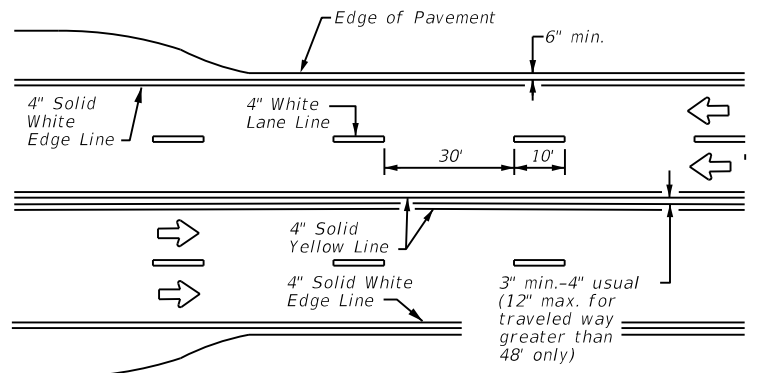
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
©TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
3-15	DIST	COUNTY	SHEET NO.	
7-20	HOU	FORT BEND	72	



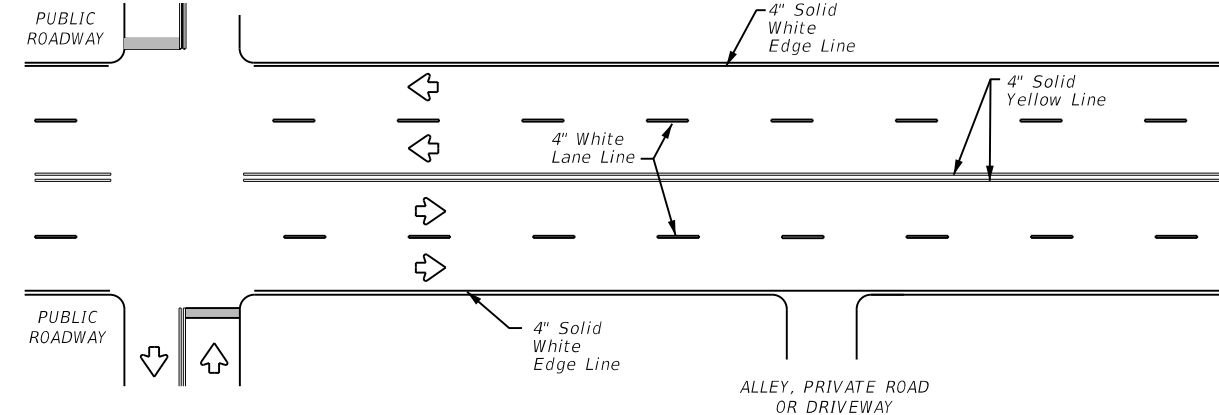
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



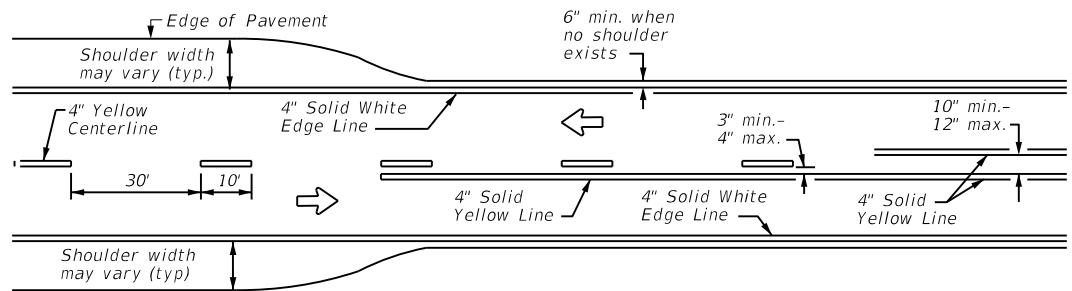
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



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



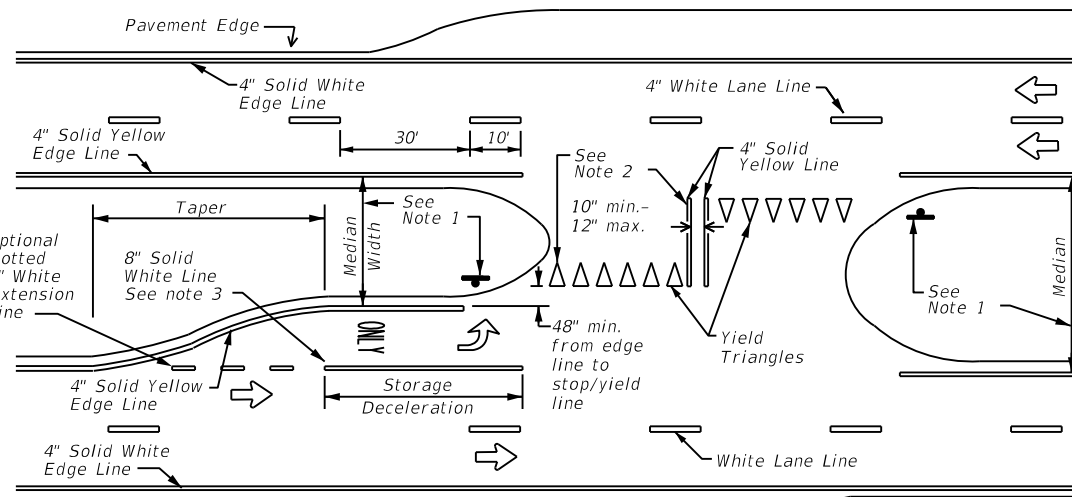
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



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



**YIELD LINES**



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

**NOTE:**

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

**NOTES**

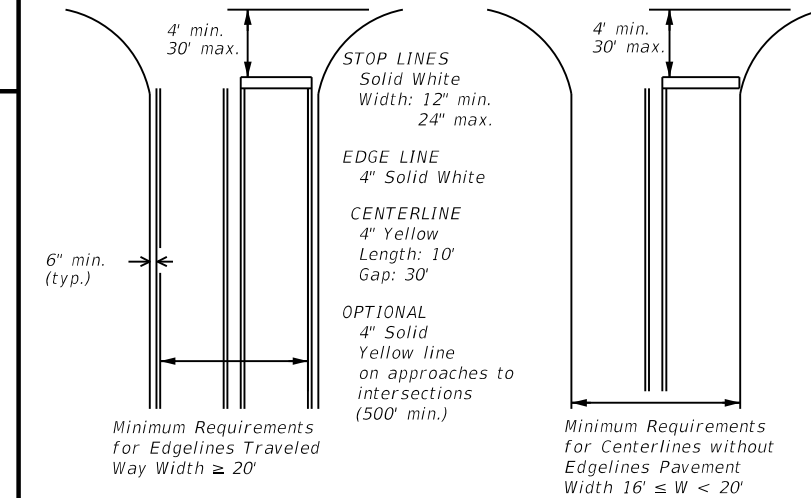
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

**GENERAL NOTES**

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

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

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



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

Based on Traveled Way and Pavement Widths for Undivided Highways

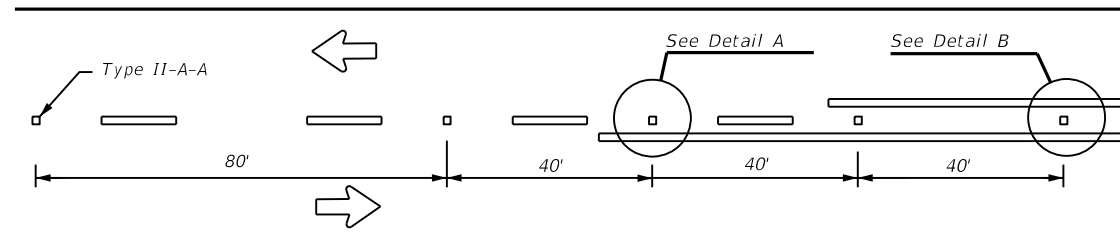


**TYPICAL STANDARD  
PAVEMENT MARKINGS**

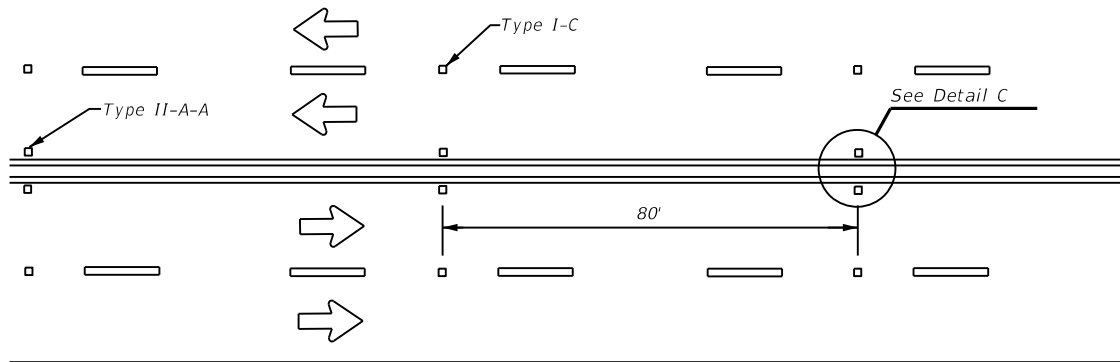
PM-20

© TXDOT NOVEMBER 1978		DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
8-95	2-12	0543	02	076	FM 359
5-00	8-16				
8-00	7-20				
3-03					
		DIST	COUNTY		SHEET NO.
		HOU	FORT BEND		73

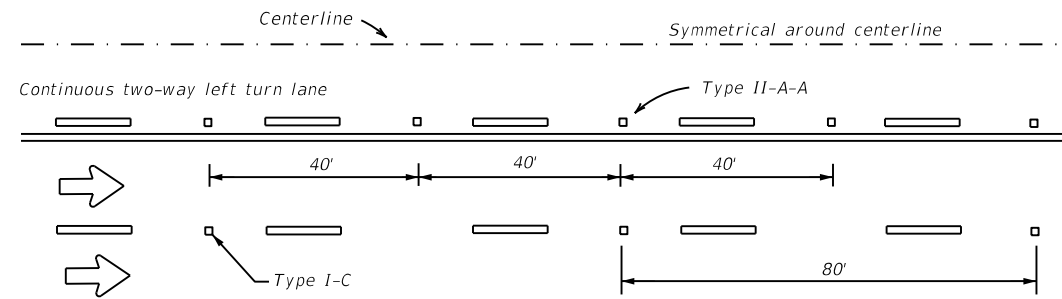
# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



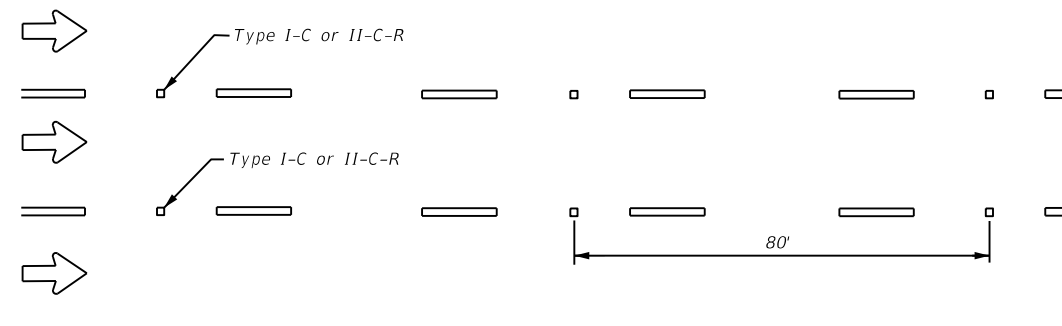
**CENTERLINE FOR ALL TWO LANE ROADWAYS**



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

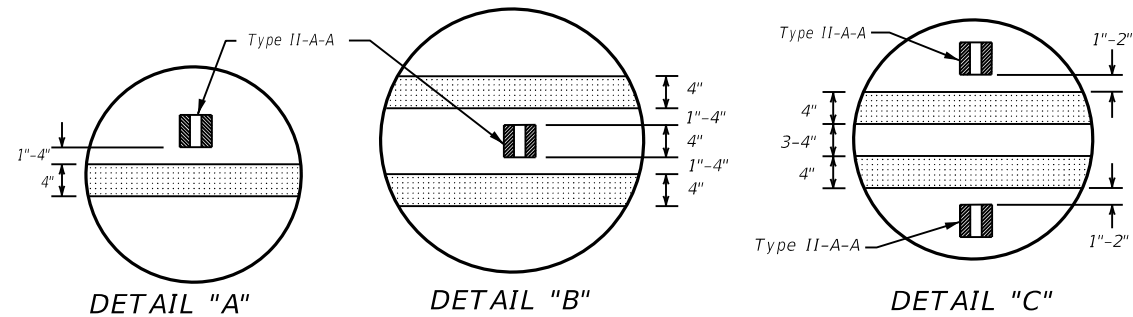


**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**



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

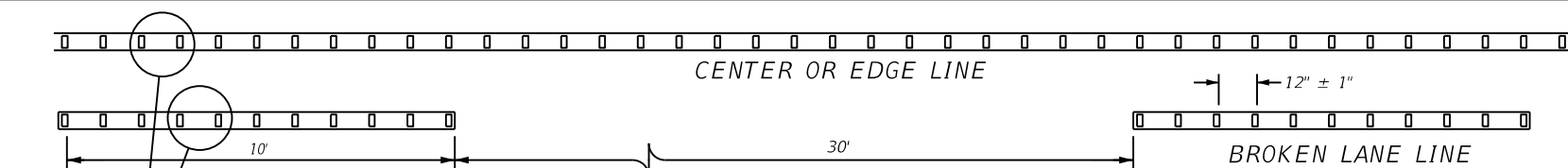
*Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.*



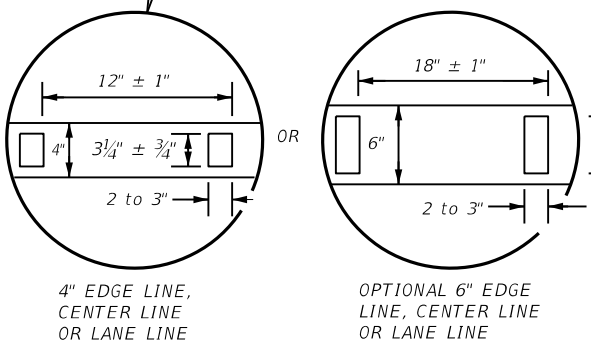
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**

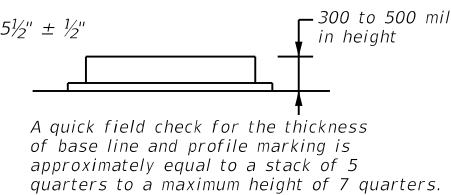


**REFLECTORIZED PROFILE  
PATTERN DETAIL**  
USING REFLECTIVE PROFILE PAVEMENT MARKINGS



**4" EDGE LINE,  
CENTER LINE  
OR LANE LINE**

**OPTIONAL 6" EDGE  
LINE, CENTER LINE  
OR LANE LINE**



**NOTE**

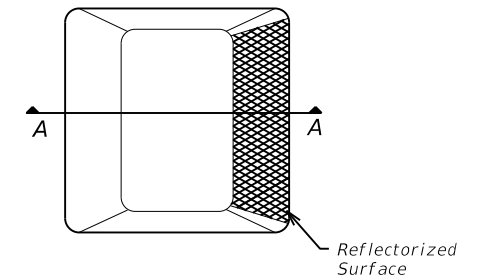
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

**GENERAL NOTES**

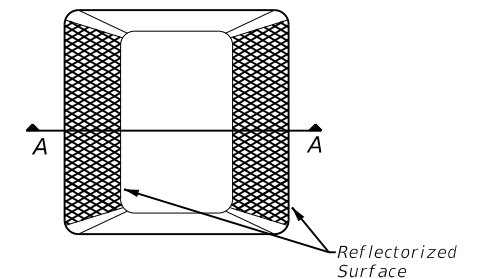
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

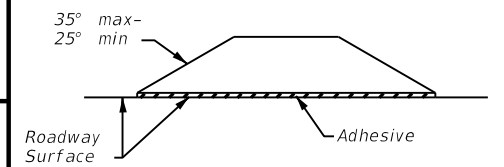
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



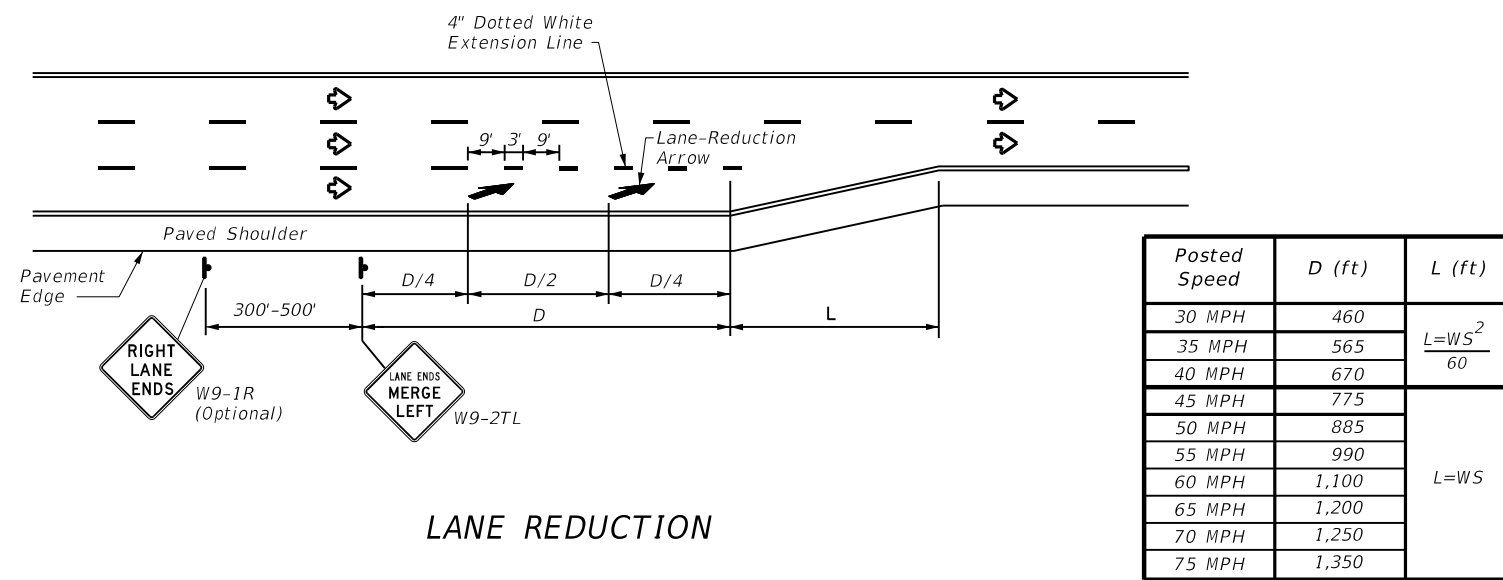
**SECTION A**

**RAISED PAVEMENT MARKERS**



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

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
4-92 2-10 REVISIONS	0543	02	076	FM 359
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	HOU	FORT BEND		74

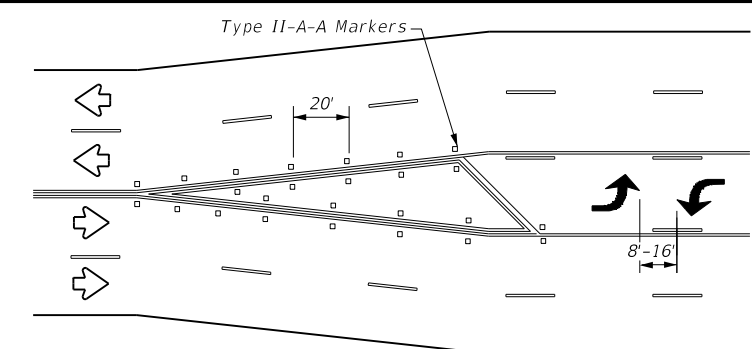


**NOTES**

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

**GENERAL NOTES**

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

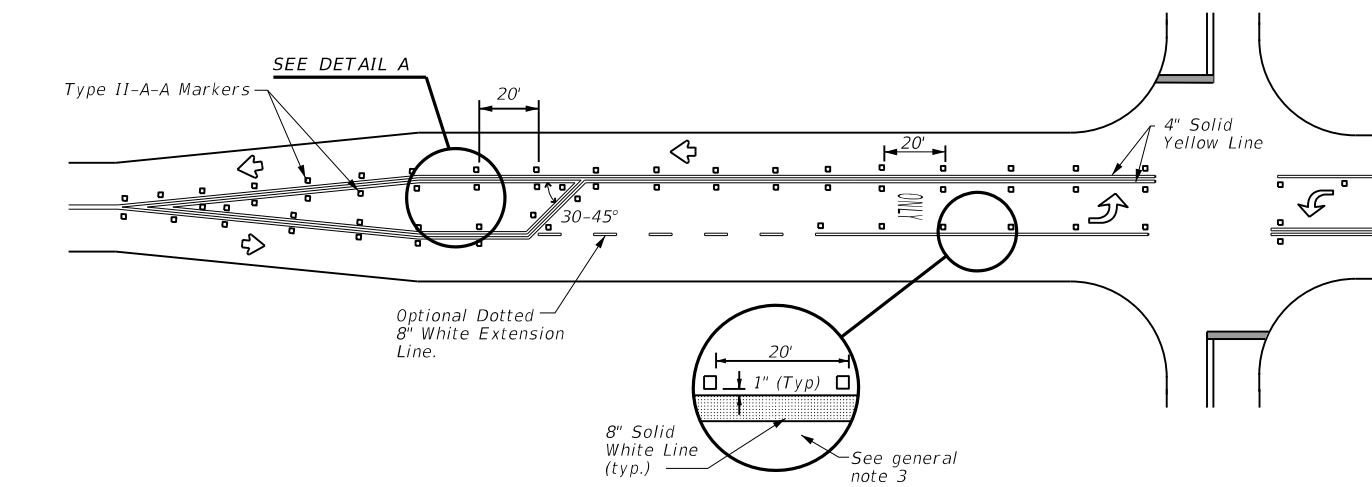
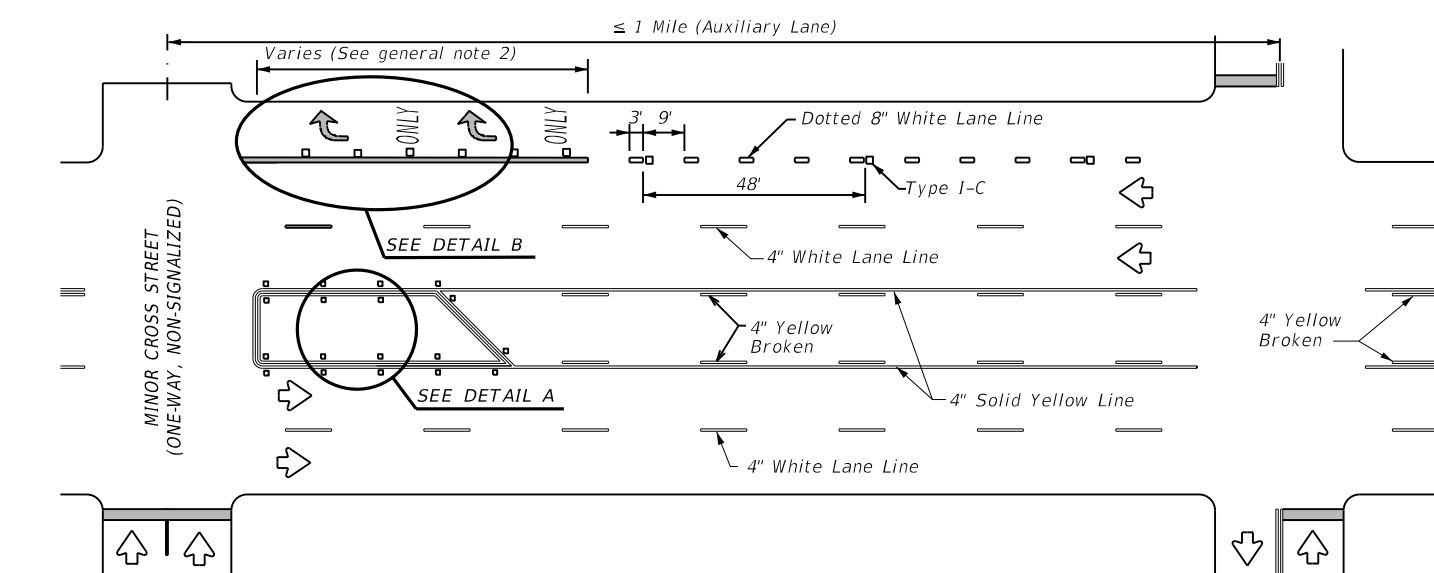


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

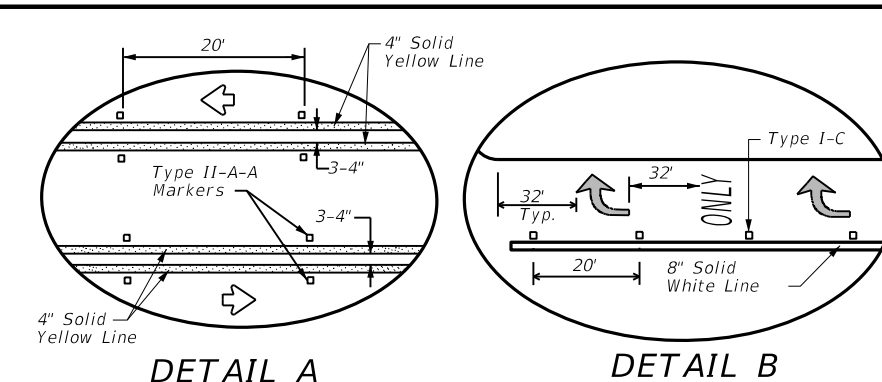
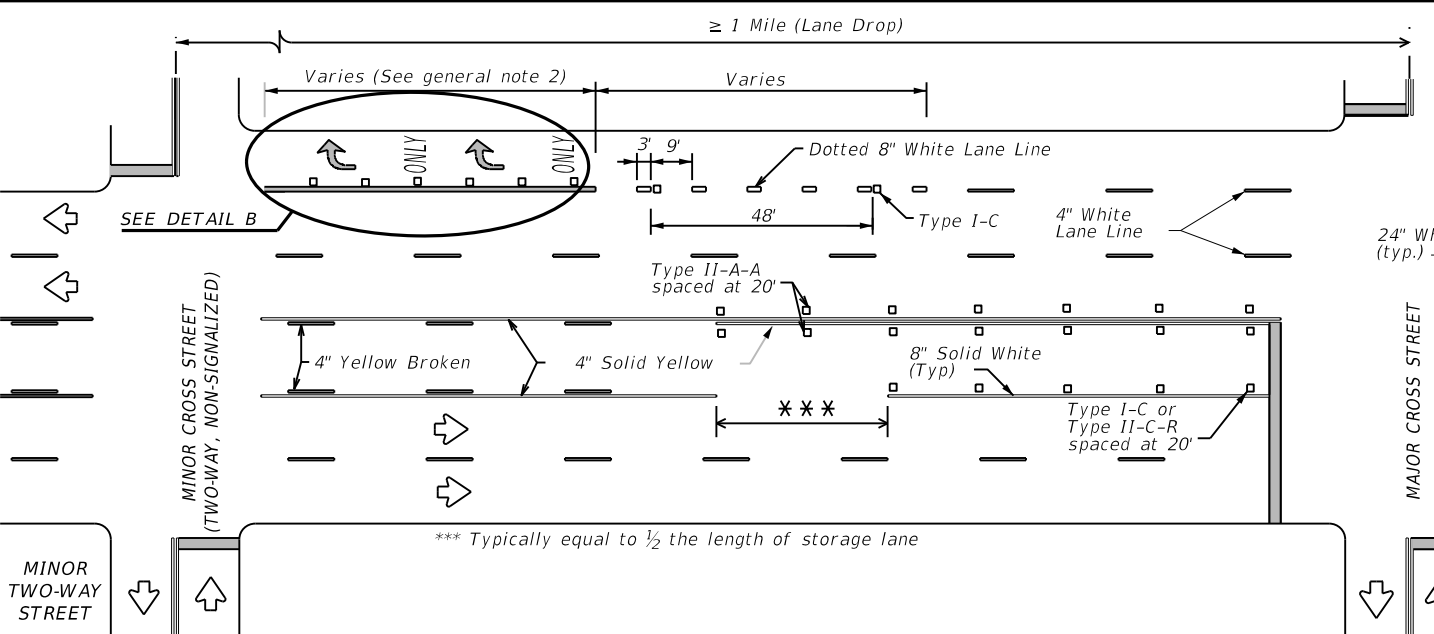
**TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY**

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

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



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



Texas Department of Transportation  
Traffic Safety Division Standard

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

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONTRACT	SECTION	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
5-00 2-10	DIST	COUNTY	SHEET NO.	
8-00 2-12	HOU	FORT BEND	75	
3-03 6-20				

## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

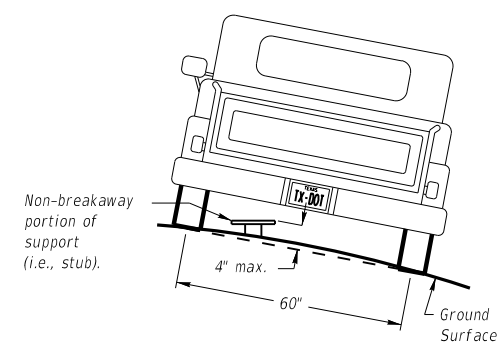
SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type \_\_\_\_\_  
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))  
 TWT = Thin-Walled Tubing (see SMD(TWT))  
 10BWG = 10 BWG 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))

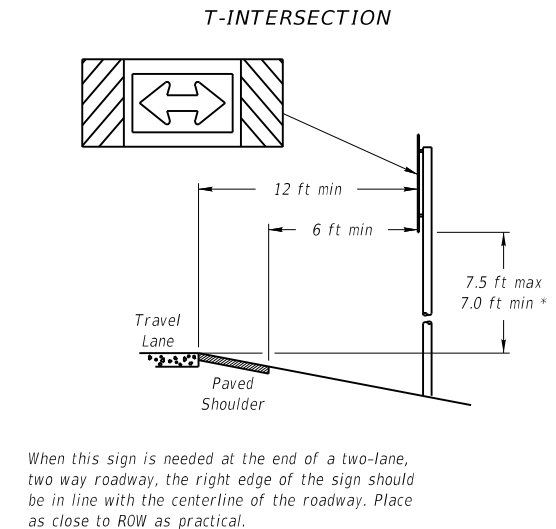
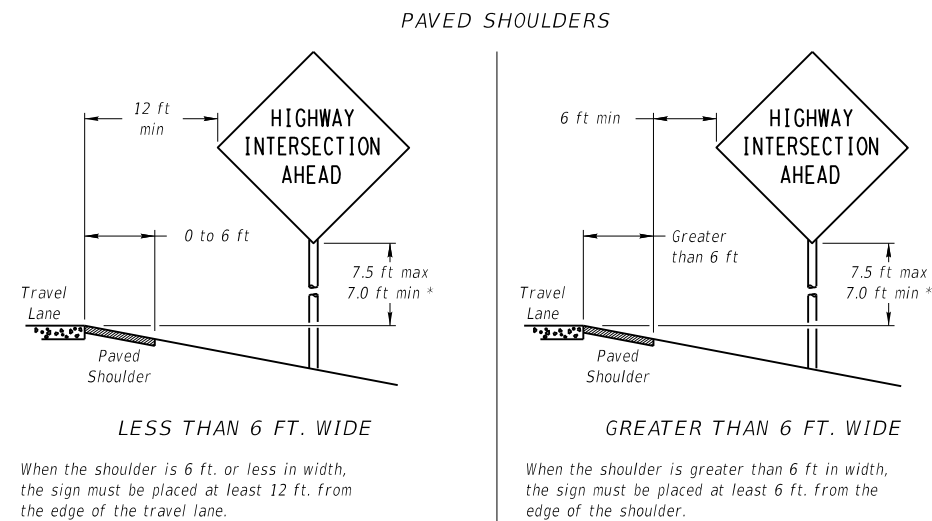
Sign Mounting Designation  
 P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))  
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))  
 IF REQUIRED  
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 BM = Extruded 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

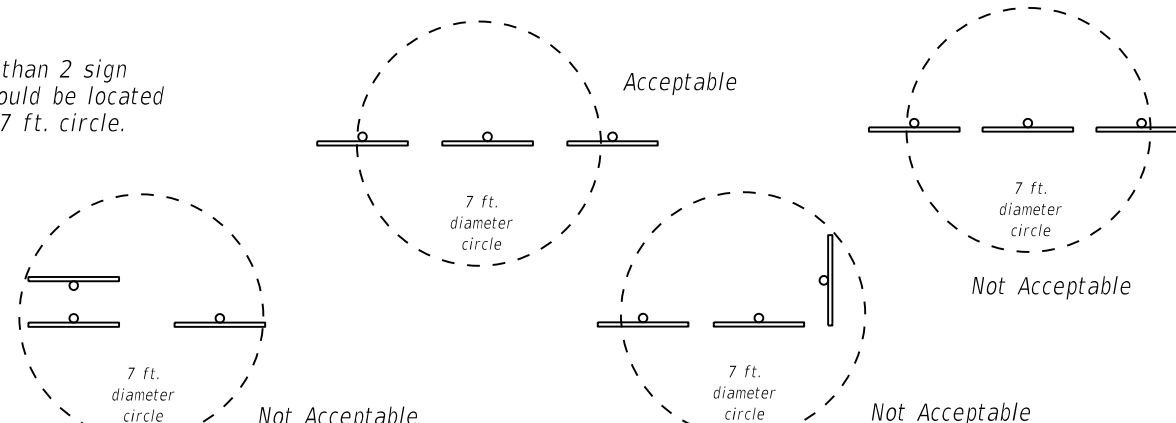


To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

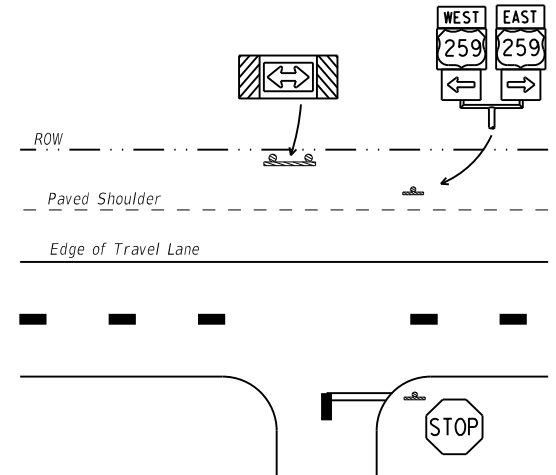
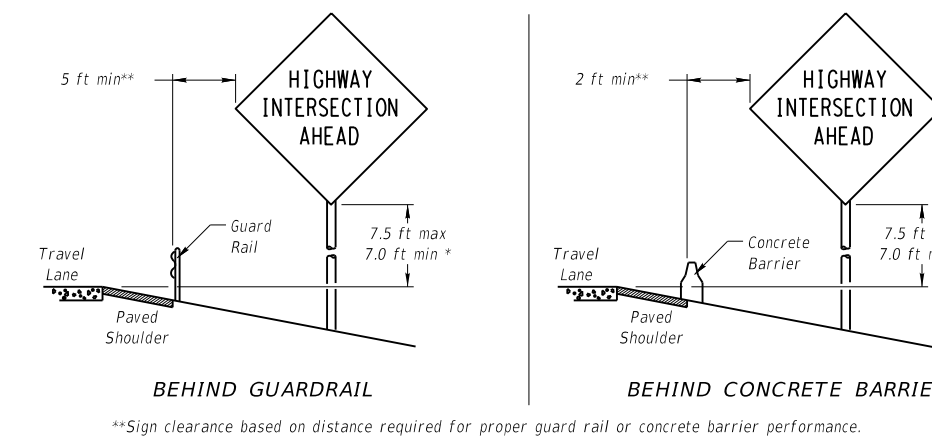
## SIGN LOCATION



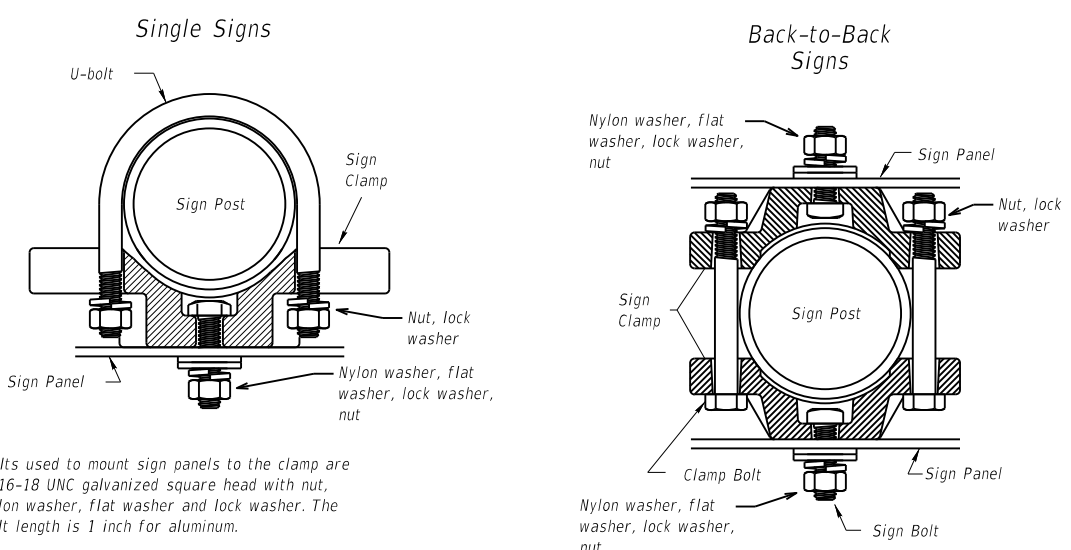
No more than 2 sign posts should be located within a 7 ft. circle.



## BEHIND BARRIER



## TYPICAL SIGN ATTACHMENT DETAIL



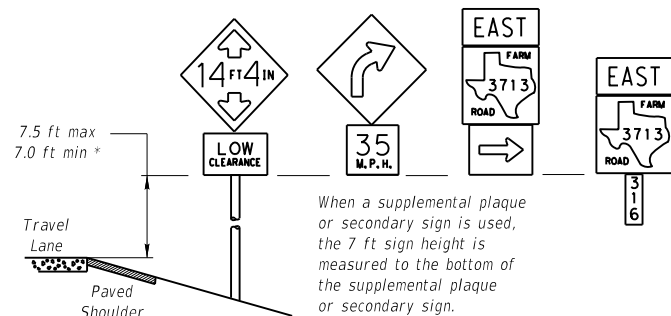
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

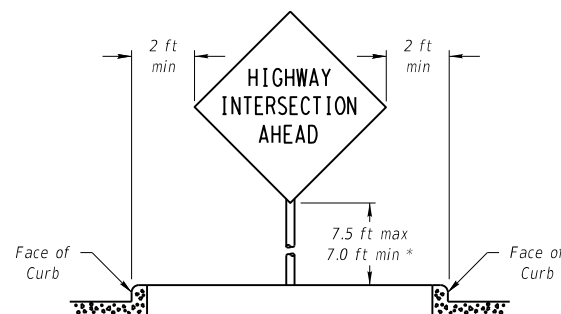
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

## SIGNS WITH PLAQUES



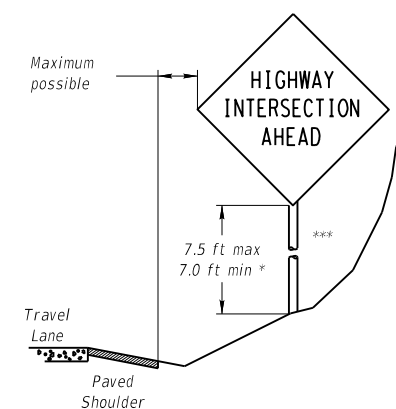
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

## 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 backslope.

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>

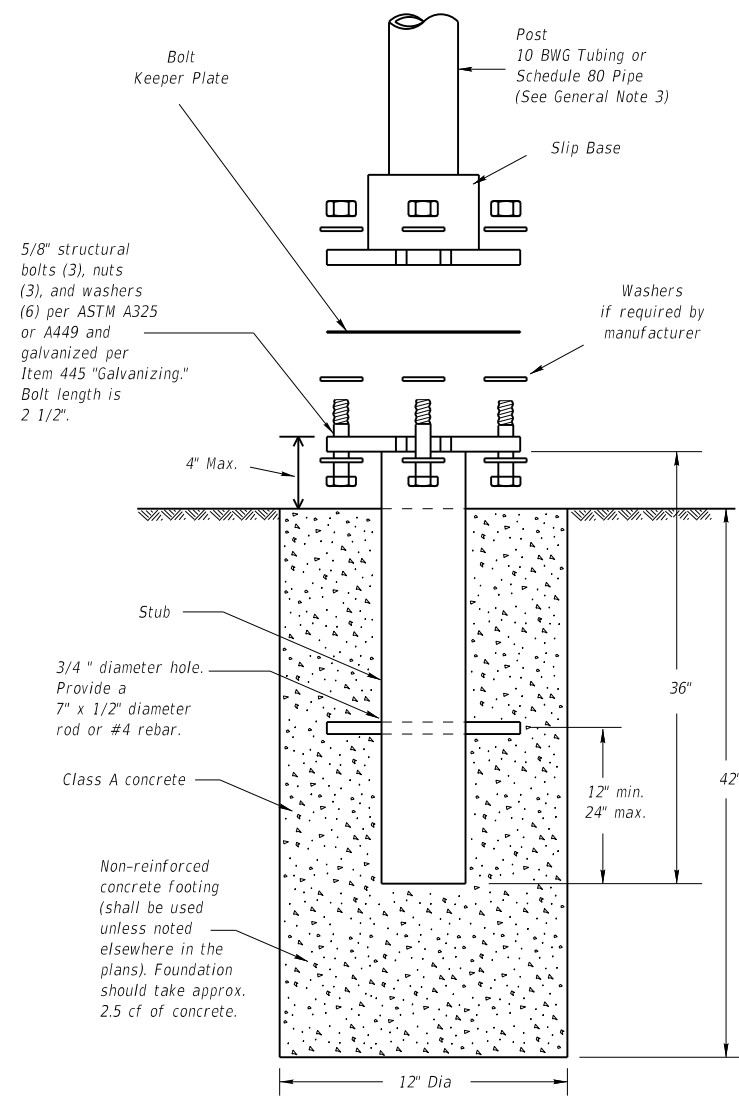


## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

© TXDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	REVISIONS	CONT	SECT	JOB
		0543	02	076
		DIST	COUNTY	HIGHWAY
		HOU	FORT BEND	FM 359
				SHEET NO.
				76

# TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

## 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](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 precoated 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

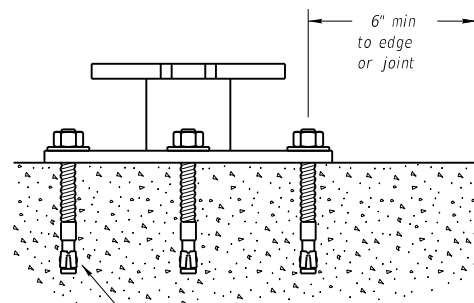
### Foundation

- 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)

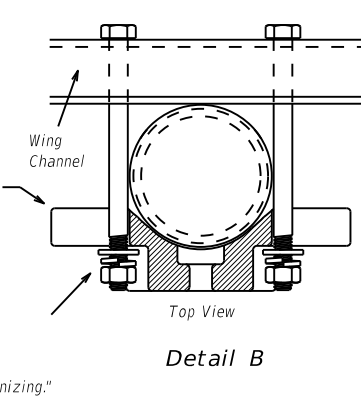
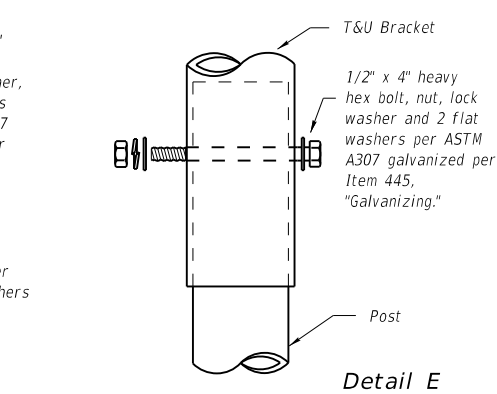
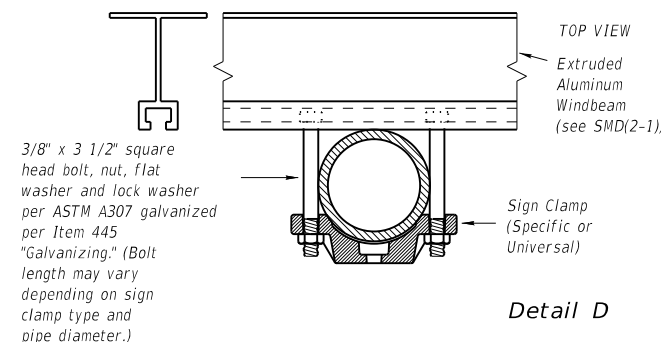
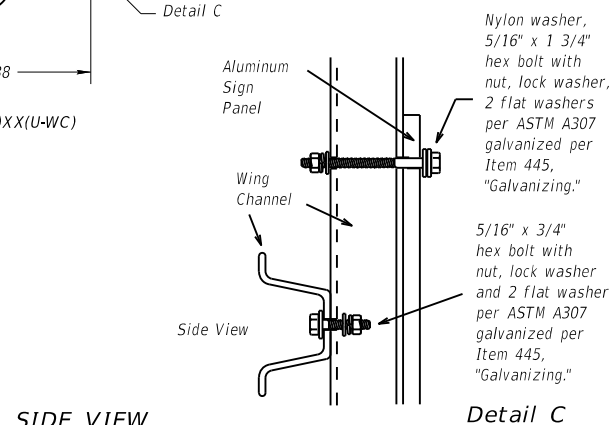
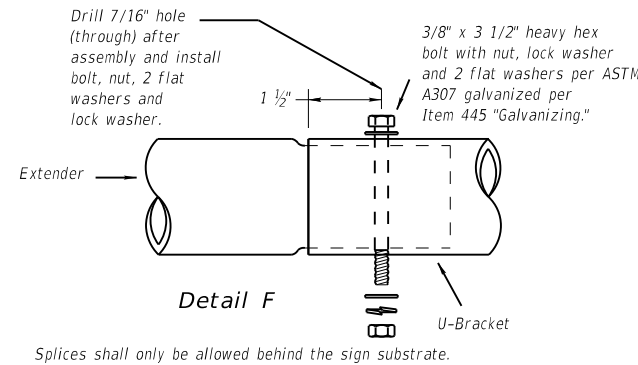
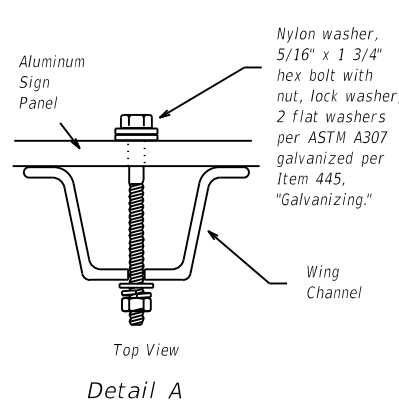
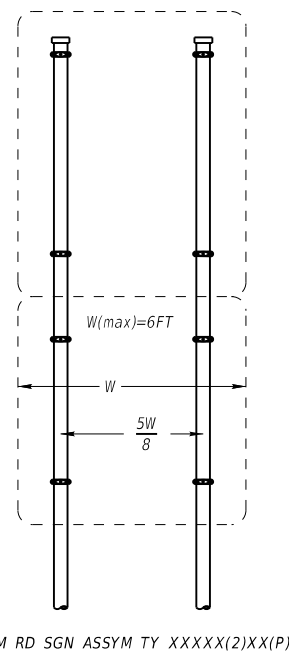
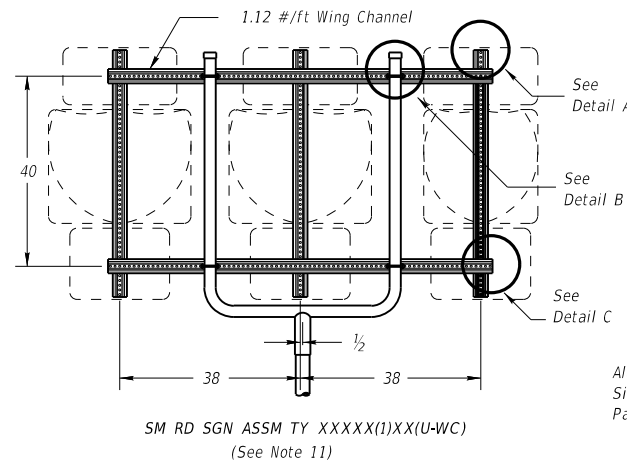
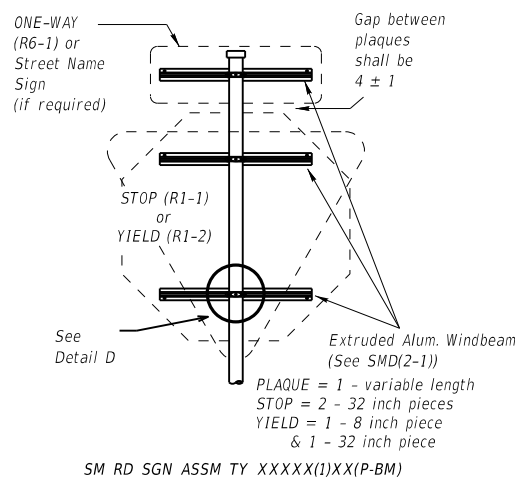
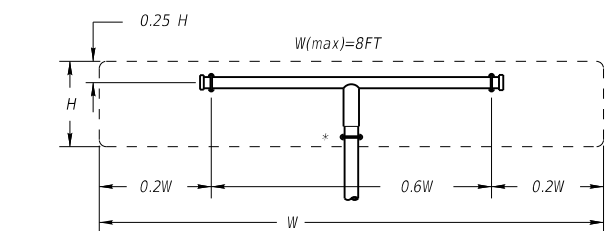
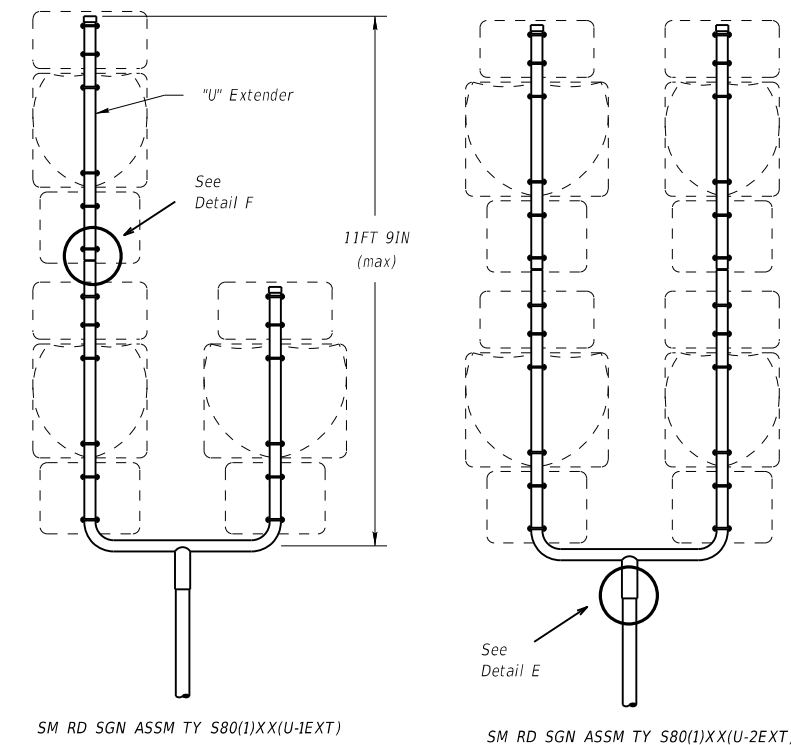
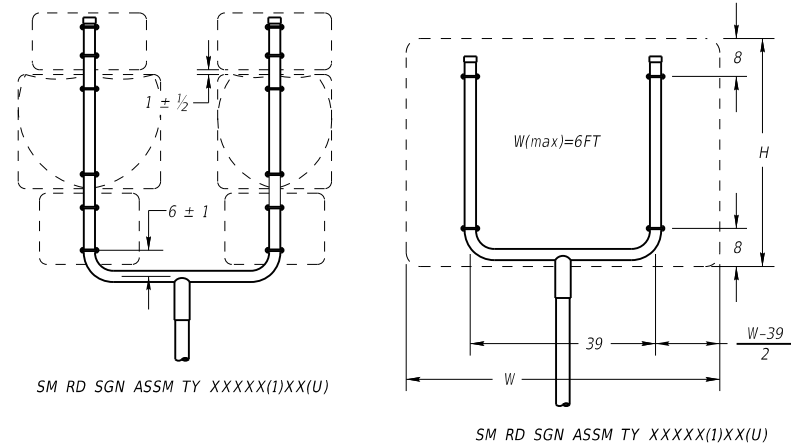
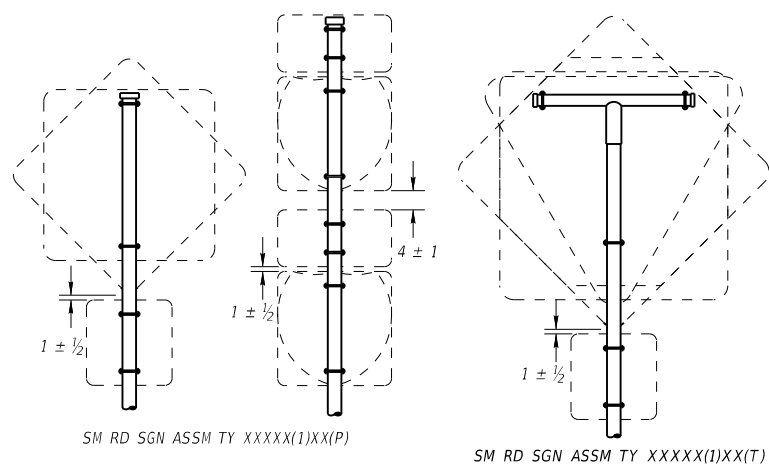
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies 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.



## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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9-08	REVISIONS	CONT	SECT	JOB
		0543	02	076
		DIST	COUNTY	HIGHWAY
		HOU	FORT BEND	FM 359
				SHEET NO.
				77

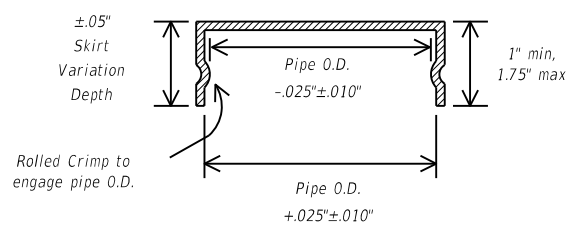


GENERAL NOTES:

- | 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."
- 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	
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)
Warning	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)	

FRICION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. 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.



SIGN MOUNTING DETAILS  
SMALL ROADSIDE SIGNS  
TRIANGULAR SLIPBASE SYSTEM

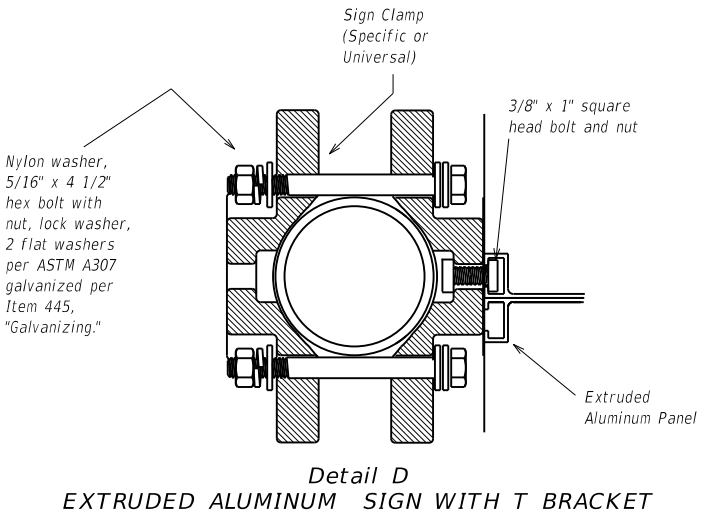
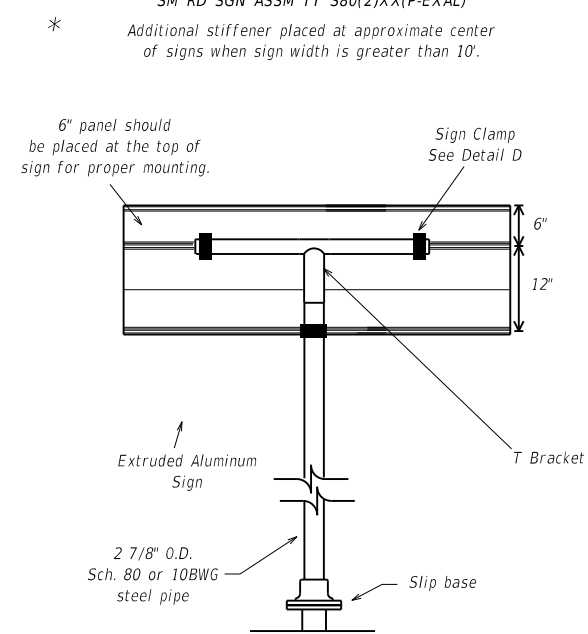
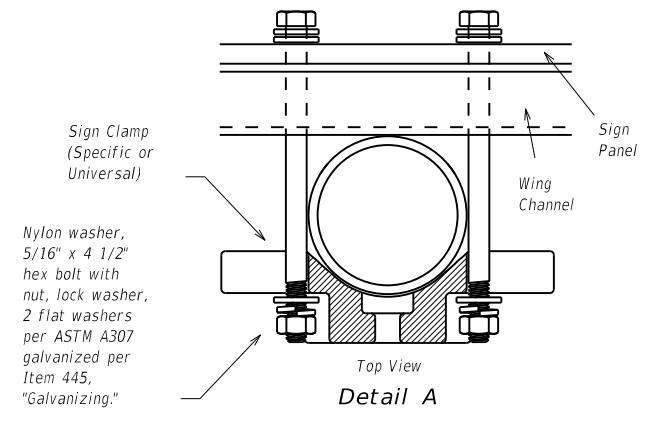
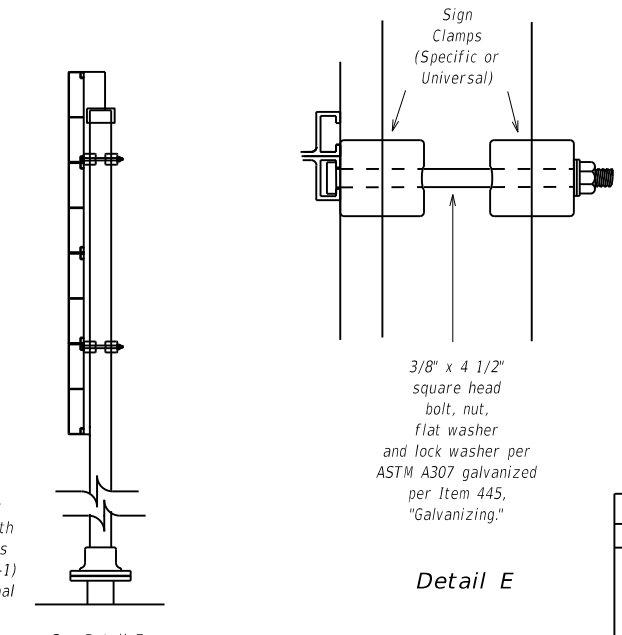
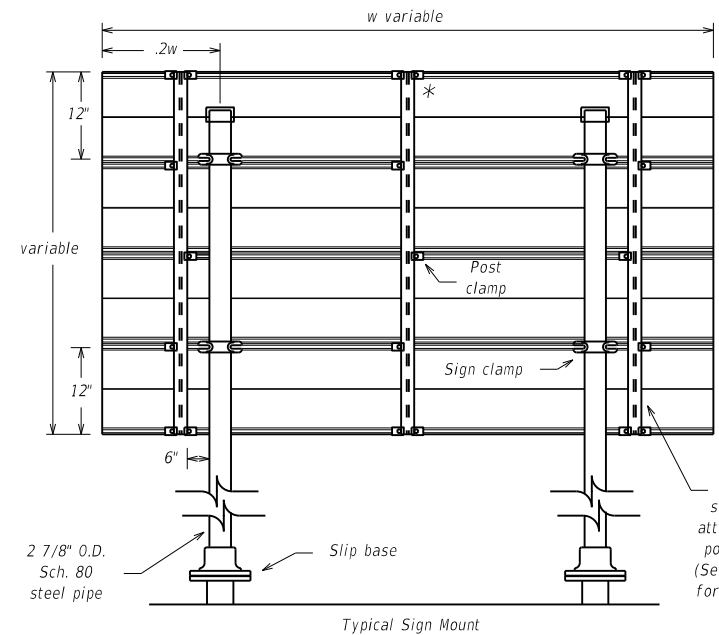
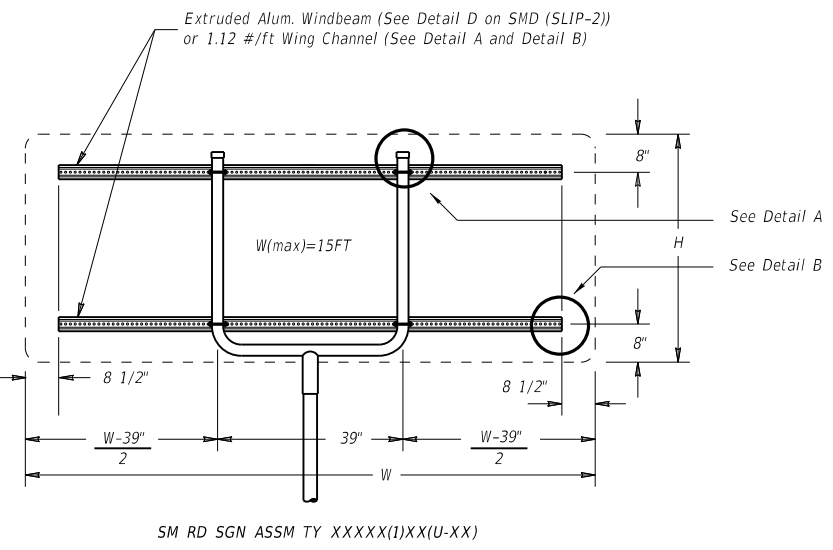
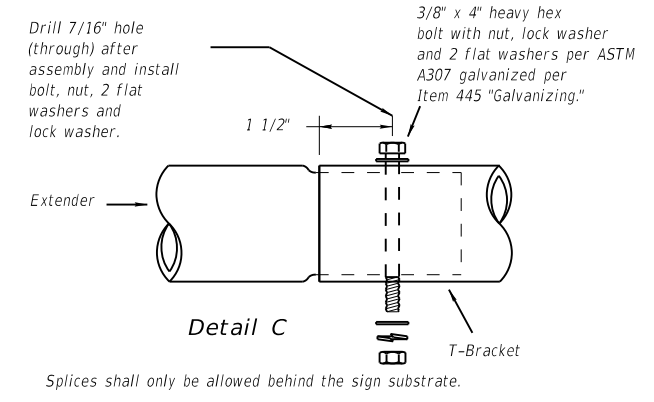
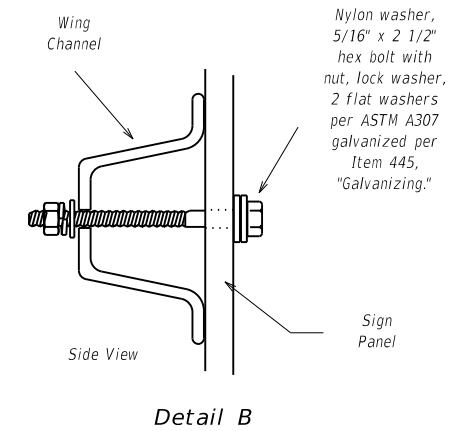
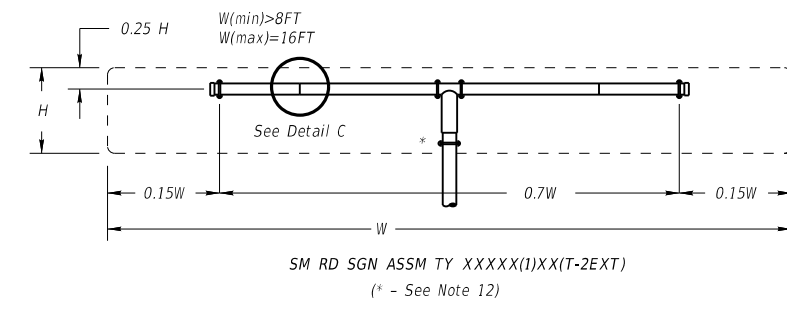
SMD(SLIP-2)-08

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9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0543	02	076	FM 359
	DIST	COUNTY	SHEET NO.	
	HOU	FORT BEND	78	



GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
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| 10 BWG       | 2          | 32 SF          |
| Sch 80       | 1          | 32 SF          |
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- 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)	

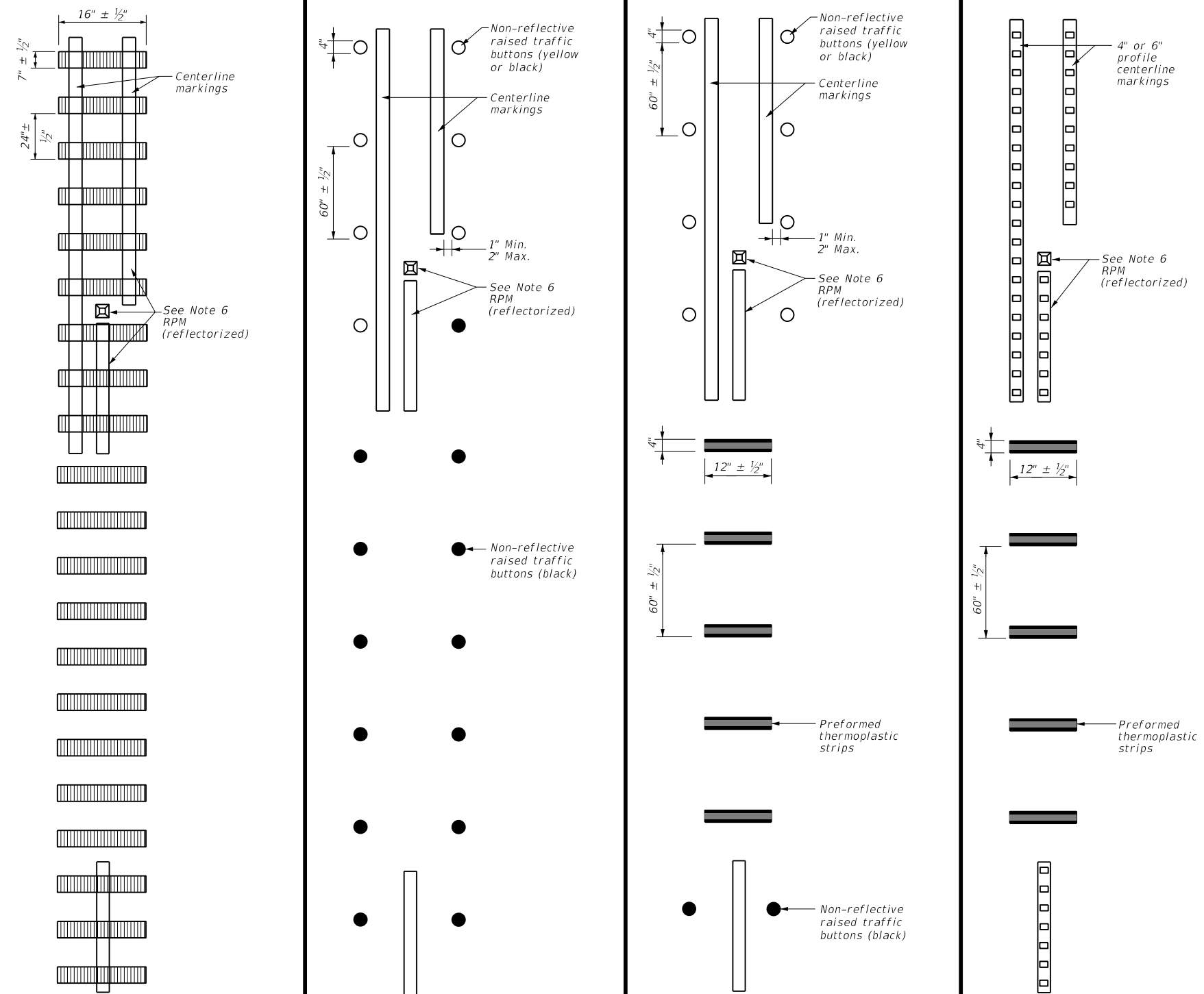
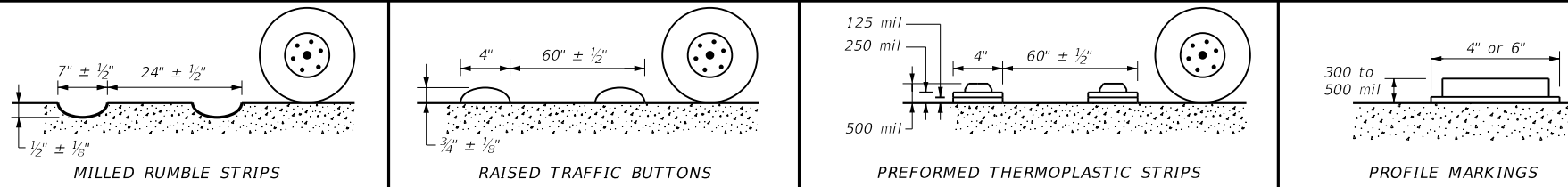
**Texas Department of Transportation**  
Traffic Operations Division

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

**SMD(SLIP-3)-08**

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9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0543	02	076	FM 359
	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		79

# CENTERLINE RUMBLE STRIPS



PLAN VIEW  
OPTION 1

PLAN VIEW  
OPTION 2

PLAN VIEW  
OPTION 3

PLAN VIEW  
OPTION 4

TWO LANE TWO-WAY  
ROADWAYS

MILLED CENTERLINE  
RUMBLE STRIPS

RAISED CENTERLINE  
RUMBLE STRIPS

RAISED CENTERLINE RUMBLE  
STRIPS AND PREFORMED  
THERMOPLASTIC STRIPS

PROFILE CENTERLINE MARKINGS  
AND PREFORMED THERMOPLASTIC  
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 edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks.
6. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, and dimensions pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inch depth of milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

### 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.

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

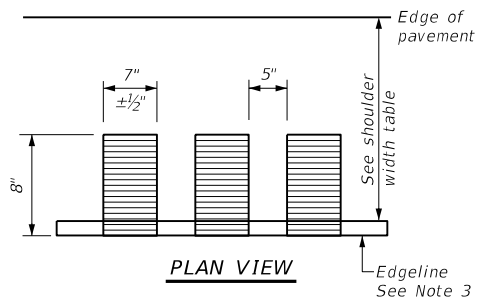
12. See standard sheet RS(4).



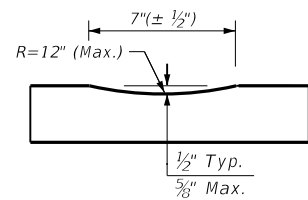
## CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

**RS(3)-13**

FILE: <b>rs(3)-13.dwg</b>	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
DIST	COUNTY		SHEET NO.	
HOU	FORT BEND		80	

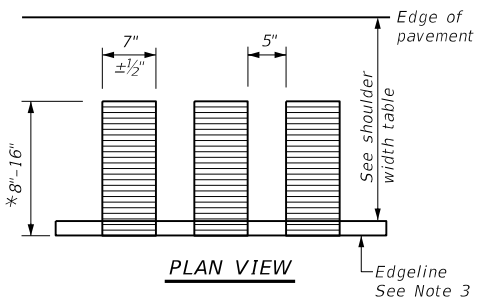


PLAN VIEW

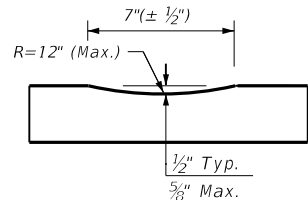


PROFILE VIEW  
OPTION 1

CONTINUOUS MILLED  
DEPRESSIONS  
(Rumble Strips)

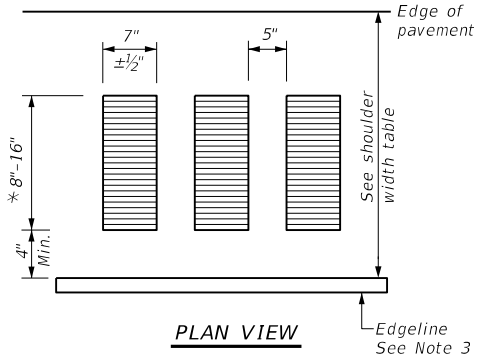


PLAN VIEW



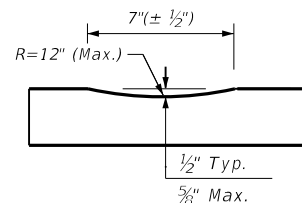
PROFILE VIEW  
OPTION 2

CONTINUOUS MILLED  
DEPRESSIONS  
(Rumble Strips)



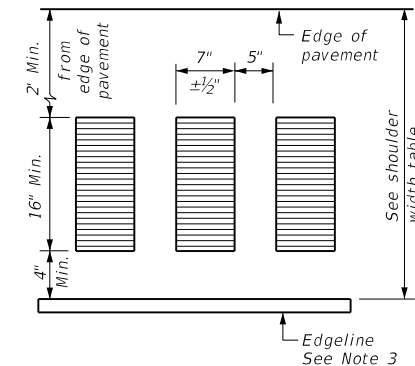
PLAN VIEW

\* This distance may vary based on width of shoulder

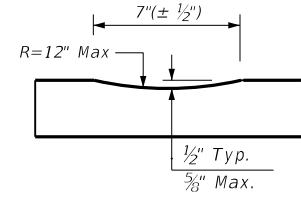


PROFILE VIEW  
OPTION 3

CONTINUOUS MILLED  
DEPRESSIONS  
(Rumble Strips)



PLAN VIEW



PROFILE VIEW  
OPTION 4

CONTINUOUS MILLED  
DEPRESSIONS  
(Rumble Strips)

GENERAL NOTES

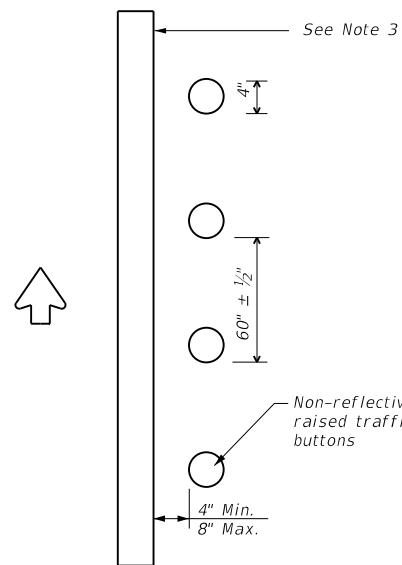
- Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
- Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not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

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

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

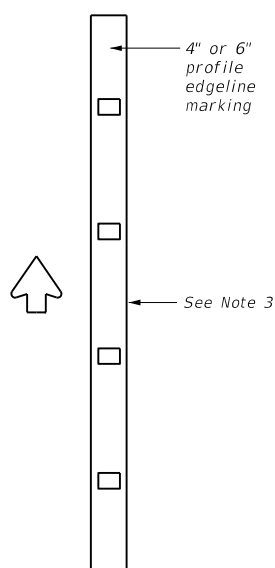
WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

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



PLAN VIEW  
OPTION 5

RAISED EDGELINE  
RUMBLE STRIPS



PLAN VIEW  
OPTION 6

PROFILE EDGELINE  
MARKINGS

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

				<b>Texas Department of Transportation</b>		<b>Traffic Operations Division Standard</b>				
<b>EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13</b>										
FILE:	rs(4)-13.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT	
©TxDOT	October 2013	CONT	SECT	JOB	HIGHWAY					
REVISIONS		0543	02	076	FM 359					
		DIST	COUNTY		SHEET NO.					
		HOU	FORT BEND		81					

**SITE DESCRIPTION**

**PROJECT LIMITS:**

FM 359: WALLER COUNTY LINE TO NORTH OF FM 1093

**PROJECT DESCRIPTION:**

CONSTRUCTION OF MISCELLANEOUS WORK CONSISTING BASE REPAIR, 1.5" PLANING, 1.5" ACP OVERLAY, MILLED RUMBLE STRIPS, SIGNING AND PAVEMENT MARKINGS.

**MAJOR SOIL DISTURBING ACTIVITIES:**

NONE.

TOTAL PROJECT AREA: N/A

TOTAL AREA TO BE DISTURBED: 0.00 ACRES

WEIGHTED RUNOFF COEFFICIENT:  
(AFTER CONSTRUCTION): N/A

**EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:**

ACCORDING TO THE USDA GENERAL SOIL MAP OF TEXAS, THE PROJECT AREA CONSISTS OF KATY-WOCKLEY-GESSNER SOILS. THESE SOILS HAVE LOAMY SURFACE TEXTURES AND LOAMY AND CLAYEY SUBSOIL HORIZONS, AND THEY DIFFER PRIMARILY ON DRAINAGE CLASS AND MINERALOGY.

**NAME OF RECEIVING WATERS:**

RUNOFF WILL BE RECEIVED BY BROOKSHIRE CREEK (SEGMENT 1202G) AND BESSIES CREEK (SEGMENT 1202I) BOTH CREEKS ULTIMATELY DRAIN INTO THE BRAZOS RIVER (SEGMENT 1202) BRAZOS RIVER BASIN.

**EROSION AND SEDIMENT CONTROLS**

**SOIL STABILIZATION PRACTICES:**

- TEMPORARY SEEDING
- PERMANENT PLANTING, SODDING, OR SEEDING
- MULCHING
- SOIL RETENTION BLANKET
- BUFFER ZONES
- PRESERVATION OF NATURAL RESOURCES

OTHER:

**STRUCTURAL PRACTICES:**

- SILT FENCES
- HAY BALES
- ROCK BERMS
- DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- DIVERSION DIKE AND SWALE COMBINATIONS
- PIPE SLOPE DRAINS
- PAVED FLUMES
- ROCK BEDDING AT CONSTRUCTION EXIT
- TIMBER MATTING AT CONSTRUCTION EXIT
- CHANNEL LINERS
- SEDIMENT TRAPS
- SEDIMENT BASINS
- STORM INLET SEDIMENT TRAP
- STONE OUTLET STRUCTURES
- CURBS AND GUTTERS
- STORM SEWERS
- VELOCITY CONTROL DEVICES
- EROSION CONTROL LOGS

OTHER:

**NARRATIVE - SEQUENCE OF CONSTRUCTION (STORM WATER MANAGEMENT) ACTIVITIES:**

AFTER THE SIGNS AND BARRICADES HAVE BEEN INSTALLED:

1. INSTALL ANY SWP3 AS DIRECTED BY ENGINEER.
2. MAINTAIN THE SWP3 DURING THE PROJECT.
3. REMOVE THE SWP3 ON COMPLETION OF WORK AT EACH LOCATION.

**STORM WATER MANAGEMENT:**

STORM WATER DRAINAGE WILL BE FACILITATED BY EXISTING ROADSIDE DITCHES.

**OTHER EROSION AND SEDIMENT CONTROLS:**

**MAINTENANCE:**

All erosion and sediment controls will be maintained in good working order. If a repair is necessary, it will be done at the earliest date possible, but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. The area adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

INSPECTION: All inspections will be performed by a TxDOT inspector per one of the options below as directed by the Area Engineer

1. At least every 7 calendar days
2. At least every 14 days or after 0.5 inches or more of rainfall

An inspection and maintenance report should be made for each inspection. Based on the inspection results, the controls shall be revised according to the inspection report.

**WASTE MATERIALS:**

The dumpster used to store all waste material will meet all state and local city solid waste management regulations. All trash and construction debris will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation and the trash will be hauled to a local dump. No construction waste material will be buried on site.

**HAZARDOUS WASTE (INCLUDING SPILL REPORTING):**

In the event of a spill which may be considered hazardous, the Houston District Safety Office shall be contacted immediately at 713-802-5962.

**SANITARY WASTE:**

All Sanitary Waste will be collected from the portable units as necessary or as required by local regulations by a licensed sanitary waste management contractor.

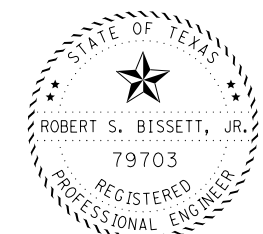
**OFFSITE VEHICLE TRACKING:**

- HAUL ROADS DAMPENED FOR DUST CONTROL
- LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- EXCESS DIRT ON ROAD REMOVED DAILY
- STABILIZED CONSTRUCTION ENTRANCE

OTHER:

**REMARKS:**

Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the sediment that may enter receiving waterways. Disposal areas shall not be located in any waterway, waterbody or streambed. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner which minimizes the runoff of all pollutants. All waterways shall be cleared as soon as practical of temporary embankments, temporary bridges, matting, falsework, piling, debris, and other obstructions placed during construction operations that are not part of the finished work.



Robert S. Bissett, Jr.  
09/22/21

Texas Department of Transportation  
Houston District

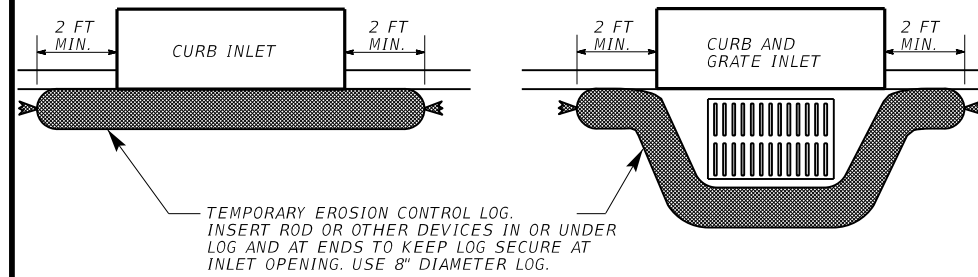
**TxDOT STORM WATER POLLUTION PREVENTION PLAN**

**SWP3**

FILE: STDG1.DGN	DN: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT JANUARY 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
9/2010 INSPECTION NOTE	DIST	COUNTY	SHEET NO.	
9/2013 INSPECTION NOTE	HOU	FORT BEND	82	
11/2013 SWP3 TO SWP3				
03/2015 2014 SPECS				

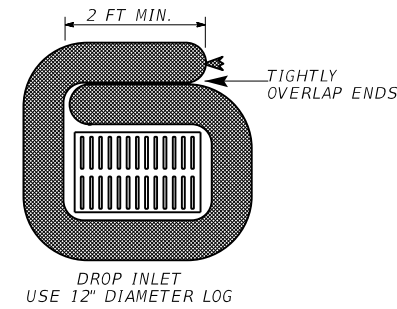
## CURB INLETS 8" DIAMETER LOGS

ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8")

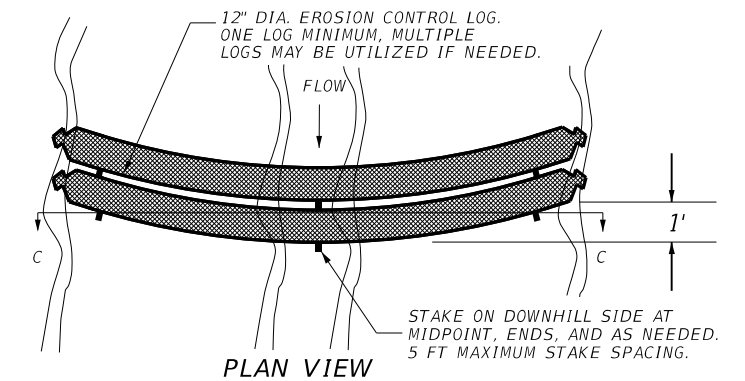


## DROP INLETS AND OTHER LOCATIONS 12" DIAMETER LOGS

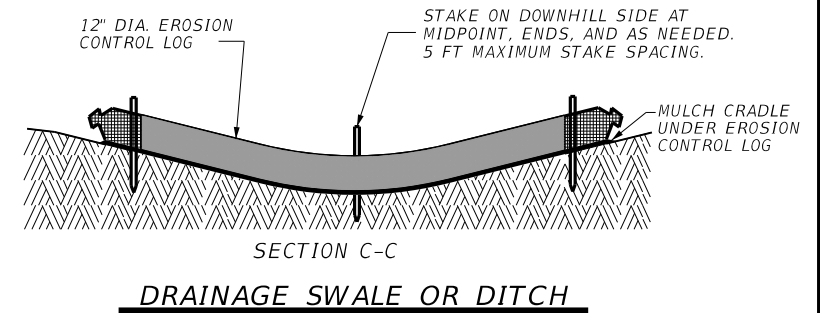
ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")



**DROP INLETS**



**PLAN VIEW**



**DRAINAGE SWALE OR DITCH**

### MATERIAL REQUIREMENTS

#### FILL:

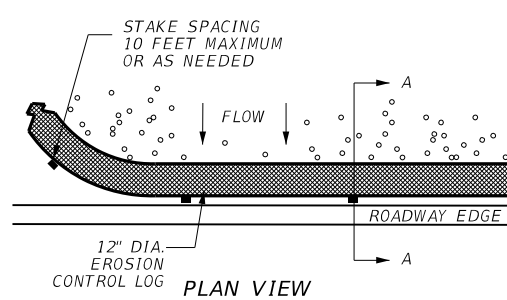
Use 100% shredded mulch or other non-compost biodegradable material as fill for logs.

No compost or fines.

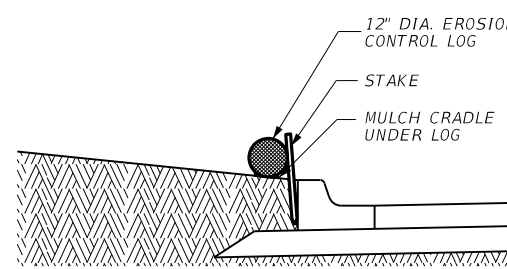
**DO NOT USE MATERIAL WHICH PROHIBITS WATER INFILTRATION.**

#### LOG MESH:

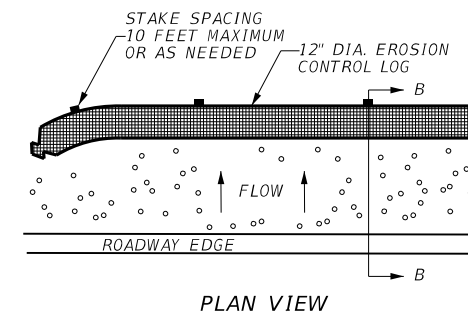
Use mesh with 1/4" openings or larger. Mesh must allow water infiltration but also hold fill material in place.



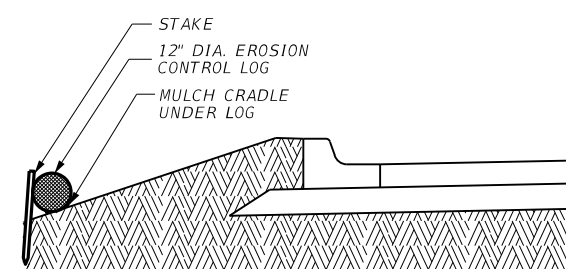
**PLAN VIEW**



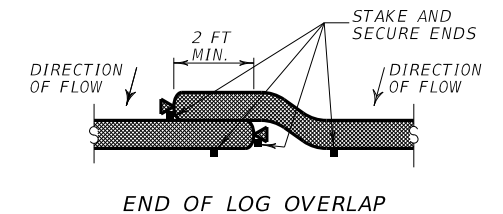
**SECTION A-A  
SLOPE TO ROADWAY EDGE**



**PLAN VIEW**



**SECTION B-B  
SLOPE AWAY FROM ROADWAY EDGE**



**END OF LOG OVERLAP**

### SEDIMENT BASIN & TRAP USAGE GUIDELINES

A sediment trap (erosion control log) may be used to filter sediment out of runoff draining from an unstabilized area.

Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

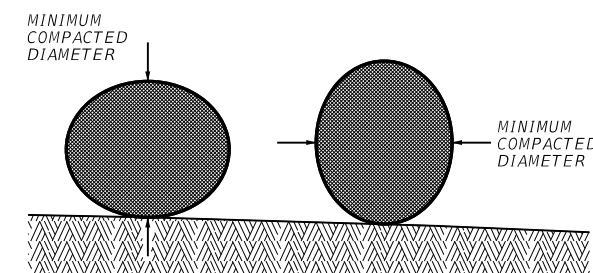
Sediment traps should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way

The trap should be cleaned when the capacity has been reduced by 1/2 or the sediment has accumulated to a depth of 1', whichever is less.

#### REQUIRED ITEMS:

- ITEM 506-6040 BIODEG EROSN CONT LOGS (INSTL) (8") LF
- ITEM 506-6041 BIODEG EROSN CONT LOGS (INSTL) (12") LF
- ITEM 506-6043 BIODEG EROSN CONT LOGS (REMOVE) LF



**DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS**

## EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DW: TxDot	CK: TxDot	DW: TxDot	CK: TxDot
©TxDOT 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	02	076	FM 359
3/15 MINOR CORRECTIONS	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		83

**I. STORMWATER POLLUTION PREVENTION**

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is 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. Refer to Storm Water Pollution Prevention Plan (SWP3) Houston District standard plan.  
No Additional Comments

**II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS**

United States Army Corps of Engineers (USACE) Permit is required for filling, dredging, excavating or other work in water bodies, rivers, creeks, streams, wetlands or wet areas. The Contractor must adhere to all of the terms and general conditions associated with the following permit(s). If additional work not represented in the plans is required, contact the Engineer immediately.

No United States Army Corps (USACE) Permit Required

Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set. The USACE general conditions are in the "General Notes."

Work is authorized by the United States Army Corps of Engineers (USACE) under a Nationwide Permit (NWP) with a Pre-Construction Notification (PCN). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set. The USACE general conditions are in the "General Notes."

Work is authorized by the United States Army Corps of Engineers (USACE) under a Individual Permit (IP). The project specific permit issued by the United States Army Corps of Engineers (USACE) is included in the plan set.

Work would be authorized by the United States Army Corps of Engineers (USACE) permit. The project specific permit issued by the USACE will be provided to the contractor.

United States Coast Guard (USCG) Permit is required for projects that involve the construction or modification (including changes to lighting) of a bridge or causeway across a water body determined to be navigable by the United States Coast Guard (USCG) under Section 9 of the Rivers and Harbors Act. If additional work not represented in the plans is required, contact the Engineer immediately.

No United States Coast Guard (USCG) Coordination Required

United States Coast Guard (USCG) Permit

United States Coast Guard (USCG) Exemption

No Additional Comments

**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 area and contact the Engineer immediately.  
No Additional Comments

**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.  
No Additional Comments

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

If any of the listed species below are observed, cease work in the area, do not disturb species or habitat and contact the Engineer immediately.

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to September 30). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

Field Biologist, Ornithologist – a field biologist is defined as an individual qualified to perform field investigations, presence/absence surveys and habitat surveys for protected avian species or species of concern. A mandatory bachelor's degree in biology or a related science is required. At a minimum, the Field Biologist, Ornithologist, shall have completed and reported a minimum of three presence/absence and habitat surveys for protected avian species in the past five years. A minimum of three projects must have been conducted in Texas. Surveys shall have been performed for documentation of species in accordance with a protocol approved by USFWS or TPWD, or following generally accepted methodologies.

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.  
No Additional Comments

**VII. OTHER ENVIRONMENTAL ISSUES**

Comments:



**ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS**  
**EPIC**

FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0543	03	076	FM 359
UPDATED section V. text and added definition (10/17)	DIST	COUNTY		SHEET NO.
	HOU	FORT BEND		84