

HARRIS C-271-16-167

FOR INDEX OF SHEETS SEE SHEET 2

NO REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION REQUIRED

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED

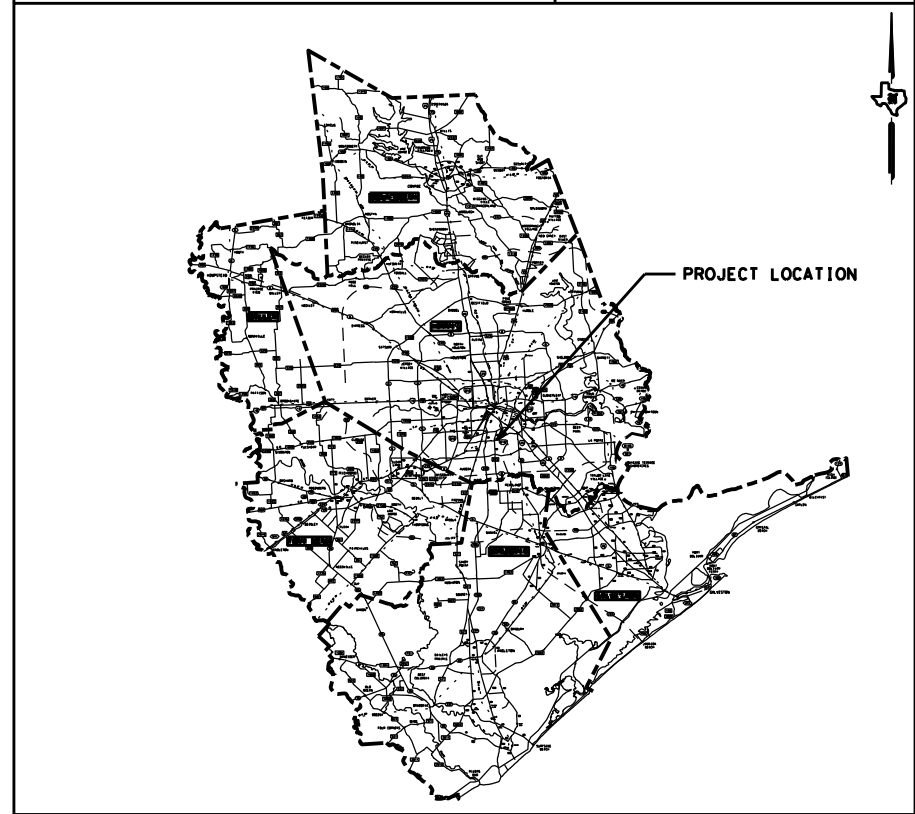
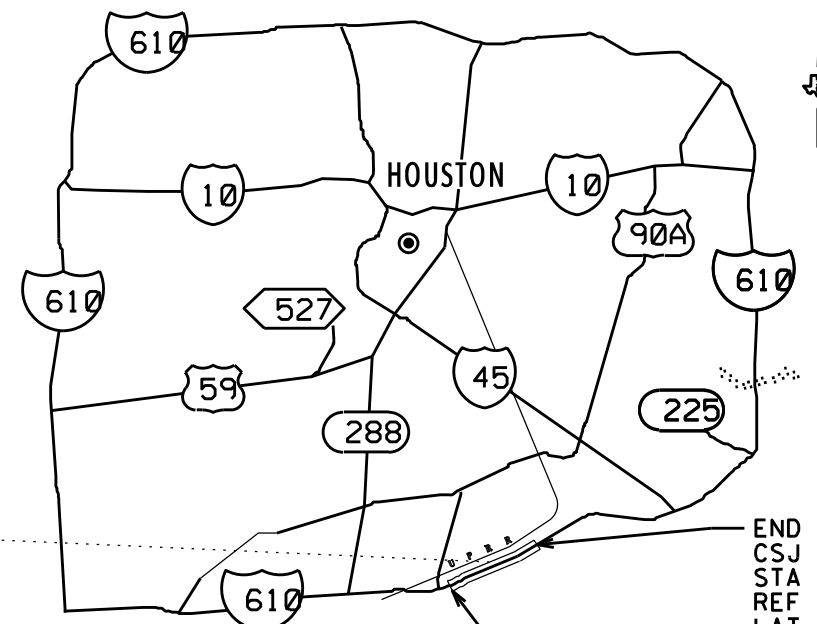
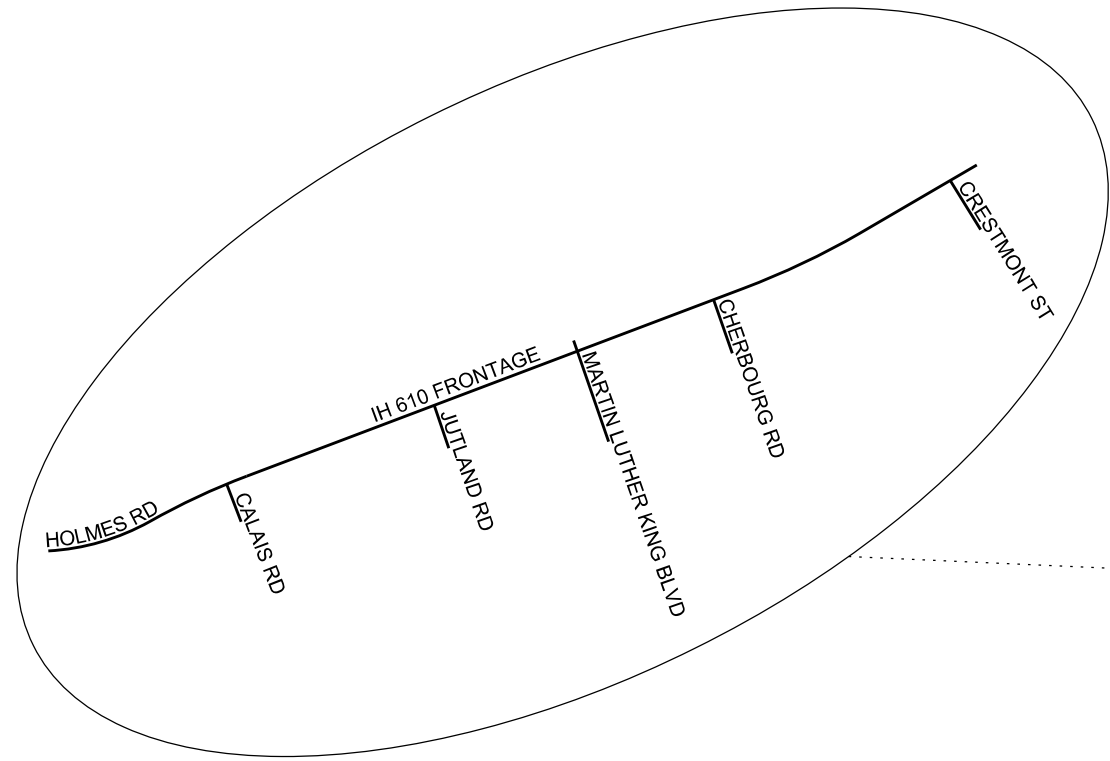
PROJECT NO. C-271-16-167
CONTROL CSJ: 0271-16-167
IH 610 FRONTAGE WB

LIMITS: CRESTMONT ST. TO HOLMS RD.
TOTAL PROJECT LENGTH = 6,639.2 FT = 1.257 MI

FOR THE CONSTRUCTION OF MILLING AND OVERLAYING
OF A FREEWAY FACILITY CONSISTED OF REPLACE PAVEMENT MARKING

DESIGN SPEED & ADT			
MAINLANES.....	60 MPH		
FRONTAGE ROADS.....	45 MPH		
	2024	2044	
IH 610 FRONTAGE	5,013	6,941	

CONT.	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE	COUNTY		SHEET NO.
HOU	HARRIS		1



VICINITY MAP

END PROJECT
CSJ 0271-16-167
STA 209+17.62
REF MARK: 35+0.52
LAT.: 29° 41' 21.41"N
LONG.: 95° 19' 55.47"W

BEGIN PROJECT
CSJ 0271-16-167
STA 142+78.34
REF MARK: 36+0.78
LAT.: 29° 40' 57.81"N
LONG.: 95° 21' 5.31"W

PROJECT LOCATION MAP
N. T. S.

EXCEPTION: NONE
EQUATION: NONE
RAILROAD CROSSING: NONE

FILE: H:\00\Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontageCrestmont+Callien+TITLE SHEET.dgn
DATE: 11/29/2023
PROJECT: 0271-16-167

COUNTY HARRIS
PROJ. NO. C-271-16-167
LETTING DATE FEBRUARY 2024
CONTRACTOR NAME
CONTRACT BEGIN DATE
WORK COMPLETED DATE
DATE OF ACCEPTANCE

SPECIFICATION ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION
NOVEMBER 01, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS
FOLLOWS SHALL GOVERN ON THIS PROJECT: REQUIRED LABOR PROVISION
FOR STATE PROJECT: SPO00 ---008.

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SUBMITTED FOR LETTING DATE: 11/15/2024
 Muhammad j elahi
 AREA ENGINEER

APPROVED FOR LETTING DATE: 11/21/2023
 James Koch, P.E.
 DISTRICT ENGINEER

FILE: H:\00\Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610\FrontageCrestmont\CulIen\INDEX.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

GENERAL

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3-7	PROJECT LAYOUTS	
8-9	TYPICAL SECTIONS	# 57
10	TYPICAL TRANSITION DETAILS	# 58-63
11, 11A-11E	GENERAL NOTES	# 64-68
12-13	ESTIMATE AND QUANTITY SHEET	# 69-70
14	SUMMARY OF QUANTITIES	# 71

TRAFFIC CONTROL STANDARDS

# 15-26	BC(1)-21 THRU BC(12)-21	
# 27-28	TCP (1-4)-18 THRU TCP (1-5)-18	
# 29-31	TCP (2-4)-18 THRU TCP (2-6)-18	
# 32	TCP (3-2)-13	75
# 33	TCP (3-3)-14	76-77
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# 35	TCP (3-5)-18	
# 36-39	TCP (6-2)-12 THRU TCP (6-5)-12	# 78
# 40-43	TCP (SC-5)-22 THRU TCP (SC-8)-22	
# 44	WZ(TD)-17	
# 45	WZ (RCD)-13	
# 46	WZ (STPM)-23	
# 47	WZ (UL)-13	

ROADWAY STANDARDS

# 48-49	REPCP-14
# 50	TE(HMAC)-11

CURB & GUTTER STANDARDS

# 51	CCCG-22
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PAVEMENT MARKING DETAILS

IH 610 STRIPING LAYOUTS

PAVEMENT MARKING STANDARDS

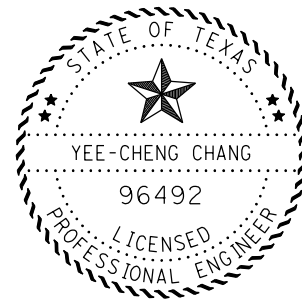
CPM (1)-23
FPM (1)-22 THRU FPM(6)-22
PM(1)-22 THRU PM(5)-22
ER-FR (1)-09 THRU ER-FR(2)-09 (HOU)
PM (CLL)-14 (HOU)
PM (DOT)-11 (HOU)
PM (R&G)-10 (HOU)
PM (20) (HOU)

ENVIRONMENTAL

EPIC
SWP3

ENVIRONMENTAL STANDARD

ECL-12



The standard sheets specifically identified above have been selected by me or under my responsible supervision as being applicable to this project."

Eddy Choy
YEE-CHENG CHANG

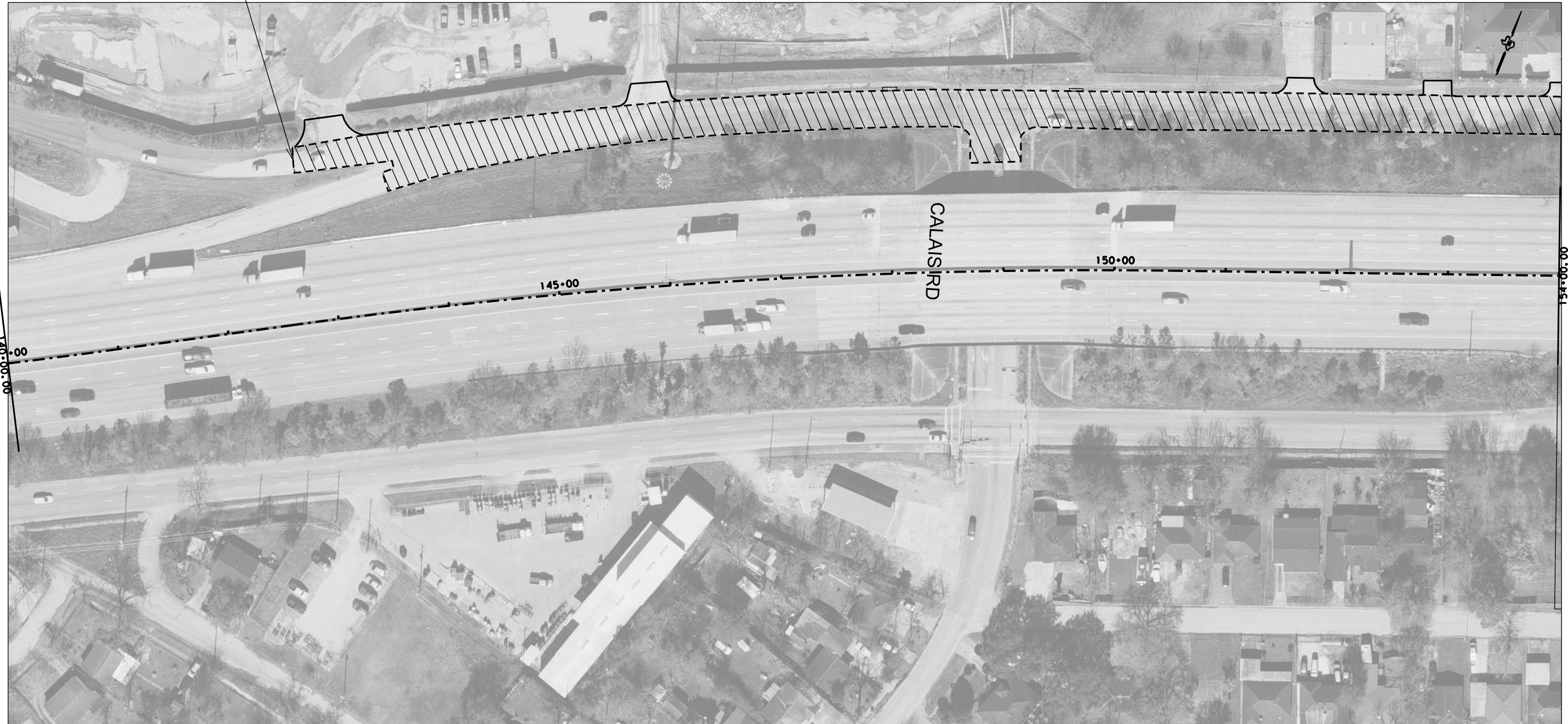
11/9/2023
DATE

INDEX OF SHEETS
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CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY	SHEET NO.	
HOU	HARRIS	2	

BEGIN PROJECT
STA 142+78.34
MILL & OVERLAY
PAVEMENT MARKING

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY
0316-6009	ASPH (A-R TYPE II OR III)	GAL	2179.67
0316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B))	CY	39.92
0354-6037	PLANE CONC PAV(0" TO 2")	SY	5189.70
0361-6064	FULL-DEPTH REPAIR CRCP (6"-7")	SY	207.60
3077-6051	SP MIXES SP-D PG70-22	TON	428.14



FILE: H:\00\Main\Intenance\METRO MA INTENANCE\FY22-23 RMCs\1H610FrontsgeCrestmont\Cullien\GeoPak\CutSheets\PROJECT LAYOUT1.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

NOTES:

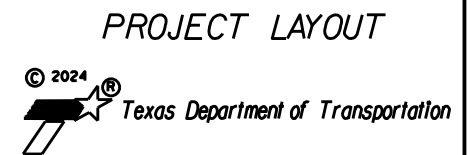
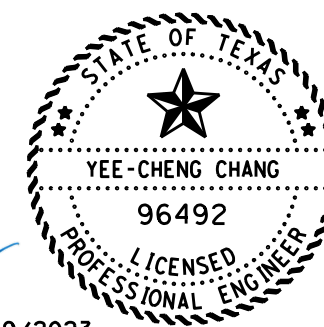
1. THE SEAL COAT WILL BE COVERED WITH THE HMA OVERLAY (ITEM 316) PRIOR TO REOPENING TO TRAFFIC EACH DAY. THE ROADWAY WILL NOT BE OPENED TO TRAFFIC UNTIL THE HMA AND WORK ZONE PAVEMENT MARKINGS ARE IN PLACE.
2. MILLING OPERATIONS MUST BE PERFORMED BEGINNING WITH THE OUTSIDE LANE AND WORKING INWARDS IN EACH ADJOINING LANE.
3. FOR LIMITS OF ACP OVERLAY AT DRIVEWAYS AND ROADWAYS SEE "ACP OVERLAY DETAILS".
4. FOR PAVEMENT MARKINGS SEE "PAVEMENT MARKINGS LAYOUT" AND STANDARD SHEETS. ELIMINATING RAISED PAVEMENT MARKERS IS SUBSIDIARY TO THE VARIOUS BID ITEMS.
5. THE LOCATION OF BASE REPAIR AREA VARIES AND WILL BE DIRECTED BY THE ENGINEER IN THE FIELD.
6. REMOVE DIRT, DUST, OR OTHER LOOSE MATERIAL BEFORE PLACING UNDERSEAL COURSE. NO ADDITIONAL PAYMENT WILL BE MADE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

LEGEND:

- PROPOSED 2" MILL
- PROPOSED 0.5" SEAL COAT
- PROPOSED 1.5" SP MIXES SP PG70-22

Eddy Chang

11/9/2023



CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		3

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY
0316-6009	ASPH (A-R TYPE II OR III)	GAL	2325.00
0316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B))	CY	42.58
0354-6037	PLANE CONC PAV(0" TO 2")	SY	5535.70
0361-6064	FULL-DEPTH REPAIR CRCP (6"-7")	SY	221.43
3077-6051	SP MIXES SP-D PG70-22	TON	456.70



FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\1H610FronstgeCrestmont\Cullien\GeoPak\CutSheets\PROJECT LAYOUT2.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

NOTES:

1. THE SEAL COAT WILL BE COVERED WITH THE HMA OVERLAY (ITEM 316) PRIOR TO REOPENING TO TRAFFIC EACH DAY. THE ROADWAY WILL NOT BE OPENED TO TRAFFIC UNTIL THE HMA AND WORK ZONE PAVEMENT MARKINGS ARE IN PLACE.
2. MILLING OPERATIONS MUST BE PERFORMED BEGINNING WITH THE OUTSIDE LANE AND WORKING INWARDS IN EACH ADJOINING LANE.
3. FOR LIMITS OF ACP OVERLAY AT DRIVEWAYS AND ROADWAYS SEE "ACP OVERLAY DETAILS".
4. FOR PAVEMENT MARKINGS SEE "PAVEMENT MARKINGS LAYOUT" AND STANDARD SHEETS. ELIMINATING RAISED PAVEMENT MARKERS IS SUBSIDIARY TO THE VARIOUS BID ITEMS.
5. THE LOCATION OF BASE REPAIR AREA VARIES AND WILL BE DIRECTED BY THE ENGINEER IN THE FIELD.
6. REMOVE DIRT, DUST, OR OTHER LOOSE MATERIAL BEFORE PLACING UNDERSEAL COURSE. NO ADDITIONAL PAYMENT WILL BE MADE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

LEGEND:

- PROPOSED 2" MILL
- PROPOSED 0.5" SEAL COAT
- PROPOSED 1.5" SP MIXES SP PG70-22

PROJECT LAYOUT

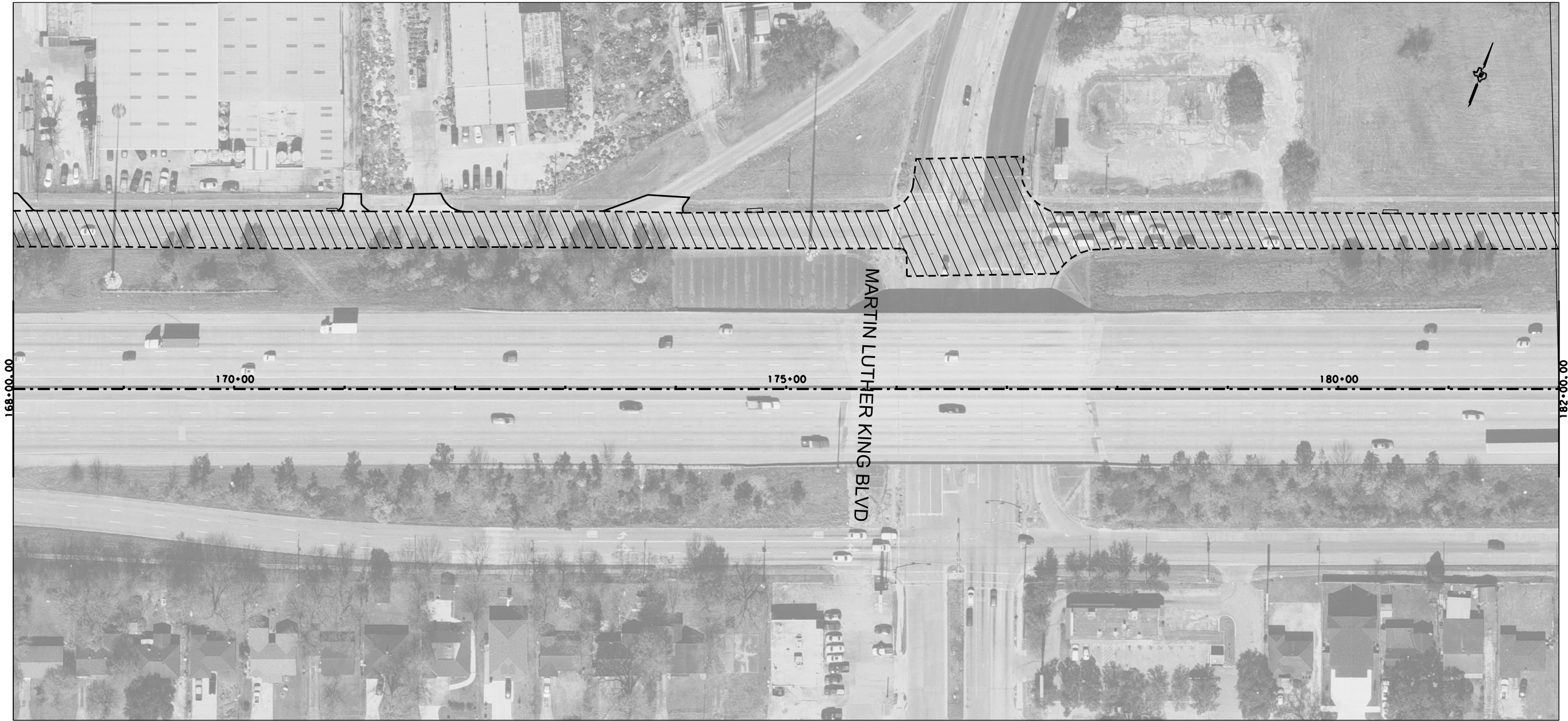


Eddy Chay

11/9/2023

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		4

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY
0316-6009	ASPH (A-R TYPE II OR III)	GAL	2555.55
0316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B)	CY	46.81
0354-6037	PLANE CONC PAV(0" TO 2")	SY	6084.70
0361-6064	FULL-DEPTH REPAIR CRCP (6"-7")	SY	243.40
3077-6051	SP MIXES SP-D PG70-22	TON	502.00



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 DATE: 11/9/2023
 PROJECT: 0271-16-167

NOTES:

1. THE SEAL COAT WILL BE COVERED WITH THE HMA OVERLAY (ITEM 316) PRIOR TO REOPENING TO TRAFFIC EACH DAY. THE ROADWAY WILL NOT BE OPENED TO TRAFFIC UNTIL THE HMA AND WORK ZONE PAVEMENT MARKINGS ARE IN PLACE.
2. MILLING OPERATIONS MUST BE PERFORMED BEGINNING WITH THE OUTSIDE LANE AND WORKING INWARDS IN EACH ADJOINING LANE.
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LEGEND:

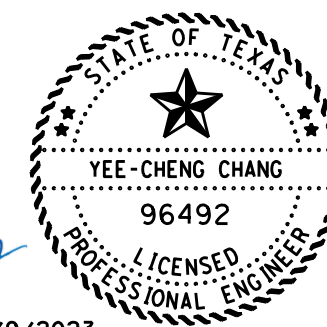
- PROPOSED 2" MILL
- PROPOSED 0.5" SEAL COAT
- PROPOSED 1.5" SP MIXES SP PG70-22

PROJECT LAYOUT



Eddy Chang

11/9/2023



CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		5

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY
0316-6009	ASPH (A-R TYPE II OR III)	GAL	2317.05
0316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B))	CY	42.44
0354-6037	PLANE CONC PAV(0" TO 2")	SY	5516.70
0361-6064	FULL-DEPTH REPAIR CRCP (6"-7")	SY	220.67
3077-6051	SP MIXES SP-D PG70-22	TON	455.13



FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\1H610FrontsgeCrestmont\Cul1en\GeoPak\CutSheets\PROJECT LAYOUT4.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

NOTES:

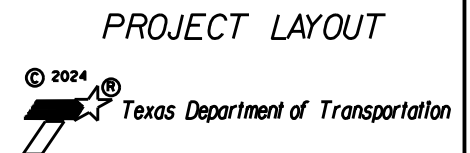
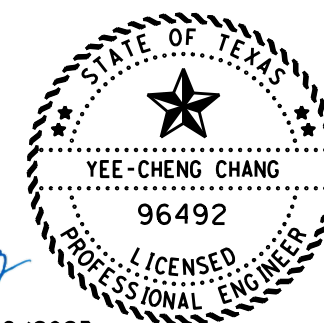
1. THE SEAL COAT WILL BE COVERED WITH THE HMA OVERLAY (ITEM 316) PRIOR TO REOPENING TO TRAFFIC EACH DAY. THE ROADWAY WILL NOT BE OPENED TO TRAFFIC UNTIL THE HMA AND WORK ZONE PAVEMENT MARKINGS ARE IN PLACE.
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LEGEND:

- PROPOSED 2" MILL
- PROPOSED 0.5" SEAL COAT
- PROPOSED 1.5" SP MIXES SP PG70-22

Eddy Choy

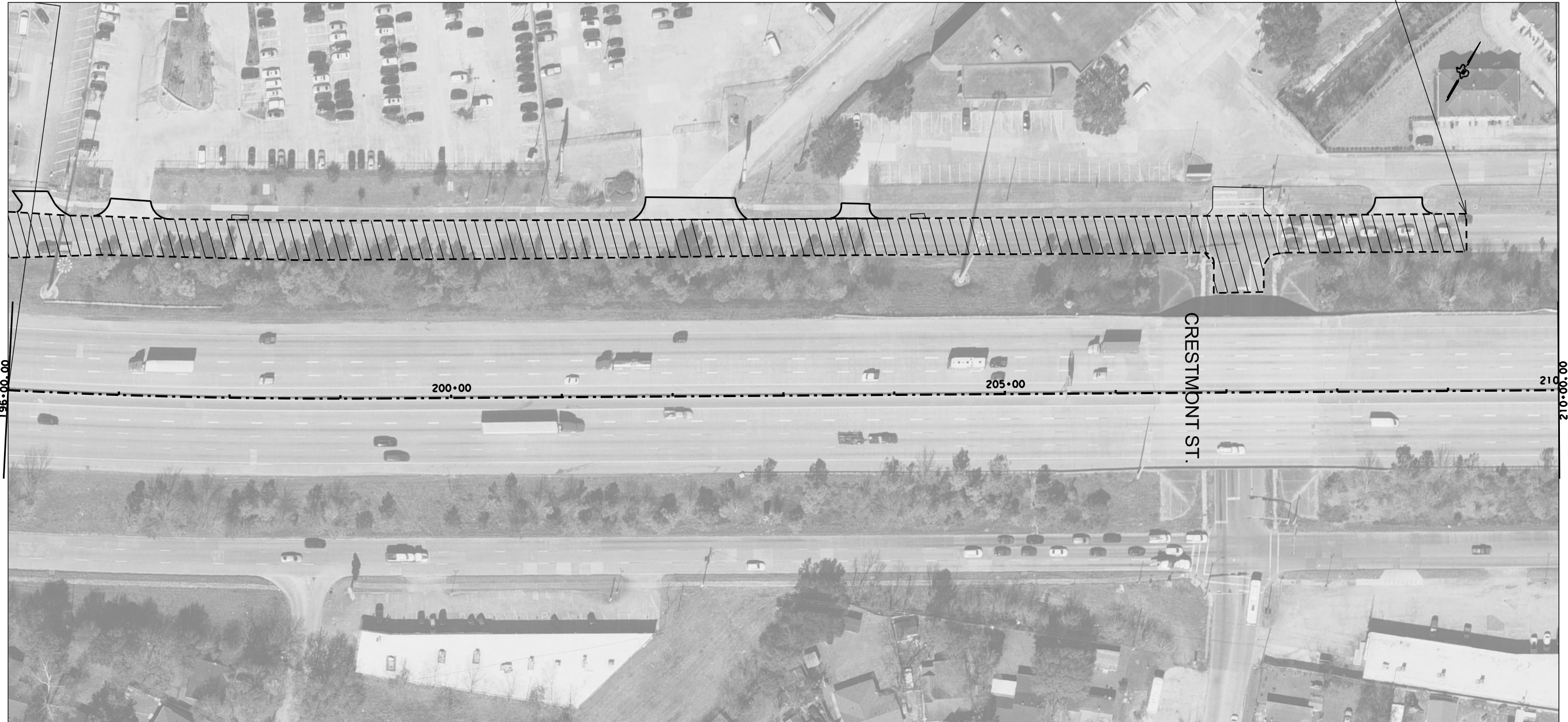
11/9/2023



CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		6

ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY
0316-6009	ASPH (A-R TYPE II OR III)	GAL	1890.00
0316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B))	CY	34.61
0354-6037	PLANE CONC PAV(0" TO 2")	SY	4500.00
0361-6064	FULL-DEPTH REPAIR CRCP (6"-7")	SY	180.00
3077-6051	SP MIXES SP-D PG70-22	TON	371.24

END PROJECT
 STA 209+17.62
 MILL & OVERLAY
 PAVEMENT MARKING



FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\1H610FontsgCrestmont\Cullien\GeoPak\CutSheets\PROJECT LAYOUT5.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

NOTES:

1. THE SEAL COAT WILL BE COVERED WITH THE HMA OVERLAY (ITEM 316) PRIOR TO REOPENING TO TRAFFIC EACH DAY. THE ROADWAY WILL NOT BE OPENED TO TRAFFIC UNTIL THE HMA AND WORK ZONE PAVEMENT MARKINGS ARE IN PLACE.
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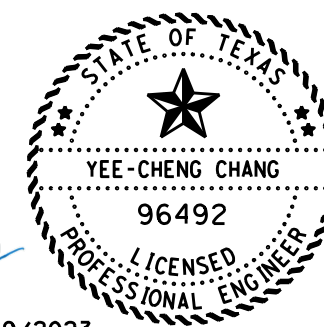
- PROPOSED 2" MILL
- PROPOSED 0.5" SEAL COAT
- PROPOSED 1.5" SP MIXES SP PG70-22

PROJECT LAYOUT



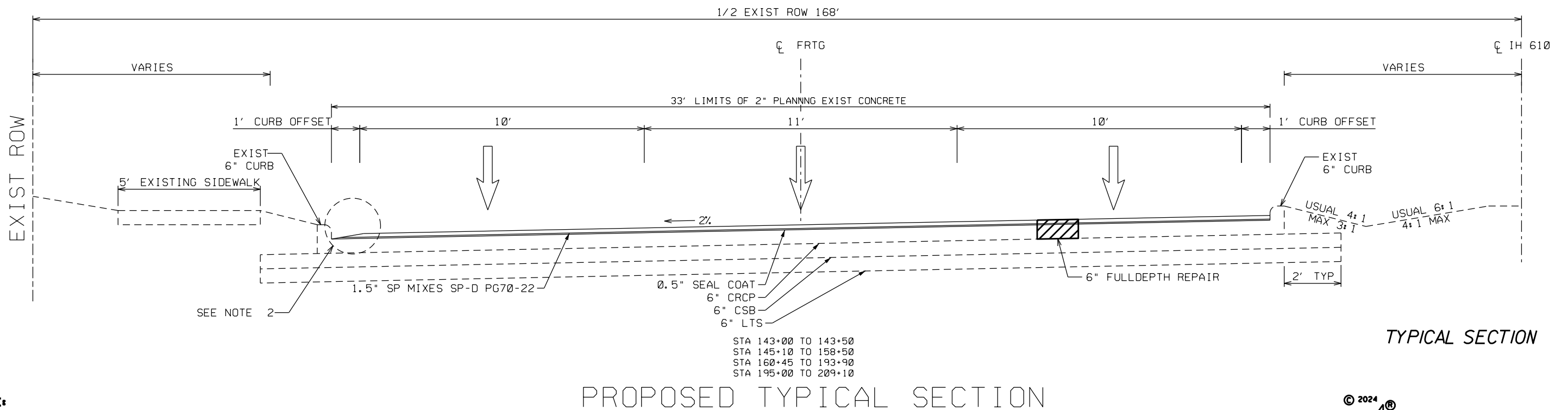
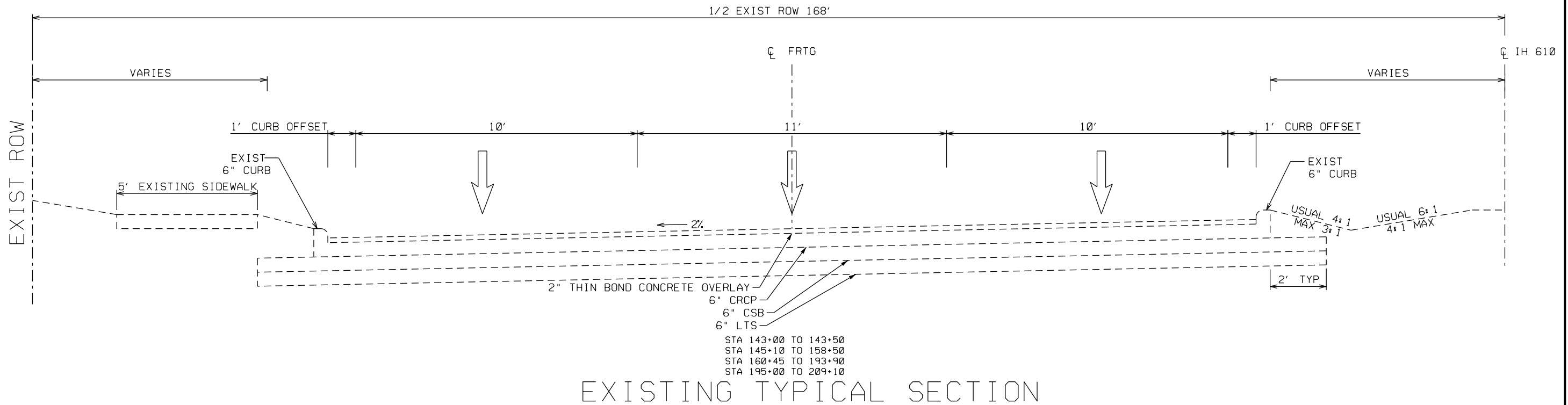
Eddy Chang

11/9/2023



CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		7

FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\IH610FrontsgeCrestmont+CulIlen\TYPICAL SECTION1.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



NOTE:

- 1 SURFACE TEST TYPE B PAY ADJUSTMENT SCHEDULE 3 IS APPLICABLE FOR THIS PROJECT. SEE ITEM 585 "RIDE QUALITY FOR PAVEMENT SURFACE" UNDER GENERAL NOTES.
- 2 SEE SHEET "TYPICAL TRANSITION DETAILS" FOR MORE INFORMATION.
- 3 LOCATIONS AND SIZES OF ALL FULL-DEPTH CONCRETE REPAIRS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
- 4 LOCATIONS AND SIZES OF ALL FULL-DEPTH CONCRETE REPAIRS TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
- 5 FOR PAVEMENT MARKINGS, SEE PAVEMENT MARKING LAYOUT AND STANDARD SHEETS.
- 6 REMOVE DIRT, DUST, OR OTHER MATERIAL BEFORE ASPHALT SEALING. NO ADDITIONAL PAYMENT WILL BE MADE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.
- 7 MATCH EXISTING CROSS SLOPES.

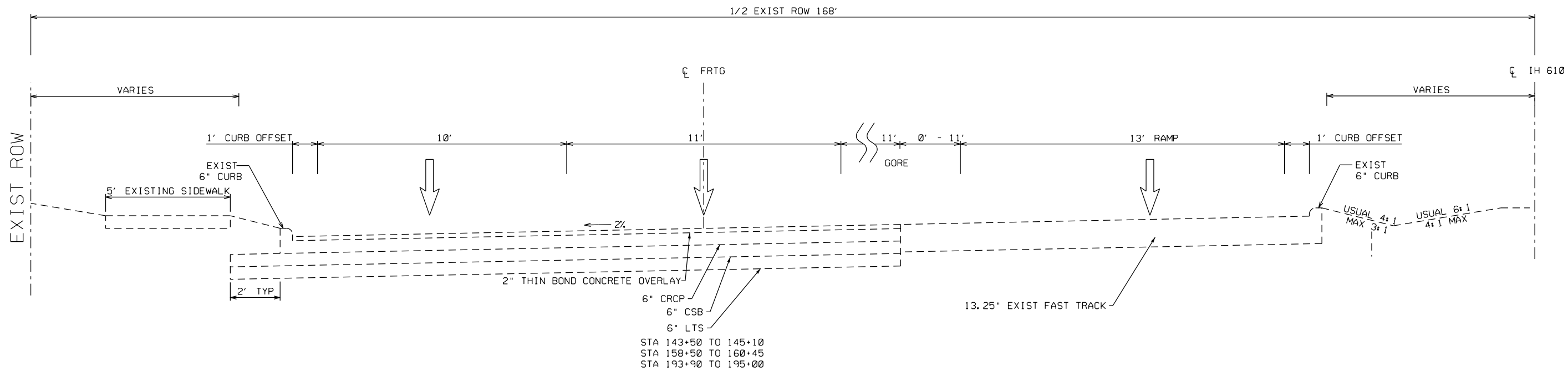
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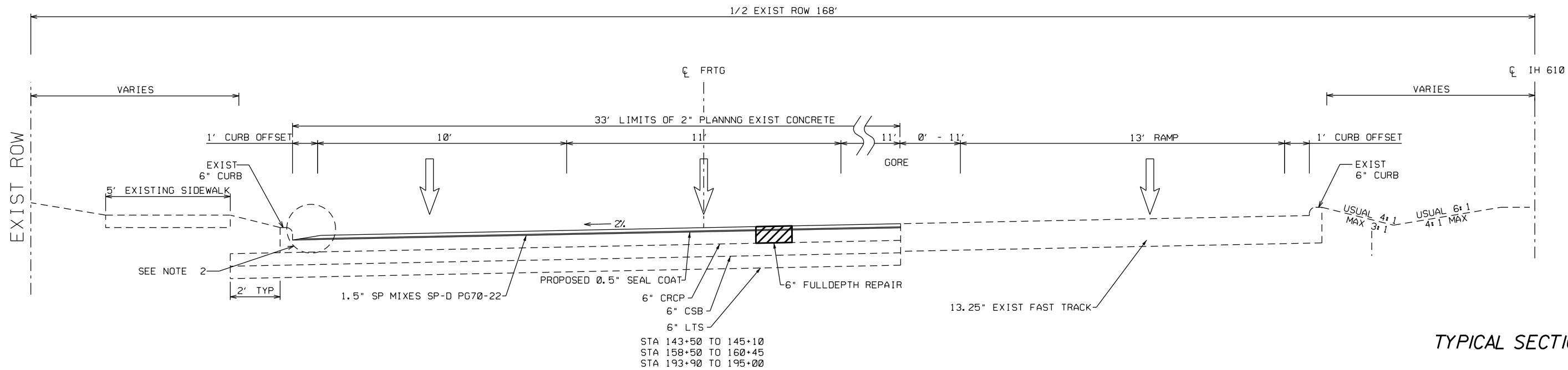
11/9/2023

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		8

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



EXISTING TYPICAL SECTION

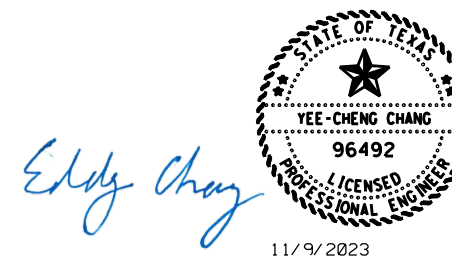


PROPOSED TYPICAL SECTION

TYPICAL SECTION

NOTE:

- 1 SURFACE TEST TYPE B PAY ADJUSTMENT SCHEDULE 3 IS APPLICABLE FOR THIS PROJECT. SEE ITEM 585 "RIDE QUALITY FOR PAVEMENT SURFACE" UNDER GENERAL NOTES.
- 2 SEE SHEET "TYPICAL TRANSITION DETAILS" FOR MORE INFORMATION.
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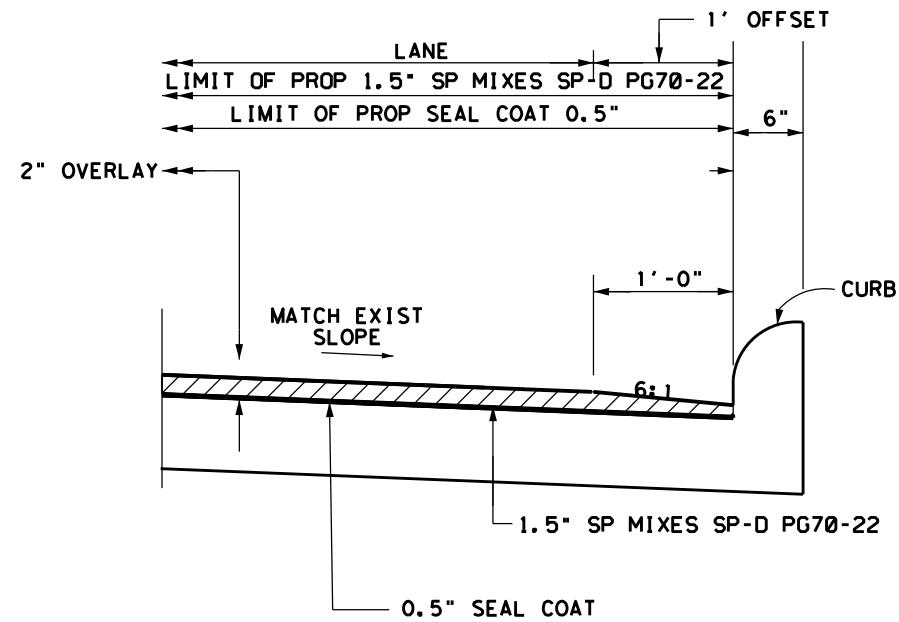


Eddy Chang

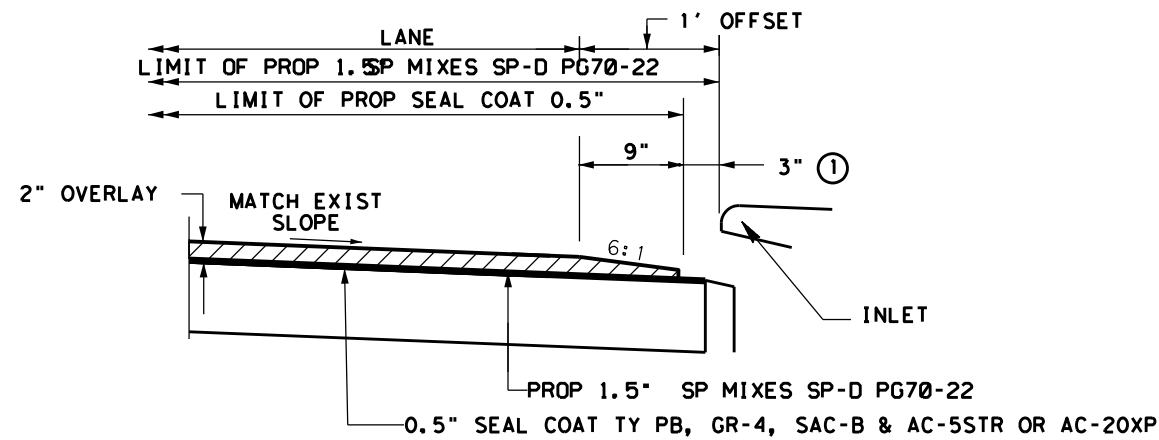
11/9/2023

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY	SHEET NO.	
HOU	HARRIS	9	

FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\1161 OF FrontageCrestmont\Cullien\TYPICAL TRANSITION DETAILS.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



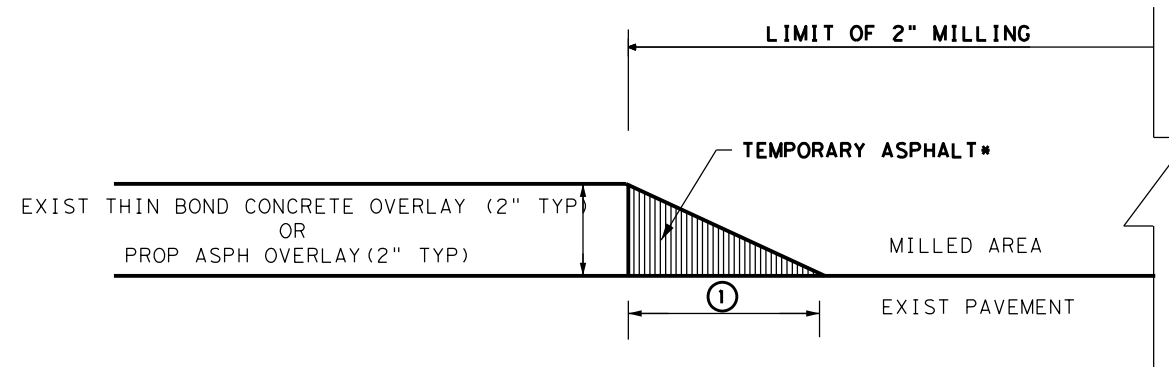
AT TYPICAL CURB LOCATIONS



AT INLET LOCATIONS

NOTES:

- ① HAND FINISH OVERLAY AROUND INLET DRAIN OPENINGS. LEAVE A 3" MIN GAP AROUND OPENING.



① FOR PARALLEL TRAFFIC USE 6:1 TAPER.

*INSTALLATION AND REMOVAL OF TEMPORARY ASPHALT WILL BE INCIDENTAL TO MILLING BID ITEMS.

TEMPORARY ASPHALT FOR PHASED CONSTRUCTION

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TYPICAL TRANSITION DETAILS

Eddy Choy
 11/9/2023

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY	SHEET NO.	
HOU	HARRIS	10	

County: Harris**Highway:** IH 610

Schedule work so that the base placement operations follow the subgrade work as closely as practical to reduce the hazard to the traveling public and to prevent undue delay caused by wet weather.

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

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at <https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design>. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

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:

County: Harris**Highway:** IH 610

- 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.

Place erosion control measures around the perimeter of impacted wetlands as shown in the above mentioned U.S. Army Corps of Engineers Nationwide permits. During staging and construction operations, equipment is not allowed in the Waters of the United States.

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 identified.

The nesting / breeding season for migratory birds is February 15 through September 30.

Conduct any tree removal outside of the migratory bird nesting season. If this is not possible due to scheduling, then exercise caution to remove only those trees with no active nests. Do not destroy nests on structures or in trees within the project limits during the nesting / breeding season.

Take measures to prevent the building of nests on any structures or trees within the project limits throughout the duration of the construction if work / removal will be performed during the

County: Harris**Highway:** IH 610

nesting / breeding season. This can be accomplished by application of bird repellent gel, netting by hand every 3 to 4 days, or any other non-threatening method approved by the Houston District Environmental Section. Obtain this approval well in advance of the planned use. Contact the Houston District Environmental Section at 713-802-5244. The cost of this work is subsidiary to the various bid items.

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

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

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

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 Five-Day Workweek with nighttime only in accordance with Section 8.3.1.6.

Provide a virus-free computer disk or other acceptable electronic media containing the Primavera construction schedule.

The Lane Closure Assessment Fee is \$ 200.00. This fee applies to the Contractor for closures or obstructions that overlap into restricted hour traffic for each hour or portion thereof, per lane, regardless of the length of lane closure or obstruction. For Restricted Hours subject to Lane Assessment Fee refer to the Item, "Barricades, Signs, and Traffic Handling." The time increment for the Lane Closure Assessment fee for this project is one hour.

Item 316: Seal Coat**County:** Harris**Highway:** IH 610

The asphalt application rate shown on the "Basis of Estimate" is an average rate for calculating asphalt quantities. Vary the rate based on the pavement conditions and other factors such as the type and grade of aggregate used, weather, and traffic.

Allowable Asphalt Cements based on Average Daily Traffic (ADT) are shown below:

<u>For ADT greater than 5000</u>	<u>ADT 1000 to 5000</u>	<u>ADT less than 1000</u>
AC-20 XP	AC-15P	AC-10-2TR
AC-20-5TR	AC-20-5TR	AC-10 w/2% SBR
	AC-20-XP	AC-15P
	AC-10-2TR	

Item 361: Repair of Concrete Pavement

For full depth repair, remove only the quantity of pavement replaceable during the daily allowable work schedule.

Remove loose sub-base material and replace it with concrete. Use a bondbreaker, such as a polyethylene sheet, at the interface between the replaced sub-base material and the new concrete pavement.

Supply polyethylene fabric on the job site sufficient to cover the area of repair.

Do not place concrete if impending weather may result in rainfall or low temperatures that may impair the quality of the finished work.

Repair portions of the concrete pavement surfaces that are damaged while in a plastic state before those areas receive permanent pavement markings and open to traffic. Perform repairs that are structurally equivalent to and cosmetically uniform with adjacent undamaged areas. Do not repair by grouting onto the surface.

Ready mix concrete will be permitted if the equipment and construction methods can produce the desired results. Hand finishing will be permitted.

Perform saw cutting as shown on the plans in accordance with Section 360.4.10, "Sawing Joints." This saw cutting is subsidiary to this bid Item.

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. The latest versions of Work Zone Standard Sheets WZ (BTS-1) and WZ (BTS-2) are the traffic control plan for the signal installations.

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

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

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

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

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

If a section is not complete before the end of the workday, pull back the base material to the existing pavement edge on a 6H: 1V slope. Edge drop-offs during the hours of darkness are not permitted.

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.

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

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

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

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

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

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

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

One and Two Lane Closures on IH 610 Frontage Roads and Intersections

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours
Monday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Tuesday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Wednesday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00PM
Thursday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Friday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Saturday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Sunday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM

Full Closure

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours
Monday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Tuesday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM

Day	Daytime Closure Hours	Nighttime Closure Hours	Restricted Hours
Wednesday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00PM
Thursday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Friday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Saturday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM
Sunday	N/A	12:00 AM – 5:00 AM 9:00 PM – 11:59 PM	5:00AM – 9:00 PM

County: Harris**Highway:** IH 610

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

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

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

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

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

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 506: Temporary Erosion, Sedimentation, and Environmental Control

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.

Item 529: Concrete Curb, Gutter, and Combined Curb and Gutter

An air-entraining admixture is not required.

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For concrete curbs, use Grade 7 aggregate conforming to Section 421.2.6 of the Item, "Hydraulic Cement Concrete."

For driveways and turnouts, coarse aggregate Grade No. 3 through No. 8 conforming to the gradation requirements specified in the Item, "Hydraulic Cement Concrete" will be permitted.

For reinforcing steel in sidewalks and pedestrian ramps, use No. 4 bars at a maximum 18 in. spacing center-to-center in both directions.

Item 662: Work Zone Pavement Markings**Item 666: Reflectorized Pavement Markings****Item 668: Prefabricated Pavement Markings**

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

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

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

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

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

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

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

Stripe all roadways before opening them to traffic.

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

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.

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Item 672: Raised Pavement Markers

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

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

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

Item 677: Eliminating Existing Pavement Markings and Markers

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

Item 678: Pavement Surface Preparation for Markings

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

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

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

Do not clean concrete pavement by grinding.

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

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

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

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.

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

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

Basis of Estimate

Item	Description	Limit and Rate	Unit
316	Seal Coat	0.32 Gal. / Sq. Yd.	GAL
	<ul style="list-style-type: none"> • Asphalt • Aggregate (Gr 4) 	1/130 Cu. Yd. / Sq. Yd.	CY
	A-R Binder	0.42 Gal. / Sq. Yd.	GAL
	<ul style="list-style-type: none"> • Asphalt • Aggregate (Gr 4) 	1/130 Cu. Yd. / Sq. Yd.	CY
3077	Superpave Mixtures	100 Lb. / Sq. Yd.-In.	TON
	<ul style="list-style-type: none"> • Asphalt • Aggregate 	8 % by weight 92 % by weight	

* If used in existing roadway base, rate will be determined on a case by case basis.

County: Harris**Highway:** IH 610**General Notes:****General:**

Area Engineer contact information for this project follows:

Jamal Elahi, P.E.
Jamal.Elahi@txdot.gov

Vanessa Bosques, P.E.
Vanessa.bosques@txdot.gov

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

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

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

Large files with relevant project documentation, such as Geotech reports, As-Built plans, and cross-sections will continue to be provided on the following FTP site:

[Index of /pub/txdot-info/Pre-Letting Responses/Houston District \(state.tx.us\)](#) or

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

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.

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

The following standard detail sheets are modified:

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.

County: Harris**Highway:** IH 610

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.

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

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

General: Site Management

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

Schedule construction operations such that preparing individual items of work follows in close sequence to constructing storm drains in order to provide as little inconvenience as practical to the businesses and residents along the project.



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0271-16-167

DISTRICT Houston
HIGHWAY IH 610

COUNTY Harris

CONTROL SECTION JOB				0271-16-167		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00197986			
COUNTY				Harris			
HIGHWAY				IH 610			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	316-6009	ASPH (A-R TYPE II OR III)	GAL	11,267.260		11,267.260	
	316-6434	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B)	CY	206.360		206.360	
	354-6037	PLANE CONC PAV(0" TO 2")	SY	26,826.800		26,826.800	
	361-6064	FULL-DEPTH REPAIR CRCP (6"-7")	SY	1,073.100		1,073.100	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2.000		2.000	
	529-6002	CONC CURB (TY II)	LF	500.000		500.000	
	662-6046	WK ZN PAV MRK REMOV (REFL) TY I-A	EA	19.000		19.000	
	662-6048	WK ZN PAV MRK REMOV (REFL) TY I-C	EA	75.000		75.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	56.000		56.000	
	662-6052	WK ZN PAV MRK REMOV (REFL) TY II-C-R	EA	183.000		183.000	
	662-6064	WK ZN PAV MRK REMOV (W)6"(BRK)	LF	3,516.000		3,516.000	
	662-6065	WK ZN PAV MRK REMOV (W)6"(DOT)	LF	115.000		115.000	
	662-6067	WK ZN PAV MRK REMOV (W)6"(SLD)	LF	840.000		840.000	
	662-6071	WK ZN PAV MRK REMOV (W)8"(SLD)	LF	1,479.000		1,479.000	
	662-6073	WK ZN PAV MRK REMOV (W)12"(SLD)	LF	1,690.000		1,690.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	591.000		591.000	
	662-6080	WK ZN PAV MRK REMOV (W)(ARROW)	EA	15.000		15.000	
	662-6081	WK ZN PAV MRK REMOV (W)(DBL ARROW)	EA	4.000		4.000	
	662-6082	WK ZN PAV MRK REMOV (W)(ENTR GORE)	EA	2.000		2.000	
	662-6083	WK ZN PAV MRK REMOV (W)(EXIT GORE)	EA	1.000		1.000	
	662-6090	WK ZN PAV MRK REMOV (W)(WORD)	EA	14.000		14.000	
	662-6098	WK ZN PAV MRK REMOV (Y)6"(SLD)	LF	2,150.000		2,150.000	
	662-6099	WK ZN PAV MRK REMOV (Y)8"(SLD)	LF	380.000		380.000	
	662-6100	WK ZN PAV MRK REMOV (Y)12"(SLD)	LF	256.000		256.000	
	666-6018	REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	115.000		115.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	1,479.000		1,479.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	1,690.000		1,690.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	591.000		591.000	
	666-6081	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	EA	2.000		2.000	
	666-6084	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	EA	1.000		1.000	
	666-6138	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF	380.000		380.000	
	666-6141	REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	256.000		256.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	3,516.000		3,516.000	
	666-6225	PAVEMENT SEALER 6"	LF	10,137.000		10,137.000	
	666-6226	PAVEMENT SEALER 8"	LF	1,859.000		1,859.000	
	666-6228	PAVEMENT SEALER 12"	LF	1,946.000		1,946.000	

DISTRICT	COUNTY	CCSJ	SHEET
Houston	Harris	0271-16-167	12



CONTROLLING PROJECT ID 0271-16-167

DISTRICT Houston
HIGHWAY IH 610

COUNTY Harris

Estimate & Quantity Sheet

CONTROL SECTION JOB				0271-16-167		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00197986			
COUNTY				Harris			
HIGHWAY				IH 610			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	666-6230	PAVEMENT SEALER 24"	LF	591.000		591.000	
	668-6019	PREFAB PAV MRK TY B (W)(ARROW)	EA	15.000		15.000	
	668-6020	PREFAB PAV MRK TY B (W)(DBL ARROW)	EA	4.000		4.000	
	668-6027	PREFAB PAV MRK TY B (W)(WORD)	EA	14.000		14.000	
	672-6006	REFL PAV MRKR TY I-A	EA	19.000		19.000	
	672-6007	REFL PAV MRKR TY I-C	EA	75.000		75.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	56.000		56.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	183.000		183.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	10,137.000		10,137.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	1,859.000		1,859.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	1,946.000		1,946.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	591.000		591.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	15.000		15.000	
	677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	4.000		4.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	14.000		14.000	
	677-6013	ELIM EXT PAV MRK & MRKS (ENTR GORE)	EA	2.000		2.000	
	677-6014	ELIM EXT PAV MRK & MRKS (EXIT GORE)	EA	1.000		1.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	10,137.000		10,137.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	1,859.000		1,859.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	1,946.000		1,946.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	591.000		591.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	15.000		15.000	
	678-6010	PAV SURF PREP FOR MRK (DBL ARROW)	EA	4.000		4.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	14.000		14.000	
	3077-6051	SP MIXES SP-D PG70-22	TON	2,213.210		2,213.210	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	150.000		150.000	
	6048-6003	RE PM W/RET REQ TY I (W)6"(BRK)	LF	3,516.000		3,516.000	
	6048-6004	RE PM W/RET REQ TY I (W)6"(SLD)	LF	840.000		840.000	
	6048-6008	RE PM W/RET REQ TY I (Y)6"(SLD)	LF	2,150.000		2,150.000	
	6185-6002	TMA (STATIONARY)	DAY	120.000		120.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	400.000		400.000	
08		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	

FILE: H:\00-Maintenance\METRO MA INTENANCE\FY22-23 RMCs\IH610FrontageCrestmont+Cuilen\SUMMARY OF QUANTITIES.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

		0316	0316	0354	0361	0529	0662	0662	0662	0662	0662	0662	0662	0662	0662	0662	0662
		6009	6434	6037	6064	6002	6046	6048	6050	6052	6064	6065	6067	6071	6073	6075	6080
		ASPH (A-R TYPE II OR III)	AGGR (TY-PB GR-4 OR TY-PL GR-4 (SAC-B))	PLANE CONC PAV(0" TO 2")	FULL-DEPTH REPAIR CRCP (6"-7")	CONC CURB (TY II)	WK ZN PAV MRK REMOV (REFL) TY I-A	WK ZN PAV MRK REMOV (REFL) TY I-C	WK ZN PAV MRK REMOV (REFL) TY II-A-A	WK ZN PAV MRK REMOV (REFL) TY II-C-R	WK ZN PAV MRK REMOV (W)6"(BRK)	WK ZN PAV MRK REMOV (W)6"(DOT)	WK ZN PAV MRK REMOV (W)6"(SLD)	WK ZN PAV MRK REMOV (W)8"(SLD)	WK ZN PAV MRK REMOV (W)12"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (W)ARROW
	STATION	GAL	CY	SY	SY	LF	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	EA
LAYOUT SHEET 1	142+78.34 154+00	2179.67	39.92	5189.70	207.60	100	0	0	30	36	713	22	240	0	410	140	3
LAYOUT SHEET 2	154+00 168+00	2325.00	42.58	5535.70	221.43	100	19	0	0	29	462	0	160	0	0	0	0
LAYOUT SHEET 3	168+00 182+00	2555.55	46.81	6084.70	243.40	100	0	53	0	45	891	93	240	1055	760	281	8
LAYOUT SHEET 4	182+00 196+00	2317.05	42.44	5516.70	220.67	100	0	0	0	35	700	0	0	0	0	0	0
LAYOUT SHEET 5	196+00 209+17.62	1890.00	34.61	4500.00	180.00	100	0	22	26	38	750	0	200	424	520	170	4
TOTAL		11267.27	206.36	26826.80	1073.10	500	19	75	56	183	3516	115	840	1479	1690	591	15

		0662	0662	0662	0662	0662	0662	0662	0666	0666	0666	0666	0666	0666	0666	0666	0666	0666	0666
		6081	6082	6083	6090	6098	6099	6100	6018	6036	6042	6048	6081	6084	6138	6141	6162	6225	6226
		WK ZN PAV MRK REMOV (W)(DBL ARROW)	WK ZN PAV MRK REMOV (W)(ENTR GORE)	WK ZN PAV MRK REMOV (W)(EXIT GORE)	WK ZN PAV MRK REMOV (W)(WORD)	WK ZN PAV MRK REMOV (Y)6"(SLD)	WK ZN PAV MRK REMOV (Y)8"(SLD)	WK ZN PAV MRK REMOV (Y)12"(SLD)	REFL PAV MRK TY I (W)6"(DOT)(100 MIL)	REFL PAV MRK TY I (W)8"(SLD)(100 MIL)	REFL PAV MRK TY I (W)12"(SLD)(100 MIL)	REFL PAV MRK TY I (W)24"(SLD)(100 MIL)	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	REFL PAV MRK TY I (Y)12"(SLD)(100 MIL)	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	PAVEMENT SEALER 6"	PAVEMENT SEALER 8"
	STATION	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF	LF	EA	EA	LF	LF	LF	LF	LF
LAYOUT SHEET 1	142+78.34 154+00	0	1	0	2	942	0	0	22	0	410	140	1	0	0	0	713	2630	0
LAYOUT SHEET 2	154+00 168+00	0	0	1	0	312	380	256	0	0	0	0	0	1	380	256	462	1396	380
LAYOUT SHEET 3	168+00 182+00	4	0	0	8	0	0	0	93	1055	760	281	0	0	0	0	891	2115	1055
LAYOUT SHEET 4	182+00 196+00	0	1	0	0	265	0	0	0	0	0	0	1	0	0	0	700	1665	0
LAYOUT SHEET 5	196+00 209+17.62	0	0	0	4	631	0	0	0	424	520	170	0	0	0	0	750	2331	424
TOTAL		4	2	1	14	2150	380	256	115	1479	1690	591	2	1	380	256	3516	10137	1859

		0666	0666	0668	0668	0668	0672	0672	0672	0672	0677	0677	0677	0677	0677	0677	0677	0677	0677
		6228	6230	6019	6020	6027	6006	6007	6009	6010	6002	6003	6005	6007	6008	6009	6012	6013	6014
		PAVEMENT SEALER 12"	PAVEMENT SEALER 24"	PREFAB PAV MRK TY B (W)(ARROW)	PREFAB PAV MRK TY B (W)(DBL ARROW)	PREFAB PAV MRK TY B (W)(WORD)	REFL PAV MRKR TY I-A	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (6")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (ARROW)	ELIM EXT PAV MRK & MRKS (DBL ARROW)	ELIM EXT PAV MRK & MRKS (WORD)	ELIM EXT PAV MRK & MRKS (ENTR GORE)	ELIM EXT PAV MRK & MRKS (EXIT GORE)
	STATION	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	EA	EA	EA	EA	EA
LAYOUT SHEET 1	142+78.34 154+00	410	140	3	0	2	0	0	30	36	2630	0	410	140	3	0	2	1	0
LAYOUT SHEET 2	154+00 168+00	256	0	0	0	0	19	0	0	29	1396	380	256	0	0	0	0	0	1
LAYOUT SHEET 3	168+00 182+00	760	281	8	4	8	0	53	0	45	2115	1055	760	281	8	4	8	0	0
LAYOUT SHEET 4	182+00 196+00	0	0	0	0	0	0	0	0	35	1665	0	0	0	0	0	0	1	0
LAYOUT SHEET 5	196+00 209+17.62	520	170	4	0	4	0	22	26	38	2331	424	520	170	4	0	4	0	0
TOTAL		1946	591	15	4	14	19	75	56	183	10137	1859	1946	591	15	4	14	2	1

		0678	0678	0678	0678	0678	0678	0678	3077	6001	6048	6048	6048	6185	6185
		6002	6004	6006	6008	6009	6010	6016	6051	6001	6003	6004	6008	6002	6003
		PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (DBL ARROW)	PAV SURF PREP FOR MRK (WORD)	SP MIXES SP-D PG70-22	PORTABLE CHANGEABLE MESSAGE SIGN	RE PM W/RET REQ TY I (W)6"(BRK)	RE PM W/RET REQ TY I (W)6"(SLD)	RE PM W/RET REQ TY I (Y)6"(SLD)	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	STATION	LF	LF	LF	LF	EA	EA	EA	TON	DAY	LF	LF	LF	DAY	HR
LAYOUT SHEET 1	142+78.34 154+00	2630	0	410	140	3	0	2	428.14		713	240	942		
LAYOUT SHEET 2	154+00 168+00	1396	380	256	0	0	0	0	456.70		462	160	312		
LAYOUT SHEET 3	168+00 182+00	2115	1055	760	281	8	4	8	502.00		891	240	0		
LAYOUT SHEET 4	182+00 196+00	1665	0	0	0	0	0	0	455.13		700	0	265		
LAYOUT SHEET 5	196+00 209+17.62	2331	424	520	170	4	0	4	371.24		750	200	631		
TOTAL		10137	1859	1946	591	15	4	14	2213.21	150	3516	840	2150	120	400

SUMMARY OF QUANTITIES



CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH610
STATE DIST. NO.	COUNTY	SHEET NO.	
HOU	HARRIS	14	

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

WORKER SAFETY NOTES:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

SHEET 1 OF 12



**BARRICADE AND CONSTRUCTION
GENERAL NOTES
AND REQUIREMENTS**

BC (1) - 21

FILE#	bc-21.dgn	DATE	TxDOT	CR#	TxDOT	DATE	TxDOT	CR#	TxDOT
© TxDOT	November 2002	CONT	16	SECT	167	JOB	1H610	HIGHWAY	
REVISIONS		DIST	COUNTY		SHEET NO.				
4-03	7-13	12	HARRIS		15				
9-07	8-14								
5-10	5-21								

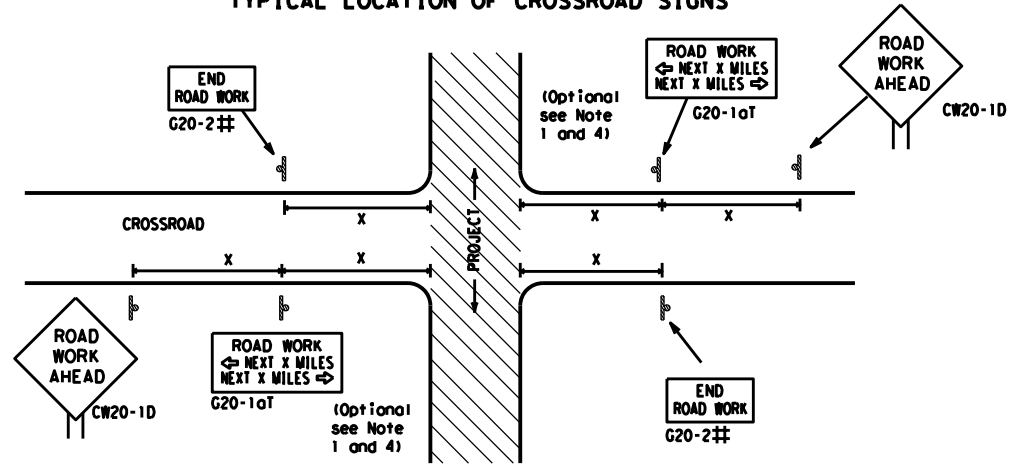
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 DATE: 11/9/2023
 PROJECT: 0271-16-167

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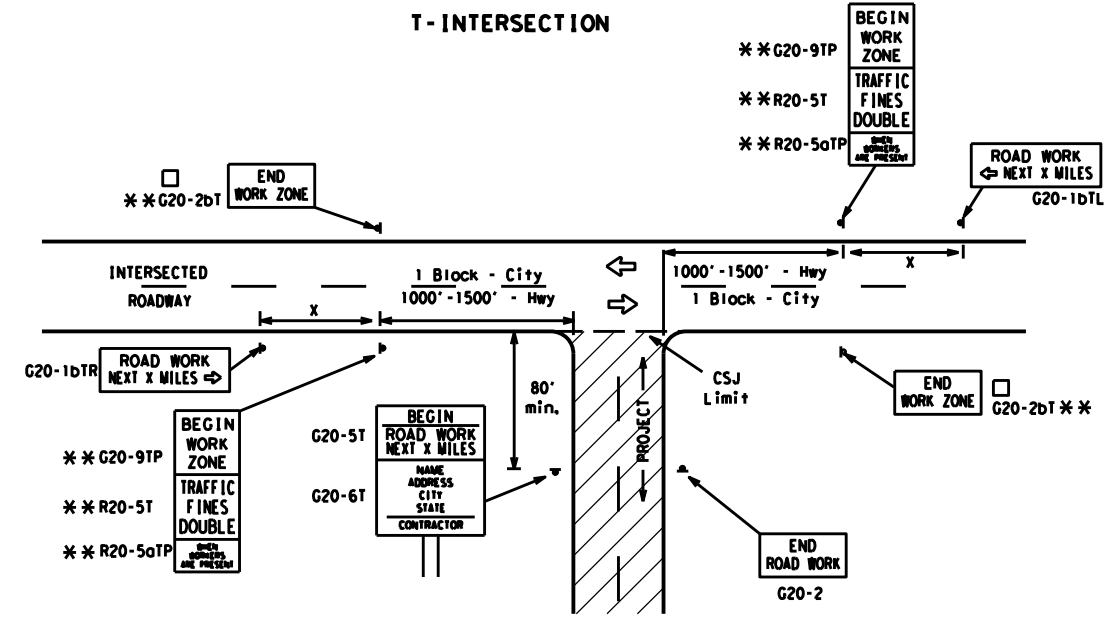
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 DATE: 11/9/2023
 PROJECT: 0271-16-167

TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING^{1,5,6}

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

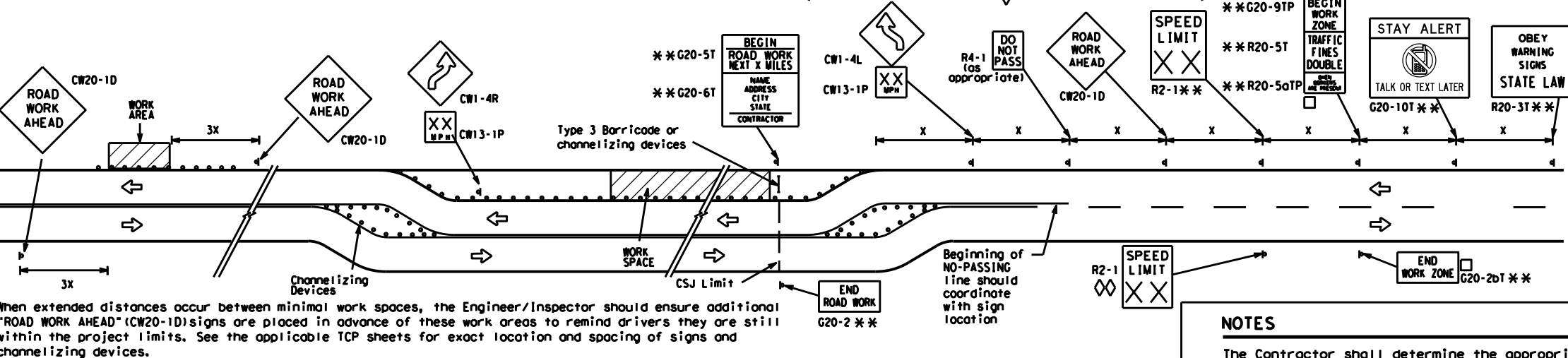
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

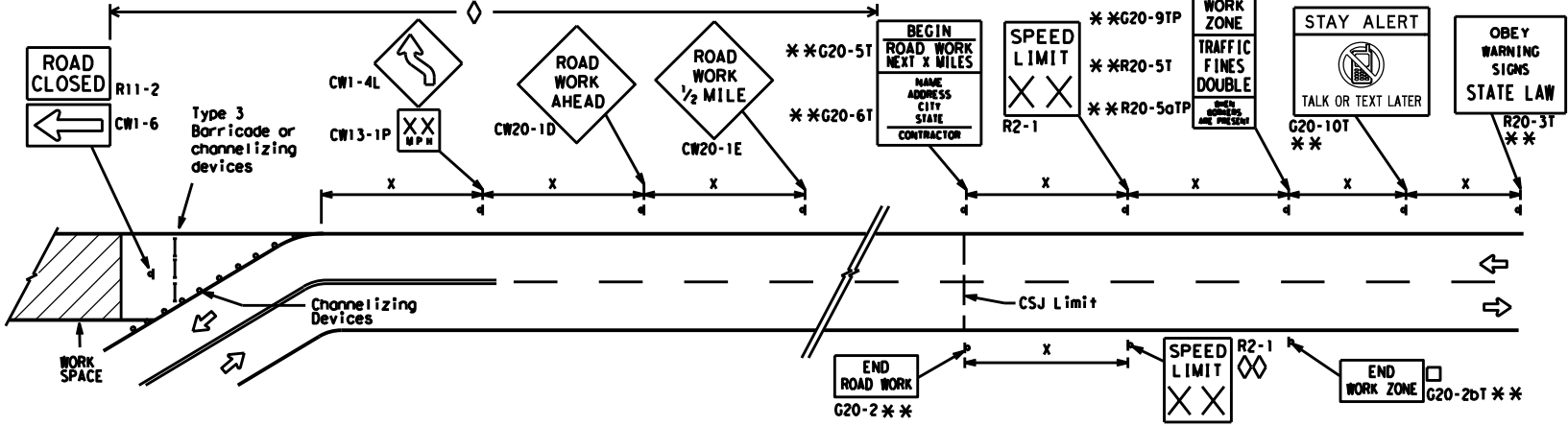
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

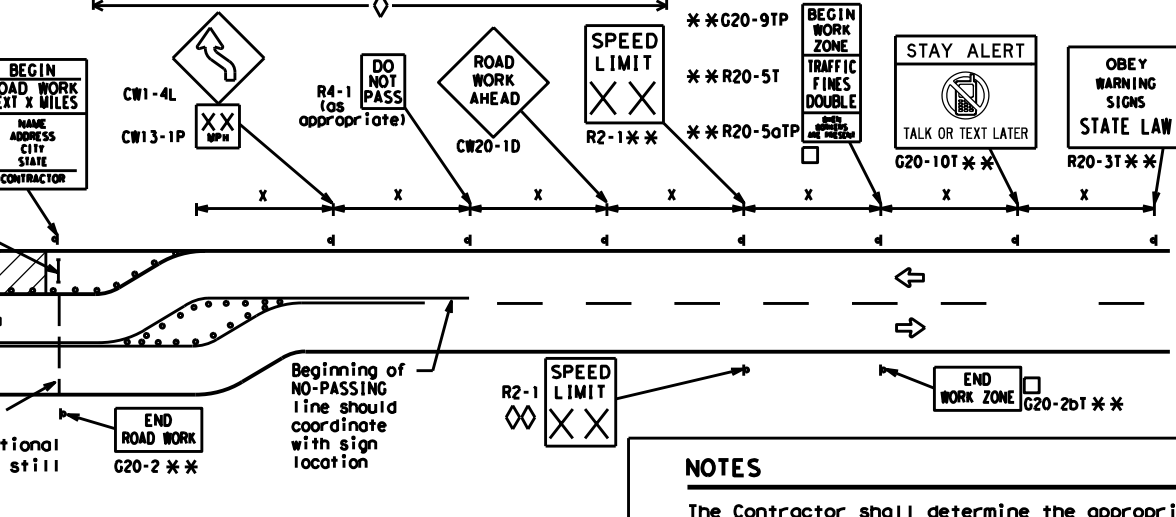


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



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

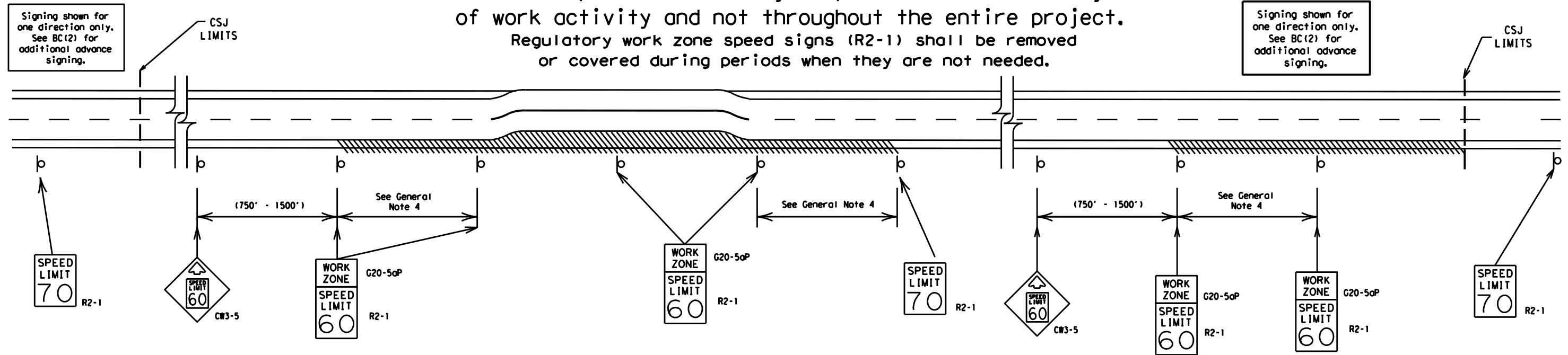
BC(2)-21

FILE: bc-21.dgn	DATE: 11/9/2023	BY: TxDOT	CHK: TxDOT	APP: TxDOT	CR: TxDOT
© TxDOT November 2002	CONV: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610	
REVISIONS					
9-07 8-14					
7-13 5-21					
	DIST: 12	COUNTY: HARRIS	SHEET NO.: 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

FILE:	bc-21.dgn	DATE:	11/9/2023	BY:	TxDOT	CHK:	TxDOT
PROJECT:	0271-16-167	NO:	0271	SECT:	16	JOB:	167
REVISIONS:		DIST:		COUNTY:		SHEET NO.:	
9-07	8-14	12		HARRIS		17	
7-13	5-21						

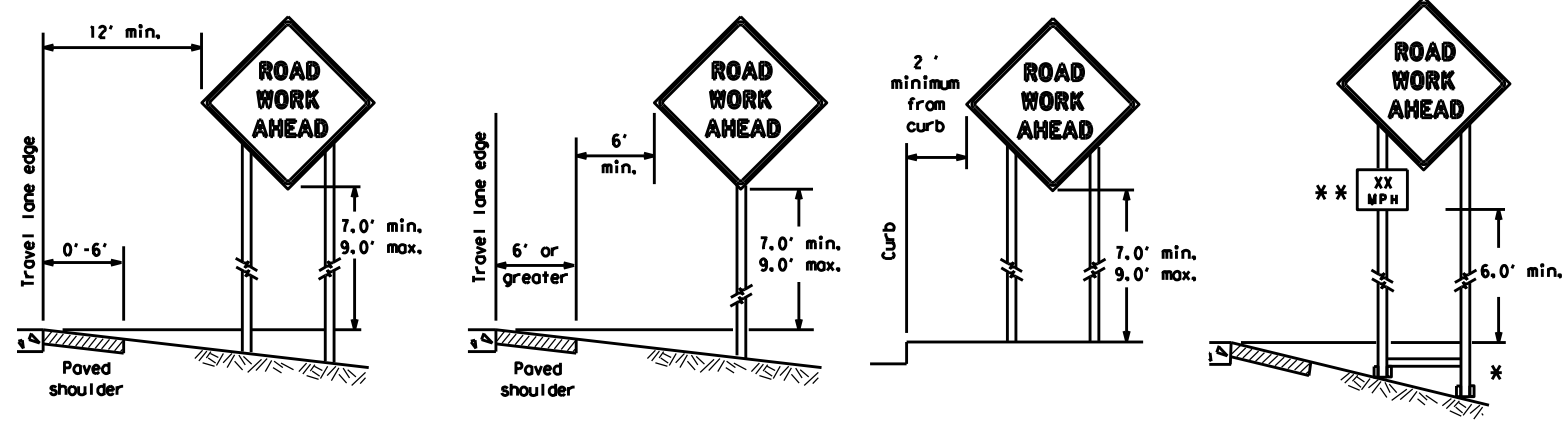
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FILE: H:\00\Maintenance\METRO MAINTENANCE\FY22-23 RMCs\I\H610\FrontageCrestmont\Cullen\Standards\TrafficControl\BC-21#3.DGN
DATE: 11/9/2023
PROJECT: 0271-16-167

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FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\H610FrontageCrestmont+Collen\Standards\TrafficControl\BC-21#4.DGN
 DATE: 11/29/2023
 PROJECT: 0271-16-167

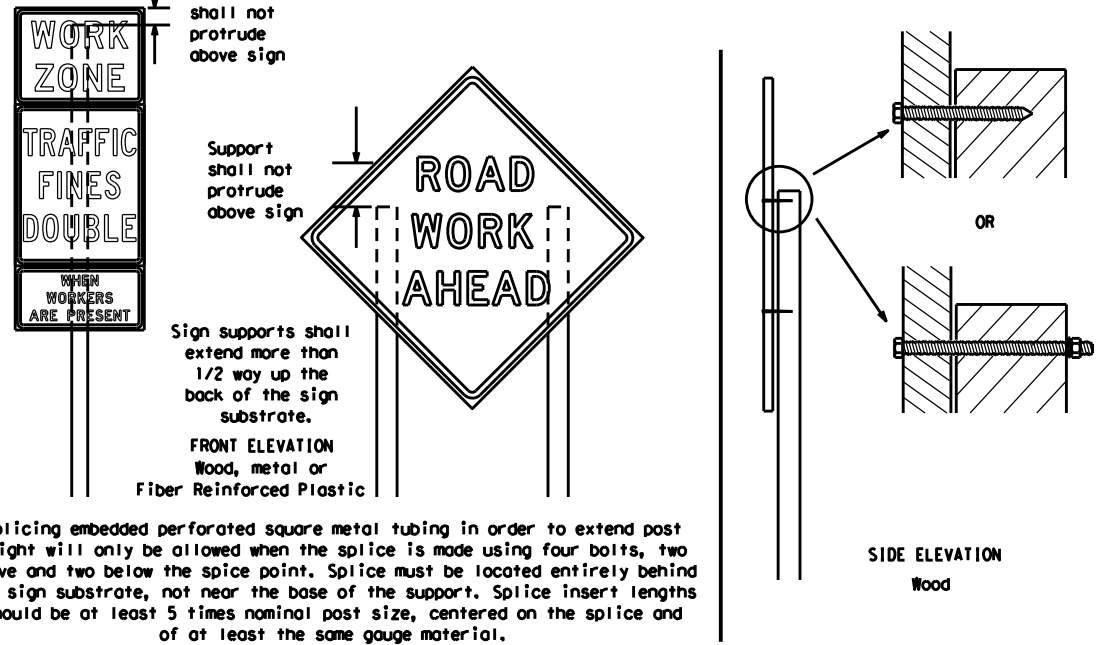
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

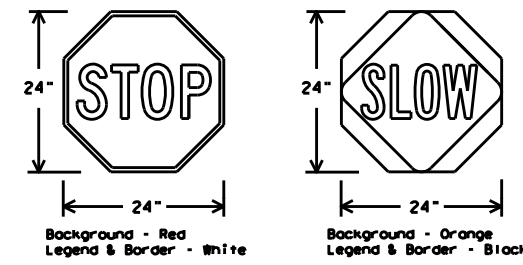
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

FLAGS ON SIGNS

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

- Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
- When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the 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.



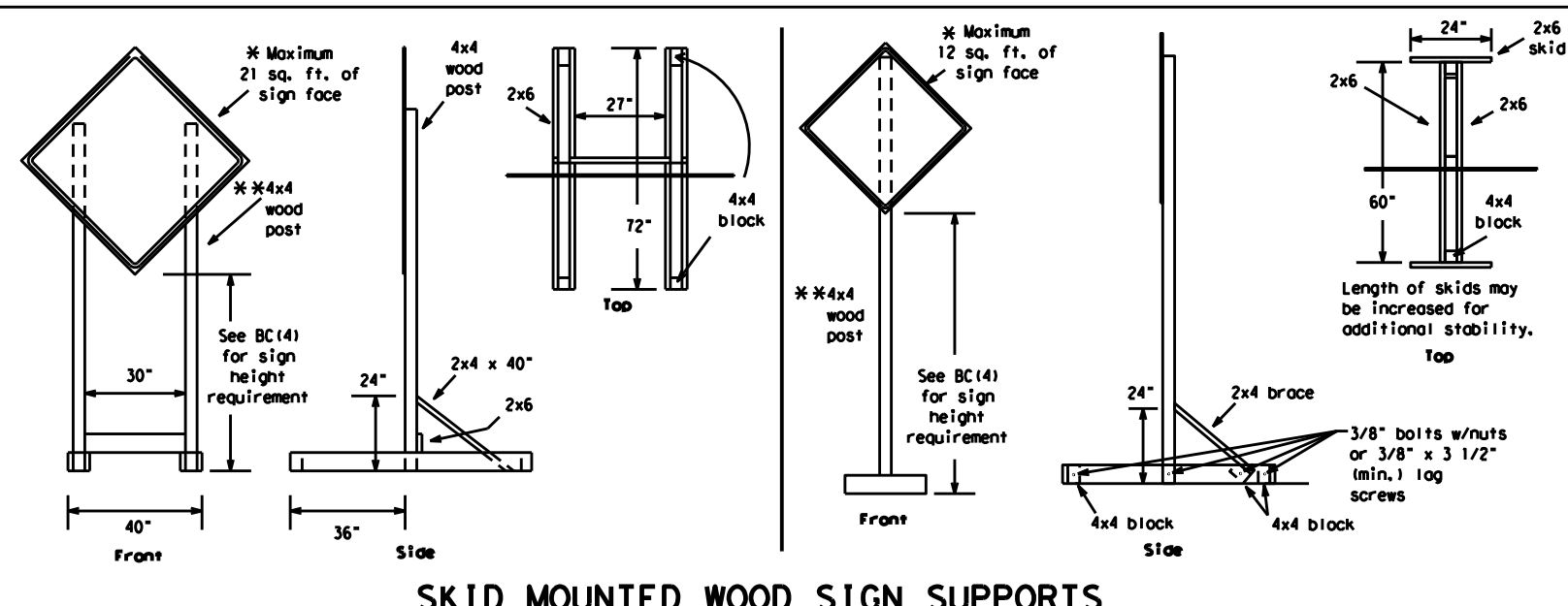
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE#	bc-21.dgn	DATE	11/29/2023	BY	TxDOT	CHK	TxDOT
REVISIONS	NOVEMBER 2002	NOVEMBER 2002	NOVEMBER 2002	NOVEMBER 2002	NOVEMBER 2002	NOVEMBER 2002	NOVEMBER 2002
NO.	0271	16	167	167	167	167	167
DATE	9-07	8-14	7-13	5-21			
DIST			12				
COUNTY			HARRIS				
SHEET NO.			18				

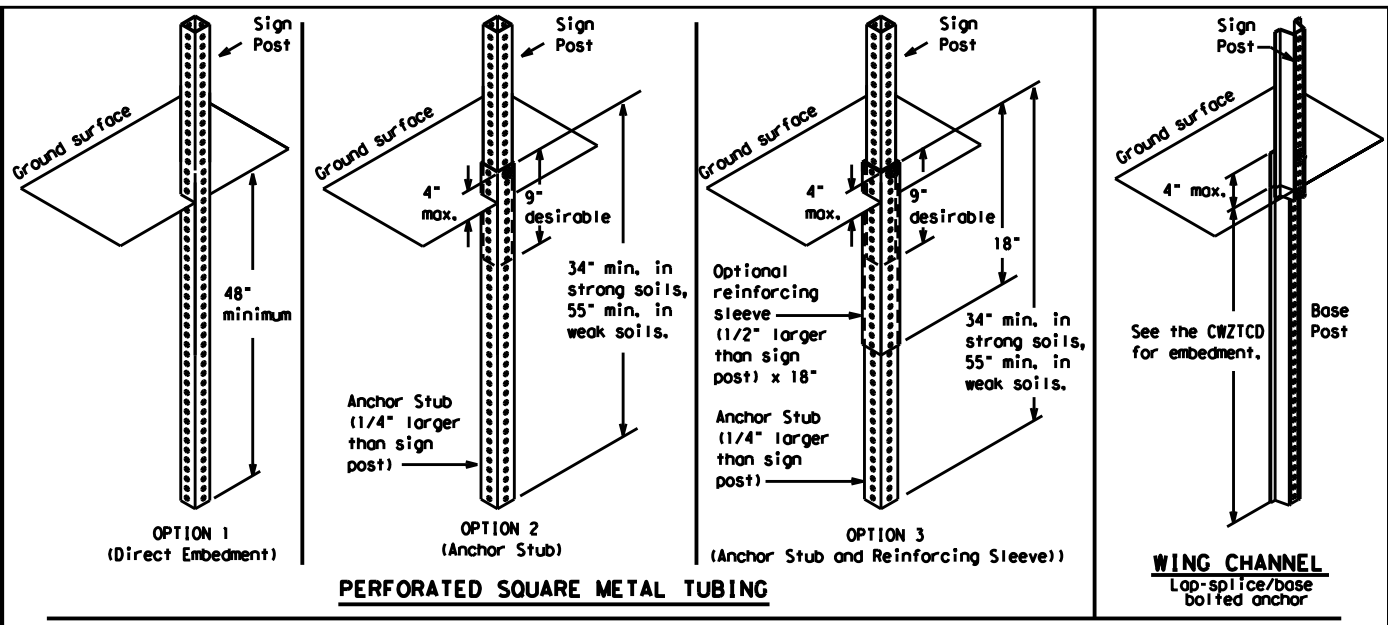
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FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610FrontageCrestmont+Collen+Standards\TrafficControl\BC-21+5.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



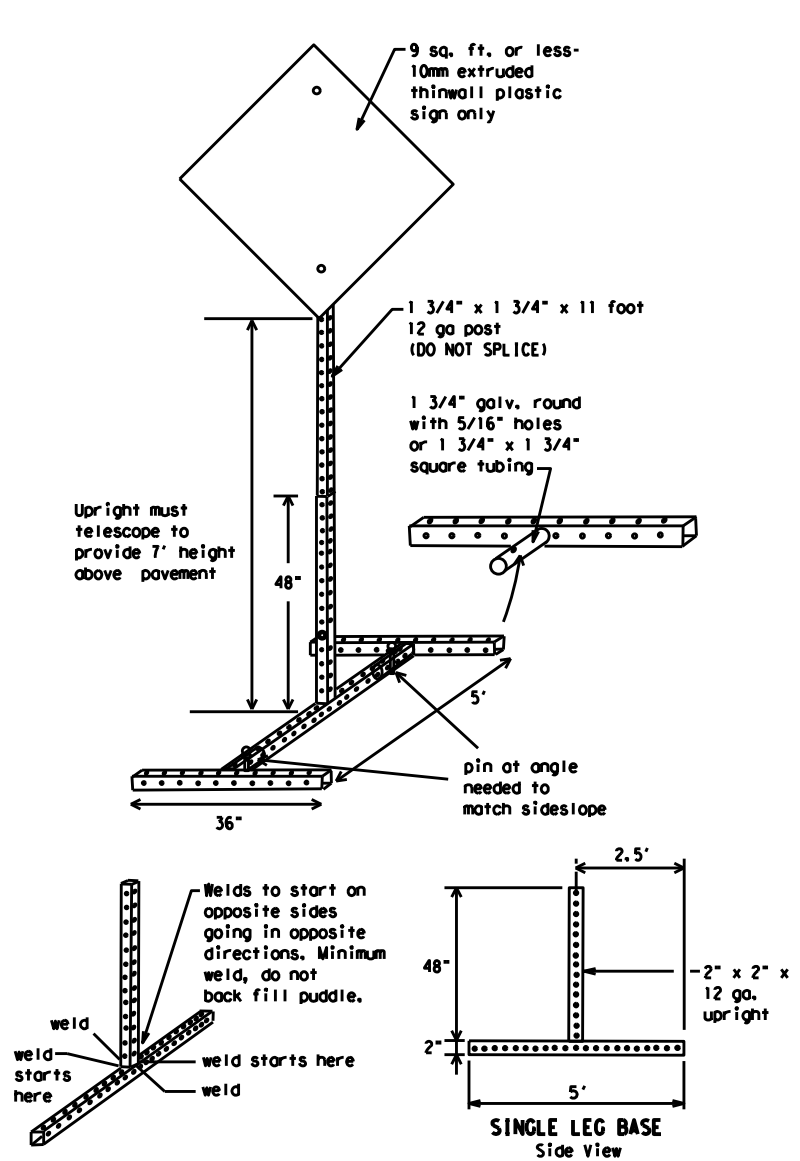
SKID MOUNTED WOOD SIGN SUPPORTS

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



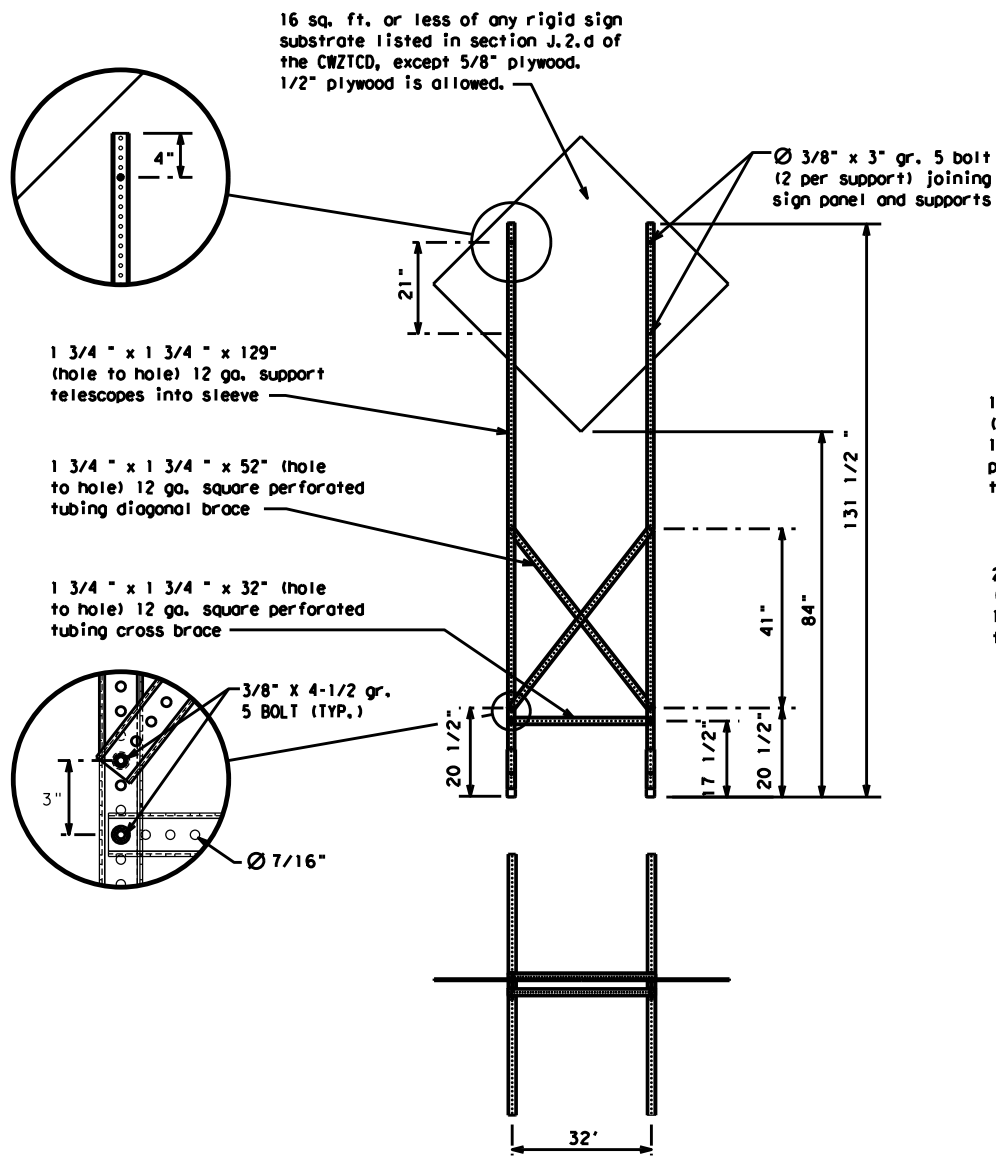
GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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



WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" log screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

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

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DATE: 11/9/2023	BY: TxDOT	CHK: TxDOT	APP: TxDOT	CR: TxDOT
© TxDOT November 2002	REV: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610	
9-07 8-14	7-13 5-21	DIST: 12	COUNTY: HARRIS	SHEET NO. 19	

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 MUTCD.
- PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
- Each line of text should be centered on the message board rather than left or right justified.
- If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

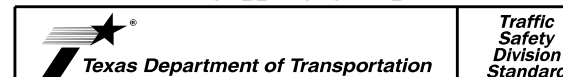
FULL MATRIX PCMS SIGNS

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

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

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

SHEET 6 OF 12



BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE#	BC-21.dgn	DATE	TxDOT	DATE	TxDOT	DATE	TxDOT	DATE	TxDOT
© TxDOT	November 2002	CONTRACT	0271	SECTION	16	JOB	167	HIGHWAY	IH610
REVISIONS		DIST	12	COUNTY	HARRIS	SHEET NO.	20		
9-07	8-14								
7-13	5-21								

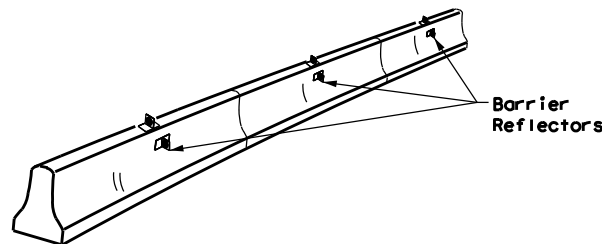
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DATE: 11/29/2023
PROJECT: 0271-16-167

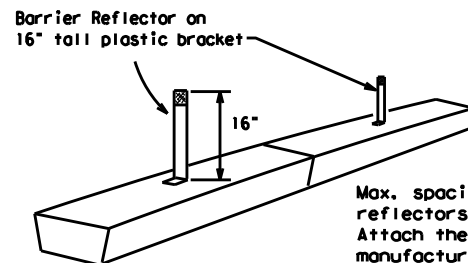
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 DATE: 11/29/2023
 PROJECT: 0271-16-167

- 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)



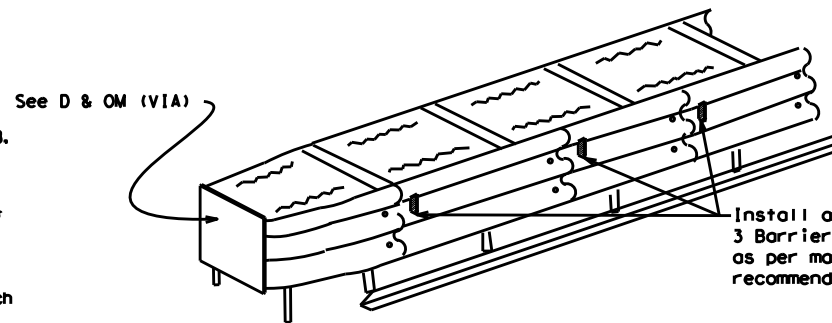
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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

LOW PROFILE CONCRETE BARRIER (LPCB)

- 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.



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

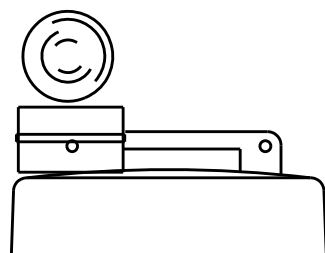
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

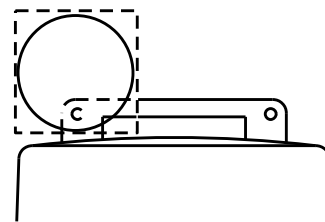
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



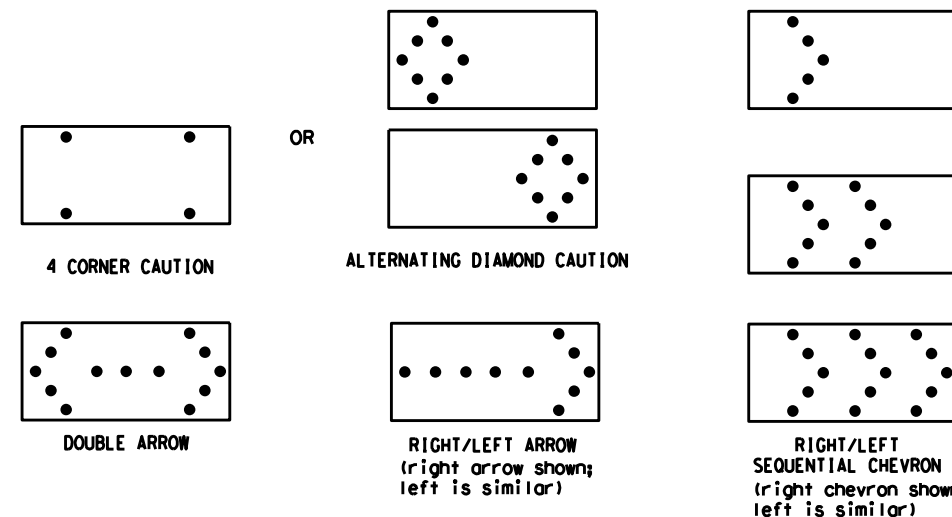
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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	DATE	11/29/2023	BY	0271	REV	16	JOB	167	HIGHWAY	IH610
©TxDOT	November 2002	CONTRACT	0271	SECTION	16	DISTRICT	12	COUNTY	HARRIS	SHEET NO.	21

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 DATE: 11/9/2023
 PROJECT: 0271-16-167

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:

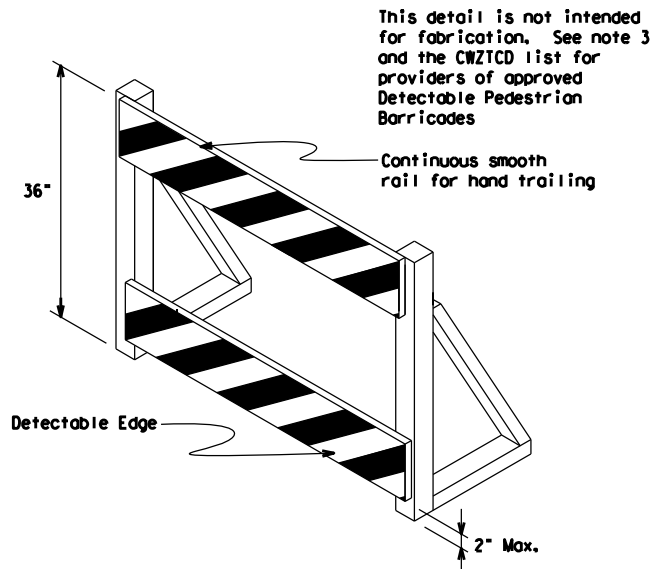
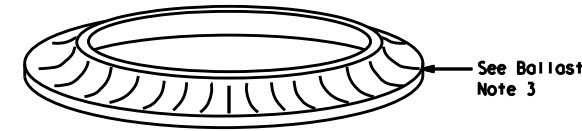
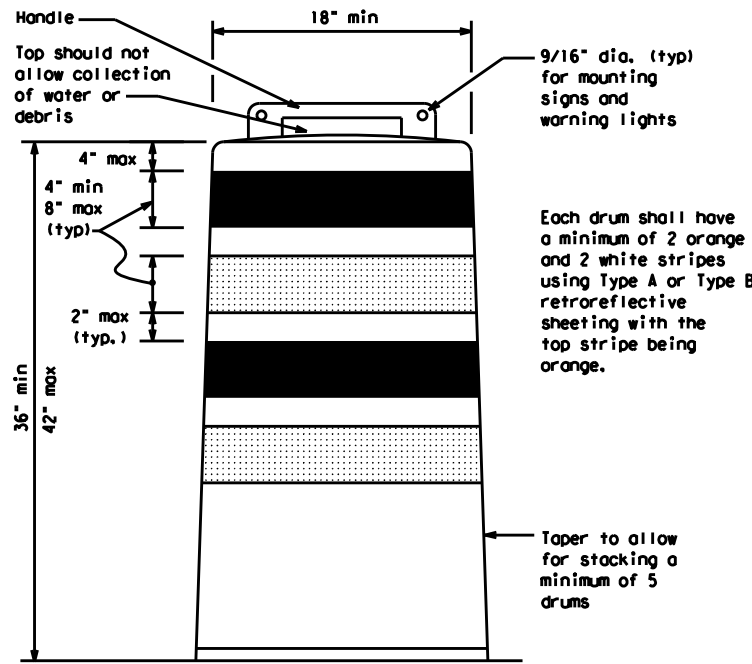
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

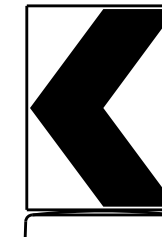
BALLAST

- 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.

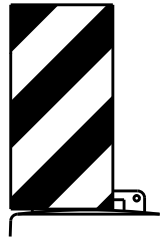


DETECTABLE PEDESTRIAN BARRICADES

- 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_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- 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



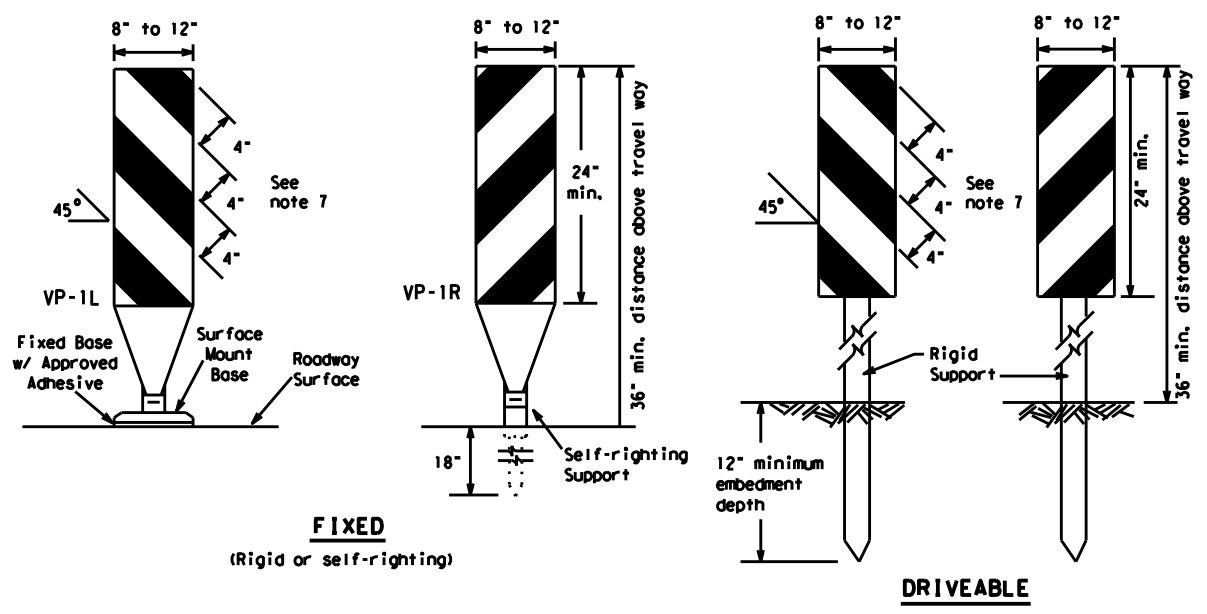
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE#	bc-21.dgn	DATE	TxDOT	REV#	TxDOT	DATE	TxDOT	REV#	TxDOT
© TxDOT	November 2002	CONTRACT	0271	SECTION	16	JOB	167	HIGHWAY	IH610
REVISIONS		DISTRICT	12	COUNTY		SHEET NO.			
4-03	8-14								
9-07	5-21								
7-13									

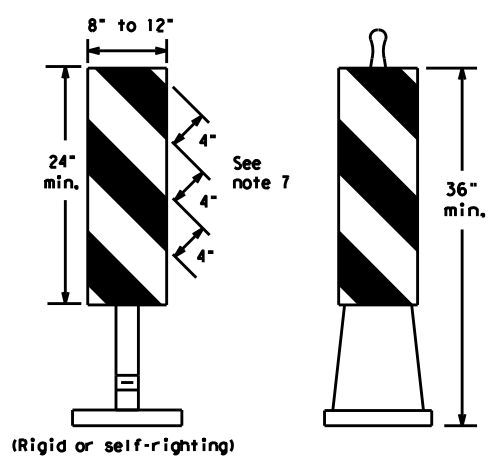
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 DATE: 11/9/2023
 PROJECT: 0271-16-167



FIXED
(Rigid or self-righting)

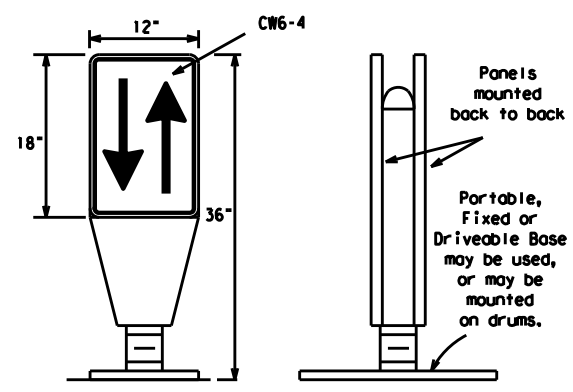
DRIVEABLE



PORTABLE

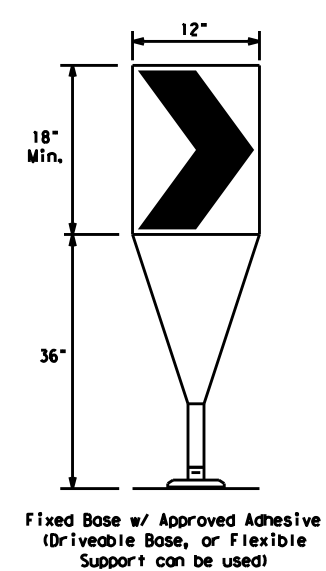
VERTICAL PANELS (VPs)

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



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

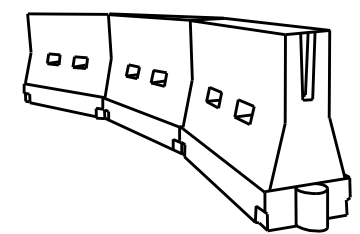
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base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



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

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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

**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	DATE:	TxDOT	DATE:	TxDOT	DATE:	TxDOT	DATE:	TxDOT
©TxDOT	November 2002	CONTRACT	SECT	JOB	HIGHWAY				
REVISIONS	0271	16	167	IH610					
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	12	HARRIS		23				

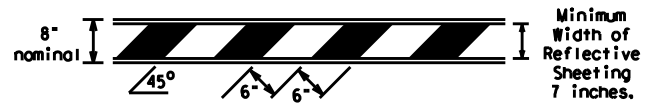
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FILE: H:\004\maintenance\METRO_MAINTENANCE\FY22-23_RMCs\IH610\FrontageCrestmont+Cullen+Standards\TrafficControl\BC-21\10.DGN
 DATE: 11/29/2023
 PROJECT: 0271-16-167

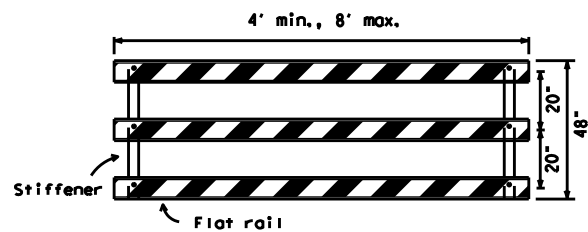
TYPE 3 BARRICADES

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.

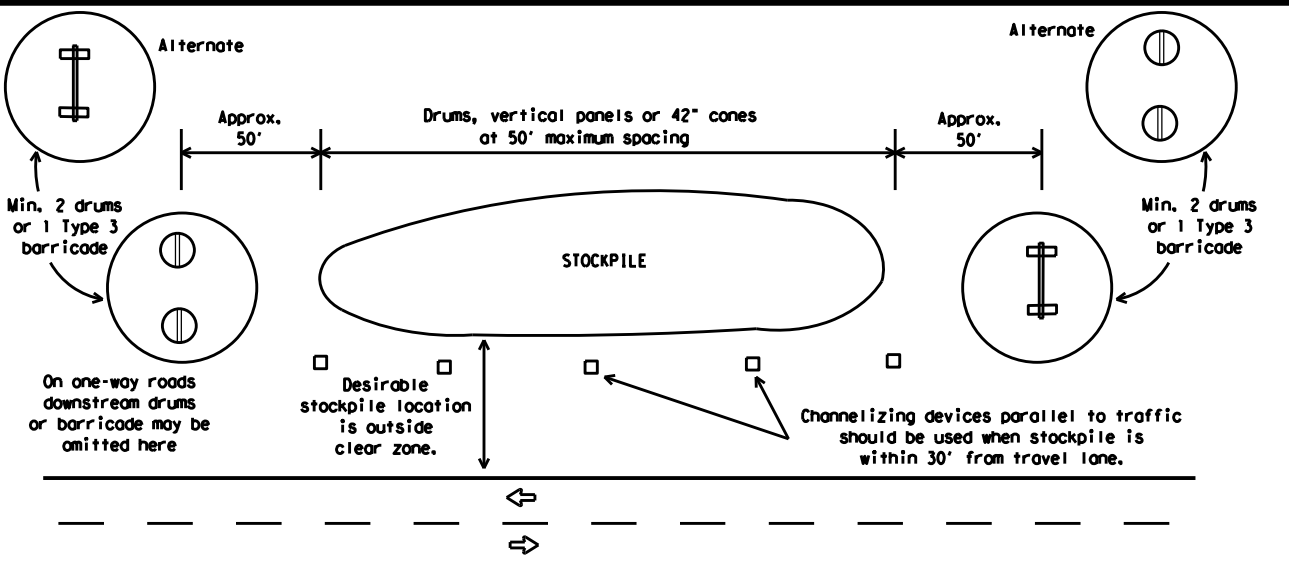
Barricades shall NOT be used as a sign support.



TYPICAL STRIPING DETAIL FOR BARRICADE RAIL

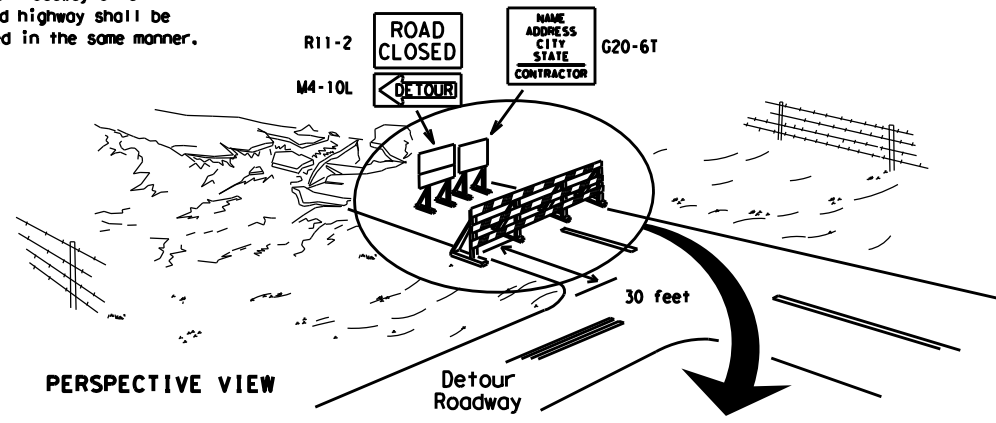


TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

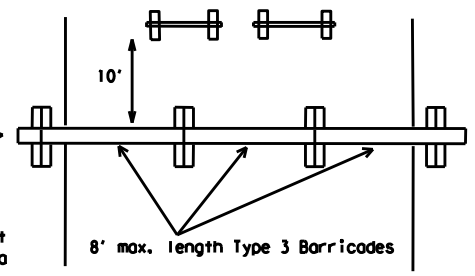
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

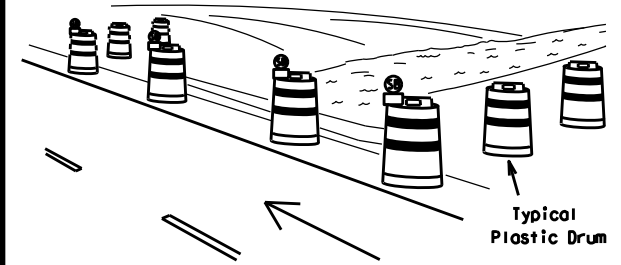
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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.

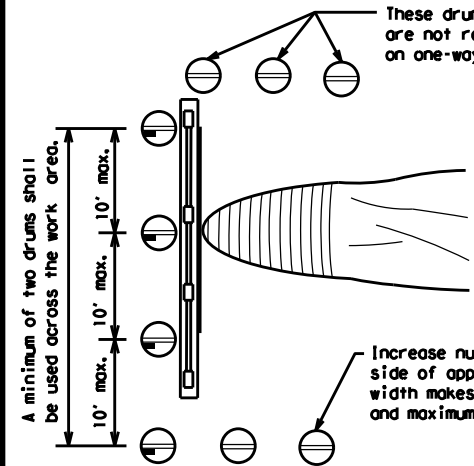


PLAN VIEW

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

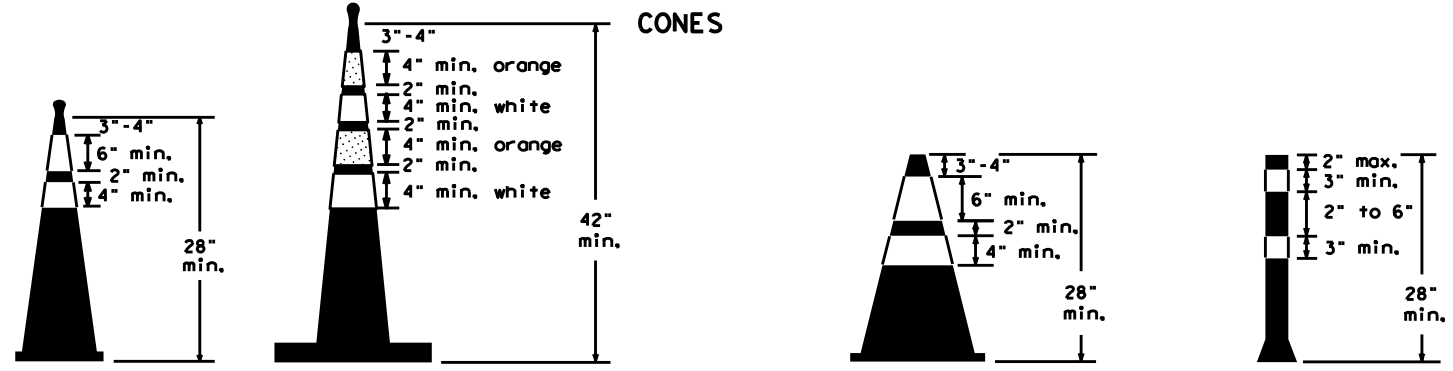


PLAN VIEW

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



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



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DATE: 11/29/2023	CONTRACT: 0271-16-167	COUNTY: HARRIS	SHEET NO: 24
© TxDOT November 2002	REVISIONS: 0271 16 167			

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

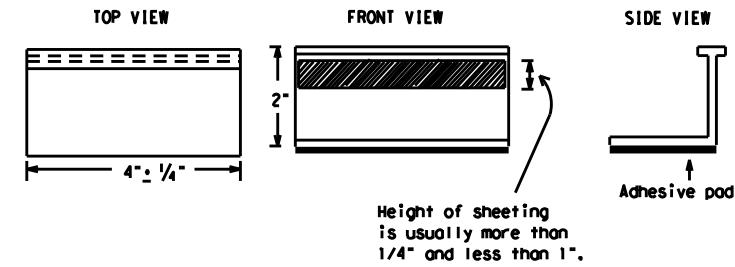
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DN: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	167	IH610
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	12	HARRIS		25
11-02 8-14				

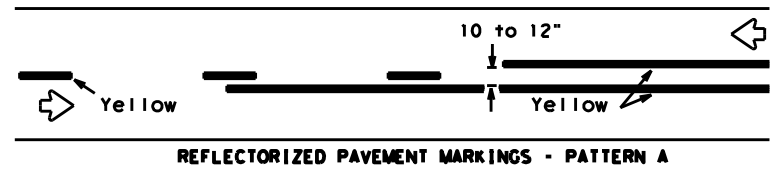
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 PROJECT: 0271-16-167

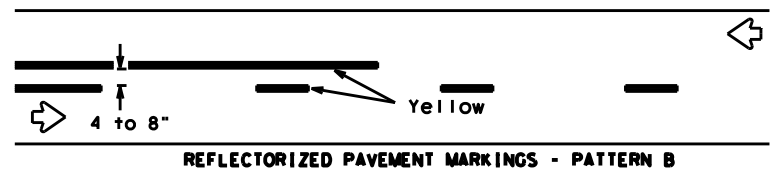
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 DATE: 11/9/2023
 PROJECT: 0271-16-167

PAVEMENT MARKING PATTERNS

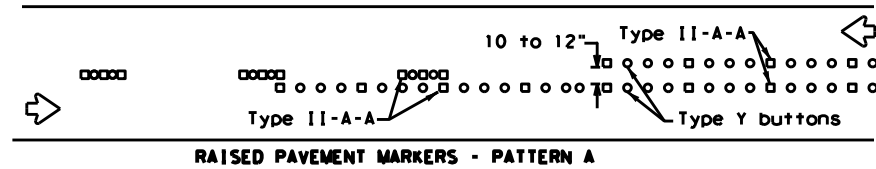


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

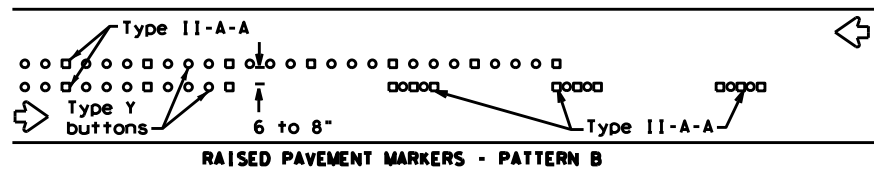


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

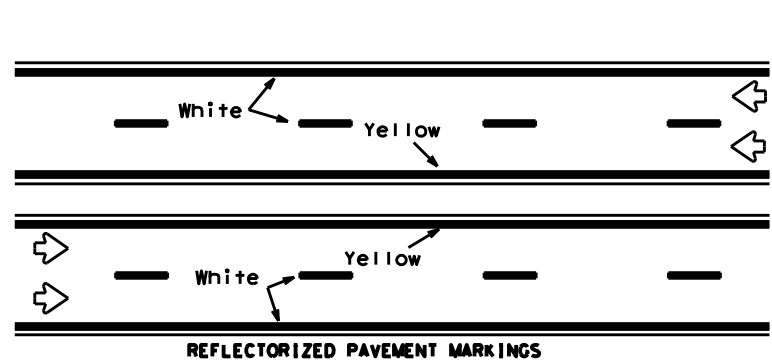


RAISED PAVEMENT MARKERS - PATTERN A



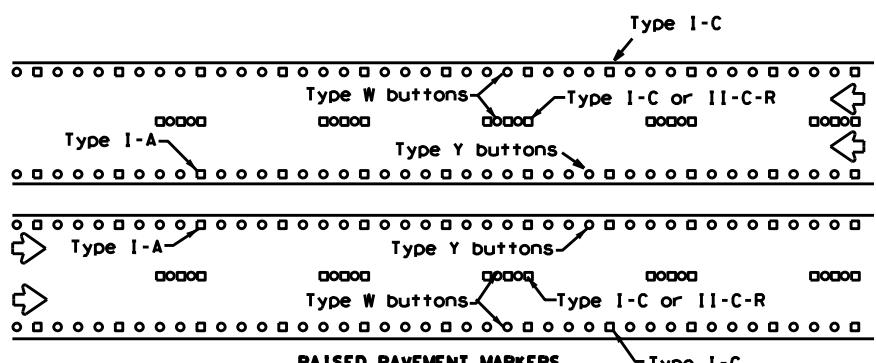
RAISED PAVEMENT MARKERS - PATTERN B

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



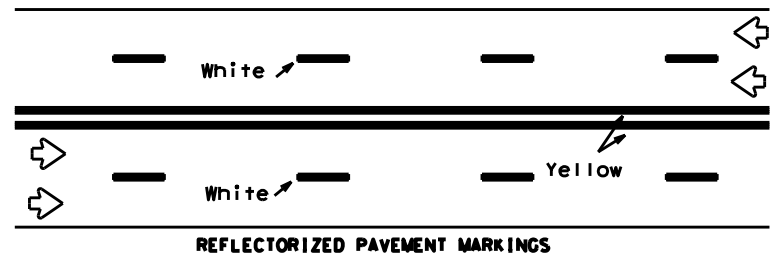
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



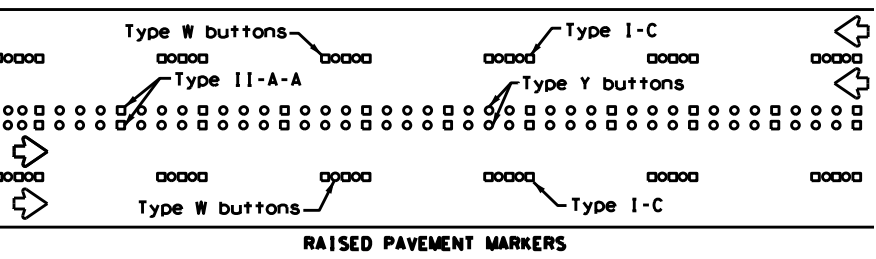
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



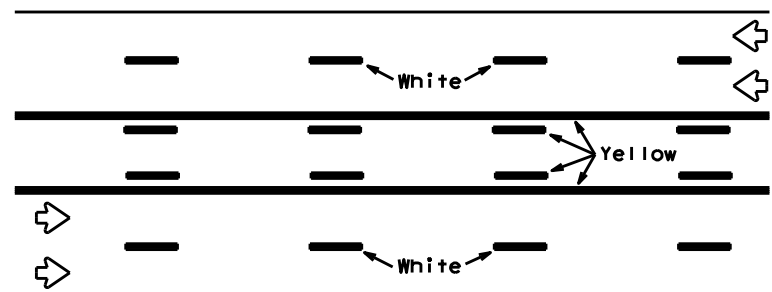
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



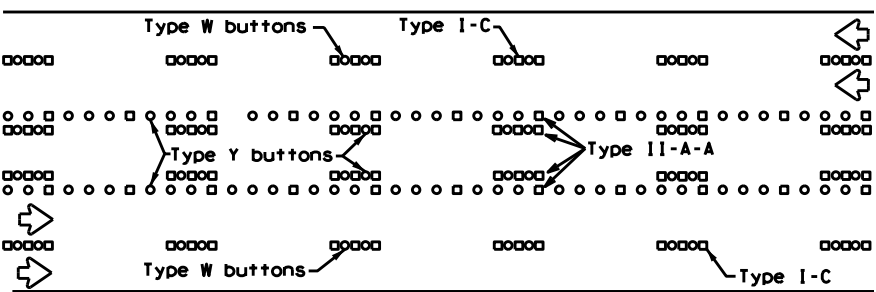
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

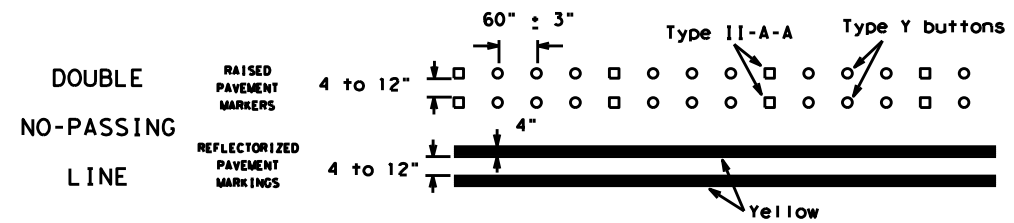
Prefabricated markings may be substituted for reflectorized pavement markings.



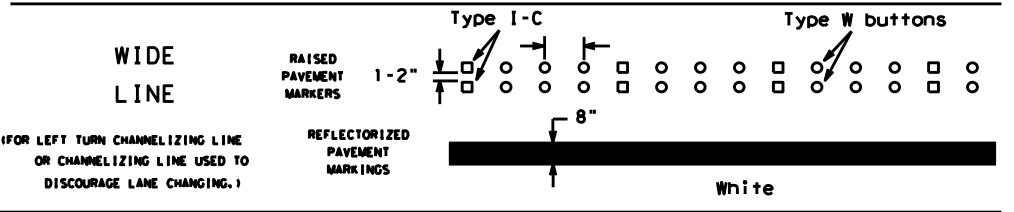
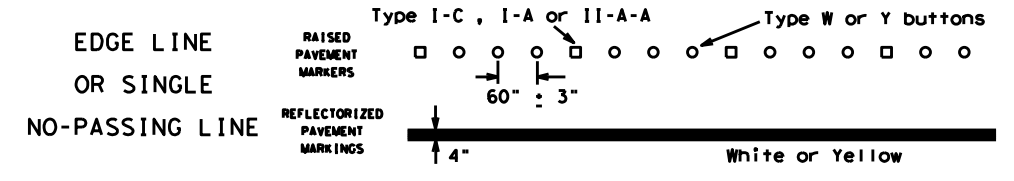
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

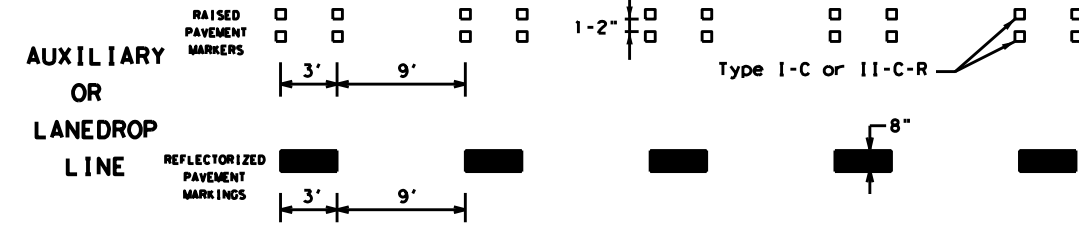
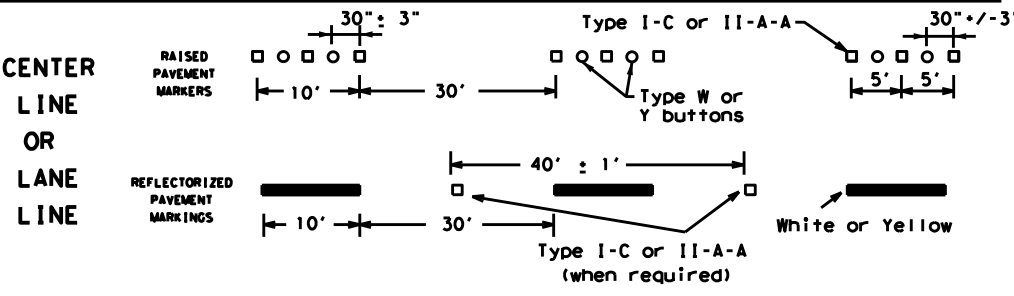
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



SOLID LINES

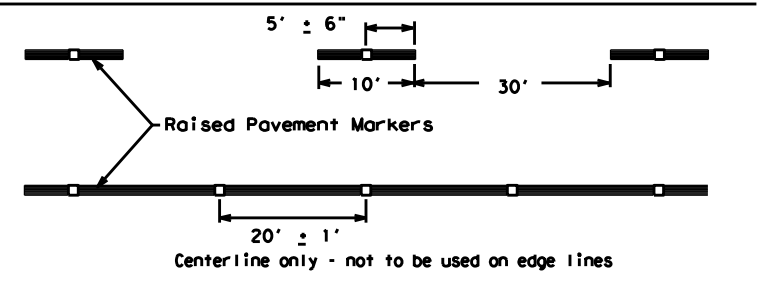


BROKEN LINES



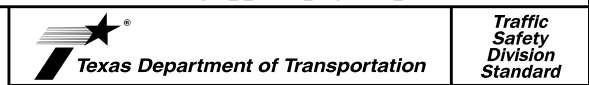
REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12

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."



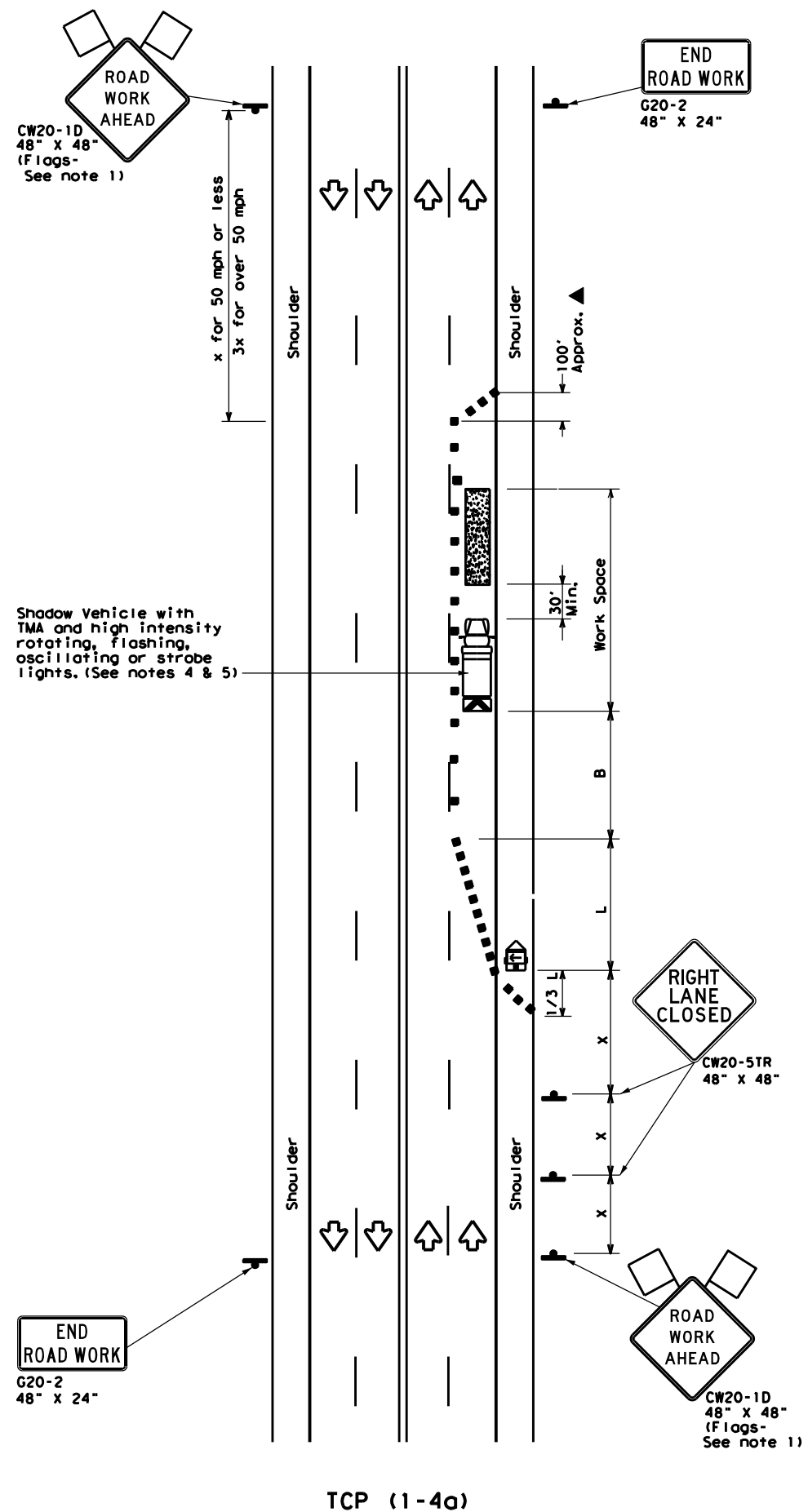
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

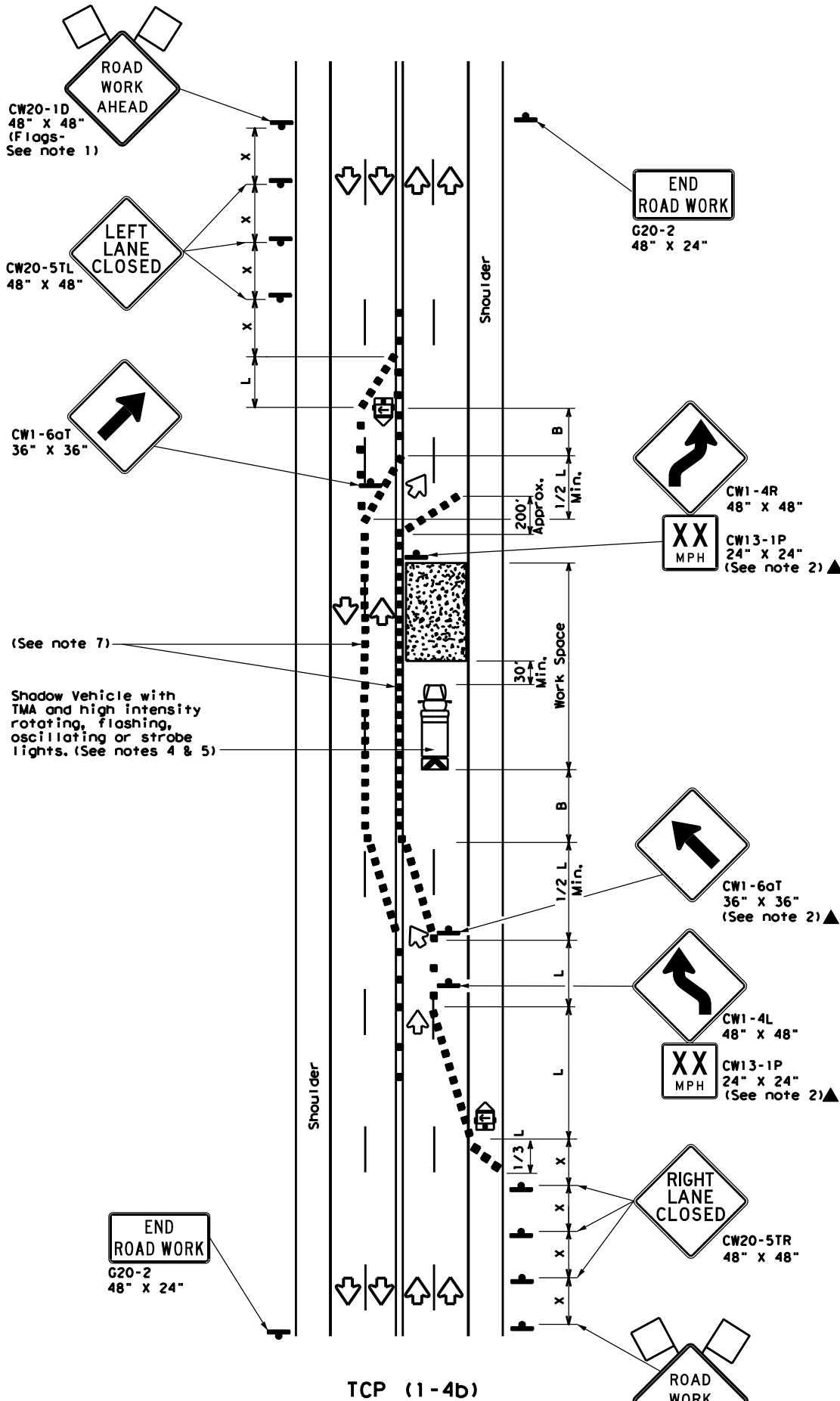
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©TxDOT February 1998		CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12		COUNTY: HARRIS	SHEET NO: 26
1-97	9-07	5-21			
2-98	7-13				
11-02	8-14				

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



TCP (1-4a)
ONE LANE CLOSED



TCP (1-4b)
TWO LANES CLOSED

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

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

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

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

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

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation
 Traffic Operations Division Standard

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

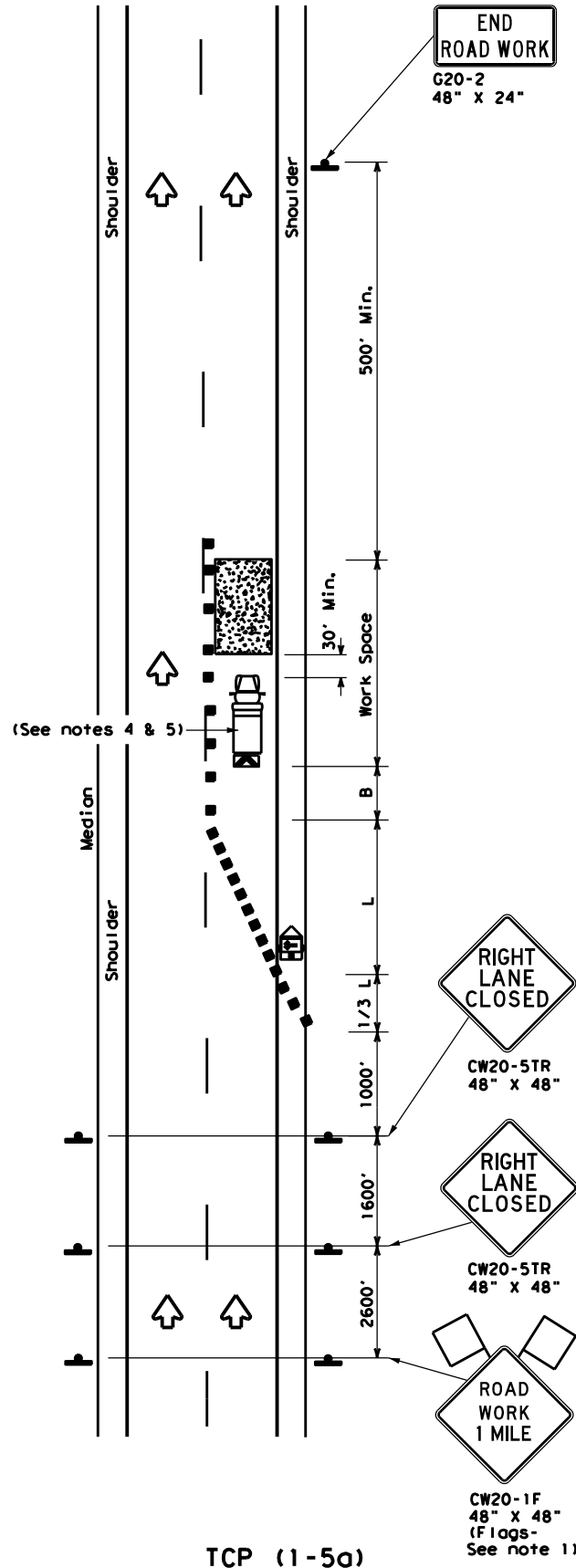
TCP (1-4) - 18

FILE: tcp1-4-18.dgn	DATE: December 1985	CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 27	
2-94	4-98				
8-95	2-12				
1-97	2-18				

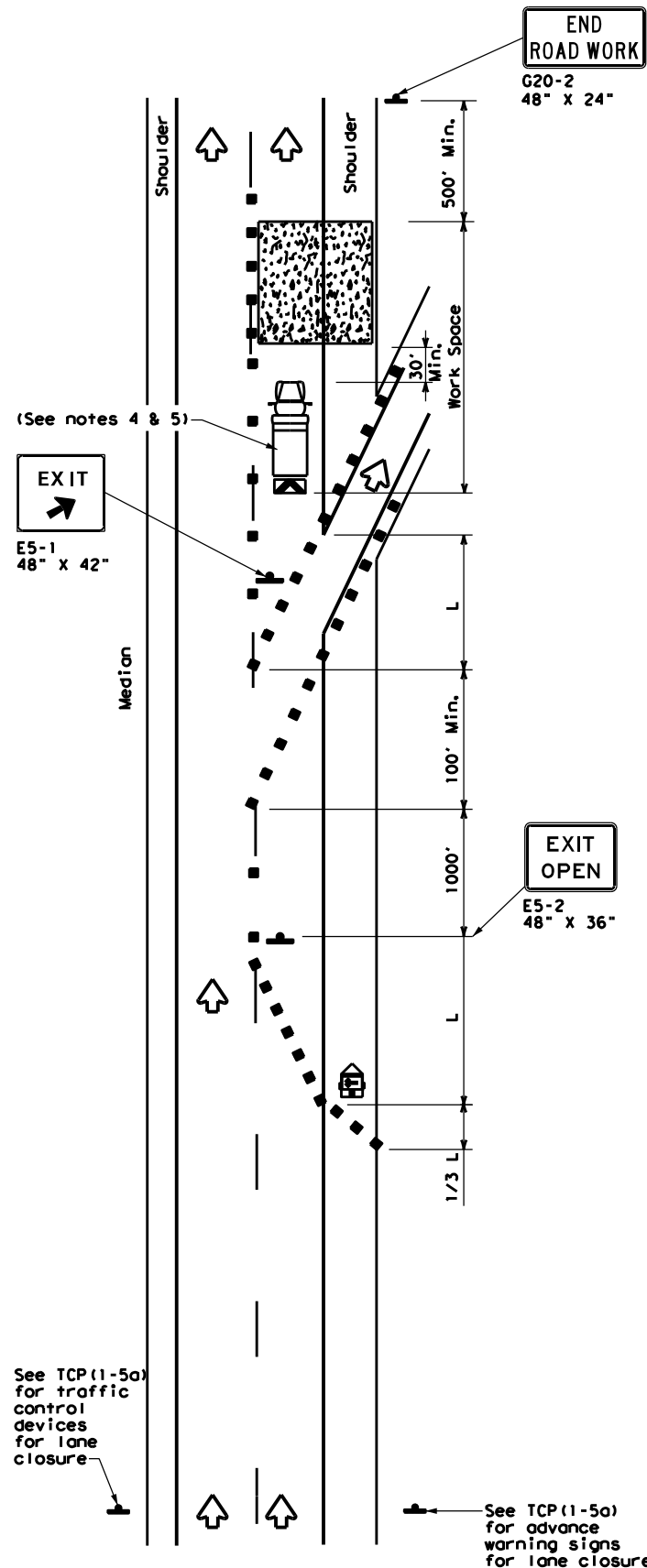
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FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610FrontageCr est\mtr\1-5-18.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

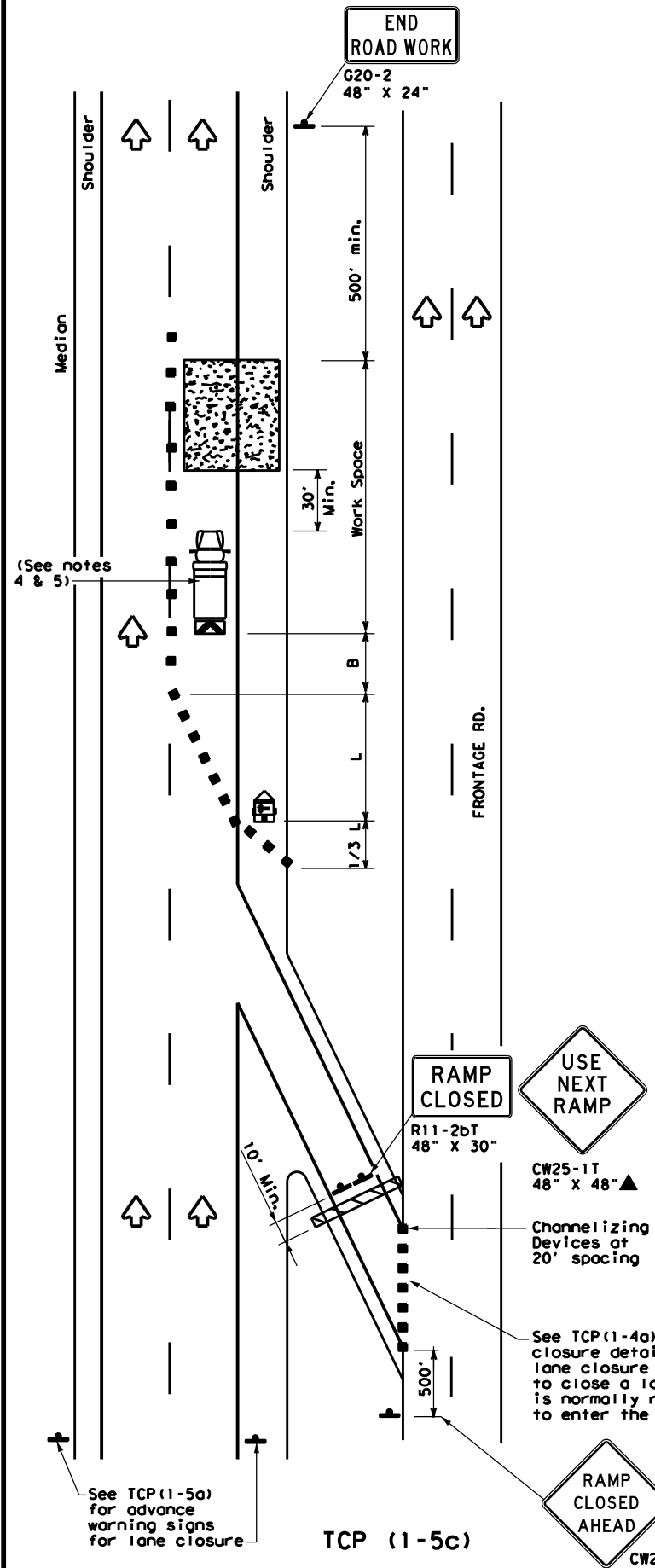
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ONE LANE CLOSURE



LANE CLOSURE NEAR EXIT RAMP



LANE CLOSURE NEAR ENTRANCE RAMP

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

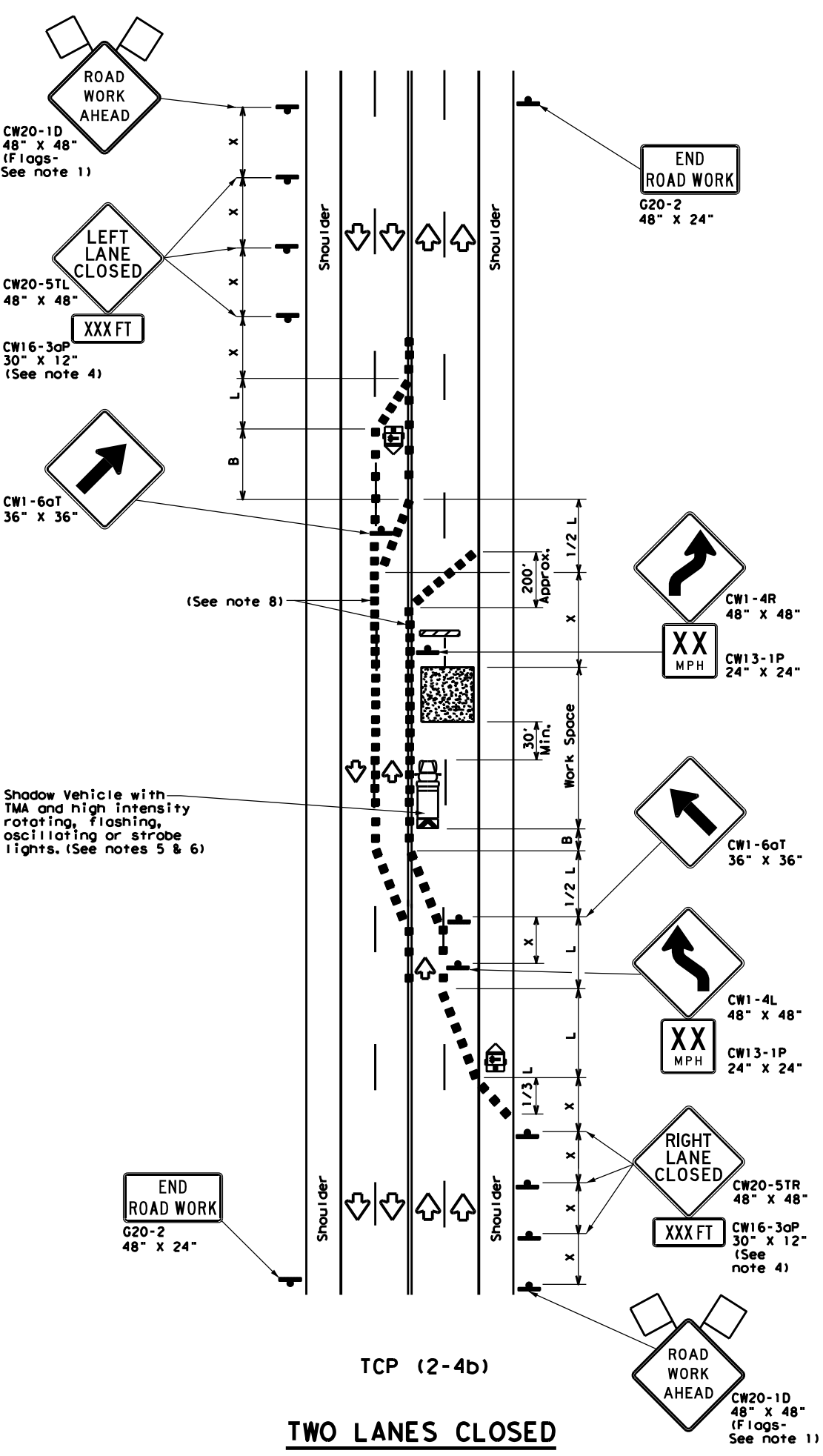
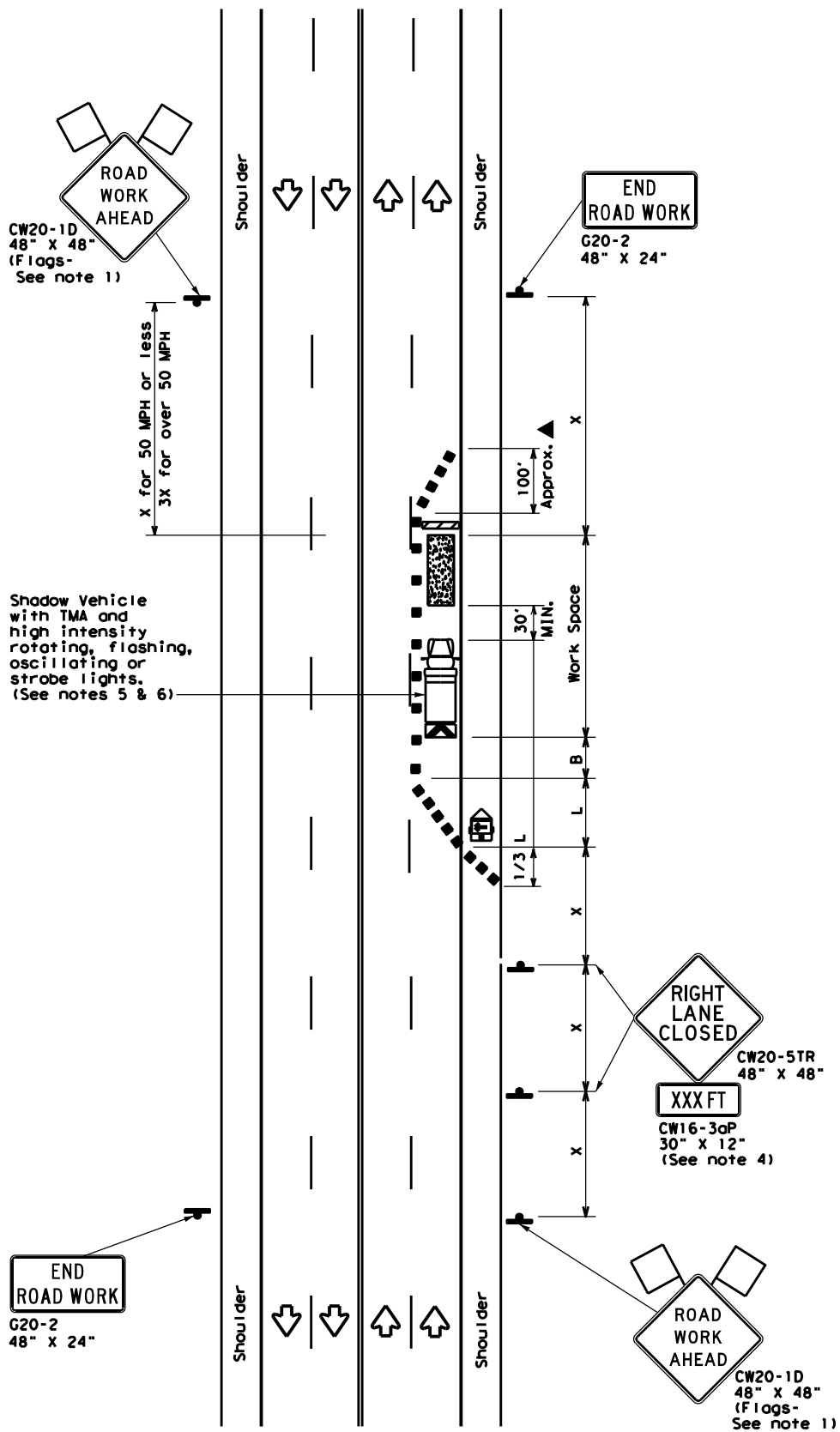
**TRAFFIC CONTROL PLAN
 LANE CLOSURES FOR
 DIVIDED HIGHWAYS**

TCP (1-5) - 18

FILE: tcp1-5-18.dgn	DATE: 02/16/2012	BY: 167	JOB: IH610
© TxDOT February 2012	REVISIONS	COUNTY: HARRIS	SHEET NO.: 28

FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23 RMCs\IH610\FrontageCr est\mtr\11/9/2023
 DATE: 11/9/2023
 PROJECT: 0271-16-167

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LEGEND

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

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

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

TYPICAL USAGE

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

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

- TCP (2-4a)**
- If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

- TCP (2-4b)**
- For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter 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
 LANE CLOSURES ON MULTILANE
 CONVENTIONAL ROADS**

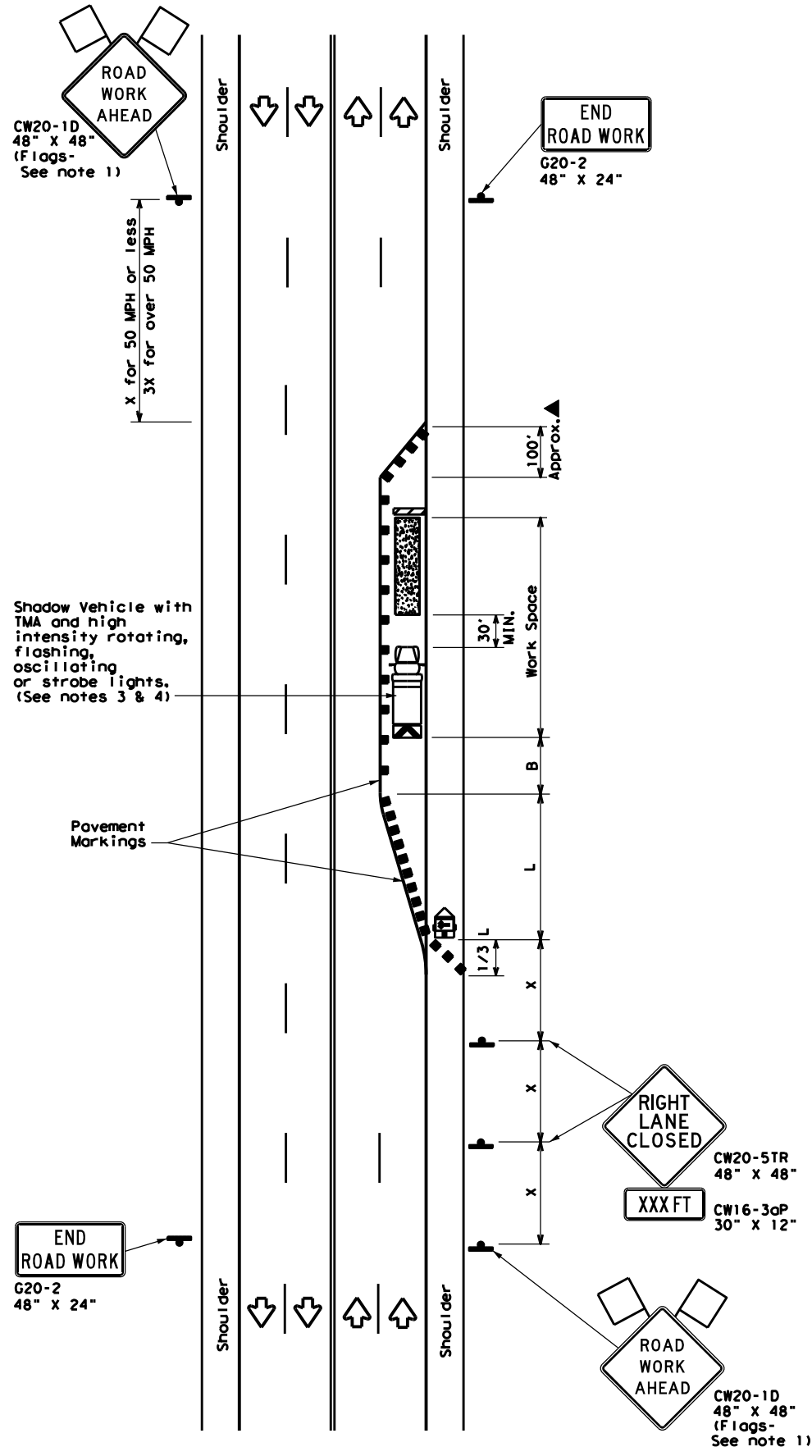
TCP (2-4) - 18

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1-97	2-12				
4-98	2-18				

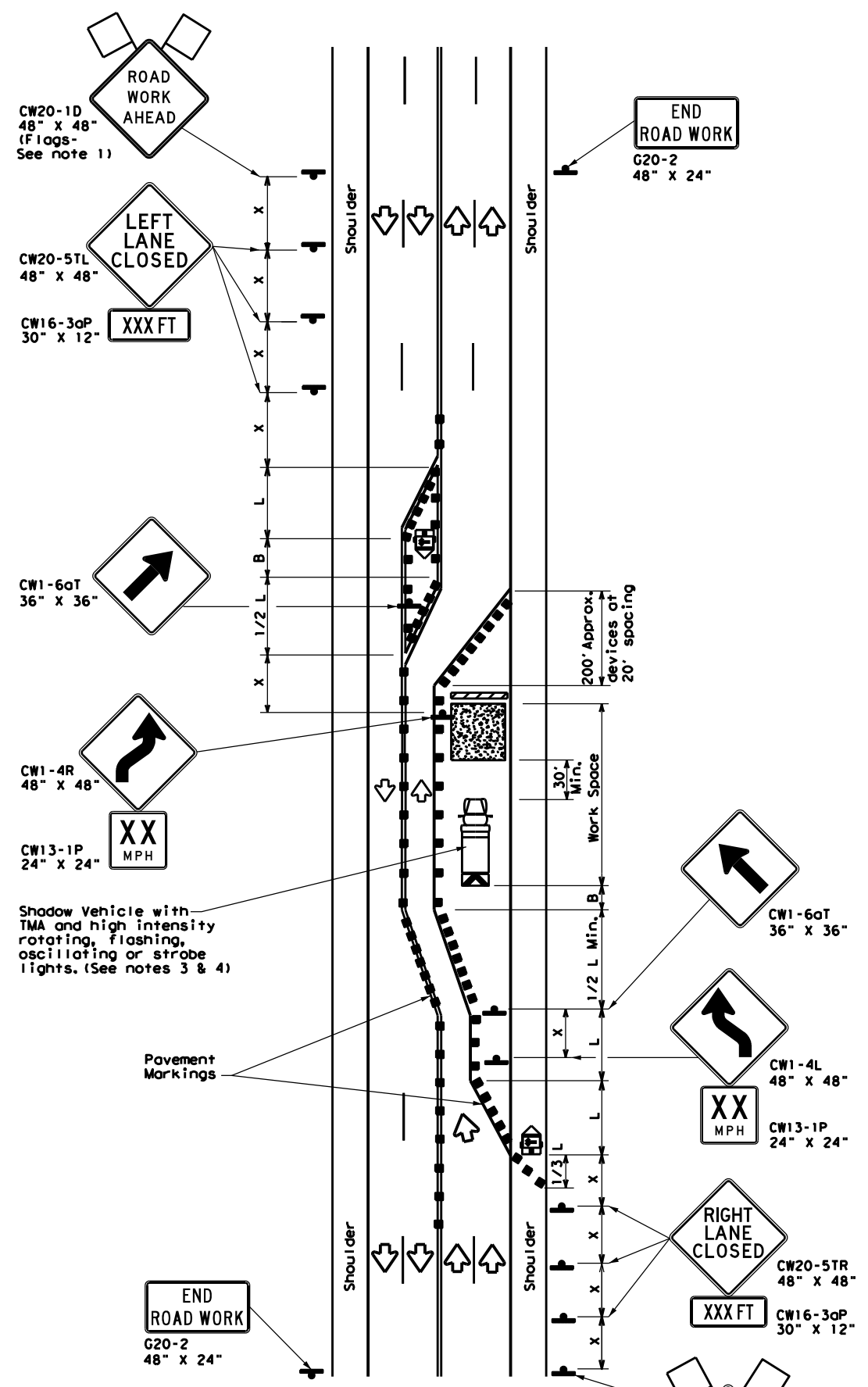
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FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23 RMCs\IH610\FrontageCr est\mtr\1616-167.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

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TCP (2-5a)
ONE LANE CLOSED



TCP (2-5b)
TWO LANES CLOSED

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			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.
 - A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
 - Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
 - The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

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

TCP (2-5b)

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

Texas Department of Transportation
 Traffic Operations Division Standard

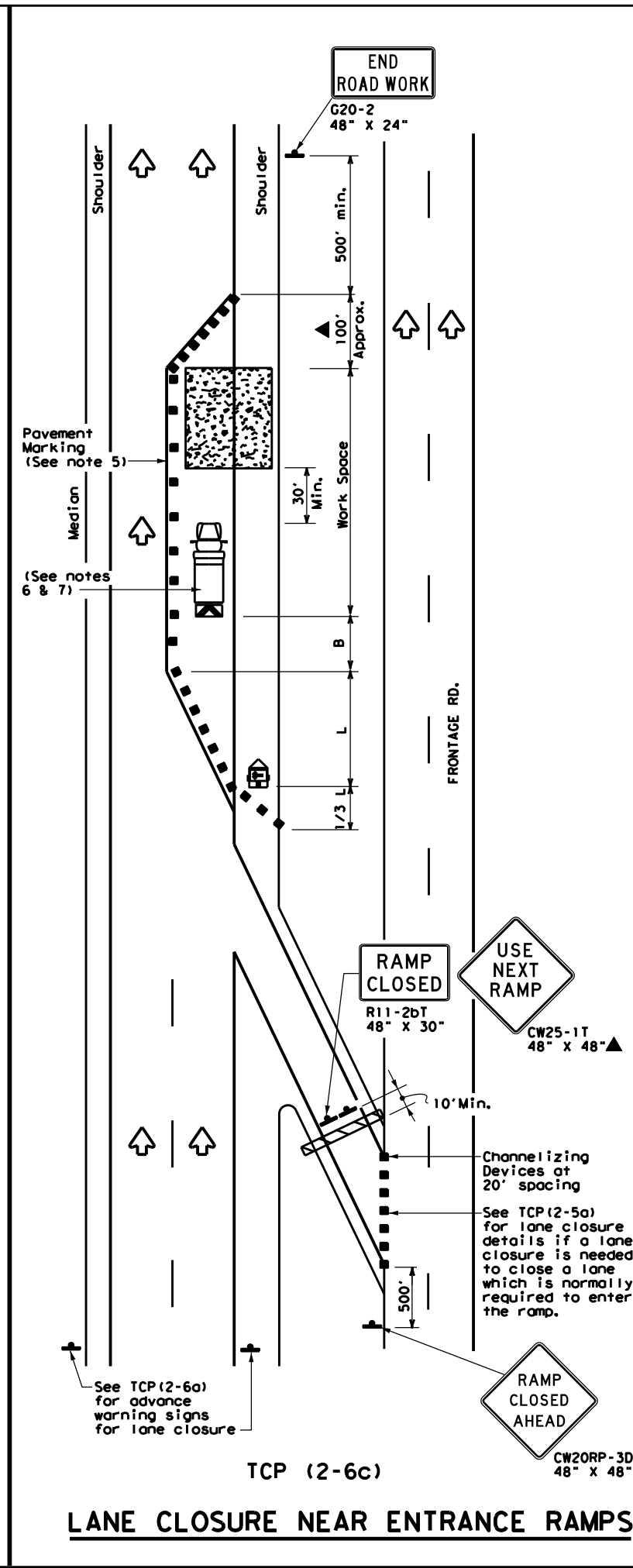
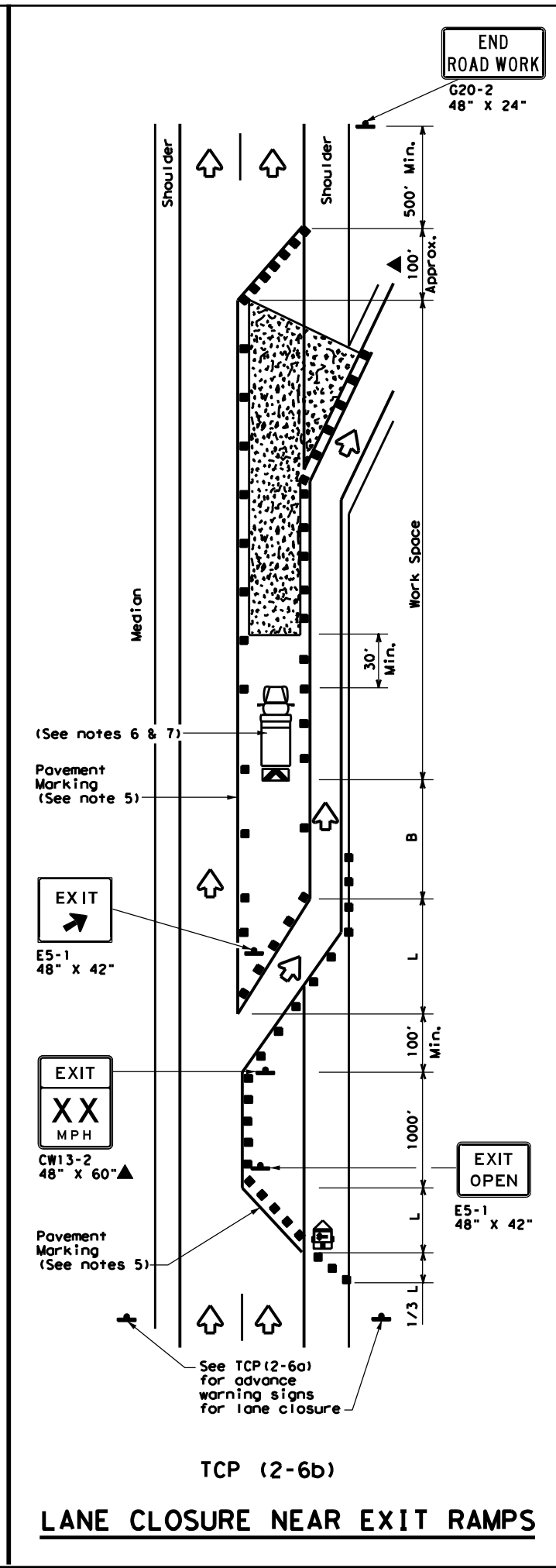
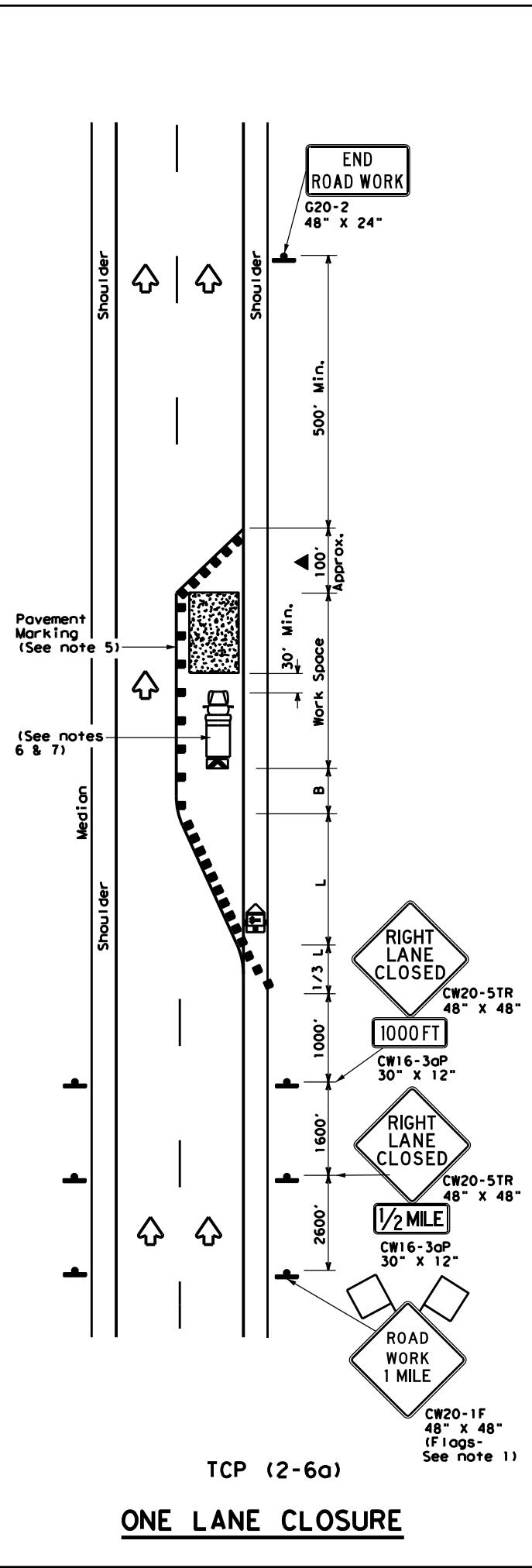
**TRAFFIC CONTROL PLAN
 LONG TERM LANE CLOSURES
 MULTILANE CONVENTIONAL RDS.**

TCP (2-5) - 18

FILE: tcp2-5-18.dgn	DATE: December 1985	CNT: 0271	SECT: 16	JOB: 167	HIGHWAY: H610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 30	
8-95 2-12					
1-97 3-03					
4-98 2-18					

FILE: H:\00Maintenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610FrontageRamp\1662-1663.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167

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LEGEND

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

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

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

TYPICAL USAGE

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

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

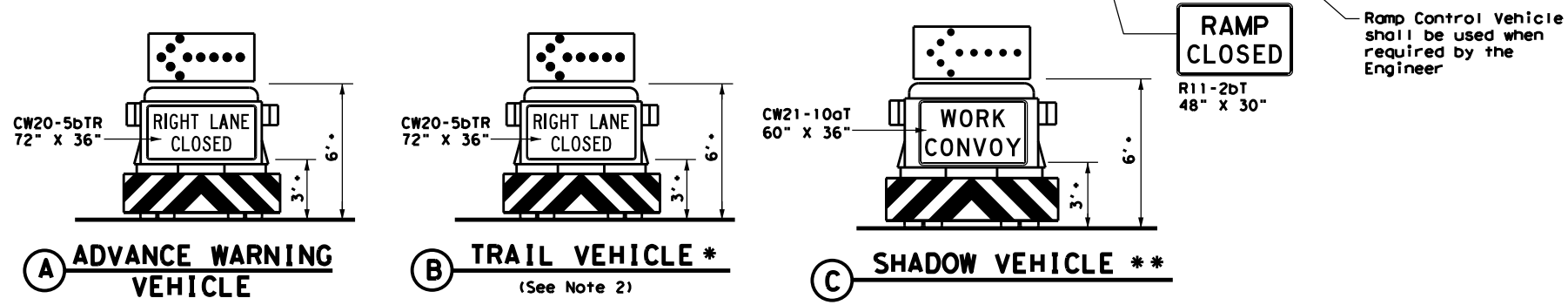
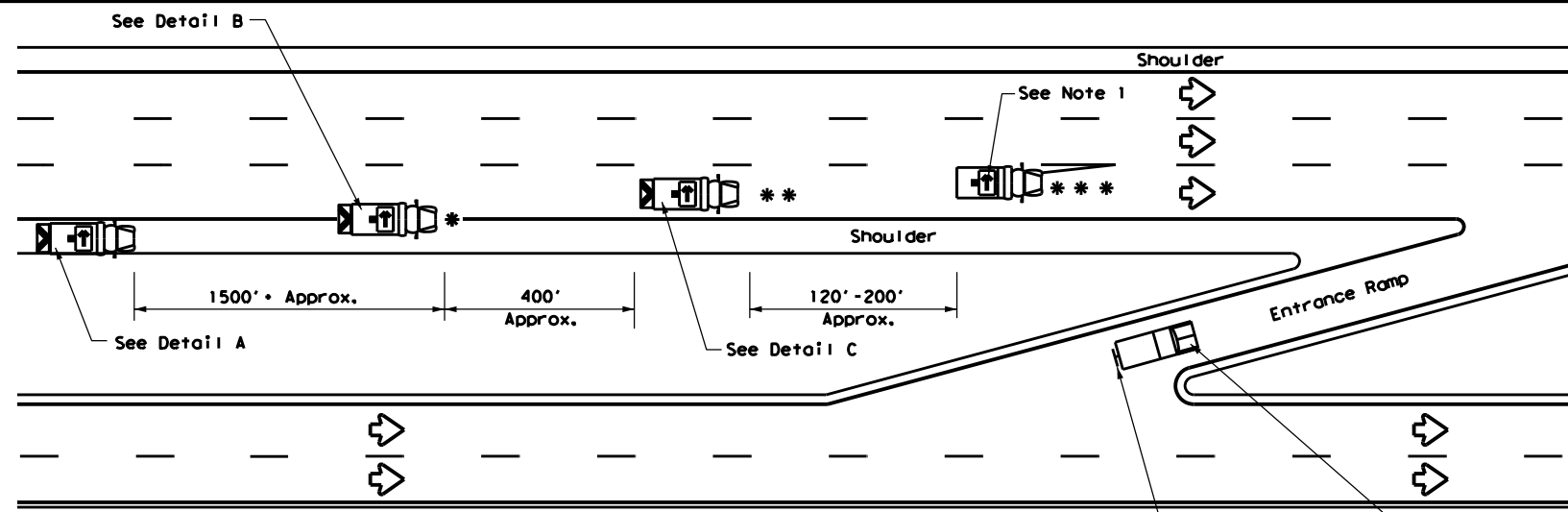
Texas Department of Transportation
 Traffic Operations Division Standard

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

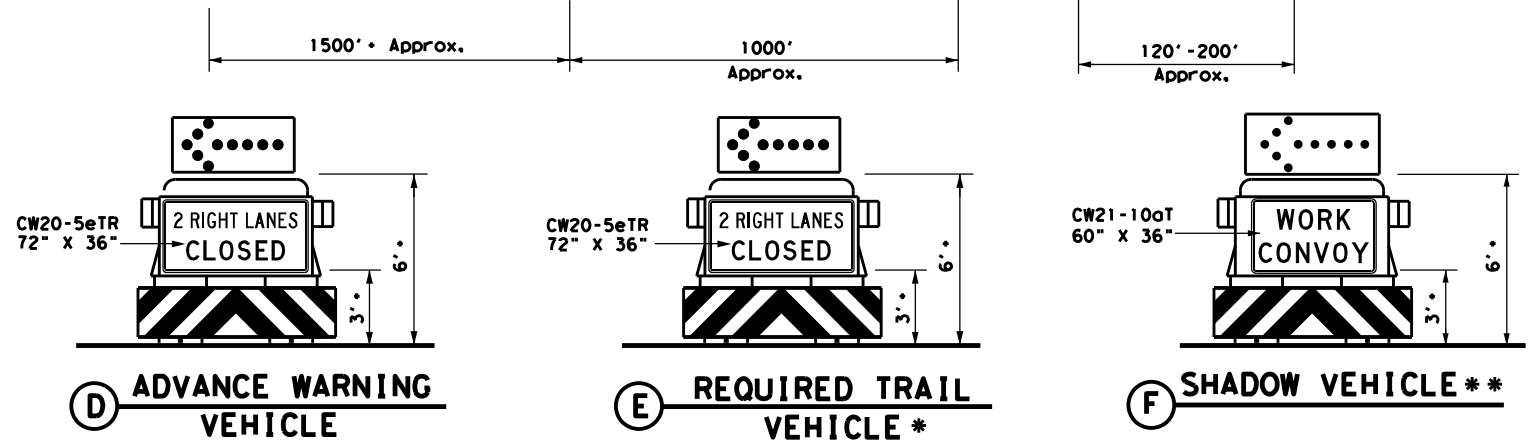
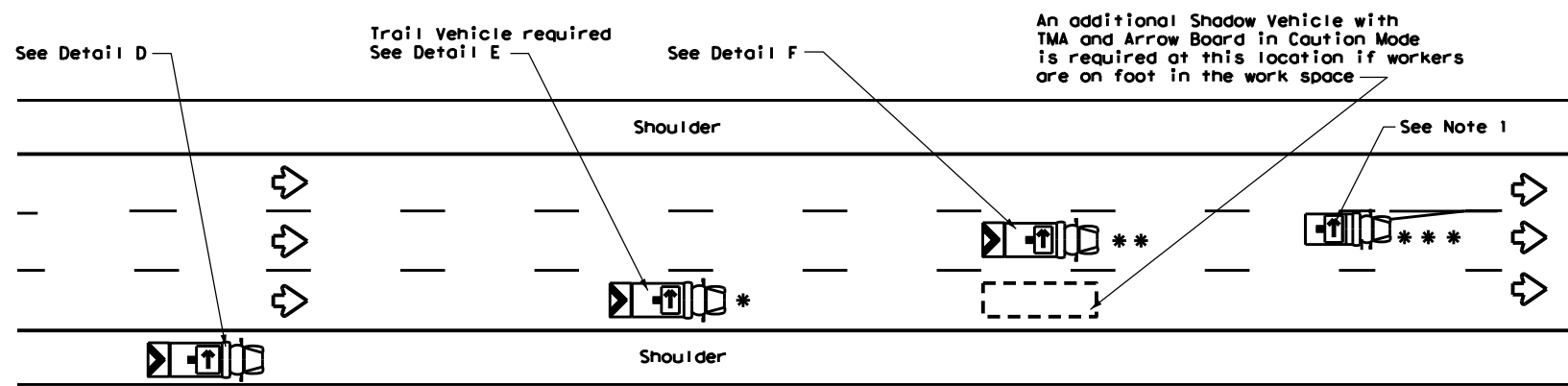
TCP (2-6) - 18

FILE: tcp2-6-18.dgn	DATE: December 1985	CON: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
REVISIONS					
2-94 4-98					
8-95 2-12					
1-97 2-18					
	DIST: 12	COUNTY: HARRIS	SHEET NO.: 31		

FILE: H:\00\Maintenance\METRO MA INTENANCE\FY22-23 RMCs\IH610\FrontageCrest\TrafficControlPlan\TrafficControlPlan.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167
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RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



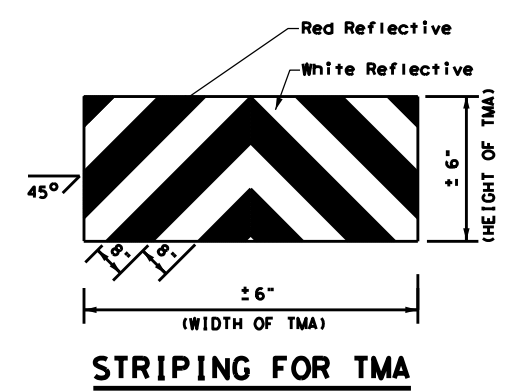
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

LEGEND			
* Trail Vehicle	ARROW BOARD DISPLAY		
** Shadow Vehicle			
*** Work Vehicle		RIGHT Directional	
	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

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



STRIPING FOR TMA

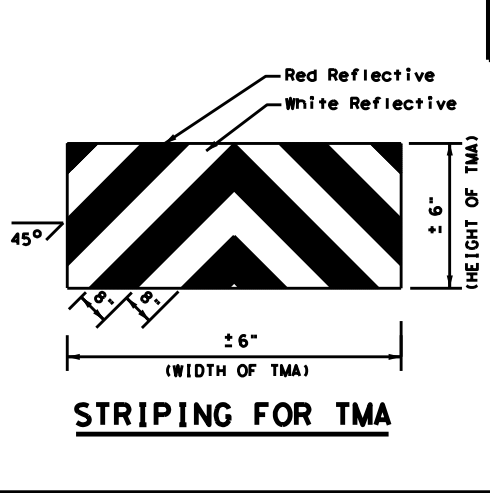
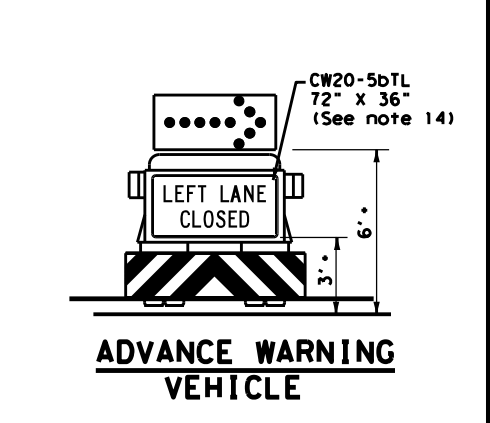
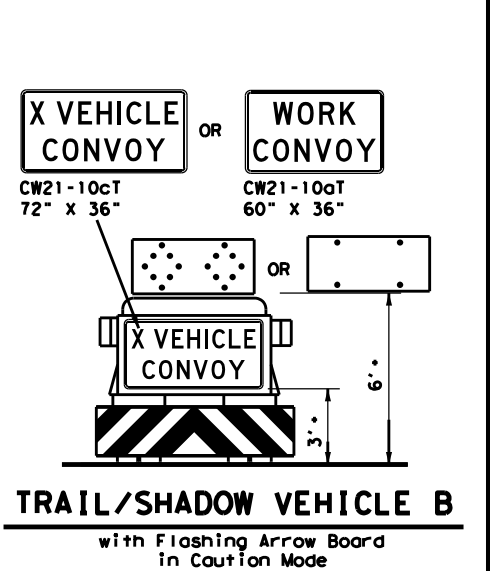
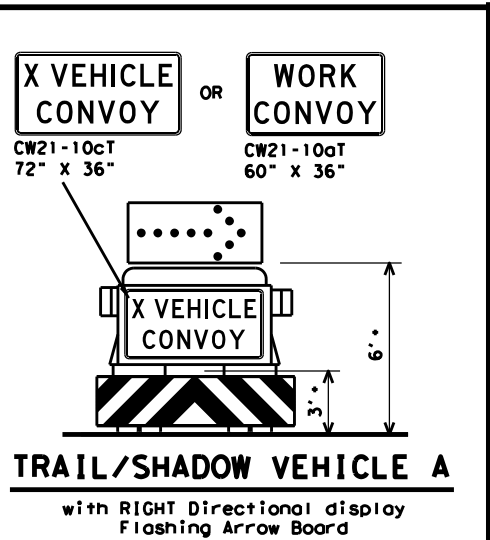
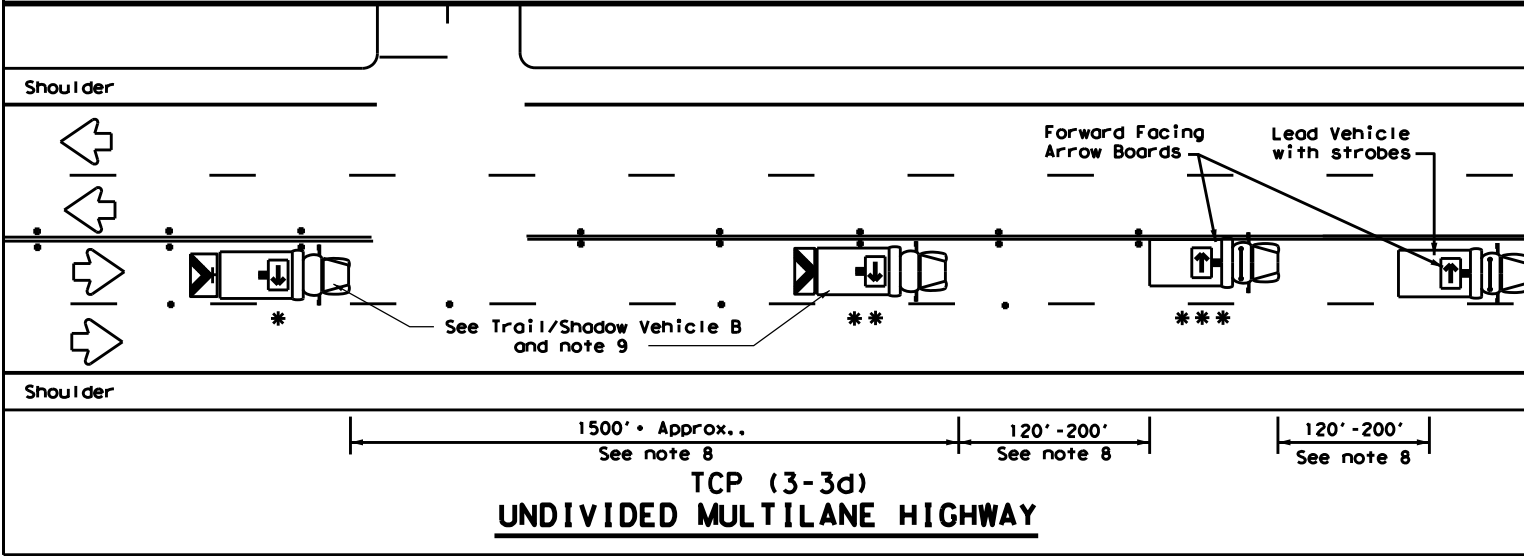
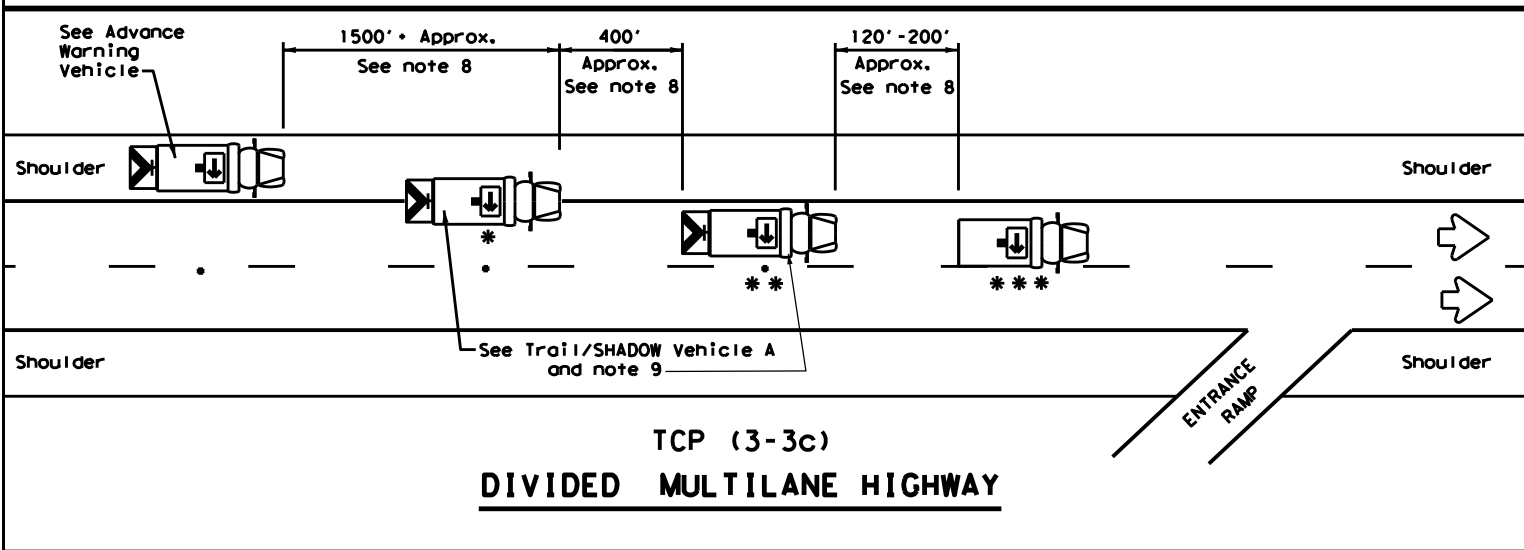
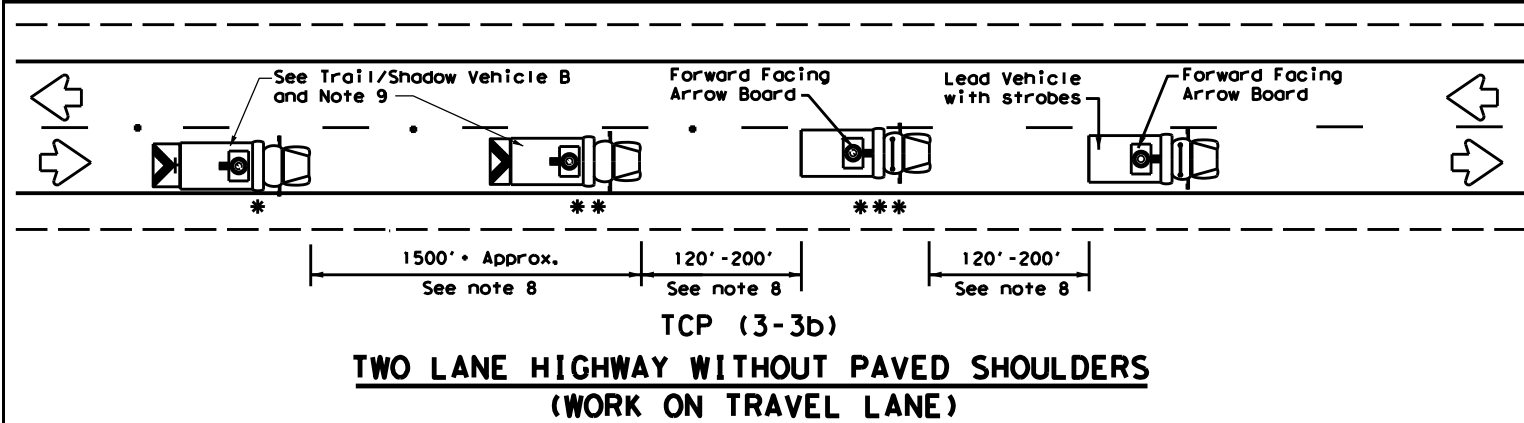
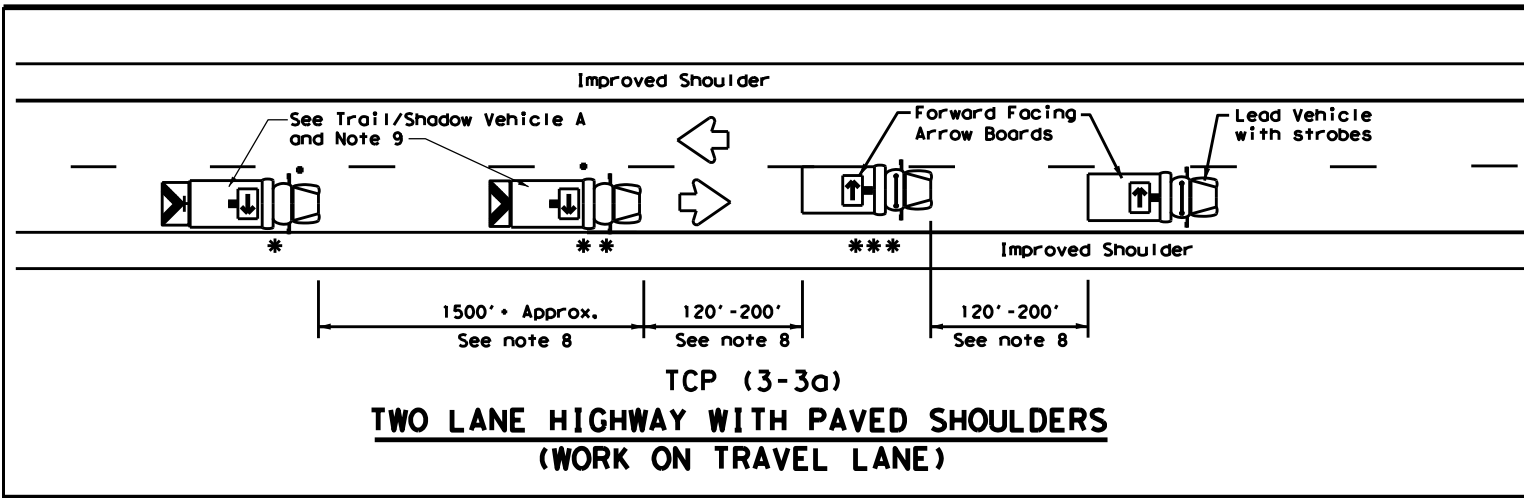
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
DIVIDED HIGHWAYS
 TCP(3-2)-13

FILE: tcp3-2.dgn	DATE: 11/9/2023	BY: TxDOT	CHK: TxDOT	APP: TxDOT	CR: TxDOT
© TxDOT December 1985		CONT: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 32	
2-94	4-98				
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176

FILE: H:\00\Mainenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610\Frontsets\Crash\Traffic Control Plan\TCP 3-3.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167
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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
✓				

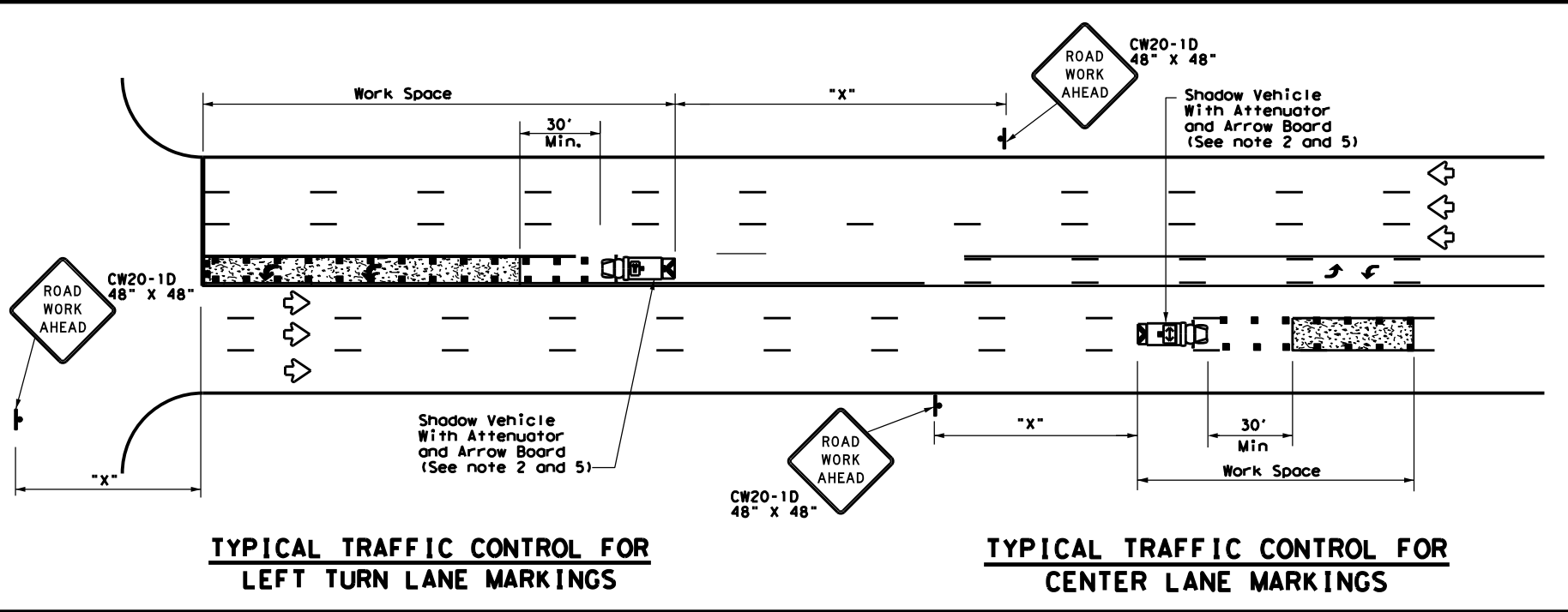
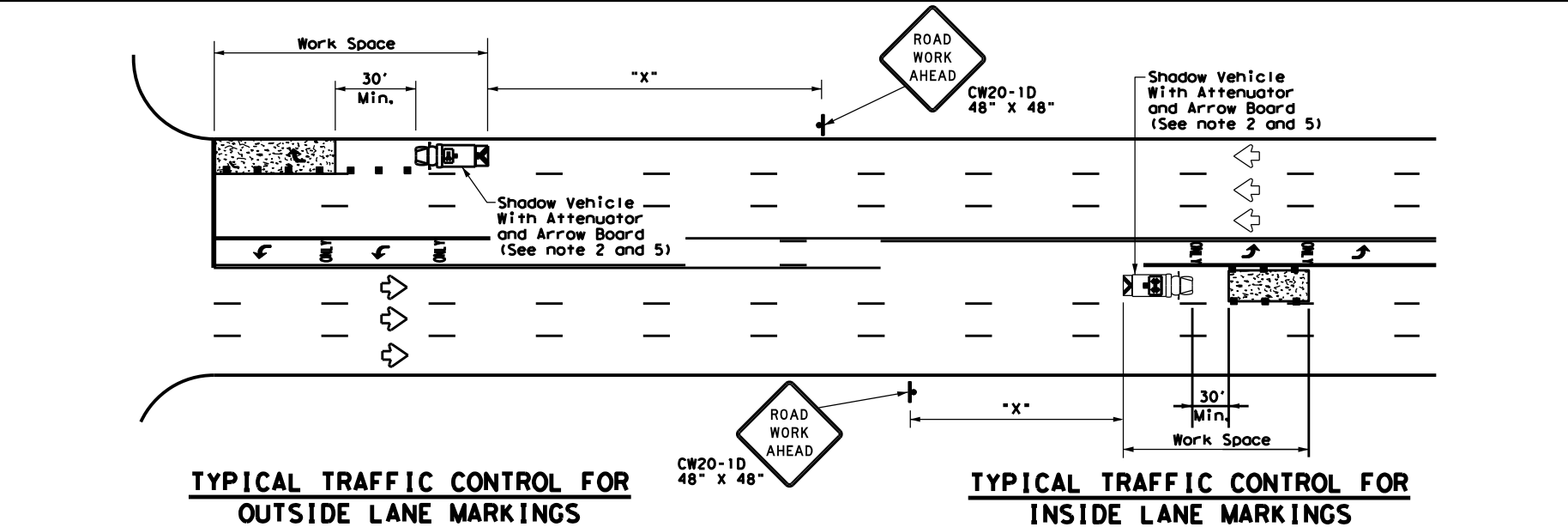
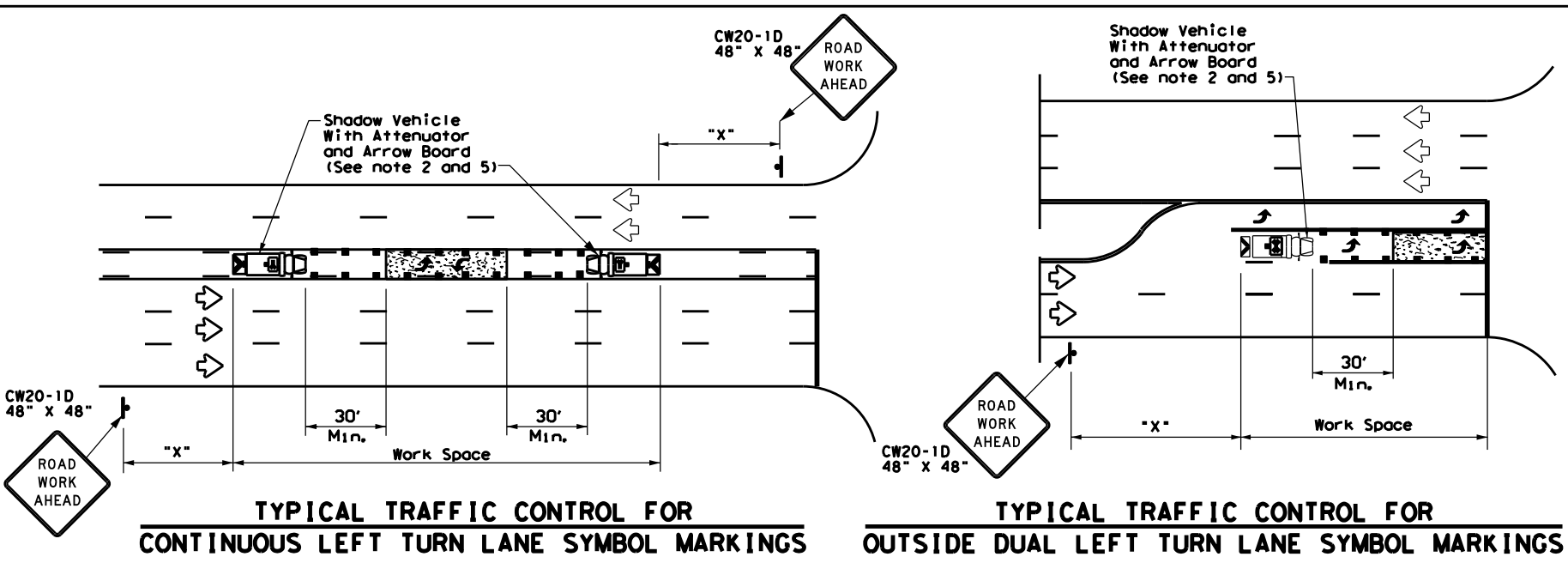
GENERAL NOTES

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

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP (3-3) - 14				
FILE: tcp3-3.dgn	DATE: TxDOT	CNT: TxDOT	JOB: TxDOT	CR: TxDOT
© TxDOT September 1987	CON: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
REVISIONS	DIST: 12	COUNTY: HARRIS	SHEET NO. 33	
2-94 4-98				
8-95 7-13				
1-97 7-14				

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FILE: H:\00\Mainenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610\Frontsets\Crstomize\Guse\11/9/2023
 DATE: 11/9/2023
 PROJECT: 0271-16-167



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

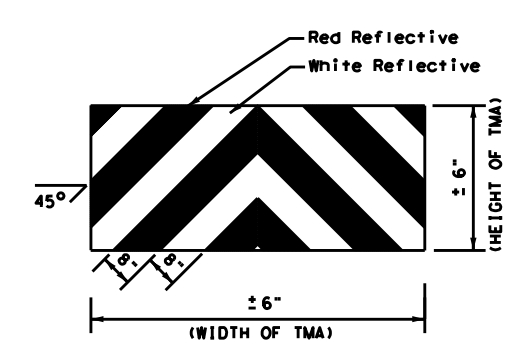
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	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

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.



STRIPING FOR TMA

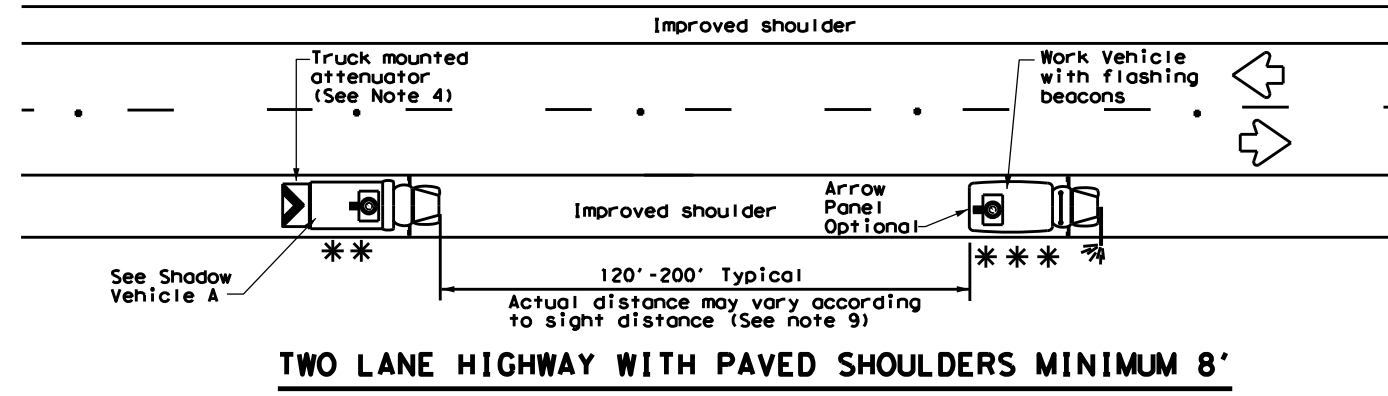
Texas Department of Transportation
 Traffic Operations Division Standard

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

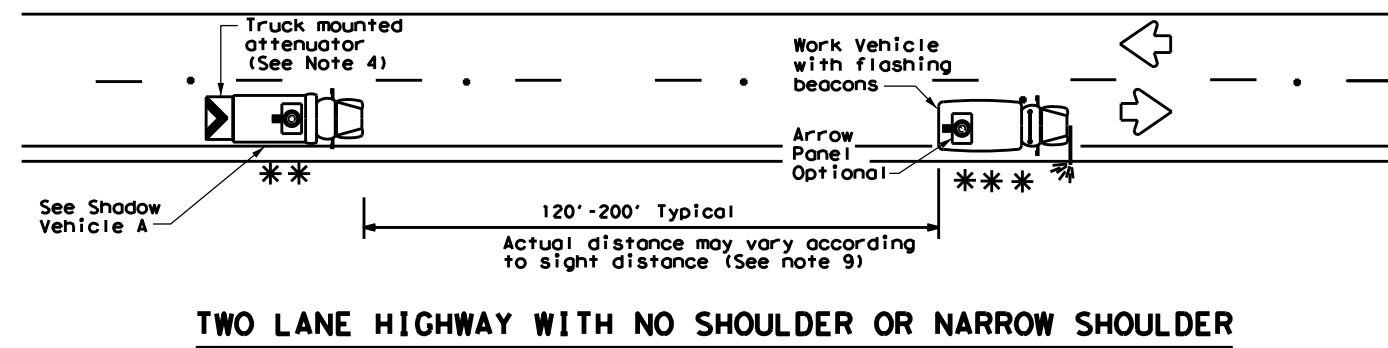
TCP(3-4)-13

FILE: tcp3-4.dgn	DATE: 07/2013	CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 34	

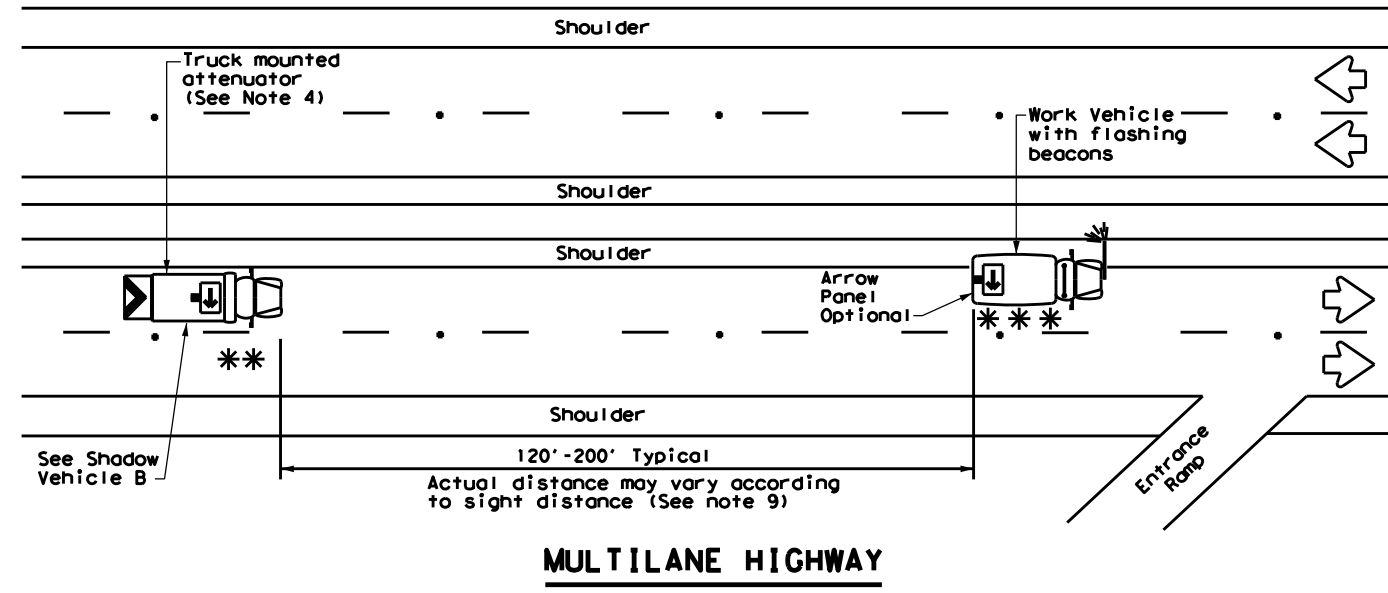
FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610\FrontageCr...
 DATE: 11/9/2023
 PROJECT: 0271-16-167
 DISCLAIMER: This document is a design standard for the purpose of providing a minimum level of safety. It is not intended to be used as a substitute for engineering judgment. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for any damages resulting from its use.



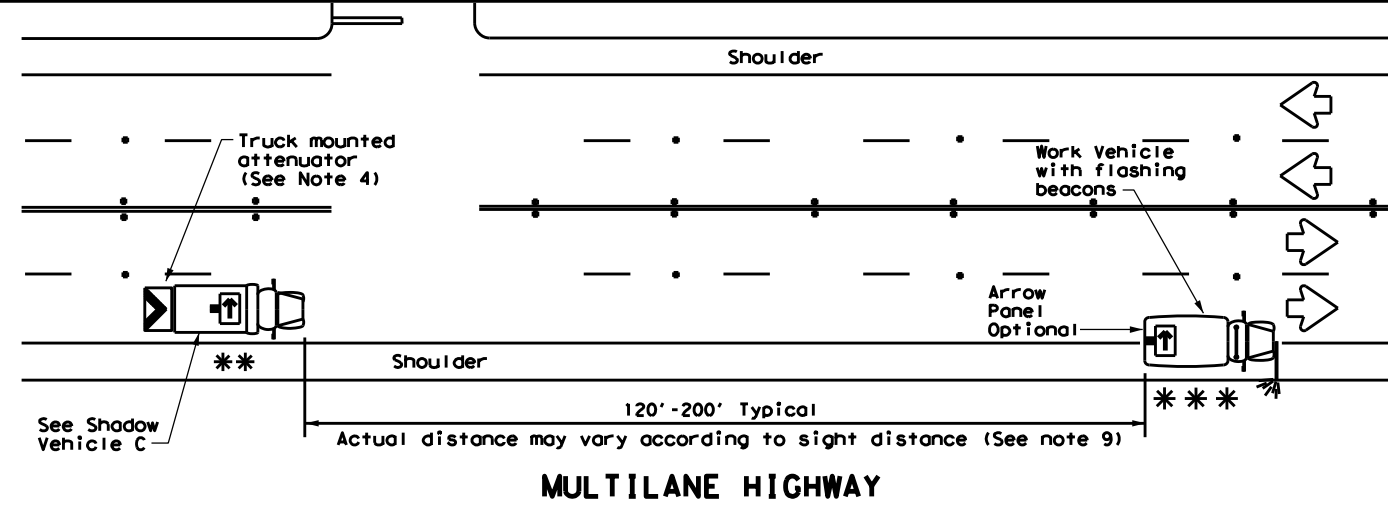
TWO LANE HIGHWAY WITH PAVED SHOULDERS MINIMUM 8'



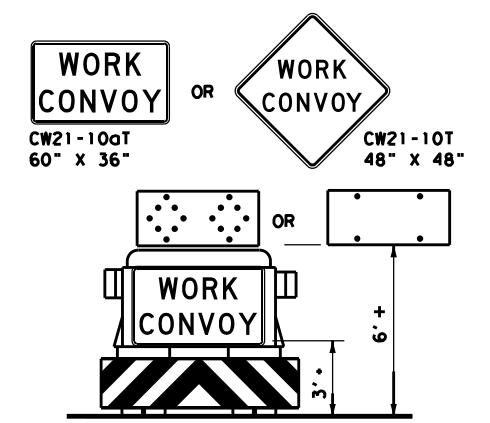
TWO LANE HIGHWAY WITH NO SHOULDER OR NARROW SHOULDER



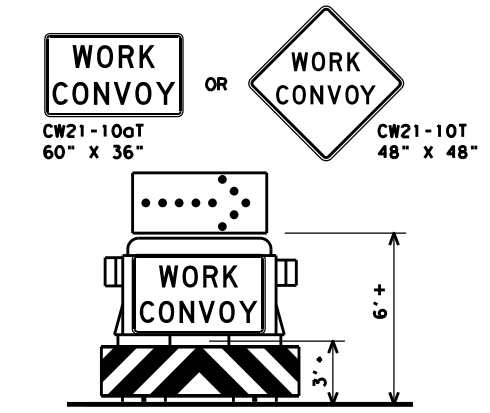
MULTILANE HIGHWAY



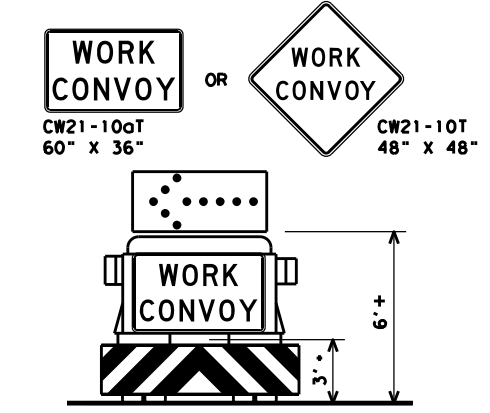
MULTILANE HIGHWAY



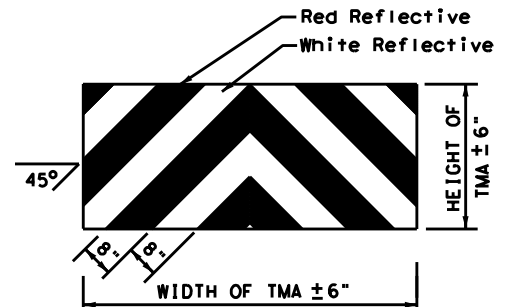
SHADOW VEHICLE A
with Flashing Arrow Board in Caution Mode



TYPICAL SHADOW VEHICLE B
with RIGHT Directional display Flashing Arrow Board



TYPICAL SHADOW VEHICLE C
with LEFT Directional display Flashing Arrow Board



STRIPING FOR TMA

LEGEND

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

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

GENERAL NOTES

- Vehicles shall be equipped with arrow panels as illustrated.
- All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
- 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 is required.
- Striping on the back panel of all TMAs shall be 8" red reflective sheeting with white background, 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.
- Flashing Arrow Panels shall be Type B or Type C as per BC Standards. The panel operation shall be controlled from inside the vehicle.
- Each vehicle shall have two-way radio communication capability.
- When the work convoy must change lanes, the Shadow Vehicle should change lanes first to protect the Work Vehicle.
- Spacing between Shadow and Work Vehicle will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the Shadow Vehicle in time to slow down and/or change lanes as they approach the Work Convoy.
- Use of an arrow panel on the Work Vehicle is optional but may be required by the Engineer. If an arrow panel is not used, dual flashing beacons, mounted as high and as widely separated as practicable at the rear of the Work Vehicle shall be required.
- On two-lane two-way roadways, the Work and Shadow Vehicles should pull over periodically to allow motor vehicle traffic to pass.
- Work and Shadow Vehicles should stay on the shoulder of highways having 8' or wider shoulders when possible.
- A Trail Vehicle may be added to the operation when approved by the Engineer. See TCP(3) series standards.

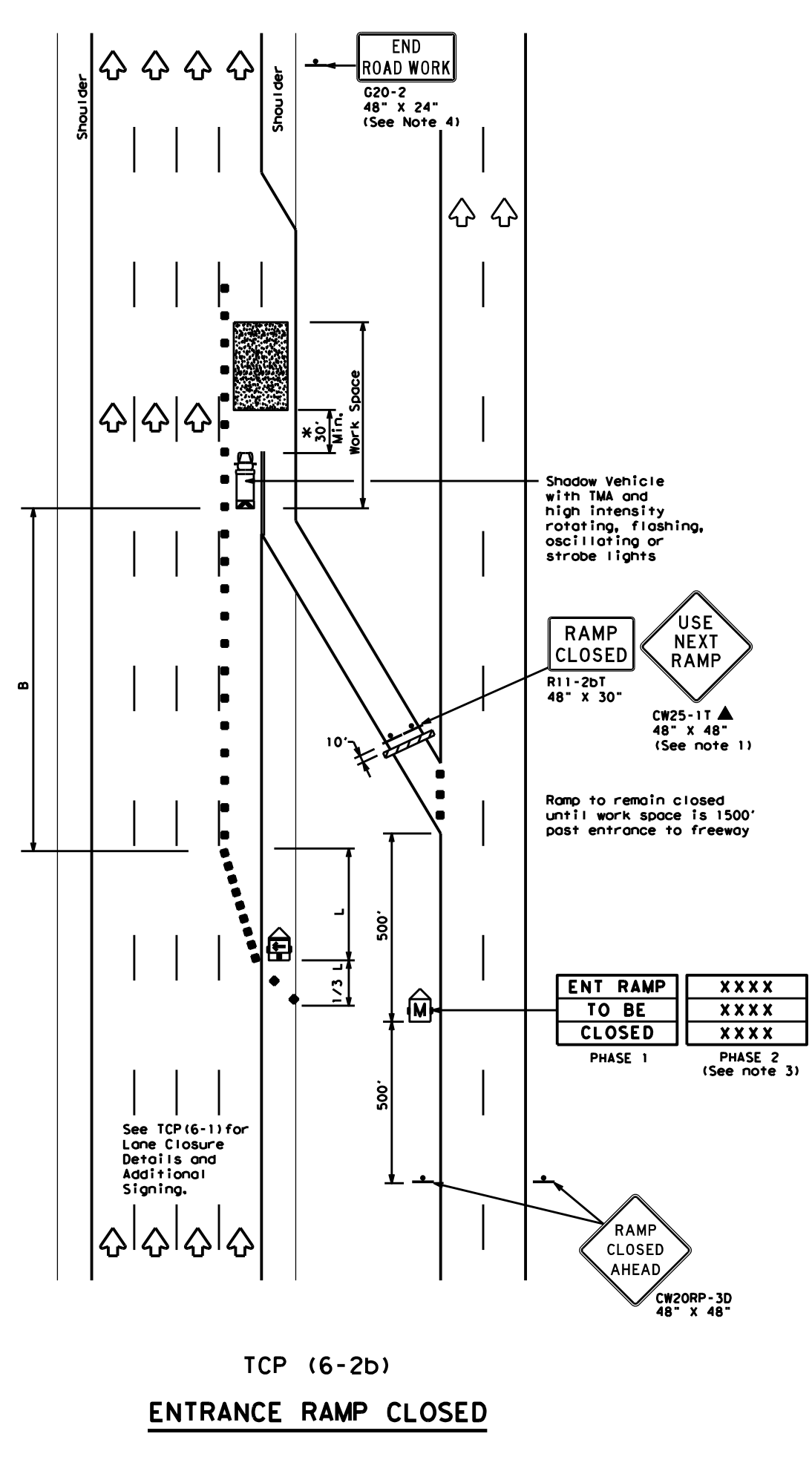
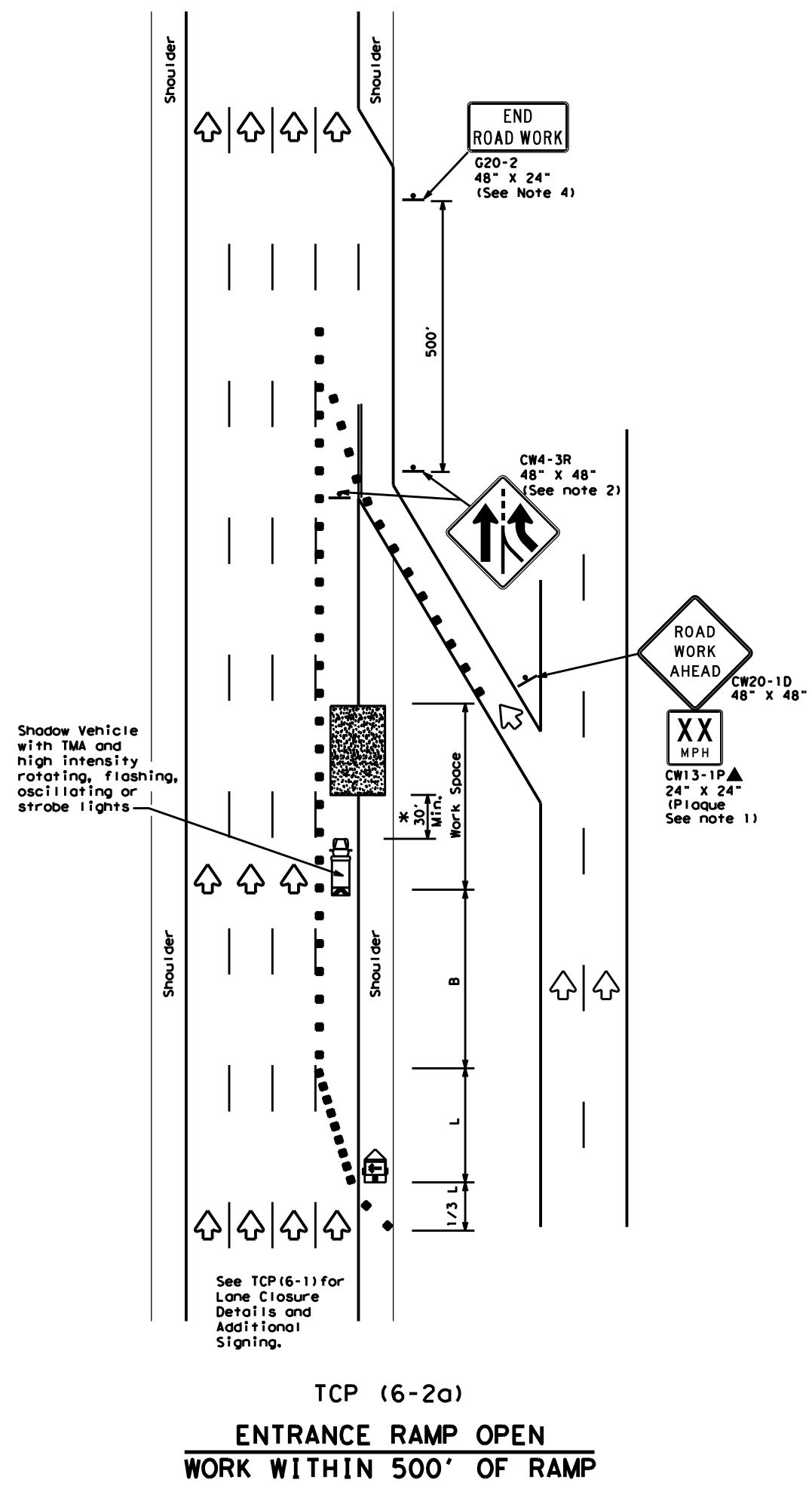
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
HERBICIDE TRUCK OPERATIONS
TCP(3-5)-15

FILE: tcp3-5.dgn	DATE: July 2015	CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 35	

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FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610\FrontageCrestline\11610\TrafficControl\11610\TrafficControl.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



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

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

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

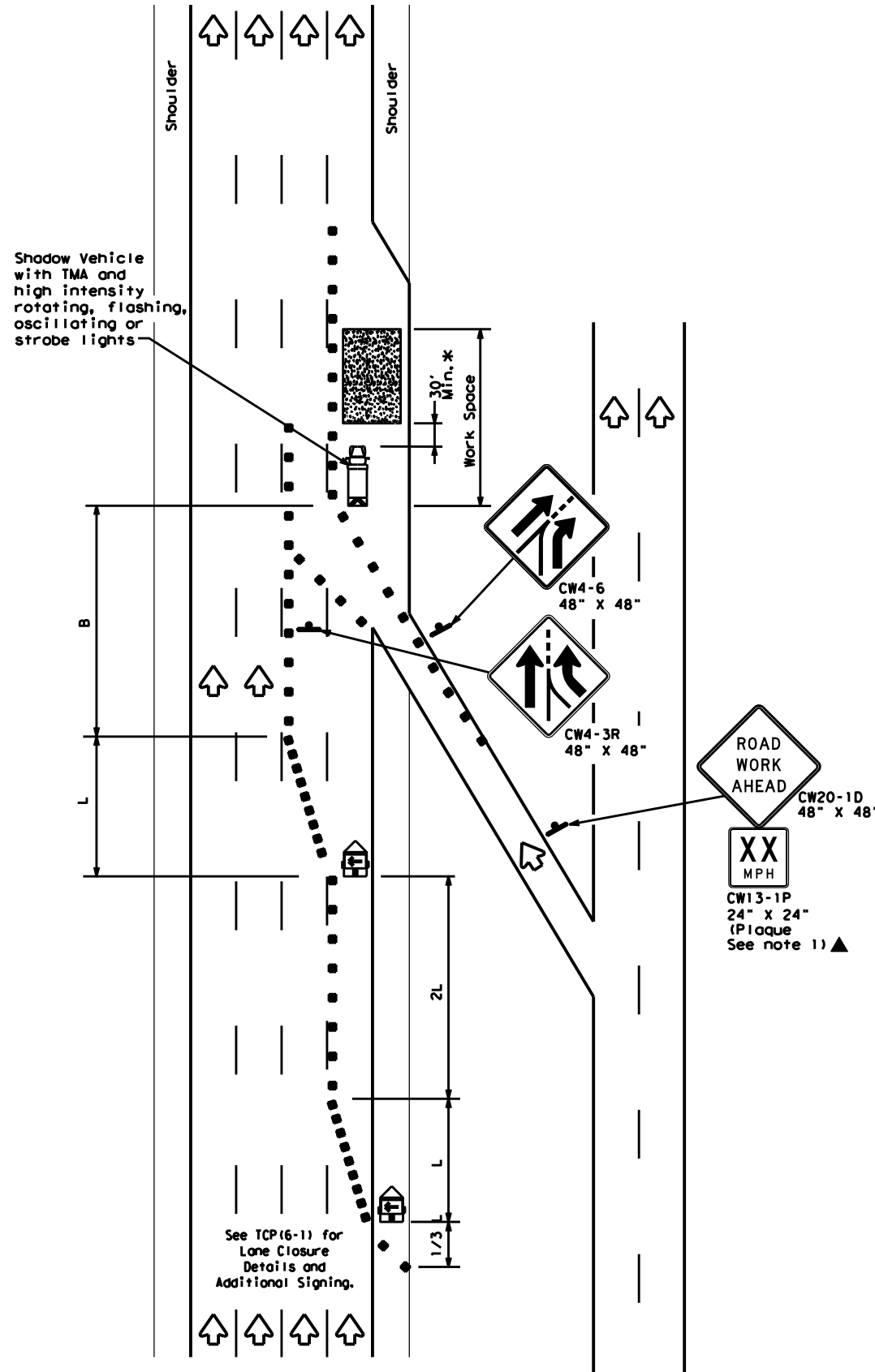
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP (6-2) - 12

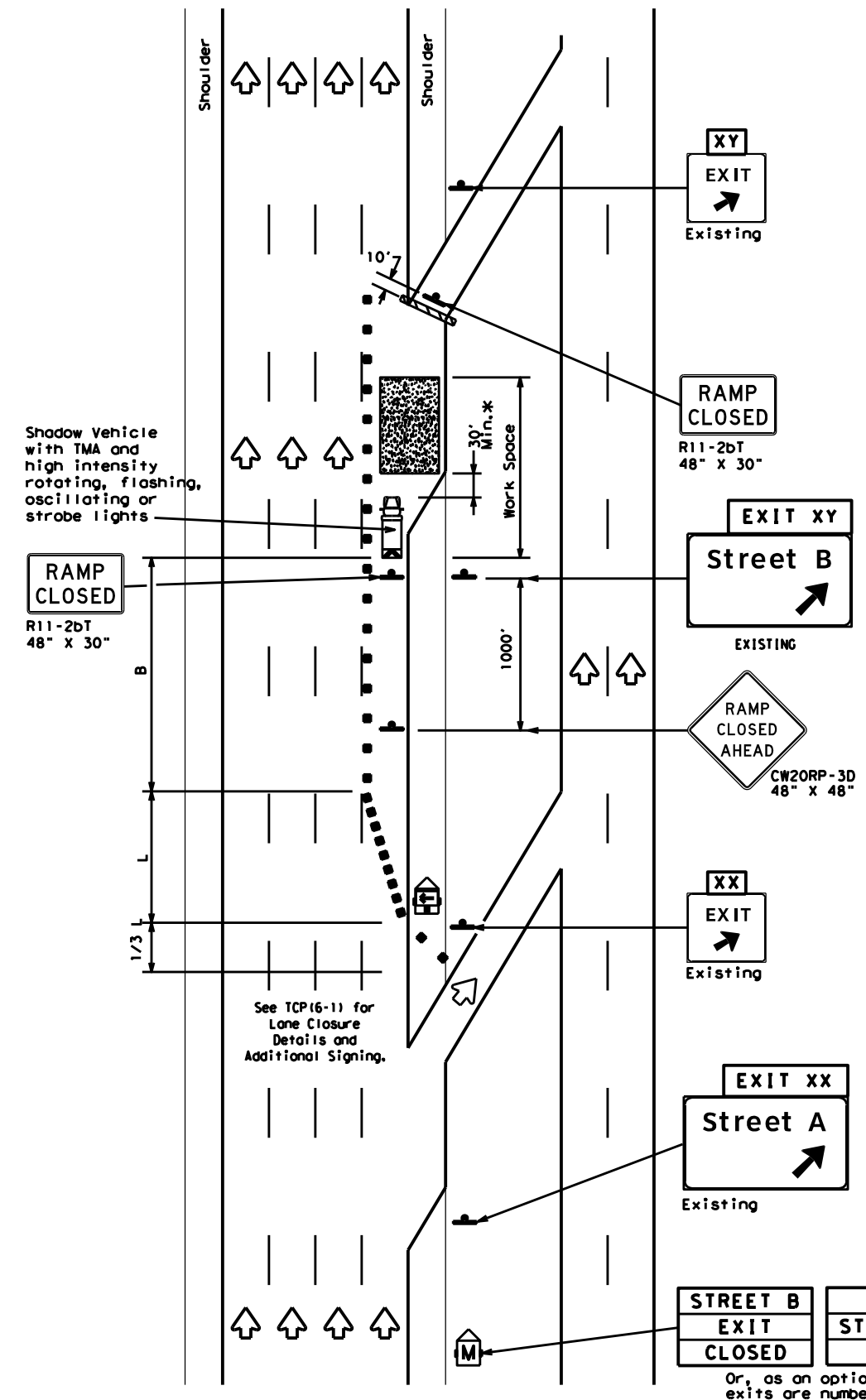
FILE: tcp6-2.dgn	DATE: 11/9/2023	BY: TxDOT	CHK: TxDOT	APP: TxDOT	CR: TxDOT
© TxDOT February 1994	CONTRACT NO: 0271-16	SECTION: 167	JOB: IH610	HIGHWAY: 167	
REVISIONS	DATE: 1-97 8-98	DIST: 12	COUNTY: HARRIS	SHEET NO: 36	
	DATE: 4-98 8-12				

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FILE: H:\00\Maintenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610\FrontageCr est\m610\TrafficControlPlans\TrafficControlPlans\TCP(6-3)\TCP(6-3a).dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



TCP (6-3a)
ENTRANCE RAMP OPEN



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

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

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

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

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

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

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

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

Texas Department of Transportation
 Traffic Operations Division Standard

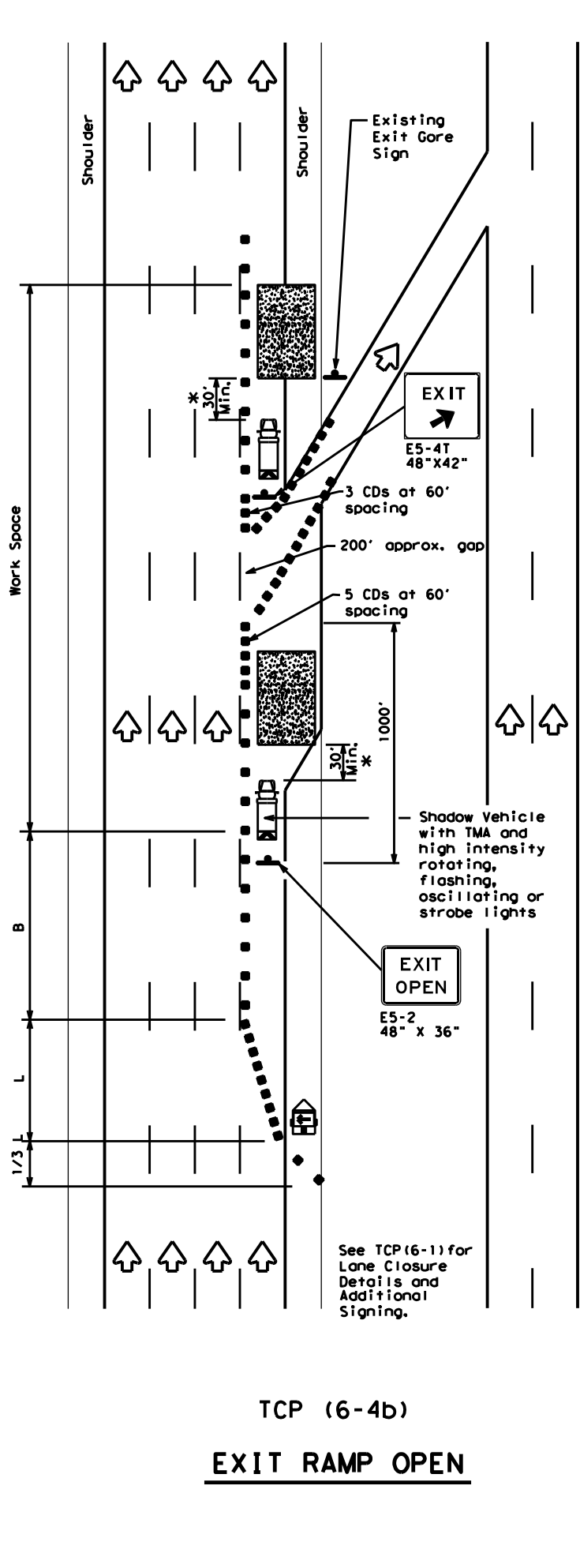
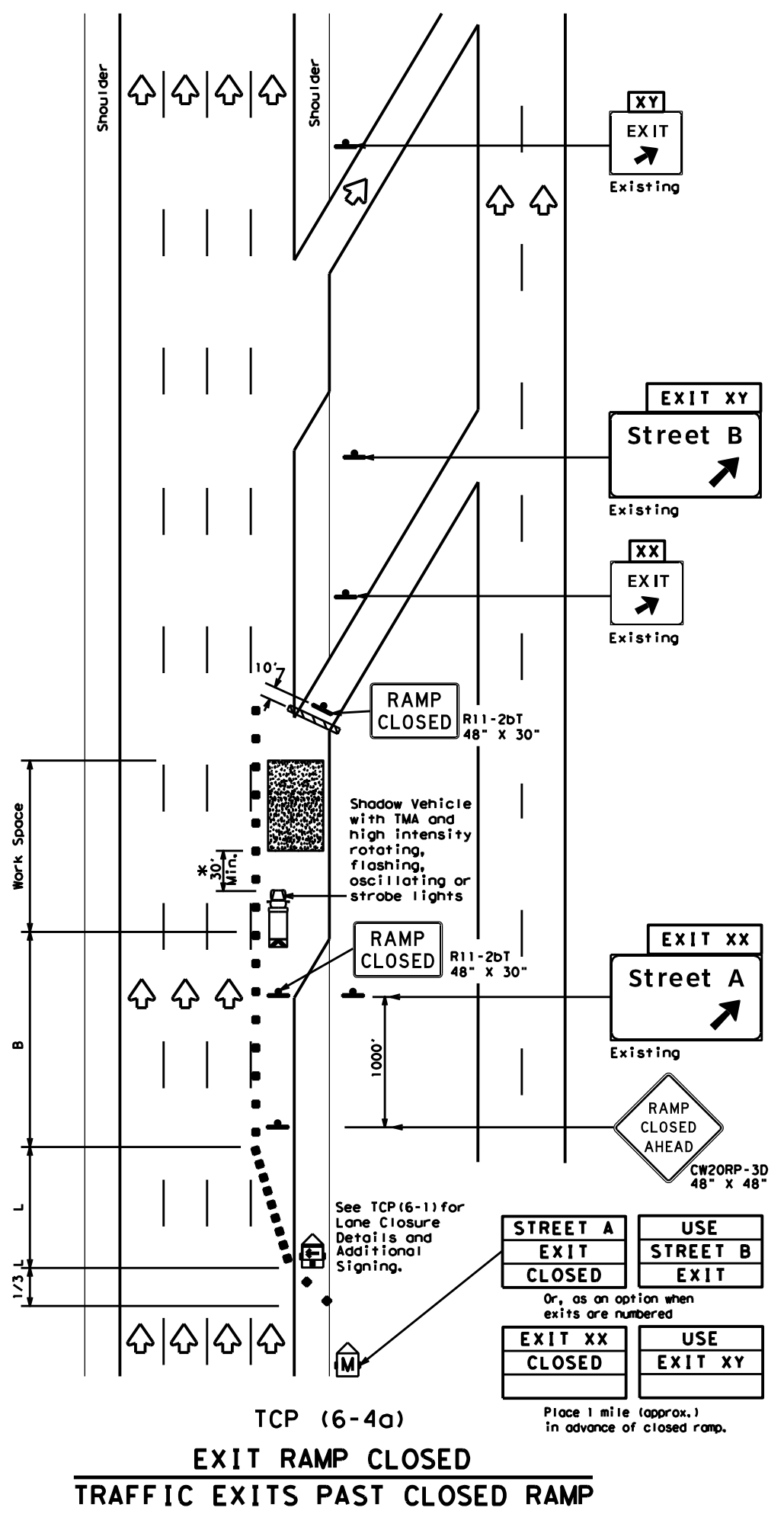
TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP (6-3) - 12

FILE#	DATE	BY	CHKD	JOB	HIGHWAY
tcp6-3.dgn	February 1994	0271	16	167	IH610
REVISIONS					
1-97 8-98					
4-98 8-12					
		DIST	COUNTY	SHEET NO.	
		12	HARRIS	37	

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FILE: H:\00Maintenance\METRO_MA INTENANCE\FY22-23 RMCs\IH610Frontrange\11/9/2023 11/9/2023
 DATE: 11/9/2023
 PROJECT: 0271-16-167



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

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

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

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

GENERAL NOTES

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

2. See BC Standards for sign details.

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

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

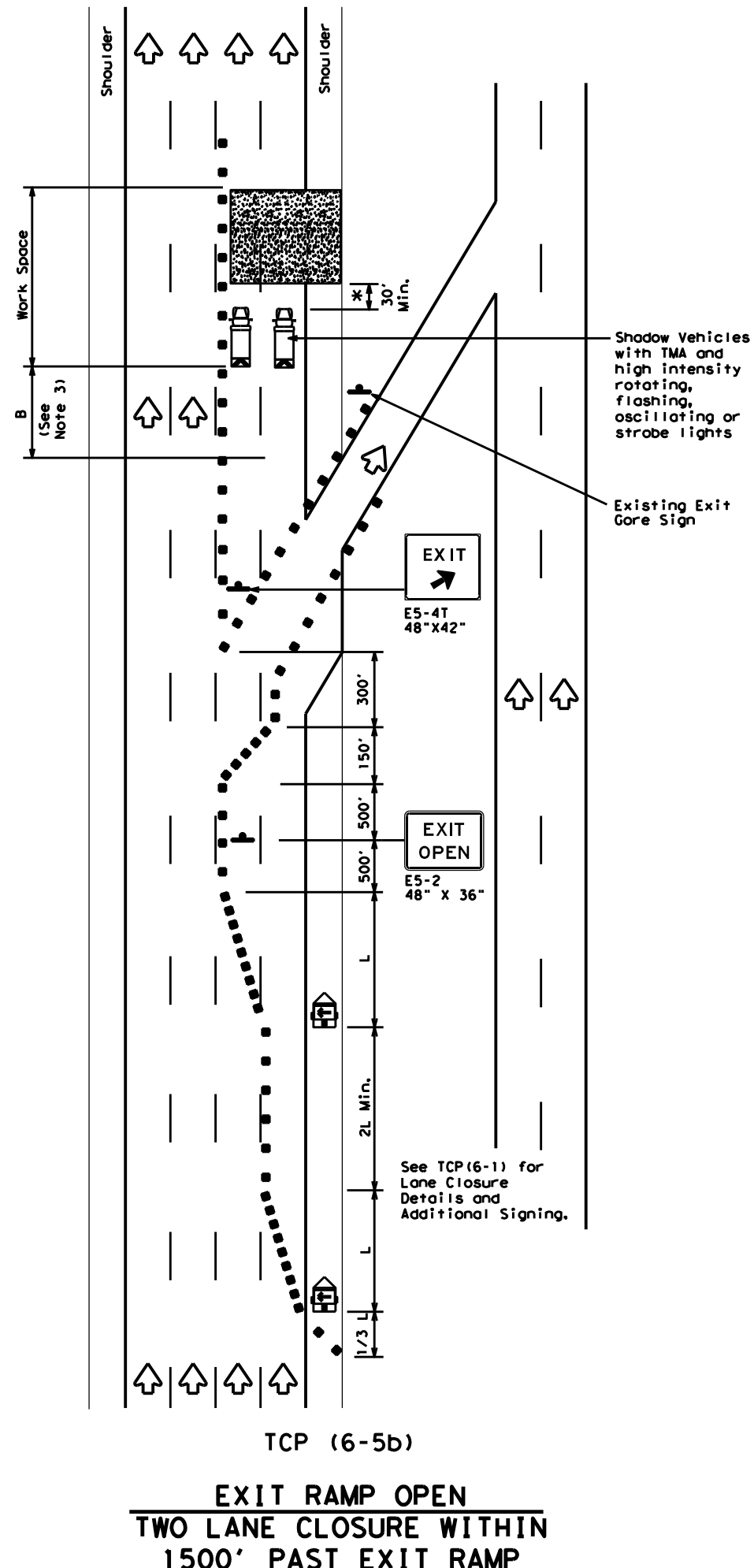
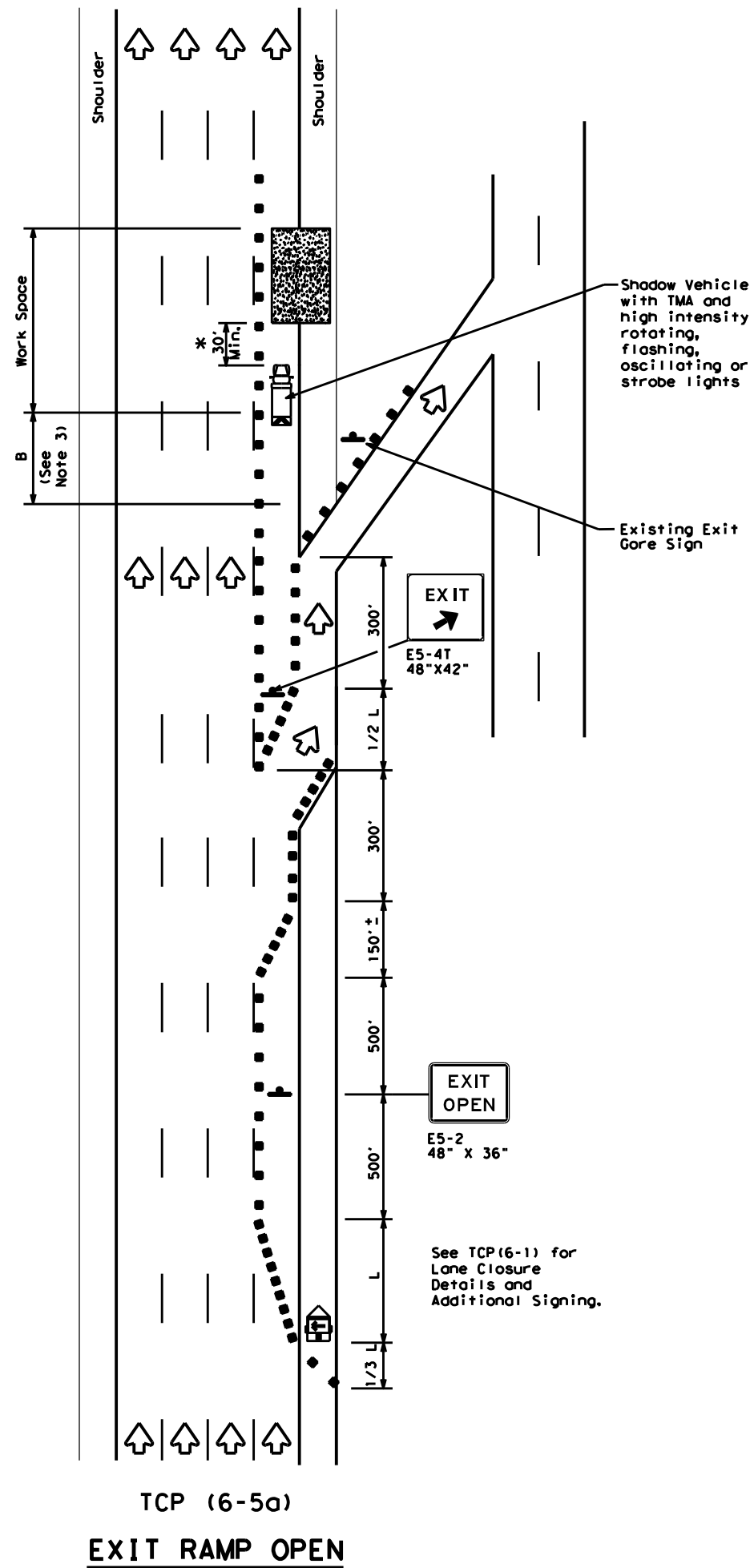
Texas Department of Transportation
 Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP (6-4) - 12

FILE: tcp6-4.dgn	DW: TxDOT	CR: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS				
0271	16		167	IH610
1-97 8-98	DIST		COUNTY	SHEET NO.
4-98 8-12	12		HARRIS	38

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

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

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

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

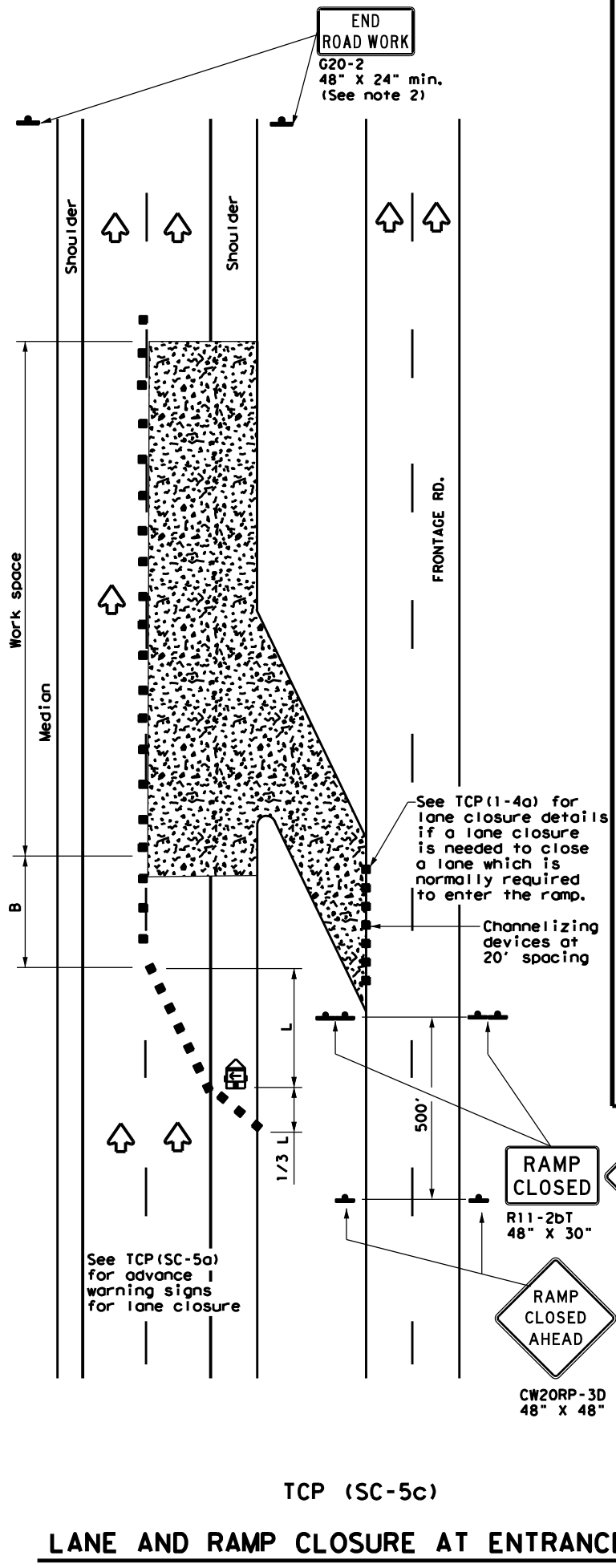
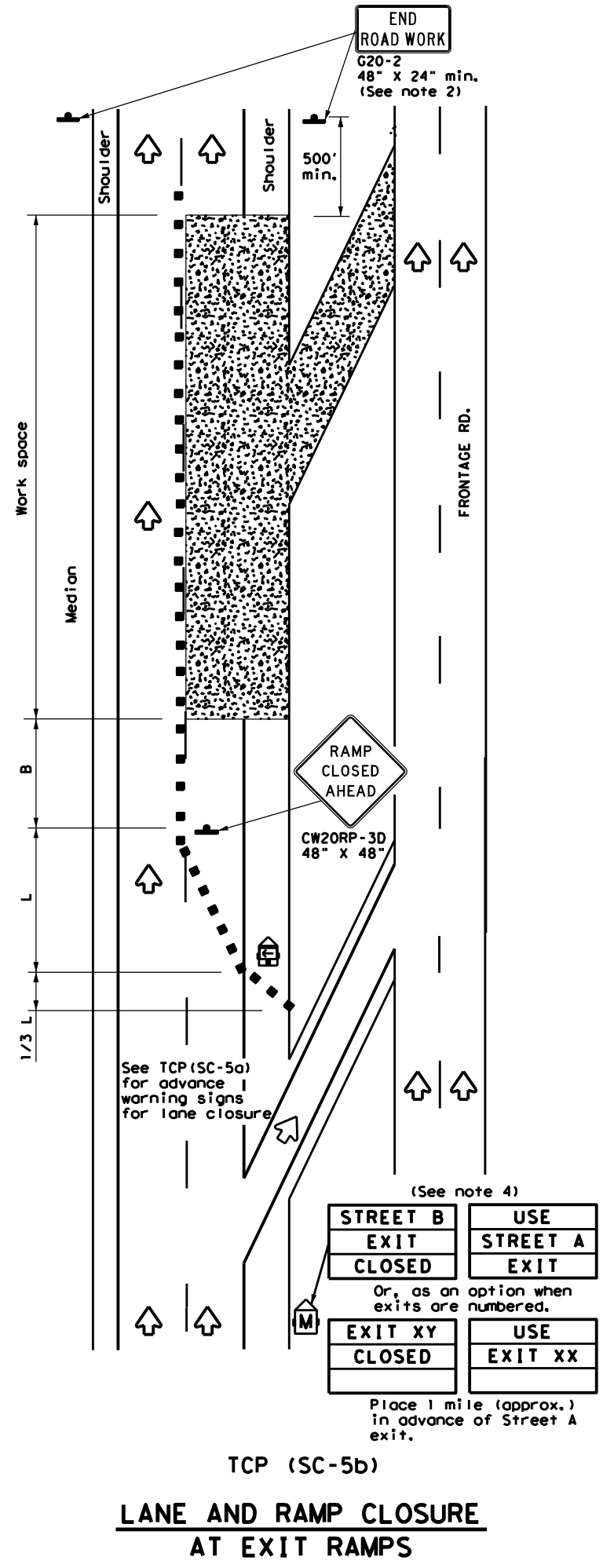
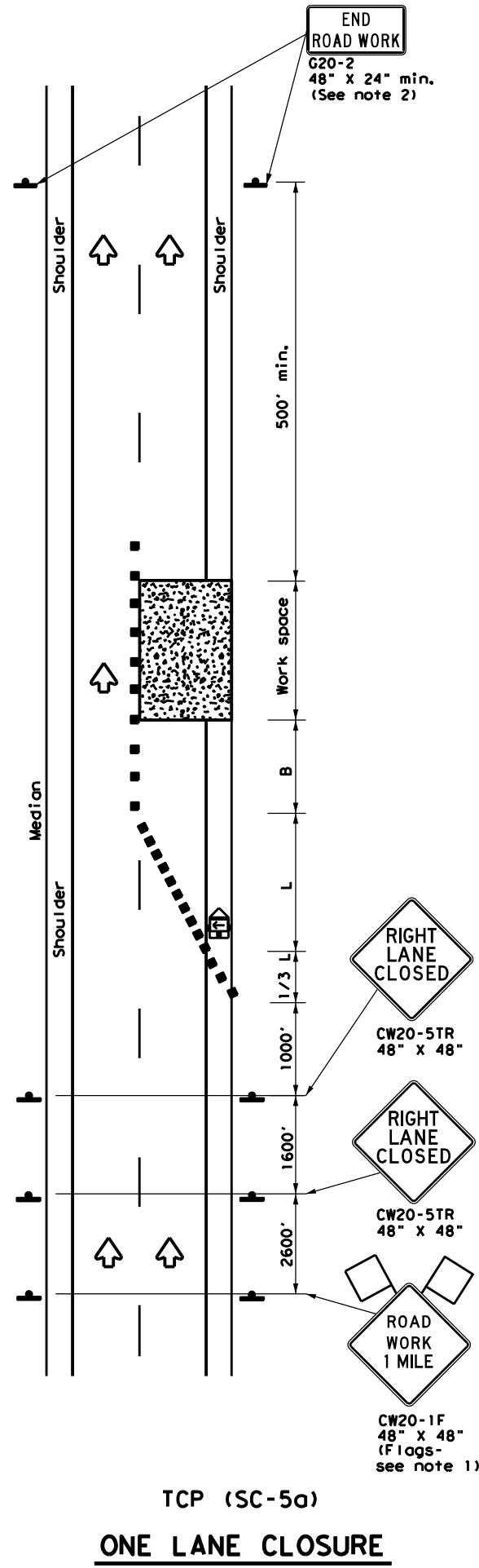
TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP (6-5) - 12

FILE: tcp6-5.dgn	DATE: February 1998	CNT: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
REVISIONS					
1-97 8-98		DIST: 12		COUNTY: HARRIS	SHEET NO: 39
4-98 8-12					

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FILE: H:\00\Mainenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610FrontageCrestmont\Cullen\Standards\TrafficControl\TCPCS-5-22.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



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 Distance "X"	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:
 - If project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
 - USE NEXT RAMP (CW25-1T) sign is optional with approval by the Engineer.
 - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
 - The PCMS may be omitted if: it is replaced with a RAMP CLOSED AHEAD (CW20RP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in the appropriate location to display a similar message as called for on the PCMS.
 - Temporary rumble strips are not required on seal coat operations.

SHEET 5 OF 8

Texas Department of Transportation
Traffic Safety Division Standard

**TRAFFIC CONTROL PLAN
SEAL COAT OPERATIONS
DIVIDED HIGHWAYS**

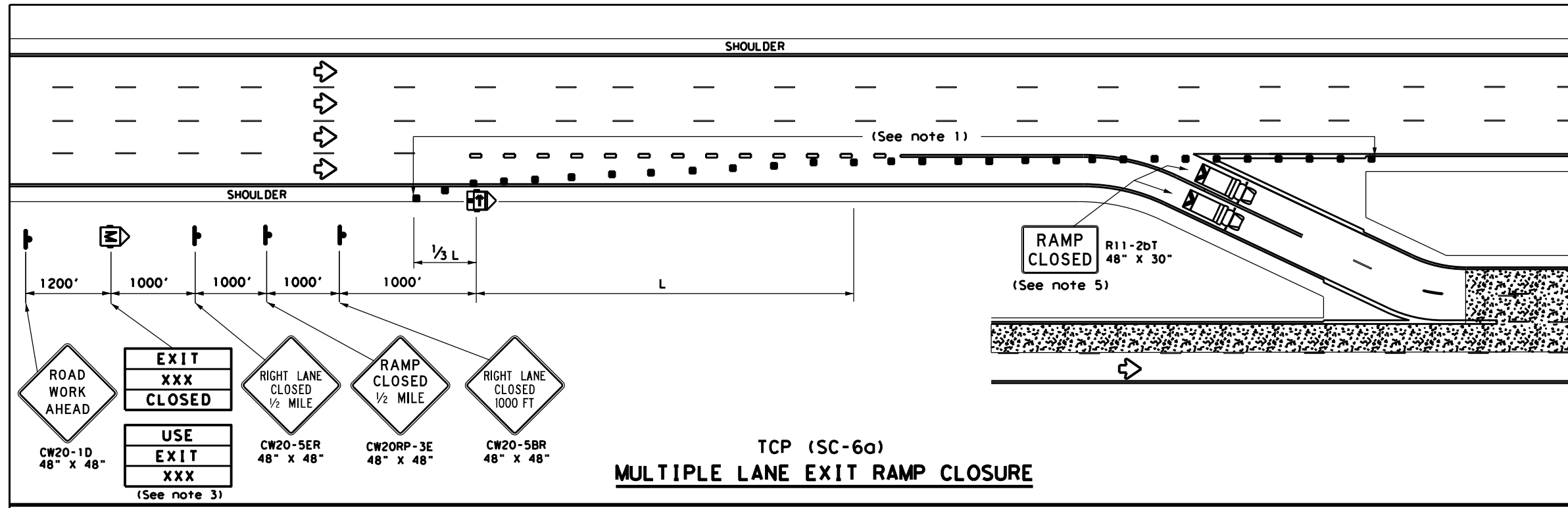
TCP (SC-5) -22

FILE: tcpsc-5-22.dgn	DATE: October 2022	CONTRACT NO: 0271-16	SECTION: 167	JOB NO: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO: 40

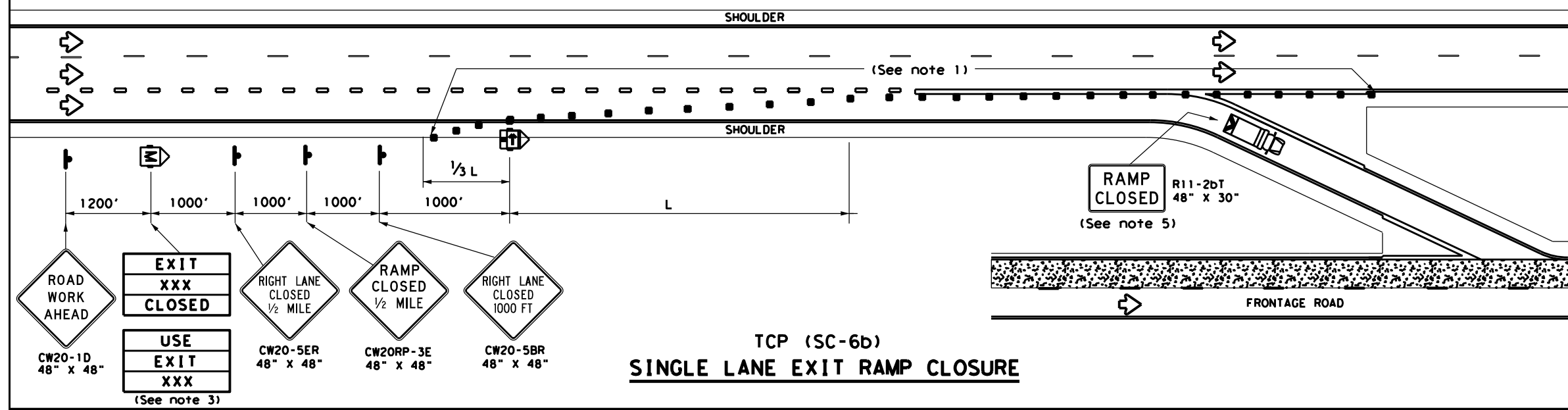
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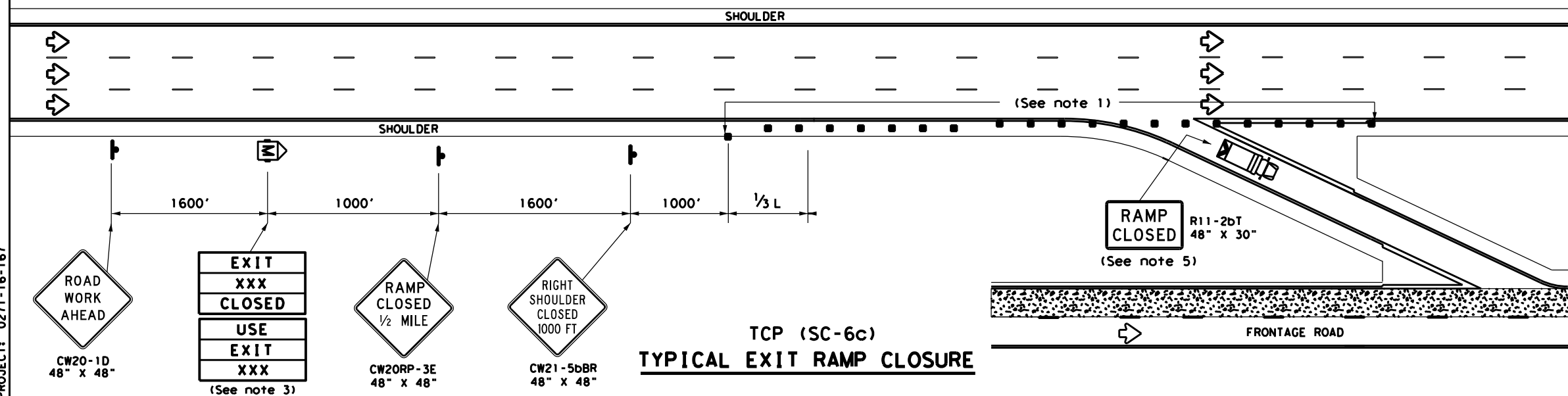
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 DATE: 11/9/2023
 PROJECT: 0271-16-167



TCP (SC-6a)
MULTIPLE LANE EXIT RAMP CLOSURE



TCP (SC-6b)
SINGLE LANE EXIT RAMP CLOSURE



TCP (SC-6c)
TYPICAL EXIT RAMP CLOSURE

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L = WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'
85		850'	935'	1020'	85'	170'	695'

** 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
	✓	✓		

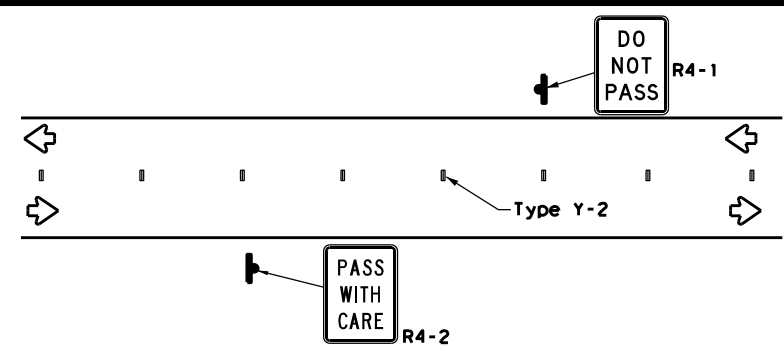
- GENERAL NOTES**
- Place channelizing devices at 20' spacings. Tighter spacing allowed as necessary to address field conditions or observed driver behavior.
 - See the Standard Highway Sign Design for Texas (SHSD) for sign details.
 - The PCMS may be omitted if replaced with a RAMP CLOSED AHEAD (CW2ORP-3D) sign or when a permanent Dynamic Message Sign (DMS) is available in an appropriate location to display a similar message as called for on the PCMS.
 - When it is determined that a through lane should be closed in addition to the exit ramp, refer to TCP(6-4) for traffic control details.
 - A Truck Mounted Attenuator (TMA), where shown, is REQUIRED and shall have a RAMP CLOSED (R11-2bT) sign mounted on the rear of the truck.

**TRAFFIC CONTROL PLAN
 SEAL COAT OPERATIONS
 DIVIDED HIGHWAYS**

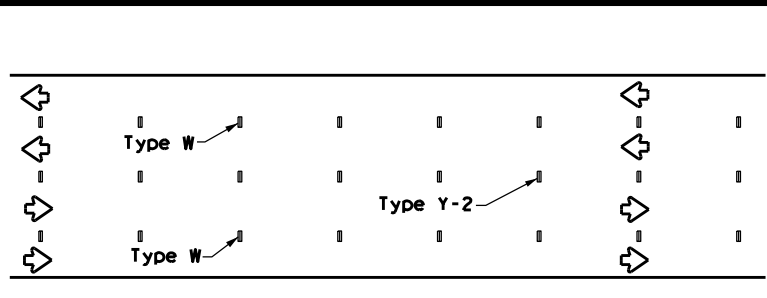
TCP (SC-6) - 22

FILE: tcpsc-6-22.dgn	DATE: TxDOT	DATE: TxDOT	DATE: TxDOT	DATE: TxDOT
© TxDOT October 2022	CONTRACT	SECTION	JOB	HIGHWAY
10-22	0271	16	167	IH610
REVISIONS	DIST	COUNTY	SHEET NO.	
	12	HARRIS	41	

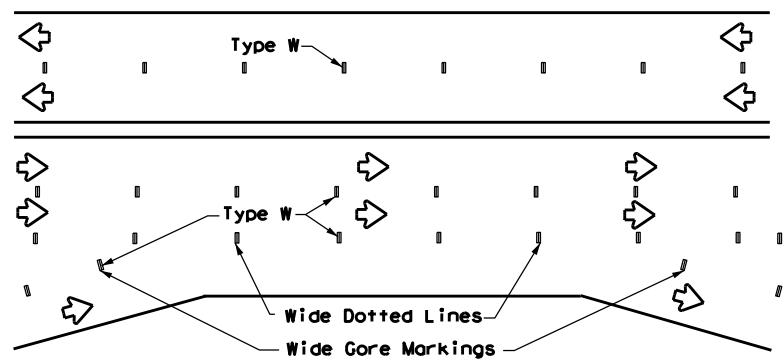
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



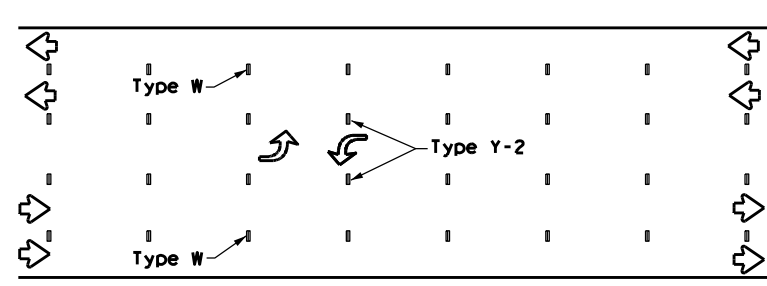
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS

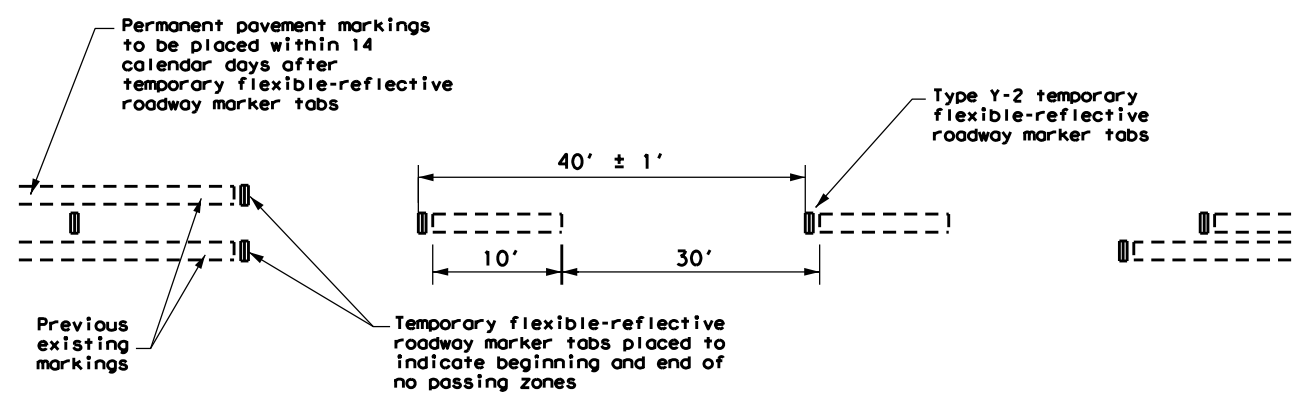


LANE LINES FOR DIVIDED HIGHWAY



TWO-WAY LEFT TURN LANE

TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS



TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

1. Temporary markings for surfacing projects shall be Temporary Flexible-Reflective Roadway Marker Tabs with protective cover 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 days before the surfacing is applied. After the surfacing is rolled and swept, the protective cover over the reflective strip shall be removed.
2. Temporary Flexible-Reflective Roadway Marker Tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with a 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).
3. Temporary Flexible-Reflective Roadway Marker Tabs will require normal maintenance replacement when used on roadways with an Average Daily Traffic (ADT) per lane of up to 7500 vehicles with no more than 10% truck mix. When roadway volumes exceed these values, additional maintenance replacement of these devices should be planned for.
4. 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.
5. 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 4.
6. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
7. Tabs shall NOT be used to simulate edge lines.

NOTES:

1. 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.
2. 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 acceptable.
3. 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.

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

1. DMSs referenced above may be found along with embedded links to their respective MPLs at the following website: <http://www.txdot.gov>

SHEET 7 OF 8

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)

SOLID LINES	DOUBLE NO-PASSING LINE	
	SINGLE NO-PASSING LINE or CHANNELIZATION LINE	
	8" WIDE SOLID LINE	
BROKEN LINES (FOR CENTER LINE OR LANE LINE)		
WIDE DOTTED LINES (FOR LANE DROP LINES)		
WIDE GORE MARKINGS		

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

Height of sheeting is usually more than 1/4" and less than 1".

TEMPORARY PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

TCP (SC-7) -22

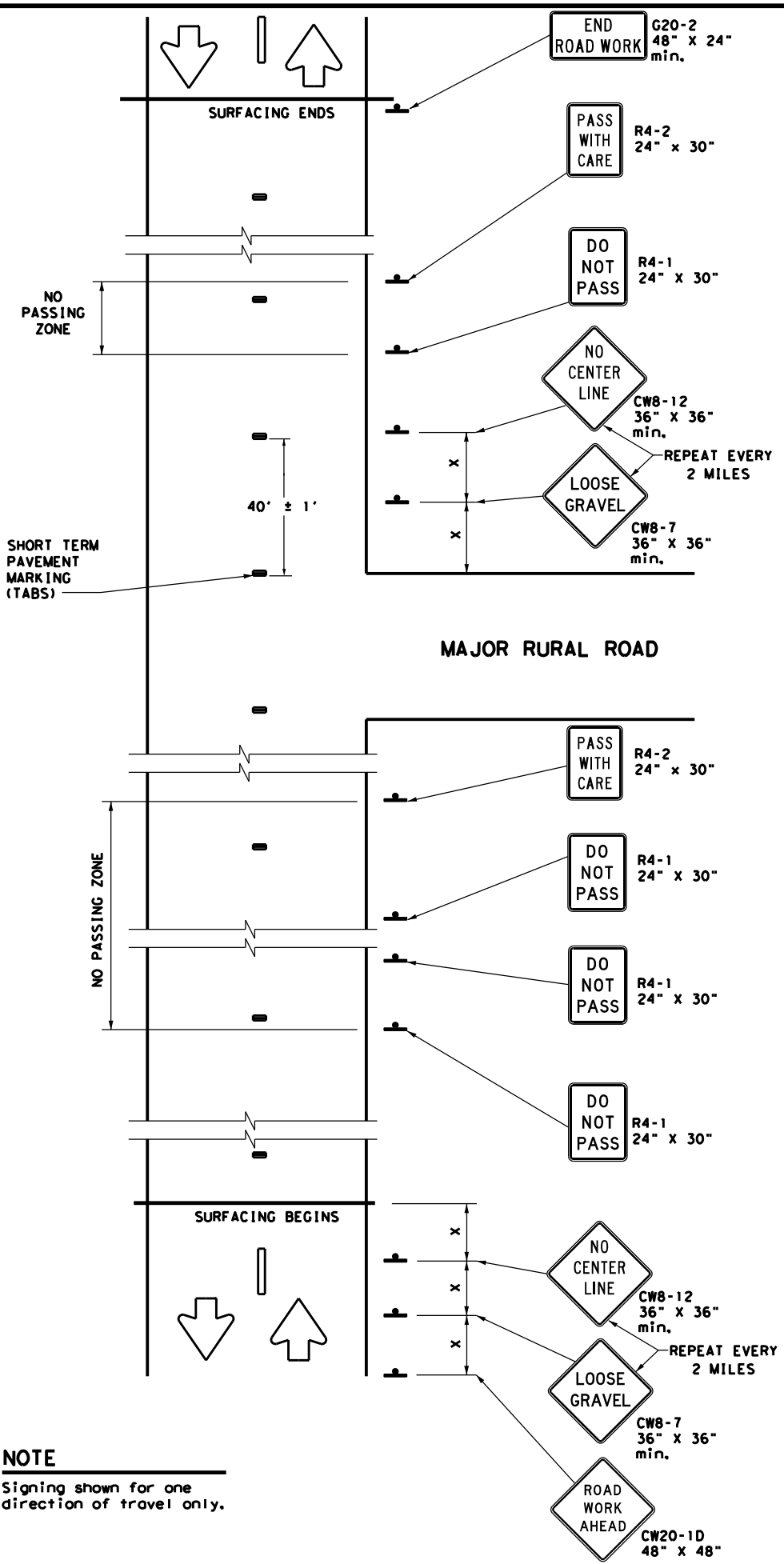
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© TxDOT	October 2022	CON:	16	JOB:	IH610				
REVISIONS		0271	16	167	IH610				
4-21	10-22	DIST:	12	COUNTY:	HARRIS	SHEET NO.		42	

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 DATE: 11/9/2023
 PROJECT: 0271-16-167

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FILE: H:\00-Maintenance\METRO MA INTENANCE\FY22-23 RMCs\IH610FrontageCrestmont+Cuilen\Standards\TrafficControl\TCPCS-8-22.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



NOTE
 Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS

DO NOT PASS (R4-1) SIGN 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 a 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 windshields 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 day of 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. DO NOT PASS and PASS WITH CARE signs are to remain in place until permanent pavement markings are installed.

NO CENTER LINE (CW8-12) SIGN

- A. Center line markings are yellow pavement markings that delineate the separation between 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 center line), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately two 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 permanent pavement markings are installed.

LOOSE GRAVEL (CW8-7) SIGN

- 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 two 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.

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:
 - a.) In the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) sign and the TRAFFIC FINES DOUBLE (R20-5T) sign; and
 - b.) 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 sign placements will then be repeated as described above.

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

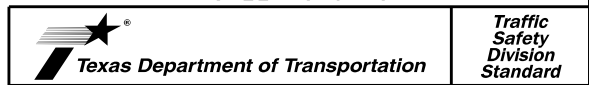
* Conventional Roads Only

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

GENERAL NOTES

1. Surfacing operations that cover or obliterate existing pavement markings must first have the passing zones clearly marked with tabs as well as having any of the traffic control devices detailed on this sheet furnished and erected as directed by the Engineer.
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 Short Duration / Short Term Stationary 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 should be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

SHEET 8 OF 8

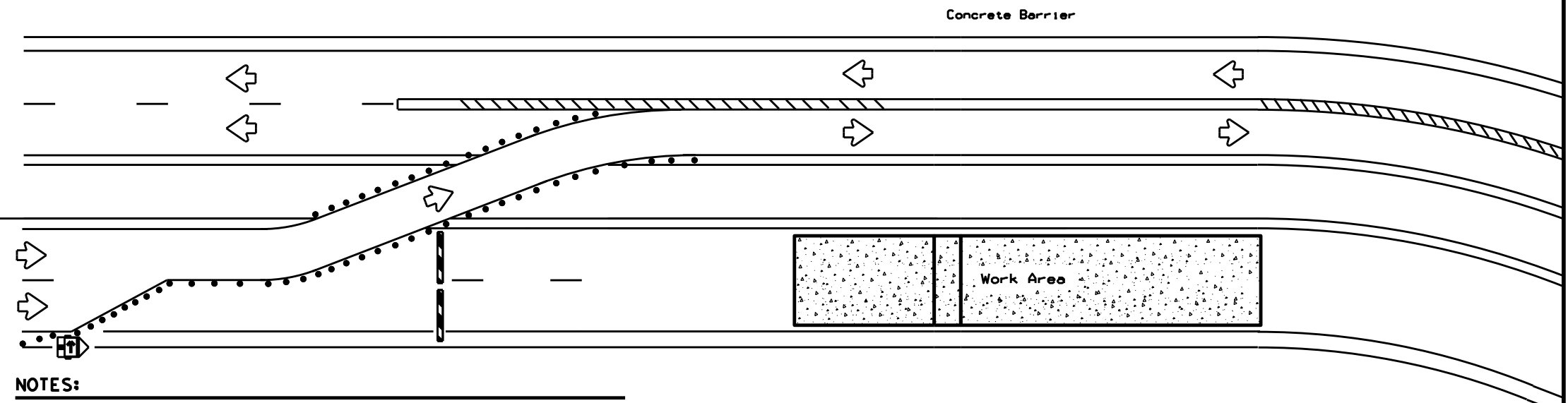


TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS
 TCP (SC-8) - 22

FILE: tcpsc-8-22.dgn	DN: TxDOT	CR: TxDOT	DN: TxDOT	CR: TxDOT
© TxDOT October 2022	CON: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
4-21	DIST: 12	COUNTY: HARRIS	SHEET NO. 43	
10-22				

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FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\1H610FrontsgeCrestmont+Cu11en+Standards\TrafficControl\WZTD-17.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



NOTES:

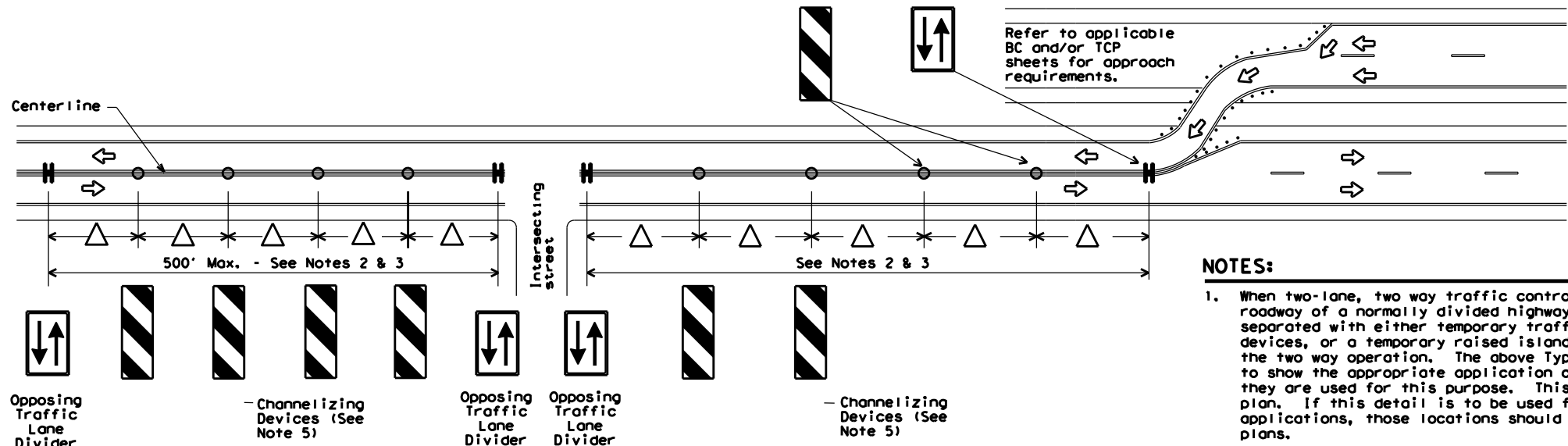
1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections 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

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. 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



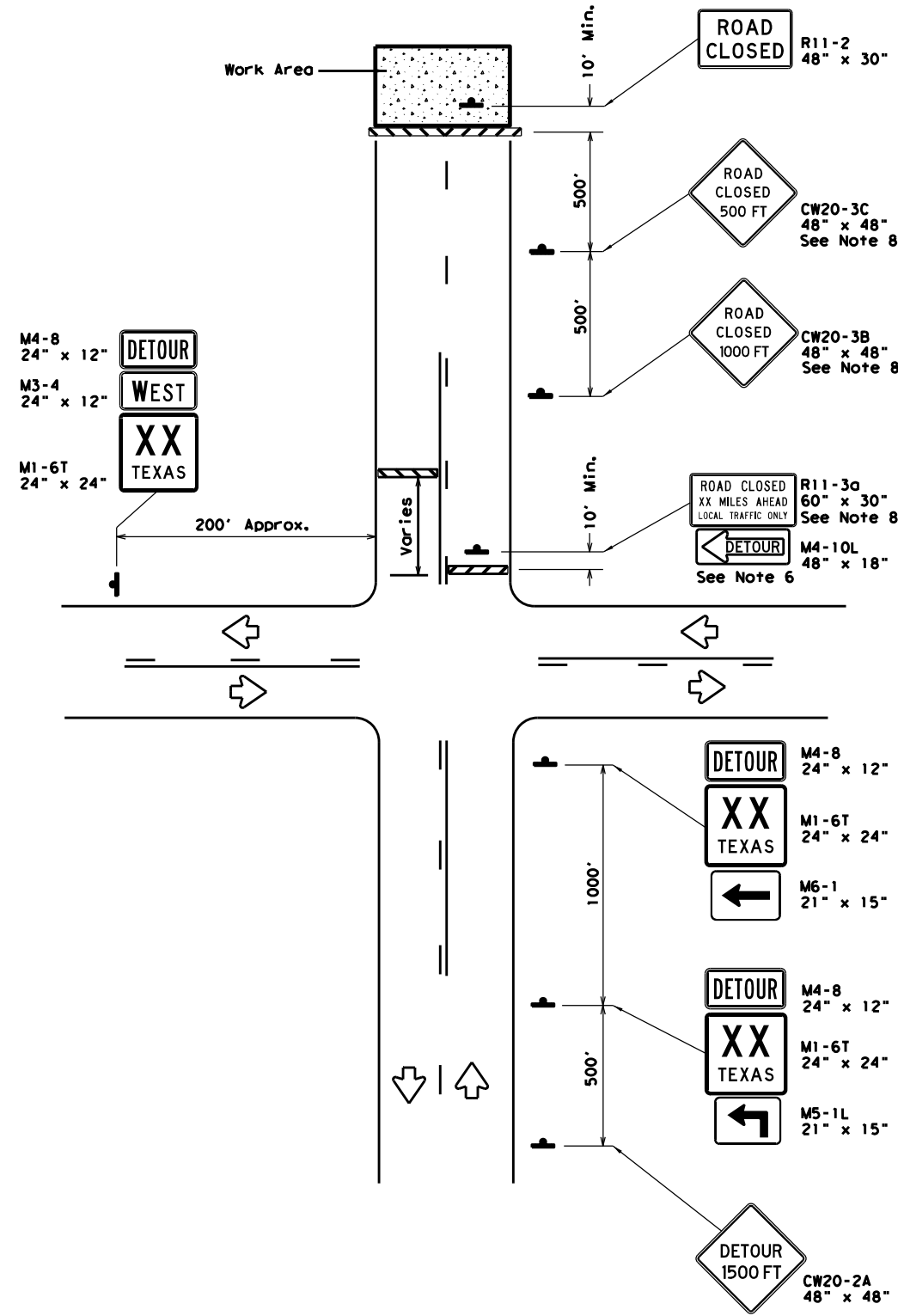
TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD) - 17

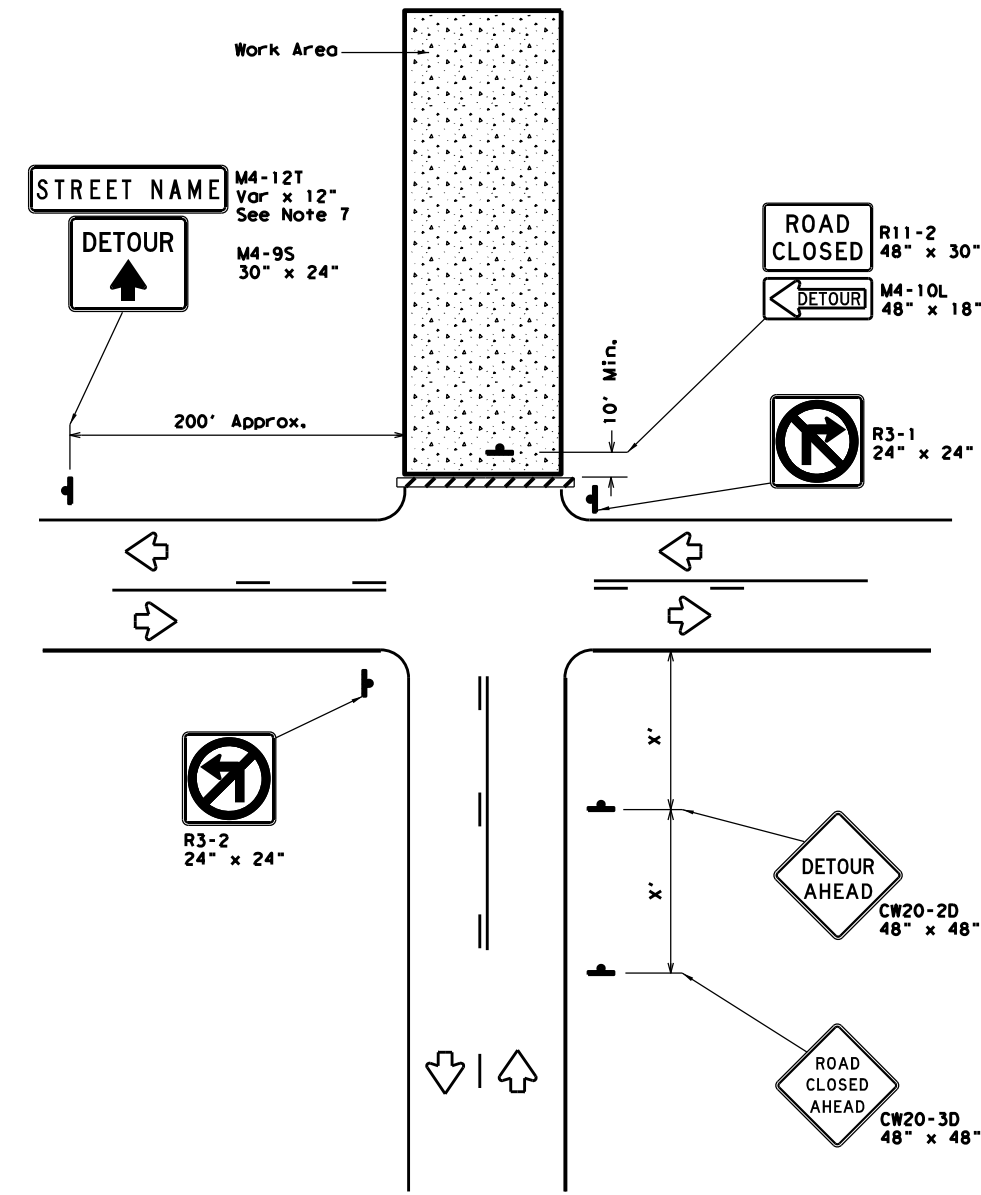
FILE: wzt1d-17.dgn	DATE: February 1998	CONTRACT: 0271	SECTION: 16	JOB: 167	COUNTY: HARRIS	SHEET NO.: 44
REVISIONS						
4-98	2-17					
3-03						
7-13						

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FILE: H:\00\Mainenance\METRO_MA INTENANCE\FY22-23_RMCs\IH610\FrontageCrestmont\Cullen\Standards\TrafficControl\WZRC-13.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



ROAD CLOSURE BEYOND THE INTERSECTION
 Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION
 Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

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

GENERAL NOTES

- This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
- Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices List (CWZTCD).
- Stockpiled materials shall not be placed on the traffic side of barricades.
- Barricades at the road closure should extend from pavement edge to pavement edge.
- Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
- If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
- The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
- For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
- Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.



WORK ZONE ROAD CLOSURE DETAILS

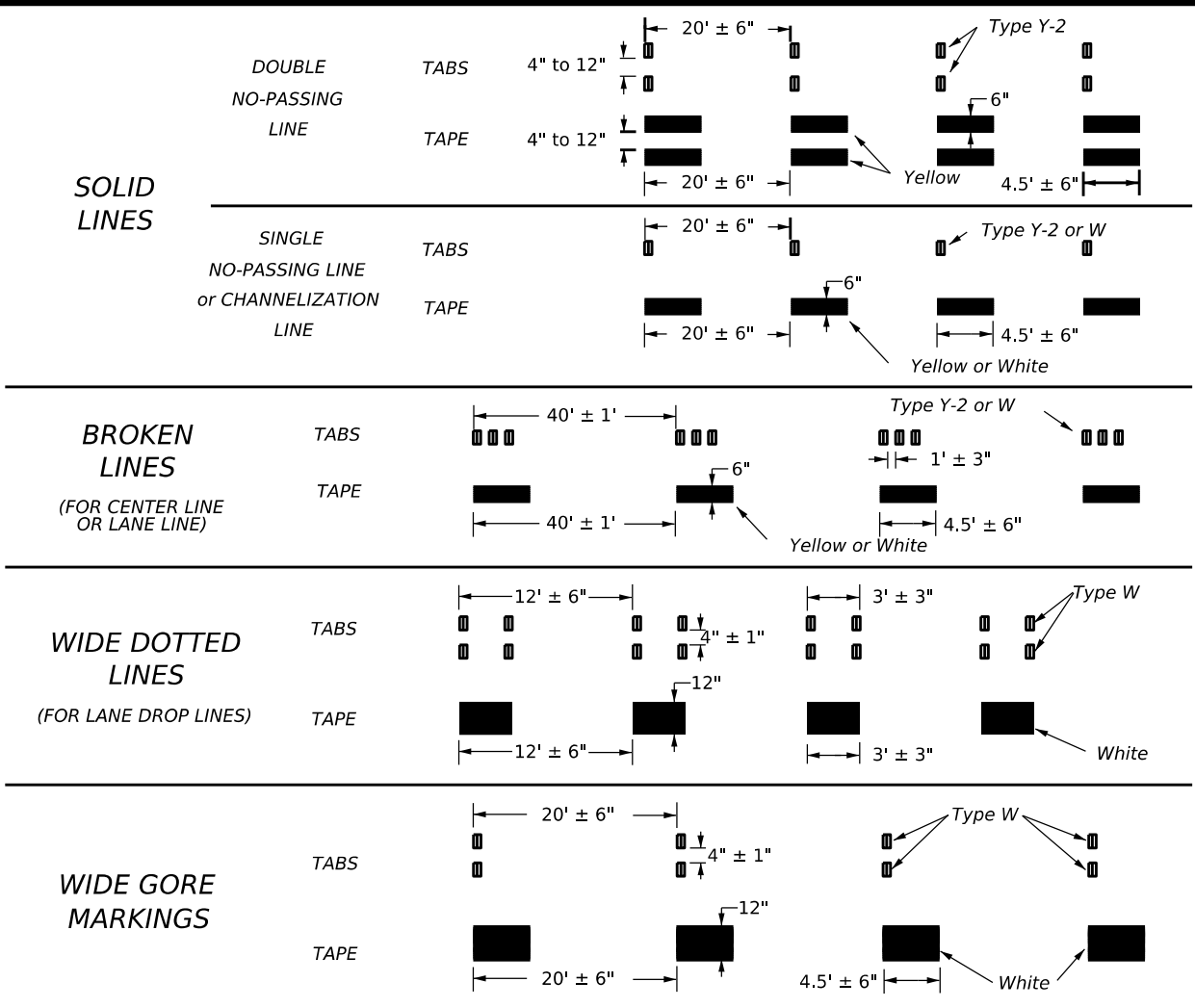
WZ (RCD) - 13

FILE: wzrcd-13.dgn	DATE: August 1995	CNT: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 45	
1-97	4-98	7-13			
2-98	3-03				

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FILE: H:\00\Main\Inten\METRO MA INTENANCE\FY22-23 RMCs\IH610FrontsgeCrestmont\Cul\len\Standards\Taff\cControl\WZ(STPM)-23.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167

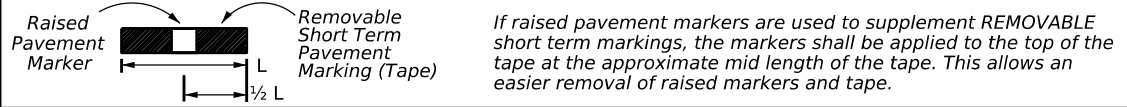
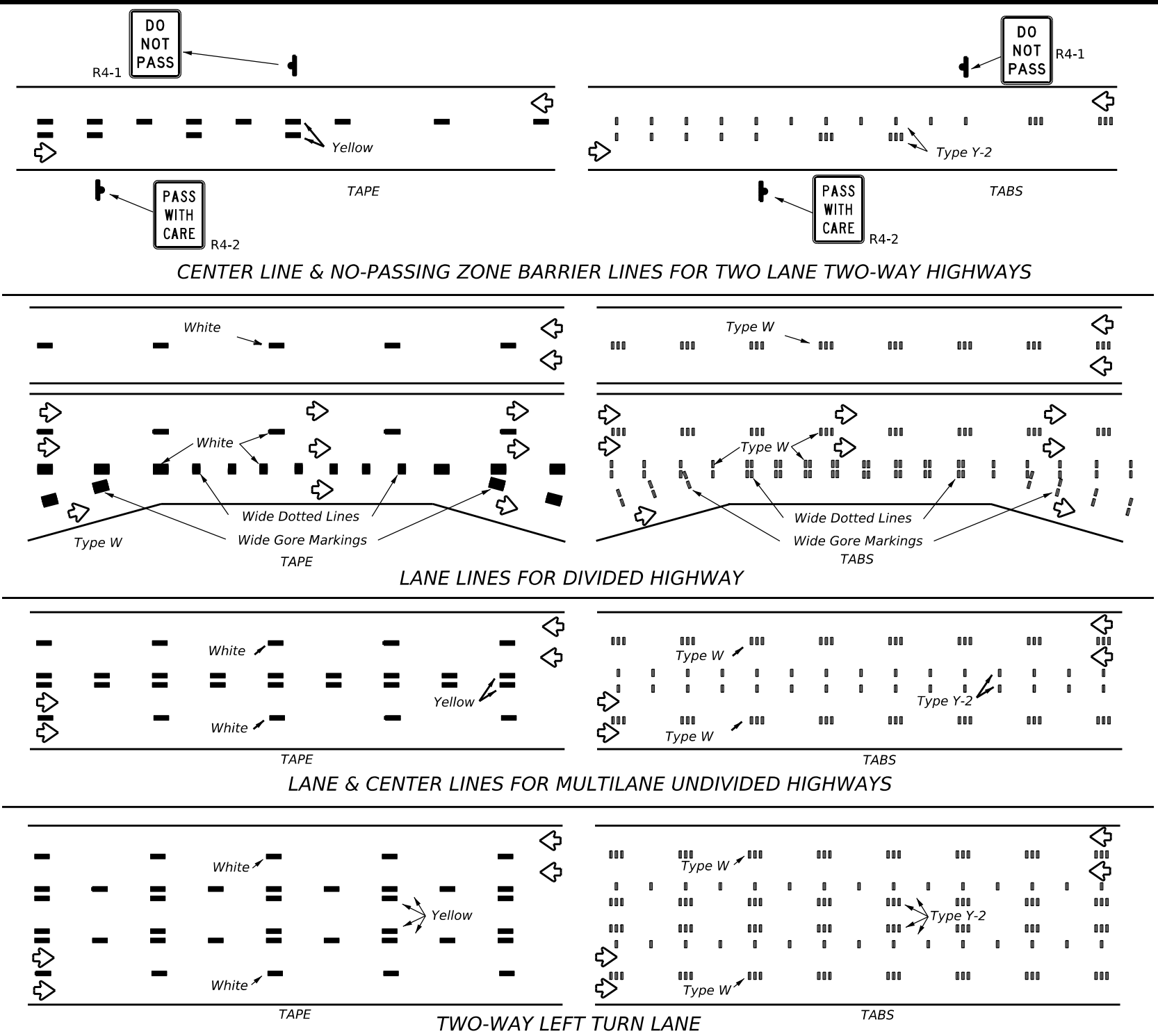
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



- 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



- 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

Texas Department of Transportation
 Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

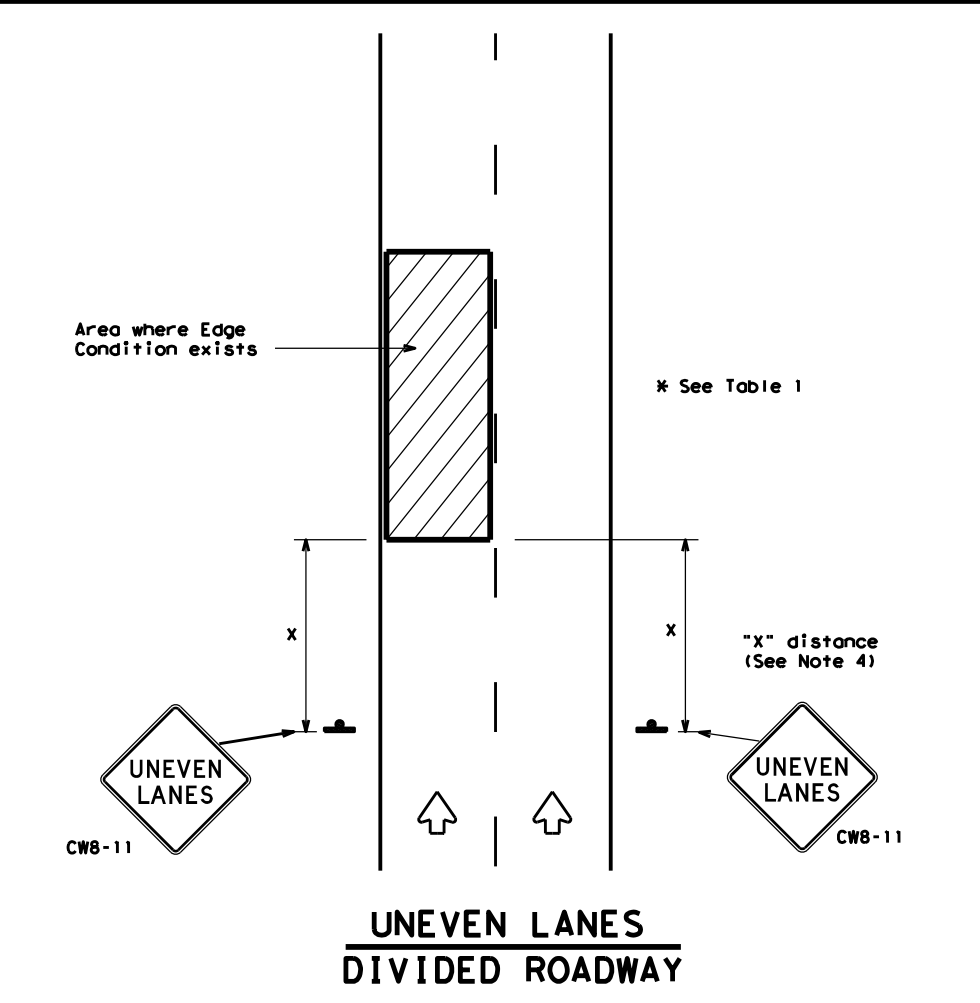
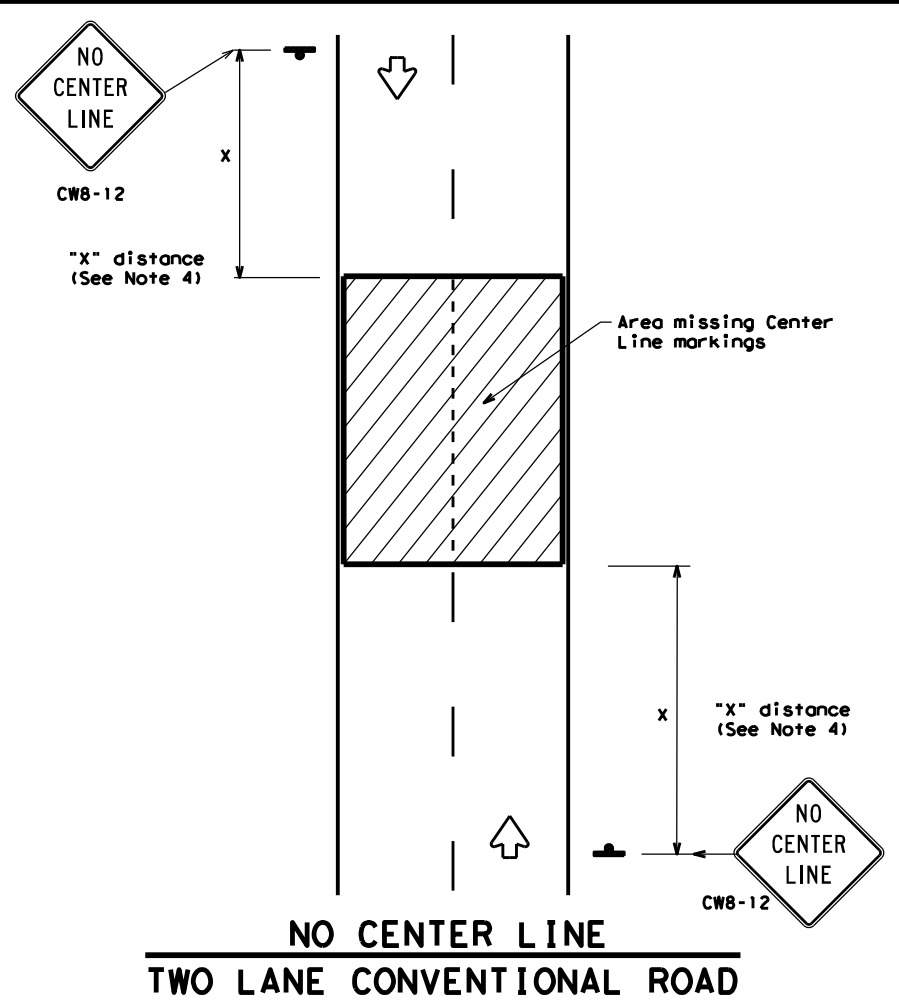
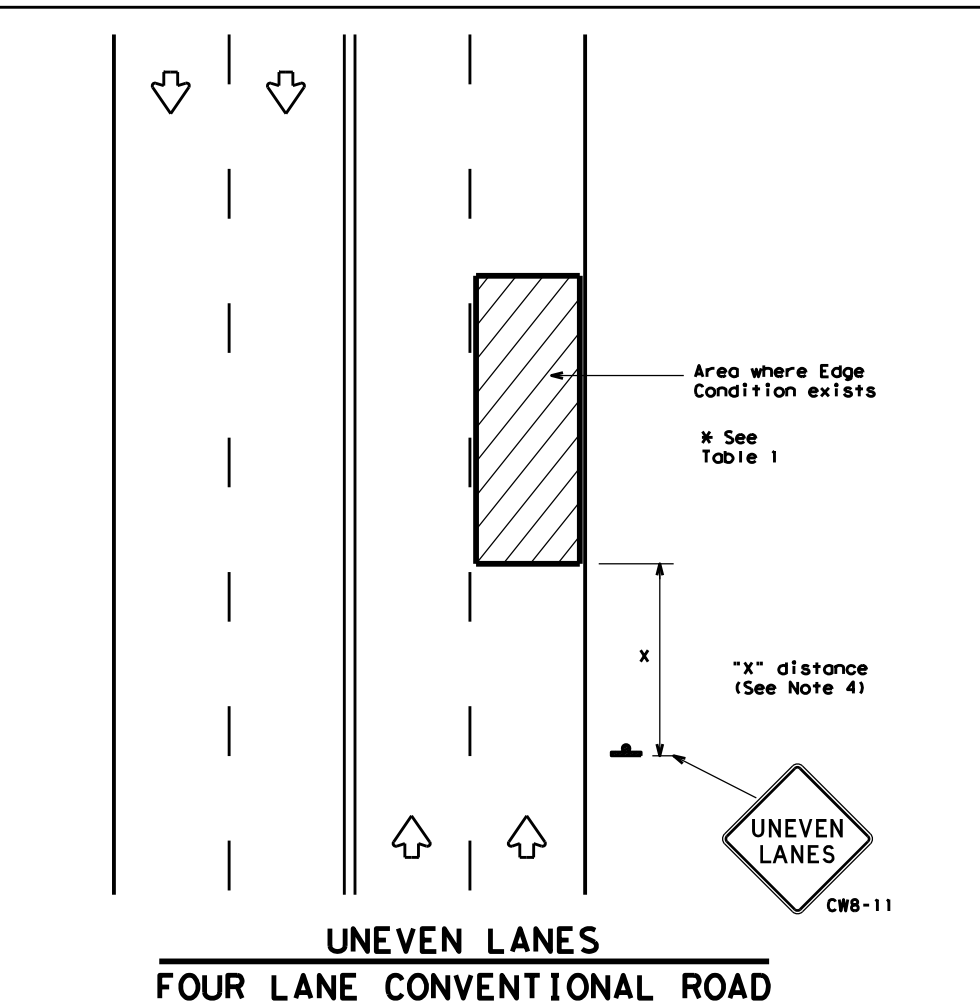
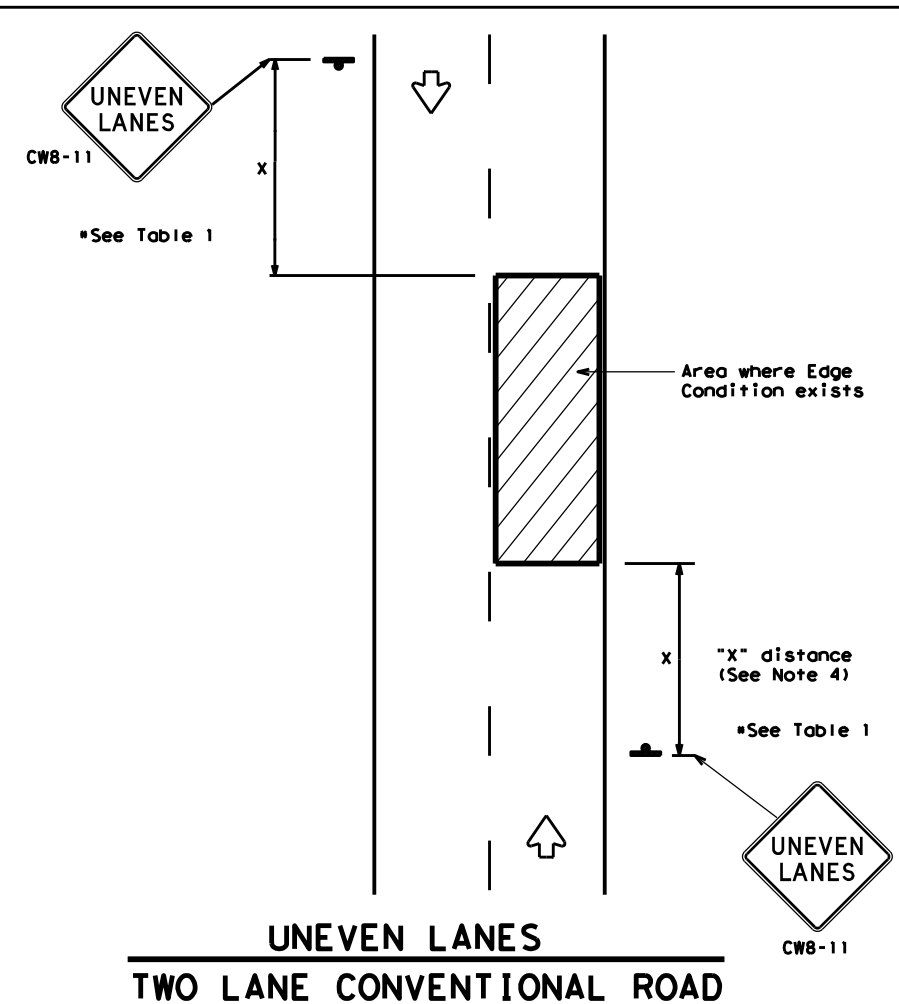
WZ(STPM)-23

FILE: wzsptm-23.dgn	DW:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	167	IH610
4-92 7-13	DIST	COUNTY	SHEET NO.	
1-97 2-23	12	HARRIS	46	
3-03				

111

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



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 _{FL} OR TYPE C _{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

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

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

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

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



SIGNING FOR UNEVEN LANES
WZ (UL) - 13

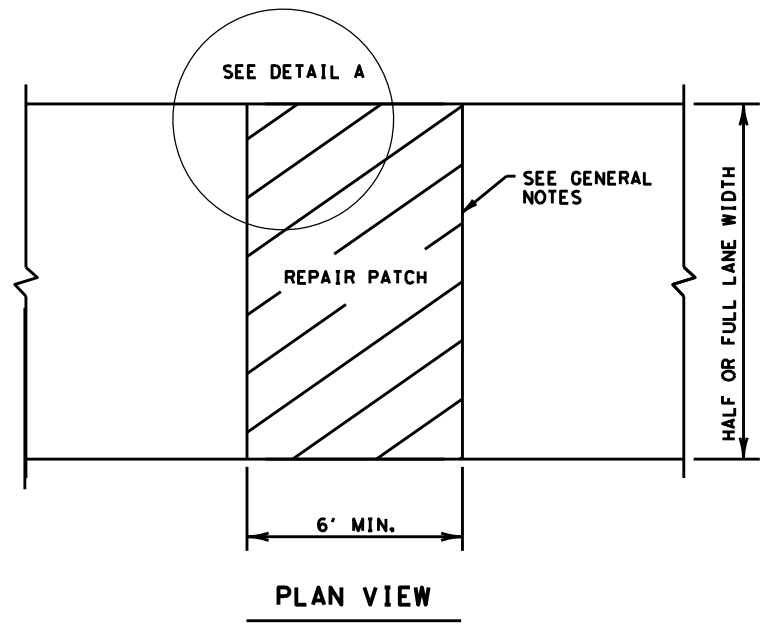
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© TxDOT	April 1992	0271	16	167		IH610	
8-95	2-98	7-13					
1-97	3-03		12		HARRIS		47

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 DATE: 11/9/2023
 PROJECT: 0271-16-167

TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
	T (IN.)	BAR SIZE	REGULAR BARS	TIEBARS	BARS	TIEBARS
			SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
	11.0	6.5	6.5			
	11.5	6.25	6.25			
	≥12.0	6.0	6.0			
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

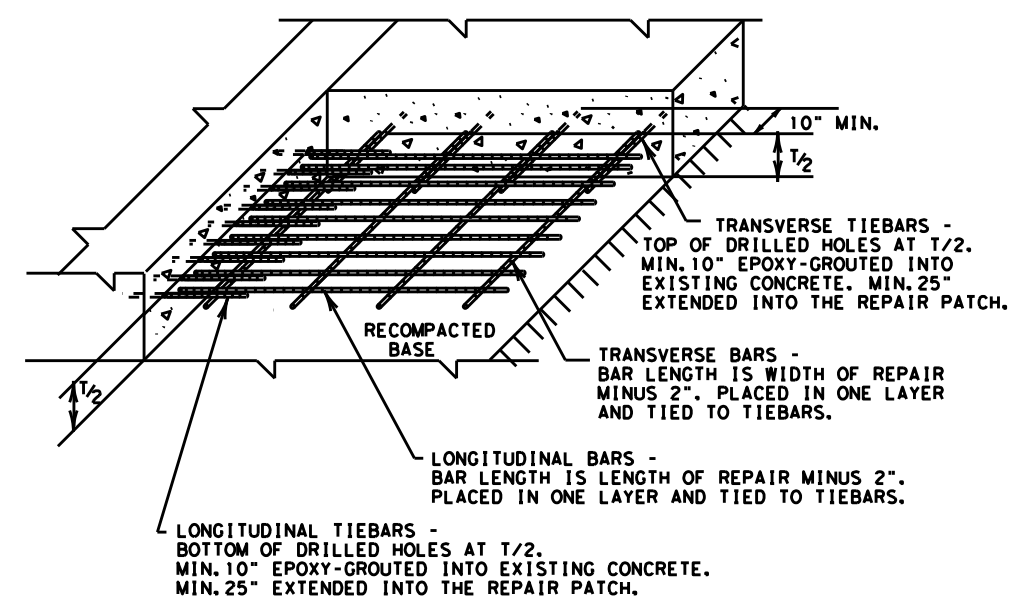


PLAN VIEW

FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

GENERAL NOTES

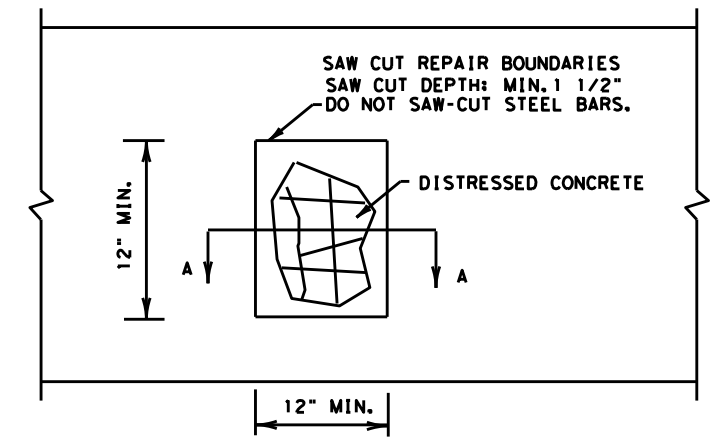
- ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
- MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
- FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
- AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
- ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
- THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
- EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



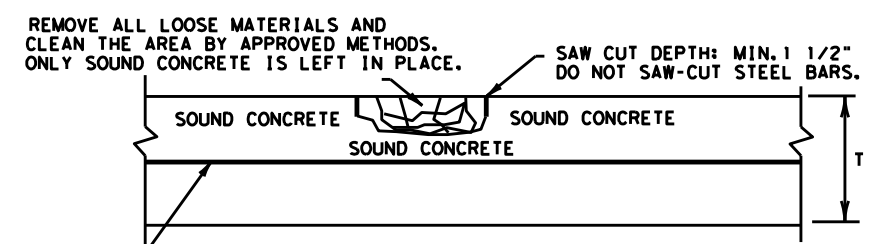
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

GENERAL NOTES

- ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
- THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
- EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



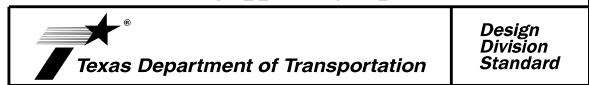
PLAN VIEW



- LONGITUDINAL STEEL BARS:
- *REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.
 - *INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

SECTION A-A
HALF-DEPTH REPAIR

SHEET 1 OF 2



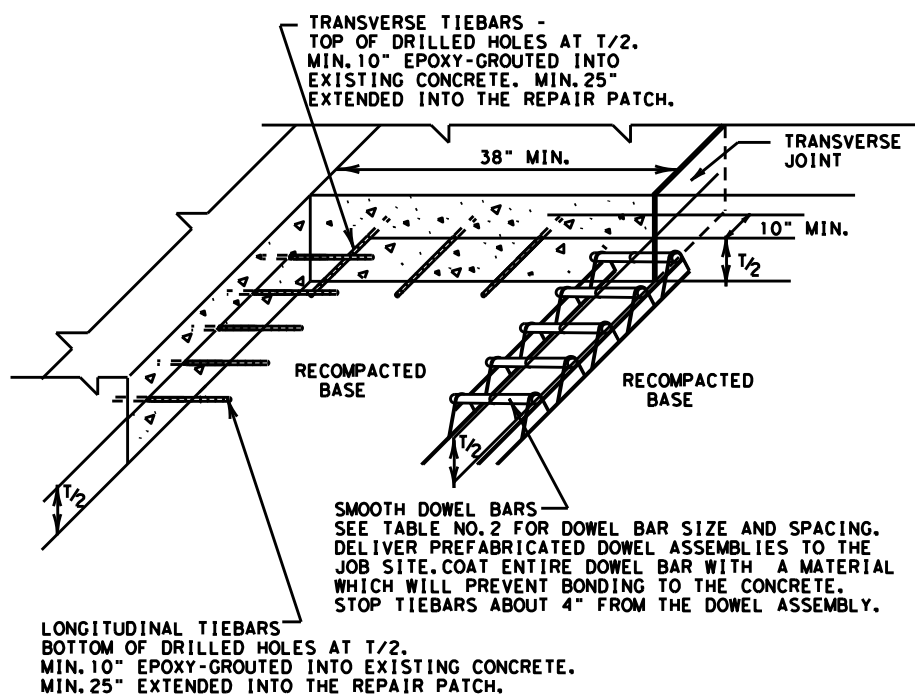
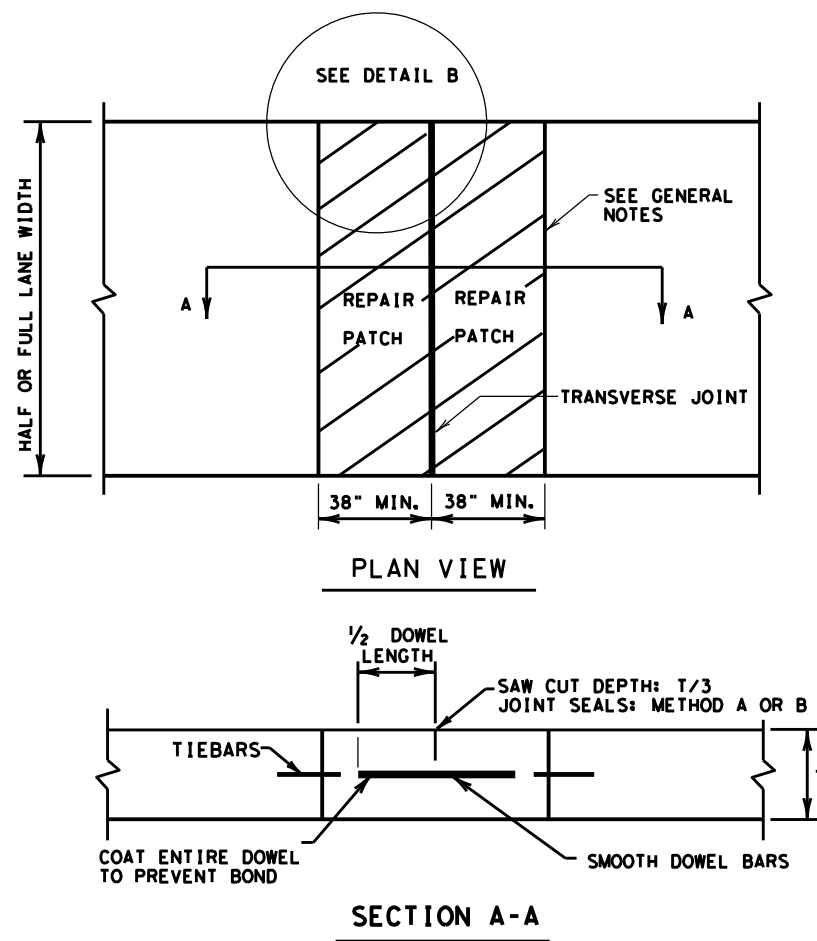
REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DN: HC	CR: AN
© TxDOT: December 2014	CON: 0271	SECT: 16	JOB: 167	HIGHWAY: IH610
REVISIONS	DIST: 12	COUNTY: HARRIS	SHEET NO. 48	

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



REPAIR OF TRANSVERSE JOINT OF CPCD

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

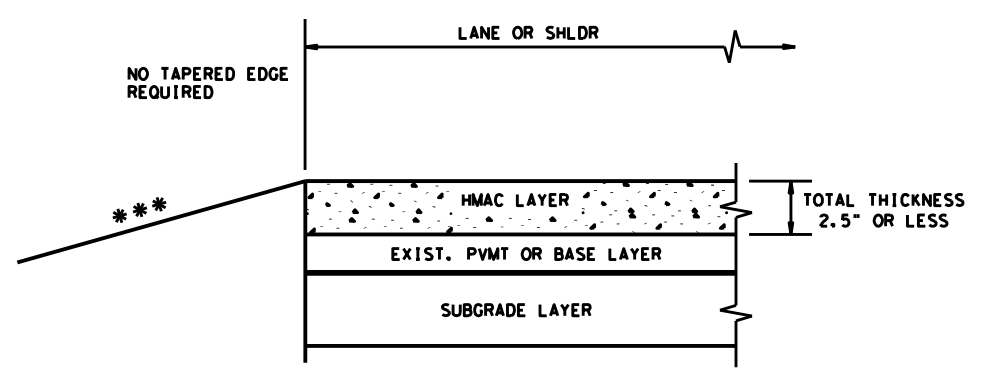
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

SHEET 2 OF 2

		Design Division Standard	
REPAIR OF CONCRETE PAVEMENT			
REPCP-14			
FILE: repcp14.dgn © TxDOT: December 2014	DWT: TxDOT 0271	DWT: HC 16	DWT: HC 167
REVISIONS	DIST: 12	COUNTY: HARRIS	CR: AN HIGHWAY: IH610 SHEET NO.: 49

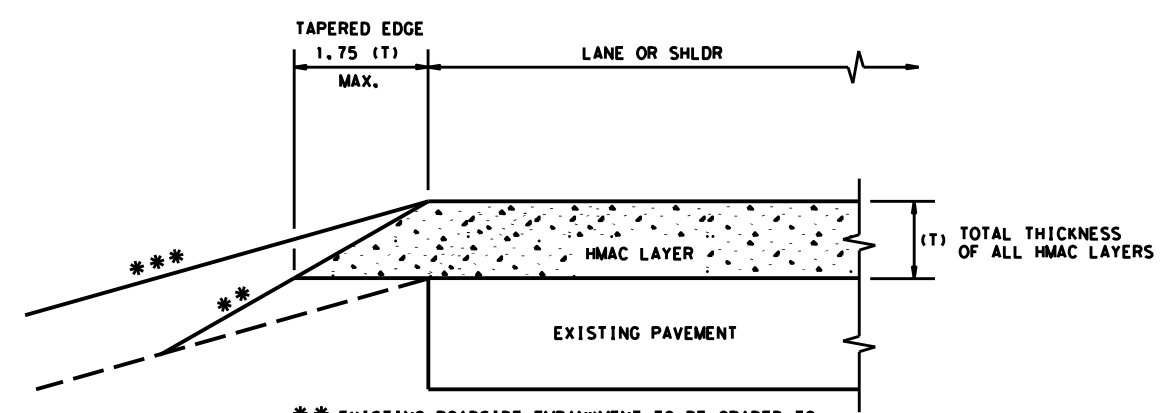
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FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontsgeCrestmont-Cullen\Standards\Pavement\TEHMAC11.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



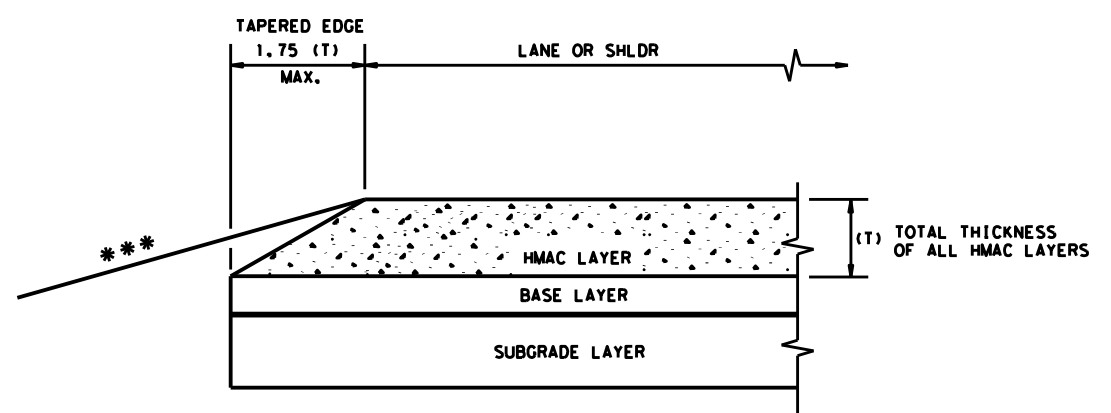
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1
 THIN HMAC SURFACES OR HMAC OVERLAY
 WITH THICKNESS OF 2.5" OR LESS



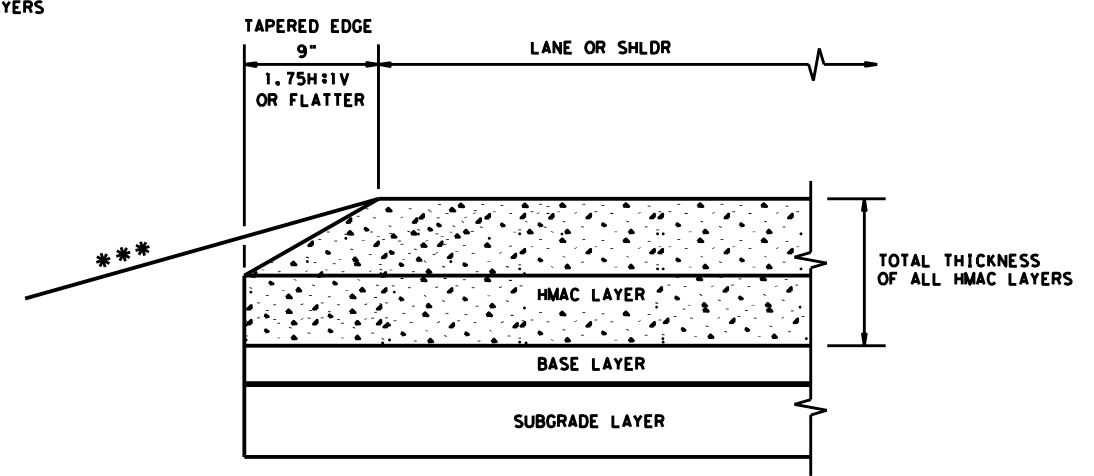
** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.
 *** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

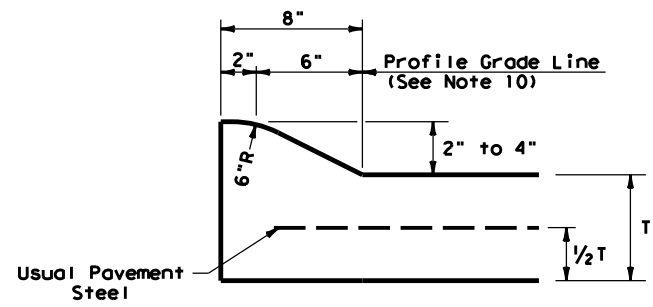
1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE 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)

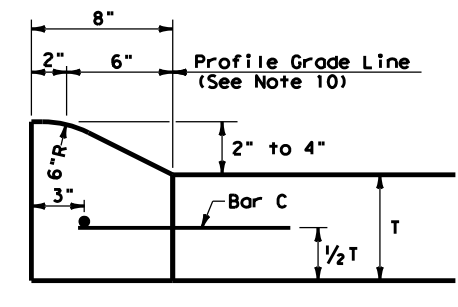
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TAPERED EDGE DETAILS HMAC PAVEMENT					
TE (HMAC) - 11					
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© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY	
REVISIONS		0271	16	167	IH610
DIST	COUNTY		SHEET NO.		
12	HARRIS		50		

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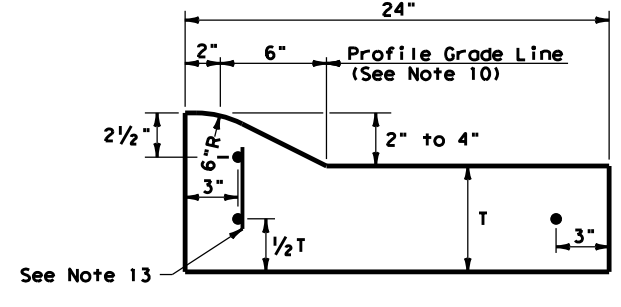
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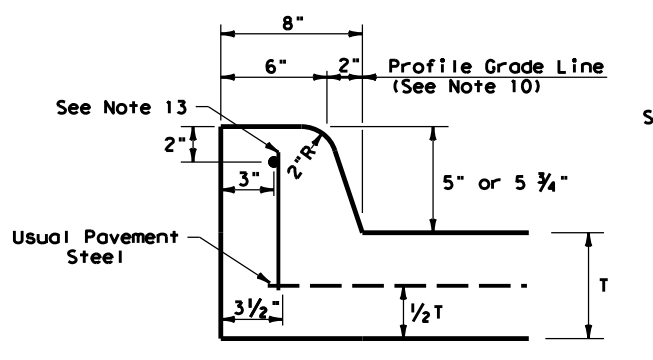
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 2" - 4" HEIGHT



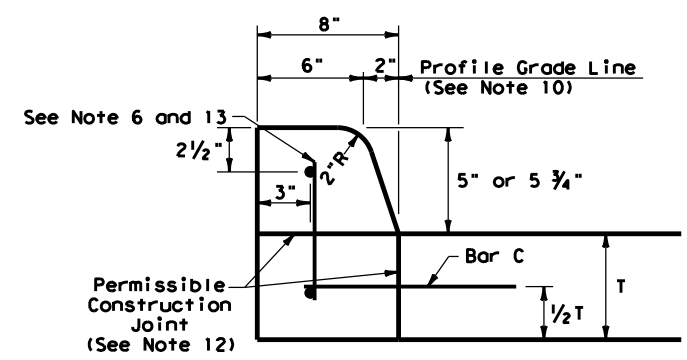
TYPE I CURB
 2" - 4" HEIGHT



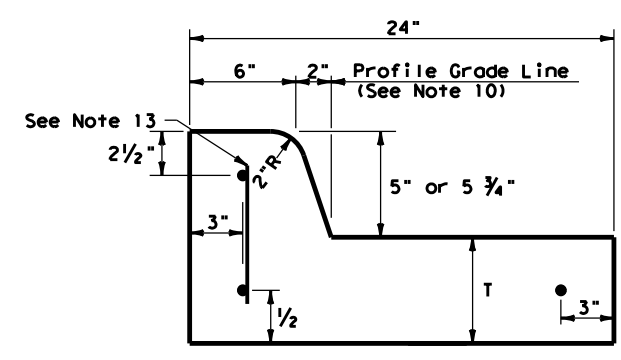
TYPE I CURB AND GUTTER
 2" - 4" HEIGHT



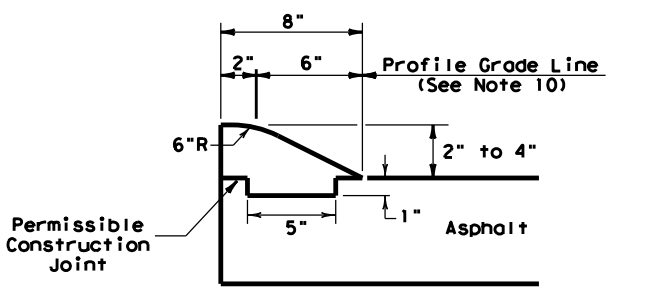
TYPE II CURB (MONOLITHIC)
 5" - 5 3/4" HEIGHT



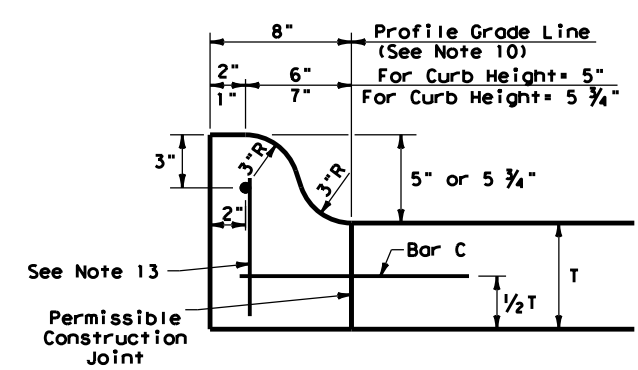
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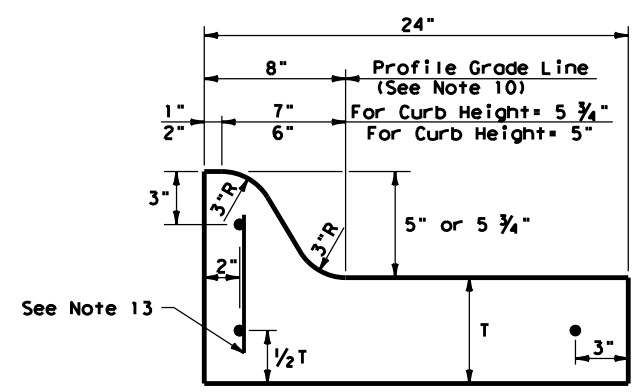
TYPE II CURB AND GUTTER
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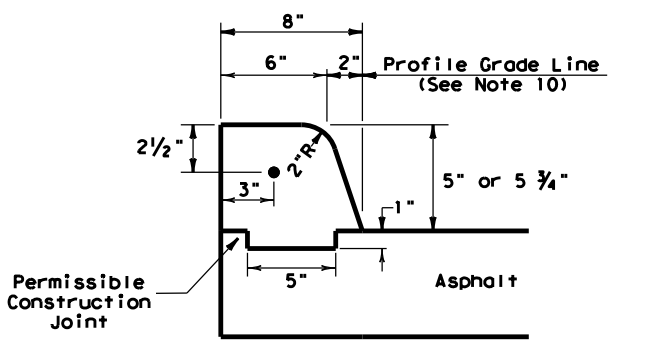
TYPE III CURB (KEYED)
 2" - 4" HEIGHT



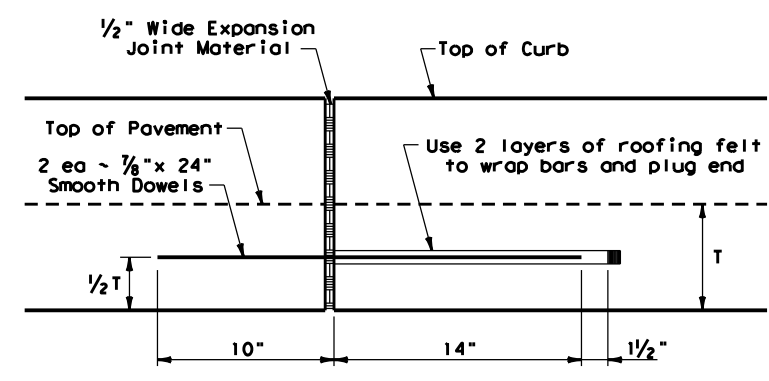
TYPE IIa CURB
 5" - 5 3/4" HEIGHT



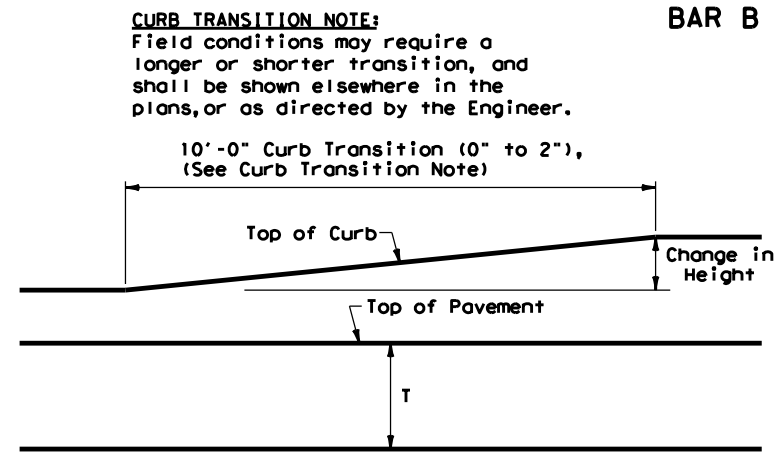
TYPE IIa CURB AND GUTTER
 5" - 5 3/4" HEIGHT



TYPE IV CURB (KEYED)
 5" - 5 3/4" HEIGHT



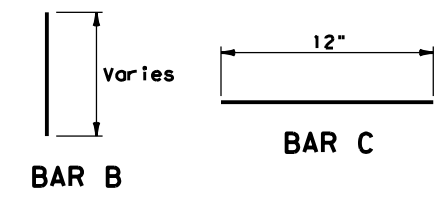
EXPANSION JOINT DETAIL



CURB TRANSITION
 Note: To be paid for as Highest Curb

GENERAL NOTES

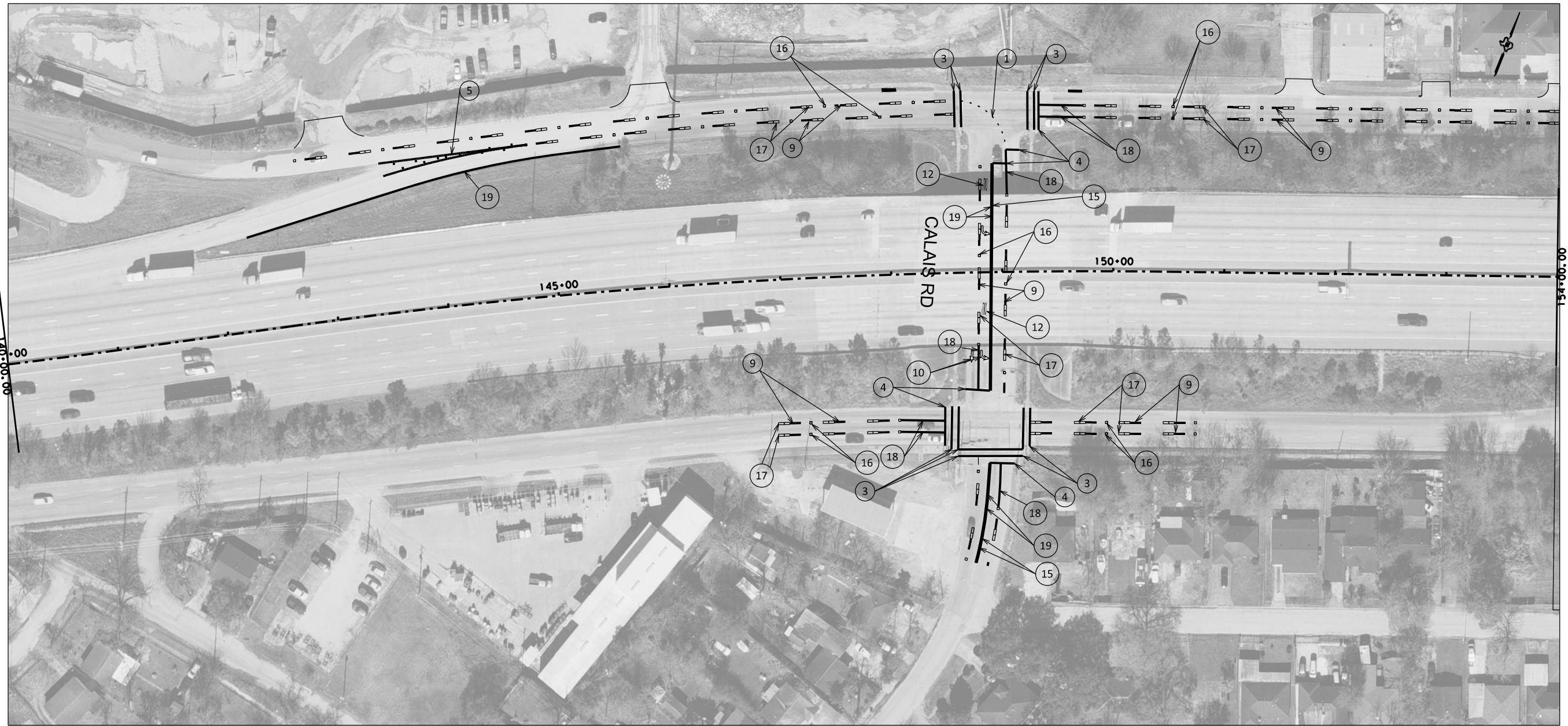
- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



CURB TRANSITION NOTE:
 Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

		Design Division Standard	
<h2>CONCRETE CURB AND GUTTER</h2>			
<h3>CCCG-22</h3>			
FILE: cccg21.dgn	DN: TXDOT	CR: AN	DR: CS
© TXDOT: JUNE 2022	CON: 0271	SECT: 16	JOB: 167
REVISIONS	DIST: 12	COUNTY: HARRIS	SHEET NO: 51

FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontsgeCrestmont+Cut\Ien\GeoPak\CutSheets\IH610 STRIPING DETAIL1.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



LEGEND:

ITEM #	DESCRIPTIONS	UNIT	QUANTITY
1	0666-6018 REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	22
3	0666-6042 REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	410
4	0666-6048 REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	140
5	0666-6081 REFL PAV MRK TY I (W)(ENTR GORE)(100MIL)	EA	1
9	0666-6162 RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)	LF	713
10	0668-6019 PREFAB PAV MRK TY B (W)(ARROW)	EA	3
12	0668-6027 PREFAB PAV MRK TY B (W)(WORD)	EA	2
15	0672-6009 REFL PAV MRKR TY II-A-A	EA	30
16	0672-6010 REFL PAV MRKR TY II-C-R	EA	36
17	6048-6003 RE PM W/RET REQ TY I (W)6"(BRK)	LF	713
18	6048-6004 RE PM W/RET REQ TY I (W)6"(SLD)	LF	240
19	6048-6008 RE PM W/RET REQ TY I (Y)6"(SLD)	LF	942

NOTE:

1. RESTRIPE BY REMOVING EXISTING PAVEMENT MARKINGS THEN REPLACE WITH PROPOSED PAVEMENT MARKINGS. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH THE PROPOSED PAVEMENT MARKINGS.
2. REMOVAL OF RAISED PAVEMENT MARKERS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS

11/9/2023



**IH 610
STRIPING
LAYOUTS**

Eddy Choy


CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		52

FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontsgeCrestmont-CulIlen\GeoPak\CutSheets\IH610 STRIPING DETAIL2.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



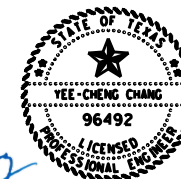
LEGEND:

ITEM #	DESCRIPTIONS	UNIT	QUANTITY
6	0666-6084 REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	EA	1
7	0666-6138 REFL PAV MRK TY I (Y)8"(SLD)(100MIL)	LF	380
8	0666-6141 REFL PAV MRK TY I (Y)12"(SLD)(100MIL)	LF	256
9	0666-6162 RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	462
13	0672-6006 REFL PAV MRKR TY I-A	EA	19
16	0672-6010 REFL PAV MRKR TY II-C-R	EA	29
17	6048-6003 RE PM W/RET REQ TY I (W)6"(BRK)	LF	462
18	6048-6004 RE PM W/RET REQ TY I (W)6"(SLD)	LF	160
19	6048-6008 RE PM W/RET REQ TY I (Y)6"(SLD)	LF	312

NOTE:
 1. RESTRIPE BY REMOVING EXISTING PAVEMENT MARKINGS THEN REPLACE WITH PROPOSED PAVEMENT MARKINGS. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH THE PROPOSED PAVEMENT MARKINGS.
 2. REMOVAL OF RAISED PAVEMENT MARKERS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS

11/9/2023

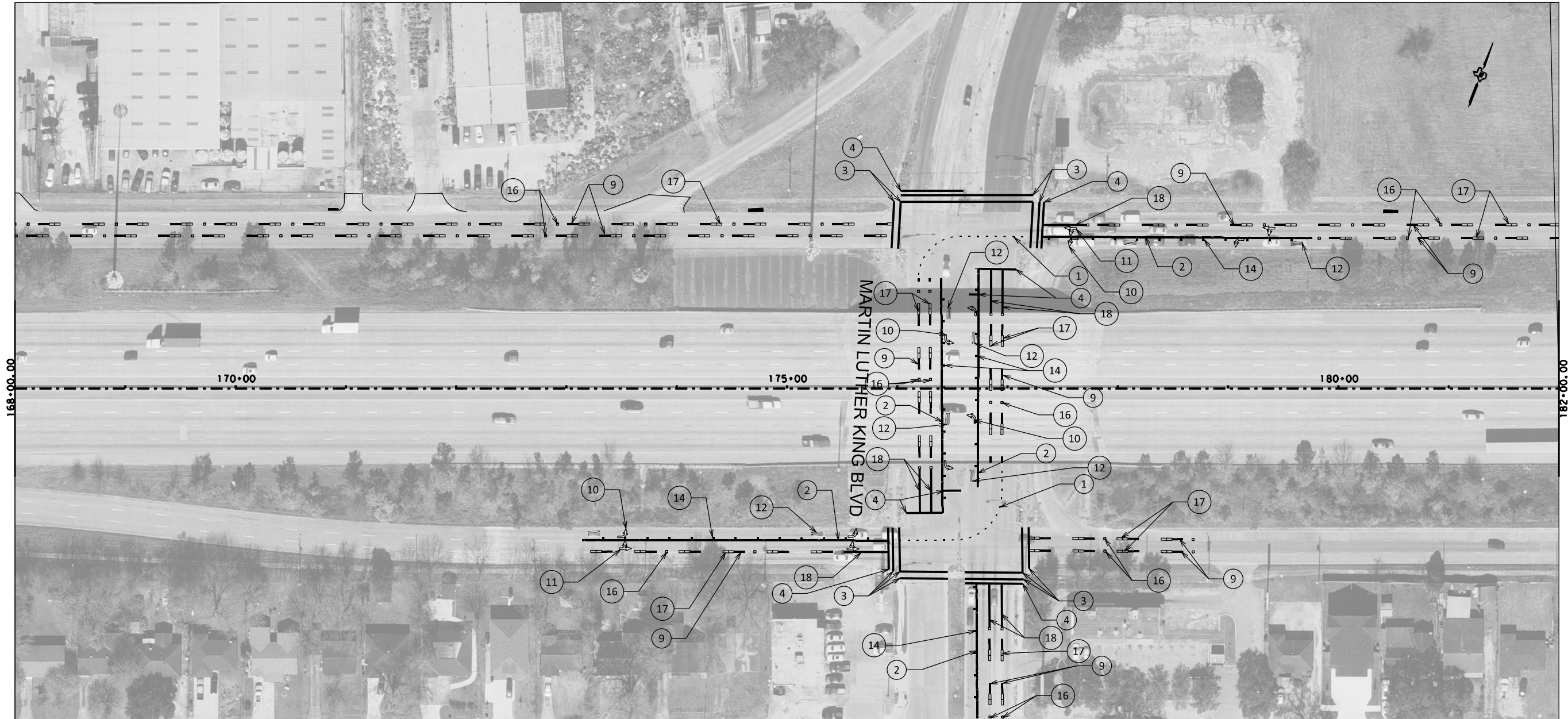
Eddy Choy



**IH 610
 STRIPING
 LAYOUTS**

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		53

FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontsgeCrestmont+Cut\Ien\GeoPak\CutSheets\IH610 STRIPING DETAIL3.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



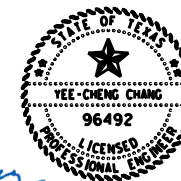
LEGEND:

ITEM #	DESCRIPTIONS	UNIT	QUANTITY
1	0666-6018 REFL PAV MRK TY I (W)6"(DOT)(100MIL)	LF	93
2	0666-6036 REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	1055
3	0666-6042 REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	760
4	0666-6048 REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	281
9	0666-6162 RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)	LF	891
10	0668-6019 PREFAB PAV MRK TY B (W)(ARROW)	EA	8
11	0668-6020 PREFAB PAV MRK TY B (W)(DBL ARROW)	EA	4
12	0668-6027 PREFAB PAV MRK TY B (W)(WORD)	EA	8
14	0672-6007 REFL PAV MRKR TY I-C	EA	53
16	0672-6010 REFL PAV MRKR TY II-C-R	EA	45
17	6048-6003 RE PM W/RET REQ TY I (W)6"(BRK)	LF	891
18	6048-6004 RE PM W/RET REQ TY I (W)6"(SLD)	LF	240

NOTE:
 1. RESTRIPE BY REMOVING EXISTING PAVEMENT MARKINGS THEN REPLACE WITH PROPOSED PAVEMENT MARKINGS. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH THE PROPOSED PAVEMENT MARKINGS.
 2. REMOVAL OF RAISED PAVEMENT MARKERS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS

11/9/2023

Eddy Chay



**IH 610
 STRIPING
 LAYOUTS**

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		54

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



LEGEND:

ITEM #	DESCRIPTIONS	UNIT	QUANTITY
5	0666-6081 REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	EA	1
9	0666-6162 RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	700
16	0672-6010 REFL PAV MRKR TY II-C-R	EA	35
17	6048-6003 RE PM W/RET REQ TY I(W)6"(BRK)	LF	700
19	6048-6008 RE PM W/RET REQ TY I(Y)6"(SLD)	LF	265

NOTE:

1. RESTRIPE BY REMOVING EXISTING PAVEMENT MARKINGS THEN REPLACE WITH PROPOSED PAVEMENT MARKINGS. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH THE PROPOSED PAVEMENT MARKINGS.
2. REMOVAL OF RAISED PAVEMENT MARKERS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS

11/9/2023



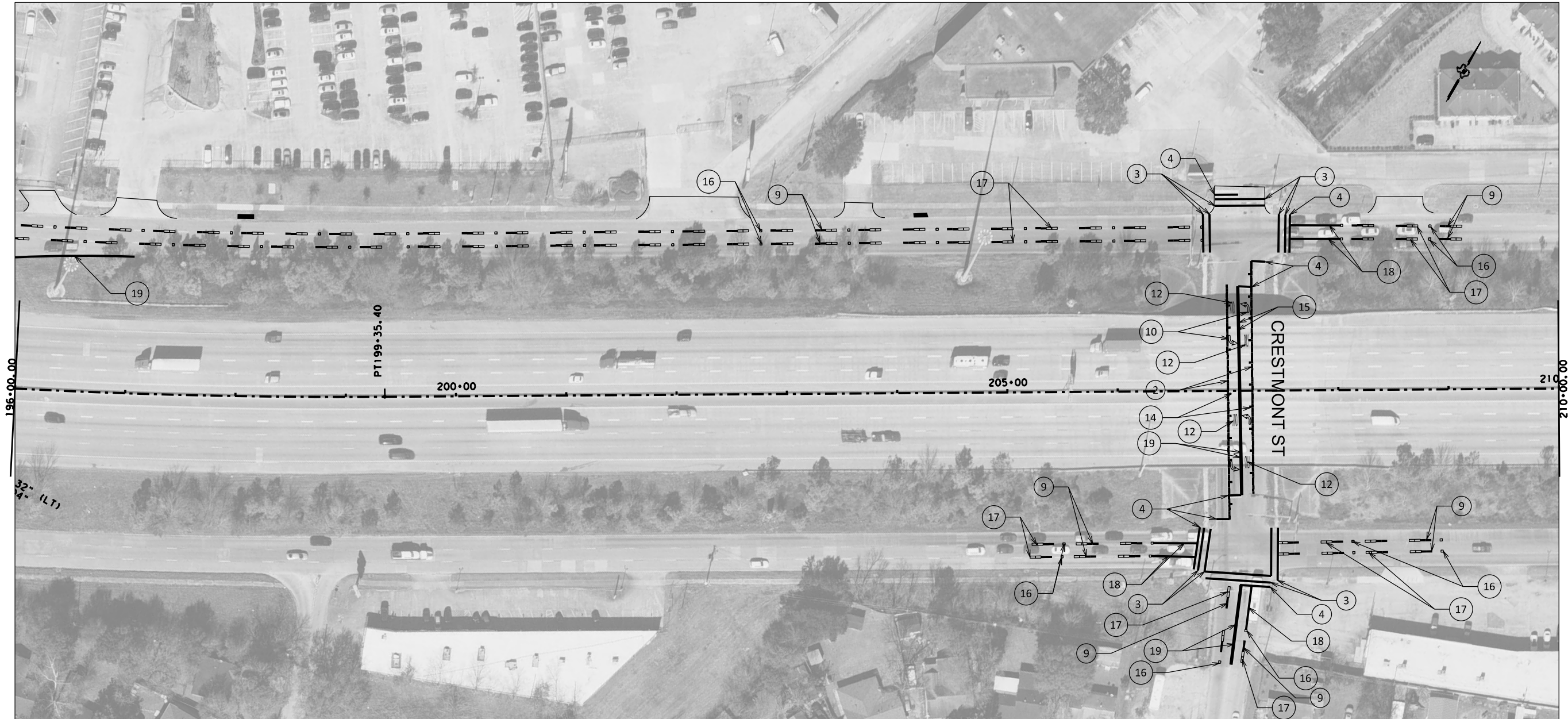
**IH 610
STRIPING
LAYOUTS**



Eddy Chang

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		55

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



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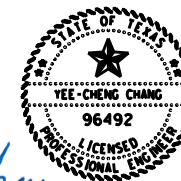
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2	0666-6036 REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	424
3	0666-6042 REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	520
4	0666-6048 REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	170
9	0666-6162 RE PV MRK TY I (BLACK)6"(SHADOW)(100MIL)	LF	750
10	0668-6019 PREFAB PAV MRK TY B (W)(ARROW)	EA	4
12	0668-6027 PREFAB PAV MRK TY B (W)(WORD)	EA	4
14	0672-6007 REFL PAV MRKR TY I-C	EA	22
15	0672-6009 REFL PAV MRKR TY II-A-A	EA	26
16	0672-6010 REFL PAV MRKR TY II-C-R	EA	38
17	6048-6003 RE PM W/RET REQ TY I (W)6"(BRK)	LF	750
18	6048-6004 RE PM W/RET REQ TY I (W)6"(SLD)	LF	200
19	6048-6008 RE PM W/RET REQ TY I (Y)6"(SLD)	LF	631

NOTE:

1. RESTRIPE BY REMOVING EXISTING PAVEMENT MARKINGS THEN REPLACE WITH PROPOSED PAVEMENT MARKINGS. REMOVE EXISTING PAVEMENT MARKINGS IN CONFLICT WITH THE PROPOSED PAVEMENT MARKINGS.
2. REMOVAL OF RAISED PAVEMENT MARKERS WILL NOT BE PAID FOR DIRECTLY AND WILL BE SUBSIDIARY TO THE PERTINENT BID ITEMS

11/9/2023

Eddy Choy

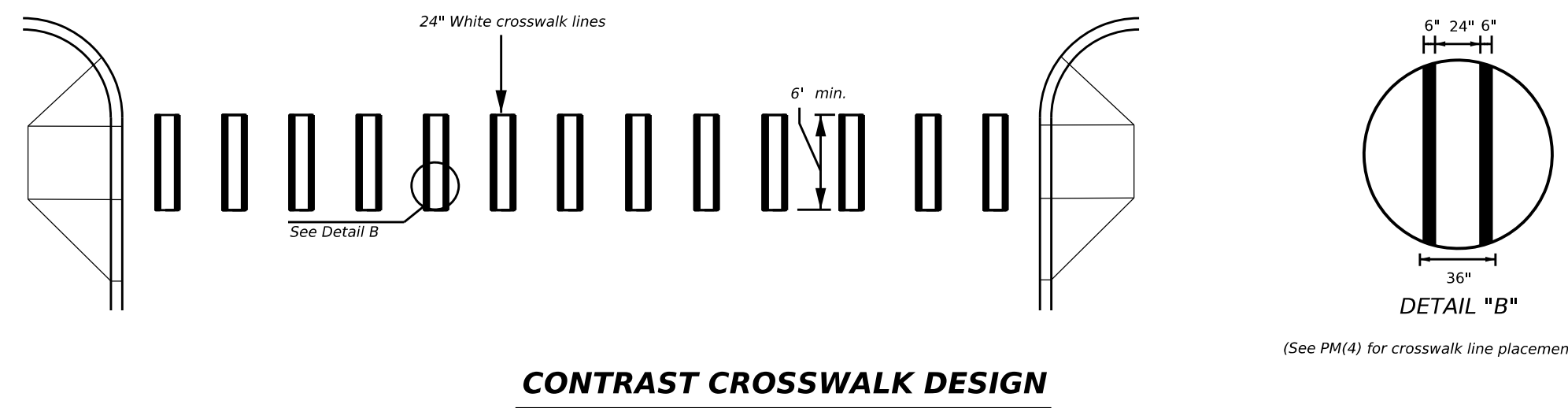
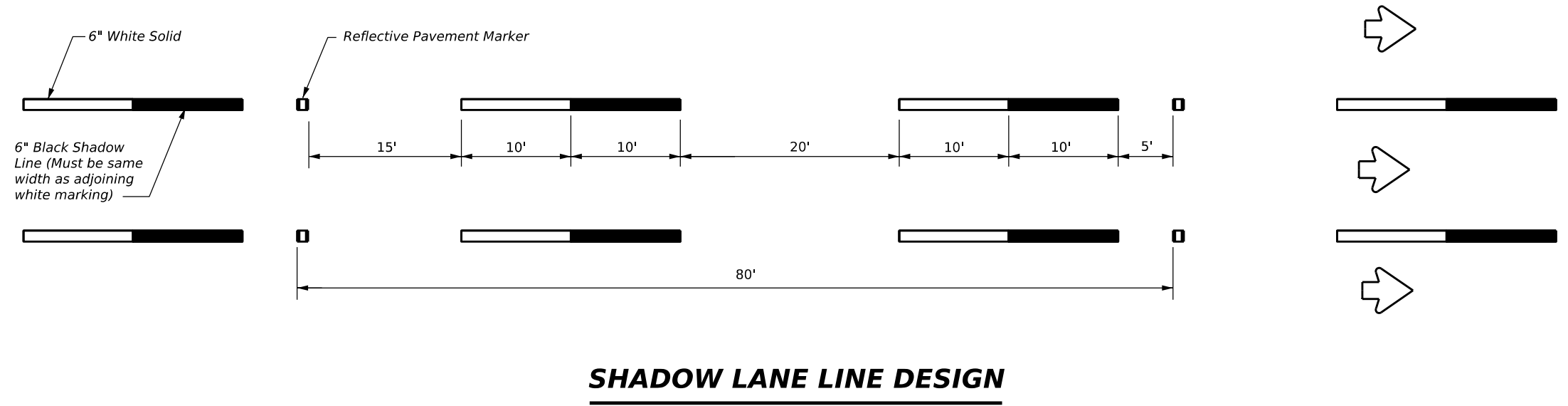
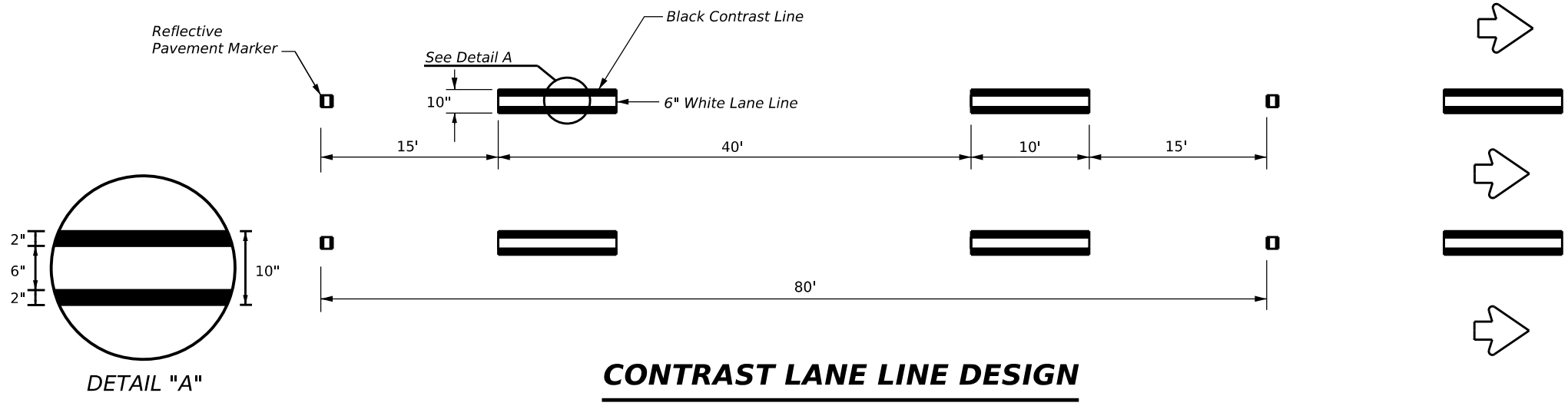


**IH 610
STRIPING
LAYOUTS**

CONT	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610
STATE DIST. NO.	COUNTY		SHEET NO.
HOU	HARRIS		56

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FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontageCrestmont+Cuilen+Standards\PavementMarkings\CPM(1)-23.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



(See PM(4) for crosswalk line placement details)

- GENERAL NOTES**
1. Contrast and Shadow markings may only be used on concrete pavements.
 2. Contrast and Shadow markings shall not be used on edge lines.
 3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
 4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
 5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
 6. See PM(2) for raised reflective pavement markings installation details.

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.



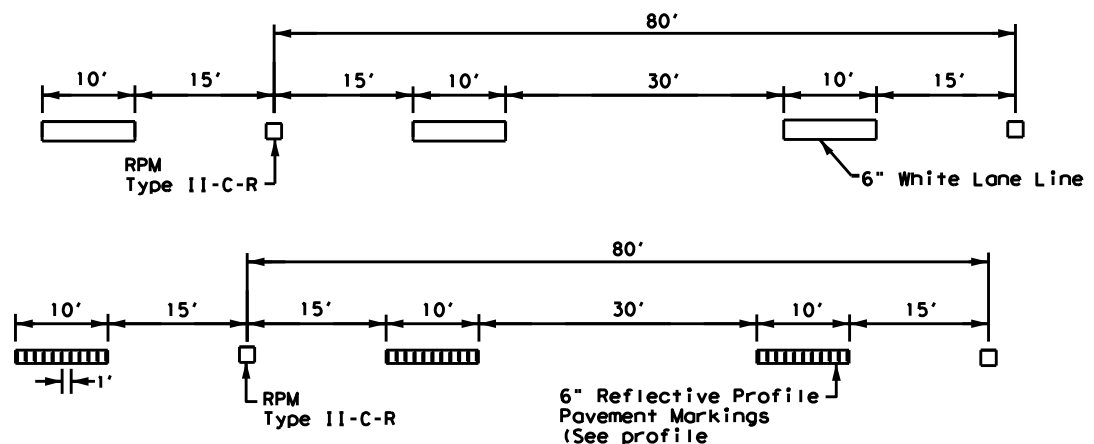
CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-23

FILE: CPM(1)-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0271	16	167	IH610
5-14	DIST	COUNTY	SHEET NO.	
2-23	12	HARRIS	57	

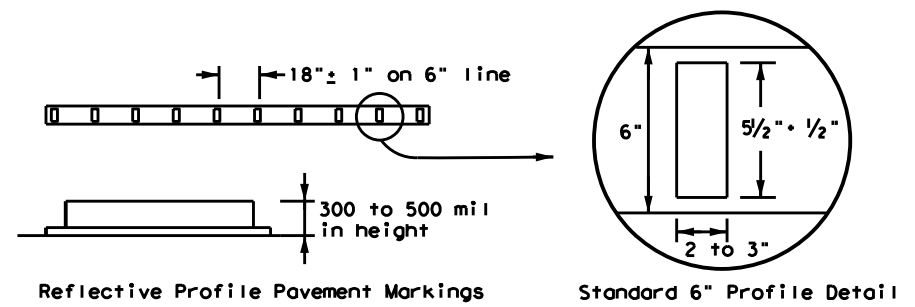
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FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\I1610FrontageCrestmont+Collins\Standards\PavementMarkings\FPM(1)-22.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



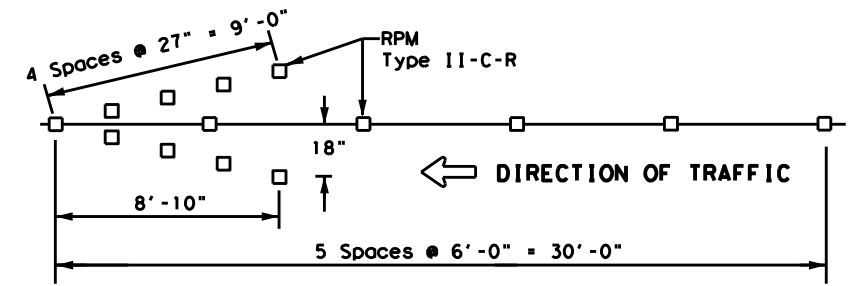
NOTE
 ReflectORIZED raised pavement markers Type II-C-R shall be spaced on 80' centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING



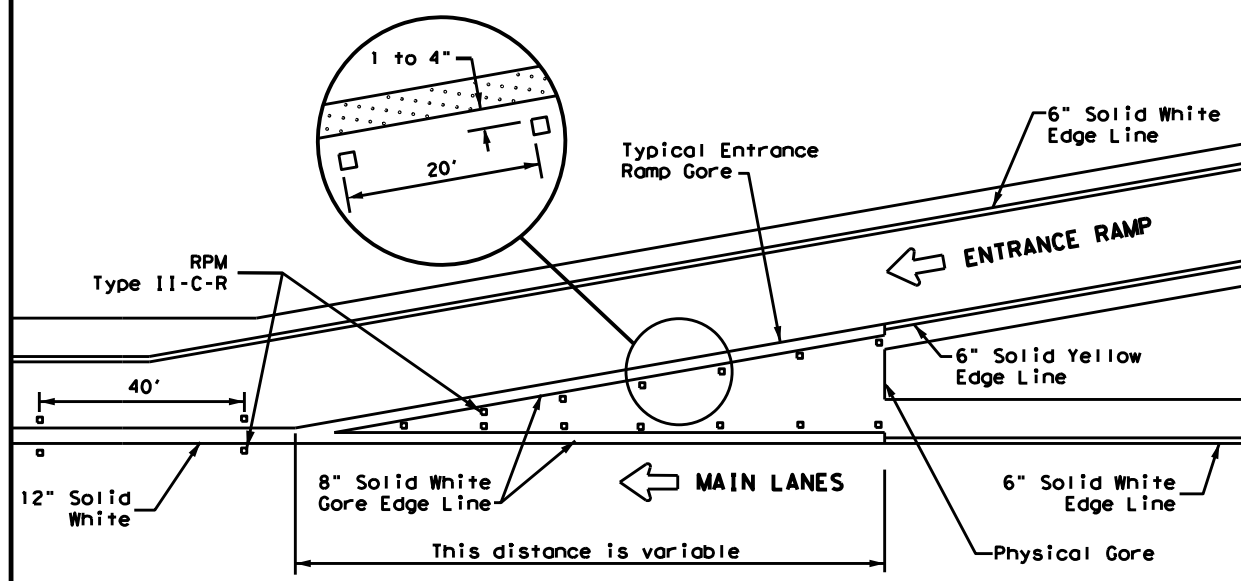
NOTE
 Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

EDGE LINE PAVEMENT MARKINGS

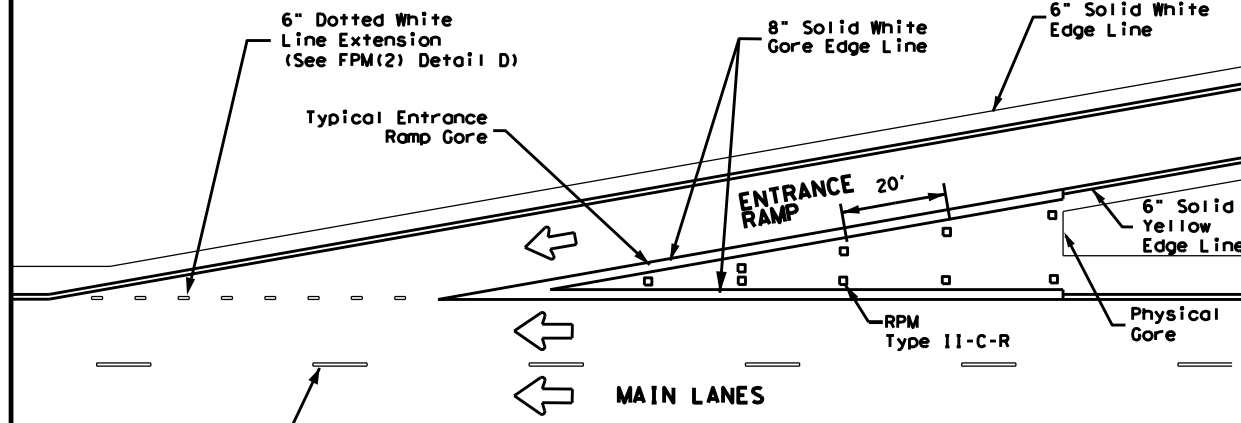


NOTES
 1. ReflectORIZED raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
 2. Red reflectORIZED wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as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

WRONG WAY ARROW

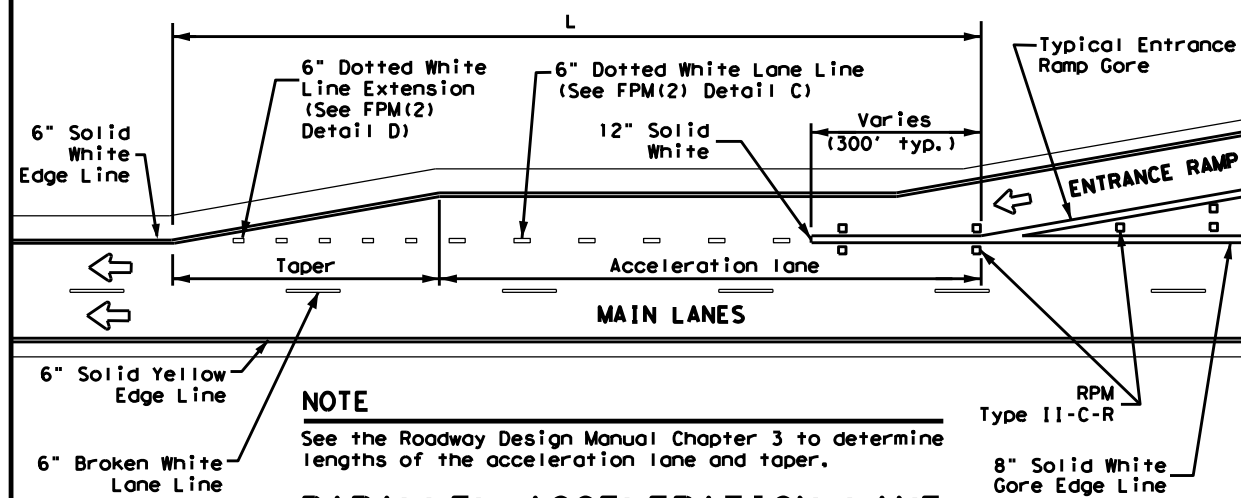


TYPICAL ENTRANCE RAMP GORE MARKING



NOTE
 See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE



NOTE
 See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

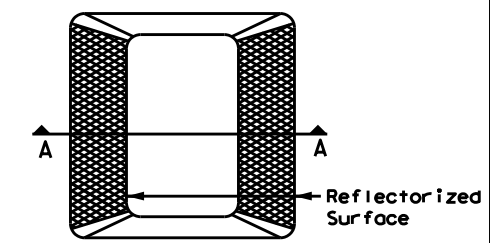
PARALLEL ACCELERATION LANE

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

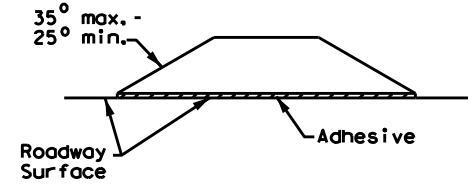
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.

LEGEND	
	Traffic flow
	Pavement marking arrows (white)
	ReflectORIZED Raised Markers (RPM) Type II-C-R

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



Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

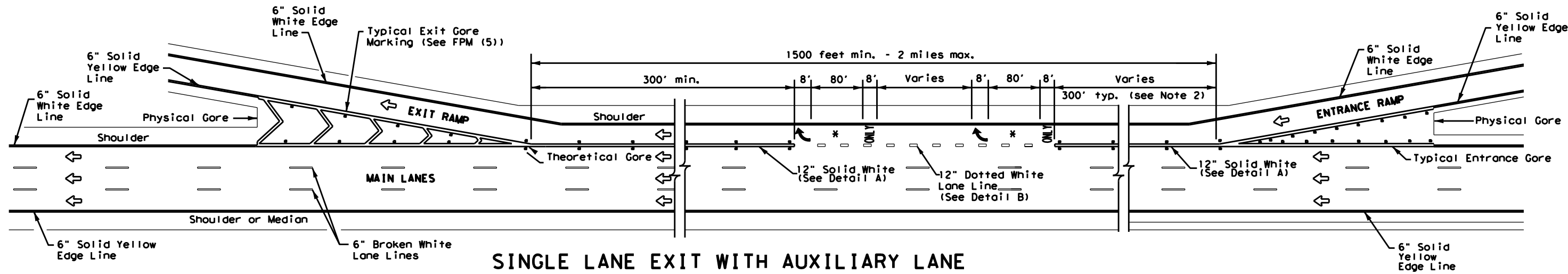


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS
 FPM(1)-22

FILE:	CON:	SECT:	JOB:	HIGHWAY:
fpm(1)-22.dgn	0271	16	167	I1610
REVISIONS				
5-74	8-00	2-12		
4-92	2-08	10-22		
5-00	2-10			
DIST:	COUNTY:	SHEET NO.		
12	HARRIS	58		

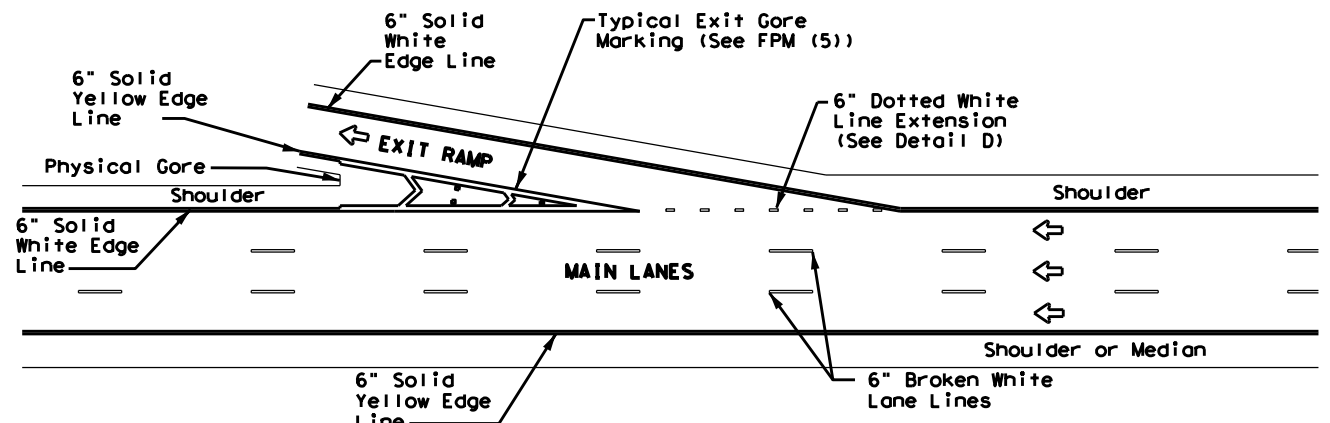
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 DATE: 11/9/2023
 PROJECT: 0271-16-167



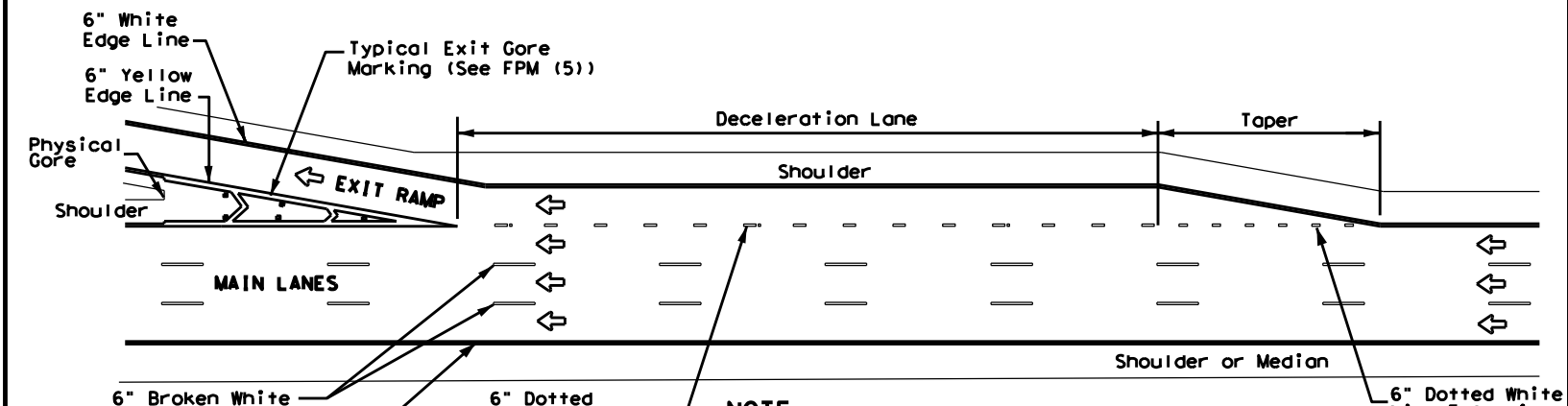
SINGLE LANE EXIT WITH AUXILIARY LANE

(See Note 2)



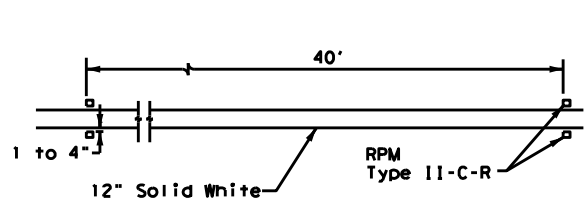
TAPERED DECELERATION LANE

NOTE
 Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

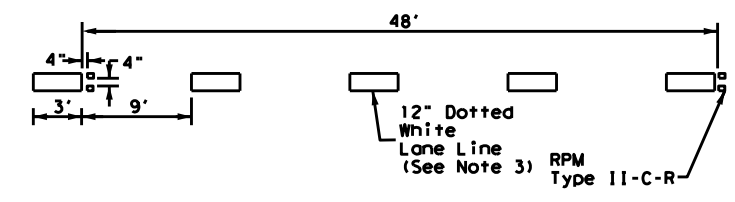


PARALLEL DECELERATION LANE

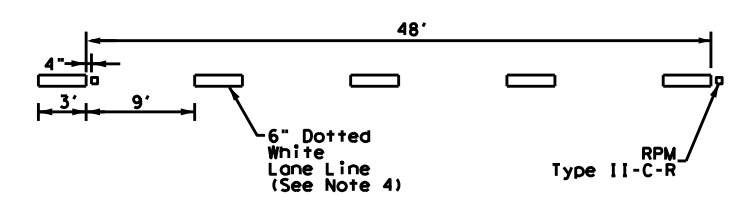
NOTE
 Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.



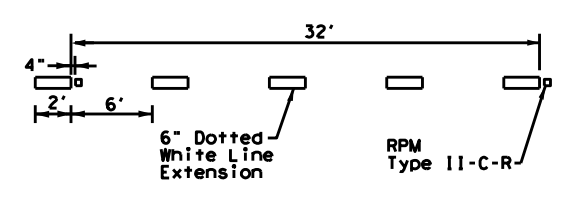
DETAIL A



DETAIL B



DETAIL C



DETAIL D

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND

←	Traffic flow
↶	Pavement marking arrows (white)
□	Reflectorized Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used

MATERIAL SPECIFICATIONS

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

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



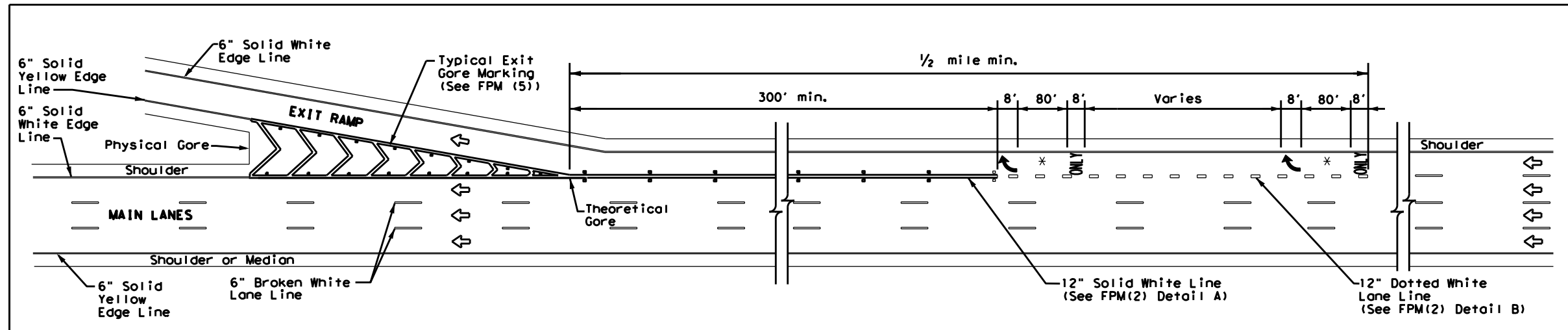
TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMP

FPM(2)-22

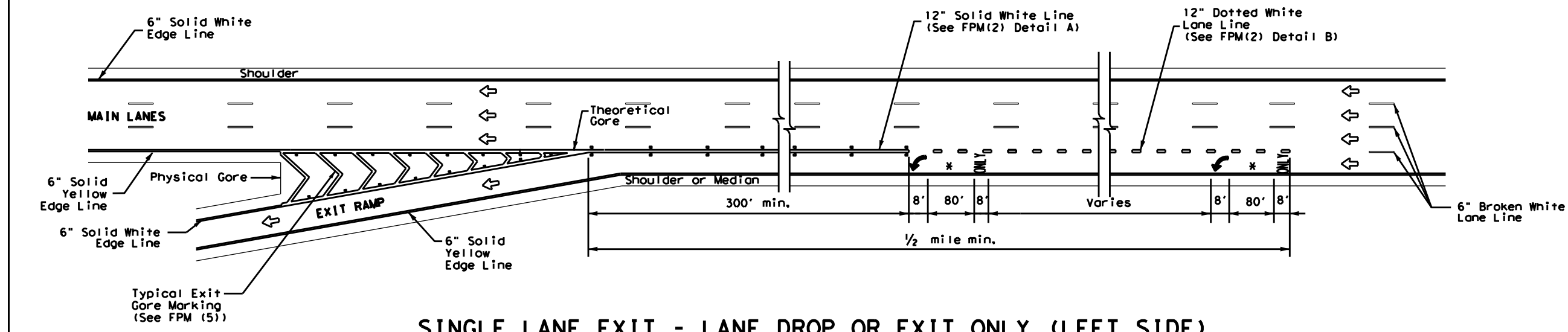
FILE: fpm(2)-22.dgn	DATE: 11/9/2023	CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		COUNTY: HARRIS		SHEET NO.: 59	
2-77	5-00	2-12			
4-92	8-00	10-22			
8-95	2-10				

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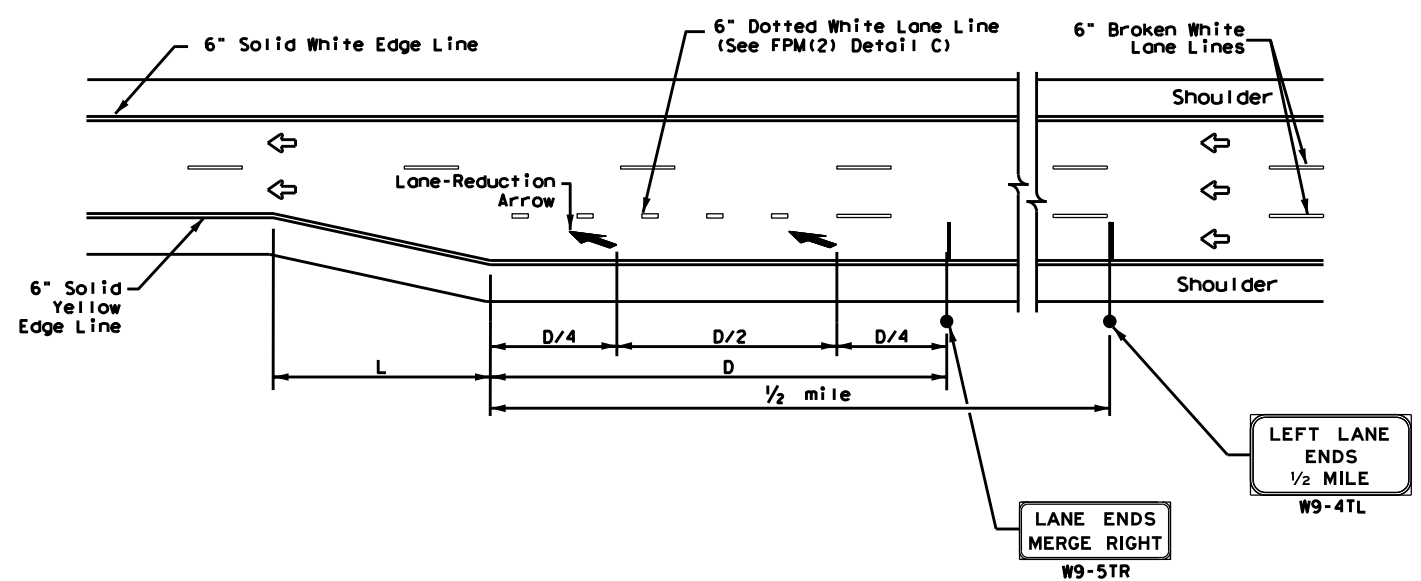
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 DATE: 11/9/2023
 PROJECT: 0271-16-167



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFT SIDE)



FREEWAY LANE REDUCTION

NOTES

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

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

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.

LEGEND	
←	Traffic flow
↶	Pavement marking arrows (white)
□	ReflectORIZED Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used

GENERAL NOTES

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

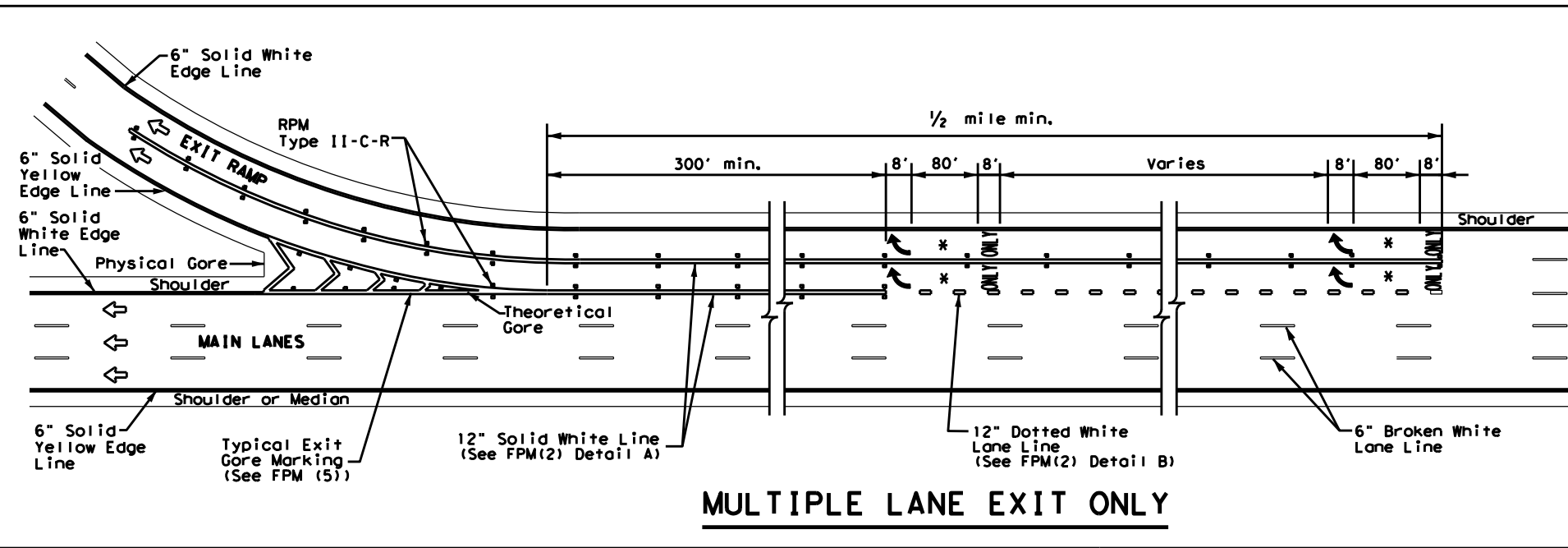


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS SINGLE LANE DROP (EXIT ONLY) AND LANE REDUCTION DETAILS
 FPM(3)-22

FILE:	DATE:	CON:	SECT:	JOB:	HIGHWAY:
fpm(3)-22.dgn	October 2022	0271	16	167	IH610
REVISIONS					
4-92	2-10				
5-00	2-12				
8-00	10-22	12	HARRIS		60

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FILE: H:\00\Mainenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontageCrestmont+Cullen\Standards\PavementMarkings\FPM(4)-22.dgn
 DATE: 11/29/2023
 PROJECT: 0271-16-167



MULTIPLE LANE EXIT ONLY

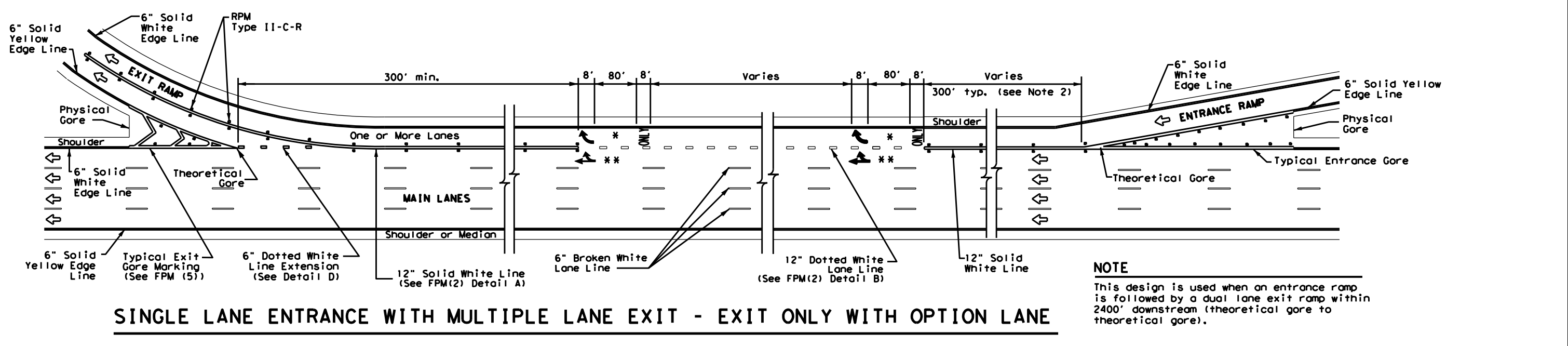
LEGEND	
↔	Traffic Flow
□	Reflectorized Raised Markers (RPM) Type II-C-R
↔	Pavement marking arrow (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used
**	Arrow markings are optional

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

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

GENERAL NOTES

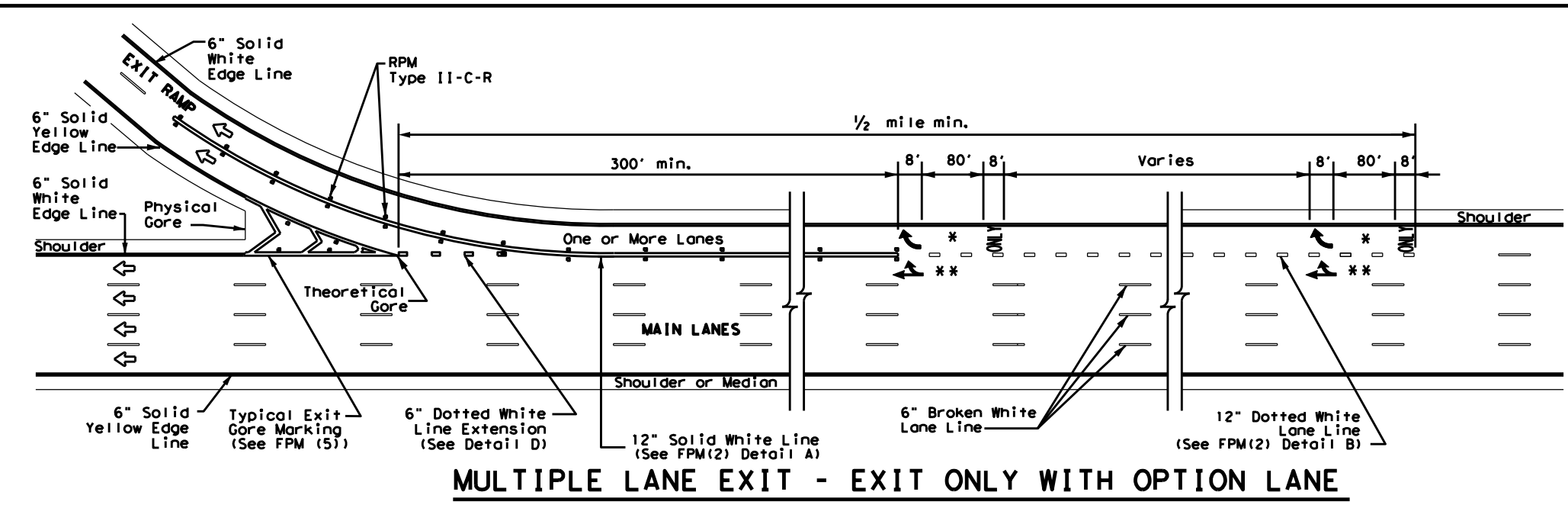
1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines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



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

NOTE

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



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

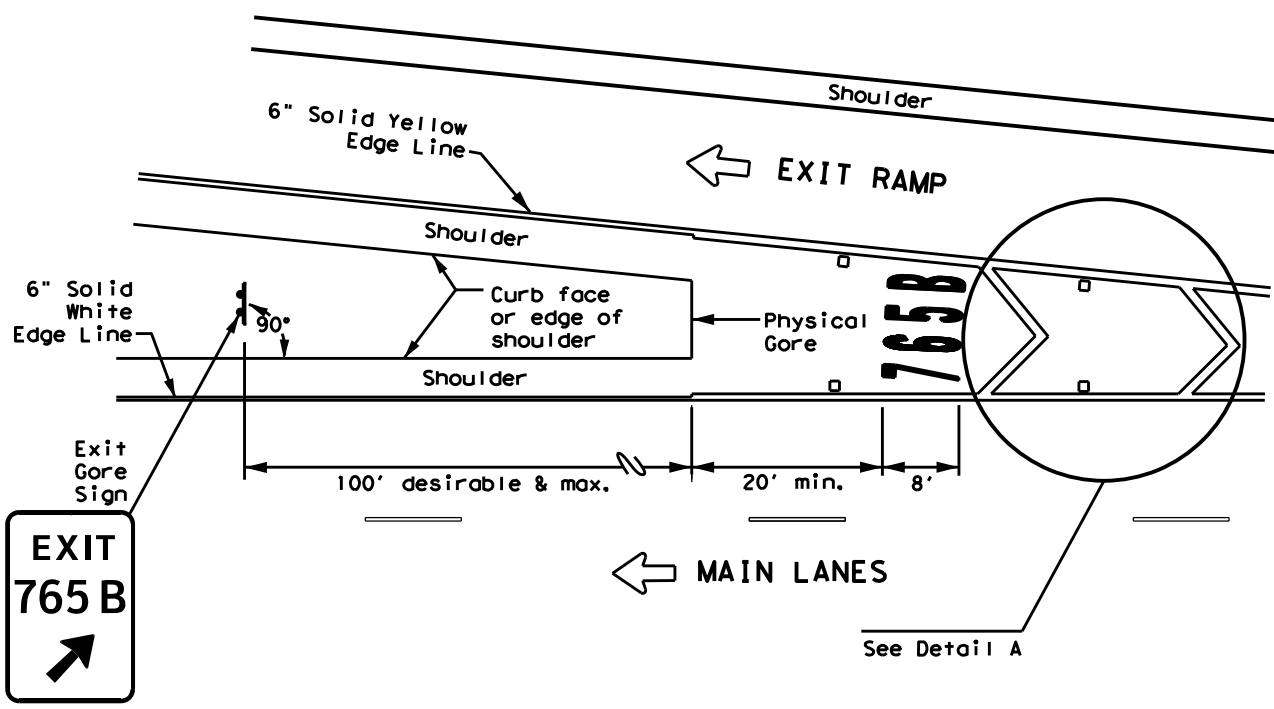


TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS MULTIPLE LANE DROP (EXIT) DETAILS FPM(4)-22

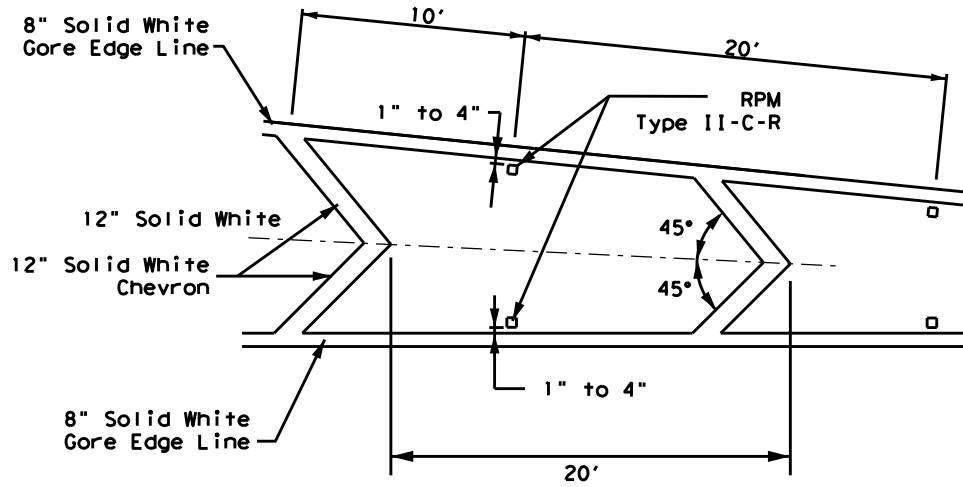
FILE:	CONTRACT:	SECTION:	JOB:	HIGHWAY:
fpm(4)-22.dgn	0271	16	167	IH610
REVISIONS				
2-77	2-10			
5-00	2-12			
8-00	10-22			
DIST:	COUNTY:	SHEET NO.		
12	HARRIS	61		

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at <http://www.txdot.gov>



MARKINGS WITH EXIT NUMBER



NOTES

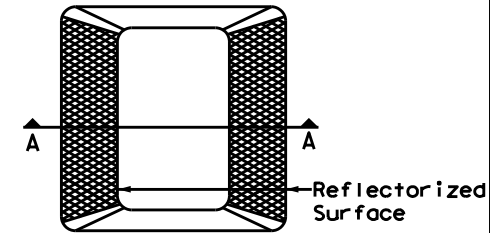
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see ReflectORIZED Raised Pavement Marker Detail.

DETAIL A

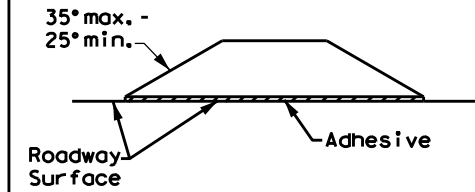
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
←	Traffic flow
□	ReflectORIZED Raised Markers (RPM) Type II-C-R



Type II (Top View)



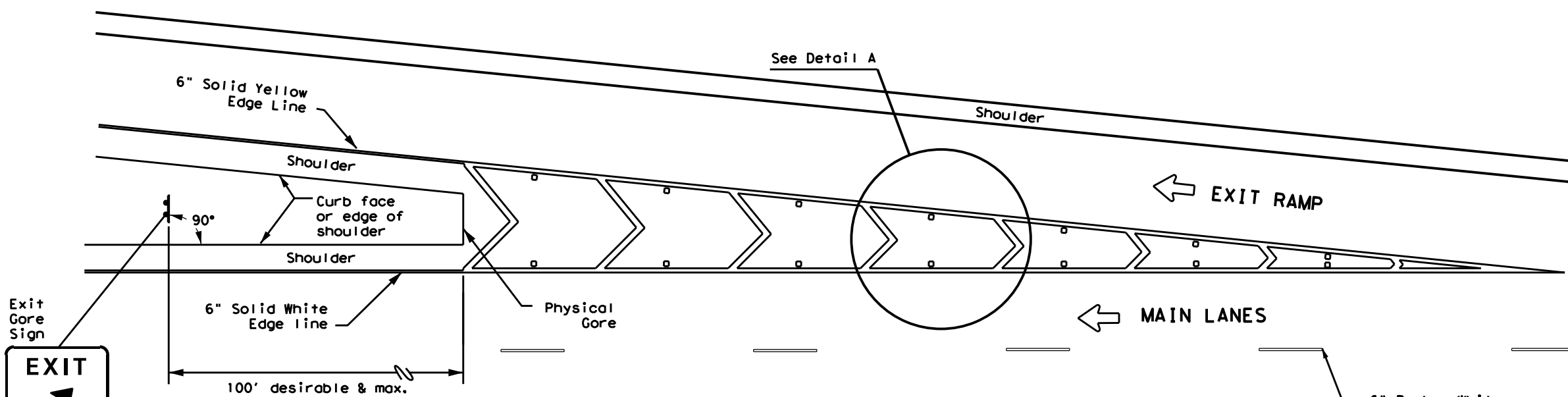
SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



EXIT GORE PAVEMENT MARKINGS

FPM(5) - 22



MARKINGS WITHOUT EXIT NUMBER

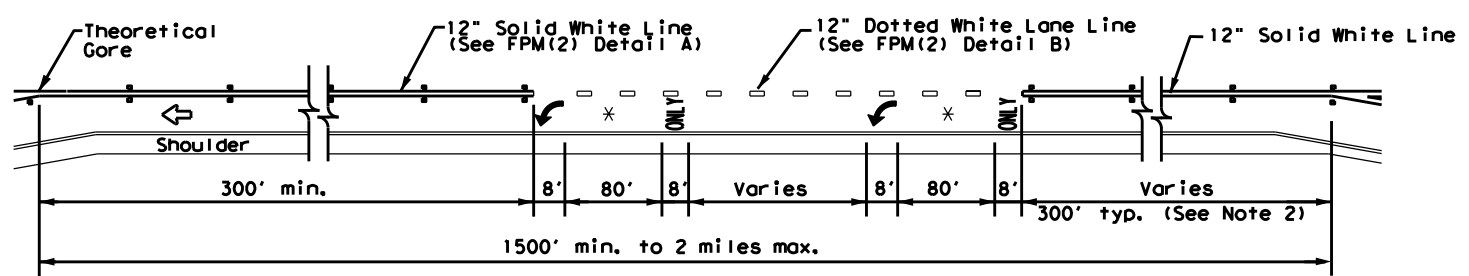
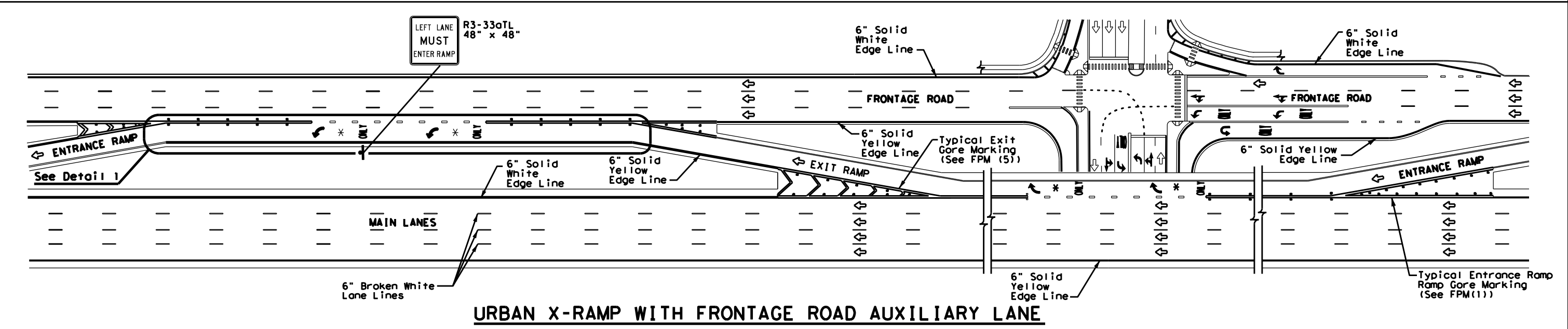
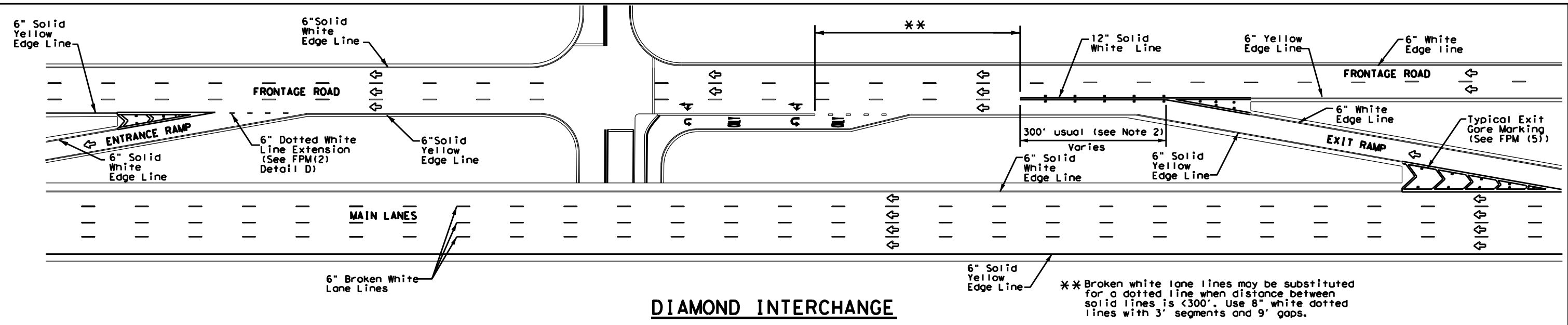
FILE:	DWG:	CR:	DWG:	CR:
fpm(5)-22.dgn				
© TxDOT October 2022	CON:	SECT:	JOB:	HIGHWAY:
	0271	16	167	IH610
REVISIONS	DIST:	COUNTY:	SHEET NO.	
9-19	12	HARRIS	62	
10-22				

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 DATE: 11/9/2023
 PROJECT: 0271-16-167

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FILE: H:\00\Mainenance\METRO MA INTENANCE\FY22-23 RMCs\IH610\FrontageCrestmont\Culien\Standards\PavementMarkings\FPM(6) - 22.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



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

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

GENERAL NOTES

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

LEGEND	
↔	Traffic flow
↗	Pavement marking arrows (white)
□	ReflectORIZED Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used

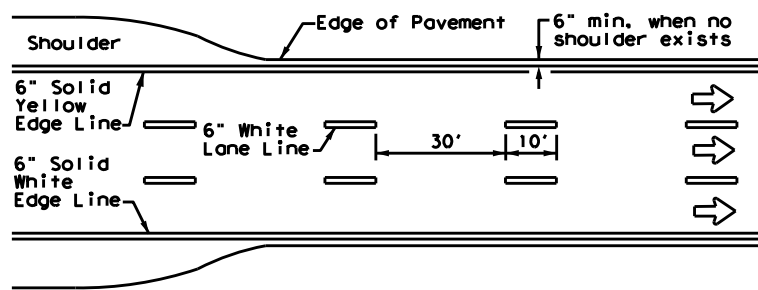


**TYPICAL STANDARD
 FREEWAY AND FRONTAGE
 ROAD PAVEMENT MARKINGS**

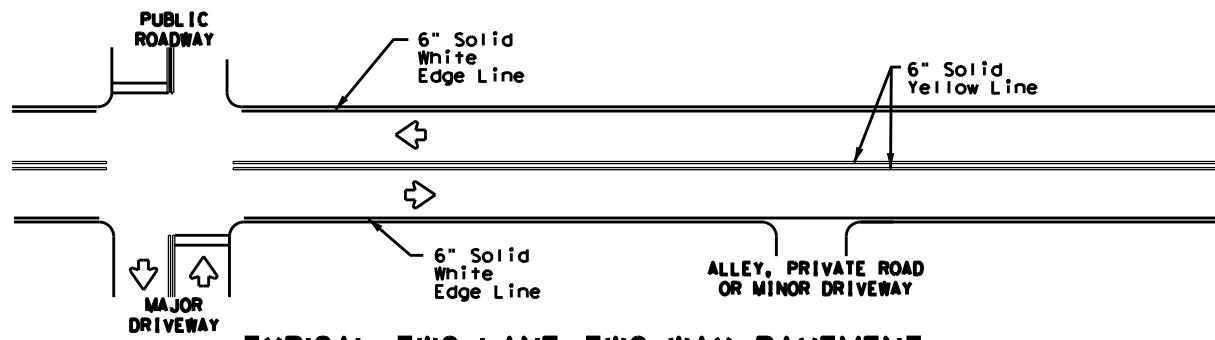
FPM(6) - 22

FILE: fpm(6) - 22.dgn	DATE: 11/9/2023	DESIGNER: CR1	DRAWN: CR1	CHECKED: CR1
© TxDOT October 2022		CONTRACT: 0271	SECTION: 16	JOB: 167
REVISIONS		COUNTY: HARRIS		HIGHWAY: IH610
10-22		SHEET NO. 63		

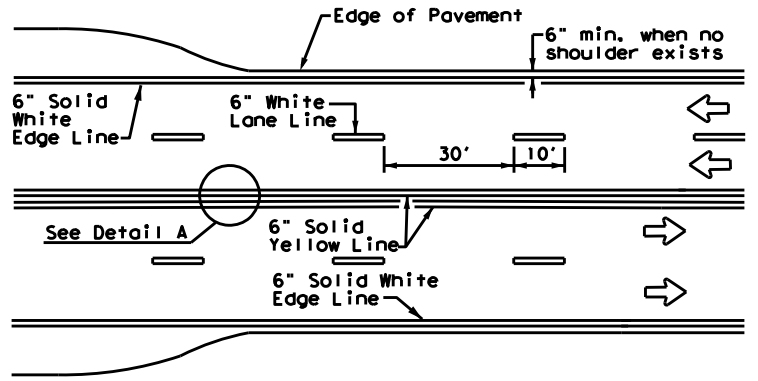
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 DATE: 11/29/2023
 PROJECT: 0271-16-167



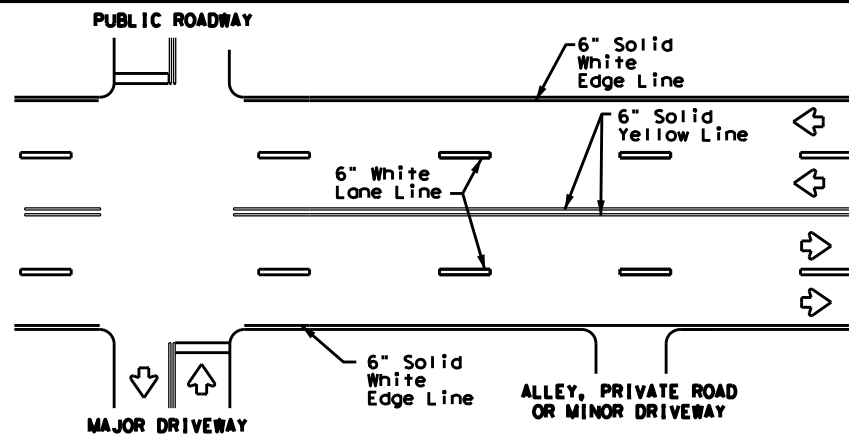
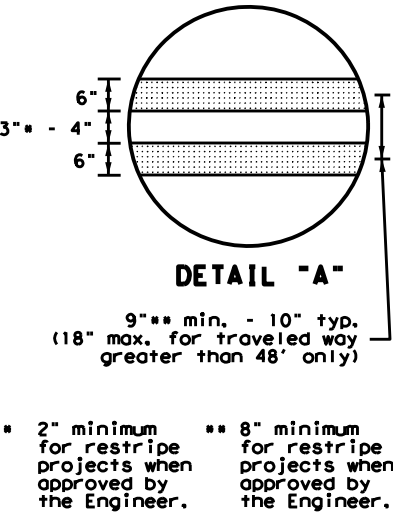
**EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



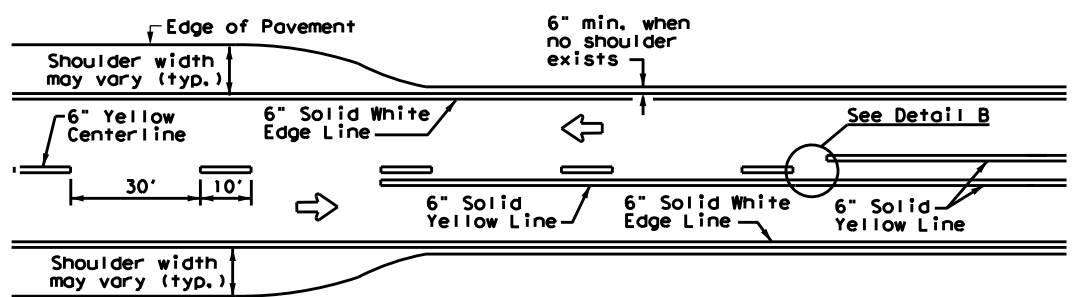
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



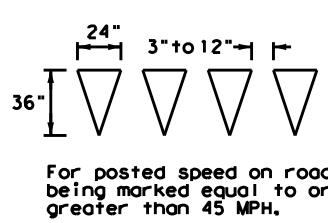
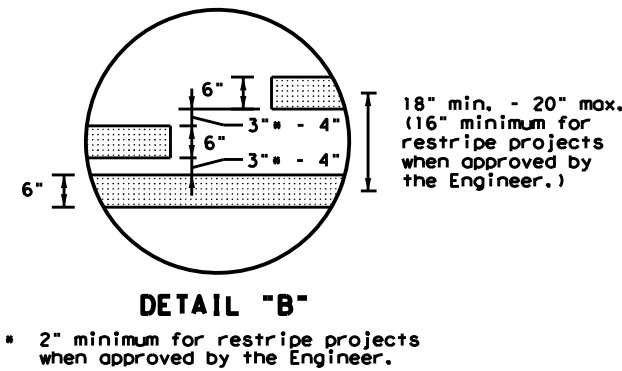
**CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



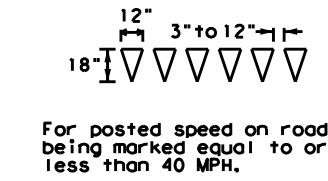
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



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



YIELD LINES



NOTES

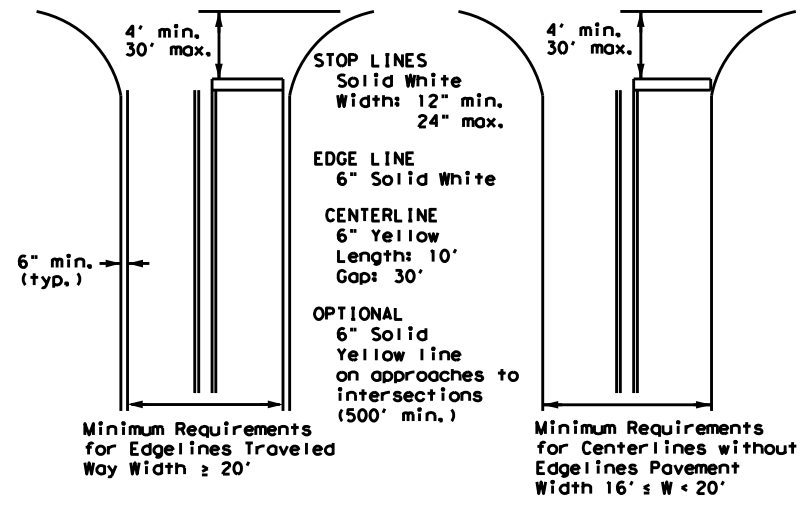
- Where divided highways are separated by median widths of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs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

GENERAL NOTES

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

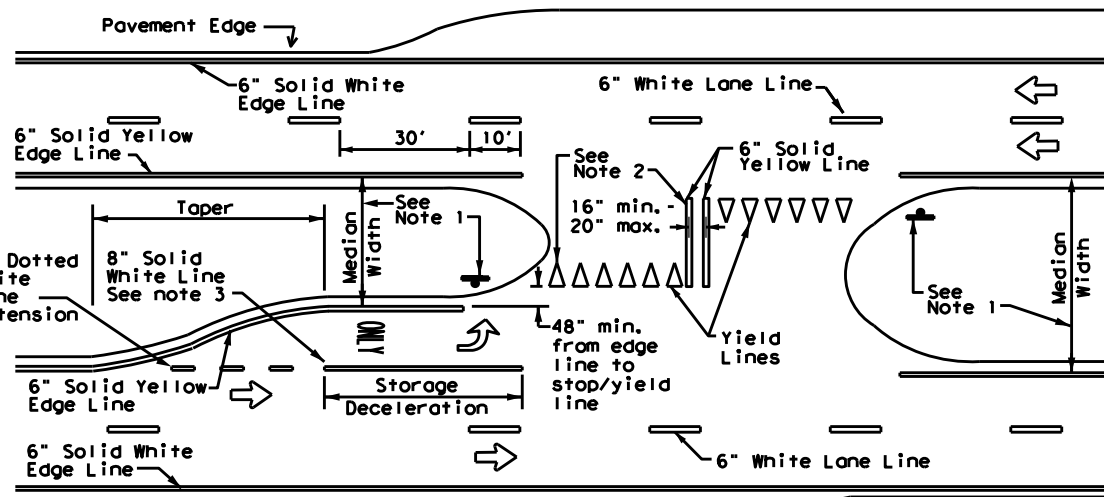
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



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

**GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE**
Based on Traveled Way and Pavement Widths for Undivided Roadways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

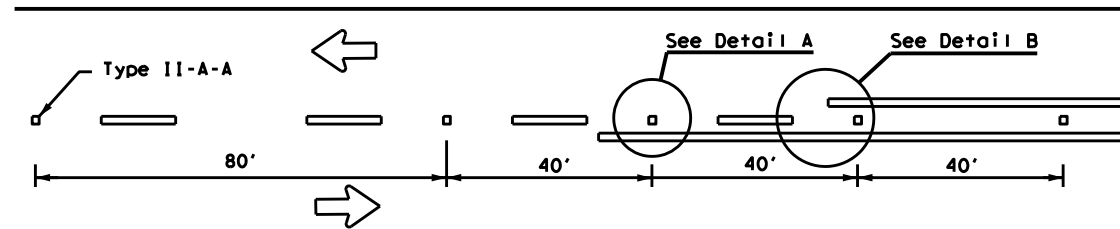


**TYPICAL STANDARD
PAVEMENT MARKINGS**

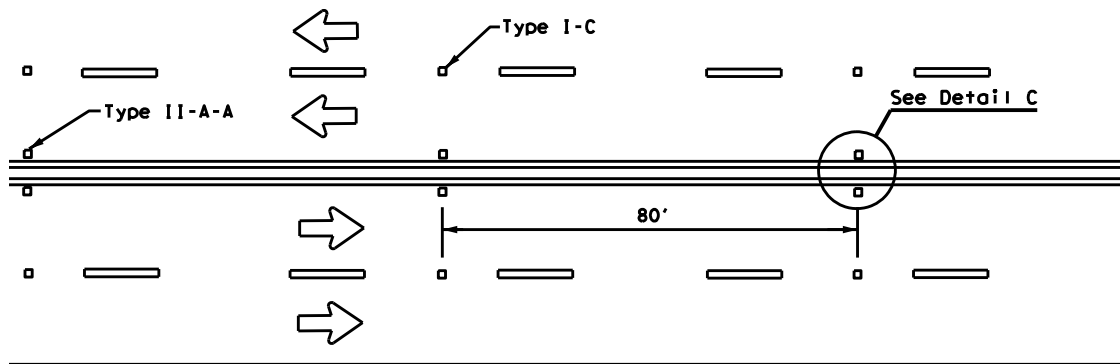
PM(1)-22

FILE:	pml-22.dgn	DATE:	December 2022	CNT:	16	JOB:	167	HIGHWAY:	IH610
REVISIONS:		DIST:	12	COUNTY:	HARRIS	SHEET NO.:	64		
11-78	8-00	6-20							
8-95	3-03	12-22							
5-00	2-12								

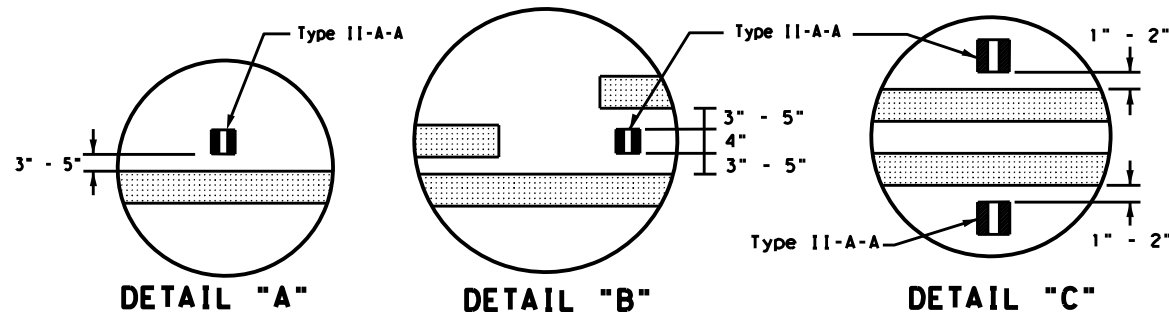
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



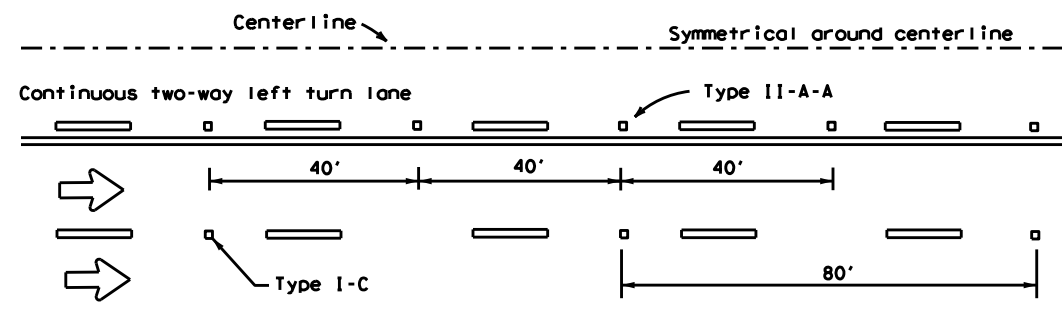
**CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS**



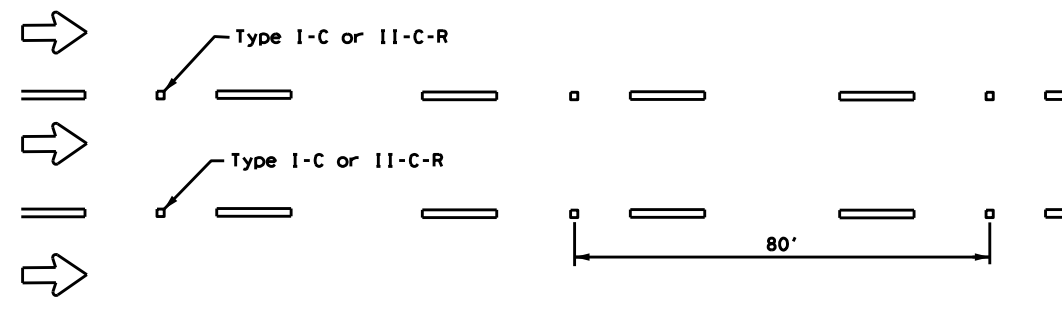
DETAIL "A"

DETAIL "B"

DETAIL "C"

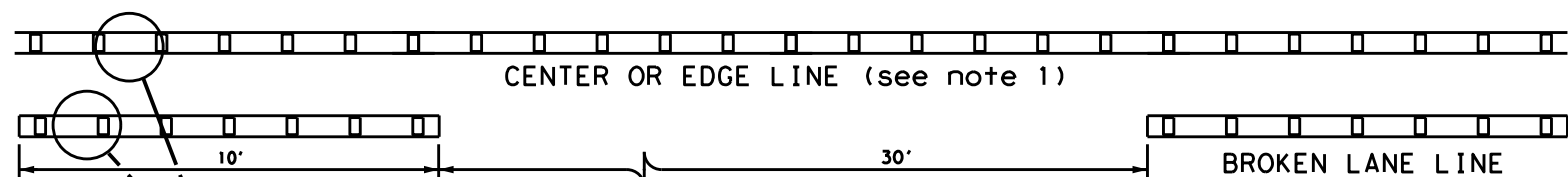


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



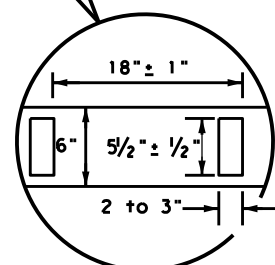
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



CENTER OR EDGE LINE (see note 1)

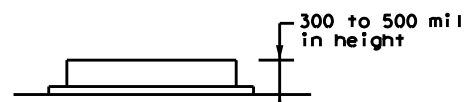
BROKEN LANE LINE



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

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



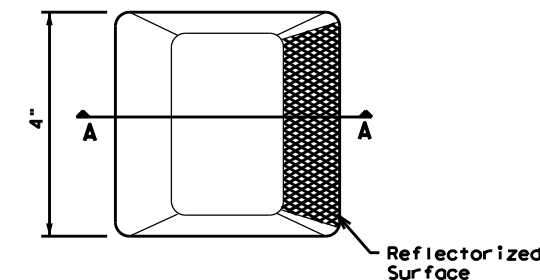
A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

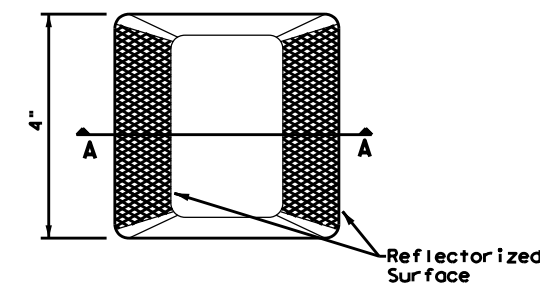
- Edge lines should typically be 6" wide and the materials shall be specified in the plans.
- Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

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

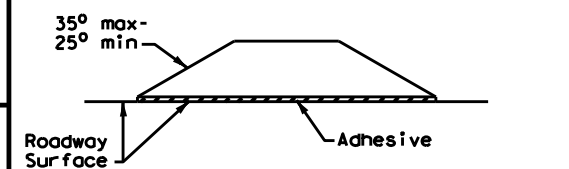
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



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

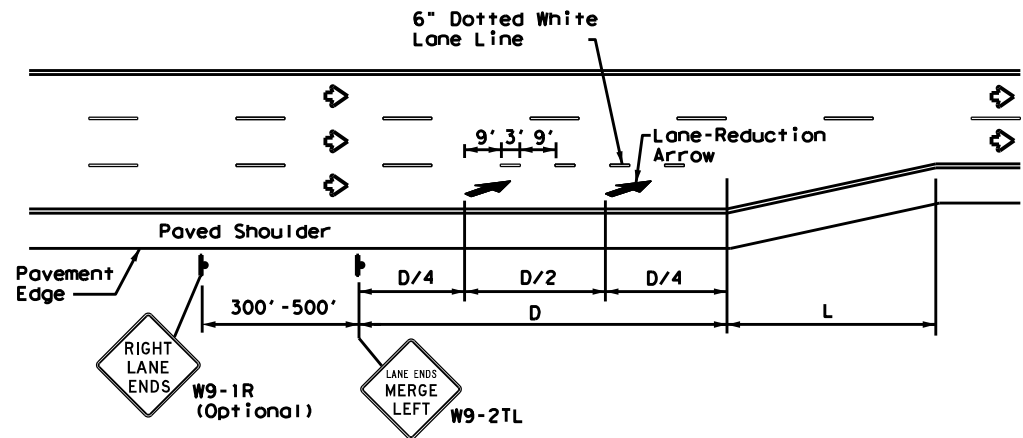
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REVISIONS										
4-77	8-00	6-20								
4-92	2-10	12-22								
5-00	2-12									
			DIST:	COUNTY:		SHEET NO.:				
			12	HARRIS		65				

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FILE: H:\00\Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontageCrestmont+Cullen\Standards\PavementMarkings\PM2-22.dgn
DATE: 11/9/2023
PROJECT: 0271-16-167

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H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\1H610\FrontageCrestmont-Cullen\Standards\PavementMarkings\PM3-22.dgn
 FILE: H:\00-Maintenance\METRO MAINTENANCE\FY22-23 RMCs\1H610\FrontageCrestmont-Cullen\Standards\PavementMarkings\PM3-22.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



LANE REDUCTION

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 RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- 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.

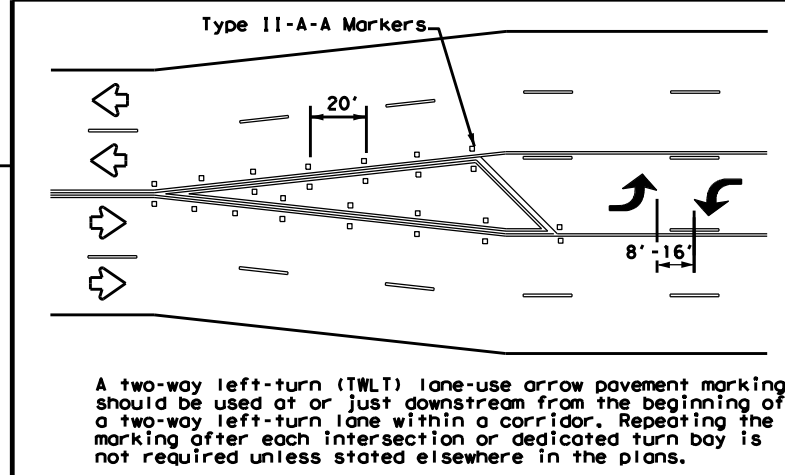
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	L = WS ² / 60
35 MPH	565	
40 MPH	670	L = WS
45 MPH	775	
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

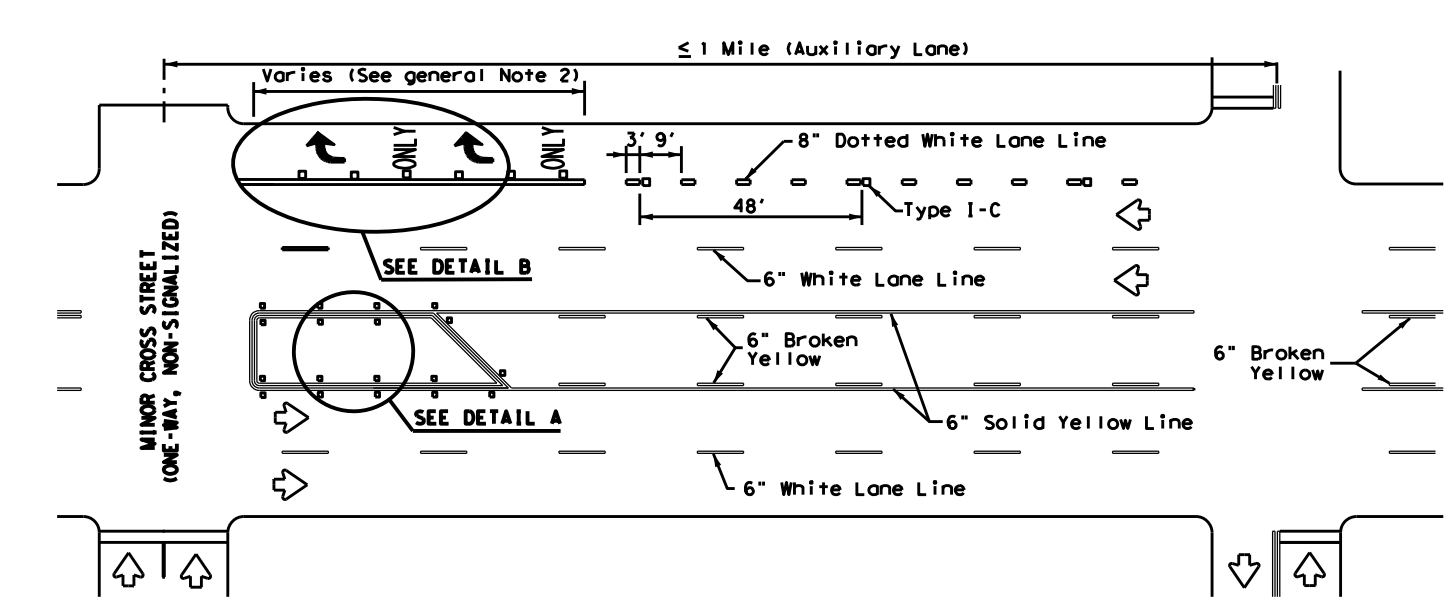
- Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

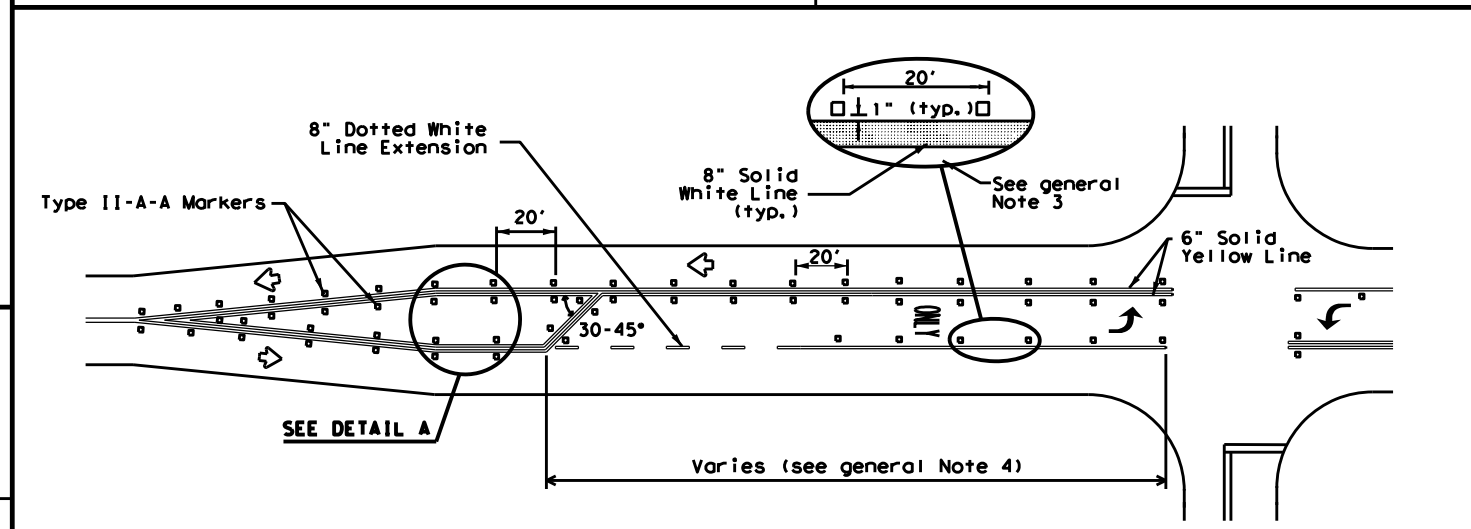
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



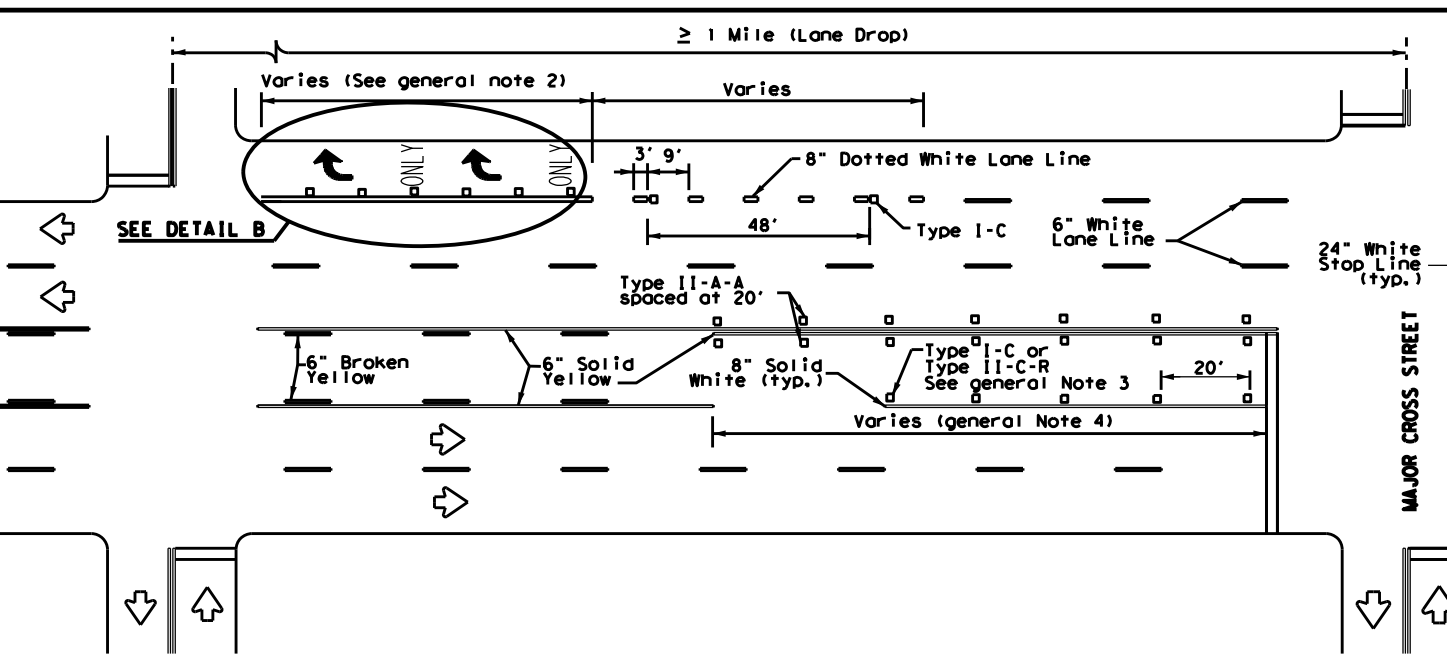
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



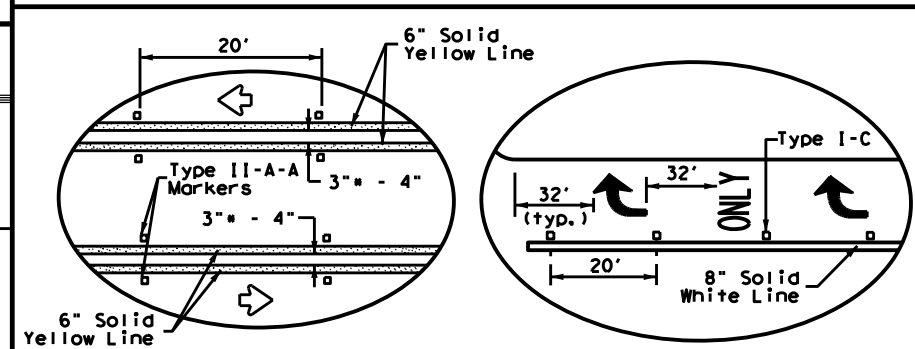
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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



DETAIL A

DETAIL B

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

Texas Department of Transportation
 Traffic Safety Division Standard

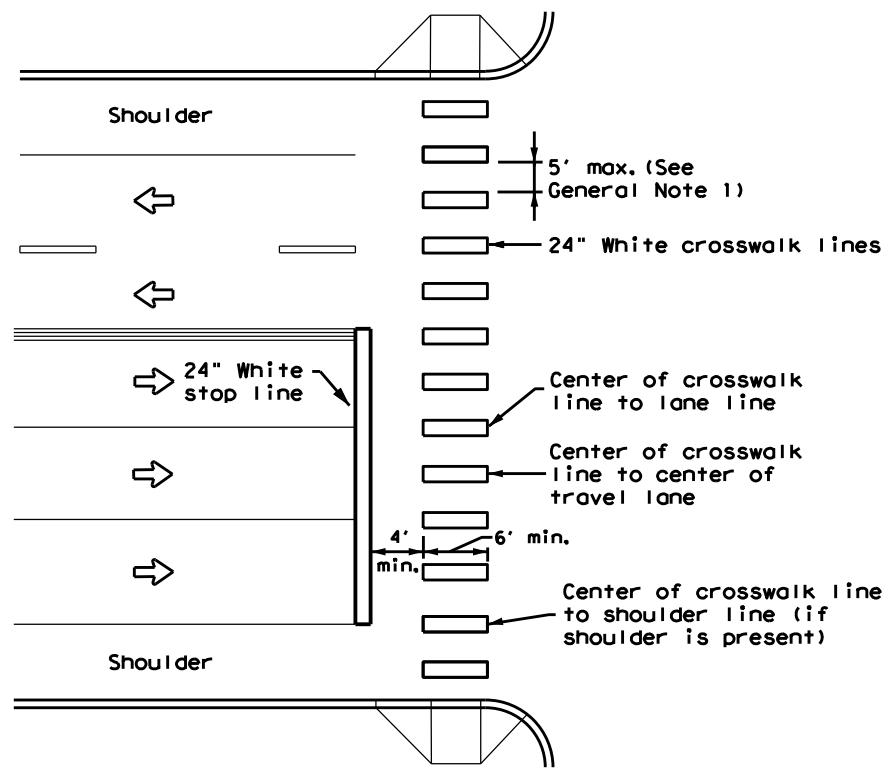
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-22

FILE: pm3-22.dgn	DATE: 11/9/2023	CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 66	
4-98	3-03 6-20				
5-00	2-10 12-22				
8-00	2-12				

22C

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FILE: H:\00-Maintenance\METRO_MAINTENANCE\FY22-23_RMCs\1H610FrontsgeCrestmont-Cullen\Standards\PavementMarkings\PM4-22A.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



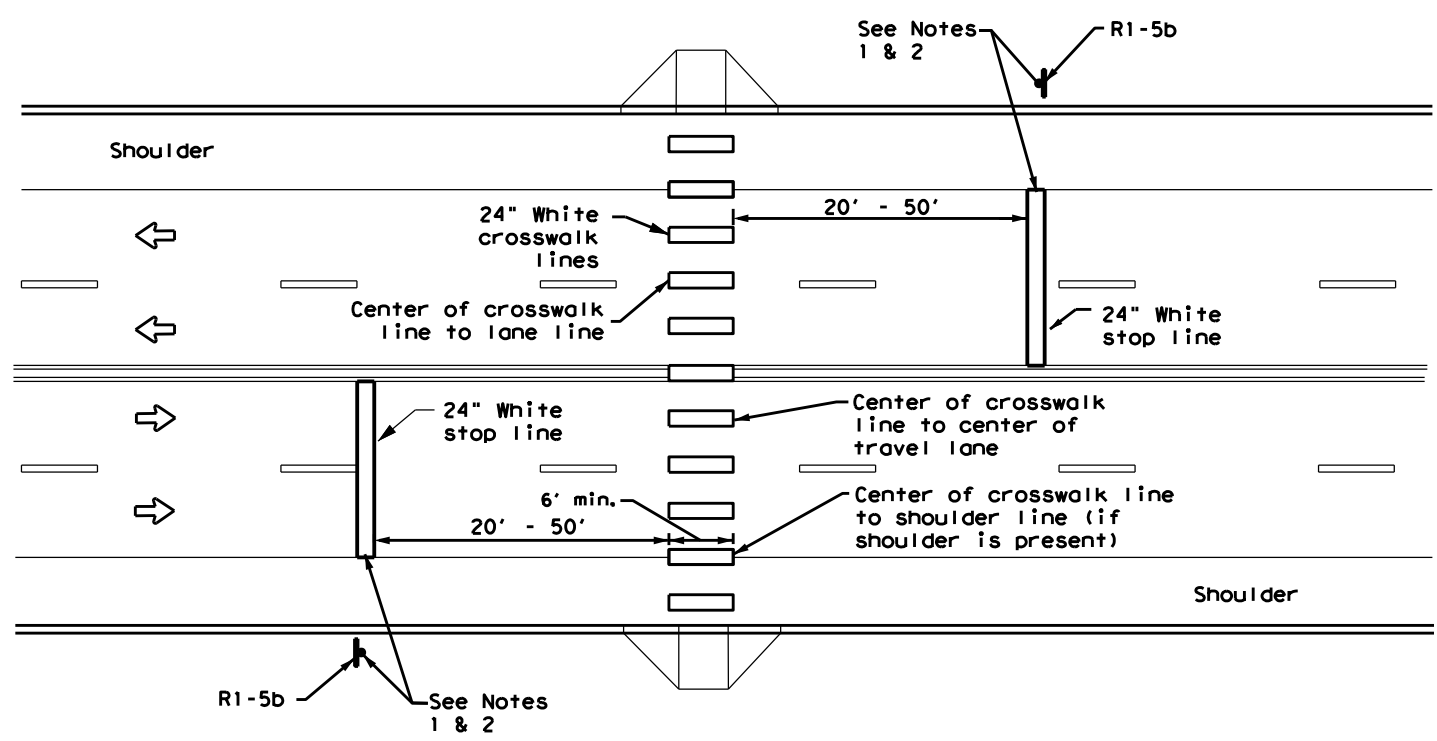
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

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

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

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

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



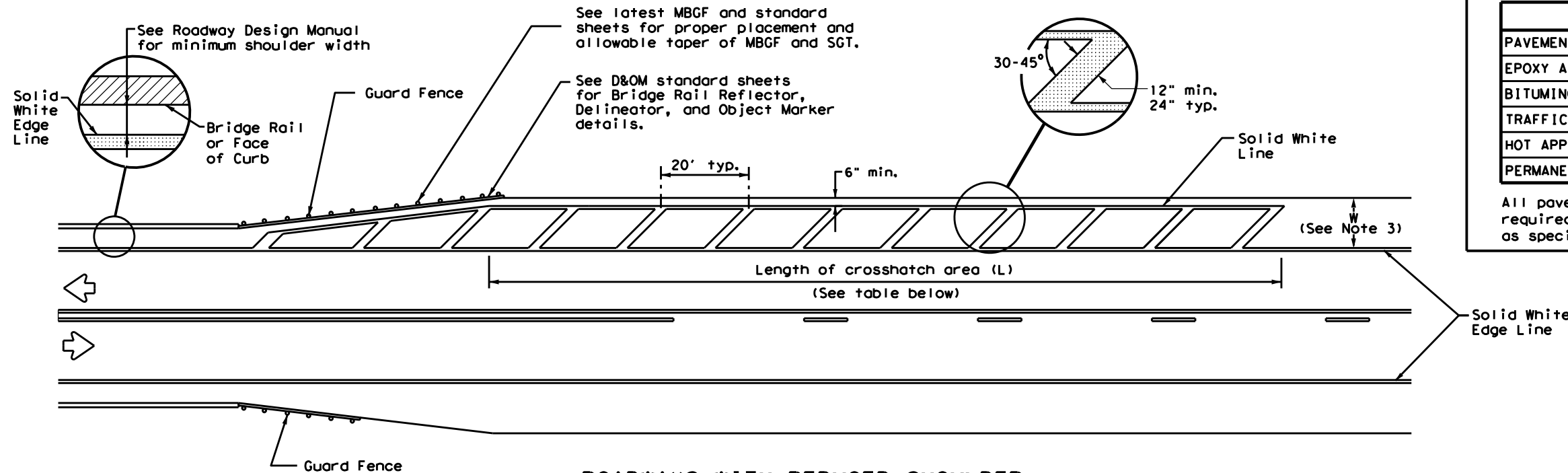
CROSSWALK PAVEMENT MARKINGS

PM(4) - 22A

FILE: pm4-22a.dgn	DATE: December 2022	CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS					
6-20					
6-22					
12-22					
DIST: 12		COUNTY: HARRIS		SHEET NO: 67	
220					

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FILE: H:\00-Maintenance\METRO MA INTENANCE\FY22-23 RMCs\IH610\FrontageCrestmont-Cullen\Standards\PavementMarkings\PM5-22.dgn
 DATE: 11/9/2023
 PROJECT: 0271-16-167



ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

NOTES

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

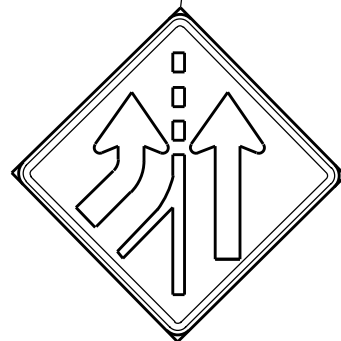
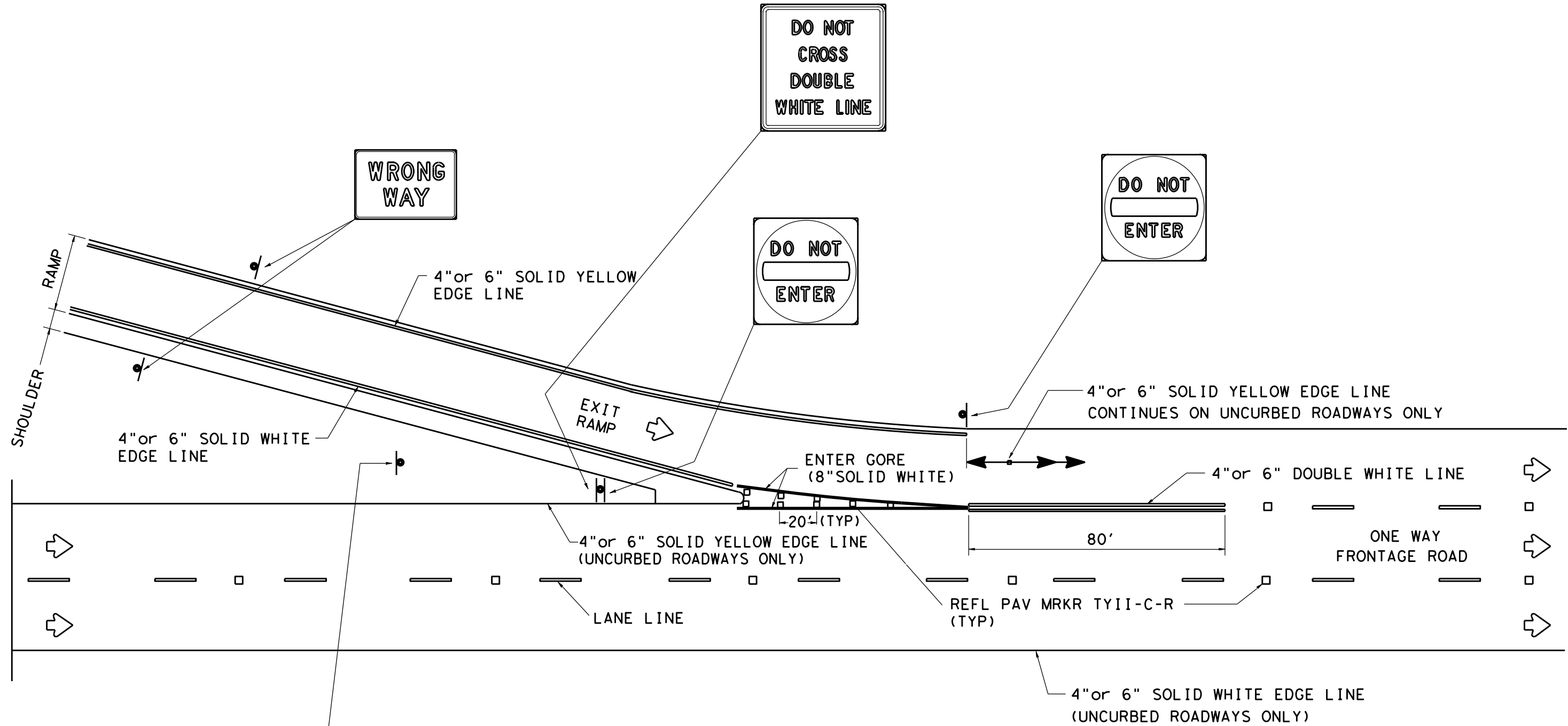
MATERIAL SPECIFICATIONS

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

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

				Traffic Safety Division Standard	
PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT PM(5) - 22					
FILE: pm5-22.dgn	DATE: 11/9/2023	BY: TxDOT	CHK: TxDOT	DATE: 11/9/2023	CHK: TxDOT
© TxDOT December 2022		CONTRACT: 0271	SECTION: 16	JOB: 167	HIGHWAY: IH610
REVISIONS		DIST: 12	COUNTY: HARRIS	SHEET NO. 68	

FILE: H:\00#Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610FrontageCrestmont\Cul len\Standards\PavementMarkings\Hou\ER-FR(1)-09.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



DRAWING SCALE: NONE

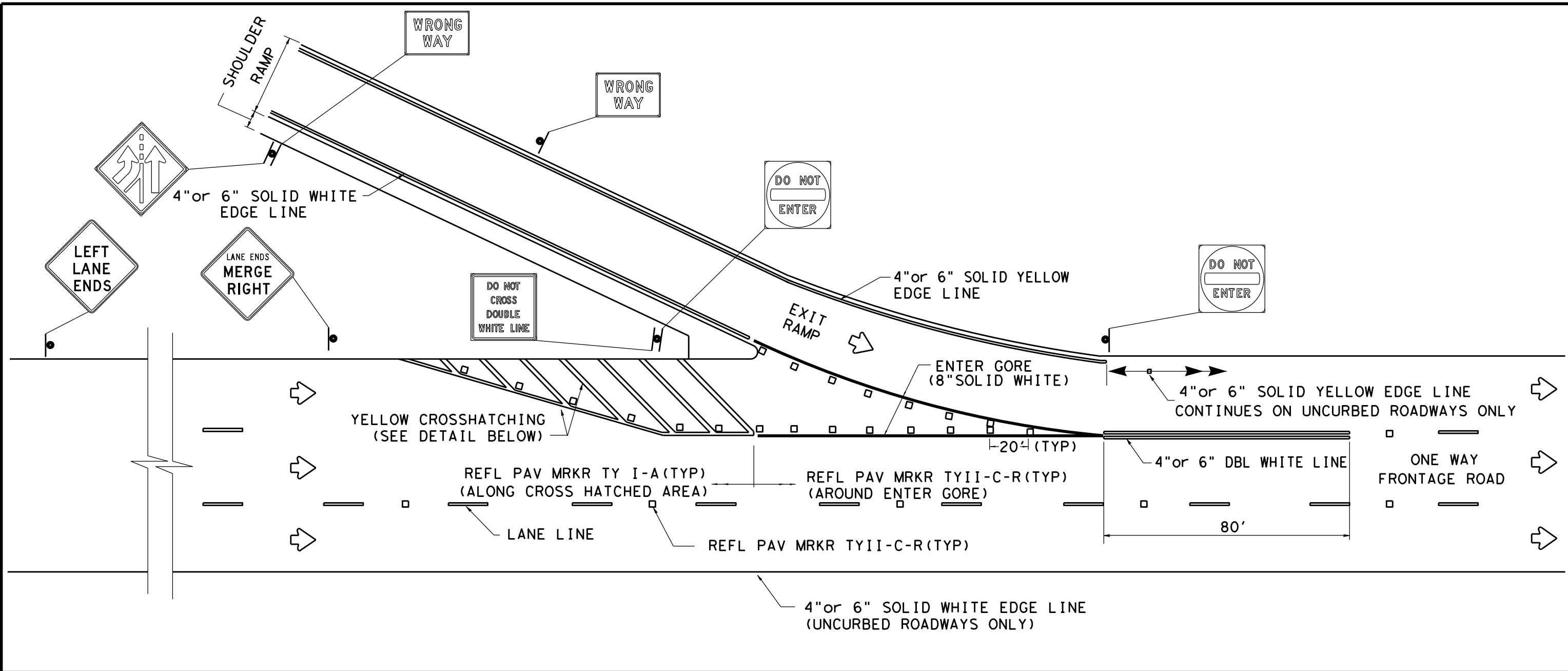
Texas Department of Transportation
Houston District

SIGNING AND PAVEMENT MARKING DETAILS
EXIT RAMPS-FRONTAGE ROAD

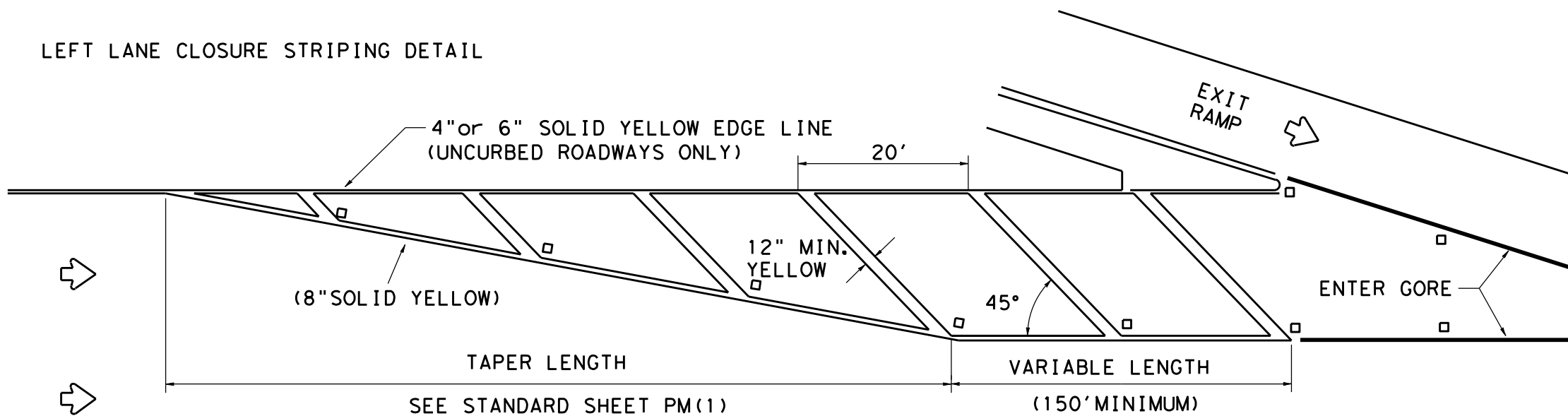
ER-FR(1)-09

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© TxDOT 1998	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS FEB., 2008 DEC., 2009	12	6	C-271-16-167	69
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	16	167
				IH610

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



LEFT LANE CLOSURE STRIPING DETAIL



DRAWING SCALE: NONE

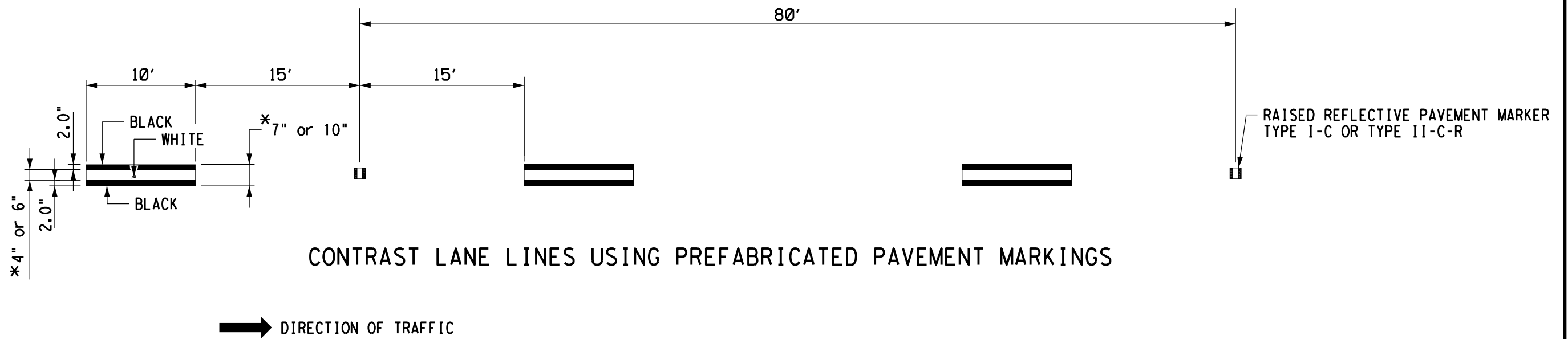
Texas Department of Transportation
Houston District

SIGNING AND PAVEMENT MARKING DETAILS
EXIT RAMPS-FRONTAGE ROAD

ER-FR(2)-09

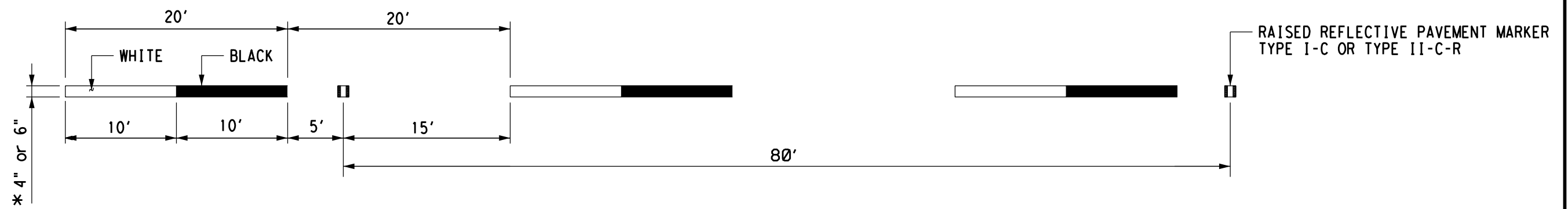
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	HARRIS	0271	16	167
				IH610

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 DATE: 11/9/2023
 PROJECT: 0271-16-167



CONTRAST LANE LINES USING PREFABRICATED PAVEMENT MARKINGS

➔ DIRECTION OF TRAFFIC



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

* AS SHOWN ON THE PLANS.

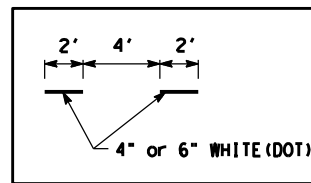


PAVEMENT MARKINGS
 (CONTRAST LANE LINES)

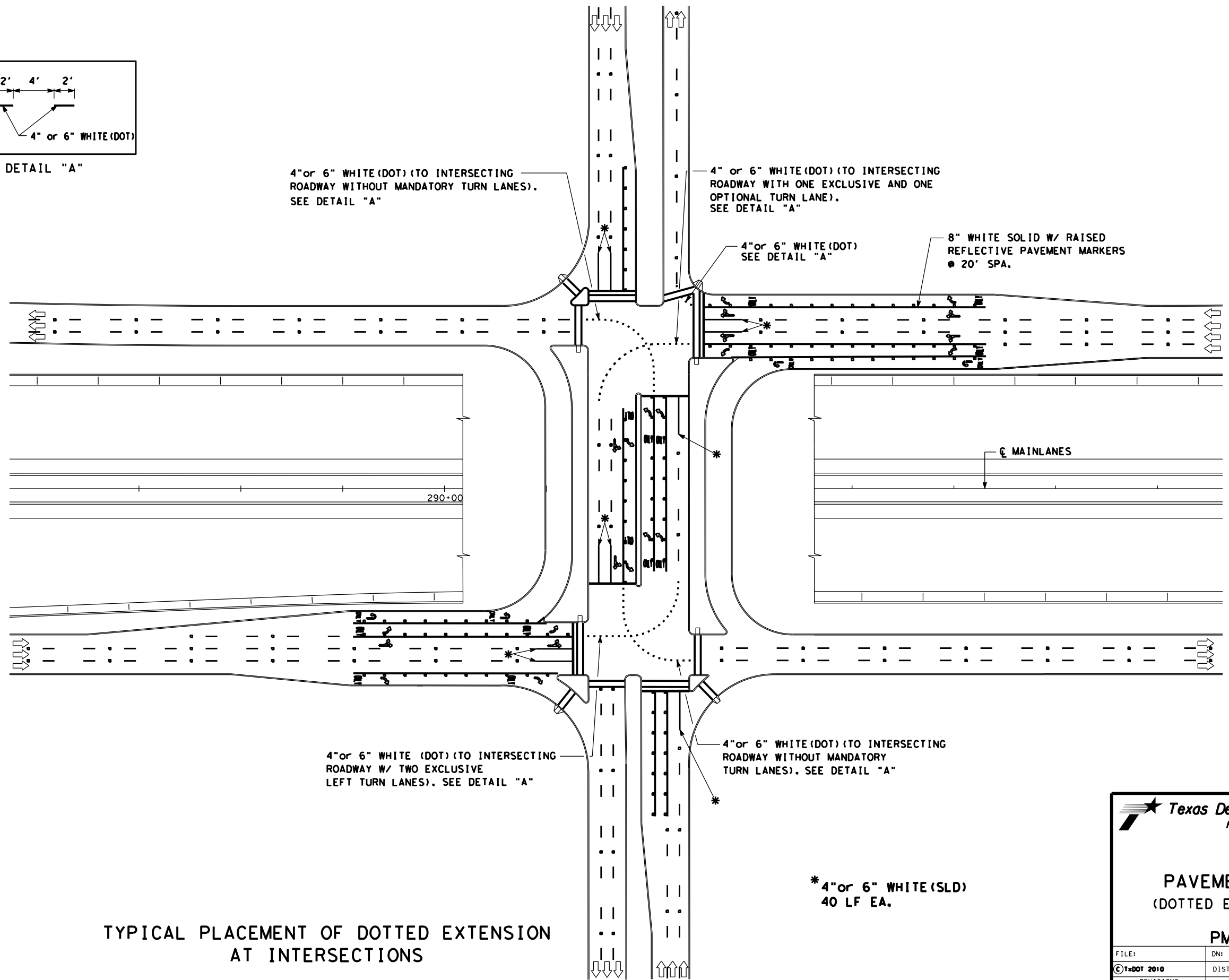
PM (CLL) - 14

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© TxDOT 2003	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HQU	6	C-271-16-167	71
01-19-08	COUNTY	CONTROL	SECT	JOB
10-2019 '9" to 10"	HARRIS	0271	16	167
				HIGHWAY
				I610

FILE: H:\00\Maintenance\METRO MAINTENANCE\FY22-23 RMCs\IH610\FrontageCrestmont\Cul Len*\Standards\PavementMarkings\Hou\PM(DOT)-11.DGN
 DATE: 11/9/2023
 PROJECT: 0271-16-167



DETAIL "A"



TYPICAL PLACEMENT OF DOTTED EXTENSION
 AT INTERSECTIONS

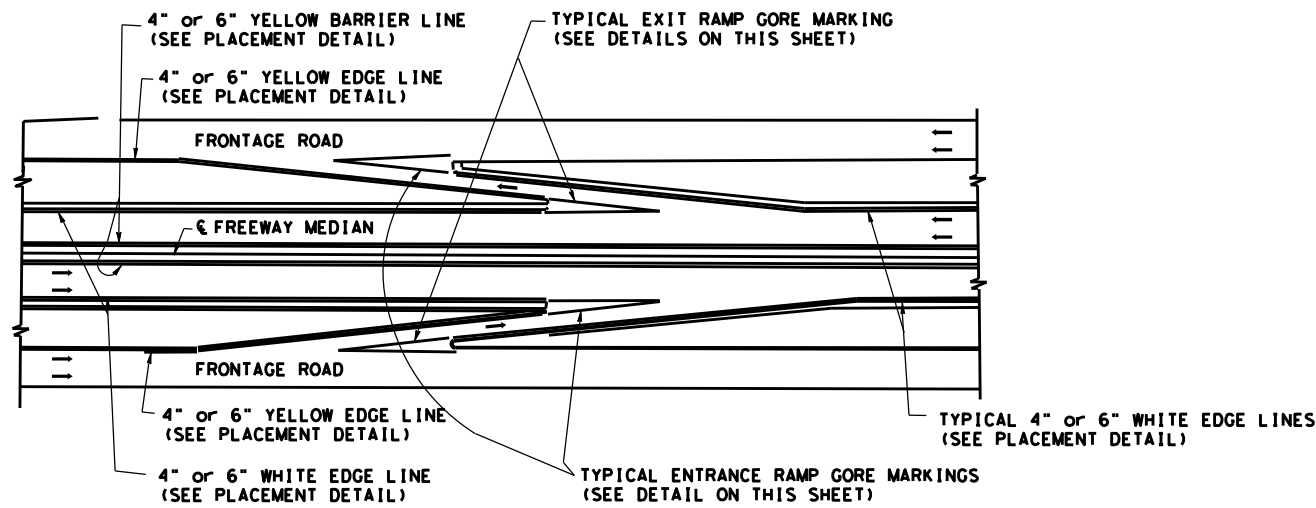
Texas Department of Transportation
 Houston District

PAVEMENT MARKINGS
 (DOTTED EXTENSION DETAILS)

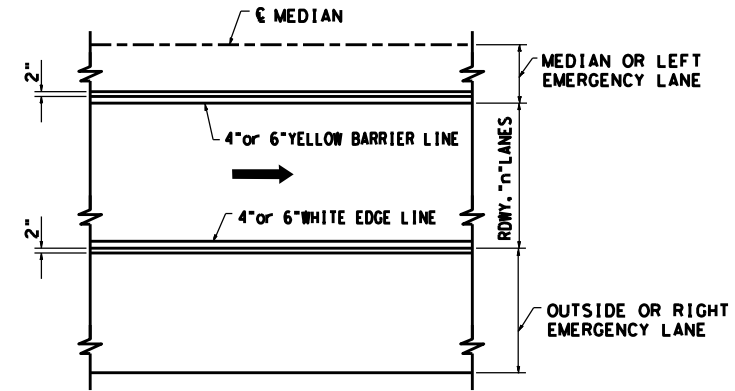
PM(DOT) - 11

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© 2010	DIST	FED REG	PROJECT NO.	SHEET
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4/2011	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	16	167
				IH610

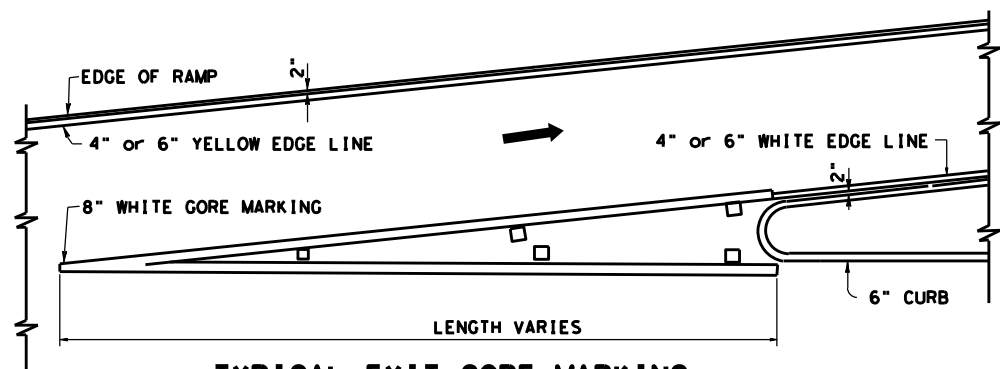
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 DATE: 11/29/2023
 PROJECT: 0271-16-167



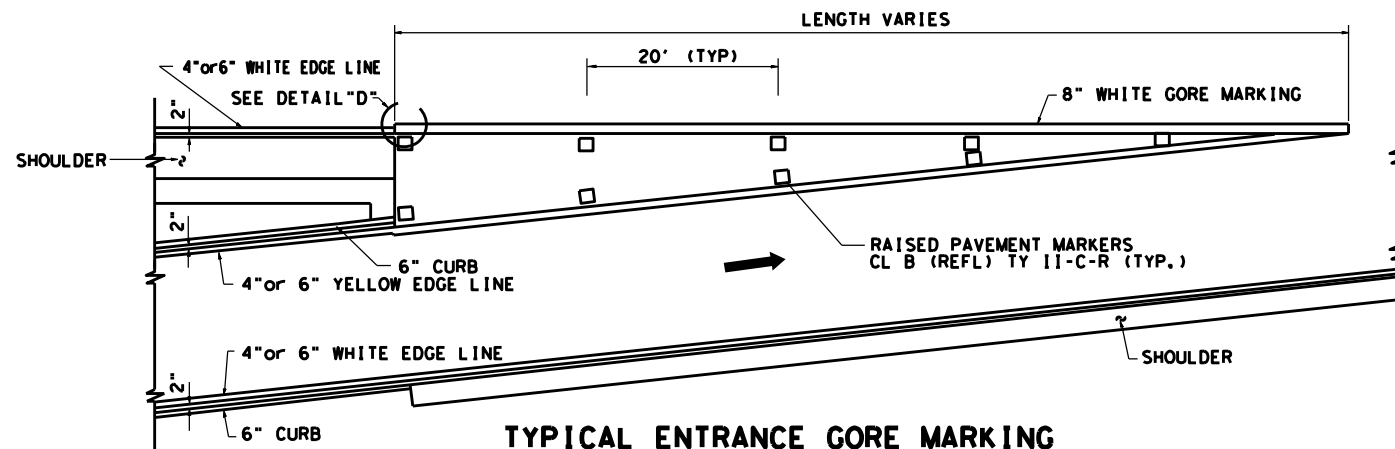
TYPICAL LAYOUT



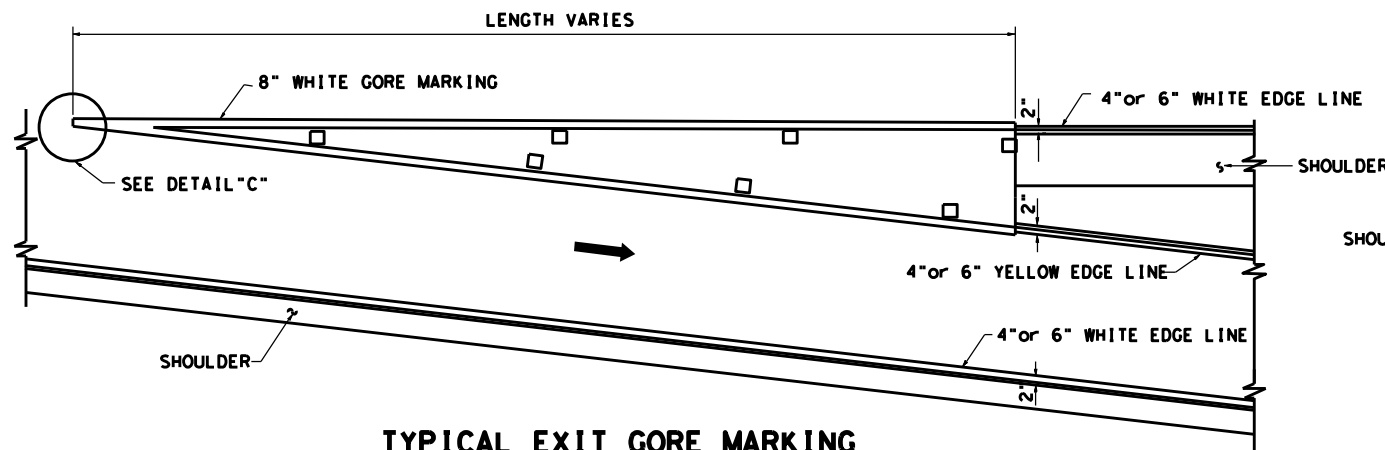
TYPICAL PLACEMENT FOR BARRIER AND EDGE LINES



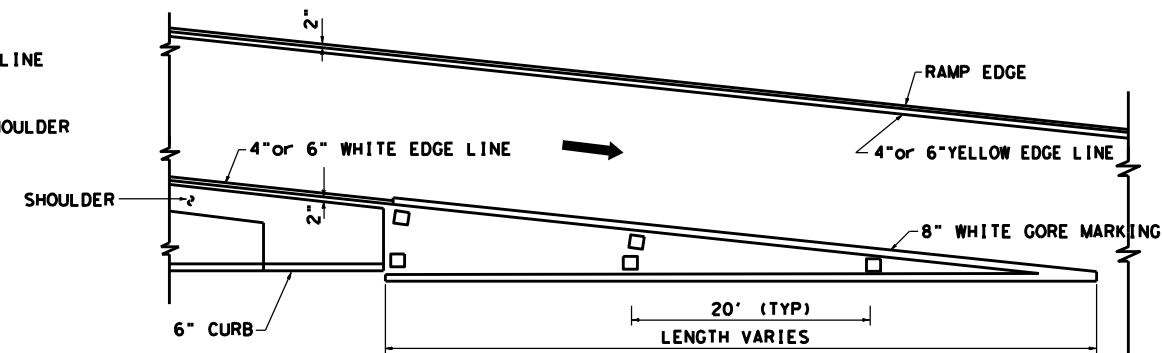
TYPICAL EXIT GORE MARKING AT FRONTAGE ROAD



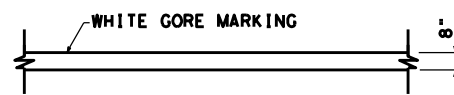
TYPICAL ENTRANCE GORE MARKING AT MAIN TRAFFIC LANES



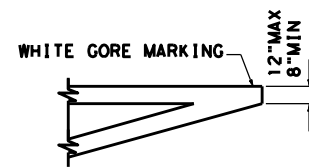
TYPICAL EXIT GORE MARKING AT MAIN TRAFFIC LANES



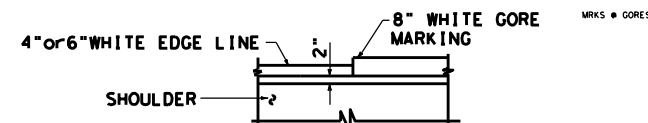
TYPICAL ENTRANCE GORE MARKING AT FRONTAGE ROAD



DETAIL "A"



DETAIL "C"



DETAIL "D"

SHEET 1 of 2

Texas Department of Transportation
Houston District

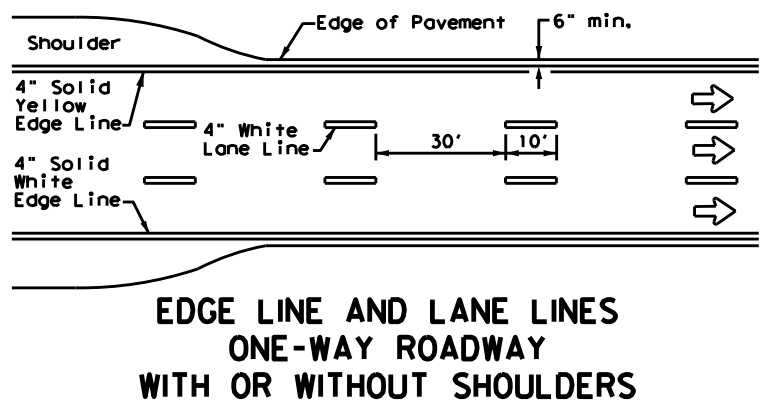
TYPICAL STANDARD PAVEMENT MARKINGS
(RAMP AND GORE DETAILS)

PM (R&G) - 10

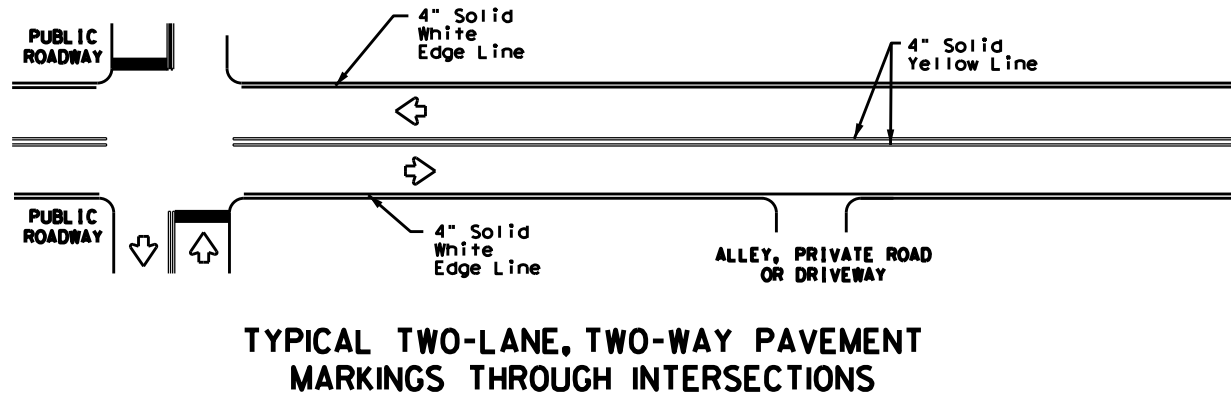
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©TXDOT 2010	DIST	FED REG	PROJECT NO.	SHEET
4/2010	12	6	C-271-16-167	73
	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	16	167
				HIGHWAY
				IH610

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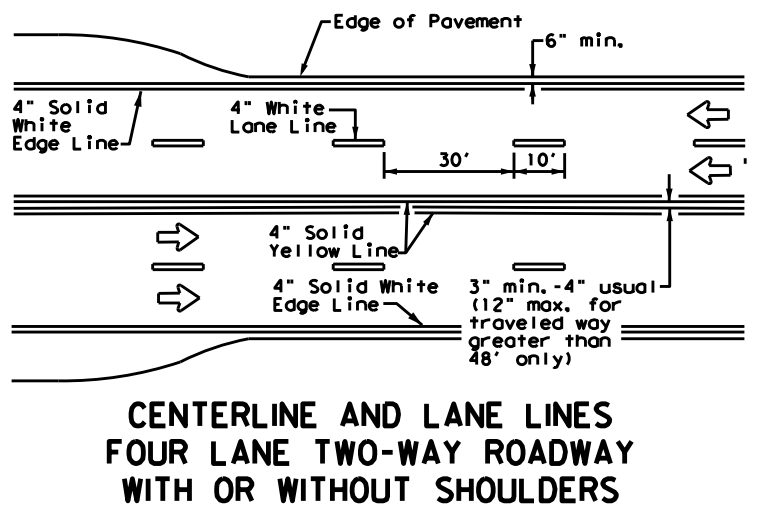
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 DATE: 11/9/2023
 PROJECT: 0271-16-167



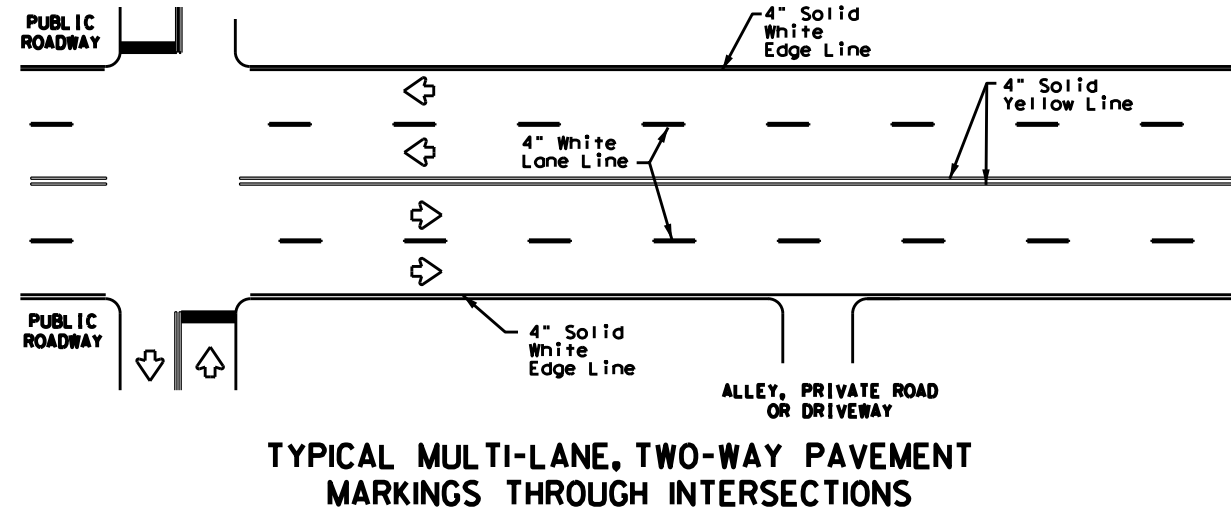
**EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



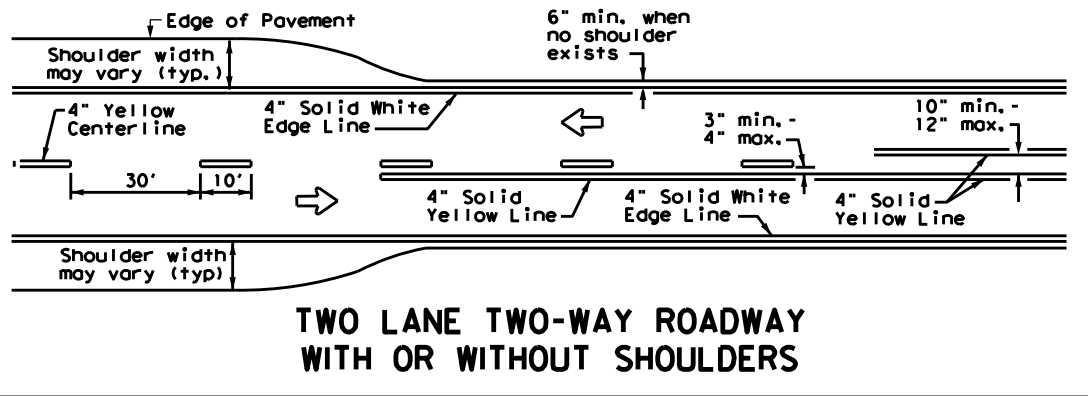
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



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



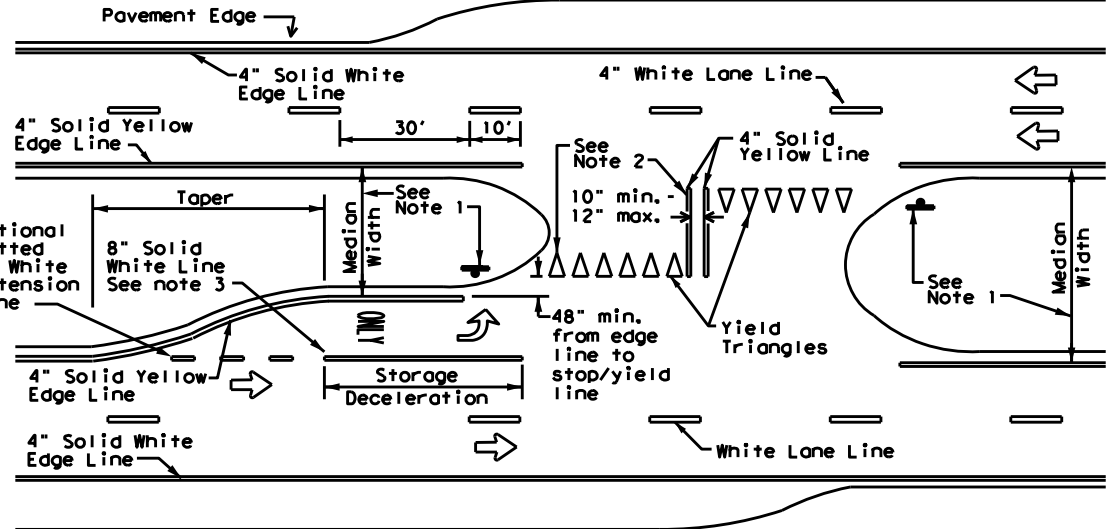
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



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



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTE:

- Irrespective of shoulder, use 6 in width lines (edge lines).
- 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

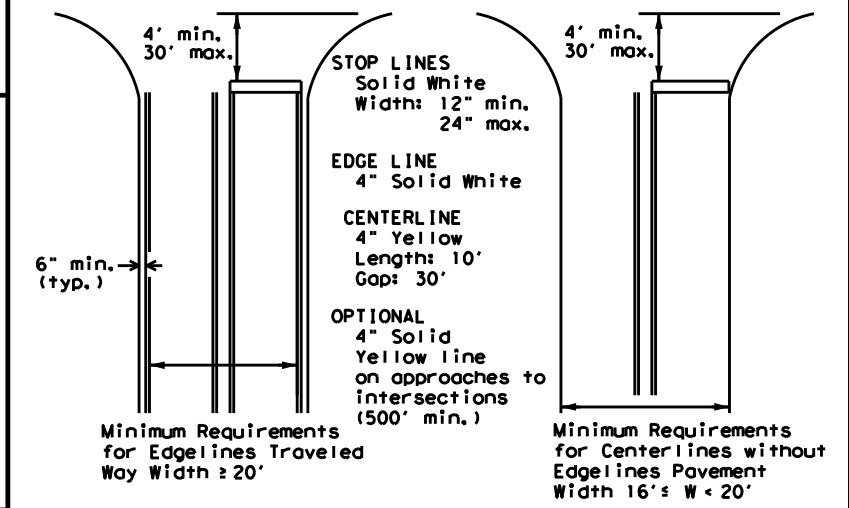
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

- 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.
- 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	DW: TXDOT	CK: TXDOT
8-95	2-12	CONT	SECT	JOB	HIGHWAY
5-00	8-16	0271	16	167	IH610
8-00	7-20	DIST	COUNTY		SHEET NO.
3-03		12	HARRIS		74

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 October 1). 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	0271	16	167	IH 610
UPDATED section V, text and added definition (10/17)	DIST	COUNTY	SHEET NO.	
ADDED USCG and USACE notes in Section VII (04/18)	HOU	Harris	75	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For projects with less than one acre of soil disturbing activity and that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0271-16-167

1.2 PROJECT LIMITS:

From: CRESTMONT ST

To: HOLMES RD

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 29°40'57.64"N, (Long) 95°21'6.85"W

END: (Lat) 29°41'21.17"N, (Long) 95°19'56.53"W

1.4 TOTAL PROJECT AREA (Acres): 5.5228 Acre

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0 Acre

1.6 NATURE OF CONSTRUCTION ACTIVITY:

PLANING, ASPHALT OVERLAY AND PAV. MARKINGS

1.7 MAJOR SOIL TYPES:

Soil Type	Description
AFLISOL, 2-4% SLOPE	NATIVE SOIL WITH CLAY SUBSOIL COVERED WITH 90% OF VARIOUS GRASSES, MODERATED WELL DRAINED

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

- Mobilization
- Install sediment and erosion controls
 - Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
 - Grading operations, excavation, and embankment
 - Excavate and prepare subgrade for proposed pavement widening
 - Remove existing culverts, safety end treatments (SETs)
 - Remove existing metal beam guard fence (MBGF), bridge rail
- Install proposed pavement per plans
 - Install culverts, culvert extensions, SETs
 - Install mow strip, MBGF, bridge rail
 - Place flex base
 - Rework slopes, grade ditches
 - Blade windrowed material back across slopes
 - Revegetation of unpaved areas
- Achieve site stabilization and remove sediment and erosion control measures
- Other: BACKFILLING PAVEMENT EDGES

Other: _____

Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
- Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities
- Other: _____
- Other: _____
- Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
BRAYS BAYOU	HOUSTON SHIP CHANNEL/BUFFALO BAYOU TIDAL - 1007

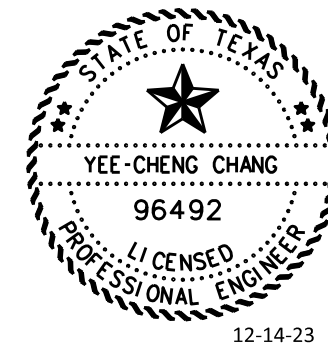
* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- Development of plans and specifications
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Other: _____
- Other: _____



Eddy Chay
12-14-23

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	C-271-16-167		76
STATE	STATE DIST.	COUNTY	
TEXAS	12	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- Biodegradable Erosion Control Logs
- Dewatering Controls
- Inlet Protection
- Rock Filter Dams/ Rock Check Dams
- Sandbag Berms
- Sediment Control Fence
- Stabilized Construction Exit
- Floating Turbidity Barrier
- Vegetated Buffer Zones
- Vegetated Filter Strips
- Other: _____
- Other: _____
- Other: _____
- Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Daily street sweeping
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

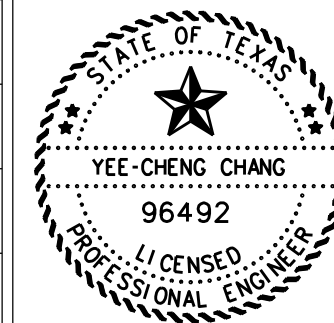
Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.



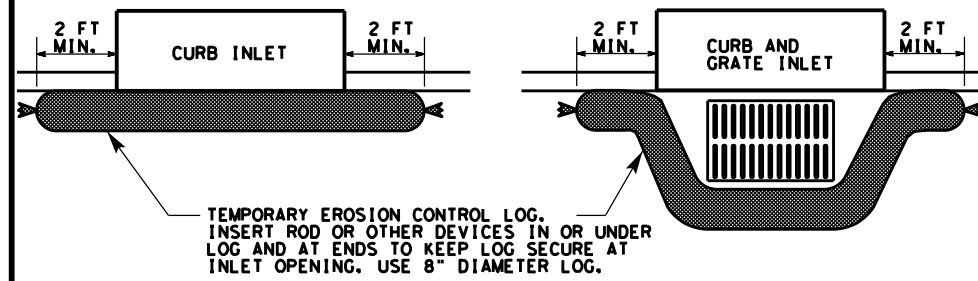
Eddy Chang
12-14-23

STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	C-271-16-167		77
STATE	STATE DIST.	COUNTY	
TEXAS	12	HARRIS	
CONT.	SECT.	JOB	HIGHWAY NO.
0271	16	167	IH 610

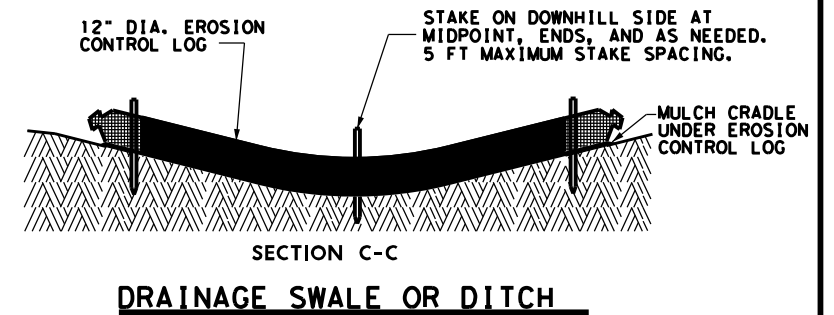
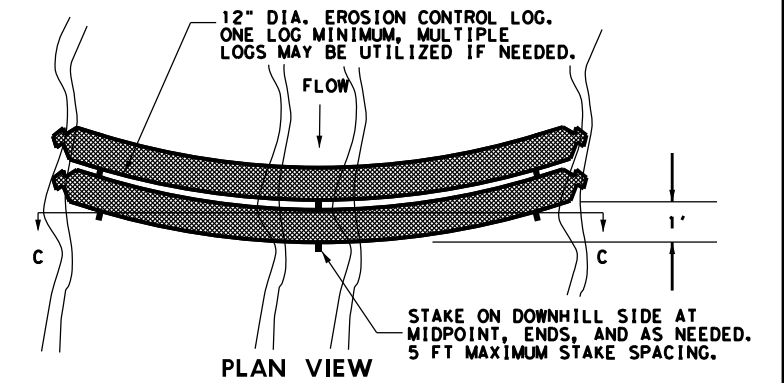
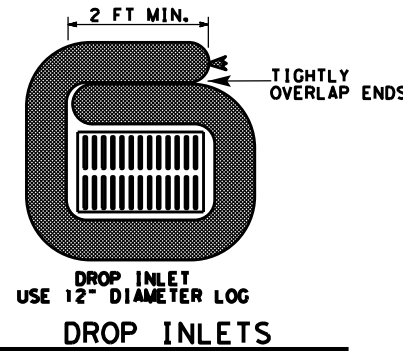
CURB INLETS 8" DIAMETER LOGS

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")



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.

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).

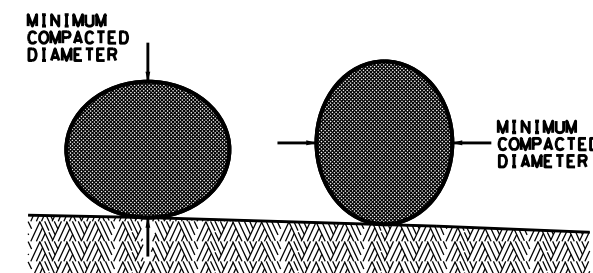
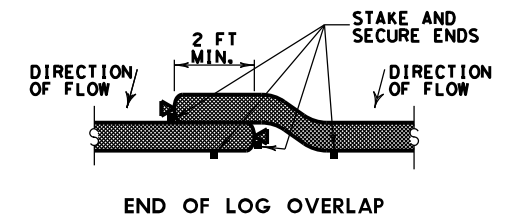
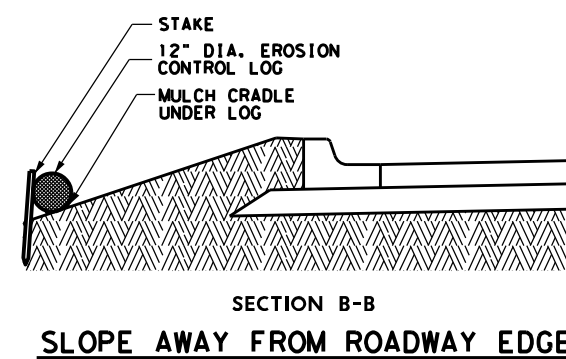
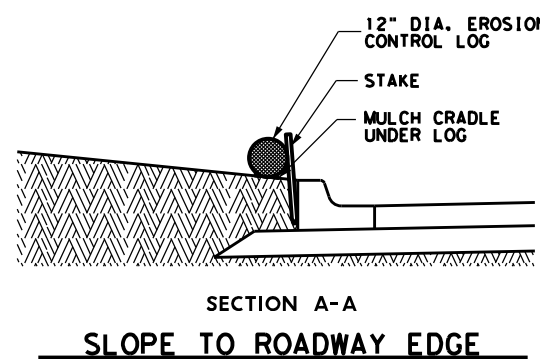
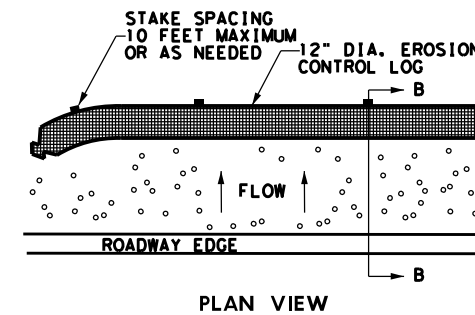
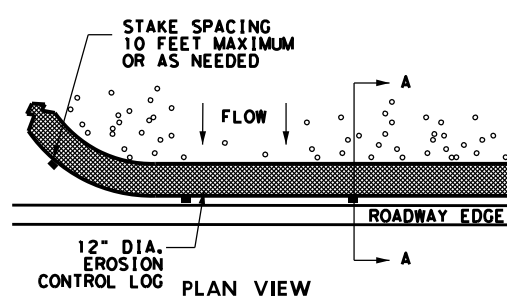
Sediment traps should be placed in the following locations:

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



EROSION CONTROL LOG

ECL-12

FILE: STDG4a.DGN	DN: TxDot	CR: TxDot	DW: TxDot	CK: TxDot
© TxDOT 2014	DISTRICT	FED REG	PROJECT NUMBER	SHEET
REVISIONS	12	6	C-271-16-167	78
3/15 MINOR CORRECTIONS	COUNTY	CONTROL	SECT	JOB
	HARRIS	0271	16	167