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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE BY A \* HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

  
 Thomas L. Le  
 2/10/2023

**ATKINS**  
MEMBER OF THE SNC-LAVALIN GROUP  
TBPE REG. # F-474

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IH 35

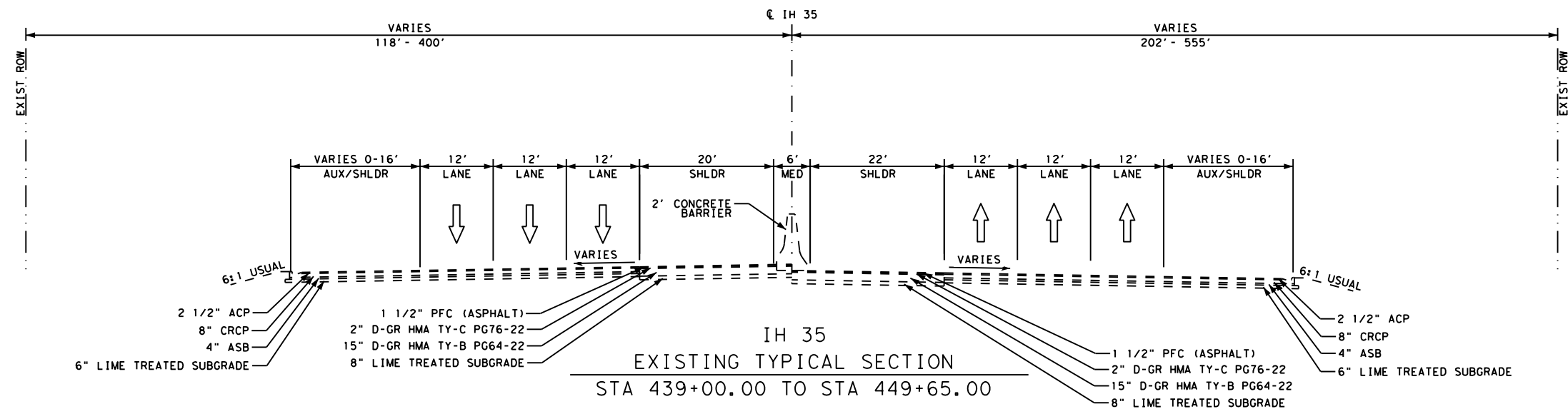
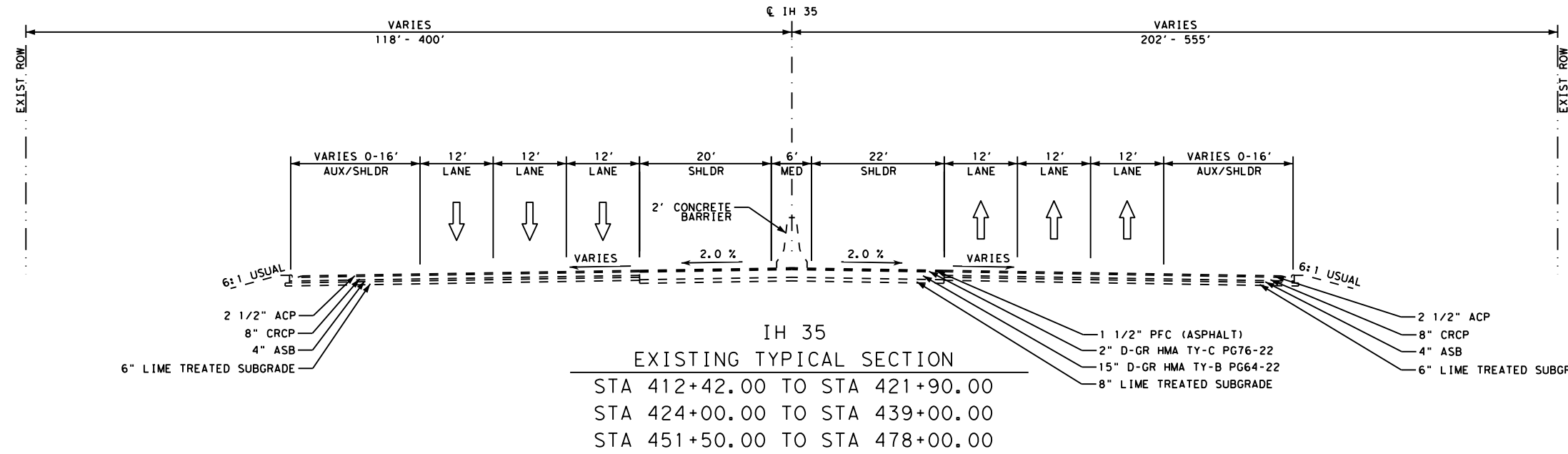
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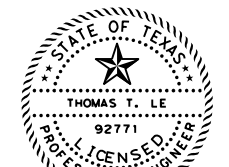
INDEX OF SHEETS

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CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	2	



  
 THOMAS T. LE  
 92771  
 LICENSED PROFESSIONAL ENGINEER  
*Thomas T. Le*  
 2/6/2023

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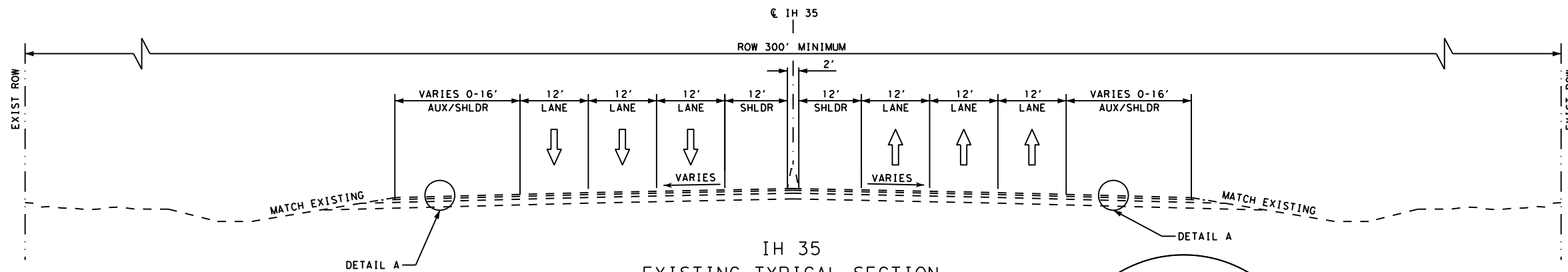
  
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IH 35  
**TYPICAL SECTIONS**

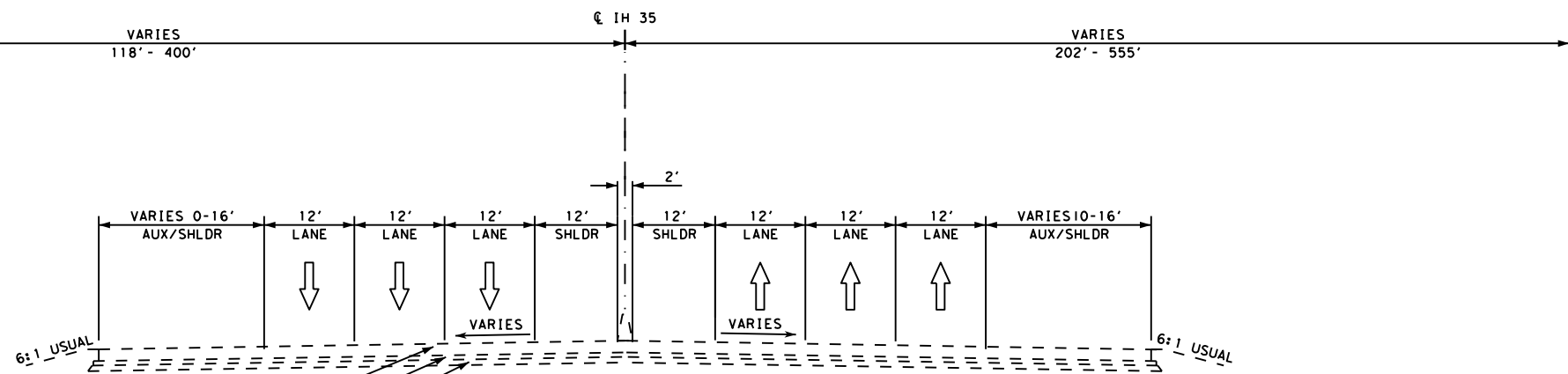
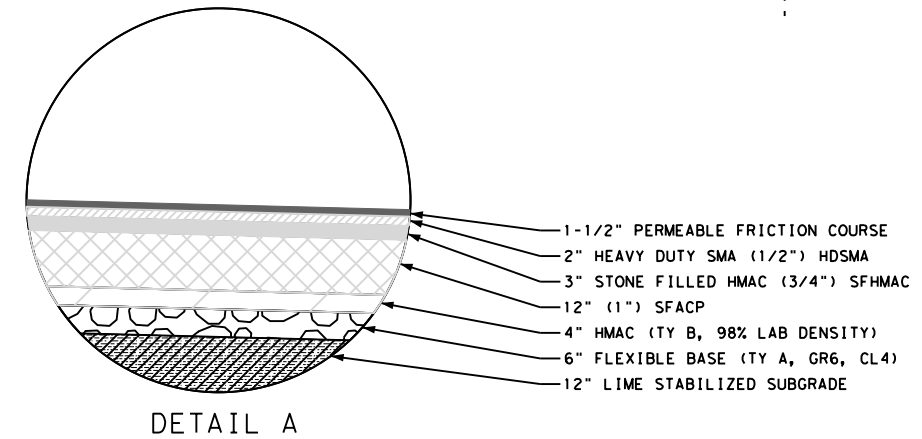
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0015	01	253	IH 35
DIST		COUNTY	SHEET NO.
WAC		McLENNAN	3

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IH 35  
 EXISTING TYPICAL SECTION  
 STA 478+00.00 TO STA 500+90.00  
 STA 503+90.00 TO STA 543+20.00  
 STA 545+80.00 TO STA 569+54.00



IH 35  
 EXISTING TYPICAL SECTION  
 STA 569+54.00 TO STA 583+00.00

- 1 1/2" PFC (ASPHALT)
- 15" D-GR HMA TY-B PG64-22
- 6" CEMENT TREATED FLEXIBLE BASE

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 2/6/2023

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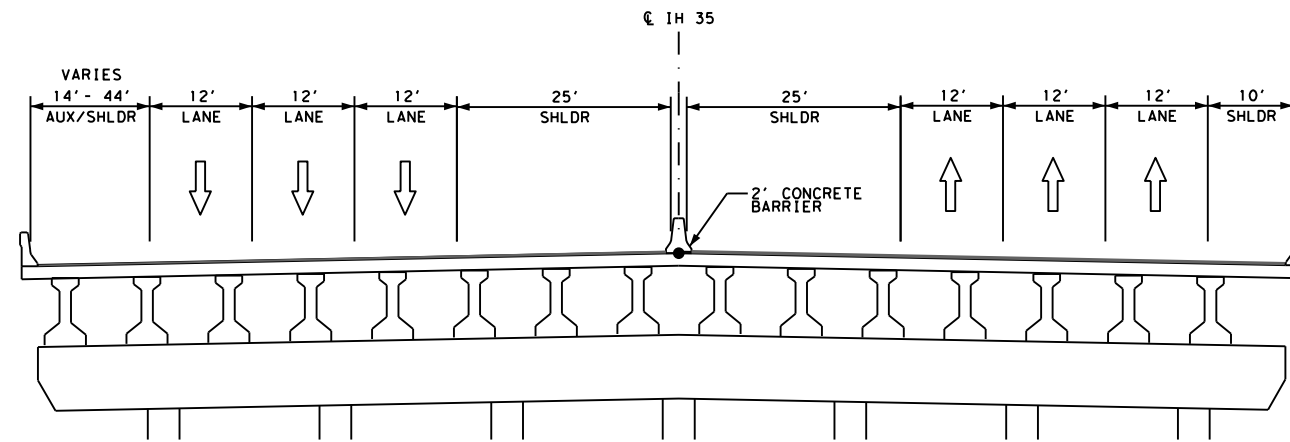
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 TYPICAL SECTIONS

SHEET 2 OF 6

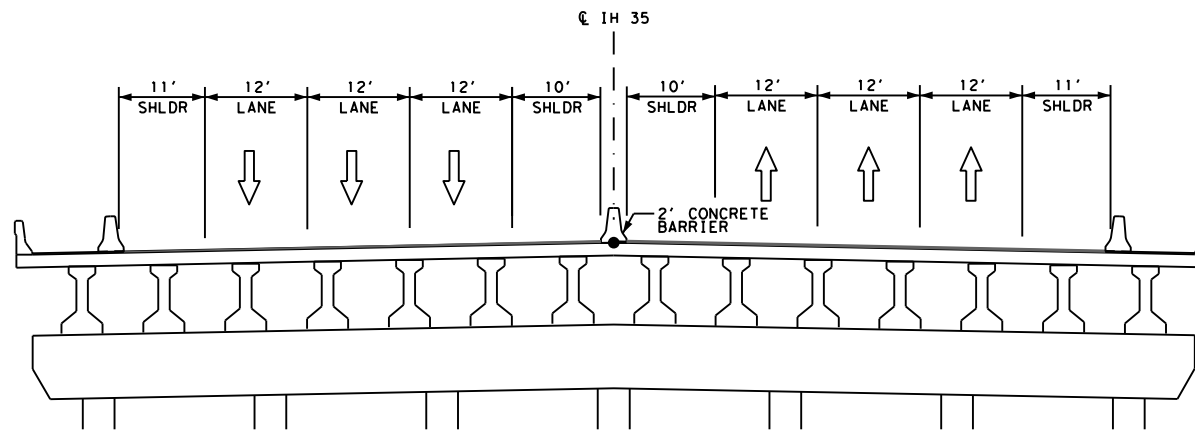
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WAC	McLENNAN	4	

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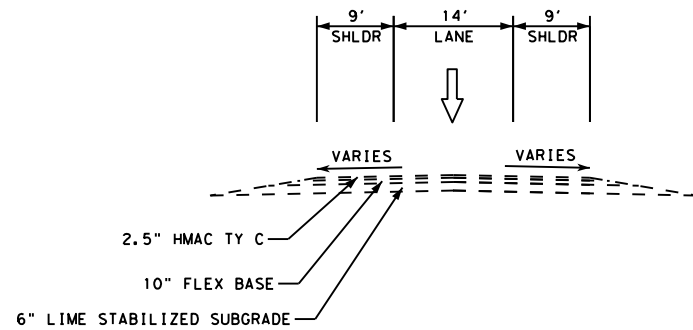




EXISTING BRIDGE LOCATION  
 SEE BRIDGE DETAILS SHEETS 67 - 68  
 STA 408+94.00 TO STA 412+14.00 (OVER LP 340)

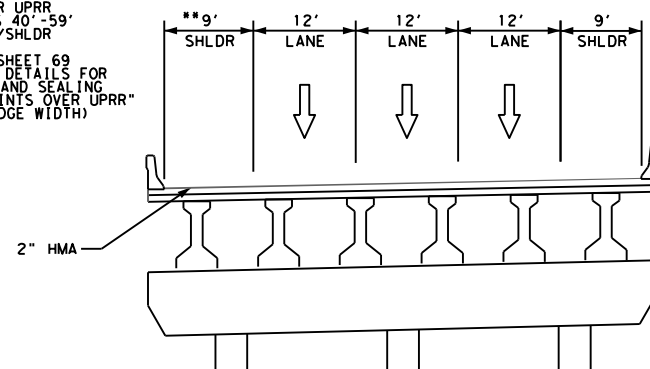


EXISTING BRIDGE LOCATION  
 SEE BRIDGE DETAILS SHEETS 74 - 77  
 STA 500+90.00 TO STA 503+60.00 (OVER CRAVEN)  
 STA 543+20.00 TO STA 545+80.00 (OVER FM 2417)

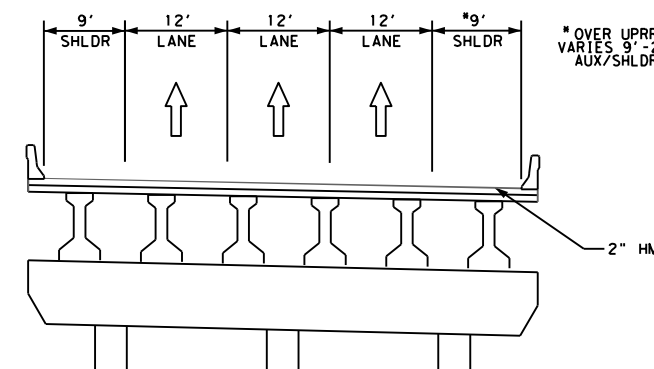


IH 35  
 EXISTING TYPICAL SECTION  
 EXIT & ENTERANCE RAMP  
 STA 413+97.02 TO STA 420+51.37  
 STA 457+55.76 TO STA 460+42.66

\*\* OVER UPRR  
 VARIES 40'-59'  
 AUX/SHLDR  
 (SEE SHEET 69  
 "LAYOUT & DETAILS FOR  
 CLEANING AND SEALING  
 EXPANSION JOINTS OVER UPRR"  
 FOR BRIDGE WIDTH)

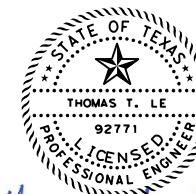


C IH 35



\* OVER UPRR  
 VARIES 9'-25'  
 AUX/SHLDR

EXISTING BRIDGE LOCATION  
 SEE BRIDGE DETAILS SHEETS 69-72  
 STA 421+90.00 TO STA 424+00.00 (OVER UPRR)  
 STA 449+65.00 TO STA 451+50.00 (OVER MEYERS LANE)



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 2/10/2023

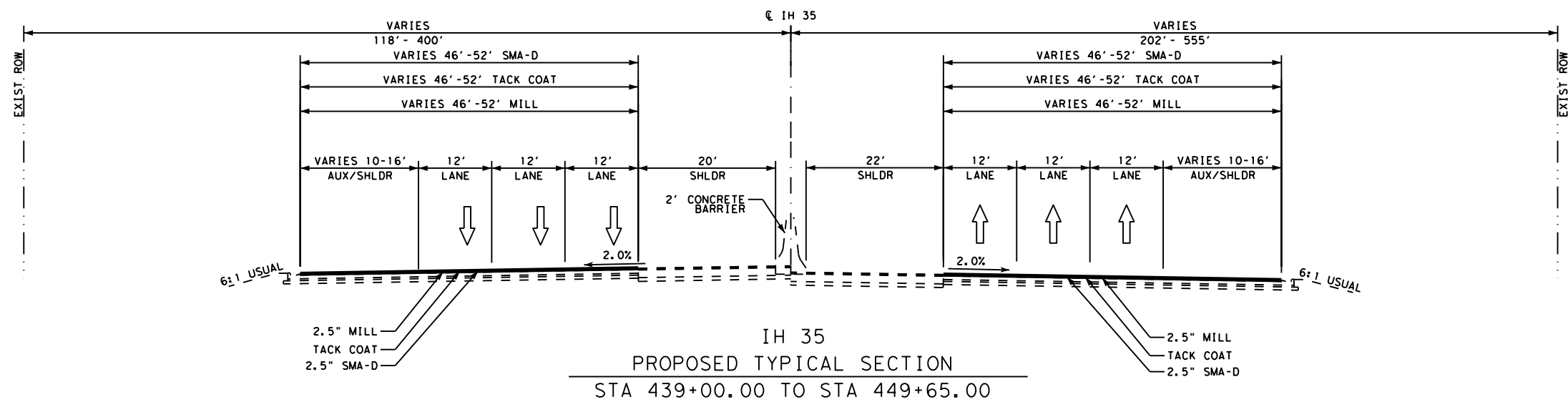
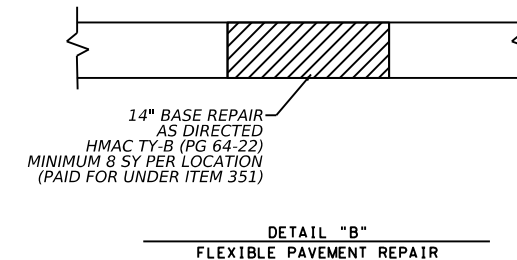
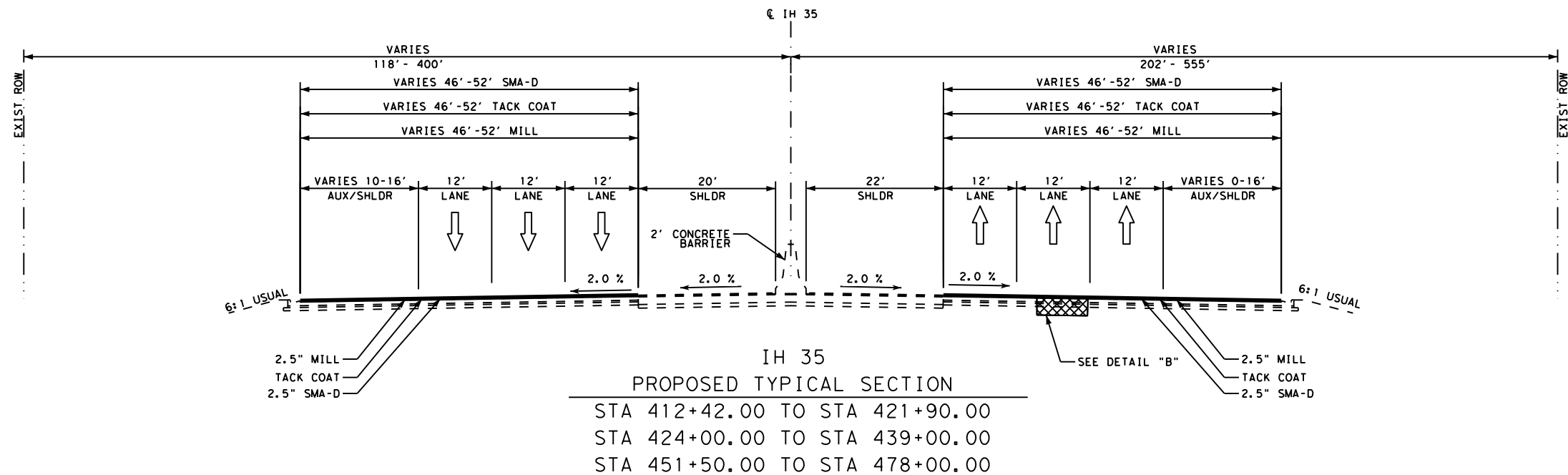
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IH 35  
 TYPICAL SECTIONS

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	5	



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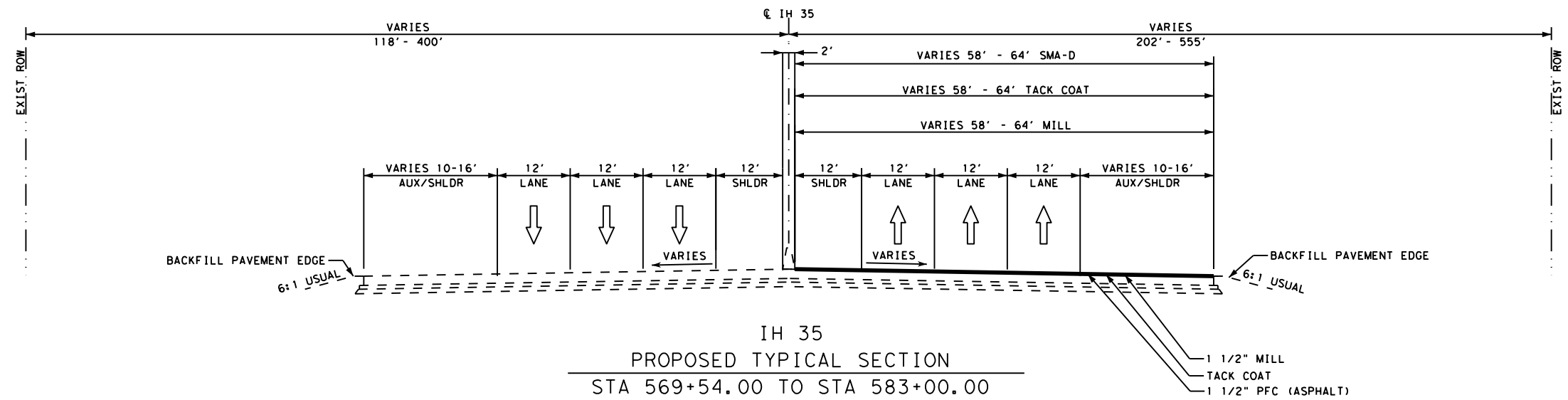
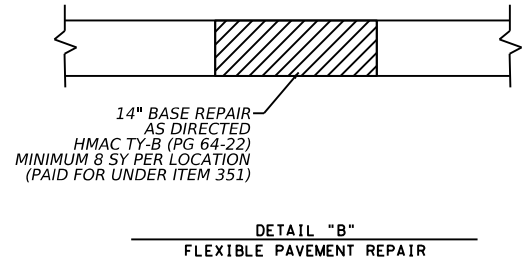
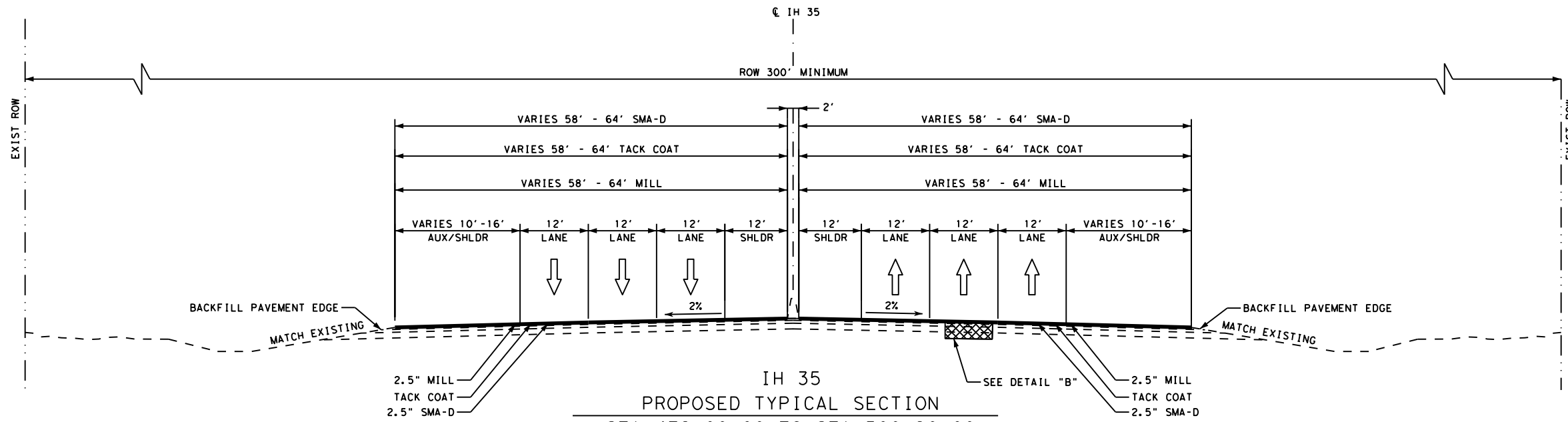
Texas Department of Transportation

IH 35  
 TYPICAL SECTIONS

SHEET 4 OF 6

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST		COUNTY	SHEET NO.
WAC		McLENNAN	6

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STATE OF TEXAS  
 THOMAS T. LE  
 92771  
 LICENSED PROFESSIONAL ENGINEER  
 Thomas T. Le  
 2/10/2023

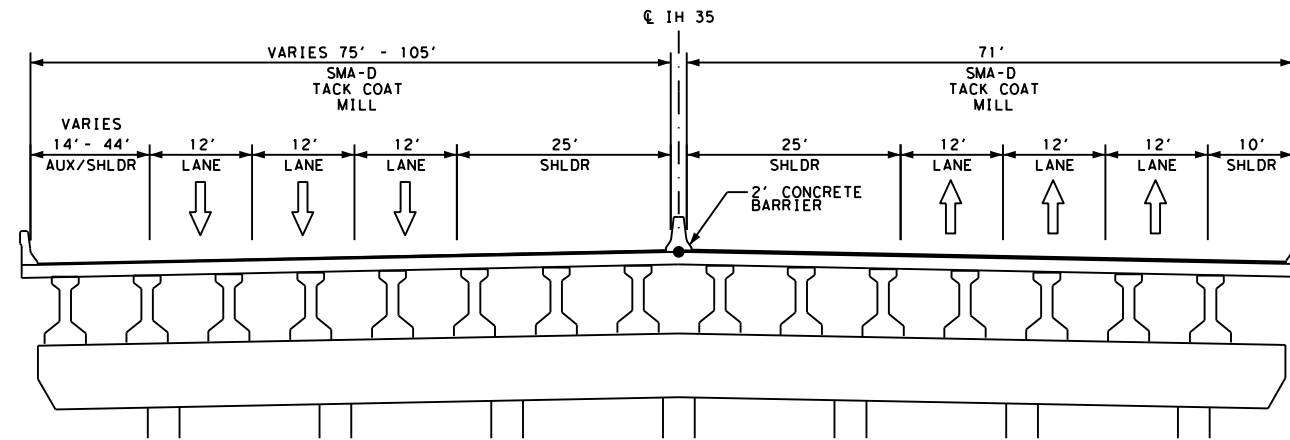
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**Texas Department of Transportation**  
 IH 35  
 TYPICAL SECTIONS

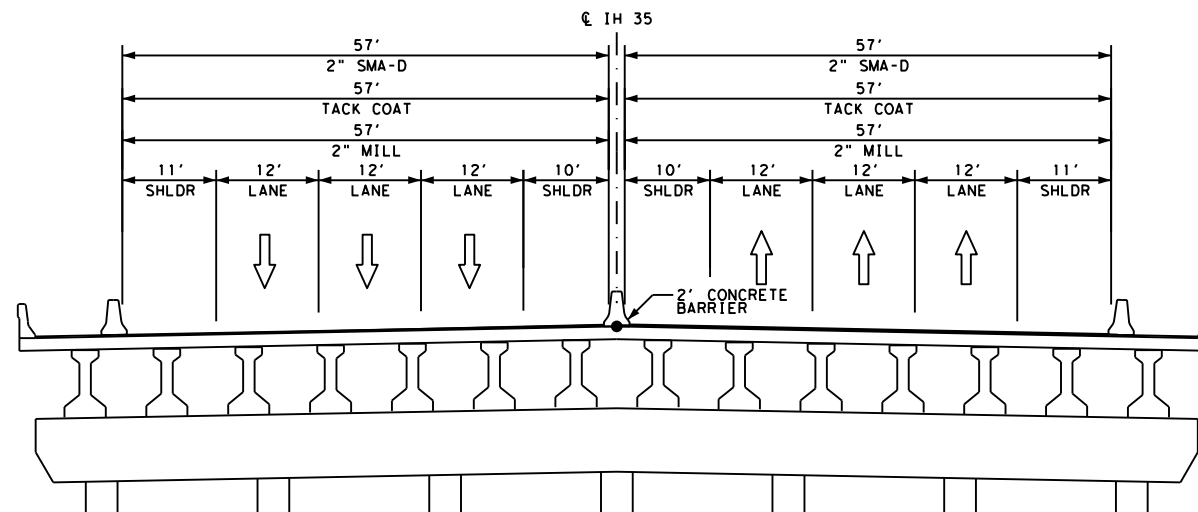
SHEET 5 OF 6

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	7	

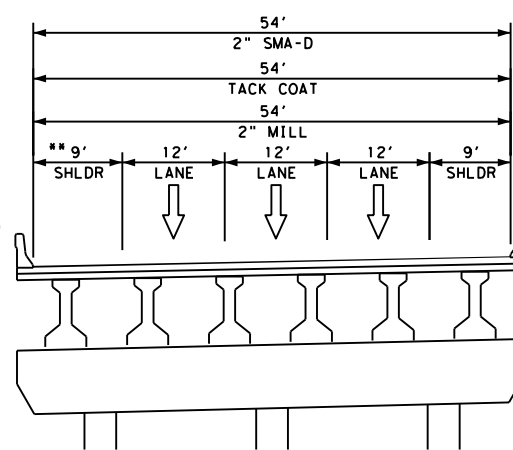
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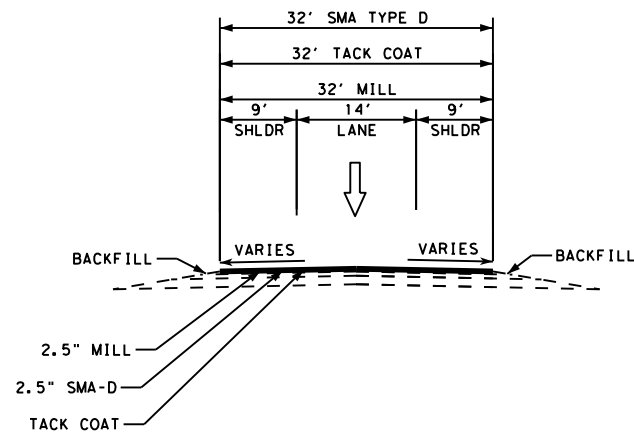
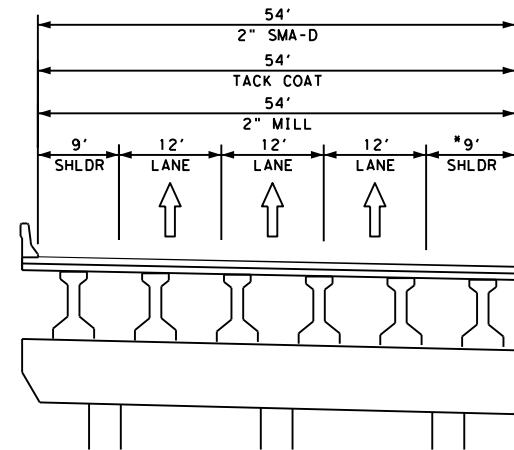
PROPOSED BRIDGE LOCATION  
 SEE BRIDGE DETAILS SHEETS 67 - 68  
 STA 408+94.00 TO STA 412+14.00 (OVER LP 340)



PROPOSED BRIDGE LOCATION  
 SEE BRIDGE DETAILS SHEETS 74 - 77  
 STA 500+90.00 TO STA 503+60.00 (OVER CRAVEN)  
 STA 543+20.00 TO STA 545+80.00 (OVER FM 2417)



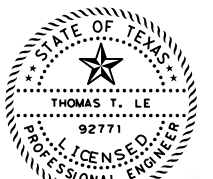
PROPOSED BRIDGE LOCATION  
 SEE BRIDGE DETAILS SHEETS 69-72  
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IH 35  
 PROPOSED TYPICAL SECTION  
 EXIT & ENTRANCE RAMP  
 STA 413+97.02 TO STA 420+51.37  
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\*\* OVER UPRR  
 VARIES 40'-59'  
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 (SEE SHEET 69  
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 FOR BRIDGE WIDTH)

\* OVER UPRR  
 VARIES 9'-25'  
 AUX/SHLDR



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IH 35  
 TYPICAL SECTIONS

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	8	

**BASIS OF ESTIMATE TABLES**

Table 1: Basis of Estimate for Asphalt Pavements				
Item	Description	Rate	Basis	Quantities
3079	<b>PERMEABLE FRICTION COURSE (PFC)</b>			
	PFC (PG76-22) (SAC A)	93.0 LB / SY	9.018 SY	629 TON
3080	<b>STONE-MATRIX ASPHALT (SMA)</b>			
	STONE-MTRX-ASPH SMA-D SAC-A PG76-22	275 LB / SY	219,107 SY	28,699 TON
	TACK COAT	0.1 GAL/SY/LIFT OF HMAC	219,107 SY	21,911 GAL

**GENERAL**

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 0.1 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The Contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the Engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

There is a high probability that an environmentally sensitive area could be encountered on the Contractor designated Project-Specific Locations (PSL) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). Item 7.6 "Project-Specific Locations" provides a listing of regulatory agencies that may need to be contacted regarding this project.

Contractor questions on this project are to be emailed to the Waco District at the following address:

Bill Compton - [Wacoprebid@txdot.gov](mailto:Wacoprebid@txdot.gov), 254-867-2770, 100 S. Loop Dr., Waco, TX  
 Carmen Chau - [Wacoprebid@txdot.gov](mailto:Wacoprebid@txdot.gov), 254-867-2794, 100 S. Loop Dr., Waco, TX

Or Via phone or in person to the following individual(s):  
 Area Engineer's: Clayton Zacha, P.E., 254-772-2890  
 Assistant Area Engineer's: Jeff Jackson, P.E., 254-772-2890

Contractor questions will be accepted through email, phone, and in person by the above individuals. Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

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

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

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



**GENERAL NOTES****ITEM 5: CONTROL OF THE WORK**

Provide the Engineer with a weekly work schedule of planned activities including anticipated quantities of materials to be placed daily (CY of each concrete placement, tons of HMAC to be placed daily, etc.). Schedules will be provided for the following week as part of each week's project meetings or by 5PM on Thursday as approved by the Engineer. Failure to provide notifications are required here may be deemed as insufficient notice per item 5.10.

Provide the Engineer Daily by 3PM the planned activities for the following day including location, quantities of materials to be placed, etc. in a format acceptable to the Engineer.

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (254)867-2808 for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (254)867-2726 for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor's negligence including, but not limited to, repair or replacement at the Contractor's expense.

**ITEM 6: CONTROL OF MATERIALS**

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

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

The Buy America Material Classification Sheet is located at the below link.  
<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only and the Contractor will be permitted to furnish like materials of other manufacturers provided they are of equal quality and comply with specifications for this project.

**ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES**

Roadway closures during the following key dates and / or special events are prohibited:

- Independence Day
- Labor Day

If utilizing private property for waste disposal sites, field office sites, equipment storage sites or for any other purpose involved with this project, provide to the Engineer written proof of the property owner's approval of the use of this property. This proof may be in the form of a letter or agreement signed by the property owner or other documents acceptable to the Engineer. Provide such proof prior to occupying the site.

Personal vehicles of the Contractor's employees will not be parked within the right of way at any time including any section closed to public traffic, unless the vehicle is being utilized for construction procedures. However, the Contractor's employees may park on the right of way at the sites where the Contractor has his office, equipment and materials storage yard.

The Contractor is alerted to the possible presence of swallows under the existing bridges or culverts. Because the migratory bird treaty act prohibits harm to swallows, their eggs or their nestlings, the Contractor will not begin potentially disturbing activities on or near the bridge until the birds have abandoned any occupied nests (approximately September 1). Active nests may not be removed regardless of the date.

Prior to the swallows returning to the nests (approximately March 1), abandoned nests will be removed from the bridge. The Contractor will prevent the establishment of new nests on any portion of the structure. Methods for preventing the establishment of new nests must be approved by the Engineer. Examples of acceptable nest prevention methods are bird-deterrent netting and bird-repelling sprays and/or gels to be applied to the structure. This work will not be paid for directly but will be subsidiary to the various bid items. No relief or compensation will be considered for project delays due the Contractors in attention / in action to preventing nesting or for nesting already underway at the commencement of work.

The Contractor will submit detailed site-specific plans for work in each “water of the United States” designated on the EPIC sheet. These plans must be approved by the Engineer prior to starting any work in these areas. The plans must also describe facilities and work activities adjacent the Ordinary High-Water Marks. The plan must show actual dimensions and materials for:

- Proposed construction roads and work areas leading to or in close proximity to the Ordinary High-Water Marks
- Temporary material or equipment storage areas in close proximity to the Ordinary High-Water Marks
- Locations of proposed sediment and erosion control devices
- Identification of construction equipment and construction techniques to accomplish the work

Once this drawing and supporting information is reviewed and approved by TxDOT, all construction workers should be made aware of the limits designated on the drawings by the Contractor’s supervision. Work in all waters of the US will be limited to the minimum necessary required to construct the bridge, culvert or roadway fills. Work will also include all activities needed for bridge and culvert demolitions. Working or disturbing soil in the stream channel outside the limits of the work plan will not be allowed. Orange fencing will be provided and maintained to establish the TxDOT approved boundaries in which work may be conducted between the Ordinary High-Water Marks. Orange fencing will not be paid for but will be considered subsidiary to Item 502, “Barricades, Signs and Traffic Handling”.

**Law Enforcement Personnel.**

As approved by the Engineer, provide uniformed off duty police officers and squad cars during the following activities:

- Lane closures on controlled access facilities or 4 lane divided facilities with speed limits above 55mph,
- ramp closures,
- Roadway Closures,
- Support of phase construction traffic switches,
- nighttime work, or
- other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce.

Law Enforcement Personnel must have jurisdictional authority to act in the area of the project.

Law Enforcement Personnel will be paid when use is approved by the Engineer. The Contractor retains the right to have law enforcement personnel on sight at their own cost and discretion when not approved by the Engineer.

Submit charge summary and invoices using the Department form 318. Provide documentation such as payroll, log sheets with signatures and badge number, or invoices from the government entity providing the officers for reimbursement.

Patrol vehicles must be clearly marked to correspond with the officer’s agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles. Windows / Windshields may not be blocked.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed. Payment is for work performed.

Cancel law enforcement personnel when the event is canceled. Cancellation, minimums or “show up” fees will not be paid when cancellation is made 12 hours prior to beginning of the event. Failure to cancel within 12 hours will not be cause for payment for cancellation, minimums, or "show up" time. Payment of actual “show up” time to the event site due to cancellation will be on a case-by-case basis at a maximum of 2 hours per officer.

**ITEM 8: PROSECUTION AND PROGRESS**

This Project will be a Five-Day Workweek in accordance with Article 8.3.1.1.

Nighttime work is required in accordance with Article 8.3.3.2.1.

In addition to Saturdays and Sundays, working days will not be charged for the following dates:

2023	2024	2025
January 2	January 1	January 1
May 29	May 27	May 26
July 3	July 4	July 3
July 4	July 5	July 4
September 4	July 6	September 1
November 23	September 2	November 26
November 24	November 28	November 27
November 25	November 29	November 28
December 23	November 30	December 24
December 25	December 23	December 25
	December 24	
	December 25	

Work on Saturdays or Sundays and the dates listed will not be permitted without written permission of the Engineer. If work requiring an Inspector to be present is performed on a Saturday or Sunday or the dates listed, and weather or other conditions permit the performance of work for 7 hr. between 7:00 A.M. and 6:00 P.M., a working day will be charged.

No Lane or Ramp Closure that further restricts or interferes with traffic will be allowed from noon on the preceding day from the dates shown in the table above. TxDOT has the right to lengthen, shorten, or otherwise modify these restrictions as actual, or expected, traffic conditions may warrant.

If contract time for the project is adjusted beyond the dates listed above, additional dates that work will not be permitted and will not be charged will be added by change order. The contractor will not be compensable for overhead charges unless delays are encountered that extend completion beyond the adjusted bid days.

Meet weekly or at intervals as agreed upon with the Engineer to notify him or her of planned work for the upcoming 3-week period.

Critical Path Method (CPM) schedule in P6 format will be required for this project. Submit baseline schedule and obtain approval prior to beginning construction. The Estimate will be held if monthly schedule update is not submitted.

Submit the schedule in both PDF and in a base software electronic file format acceptable to TxDOT to allow for import and analysis into TxDOT's current scheduling software.

**LANE CLOSURES**

IH 35 main lane closures must be coordinated with other projects on IH 35 including maintenance operations requiring main lane and frontage road closures in the Waco District with the Project Engineer and TxDOT's Mobility Coordinator. Provide one week notice to the Project Engineer of any planned lane closures to allow coordination. The Project Engineer must approve all closures prior to implementing. No additional compensation will be provided due to rescheduling of requested lane closures caused by the need for coordination with adjoining projects.

Placement of traffic control devices for night operations will not commence until after the start time and all devices must be removed from the roadway prior to the finish time.

The Contractor will be assessed a lane rental charge for each 15 minute increment one or more lanes are closed during any hours not included in defined non-peak hours provided. Charge will commence once five (5) minutes of a 15 minute increment have elapsed and will continue for each 15 minute increment until such time as all lanes are open to traffic. Charges will be as outlined in the following table:

Lane Rental Information		
Time	No. of Lanes Closed	15 Minute Increment Rate
Peak Hour	1 Lane Closed	\$100.00 / Increment
	2 Lanes Closed	\$200.00 / Increment
	3 Lanes Closed	\$500.00 / Increment
Non Peak Hours	3 Lanes or more	\$500.00 / Increment

Lane closures that are necessary to perform emergency operations, not caused by the contractors operation, are excluded from lane rental charges. Emergency operations are those circumstances to restore pavement or other items as approved by the Engineer. Failure of the Contractor to prosecute emergency operations within a reasonable timeframe may result in lane rental charges being applied, based on a case-by-case review by the Engineer.

IH 35 main lane closures will only be allowed during Non-Peak Hours, and the purpose of the Peak Hour Lane Rental rate is to apply a disincentive when operations during Non-Peak Hours are not completed promptly, requiring extending lane closures into Peak Hours.

Non-Peak Hours are as follows

Sunday 10PM – Monday 6AM

Monday 7PM – Tuesday 6AM

Tuesday 7PM – Wednesday 6AM

Wednesday 7PM – Thursday 6AM

Thursday 7PM – Friday 6AM

Lane closure restrictions will consist of:

- Lane closure length restricted to 2 miles or less
- Full freeway closures will only be allowed at nighttime as approved by the Engineer.

**ADDITIONAL INCENTIVE/DISINCENTIVE FOR PROJECT COMPLETION**

An additional incentive for project substantial completion of \$300,000 will be credited if all SMA paving and final striping is completed by September 29, 2023. This incentive will be reduced for each working day after September 29,2023 by \$30,000, as shown in the table below. This incentive will be separate and independent from other incentives.

SUBSTANTIAL COMPLETION DATE	INCENTIVE/ DISINCENTIVE	
9/29/2023	\$ 300,000	MAXIMUM INCENTIVE
10/2/2023	\$ 270,000	
10/3/2023	\$ 240,000	
10/4/2023	\$ 210,000	
10/5/2023	\$ 180,000	
10/6/2023	\$ 150,000	
10/9/2023	\$ 120,000	
10/10/2023	\$ 90,000	
10/11/2023	\$ 60,000	
10/12/2023	\$ 30,000	
10/13/2023	\$ -	
10/16/2023	\$ -	
10/17/2023	\$ -	
10/18/2023	\$ -	
10/19/2023	\$ -	
10/20/2023	\$ -	
10/23/2023	\$ -	
10/24/2023	\$ -	
10/25/2023	\$ -	
10/26/2023	\$ -	
10/27/2023	\$ -	
10/30/2023	\$ -	
10/31/2023	\$ -	
11/1/2023	\$ (30,000)	
11/2/2023	\$ (60,000)	
11/3/2023	\$ (90,000)	CONTINUES EACH DAY
		NO MAXIMUM DISINCENTIVE

An additional disincentive for project completion of \$30,000 will be deducted if the project is not completed by October 31, 2023. This disincentive will be increase for each working day after October 31,2023 by \$30,000, as shown in the table above, no maximum disincentive. This disincentive will be separate and independent from other disincentives.

Damages will be assessed concurrently with any other applicable damages within the contract. These will be calculated separately, independently, and concurrently for failure to complete the contract within the working days specified.

In the event the state terminates the Contractor's right to proceed with the work or if the Contractor abandons performance of the work, the resulting damages for any delay in completion or work will consist of the additional liquidated damages until such time as may be required for completion of the work and any increased costs incurred by the state in completing the work.

The state will recover disincentives by deducting the amount from any monies due or that may become due the Contractor. In the event the monies are insufficient to cover damages, the Contractor or his surety will pay the amount due.

**ITEM 320: EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT**

Use a self-propelled wheel mounted MTV capable of receiving mix from the haul trucks, separate from the paver. It will have a minimum storage capacity of approximately 25 tons. It will be equipped with a pivoting discharge conveyor and will completely and thoroughly remix the material prior to placement. The effectiveness of the MTV's remixing ability is subject to the approval of the Engineer. In addition, the paver will have a surge storage insert with a minimum capacity of 20 tons.

The use of windrow pick-up equipment is allowed with the exception of windrows to be placed on seal coat surface placed as part of this contract or instances when trackless tacks are used as optional bonding or sealing courses.

**ITEM 351: FLEXIBLE PAVEMENT STRUCTURE REPAIR**

For this project, a laydown machine will be required during the construction & placement of this item.

Locations and Quantities will vary as directed. The minimum area to be repaired will be 5 SY.

**ITEM 354: PLANING AND TEXTURING PAVEMENT**

Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly but is subsidiary to this item.

To remove dirt and debris, and assure reclaimable material is not contaminated per the specification, blade or otherwise make a neat cut along the existing pavement edge to a depth approx. 1" below the milling limits. This work will be required prior to milling operation and is subsidiary to this item.

Take possession of recycled asphalt pavement from the project and recycle the material.



Patch pavement cut to excessive depth by equipment failure with an approved epoxy material. Re-plane patched area to an acceptable approved ride quality. Payment for these corrections is subsidiary to this item.

Mill the pavement producing a final pavement surface with transverse pattern of 0.2-inch center to center of each strike area with a difference of no greater than one-sixteenth (1/16) inch between the ridge and valley (RVD) measurement of the final milled surface. The speed of the milling machine and RPMs of the drum will be set to ensure a smooth surface per manufacturer's instructions.

#### **ITEM 440: REINFORCEMENT FOR CONCRETE**

All ties, chairs and other appurtenances used with epoxy coated reinforcing will be epoxy coated or non-metallic.

Fiber Reinforced Concrete (FRC) can be used as a substitute for Non-Structural Class Reinforced Concrete in Mow-Strips for MBGF and Sidewalks. FRC may also be used for other Non-Structural Class Reinforced Concrete Items as approved by the Engineer.

For rip rap slope protection wire mesh will not be allowed. Rebar reinforcing will be required per the Standard Details.

#### **ITEM 466: HEADWALLS AND WINGWALLS**

Reshape embankment side slopes, provide embankment as required, and add topsoil to achieve a smooth uniform finish around the installation of the safety end treatments and culvert extensions as directed. Finishing and reshaping work will be subsidiary to this item. If such work extends beyond localized efforts within 10' of the headwall / wingwall, additional work will be paid by as agreed with the Engineer.

#### **ITEM 500: MOBILIZATION**

Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

#### **ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING**

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

Install traffic marking signs prior to sealcoat application and remove within three days after placement of traffic markings.

Access will be provided to all business and residences at all times. Where turning radii are limited during phased construction at intersections, provide all weather surfaces such as RAP or base in turning movements to accommodate and to protect the traffic from edge drop-offs. Materials, labor, maintenance and removal for these temporary accesses and radii will not be paid for directly but will be considered subsidiary to the various bid items.

A meeting between the Contractor and Engineer to discuss upcoming changes in construction phasing and traffic switches is required at least fourteen (14) days prior to the phase change. Items to be discussed at this meeting include temporary signing, traffic control, pavement markings, the processes necessary for the phase change and subcontractor scheduling.

When excavation is required next to a pavement lane carrying traffic and the widening is not completed by the end of the workday, backfill against the edge of the pavement with at least a 3:1 slope using an acceptable material to support vehicular traffic. Carefully remove and dispose of this material when work resumes. Backfilling pavement edges, and the materials required for the work will be subsidiary to this item.

Place Barricade / long term traffic control signs with driven post / sleeve mount options for all projects with more than 9 months of project barricades. e in ground mount for project limits signs / long term signs. Upon sign removal, pull sleeve or drive to below ground line.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

Provide rectangular shape (CW12-2P) Temporary Clearance Signs on all bridges where the existing vertical clearance has changed. Install Signs to the satisfaction of the Engineer prior to opening to traffic. Plywood sign blanks will have minimum dimensions of 84" X 12". Work performed and materials are subsidiary to this item.



The Contractor Responsible Person(s) (CRP) will be certified by TEEEX, ATSSA, the National Safety Council or other approved organization. Certifications will be submitted to the Engineer at the pre-construction meeting.

The Contractor Responsible Person(s) (CRP) for Work Zone Traffic Controls will inspect and ensure any deficiencies are corrected each and every day throughout the duration of this contract. Any misaligned or damaged traffic control devices will be repaired as soon as practical after deficiency is discovered.

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee(s) available to respond on the project for emergencies and for taking corrective measures within One (1) Hour.

Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.

Traffic Control Plans with Lane Closures causing backups of 20 minutes or greater in duration will be modified to reduce delays to less than 20 minutes.

Lane Closure and Pilot Car Operations will be implemented to prevent conflicts with activities including school drop-off / dismissal, large employer shift changes, etc.

Lane Closures and Pilot Car Operations will not be allowed in nighttime work hours without approval of the Engineer.

Freeway Lane Closures				
Description of Operations		Permitted Lane Closures		
Category of Work	Number of Rdwy Lanes per direction	Peak Times	Off Peak Times	Lowest Volume Time
		Monday-Friday 6:00 am - 9:00 am 3:30 pm - 7:00 pm Major Events and Major Holidays	Monday-Friday 9:00 am - 3:30pm 7:00 pm - 10:30 pm and Saturday	Monday-Friday 10:30 pm to 6:00 am and Sunday
Placement of CTB & Bridge Beams, Pavement Markings, Full Depth Roadway Repair, Bridge or Similar	5	None	2	3
	4	None	2	3
	3	None	1	2
	2	None	1	2

Demolitions*				
Adjacent Construction, Lanes for Construction Traffic or Similar Operations	5	None	1	2
	4	None	1	2
	3	None	1	1
	2	None	None	1

\* Provide a traffic control plan where bridge demolition cannot be accomplished with lane closures. Freeway closures will only be done during Lowest Volume Times.  
 \*\* The Table above is only to be used when traffic counts do not exceed 2000 Vehicles per Lane per Hour. (The capacity of all remaining open lanes must not exceed 2000 Vehicles per Lane per Hour). When traffic counts do or will exceed 2000 Vehicles per Lane per Hour, Director of Construction, Assistant District Engineer or District Engineer approval will be required for lane closures.

Additional lanes may be closed during Off Peak Times or Lowest Times with written permission of the Engineer. Lane Closures during Off Peak Times may be started earlier or be extended later with written permission of the Engineer.

**ITEM 504: FIELD OFFICE**

Furnish one Asphalt Mix Control Laboratory (Type D) for this project.

**ITEM 506: TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS**

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

Take all practicable precautions to prevent debris from being discharged into the Waters of Texas or a designated wetland. Install Best Management Practices before demolition begins and maintain them during the demolition. Remove any debris or construction material that escapes containment devices and are discharged into the restricted areas before the next rain event or within 24 hours of the discharge.

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

No soil disturbing activities will begin on any section of TxDOT ROW without adequate sedimentation controls first being installed and functioning at adjacent drainage outfalls. Begin and continuously prosecute the repairs, additions and maintenance of erosion and sedimentation control devices within seven days after the Contractor receives each Form 2118, Field Inspection and Maintenance Report, from the Engineer. Failure of the Contractor to fulfill either of the above requirements places TxDOT in potential non-compliance with permit requirements and may result in withholding estimates or stopping work or both until all environmental permit requirements are fulfilled.

Concrete Washouts are required per the CGP. The Concrete Washout Area(s) structural controls must consist of temporary berms, temporary shallow pits, and/or temporary storage tanks to prevent contaminated runoff and must be lined as to prevent contamination of underlying soil. Ensure pits properly maintained including removal of concrete as not to allow overflow. The location(s) of washout area will be approved by the Engineer. When washout pits are no longer needed, they will be removed, and area will be restored to original condition. This work, materials and labor will not be measured or paid for directly but will be subsidiary to Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls."

Cleaning and sweeping of open roadways due to material spillage or loss from Contractor equipment or tires will be the responsibility of the Contractor at no cost to TxDOT. This work will not be charged as Item 738, "Cleaning and Sweeping Highways". Cleaning and sweeping of roadways will be completed as directed, including multiple times per day, if necessary, to maintain acceptable roadways for the traveling public and to meet environmental regulations. Construction activities will cease when material deposited on the roadway is not properly removed or when equipment is not available as needed. Adequate construction exits will be planned, constructed, and maintained by the Contractor per Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls".

#### **ITEM 540: METAL BEAM GUARD FENCE**

Furnish steel posts throughout the project except as specifically noted in the plans.

Wooden block out will not be allowed.

#### **ITEM 544: GUARDRAIL END TREATMENTS**

The use of wooden block-outs will not be allowed.

#### **ITEM 585: RIDE QUALITY FOR PAVEMENT SURFACES**

Use Surface Test Type B pay adjustment schedule 2 on the travel lanes.

The Contractor will ensure satisfactory profile results in the intermediate paving layers (mixture) to eliminate corrective action for excessive deviations in the final surface layers.

Milling will not be allowed as a corrective action for excessive deviations in the surface layer.

#### **ITEM 658: DELINEATOR AND OBJECT MARKER ASSEMBLIES**

All flexible and GF2 delineators will have a tubular body.

The delineator assembly BRF Class A (D-SW) and (D-SY) are to be single delineators (Class I) attached to a flat, plastic bracket to facilitate the mounting of the delineator on top of the bridge rail at the locations shown on the plans. Submit a sample for approval before ordering materials.

#### **ITEM 666: RETROREFLECTORIZED PAVEMENT MARKINGS**

The Contractor will layout the proposed striping in accordance with TxDOT Traffic Control Plan Standards and latest version Texas Manual on Uniform Traffic Control Devices (TMUTCD) and project striping layout sheets. The Engineer will verify proposed striping layout prior to the beginning of striping operations.

The Contractor will locate the beginning and ending points of No Pass Zones.

#### **ITEM 672: RAISED PAVEMENT MARKERS**

Existing raised pavement markers to be replaced will be removed at the same time that the new markers are placed (i.e., remove and replace in one operation). Existing raised pavement markers replaced by new markers will be removed in accordance with Item 677, "Eliminating Existing Pavement Markings and Markers". Immediately fill the damaged area in the pavement due to the removal of existing markers with an approved bituminous material. This removal and backfill work will not be paid for directly, but will be subsidiary to Item 672, "Raised Pavement Markers".

#### **ITEM 3079: PERMEABLE FRICTION COURSE (PFC)**

RAP from Contractor owned sources may be used if the RAP is fractionated.

No Recycled Asphalt Shingles (RAS) will be allowed.

For SAC-A, blending SAC-B Aggregate with an RSSM greater than the SAC-A rating or 10, whichever is greater, is prohibited.

**ITEM 3080: STONE-MATRIX ASPHALT**

RAP from Contractor owned sources may be used if the RAP is fractionated.

Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class A.

No Recycled Asphalt Shingles (RAS) will be allowed.

For SAC-A, blending SAC-B Aggregate with an RSSM greater than the SAC-A rating or 10, whichever is greater, is prohibited.

**ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN**

This project will require "full matrix" type portable changeable message signs.

Ensure that the Contractor's Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

Furnish 2 portable changeable message signs. The portable changeable message sign(s) will be used for all lane closures and freeway closures as shown on the traffic control plan standard sheets.

Supply portable changeable message sign(s) in accordance with the Traffic Control Plan standard sheets and Article 6f.55 of the Texas Manual on Uniform Traffic Control Devices for Streets and Highways Part VI.

**ITEM 6185: TRUCK MOUNTED ATTENUATORS**

The total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 3 Series	Scenario			Required TMA
(3-2)-13	All			3
(3-3)-14	A	B	D	2
	C			3

TCP 6 Series	Scenario		Required TMA	
(6-1)-12	A	B	1	2
(6-2)-12 / (6-3)-12	All		1	
(6-4)-12	A	B	1	2
(6-5)-12	A	B	1	2
(6-6)-12 / (6-7)-12	All		1 Per Lane	

Shadow vehicles equipped for truck mounted attenuators (TMA) for stationary operations will be paid for by the day and must be available for use at any time as determined by the Engineer.

Mobile operations will be paid for by the hour, per specifications. For mobile operations, payment will be made only while the TMA is in use.

For mobile operations requiring multiple TMA's, judgement may be applied in lower speed, urban / in town traffic environments to reduce the numbers of TMA in use where the added TMA may pose a hazard for traffic entering and exiting driveways, side streets, etc.

The Contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA needed for the project for those times per plan requirements. Additional TMAs used that are not specified in the plans in which the Contractor expects compensation will require prior approval from the Engineer.



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0015-01-253

DISTRICT Waco  
HIGHWAY IH 35

COUNTY McLennan

CONTROL SECTION JOB				0015-01-253		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00187045			
COUNTY				McLennan			
HIGHWAY				IH 35			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	134-6011	BACKFILLING PAVEMENT EDGES	CY	498.000		498.000	
	351-6009	FLEXIBLE PAVEMENT STRUCTURE REPAIR(14")	SY	250.000		250.000	
	354-6197	PLANE ASPH CONC PAV(1.5" MICRO-MILLING)	SY	25,971.000		25,971.000	
	354-6211	PLANE ASPH CONC PAV(2" TO 4 1/2" MICRO)	SY	192,168.000		192,168.000	
	356-6021	PAV JT UNDERSEAL (24")	LF	1,905.000		1,905.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	10.000		10.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	134.700		134.700	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	1,905.000		1,905.000	
	438-6006	CLEANING AND SEALING JOINTS (CL 3)	LF	1,336.800		1,336.800	
	467-6249	SET (TY I)(S= 7 FT)(HW= 5 FT)(4:1) (C)	EA	2.000		2.000	
	496-6005	REMOV STR (WINGWALL)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7.000		7.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	94,979.000		94,979.000	
	533-6005	RUMBLE STRIPS (SHOULDER) CONCRETE	LF	78,849.000		78,849.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	412.500		412.500	
	540-6004	MTL THRIE-BEAM GD FEN (STEEL POST)	LF	6.000		6.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	1.000		1.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	7.000		7.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	3.000		3.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	33.000		33.000	
	662-6005	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	LF	17,330.000		17,330.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	38,618.000		38,618.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	11,095.000		11,095.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	36,019.000		36,019.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	1,733.000		1,733.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	900.000		900.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	11,095.000		11,095.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	264.000		264.000	
	666-6075	REFL PAV MRK TY I (W)(NUMBER)(100MIL)	EA	36.000		36.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	2.000		2.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	17,330.000		17,330.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	38,618.000		38,618.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	36,019.000		36,019.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	986.000		986.000	
	3079-6007	PFC-C (PG76 MIX) SAC-A	TON	629.000		629.000	
	3080-6007	STONE-MTRX-ASPH SMA-D SAC-A PG76-22	TON	28,699.000		28,699.000	

DISTRICT	COUNTY	CCSJ	SHEET
Waco	McLennan	0015-01-253	10



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0015-01-253

DISTRICT Waco  
HIGHWAY IH 35

COUNTY McLennan

CONTROL SECTION JOB				0015-01-253		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00187045			
COUNTY				McLennan			
HIGHWAY				IH 35			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	3080-6029	TACK COAT	GAL	21,911.000		21,911.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	100.000		100.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000	
	6185-6002	TMA (STATIONARY)	DAY	800.000		800.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	1,000.000		1,000.000	
	18	LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	



ROADWAY SUMMARY									
LOCATION	BEGINNING STATION	ENDING STATION	134 6011	3516009 [1]	354 6197	354 6211	3079 6007	3080 6029	30816007
			BACKFILLING PAVEMENT EDGES	FLEXIBLE PAVEMENT STRUCTURE REPAIR(14")	PLANE ASPH CONC PAV(1.5" MICRO-MILLING)	PLANE ASPH CONC PAV(2" TO 4 1/2" MICRO)	PFC-C (PG76 MIX) SAC-A	TACK COAT	STONE-MTRX-ASPH SMA-D SAC-A PG76-22
			CY	SY	SY	SY	TON	GAL	TON
<b>IH 35</b>									
PLAN SHEET 1 OF 8	408+50.85	435+00.00	498	250	6,743	24,625		3,234	4,075
PLAN SHEET 2 OF 8	435+00.00	459+00.00			2,101	26,545		2,865	3,823
PLAN SHEET 3 OF 8	459+00.00	483+00.00				29,339		2,934	4,034
PLAN SHEET 4 OF 8	483+00.00	507+00.00			3,643	28,210		3,185	4,179
PLAN SHEET 5 OF 8	507+00.00	531+00.00				35,147		3,515	4,833
PLAN SHEET 6 OF 8	531+00.00	555+00.00			3,409	29,851		3,326	4,386
PLAN SHEET 7 OF 8	555+00.00	579+00.00			6,880	18,451	480	2,533	3,105
PLAN SHEET 8 OF 8	579+00.00	586+30.09			3,194		149	319	265
PROJECT TOTAL			498	250	25971	192168	629	21911	28699


[1] TO BE USED IN VARIOUS LOCATIONS AS DIRECT BY ENGINEER

METAL BEAM GUARD FENCE SUMMARY									
LOCATION	BEGINNING STATION	ENDING STATION	432 6045	540 6002	540 6004	540 6016	544 6001	658 6062	540 6006
			RIPRAP (MOW STRIP)(4 IN)	MTL W-BEAM GD FEN (STEEL POST)	MTL THRIE-BEAM GD FEN (STEEL POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	INSTL DEL ASSM (D-SW/SZ 1(BRF)/GFZ(BI)	MTL BEAM GD FEN TRANS (THRIE-BEAM)
			CY	LF	Each	EA	EA	EA	EA
<b>IH 35</b>									
PLAN SHEET 1 OF 8	408+65.50	435+00.00	39.3	100.0	4.0	4.0		12	1
PLAN SHEET 2 OF 8	435+00.00	459+00.00	23.4	75.0		1.0		4	
PLAN SHEET 3 OF 8	459+00.00	483+00.00							
PLAN SHEET 4 OF 8	483+00.00	507+00.00	20.3	25.0	2.0		1.0	4	
PLAN SHEET 5 OF 8	507+00.00	531+00.00							
PLAN SHEET 6 OF 8	531+00.00	555+00.00	51.7	212.5		2.0	2.0	13	
PLAN SHEET 7 OF 8	555+00.00	579+00.00							
PLAN SHEET 8 OF 8	579+00.00	586+30.09							
PROJECT TOTAL			134.7	412.5	6.0	7.0	3.0	33	1

BRIDGE SUMMARY						
LOCATION	356 6021	438 6002	438 6006	467 6249	496 6005	432 6002
	PAV JT UNDERSEAL (24")	CLEANING AND SEALING EXIST JOINTS(CL3)	CLEANING AND SEALING JOINTS (CL 3)	SET (TY I)(S= 7 FT)(HW= 5 FT)(4:1) (C)	REMOV STR (WINGWALL)	RIPRAP (CONC)(5 IN)
<b>IH 35</b>						
IH 35 OVER UPRR	359.0	359.0	342.8			
IH 35 OVER MEYERS LANE	254.0	254.0	216.0			
IH 35 OVER CRAVEN	294.0	294.0	228.0			
IH 35 OVER FM 2417	260.0	260.0	228.0			
IH 35 OVER LOOP 340	738.0	738.0	322.0			
Bridge Class Culvert STA 428+00				2	1	10
PROJECT TOTAL						
	1905.0	1905.0	1336.8	2	1	10

PAVEMENT MARKING SUMMARY													
LOCATION	BEGINNING STATION	ENDING STATION	533 6003	533 6005	666 6036	666 6042	666 6075	666 6078	666 6306	666 6309	666 6321	672 6010	
			RUMBLE STRIPS (SHOULDER) ASPHALT	RUMBLE STRIPS (SHOULDER) CONCRETE	REFL PAV MRK TY I (W) 8"(SLD) (100MIL)	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	REFL PAV MRK TY I (W)(NUMBER)(100MIL)	REFL PAV MRK TY I (W)(WORD)(100MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REFL PAV MRKR TY II-C-R	
			LF	LF	LF	LF	EA	EA	LF	LF	LF		
<b>IH 35</b>													
PLAN SHEET 1 OF 8	408+65.50	435+00.00	9460		756			3		2,260	4,512	5,763	120
PLAN SHEET 2 OF 8	435+00.00	459+00.00	9600		947			3		2,400	4,934	4,800	131
PLAN SHEET 3 OF 8	459+00.00	483+00.00	9600		2,437			6		2,400	6,939	4,798	146
PLAN SHEET 4 OF 8	483+00.00	507+00.00	9600		1,213			6		2,390	5,463	4,800	128
PLAN SHEET 5 OF 8	507+00.00	531+00.00	9600		3,358			9	1	2,400	4,920	4,798	157
PLAN SHEET 6 OF 8	531+00.00	555+00.00	9600		1,331			3	1	2,390	5,261	4,799	134
PLAN SHEET 7 OF 8	555+00.00	579+00.00	2113	1890	593	61		6		2,390	5,123	4,800	127
PLAN SHEET 8 OF 8	579+00.00	586+30.09	28696	74272	460	203				700	1,466	1,461	43
AS DIRECTED BY ENGINEER													
PROJECT TOTAL			94979	78849	11,095	264	36	2	17,330	38,618	36,019		986

WORK ZONE SUMMARY												
LOCATION	BEGINNING STATION	ENDING STATION	662 6005	662 6008	662 6012	662 6037	662 6109	662 6111	60016001	60016002	6185 6002	6185 6003
			WK ZN PAV MRK NON-REMOV (W)6"(BRK)	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY W	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
			LF	LF	LF	LF	EA	EA	DAY	EA	DAY	HR
<b>IH 35</b>												
PLAN SHEET 1 OF 8	408+65.50	435+00.00	2,280	4,512	756	5,763	226	144	100	4	800	1,000
PLAN SHEET 2 OF 8	435+00.00	459+00.00	2,400	4,934	947	4,800	240	120				
PLAN SHEET 3 OF 8	459+00.00	483+00.00	2,400	6,939	2,437	4,798	240	120				
PLAN SHEET 4 OF 8	483+00.00	507+00.00	2,390	5,463	1,213	4,800	239	120				
PLAN SHEET 5 OF 8	507+00.00	531+00.00	2,400	4,920	3,358	4,798	240	120				
PLAN SHEET 6 OF 8	531+00.00	555+00.00	2,390	5,261	1,331	4,799	239	120				
PLAN SHEET 7 OF 8	555+00.00	579+00.00	2,390	5,123	593	4,800	239	120				
PLAN SHEET 8 OF 8	579+00.00	586+30.09	700	1,466	460	1,461	70	37				
PROJECT TOTAL			17,330	38,618	11,095	36,019	1,733	900	100	4	800	1,000



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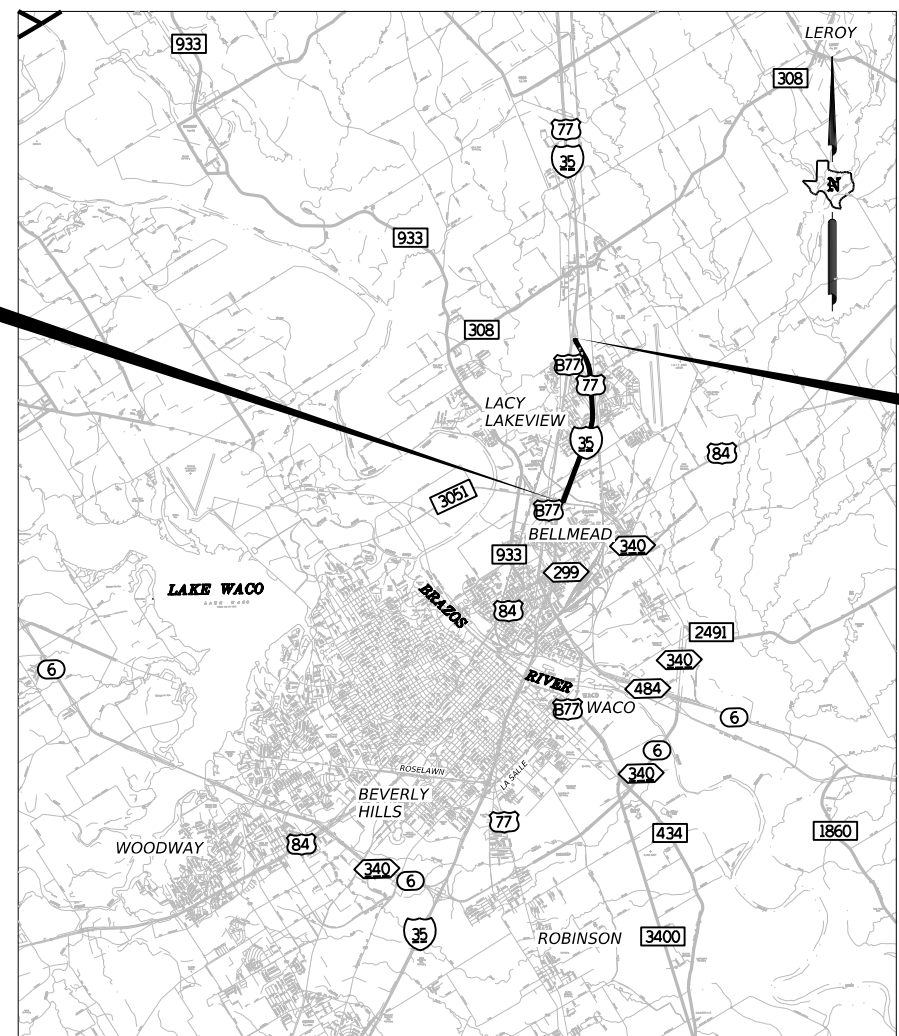
## IH 35

# SUMMARY OF QUANTITIES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST		COUNTY	SHEET NO.
WAC		MCLENNAN	11

**BEGIN PROJECT**  
 CSJ: 0015-01-253  
 IH 35  
 STA 408+65.50  
 REF MRKR: 338+0.993



**END PROJECT**  
 CSJ: 0015-01-253  
 IH 35  
 STA 586+30.09  
 REF MRKR: 342+0.355

SCALE: 1in = 25000ft

**VICINITY MAP**

**REQUIRED SIGNS**

- SIGNS R20-3T, G20-10T, G20-9TP, R20-5T, R20-5aTP, G20-5T, G20-6T, G20-2 AND G20-2bT WILL BE REQUIRED AT PROJECT LIMITS.
- SIGNS G20-5T WILL BE REQUIRED AT ALL ENTRANCE RAMPS.

**SIGNAGE LEGEND**

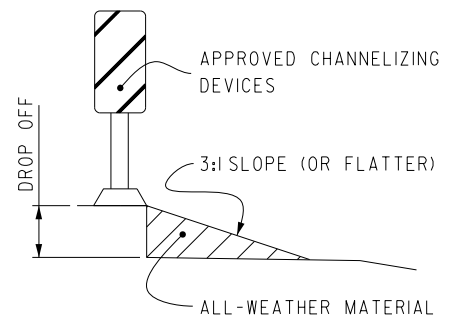
Code	Size	Description
G20-5T	48X24	BEGIN ROAD WORK NEXT X MILES
G20-6T	48X30	NAME, ADDRESS, CITY, STATE, CONTRACTOR
G20-9TP	24X24	BEGIN WORK ZONE
G20-2bT	36X18	END WORK ZONE
R20-3T	48X42	OBEY WARNING SIGNS STATE LAW
CW20-ID	36X36	ROAD WORK AHEAD
R20-5T	24X30	TRAFFIC FINES DOUBLE
R20-5aTP	36X18	WHEN WORKERS ARE PRESENT
R2-1	30X36	SPEED LIMIT 60
G20-10T	60X48	STAY ALERT TALK OR TEXT LATER
G20-2	48X24	END ROAD WORK

**NOTES:**

- ALL TRAFFIC CONTROL DEVICES WILL CONFORM WITH THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" (TMUTCD), AND WILL BE MAINTAINED AS DIRECTED. ADDITIONAL GUIDELINES FOR TRAFFIC CONTROL DEVICES MAY BE FOUND IN THE TMUTCD.
- FOR CHANNELING DEVICE PLACEMENT AND SPACING FOR ALL PHASES, REFER TO THE TCP STANDARDS.
- THE CONTRACTOR SHALL PHASE THE MILLING AND OVERLAY OPERATIONS IN A MANNER SO AS TO PROVIDE POSITIVE DRAINAGE AND AVOID PONDING ON THE TRAVELWAY.
- THE SPEED LIMIT FOR THE CONSTRUCTION WORK ZONE SHALL BE 65 MPH.

**GENERAL**

- INSTALL ALL SIGNS, BARRICADES AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITH THE STANDARD BC SHEETS AND AS DIRECTED.
- ADDITIONAL SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES WILL BE CONSIDERED SUBSIDIARY TO THE ITEM "BARRICADES, SIGNS AND TRAFFIC HANDLING".
- WORK SITES SHOULD BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN AND IN GOOD REPAIR.
- THE CONTRACTOR WILL PROVIDE SAFE ACCESS TO AND FROM ALL PRIVATE PROPERTY AT ALL TIMES AND IN ALL WEATHER CONDITIONS.
- THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN ON THE TCP SEQUENCE OF OPERATION BELOW.
- COMPLETE ALL WORK ON PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS CONTRACT.
- ANY REQUEST TO ALTER THE SEQUENCE OF OPERATION OR TRAFFIC CONTROL PLAN WILL BE SUBMITTED TO THE ENGINEER FOR WRITTEN APPROVAL.



**PAV EDGE DROP-OFF DETAIL**

- LESS THAN 2 INCHES: CW 8-II SIGNS ARE REQUIRED.
- GREATER THAN 2 INCHES BUT LESS THAN 24 INCHES: VERTICAL PANELS AND EITHER CW 8-9a OR CW 8-II SIGNS ARE REQUIRED.
- GREATER THAN 24 INCHES: POSITIVE BARRIER REQUIRED.
- THE SAFETY SLOPE WILL BE CONSTRUCTED WITH AN ALL-WEATHER MATERIAL SUCH AS RAP, WHICH IS CLEAN AND FREE OF DEBRIS AND LARGE ROCKS.

**SEQUENCE OF CONSTRUCTION**

- LANE CLOSURES WILL BE LIMITED TO ONE LANE PER DIRECTION AT A TIME.
- FINISH PROPOSED WORK IN EACH WORK AREA BEFORE PROCEEDING TO PERFORM WORK IN ANOTHER WORK AREA. AT A MINIMUM, ALL SAFETY END TREATMENT AND MBGF WILL BE COMPLETE AND IN PLACE. OBTAIN APPROVAL BEFORE PROCEEDING TO BEGIN WORK IN ANOTHER WORK AREA.
- THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE AREA ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION, WHICH GENERALLY CONFORMS TO THE FOLLOWING SEQUENCE:
  - PROVIDE AND INSTALL ALL SIGNS, BARRICADES, AND TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE TRAFFIC CONTROL STANDARDS.
  - PROVIDE AND INSTALL ALL SWP3 DEVICES IN ACCORDANCE WITH THE APPLICABLE STANDARDS.
  - INSTALL ALL MBGF AND SET AS SHOWN IN PLANS.
  - PLANE ASPHALTIC CONCRETE ON THE EXISTING BRIDGES IN ACCORDANCE WITH PLAN SPECIFICATIONS. CLEAN AND REPAIR BRIDGE JOINTS. PLACE SMA-D ON BRIDGES AND SEAL BRIDGE JOINTS. (SEE BRIDGE OVERLAY AND JOINTS DETAILS ON SHEET 67 THRU SHEET 77).
  - PLANE EXISTING ASPHALTIC CONCRETE PAVEMENT IN ACCORDANCE WITH PLAN SPECIFICATIONS AND PERFORM FULL DEPTH FLEXIBLE PAVEMENT STRUCTURE REPAIRS. FURNISH AND PLACE TEMPORARY PAVEMENT MARKINGS. TEMPORARY PAVEMENT MARKING MUST BE PLACED PRIOR TO OPENING TRAFFIC.
  - CONSTRUCT TACK COAT IN ACCORDANCE WITH PLAN SPECIFICATIONS. CONSTRUCT PFC, SMA-D AND PLACE TABS.
  - FURNISH AND PLACE TEMPORARY PAVEMENT MARKINGS.
  - PLACE PERMANENT PAVEMENT MARKERS.
  - FINAL CLEAN UP.



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**IH 35**

**TRAFFIC CONTROL SEQUENCE NARRATIVE**

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	12	

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

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

**WORKER SAFETY NOTES:**

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

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

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

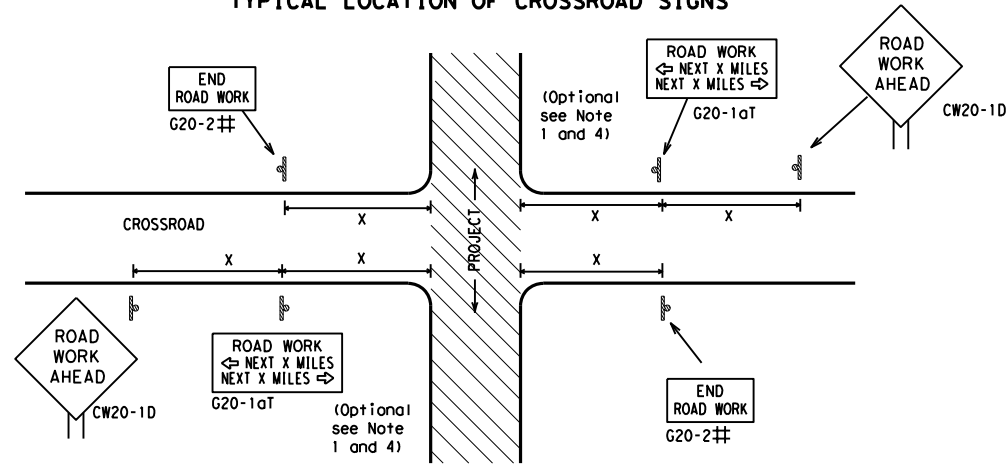
<p><b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b>  <a href="http://www.txdot.gov">http://www.txdot.gov</a></p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD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

SHEET 1 OF 12

<span style="font-size: small; vertical-align: middle;">Texas Department of Transportation</span>		<span style="font-size: x-small;">Traffic Safety Division Standard</span>
<p><b>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</b></p> <p><b>BC (1) -21</b></p>		
FILE:	bc-21.dgn	DN: TxDOT
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REVISIONS	CONT SECT	JOB
4-03 7-13	0015 01	253
9-07 8-14	DIST	COUNTY
5-10 5-21	WAC	McLENNAN
HIGHWAY	SHEET NO.	13

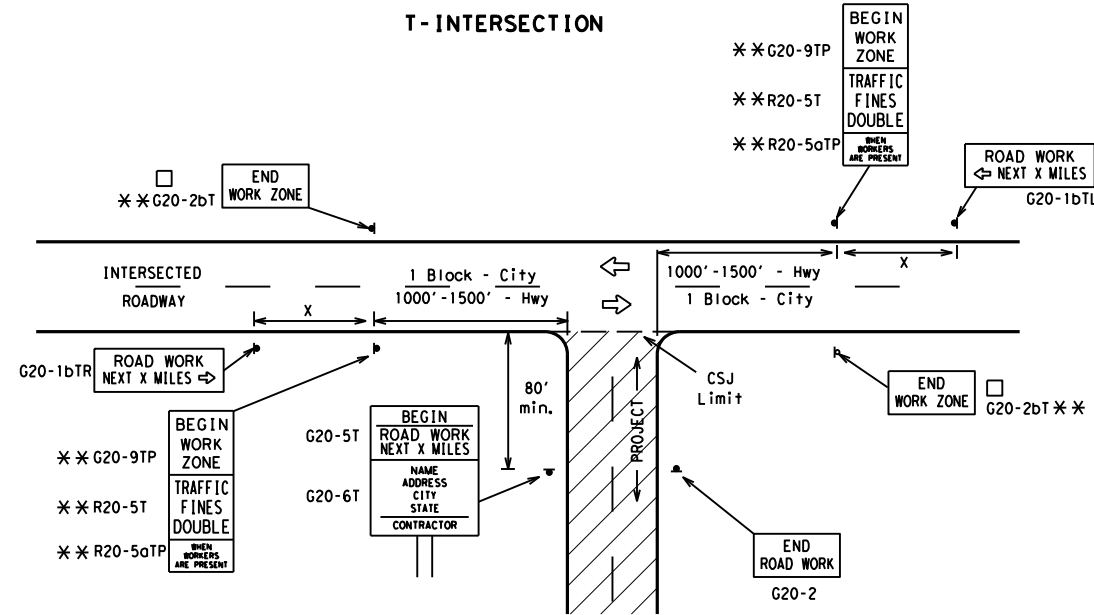
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



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

**T-INTERSECTION**



**CSJ LIMITS AT T-INTERSECTION**

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

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

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

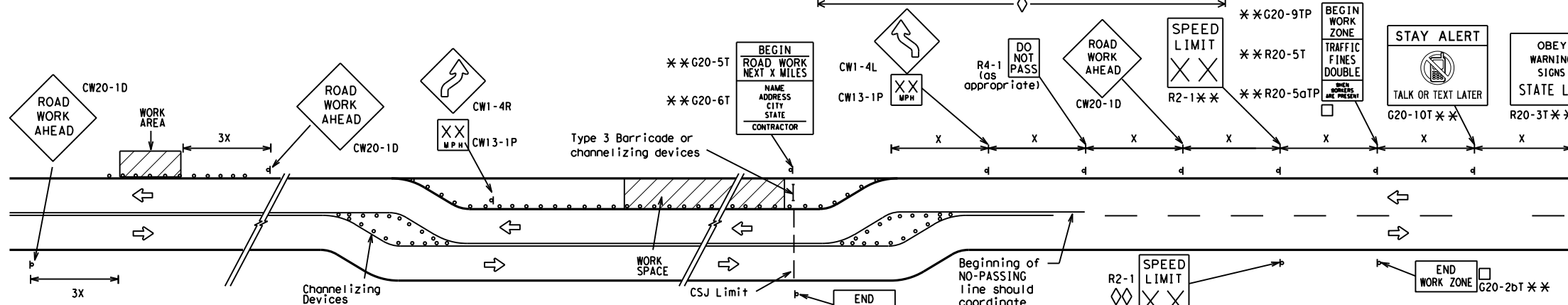
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

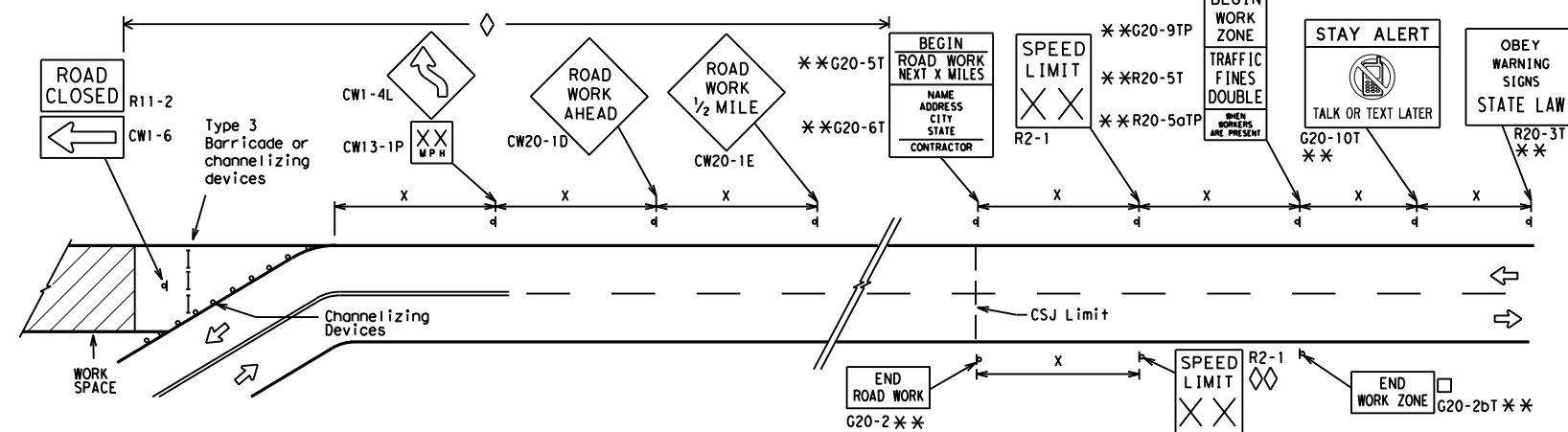
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

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

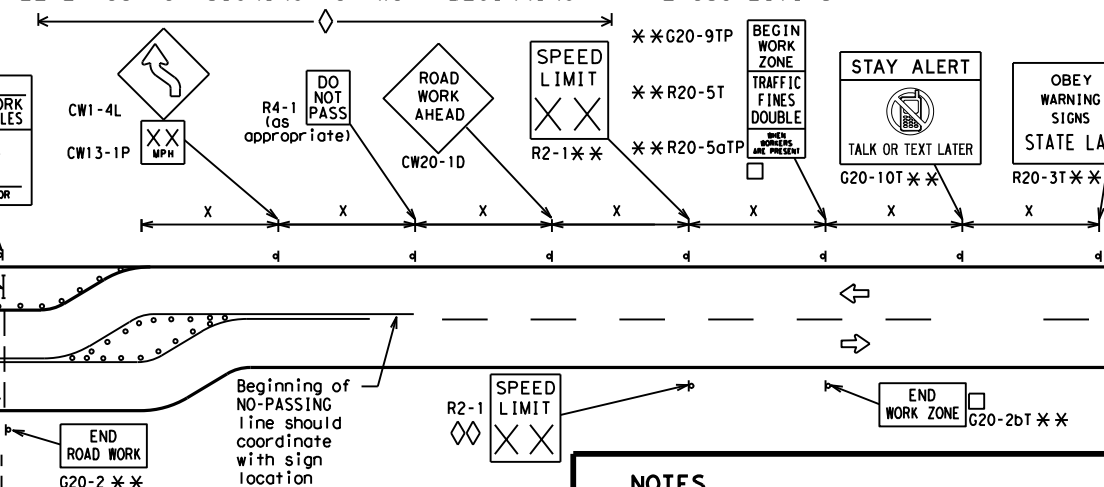


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



**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**

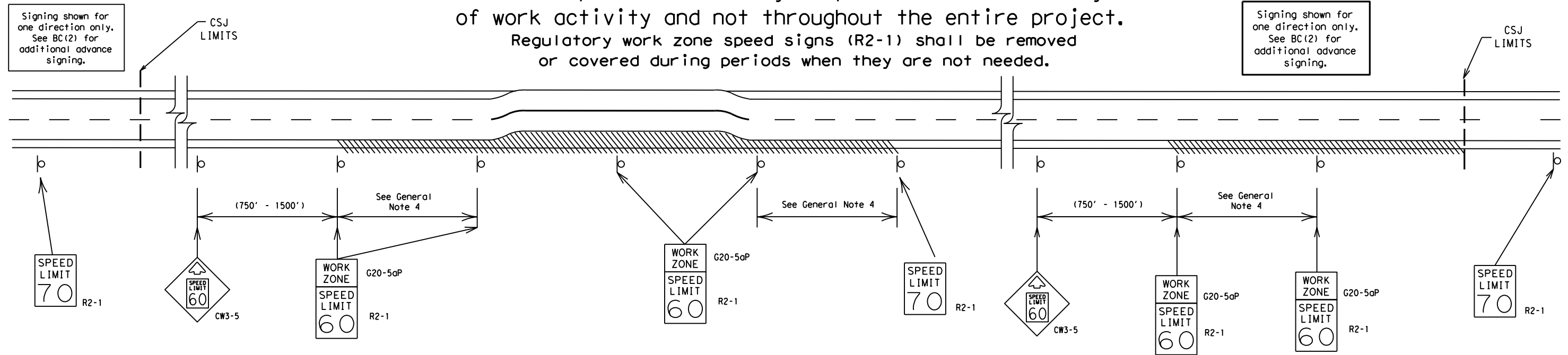
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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	WAC	McLENNAN	14	

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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



## GUIDANCE FOR USE:

### LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

### SHORT TERM WORK ZONE SPEED LIMITS

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

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

### GENERAL NOTES

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

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

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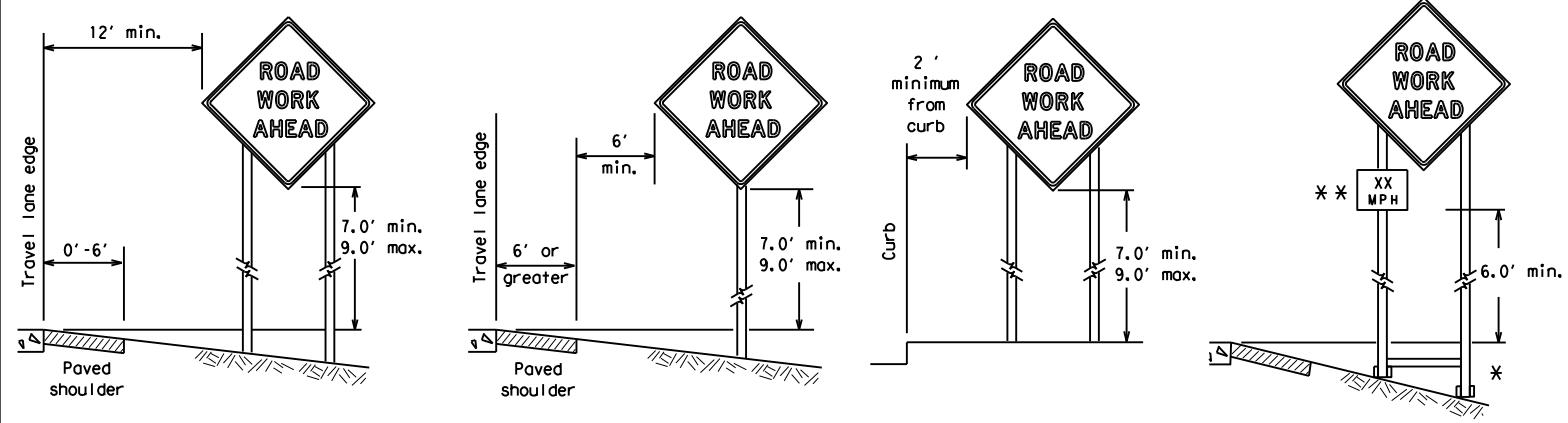
SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
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© TxDOT	November 2002	CONT:	SECT:
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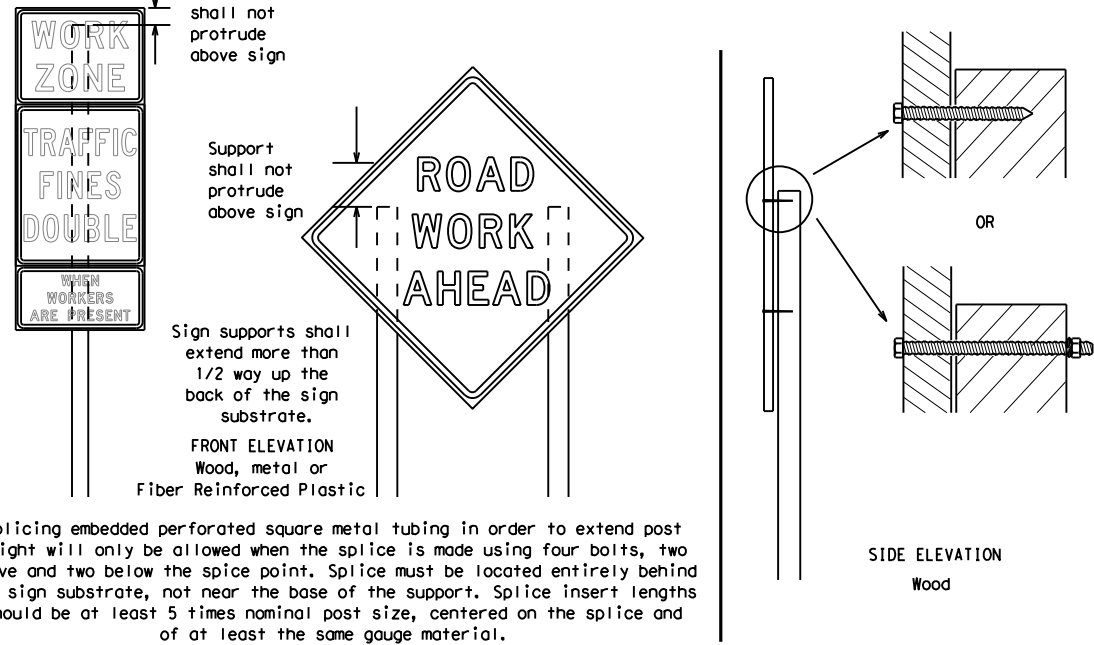
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



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

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

**ATTACHMENT FOR SIGN SUPPORTS**



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

**GENERAL NOTES FOR WORK ZONE SIGNS**

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

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

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

**SIGN MOUNTING HEIGHT**

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

**SIZE OF SIGNS**

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

**SIGN SUBSTRATES**

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

**REFLECTIVE SHEETING**

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

**SIGN LETTERS**

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

**REMOVING OR COVERING**

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

**SIGN SUPPORT WEIGHTS**

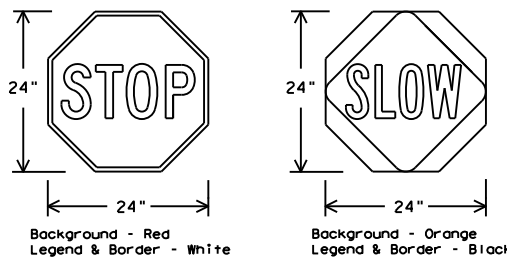
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

**FLAGS ON SIGNS**

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

**STOP/SLOW PADDLES**

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



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

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

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

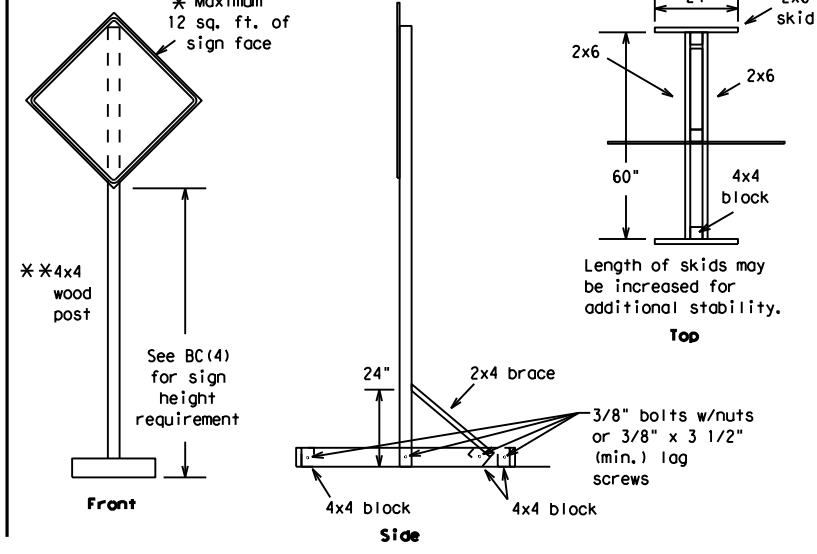
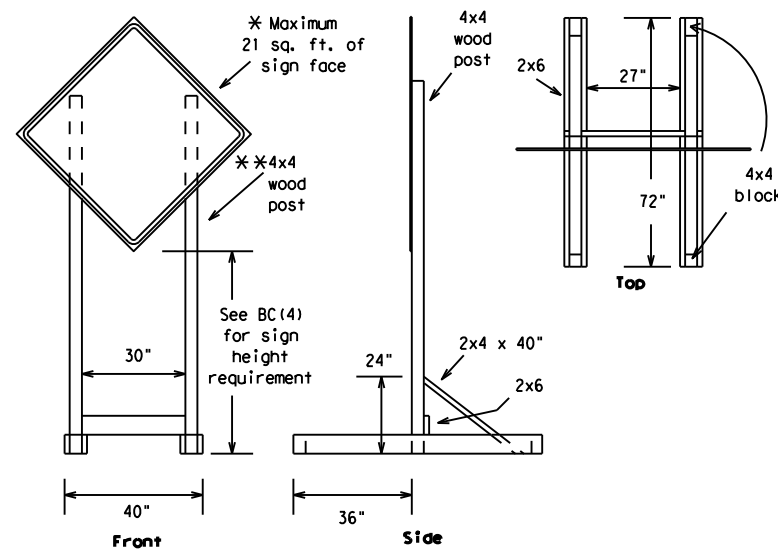


**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

**BC (4) - 21**

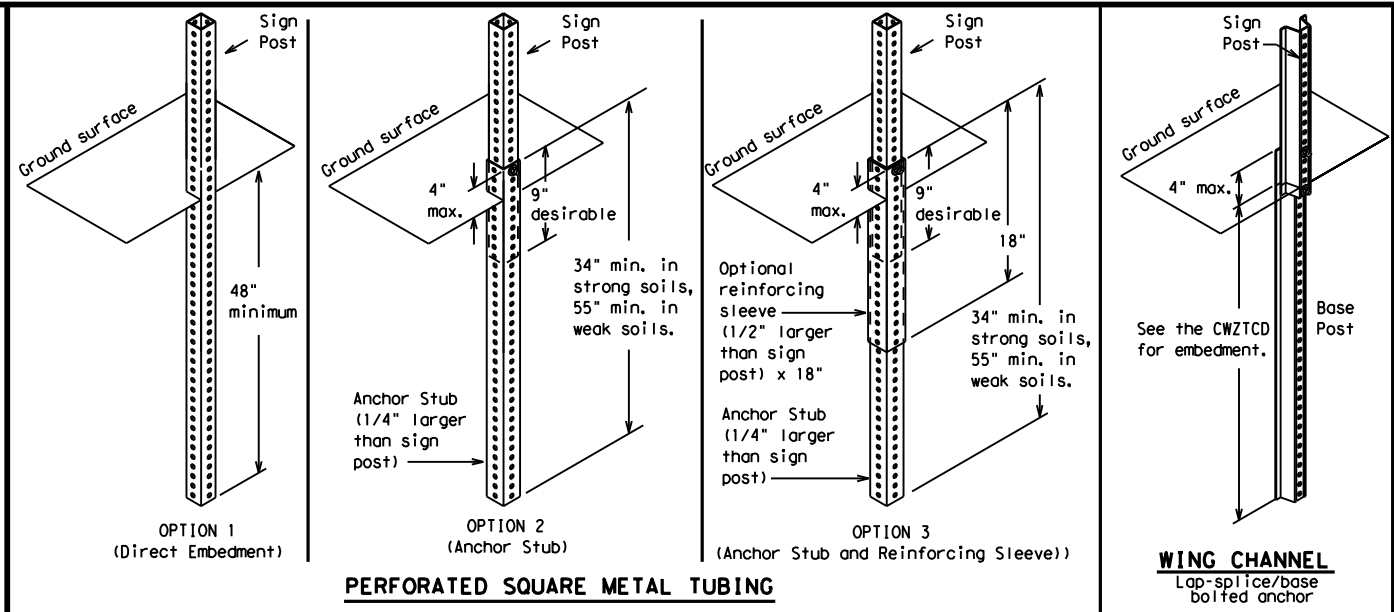
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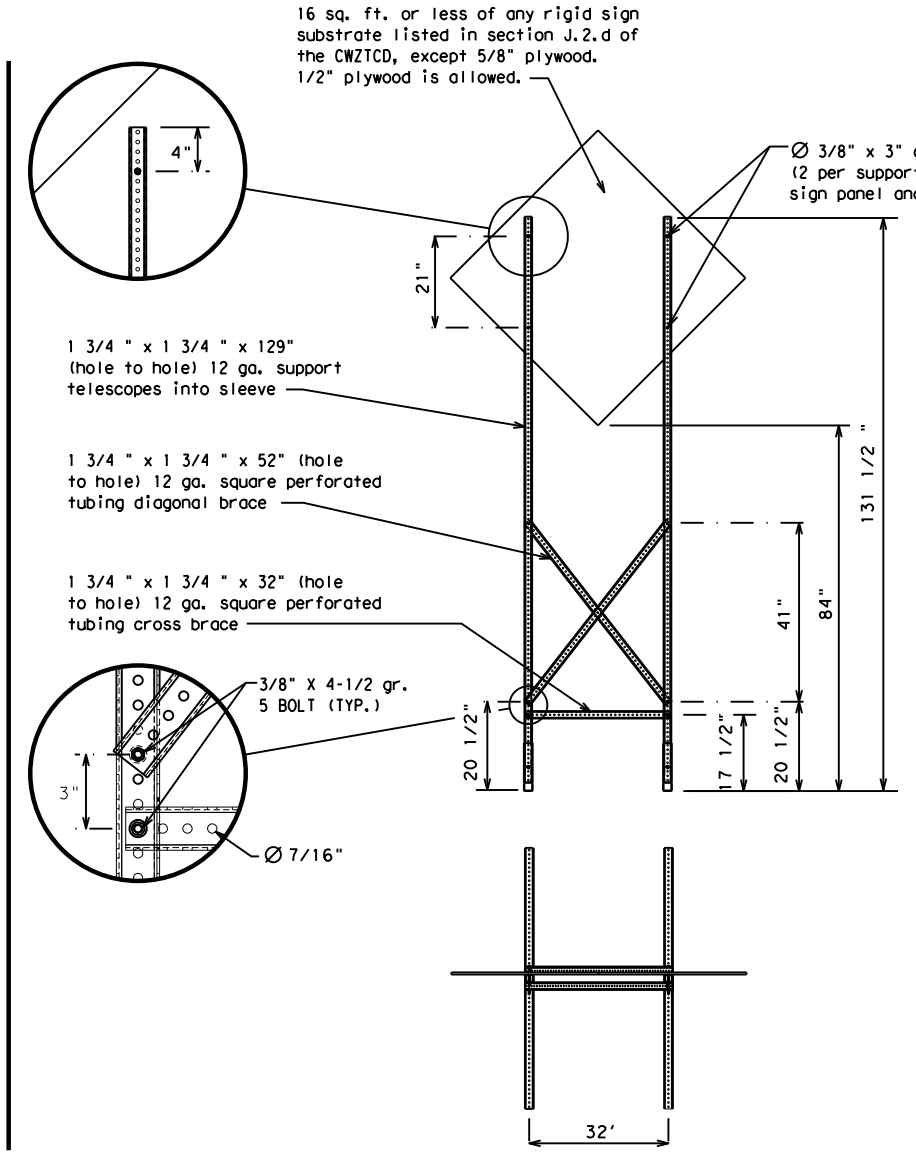
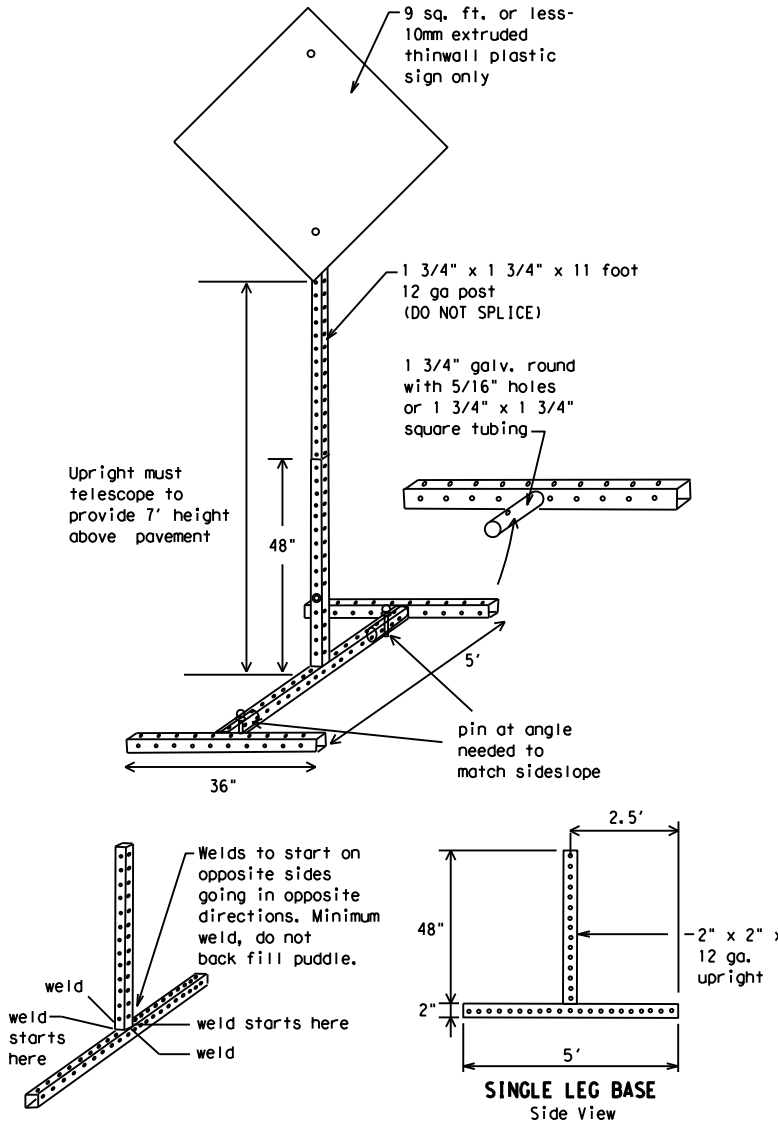
### SKID MOUNTED WOOD SIGN SUPPORTS

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



### GROUND MOUNTED SIGN SUPPORTS

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



### SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

### WEDGE ANCHORS

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

### OTHER DESIGNS

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

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

SHEET 5 OF 12



## BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Other Condition List

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

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

## Phase 2: Possible Component Lists

### Action to Take/Effect on Travel List

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

### Location List

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

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

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

## WORDING ALTERNATIVES

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

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

## FULL MATRIX PCMS SIGNS

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

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

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



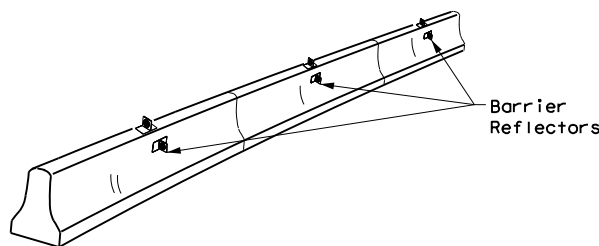
## BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	WAC	McLENNAN	18	

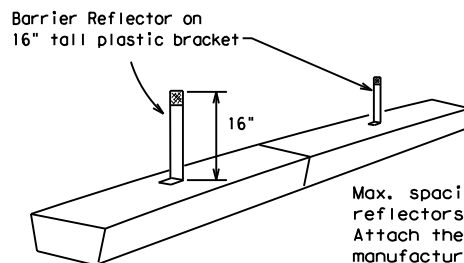
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



**CONCRETE TRAFFIC BARRIER (CTB)**

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

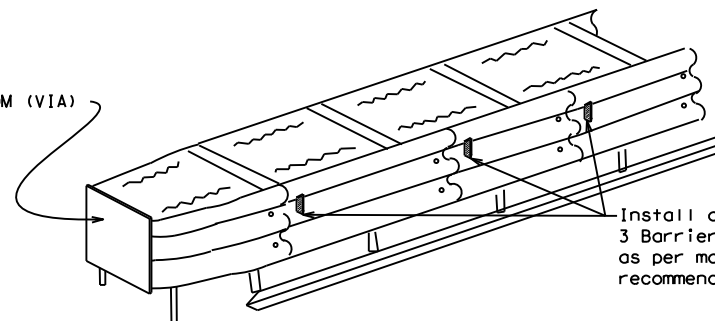


**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

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

**LOW PROFILE CONCRETE BARRIER (LPCB)**



Install a minimum of 3 Barrier Reflectors as per manufacturer's recommendations.

**DELINEATION OF END TREATMENTS**

**END TREATMENTS FOR CTB'S USED IN WORK ZONES**

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

**BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS**

**WARNING LIGHTS**

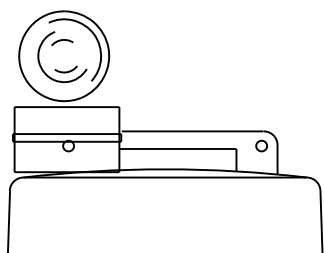
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

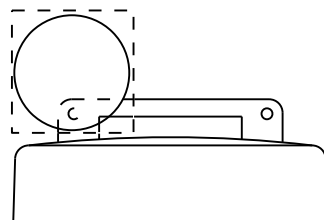
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



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

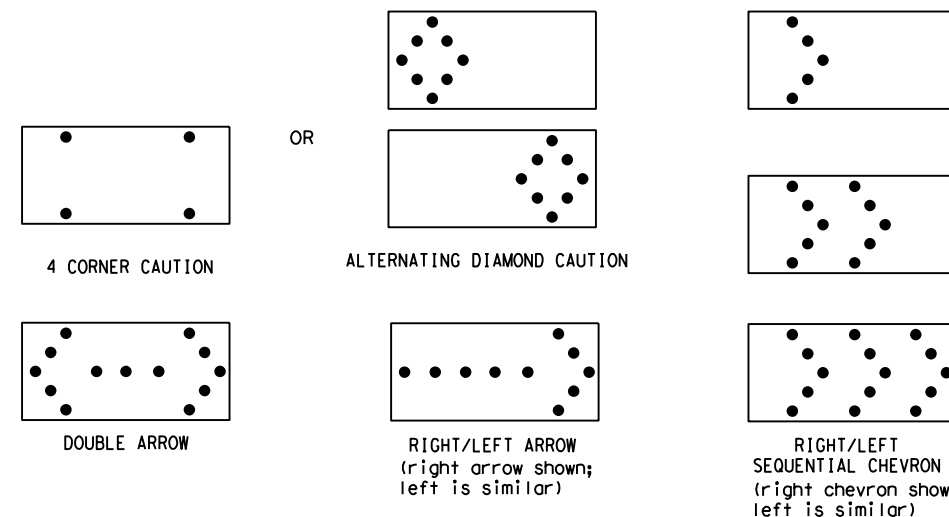


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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



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

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

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

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

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

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



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

**BC (7) -21**

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0015	01	253	IH 35
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	WAC	McLENNAN	19	

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**GENERAL NOTES**

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

**GENERAL DESIGN REQUIREMENTS**

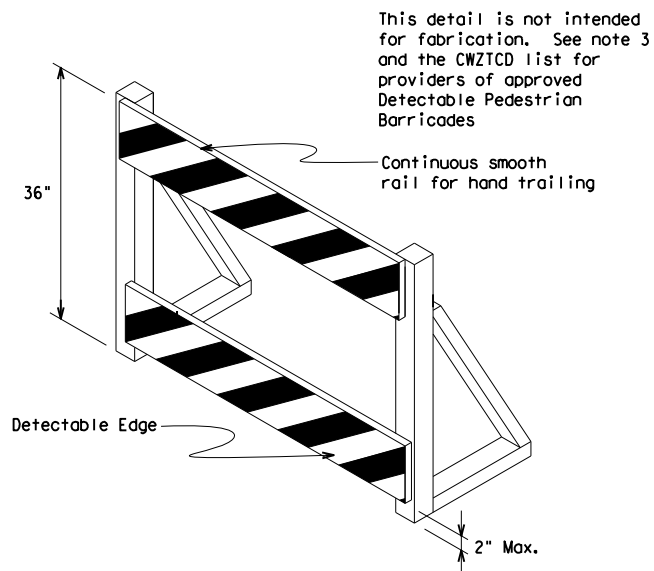
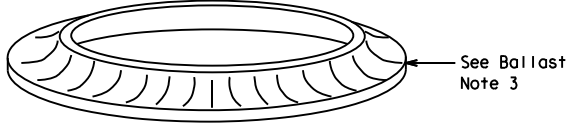
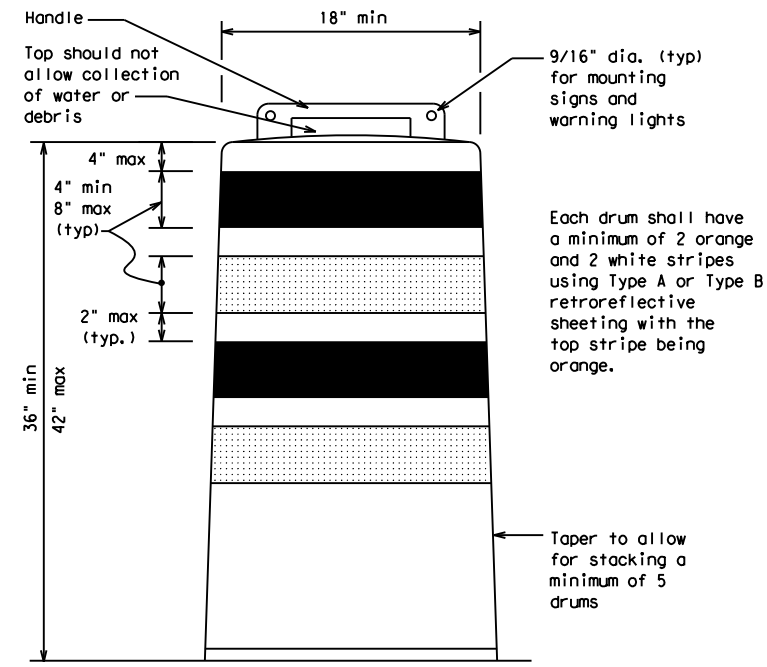
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
  - The body and base shall lock together in such a manner that the body separates from the base when impacted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

**RETROREFLECTIVE SHEETING**

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

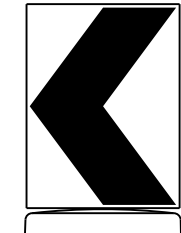
**BALLAST**

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

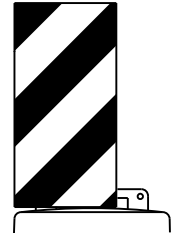


**DETECTABLE PEDESTRIAN BARRICADES**

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



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



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

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

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

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

SHEET 8 OF 12



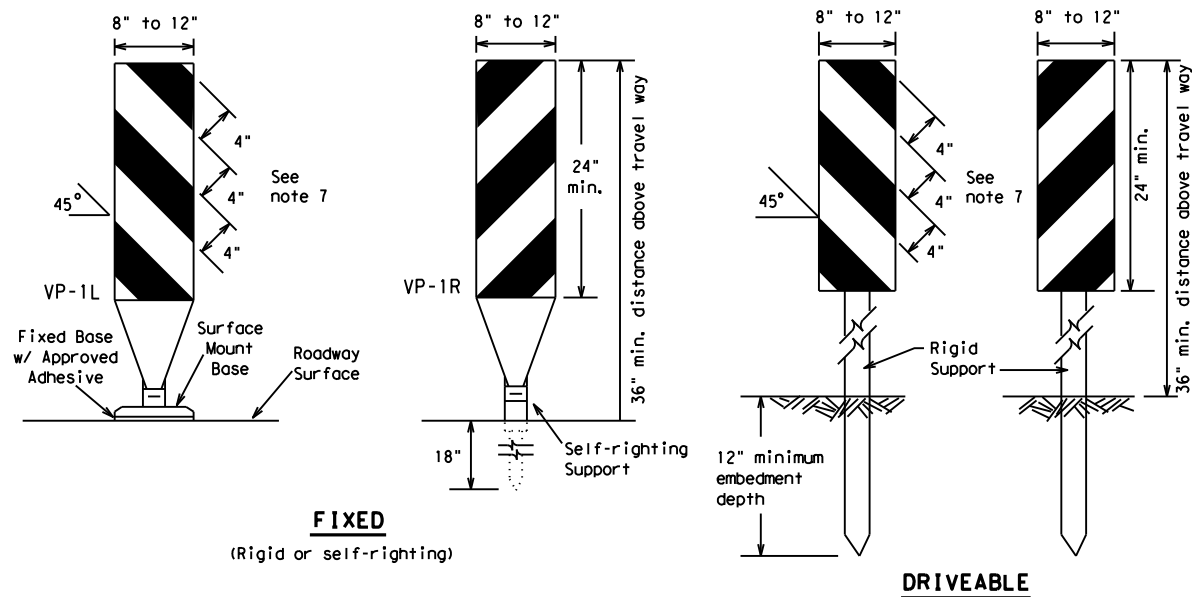
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

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4-03	8-14	DIST	COUNTY	SHEET NO.					
9-07	5-21	WAC	McLENNAN	20					
7-13									



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

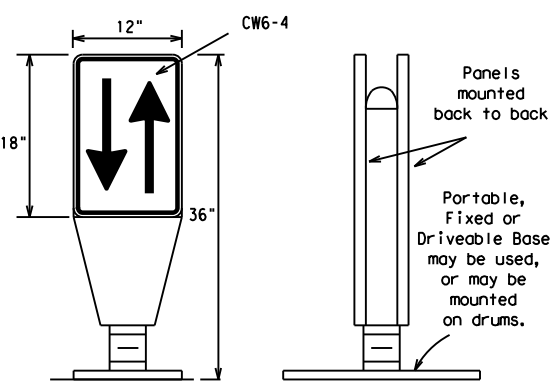
**DRIVEABLE**



**PORTABLE**

**VERTICAL PANELS (VPs)**

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



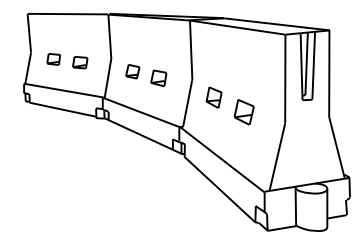
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

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



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

**CHEVRONS**



**LONGITUDINAL CHANNELIZING DEVICES (LCD)**

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

**WATER BALLASTED SYSTEMS USED AS BARRIERS**

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

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

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

**GENERAL NOTES**

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

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

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

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

SHEET 9 OF 12



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (9) - 21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	WAC	McLENNAN	21	

DATE: 2/6/2023 3:23:03 PM  
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**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.



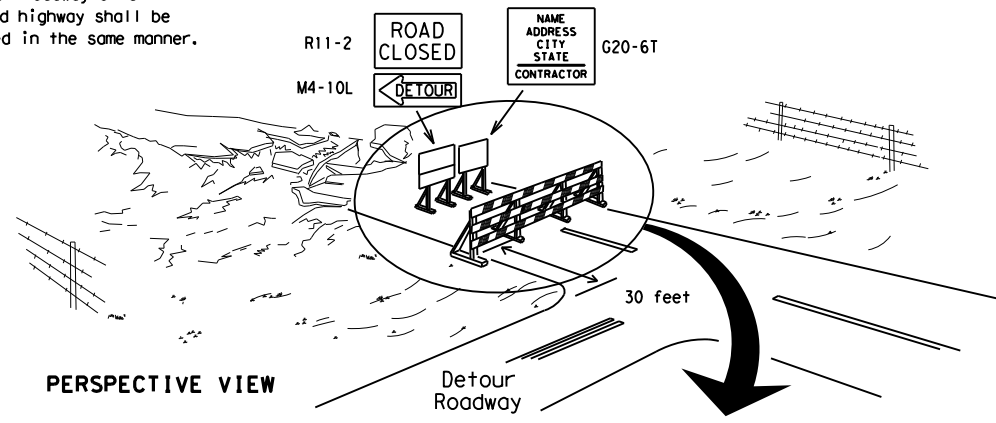
**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



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

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

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



PERSPECTIVE VIEW

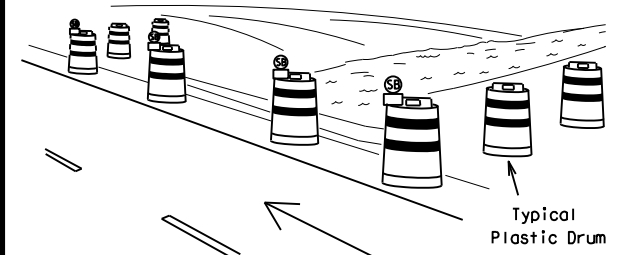
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



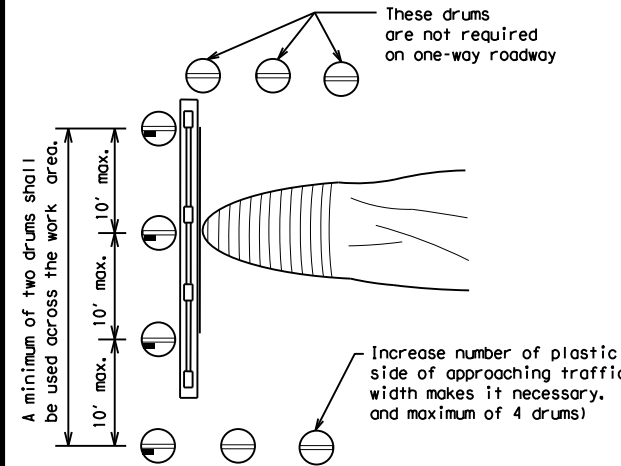
PLAN VIEW

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

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



PERSPECTIVE VIEW

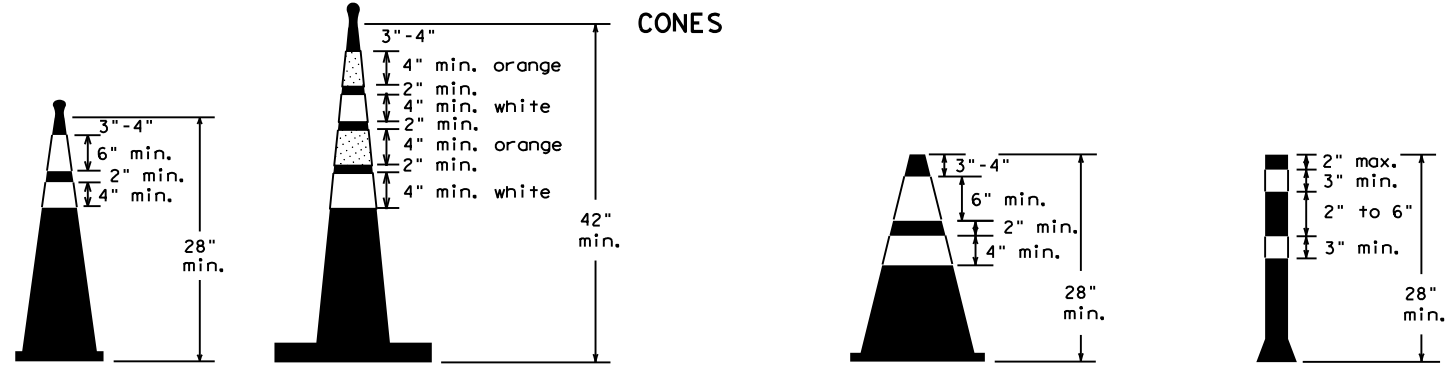


PLAN VIEW

**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



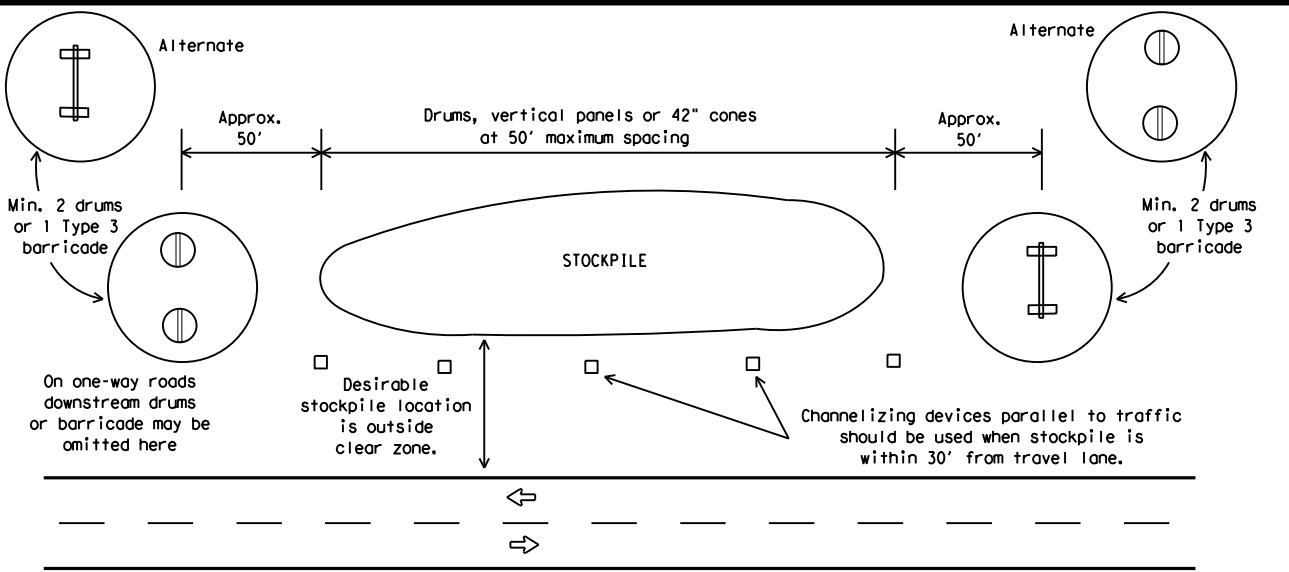
Two-Piece cones

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.



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	WAC	McLENNAN	22	

DATE: 2/6/2023 3:23:03 PM  
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## 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.

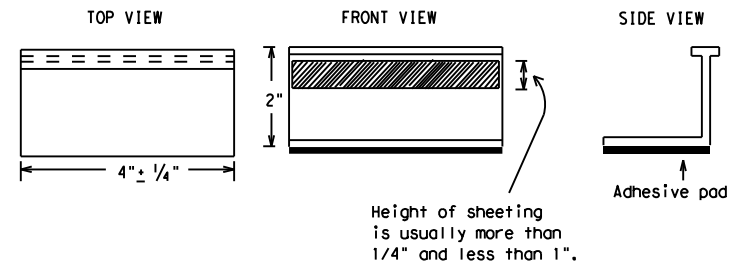
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	WAC	McLENNAN	23	
11-02 8-14				

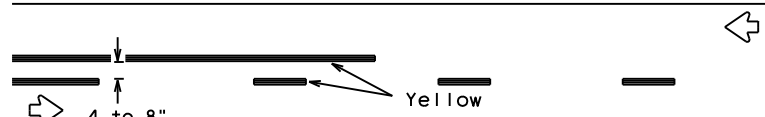
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## PAVEMENT MARKING PATTERNS

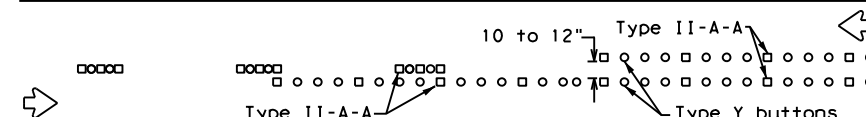


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

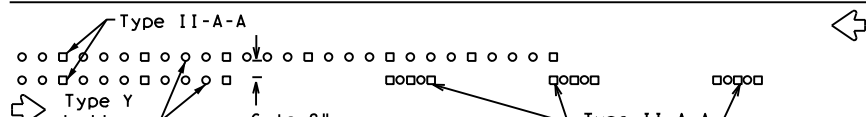


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.



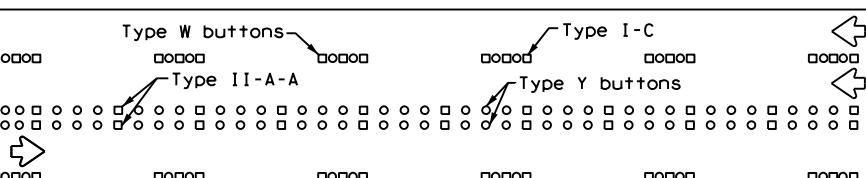
RAISED PAVEMENT MARKERS

## 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.



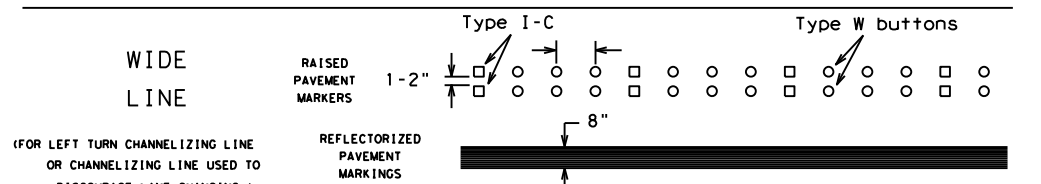
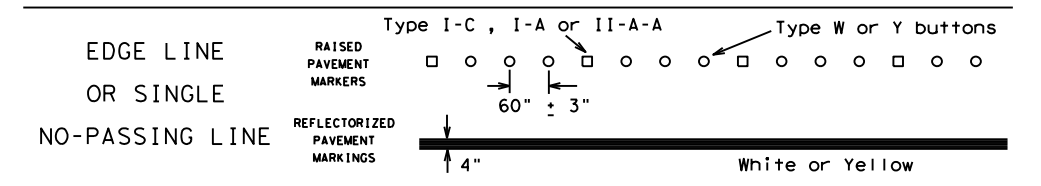
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

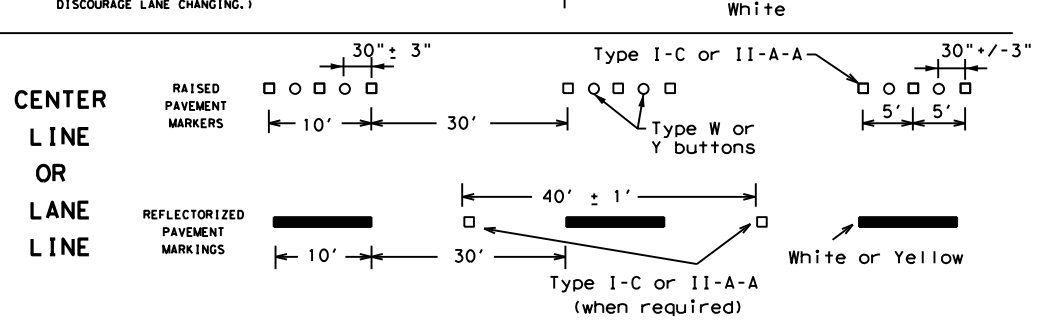
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



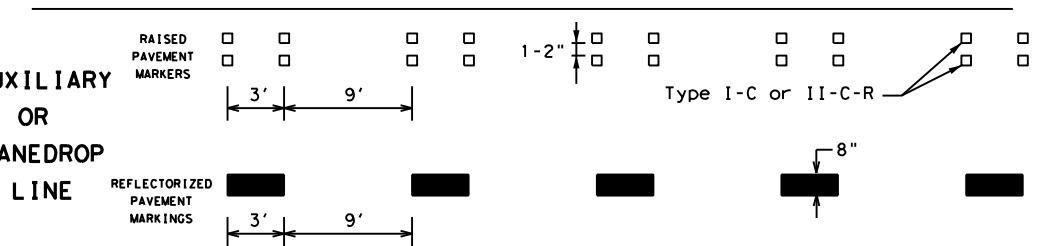
### SOLID LINES



### BROKEN LINES

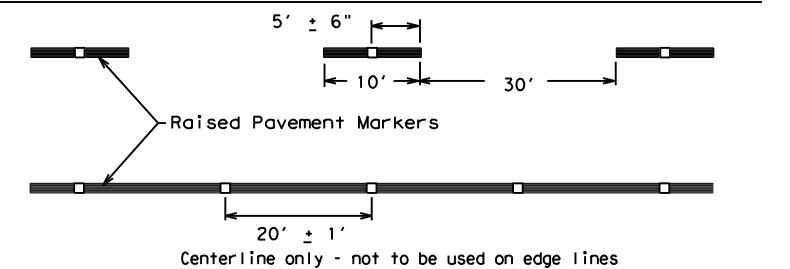


### AUXILIARY OR LANEDROP LINE



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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

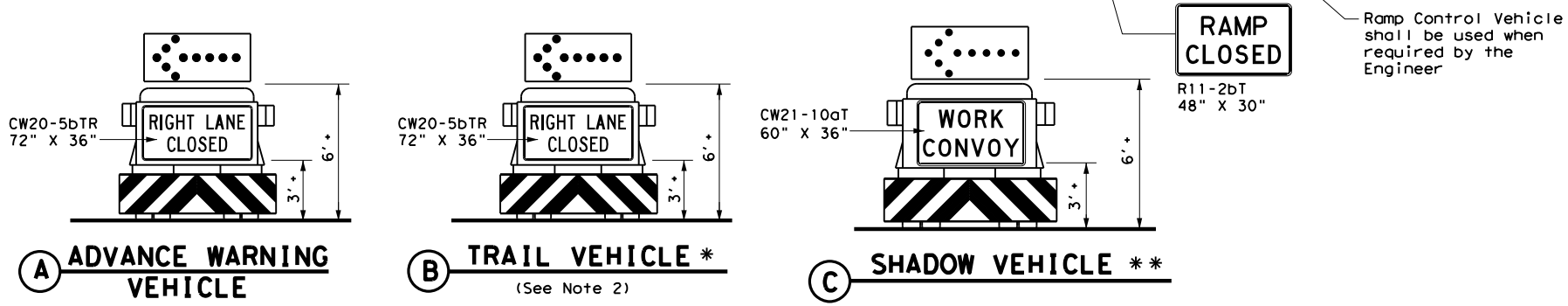
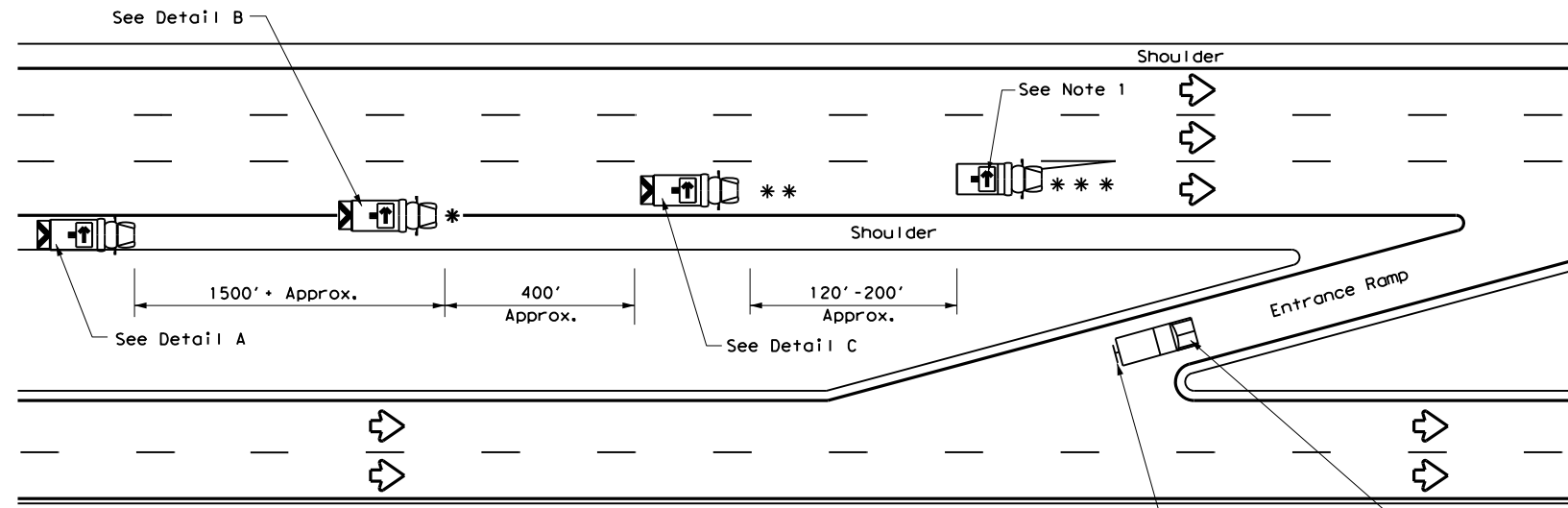
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	WAC	McLENNAN	24	
11-02 8-14				

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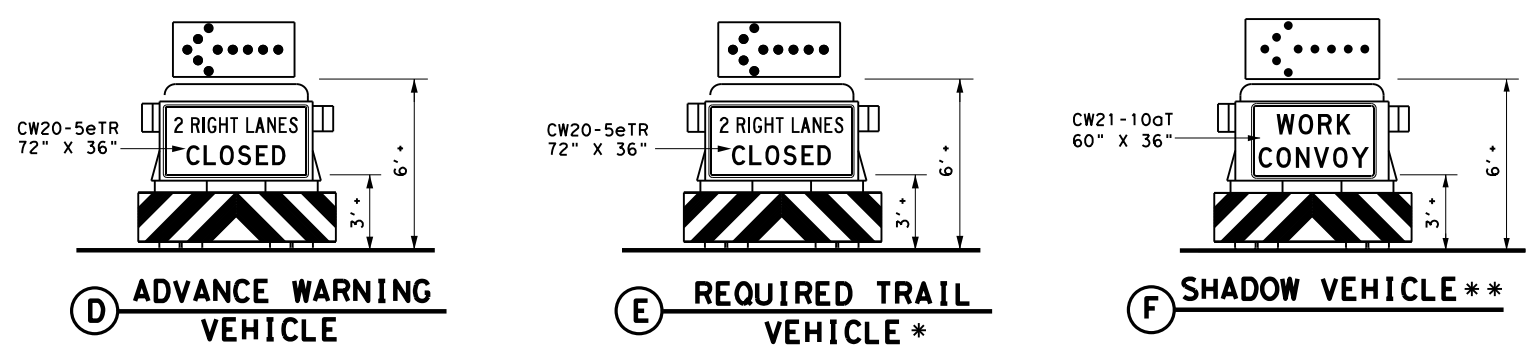
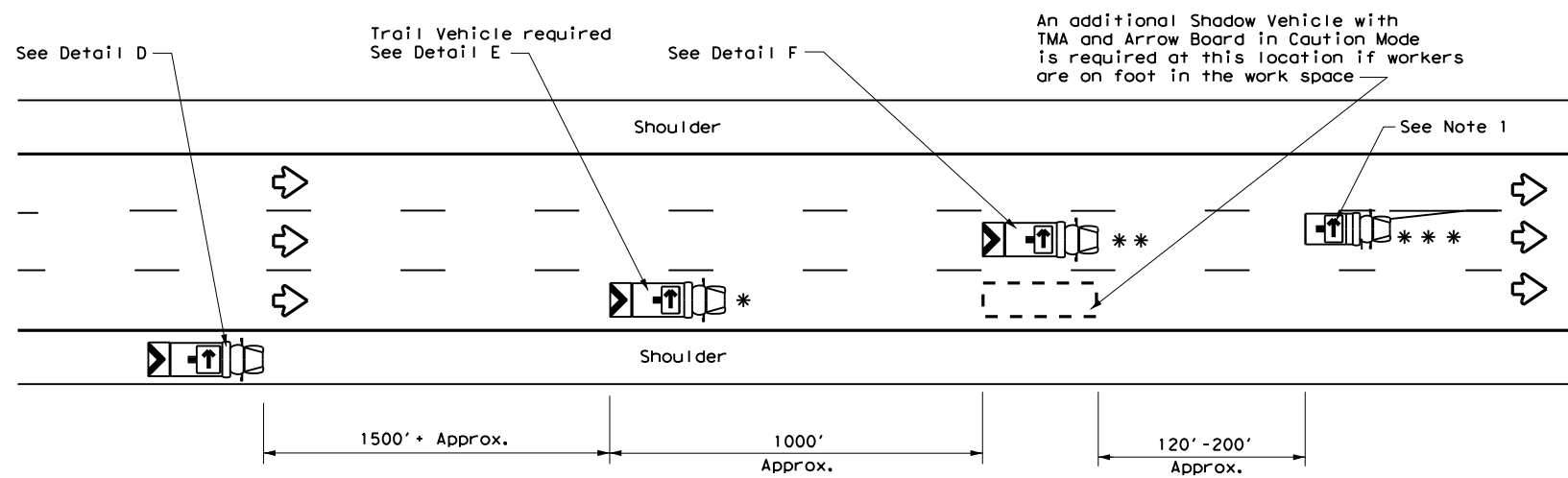
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**RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)**



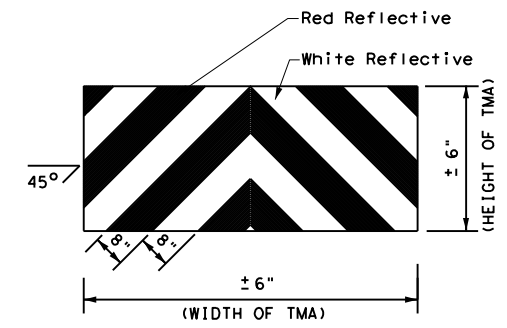
**INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)**

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

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

**GENERAL NOTES**

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



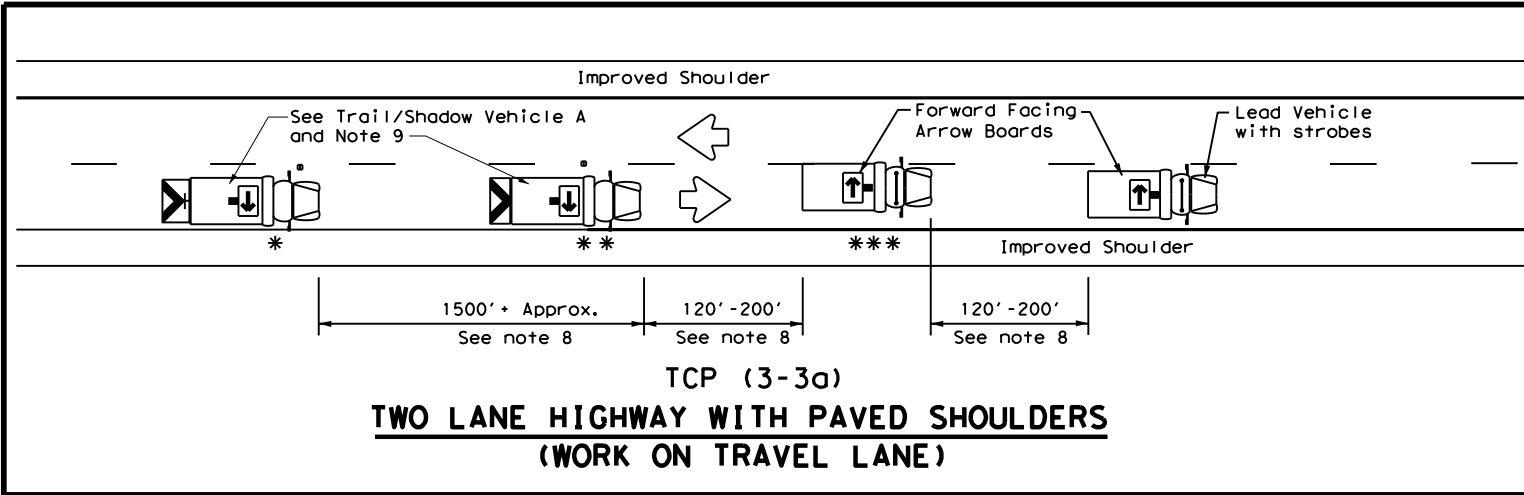
**STRIPING FOR TMA**

		<b>Traffic Operations Division Standard</b>	
<b>TRAFFIC CONTROL PLAN          MOBILE OPERATIONS          DIVIDED HIGHWAYS</b>			
<b>TCP(3-2)-13</b>			
FILE:	tcp3-2.dgn	DN:	TxDOT
© TxDOT	December 1985	CONT:	0051
REVISIONS		SECT:	01
2-94	4-98	JOB:	253
8-95	7-13	HIGHWAY:	1H 35
1-97		DIST:	WAC
		COUNTY:	McLENNAN
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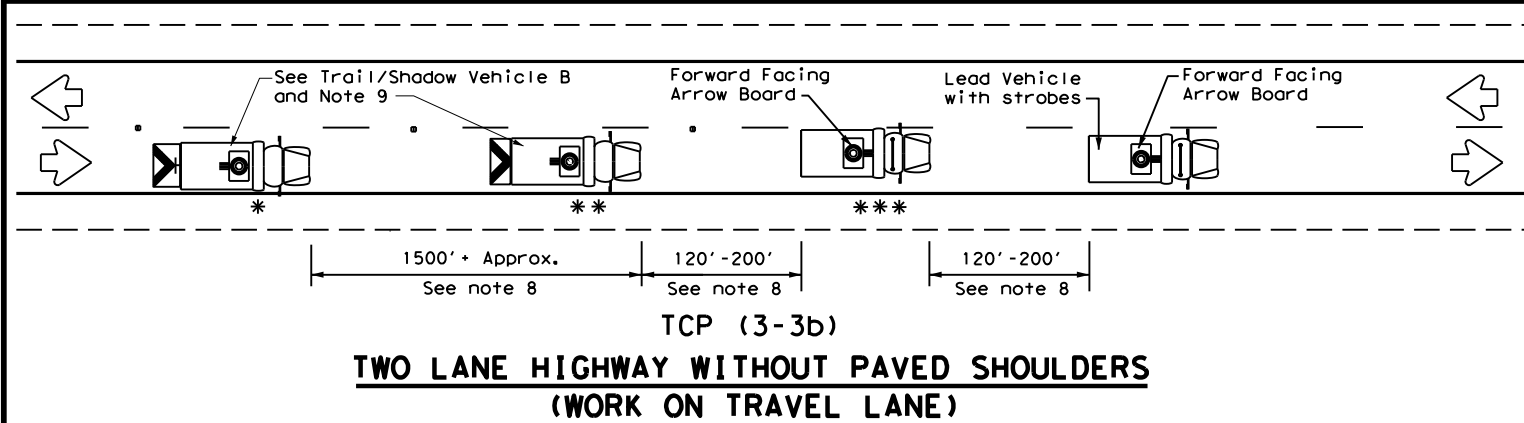


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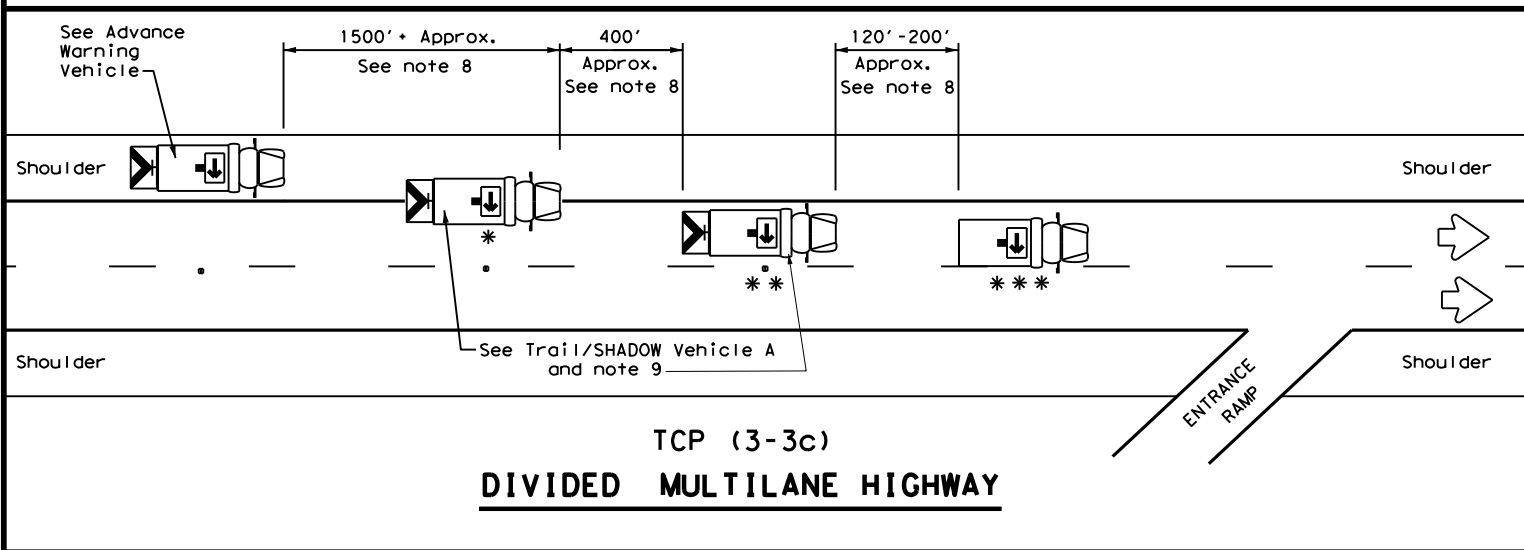
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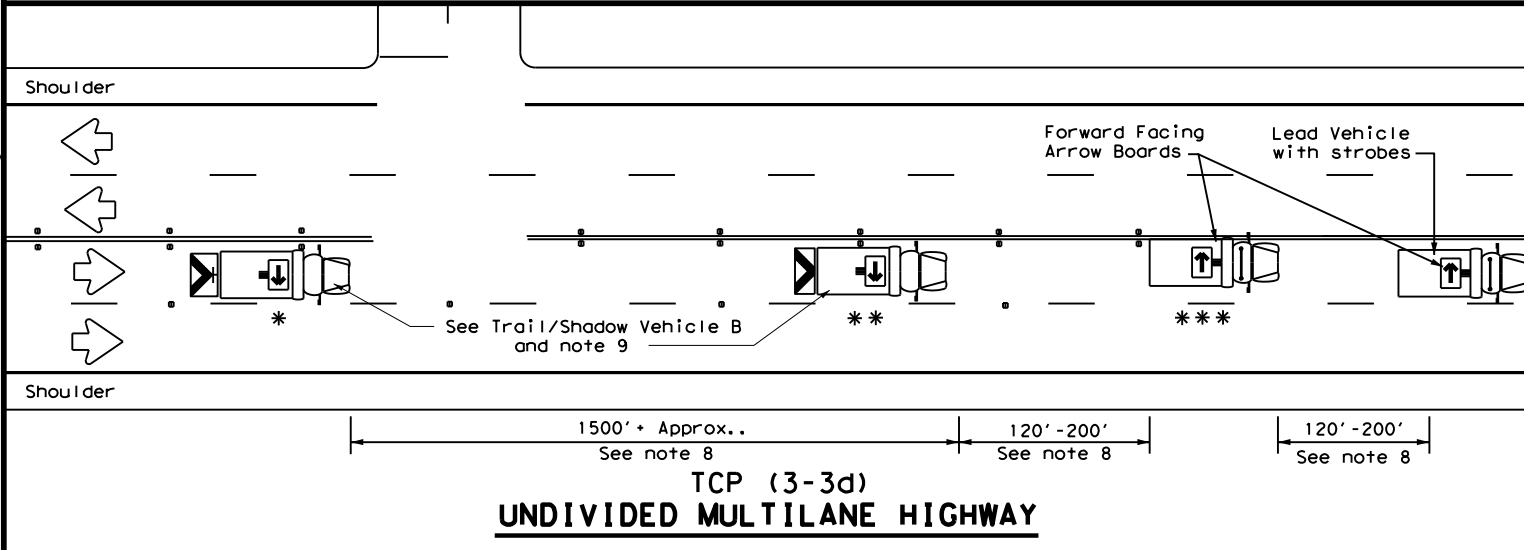
**TCP (3-3a)**  
**TWO LANE HIGHWAY WITH PAVED SHOULDERS**  
**(WORK ON TRAVEL LANE)**



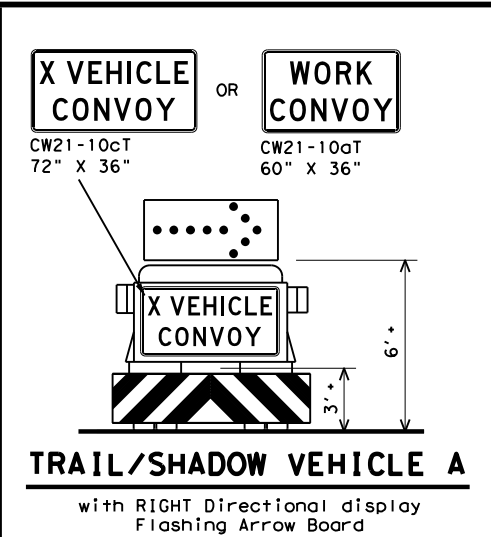
**TCP (3-3b)**  
**TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS**  
**(WORK ON TRAVEL LANE)**



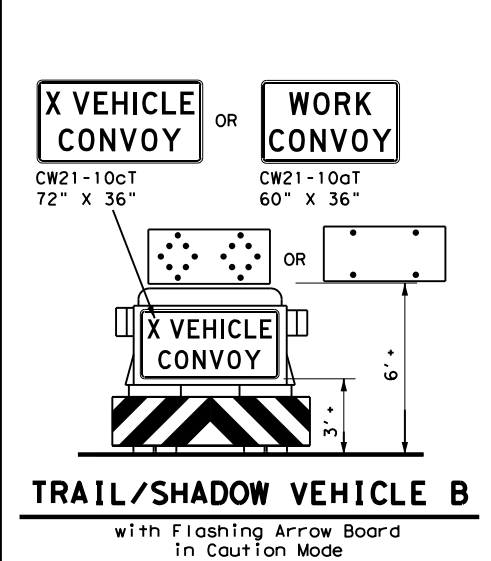
**TCP (3-3c)**  
**DIVIDED MULTILANE HIGHWAY**



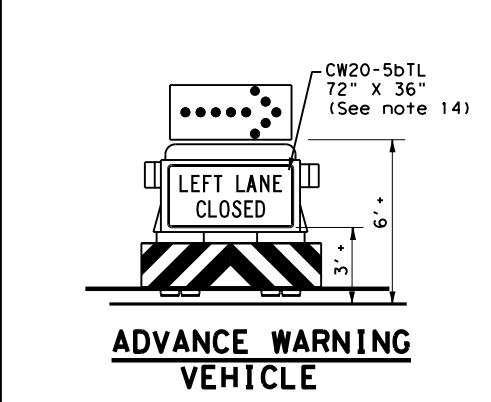
**TCP (3-3d)**  
**UNDIVIDED MULTILANE HIGHWAY**



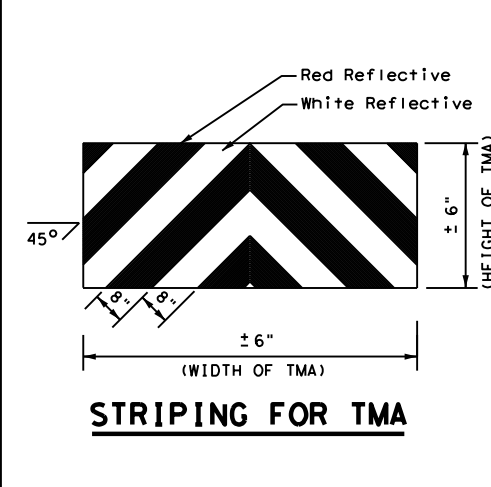
**TRAIL/SHADOW VEHICLE A**  
 with RIGHT Directional display  
 Flashing Arrow Board



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



**ADVANCE WARNING VEHICLE**



**STRIPING FOR TMA**

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

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

**GENERAL NOTES**

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

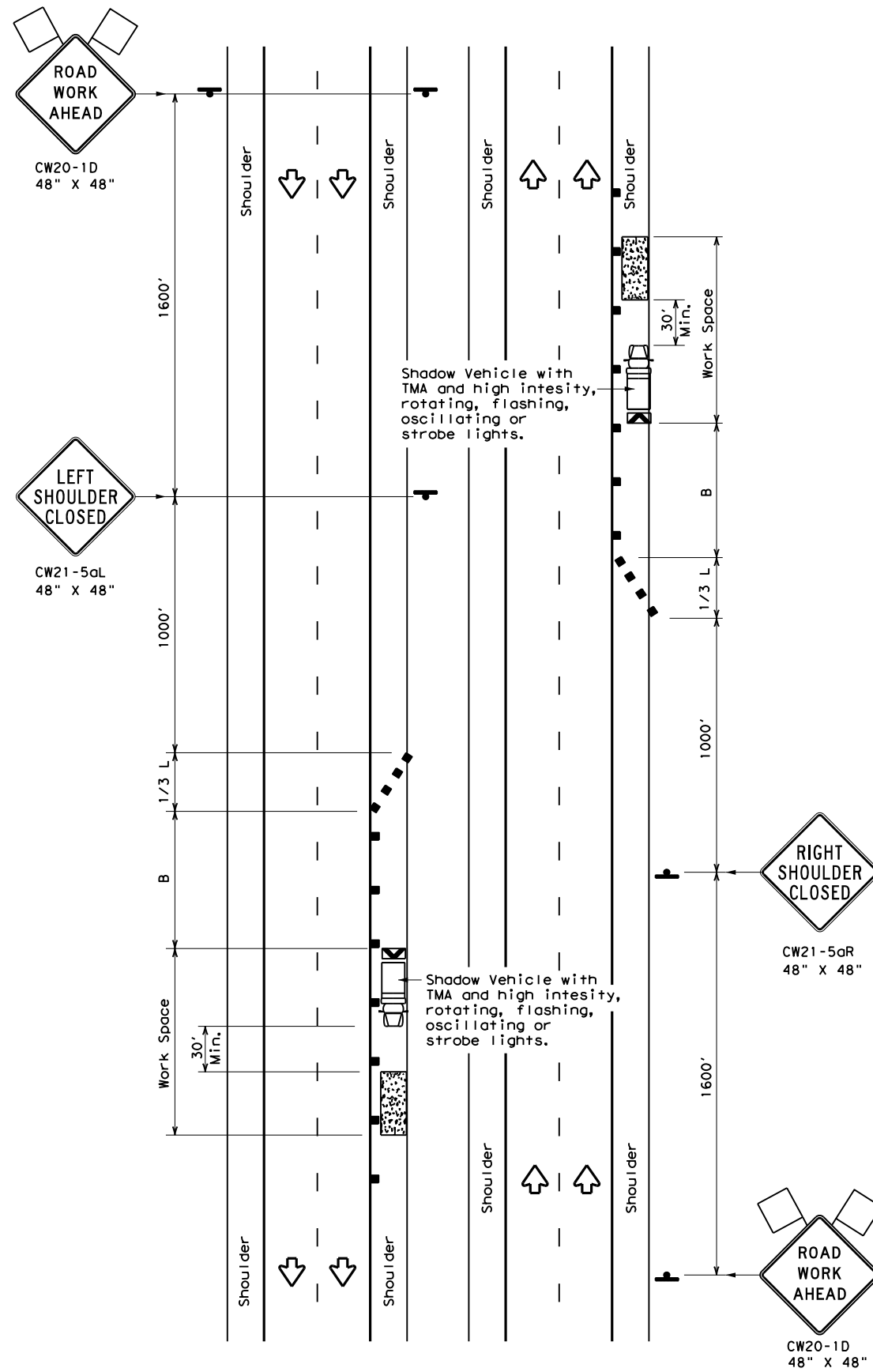
Texas Department of Transportation  
 Traffic Operations Division Standard

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

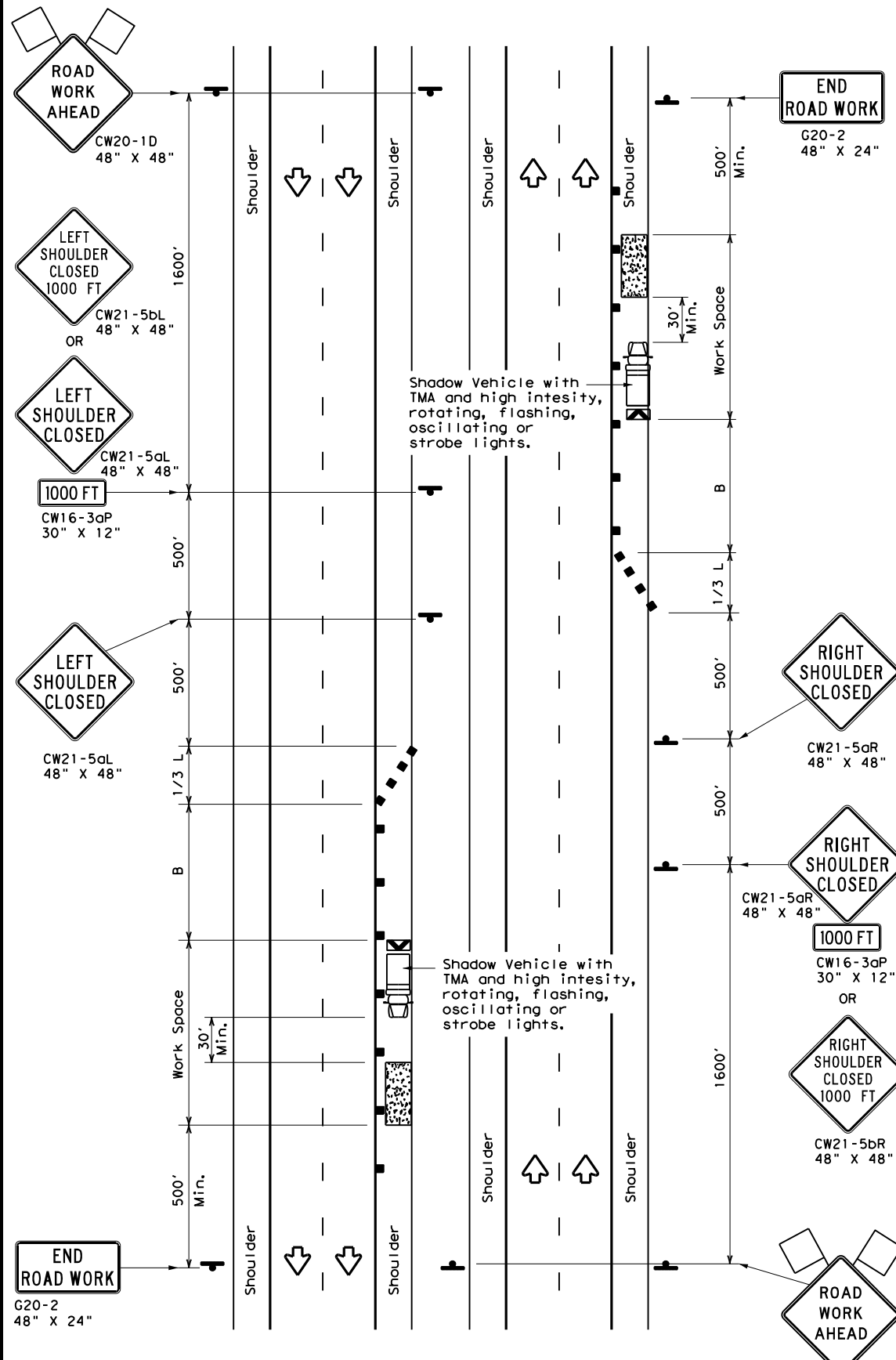
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	WAC	MCLENNAN	24B	
1-97 7-14				

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DATE: 2/6/2023 3:23:52 PM  
 FILE: ...2\_TCP\STD\_TCP\tcp5-1-18.dgn



TCP (5-1a)  
**WORK AREA ON SHOULDER**



TCP (5-1b)  
**WORK AREA ON SHOULDER**

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		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	90'
35		205'	225'	245'	35'	70'	120'
40		265'	295'	320'	40'	80'	155'
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'	

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	TCP (5-1a)	TCP (5-1b)	TCP (5-1b)	

- GENERAL NOTES**
- A Shadow Vehicle with a TMA should be used anytime it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the performance or quality of the work. Type 3 barricades or drums may be substituted when workers on foot are no longer present when approved by the Engineer.
  - 28" tall or taller one-piece cones will be allowed only for Short Duration or Short Term stationary operations when workers are present to maintain the devices upright and in proper location. Intermediate Term stationary work areas should use Drums, Vertical Panels or 42" tall two-piece cones.



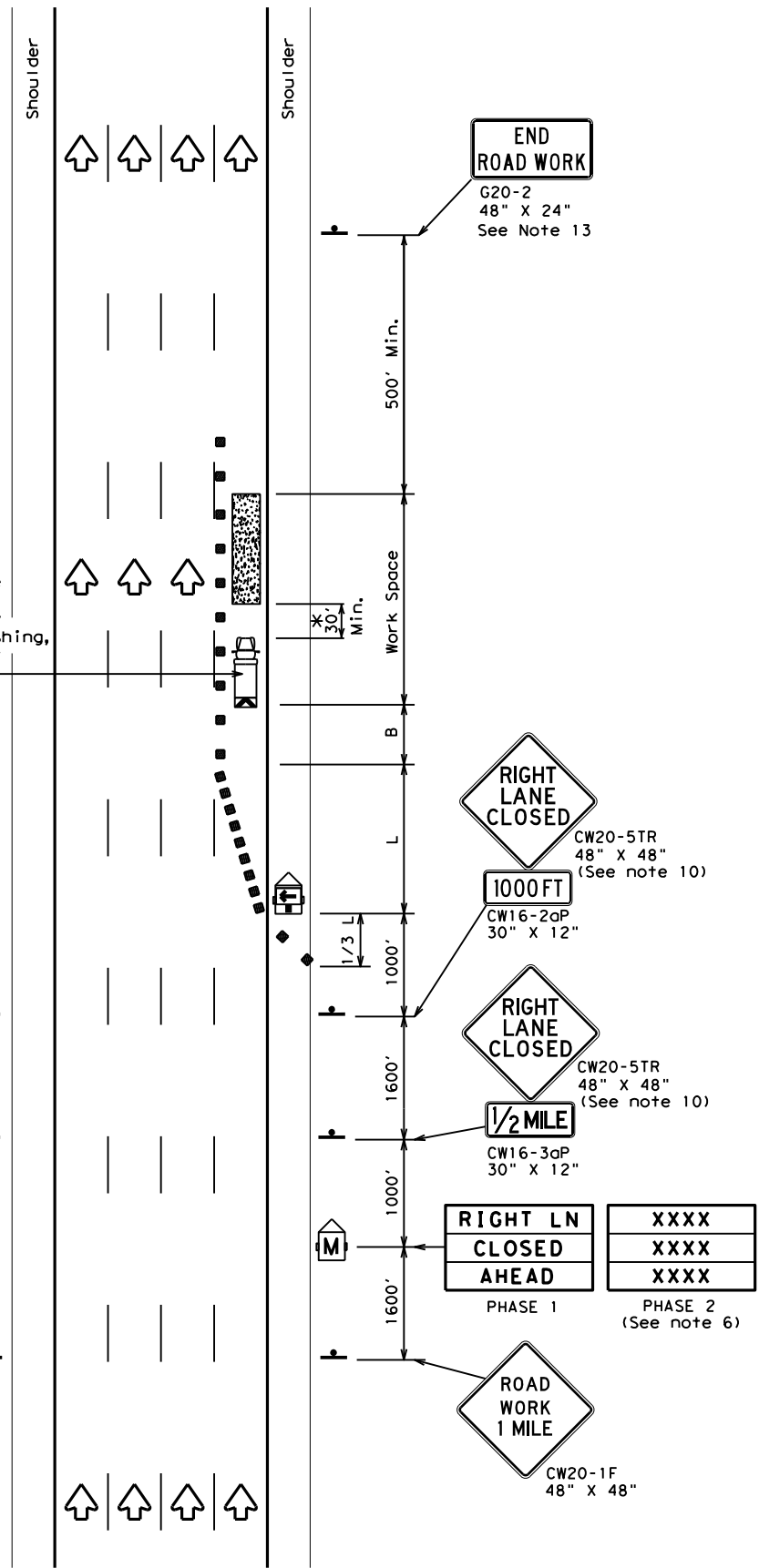
**TRAFFIC CONTROL PLAN  
 SHOULDER WORK FOR  
 FREEWAYS / EXPRESSWAYS**

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

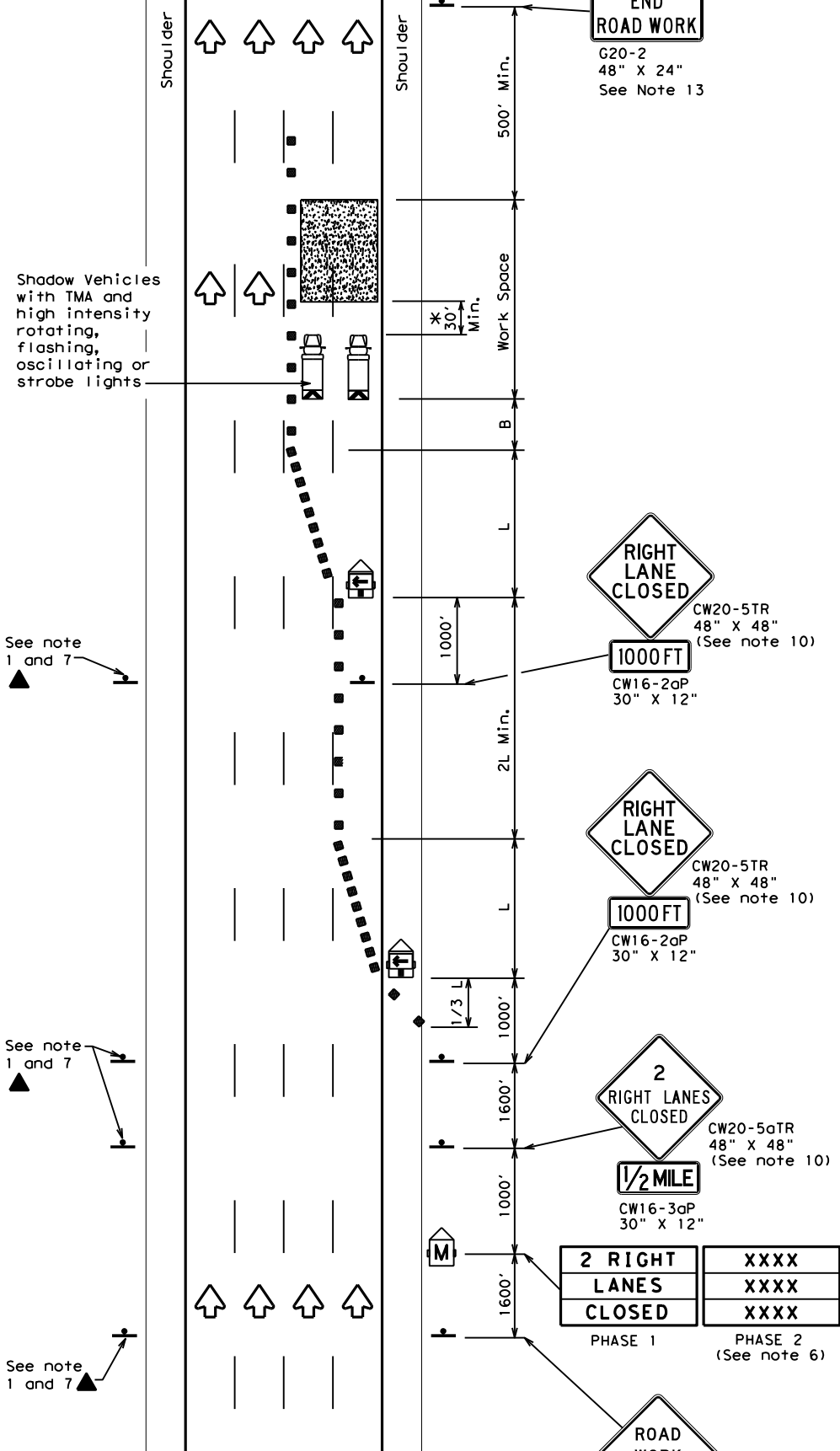
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
2-18	REVISIONS	0015 01	253	IH 35
	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	25	

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DATE: 2/6/2023 3:24:09 PM  
 FILE: ...2\_TCP\STD\_TCP\TCP6-1.dgn



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



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

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

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

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

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

**GENERAL NOTES**

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

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



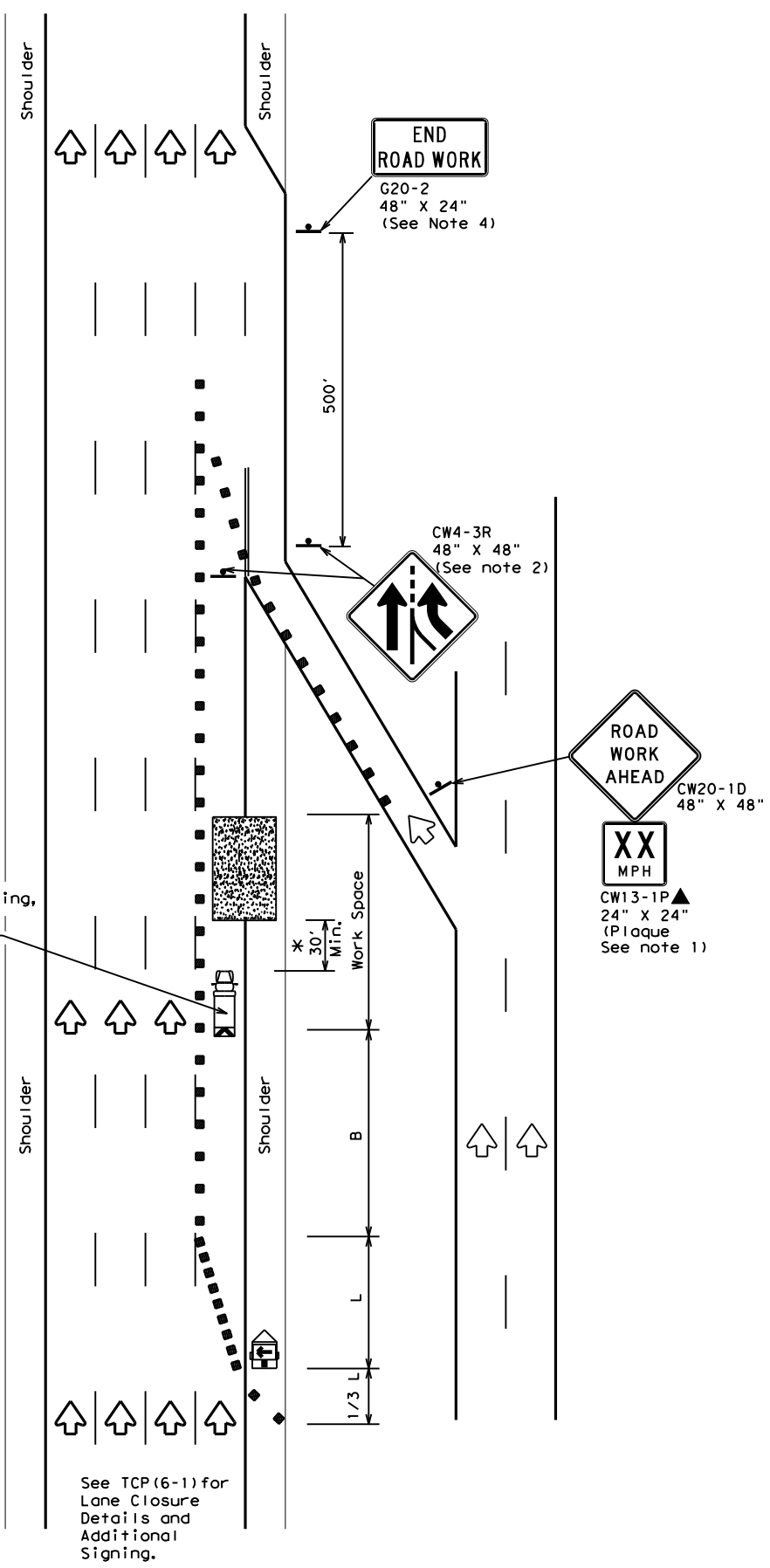
**TRAFFIC CONTROL PLAN  
 FREEWAY LANE CLOSURES**

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

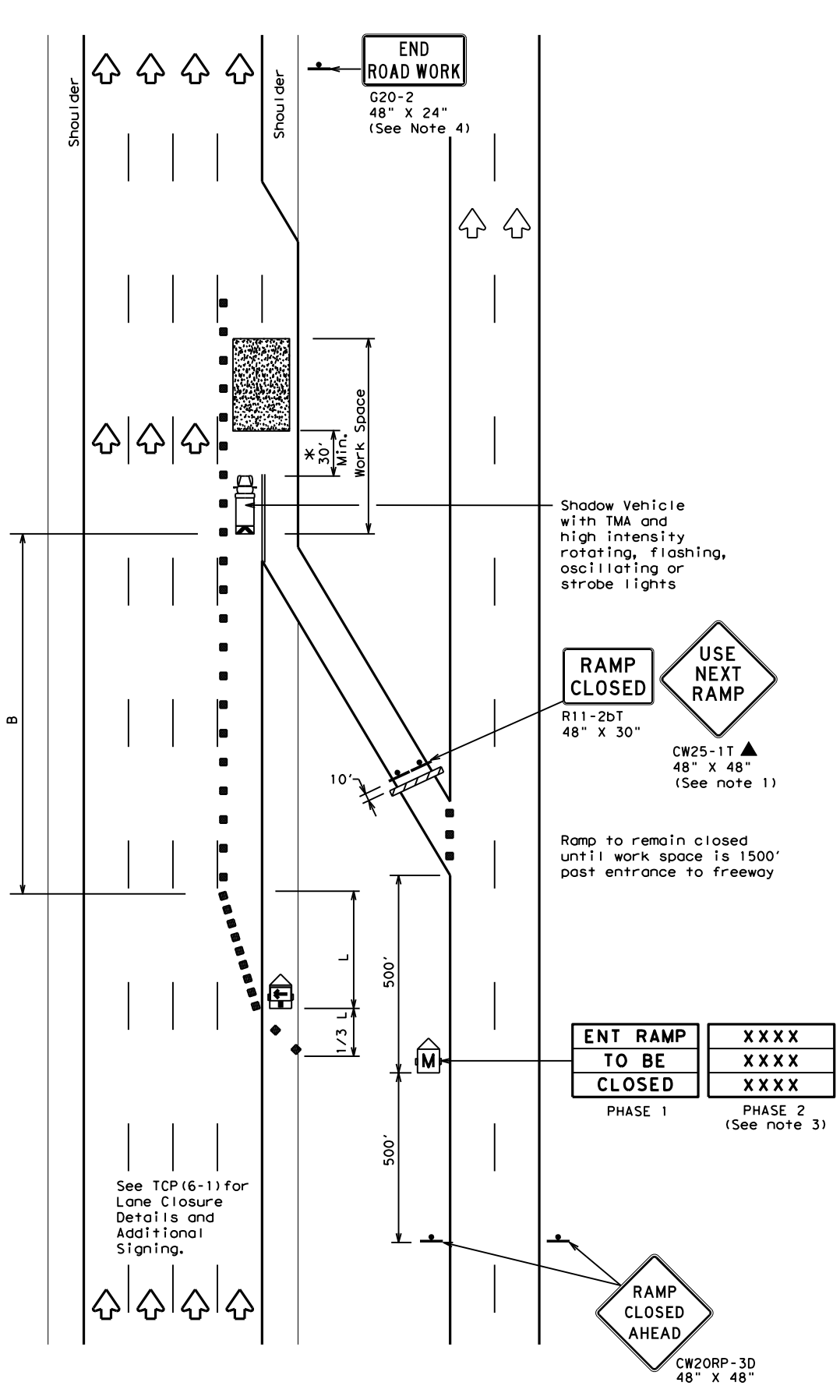
FILE:	tcp6-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	February 1998	CONT	SECT	JOB	HIGHWAY				
8-12	REVISIONS	0015	01	253	IH 35				
	DIST	COUNTY		SHEET NO.					
	WAC	McLENNAN		26					

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DATE: 2/6/2023 3:24:27 PM  
 FILE: ...2\_TCP\STD\_TCP\TCP6-2.dgn



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



TCP (6-2b)  
**ENTRANCE RAMP CLOSED**

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

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

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

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

**GENERAL NOTES**

- All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
- ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and 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.



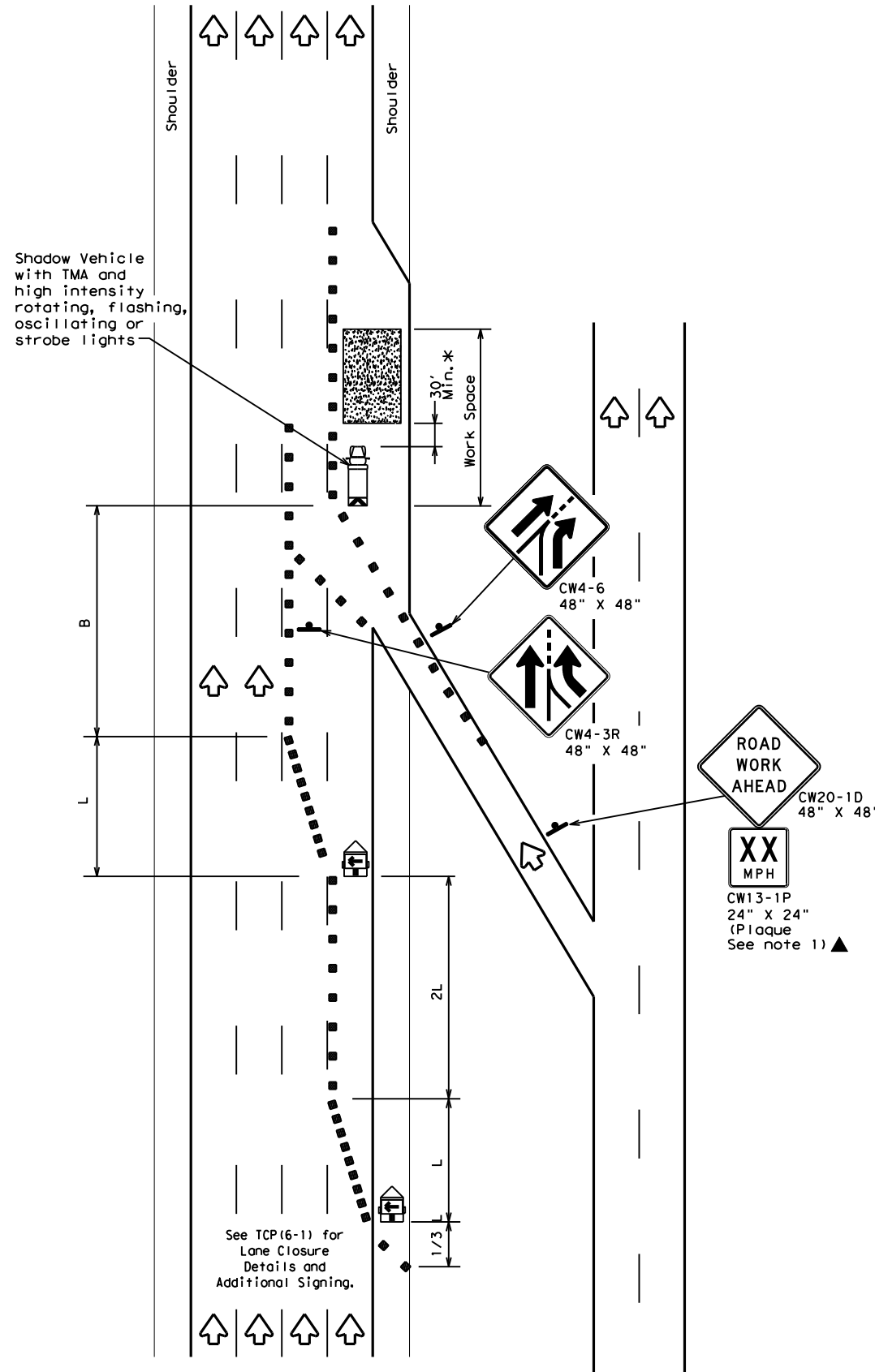
**TRAFFIC CONTROL PLAN**  
**WORK AREA NEAR RAMP**

**TCP (6-2) - 12**

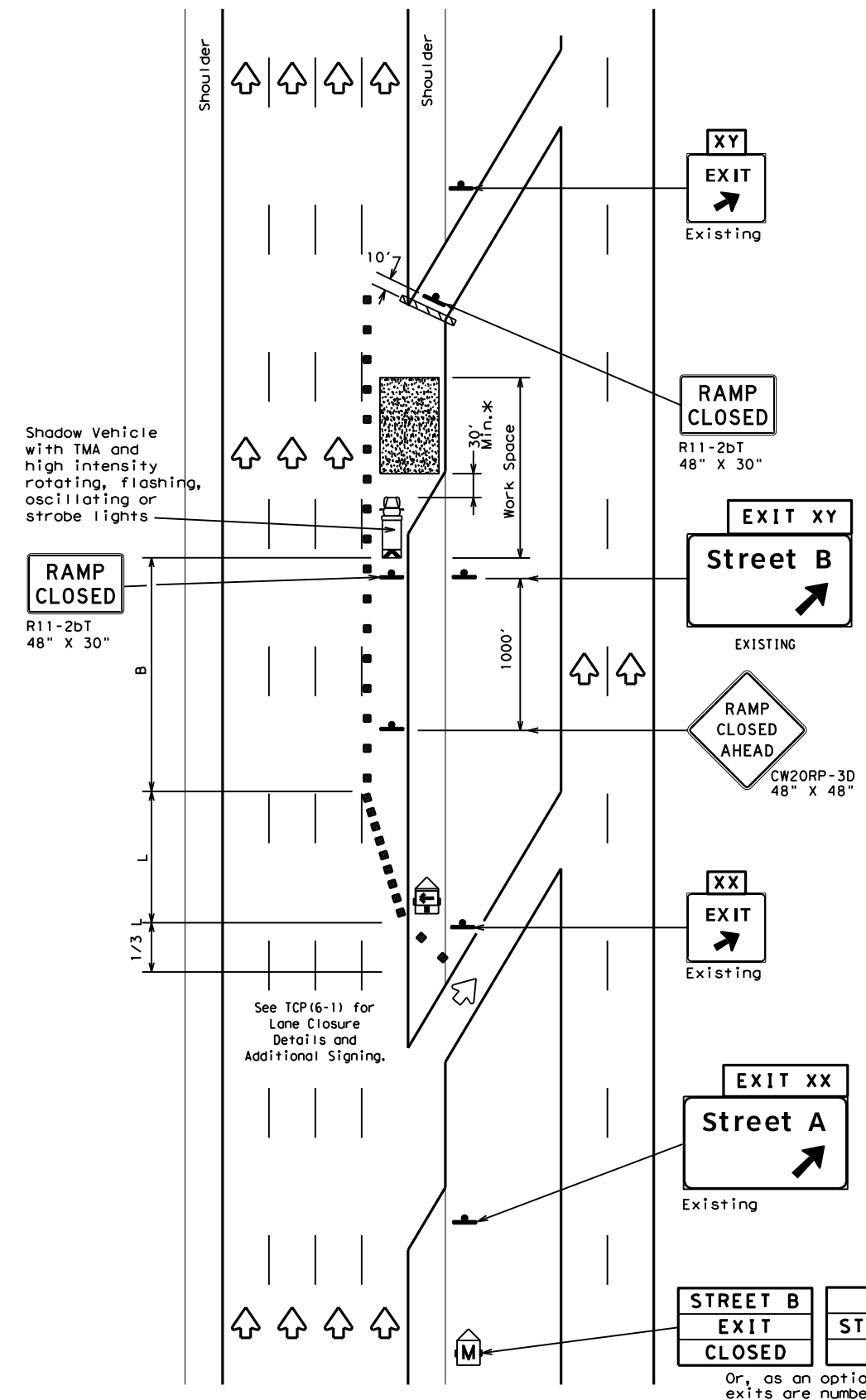
FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WAC	McLENNAN	27	

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DATE: 2/6/2023 3:24:43 PM  
 FILE: ...2\_TCP\STD\_TCP\TCP6-3.dgn



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**

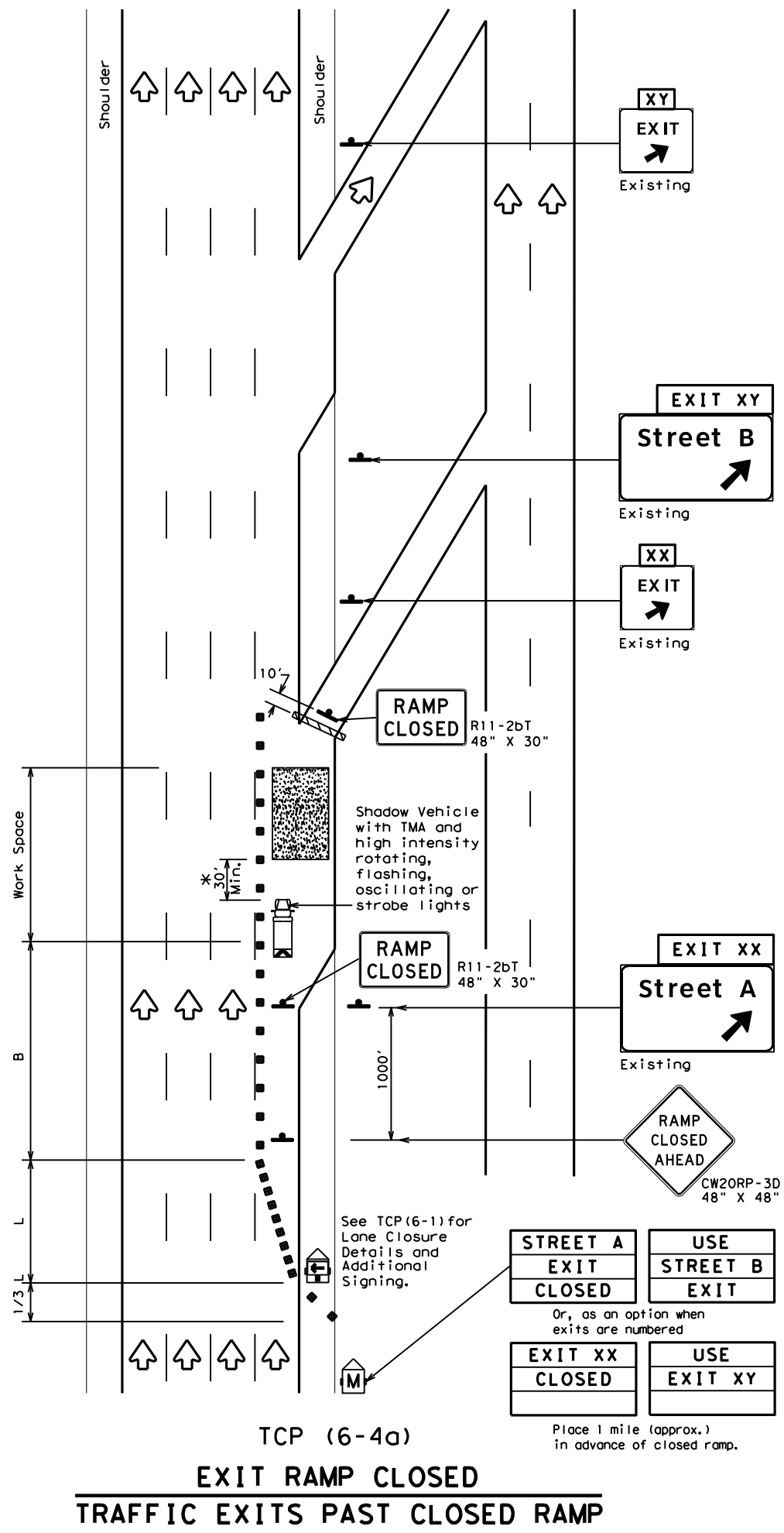
**TCP (6-3) - 12**

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WAC	McLENNAN	28	



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DATE: 2/6/2023 3:24:59 PM  
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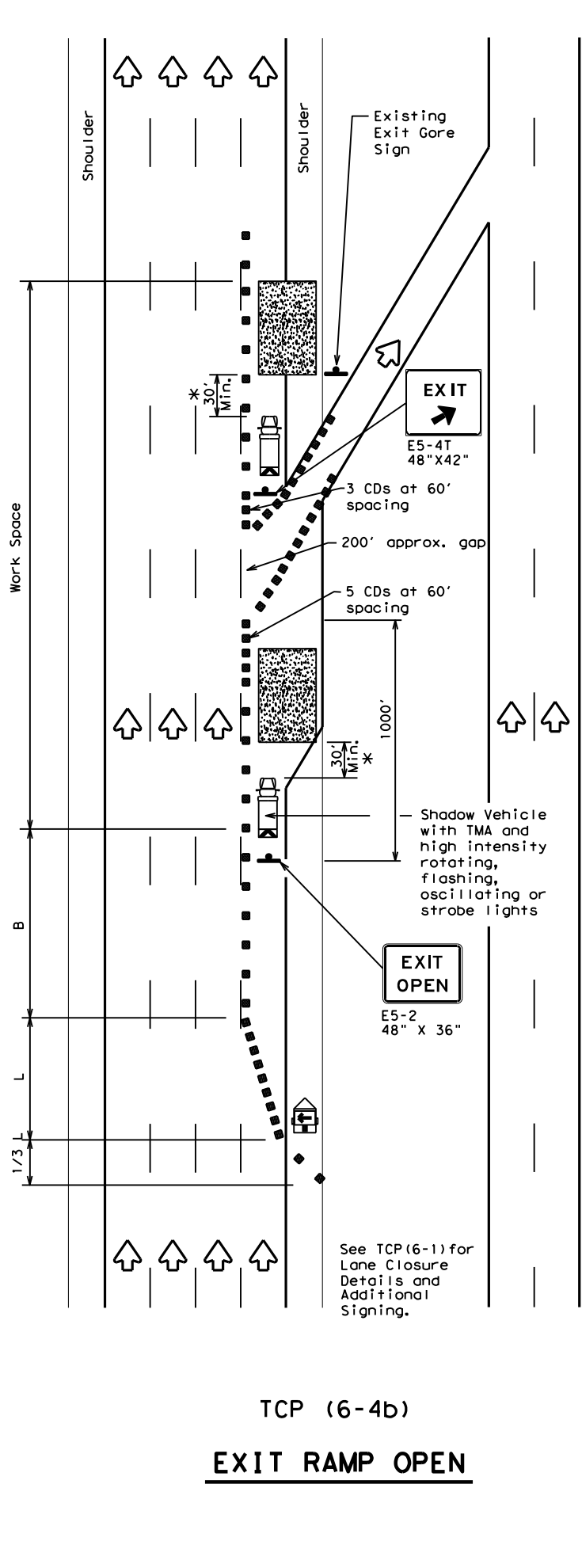


**TCP (6-4a)**  
**EXIT RAMP CLOSED**  
**TRAFFIC EXITS PAST CLOSED RAMP**

STREET A EXIT CLOSED	USE STREET B EXIT
EXIT XX CLOSED	USE EXIT XY

Or, as an option when exits are numbered

Place 1 mile (approx.) in advance of closed ramp.



**TCP (6-4b)**  
**EXIT RAMP OPEN**

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

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

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

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

**GENERAL NOTES**

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

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

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

Texas Department of Transportation  
 Traffic Operations Division Standard

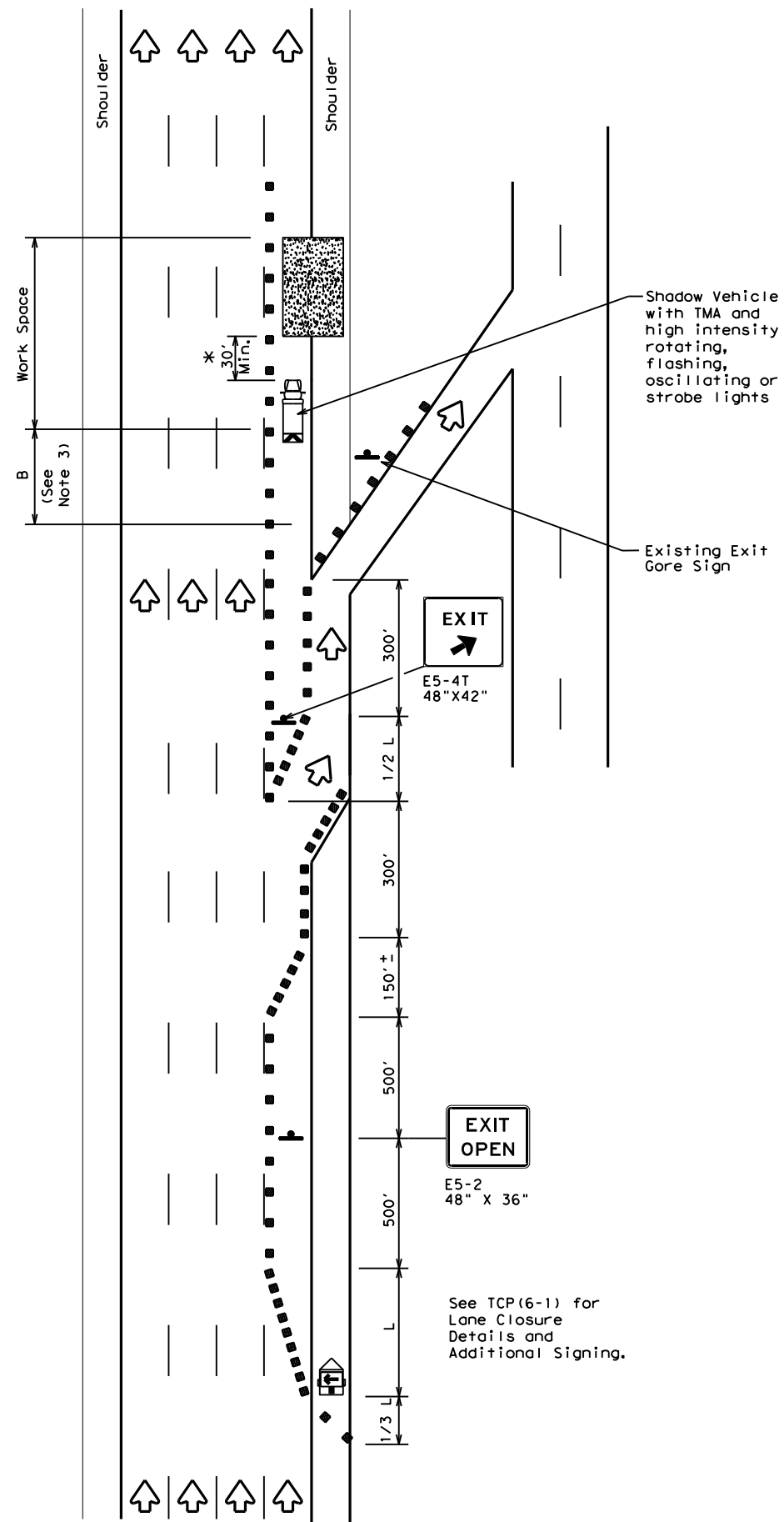
**TRAFFIC CONTROL PLAN**  
**WORK AREA AT EXIT RAMP**

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

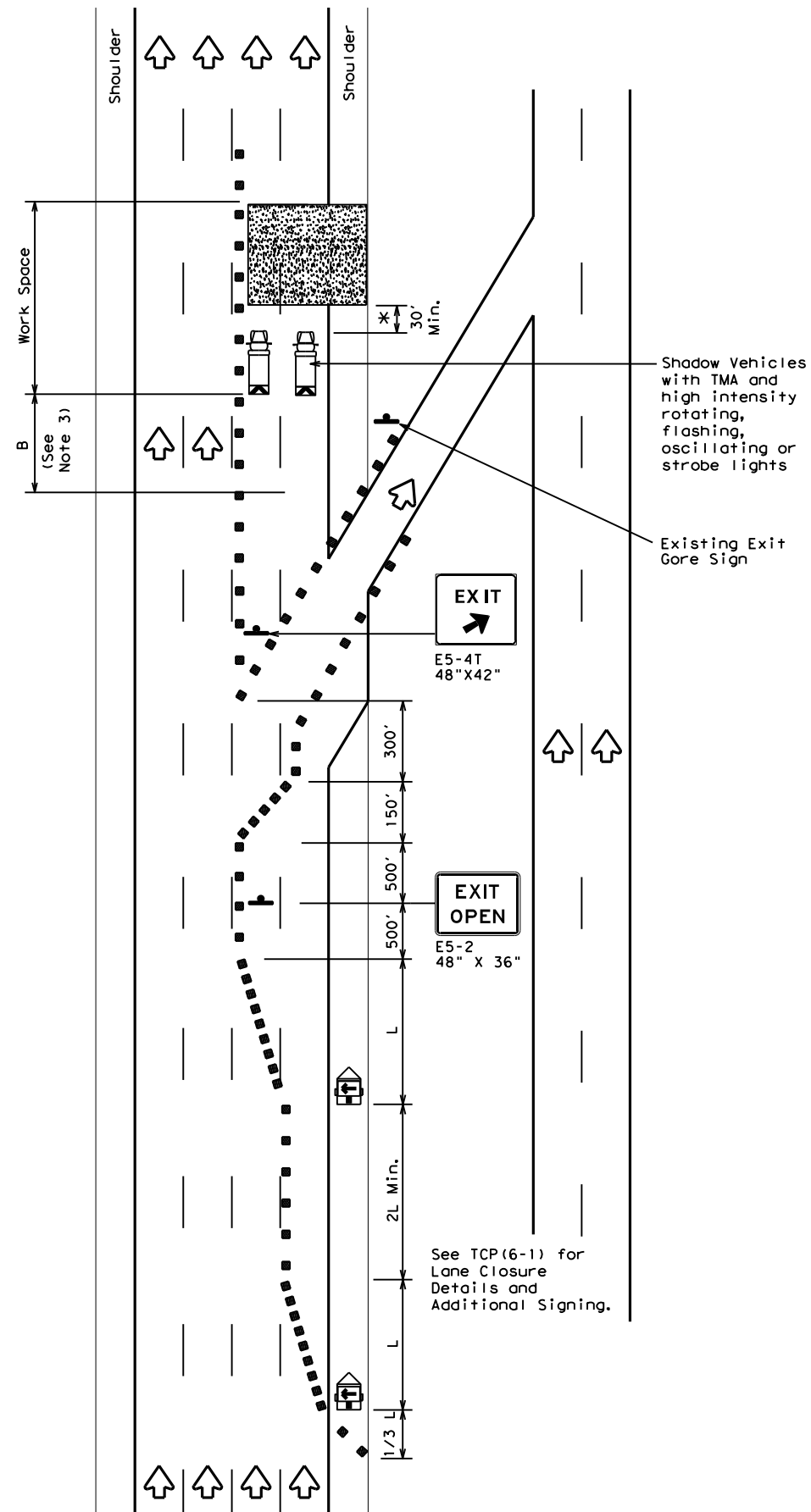
FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WAC	McLENNAN	29	

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DATE: 2/6/2023 3:25:14 PM  
 FILE: ...2\_TCP\STD\_TCP\tcp6-5.dgn



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



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

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

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

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

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

**GENERAL NOTES**

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

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

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



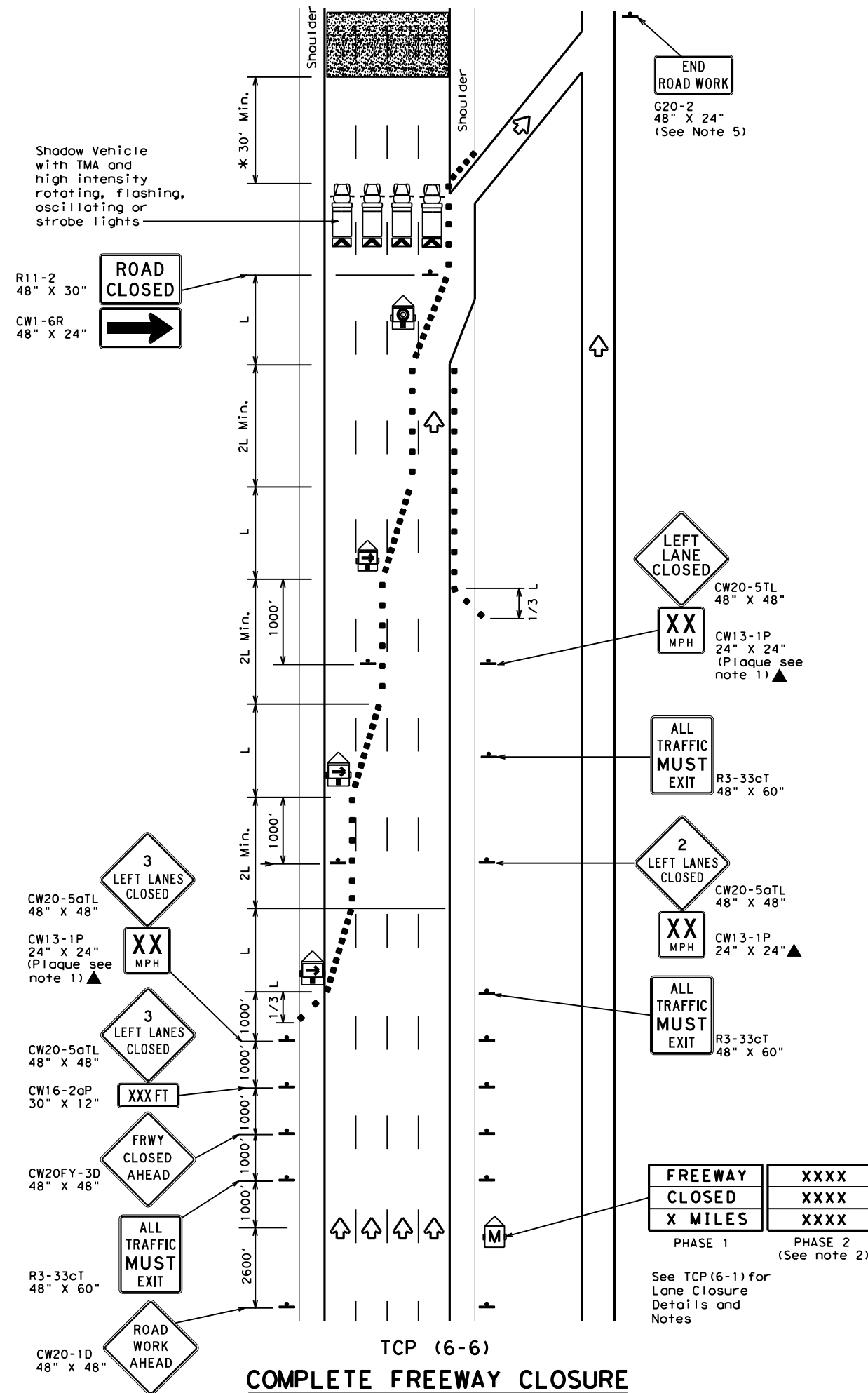
**TRAFFIC CONTROL PLAN  
 WORK AREA BEYOND EXIT RAMP**

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

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WAC	McLENNAN	30	

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DATE: 2/6/2023 3:25:28 PM  
 FILE: ...\\2...TCP\STD\_TCP\_tcp6-6.dgn



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

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

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

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

**GENERAL NOTES**

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

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

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



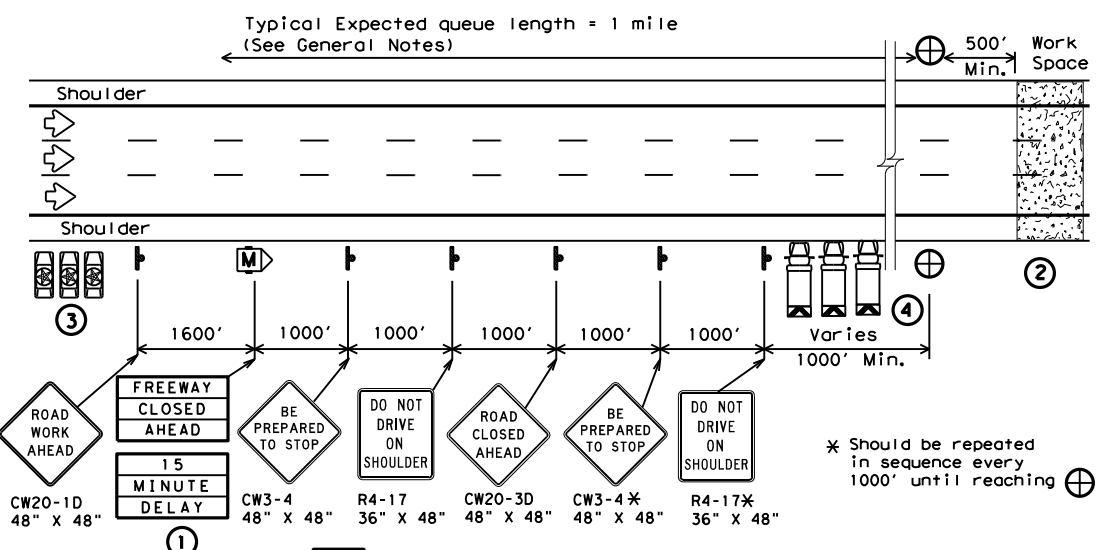
**TRAFFIC CONTROL PLAN  
 FREEWAY CLOSURE**

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

FILE: tcp6-6.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 8-98	DIST	COUNTY	SHEET NO.	
4-98 8-12	WAC	McLENNAN	31	

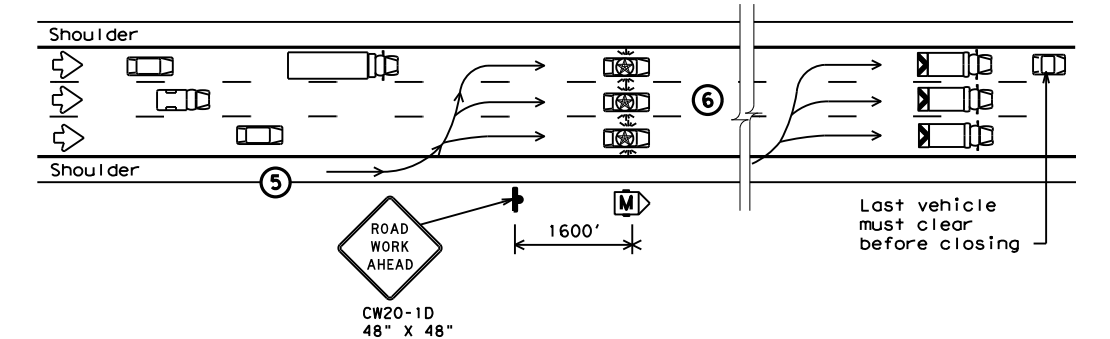
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2/6/2023 3:25:44 PM  
 FILE: ...2...TCP\STD\_TCP\tcp6-7.dgn



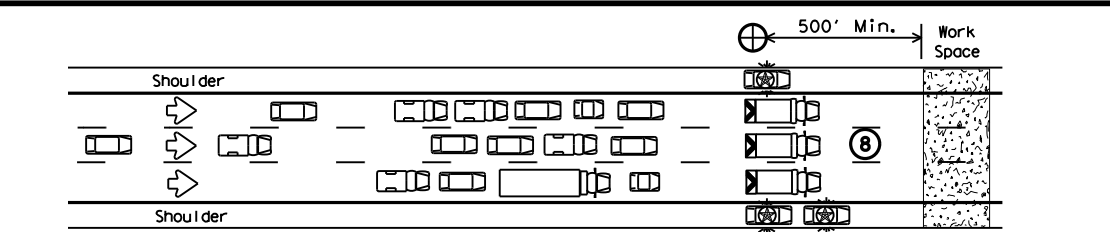
### 1 STARTING POSITION

- ① Traffic control devices should be installed or located near their intended position prior to beginning temporary roadway closure sequence. Duplicate signs should be erected on the median side of the roadway when median width permits. Warning signs should not be placed on the paved shoulders that will be used by the WARNING LEOV, or where movement of the LEOVs or barrier vehicles will be impeded.
- ② Prior to beginning the roadway closure sequence, all equipment, materials, personnel, and other items necessary to complete the work should be gathered near the work area. Entrance ramps located in the area where a queue is expected to build should be closed.
- ③ There should be one LEOV for every lane to be controlled, plus a minimum of one to warn traffic approaching a queue. An additional lead law enforcement officer is desirable to remain with the Engineer's or Contractor's point of contact (POC) during the operation in order to improve communication with all LEOVs involved.
- ④ One barrier vehicle with a Truck Mounted Attenuator and amber or blue and amber high intensity flashing/oscillating/strobe lighting shall be used for each lane to be closed.



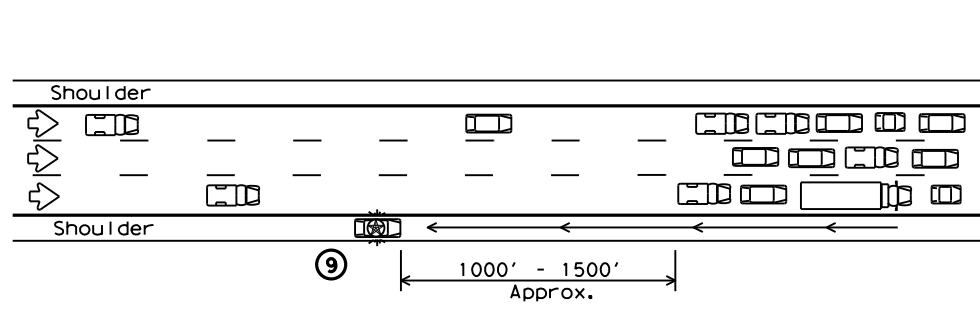
### 2 REDUCING SPEED OPERATION

- ⑤ Starting position of the LEOVs should be in advance of the most distant warning signs.
- ⑥ Once the LEOVs have achieved an abreast blocking formation while traveling toward the CP, emergency lights and headlights should be turned "ON". The LEOVs should maintain formation, not allow traffic to pass, and begin to decelerate. The LEOVs should continue to decelerate, giving the barrier vehicles opportunity to be staged upstream of the work space after traffic has cleared. The LEOVs should then continue to decelerate slowly until bringing traffic to a stop near the barrier vehicles.



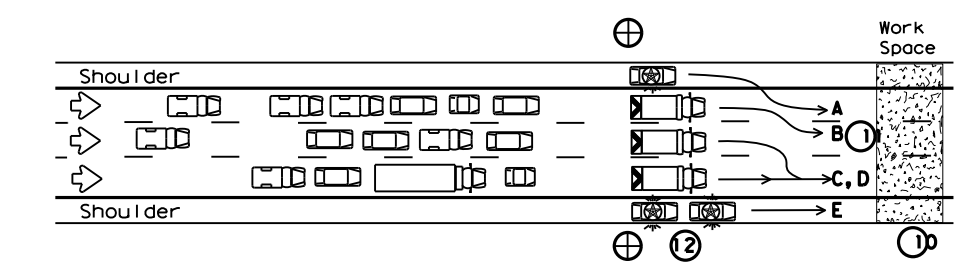
### 3 ALL TRAFFIC STOPPED AT CP

- ⑦ Once traffic is stopped the LEOVs should park on the shoulders with emergency lighting "ON" in order to provide law enforcement presence at the closure and keep shoulders blocked ahead of the work space. They should stay in radio contact with the WARNING LEOV.
- ⑧ The barrier vehicles should be parked, one in each lane, the parking brake set, with the high visibility flashing/oscillating/strobe lighting "ON," and the transmission in gear.



### 4 WARNING THE TRAFFIC QUEUE

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



### 5 RELEASING STOPPED TRAFFIC

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

LEGEND			
■	Channelizing Devices	⊕	Control Position (CP)
M	Portable Changeable Message Sign (PCMS)	⊠	Barrier Vehicle with Truck Mounted Attenuator
Ⓣ	Law Enforcement Officer's Vehicle (LEOV)	←	Traffic Flow

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

### GENERAL NOTES

1. All traffic control devices shall conform with the latest edition of the Texas Manual on Uniform Traffic Control Devices (TMUTCD). Additional guidelines for traffic control devices may be found in the TMUTCD. Signs conflicting with the roadway closure sequence should be completely removed or covered. Additional traffic control devices may be required for closure of access roads, cross streets, exit and entrance ramps as directed by the Engineer.
2. Law enforcement officers and all workers involved should review and understand all procedures before the roadway closure sequence begins. Pre-work meetings may be held for this purpose. Local emergency services and media should have advance notification of roadway closure, expected dates and approximate times of closures.
3. Law enforcement officers shall be in uniform and have jurisdiction in the locale of the work area. An additional WARNING Law Enforcement Officer's Vehicle (LEOV) may be used on the median side of the roadway where median shoulder width permits (See sequence #9).
4. The roadway closure should be during off-peak hours, as shown in the plans, or as directed by the Engineer.
5. Work should be limited to approximately 15 minutes maximum duration unless otherwise directed by the Engineer based on existing roadway conditions. If the work is not complete within 15 minutes, or if the end of the traffic queue extends past the most distant advance warning signs, the work area should be cleared of all equipment, materials, personnel, and other items, and the roadway reopened. When the queue has dissipated and the traffic flow appears normal the roadway closure sequence may be repeated.
6. For traffic volumes greater than 1000 Passenger Cars Per Hour Per Lane (PCPHPL), or for roadway closures that exceed 15 minutes, see details elsewhere in the plan.
7. If traffic queues beyond the advance warning signs during one road closure sequence, the advance warning should be extended prior to repeating the road closure sequence. When possible, PCMS signs should be located in advance of the last available exit prior to the closure to allow motorists the choice of an alternate route.

THIS PLAN IS INTENDED TO BE USED AT LOCATIONS/TIMES WHEN TRAFFIC VOLUMES ARE LESS THAN 1000 PASSENGER CARS PER HOUR PER LANE.

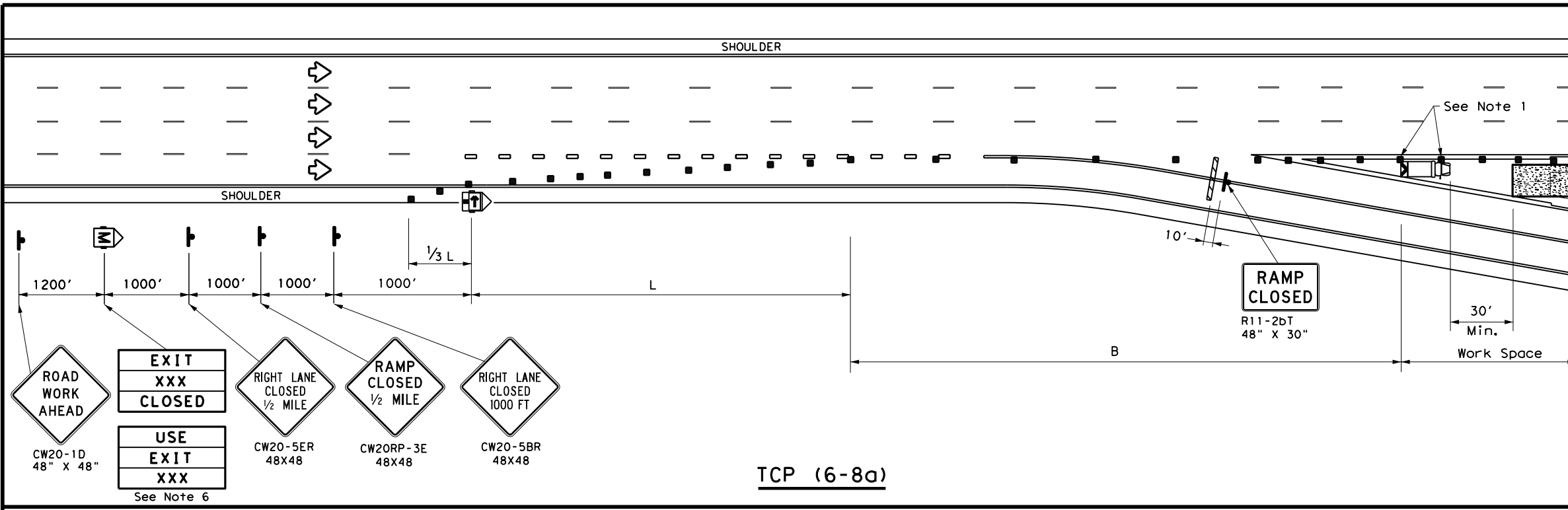
**TRAFFIC CONTROL PLAN**  
**SHORT DURATION FREEWAY**  
**CLOSURE SEQUENCE**

**TCP (6-7) - 12**

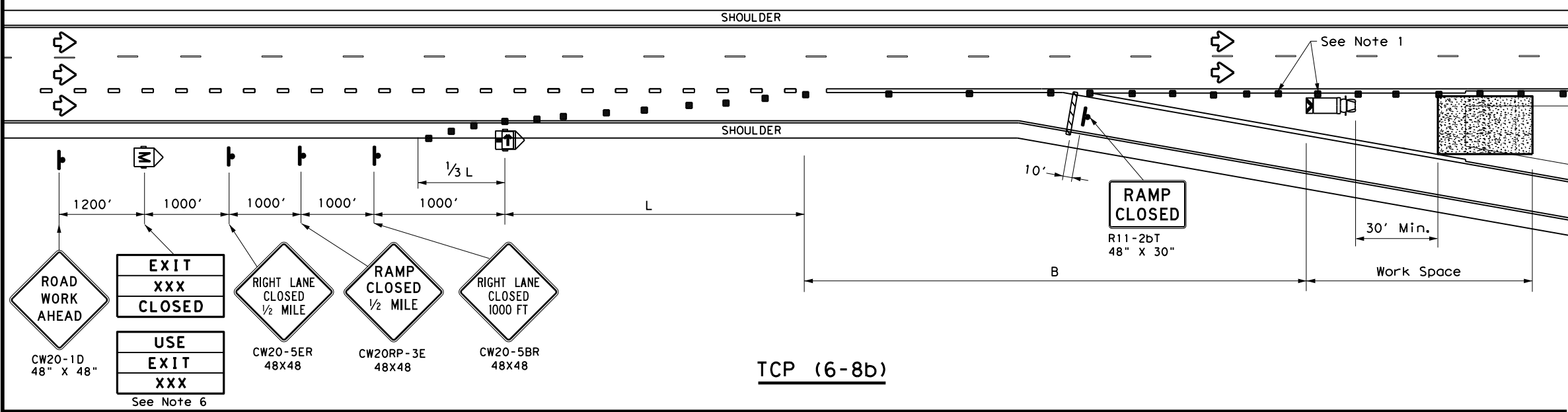
FILE: tcp6-7.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
1-97 8-12	DIST	COUNTY	SHEET NO.	
4-98	WAC	McLENNAN	32	

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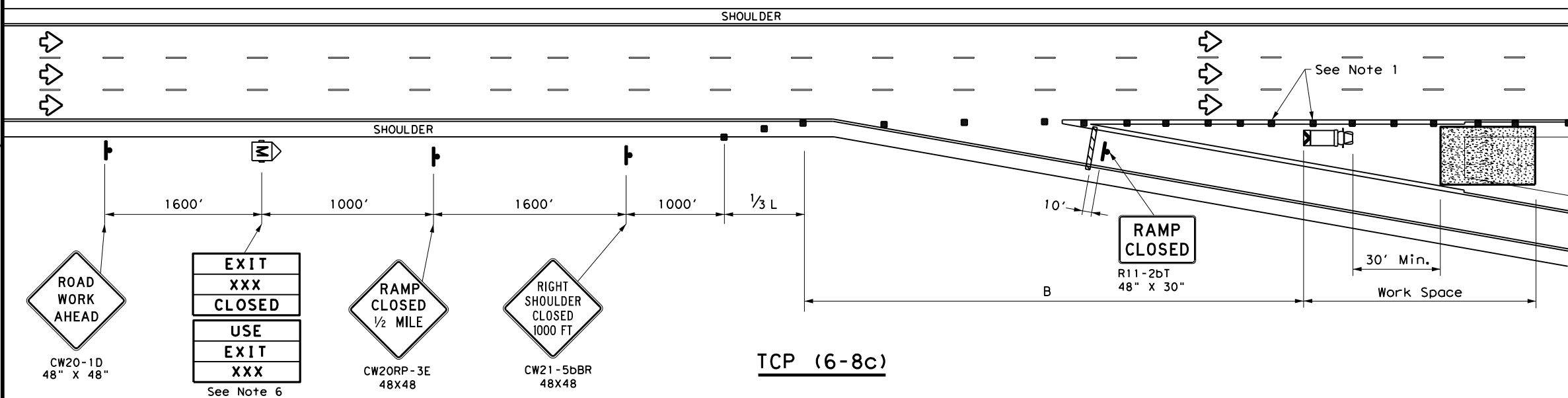
DATE: 2/6/2023 3:25:58 PM  
 FILE: ...2\_TCP\STD\_TCP.tcp6-8.dgn



TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

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

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

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

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

- GENERAL NOTES**
- Place channelizing devices in the gore at 20' spacing.
  - See the Standard Highway Sign Design for Texas (SHSD) for sign details.
  - The PCMS may be omitted when a permanent DMS sign 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.
  - Truck mounted attenuator is required.
  - The PCMS may be omitted if replaced with a "RAMP CLOSED" AHEAD (CW2ORP-3D) Sign.
  - Roadway ADT should be greater than 10,000.

Texas Department of Transportation  
 Traffic Operations Division Standard

**WORK IN EXIT GORE FOR ADT GREATER THAN 10,000**

**TCP (6-8) - 14**

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
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	WAC	McLENNAN	33	

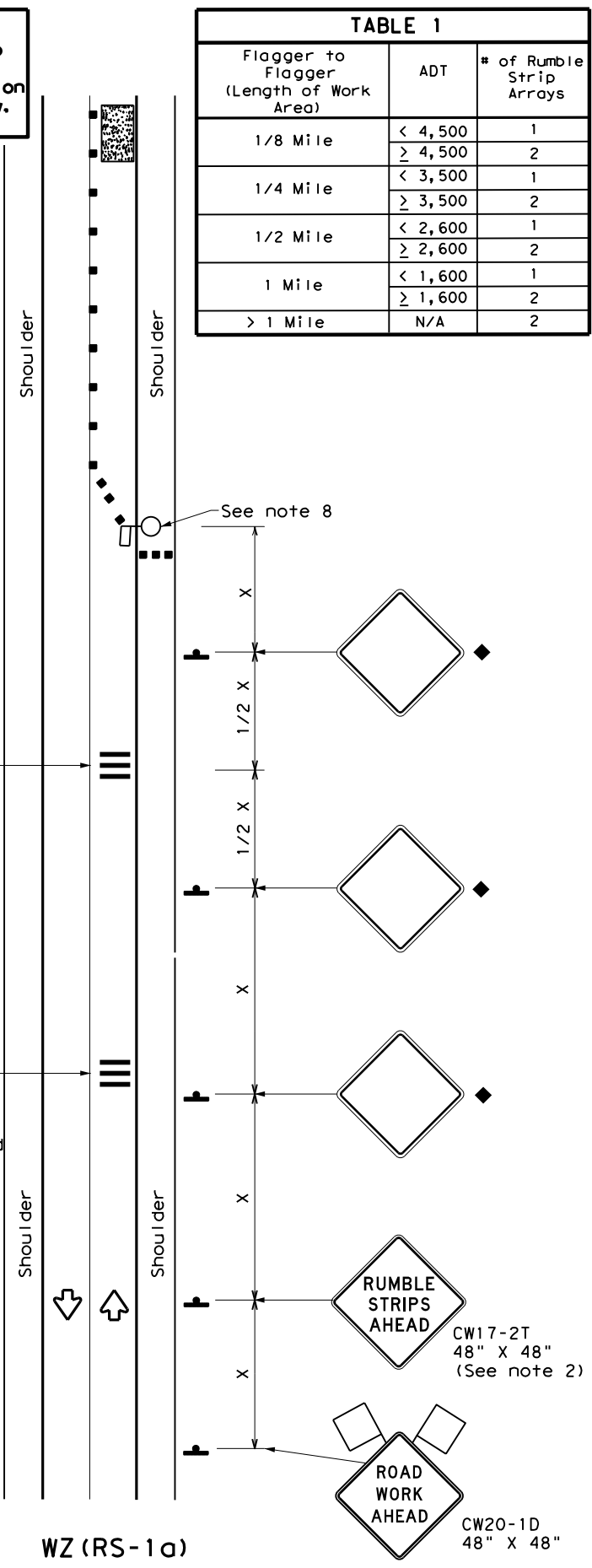


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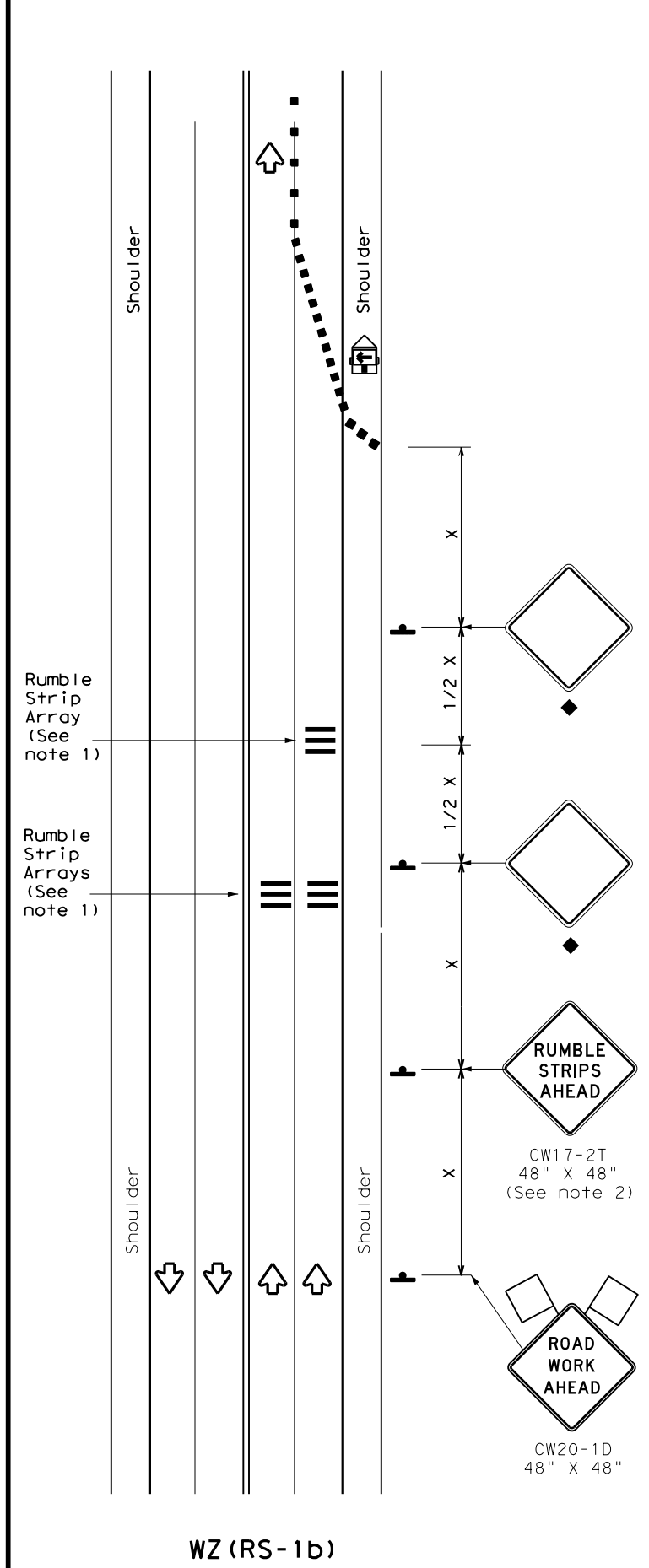
DATE: 2/6/2023 3:26:15 PM  
 FILE: ...\\2...TCP\STD\_TCP\wzrs22.dgn

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

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



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



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

**GENERAL NOTES**

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

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

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

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

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

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

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

Texas Department of Transportation  
 Traffic Safety Division Standard

## TEMPORARY RUMBLE STRIPS

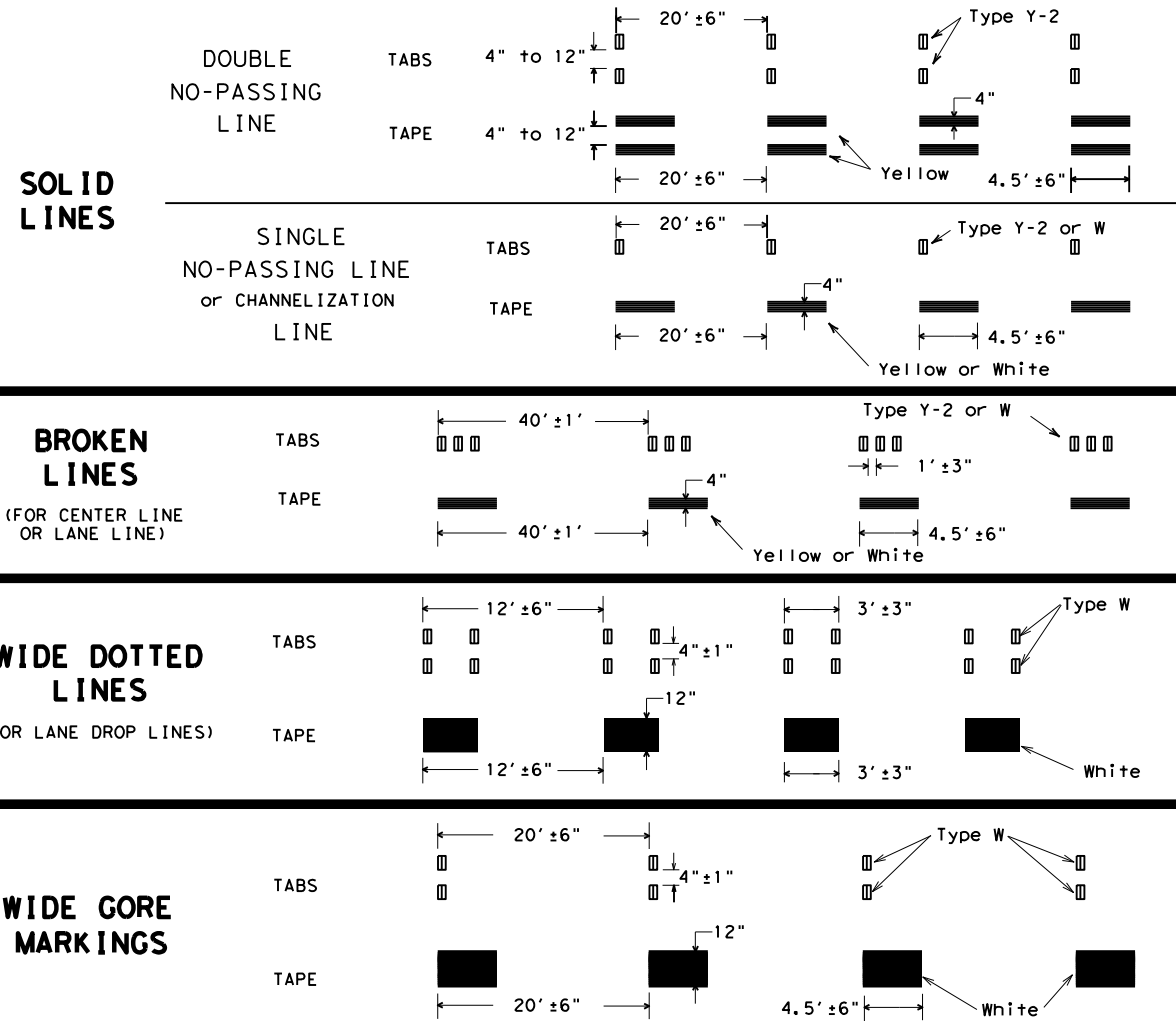
### WZ (RS) - 22

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© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	WAC	McLENNAN	34	

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DATE: 2/6/2023 3:26:29 PM  
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### WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



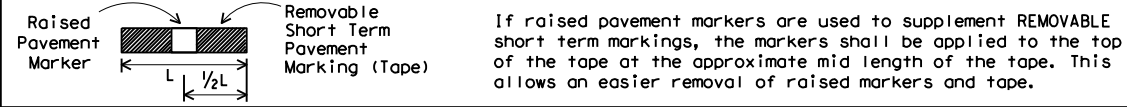
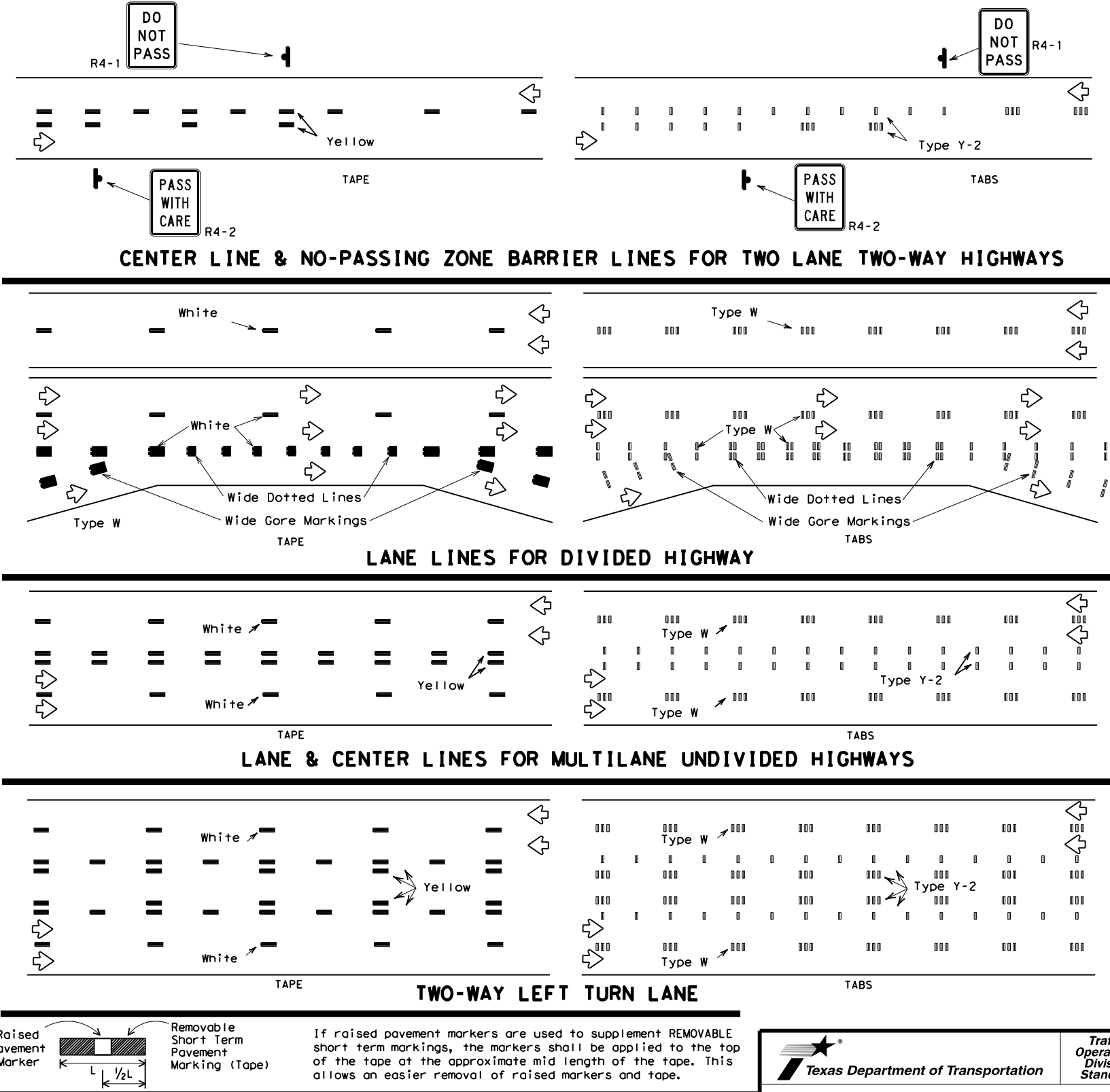
#### NOTES:

- 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](http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm)



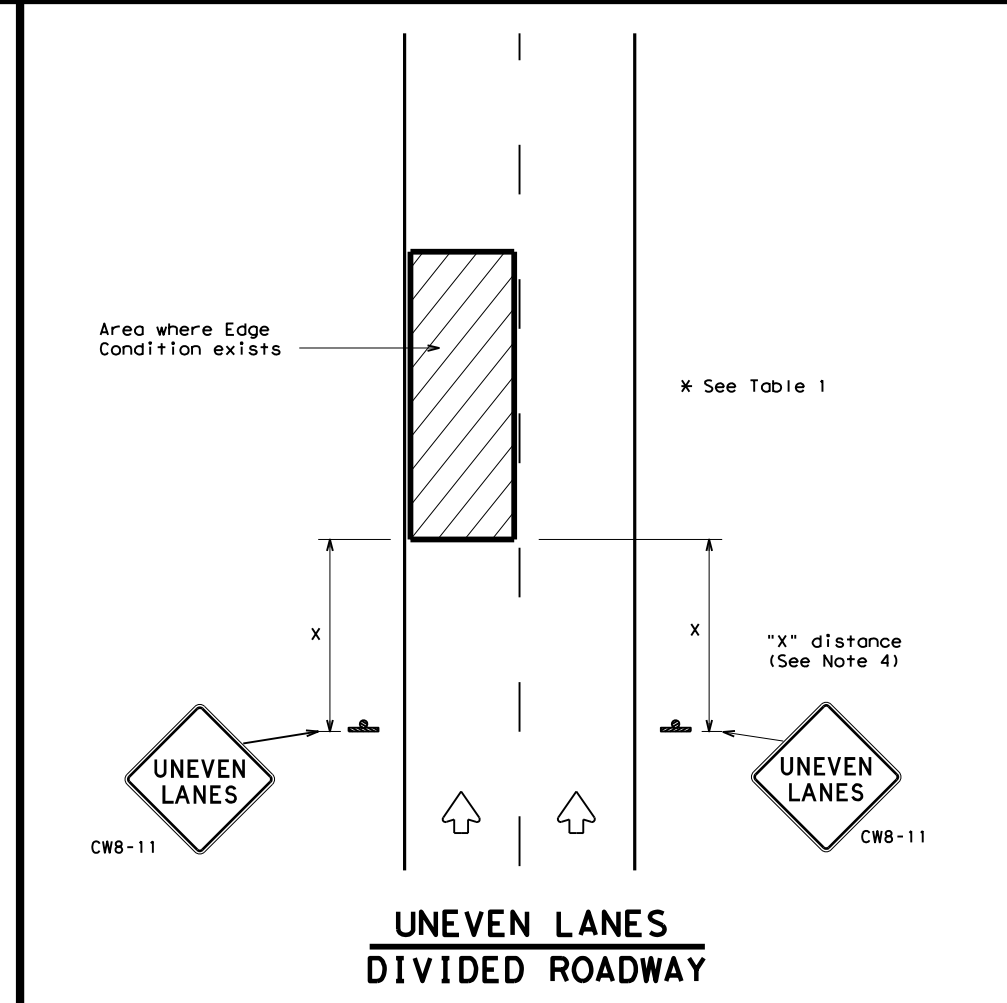
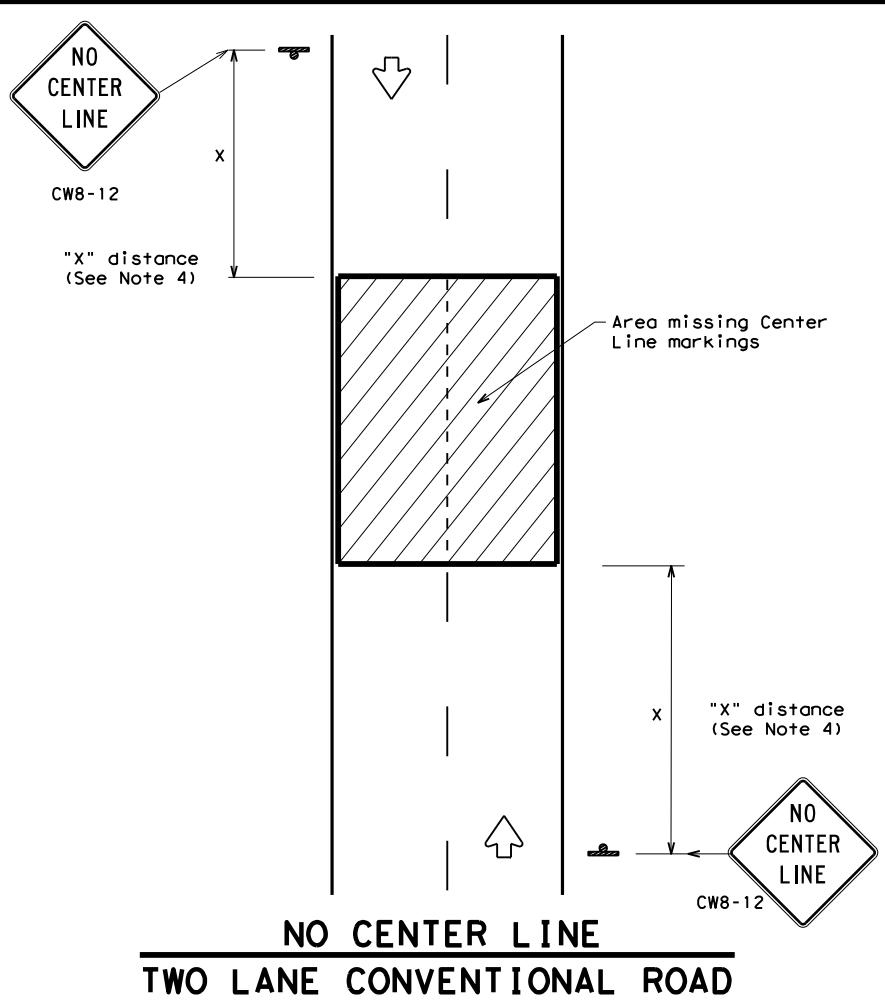
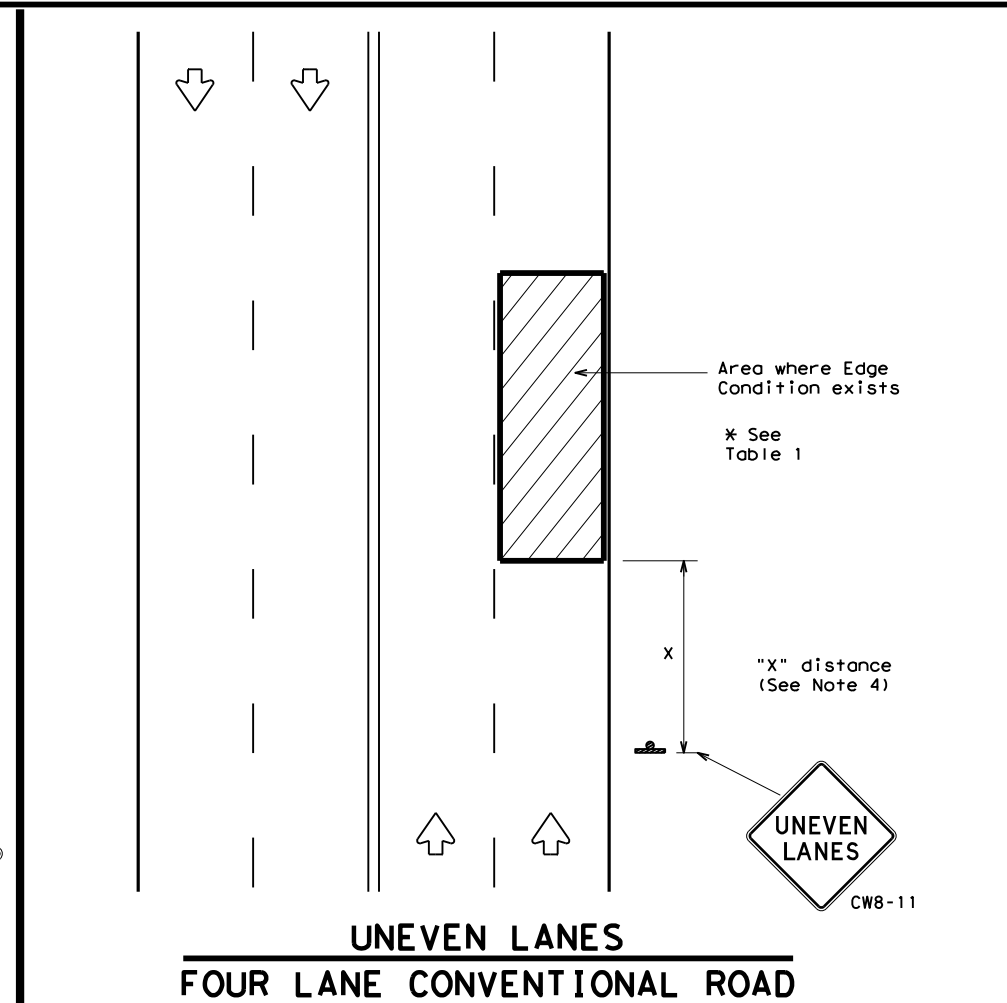
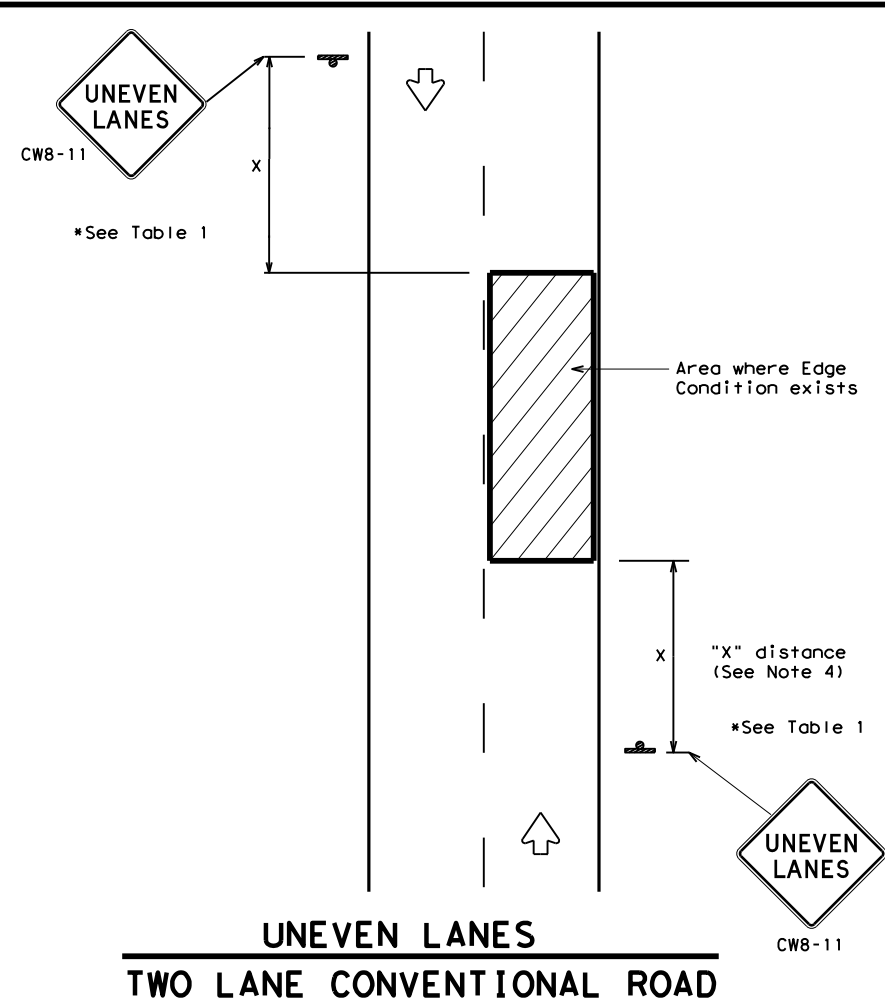
### WORK ZONE SHORT TERM PAVEMENT MARKINGS

#### WZ (STPM) - 13

FILE:	wzstpm-13.dgn	DN:	TxDOT	CK:	TxDOT	OW:	TxDOT	CK:	TxDOT
© TxDOT	April 1992	CONT:	0015	SECT:	01	JOB:	253	HIGHWAY:	IH 35
REVISIONS:		DIST:		COUNTY:		SHEET NO.:			
1-97		WAC:		McLENNAN					35
3-03									
7-13									

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

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

**GENERAL NOTES**

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

TABLE 1		
Edge Condition	Edge Height (D)	* Warning Devices
①	Less than or equal to: 1/4" (maximum-planing) 1 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"

Traffic Operations Division Standard

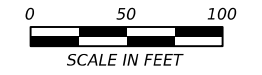
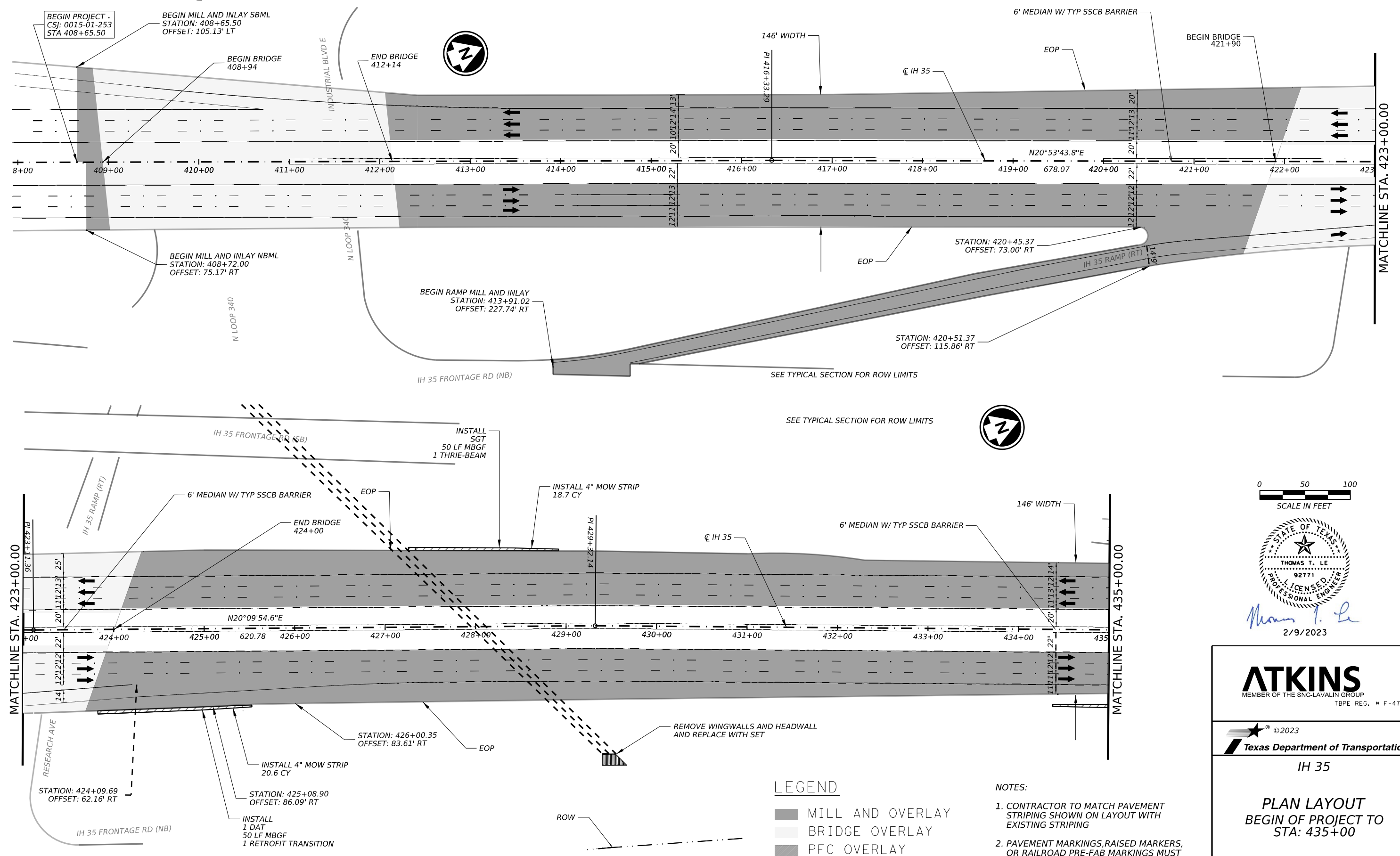
**SIGNING FOR UNEVEN LANES**

**WZ (UL) - 13**

FILE: WZUL-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT	APRIL 1992	CONT. SECT.	JOB	HIGHWAY
REVISIONS	0015 01	253	IH 35	
8-95 2-98 7-13	DIST.	COUNTY	SHEET NO.	
1-97 3-03	WAC	MCLENNAN	36	

100% SUBMITTAL

DATE: 2/9/2023 1:28:50 AM  
FILE: ...IH35\_Plan-1.dgn



STATE OF TEXAS  
 THOMAS T. LE  
 92771  
 LICENSED PROFESSIONAL ENGINEER  
 Thomas T. Le  
 2/9/2023

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IH 35  
**PLAN LAYOUT  
 BEGIN OF PROJECT TO  
 STA: 435+00**

SHEET 1 OF 8

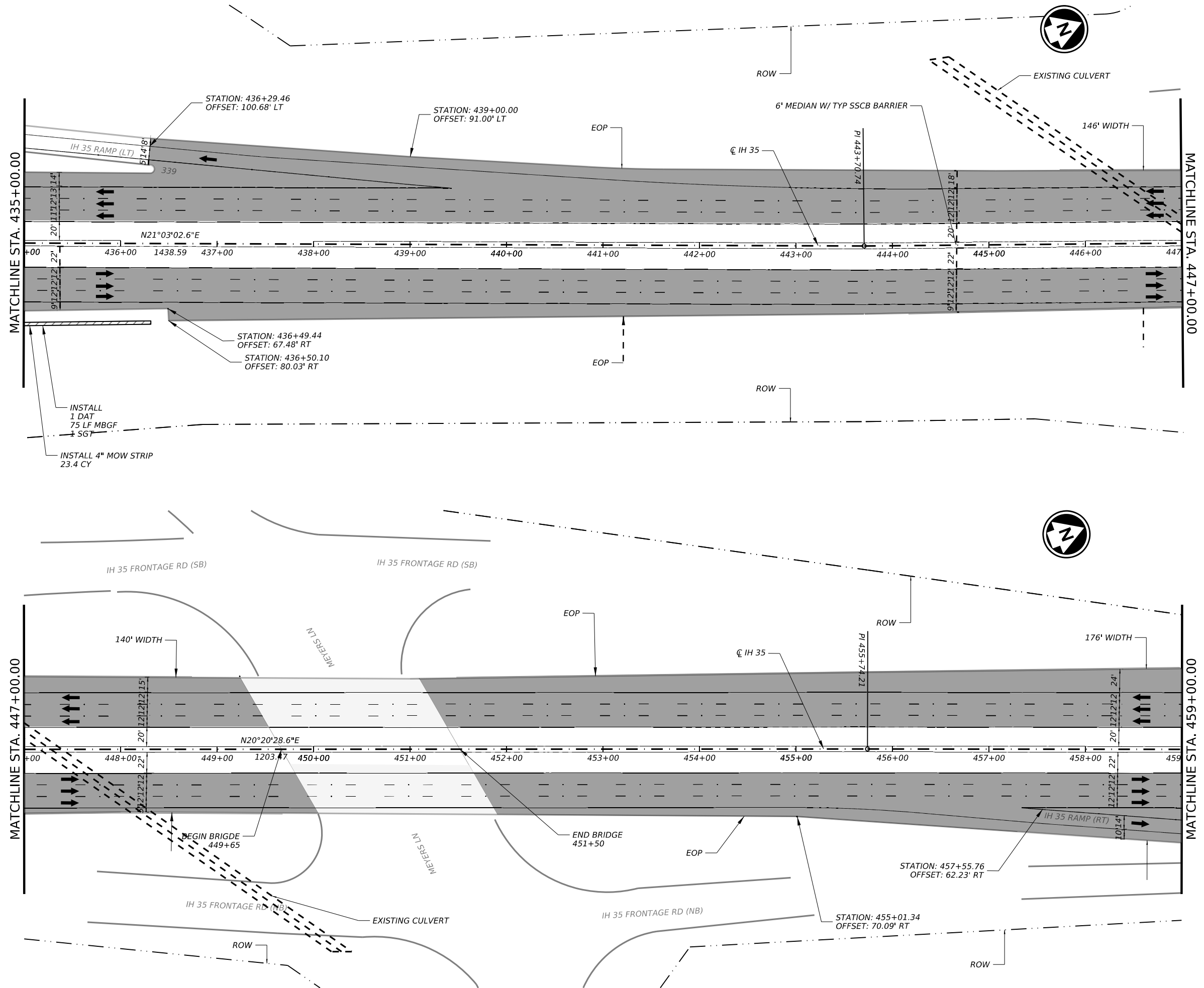
CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY		SHEET NO.
WAC	McLENAN		37

**LEGEND**

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

**NOTES:**

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



LEGEND

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



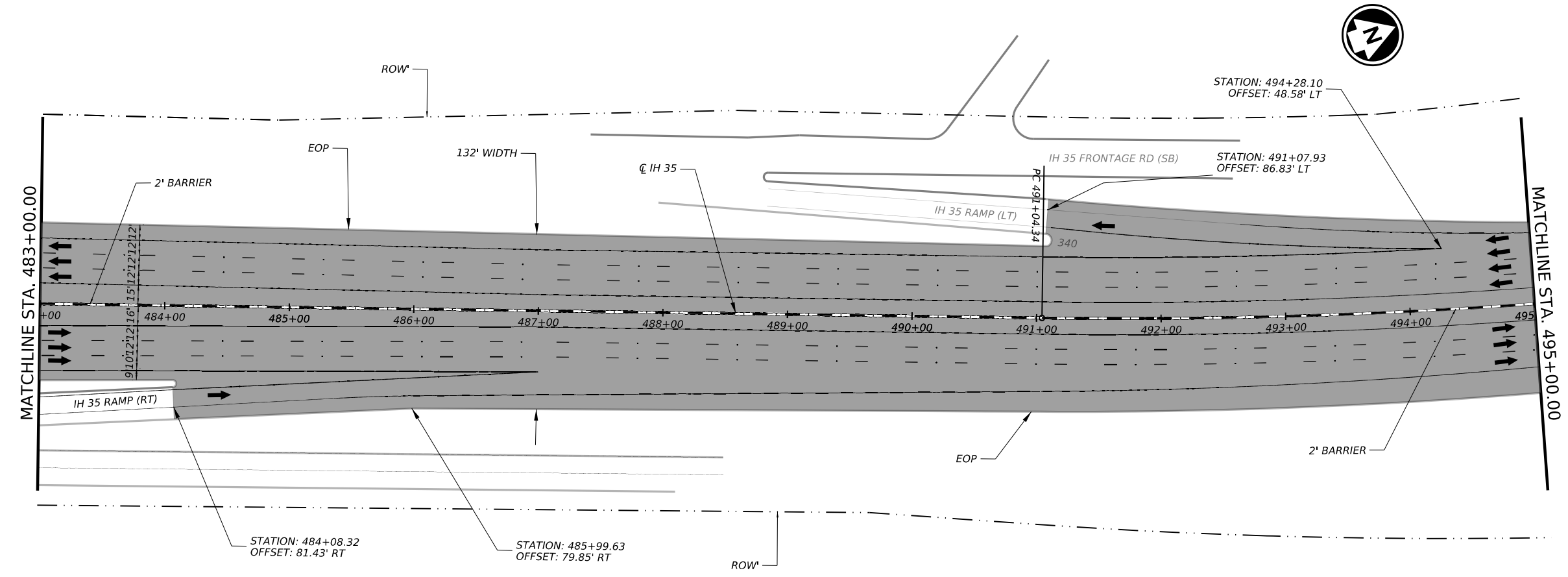
IH 35  
**PLAN LAYOUT**  
 STA: 435+00 TO 459+00

SHEET 2 OF 8

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY		SHEET NO.
WAC	MCLENNAN		38





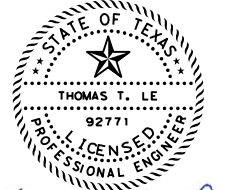
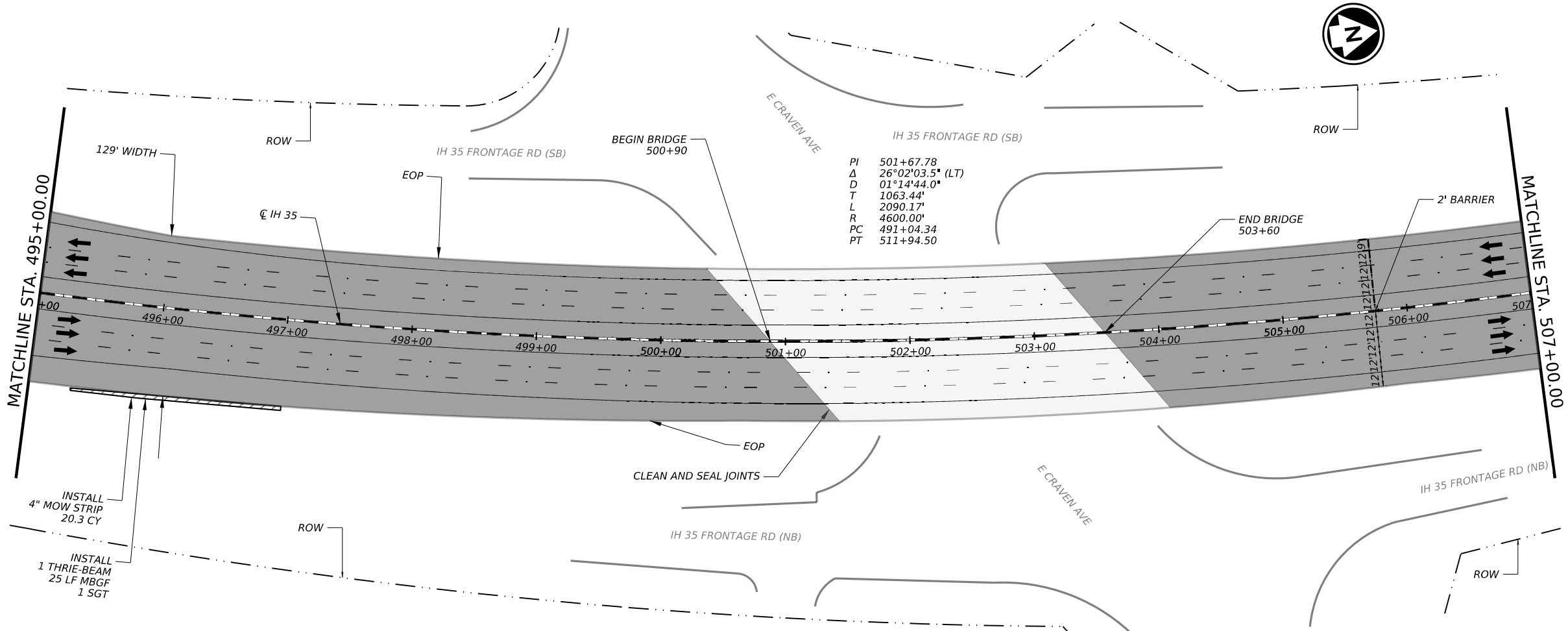


LEGEND

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



*Thomas T. Le*  
2/6/2023

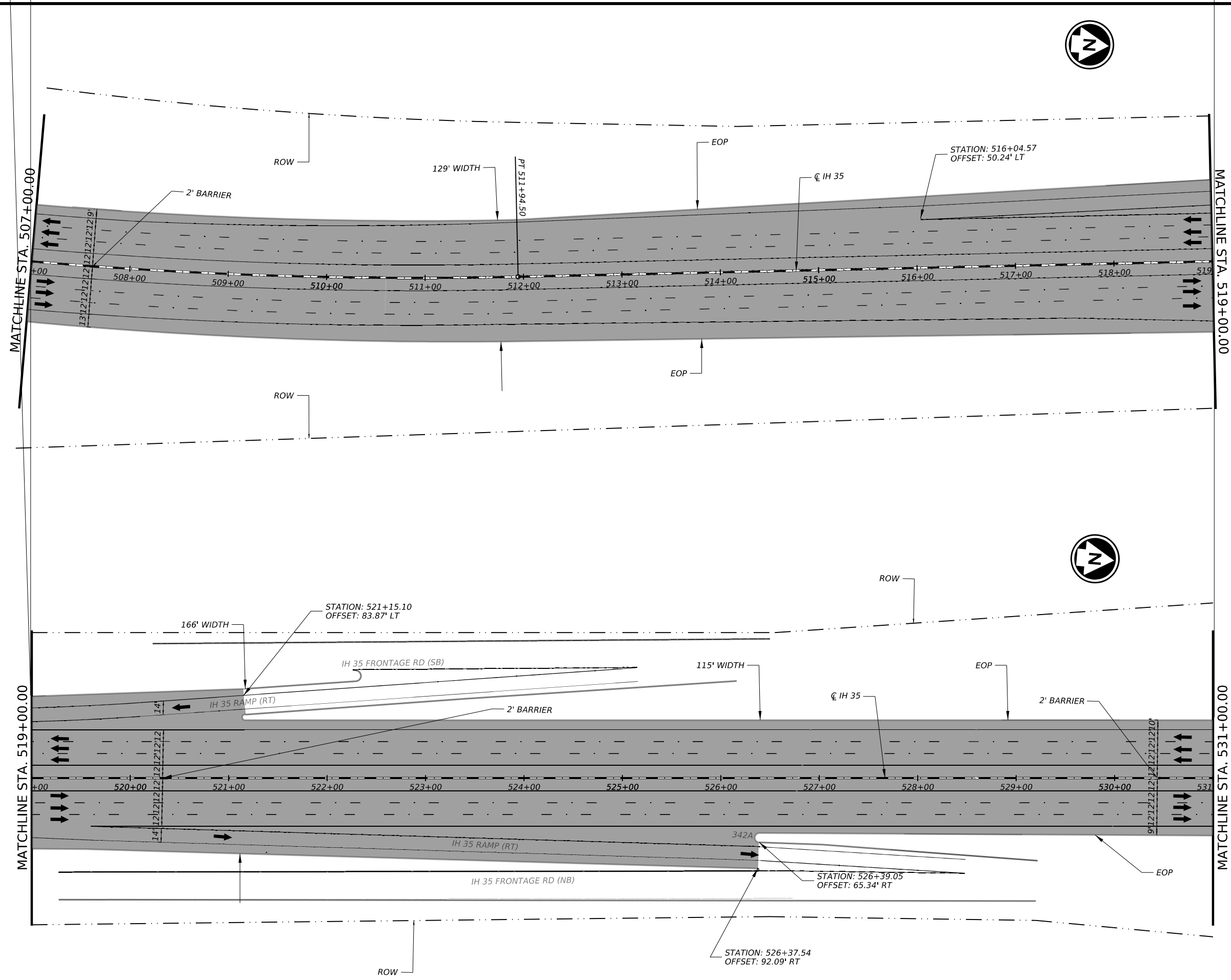
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IH 35  
**PLAN LAYOUT**  
STA: 483+00 TO 507+00

SHEET 4 OF 8

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	40	



LEGEND

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

- NOTES:
1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
  2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



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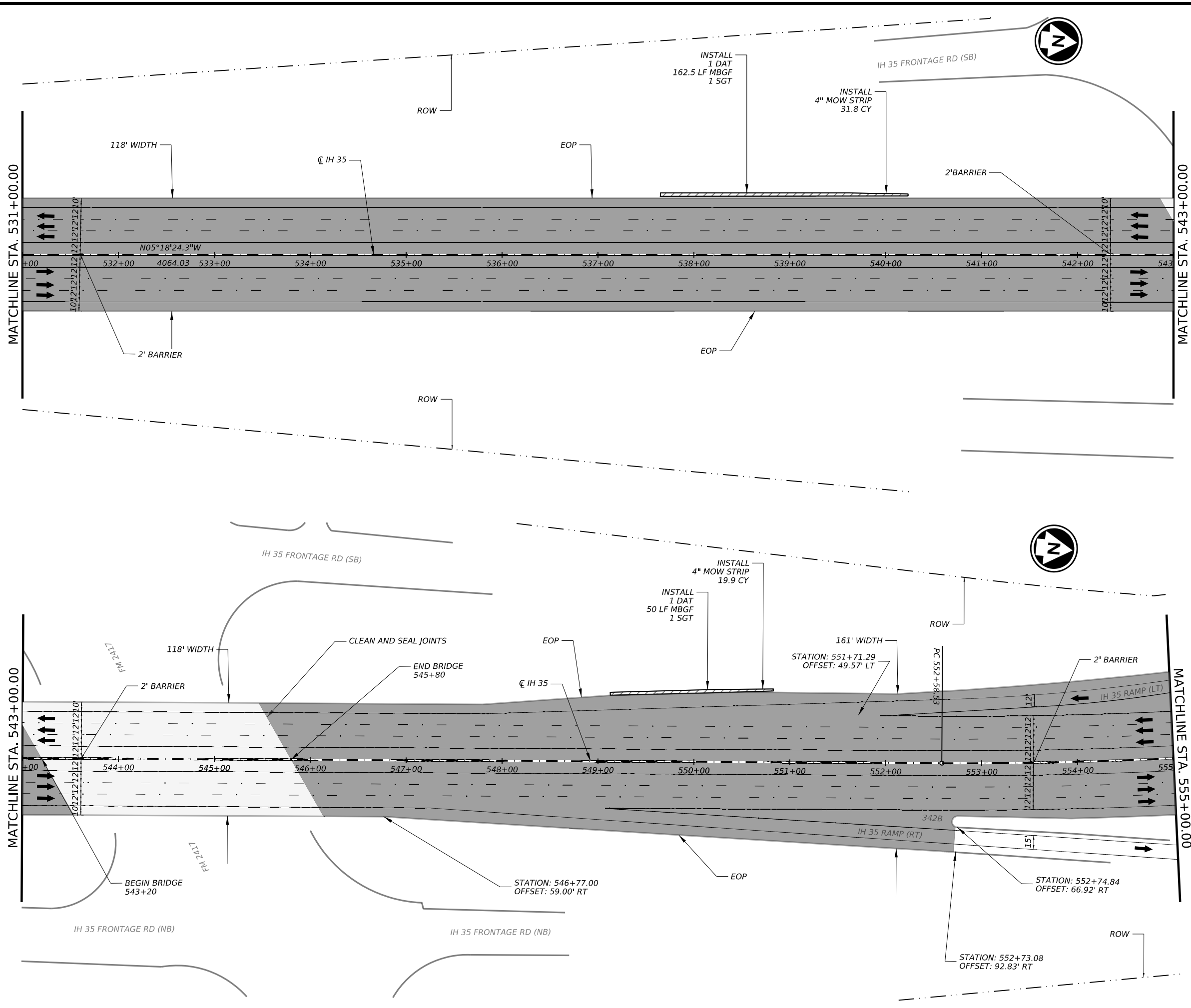
IH 35  
PLAN LAYOUT  
STA: 507+00 TO 531+00

SHEET 5 OF 8

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	41	

100% SUBMITTAL

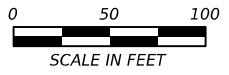
CK: DW: CC: DN:



**LEGEND**

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

- NOTES:**
1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
  2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



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**IH 35**

**PLAN LAYOUT**  
STA: 531+00 TO 555+00

SHEET 6 OF 8

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST		COUNTY	SHEET NO.
WAC		MCLENNAN	42

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DATE: 2/6/2023 3:29:18 PM  
 FILE: ...IH35\_Plan-7.dgn

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 Δ 22°28'39.0" (LT)  
 D 01°15'00.0"  
 T 910.81'  
 L 1798.20'  
 R 4583.66'  
 PC 552+58.53  
 PT 570+56.73

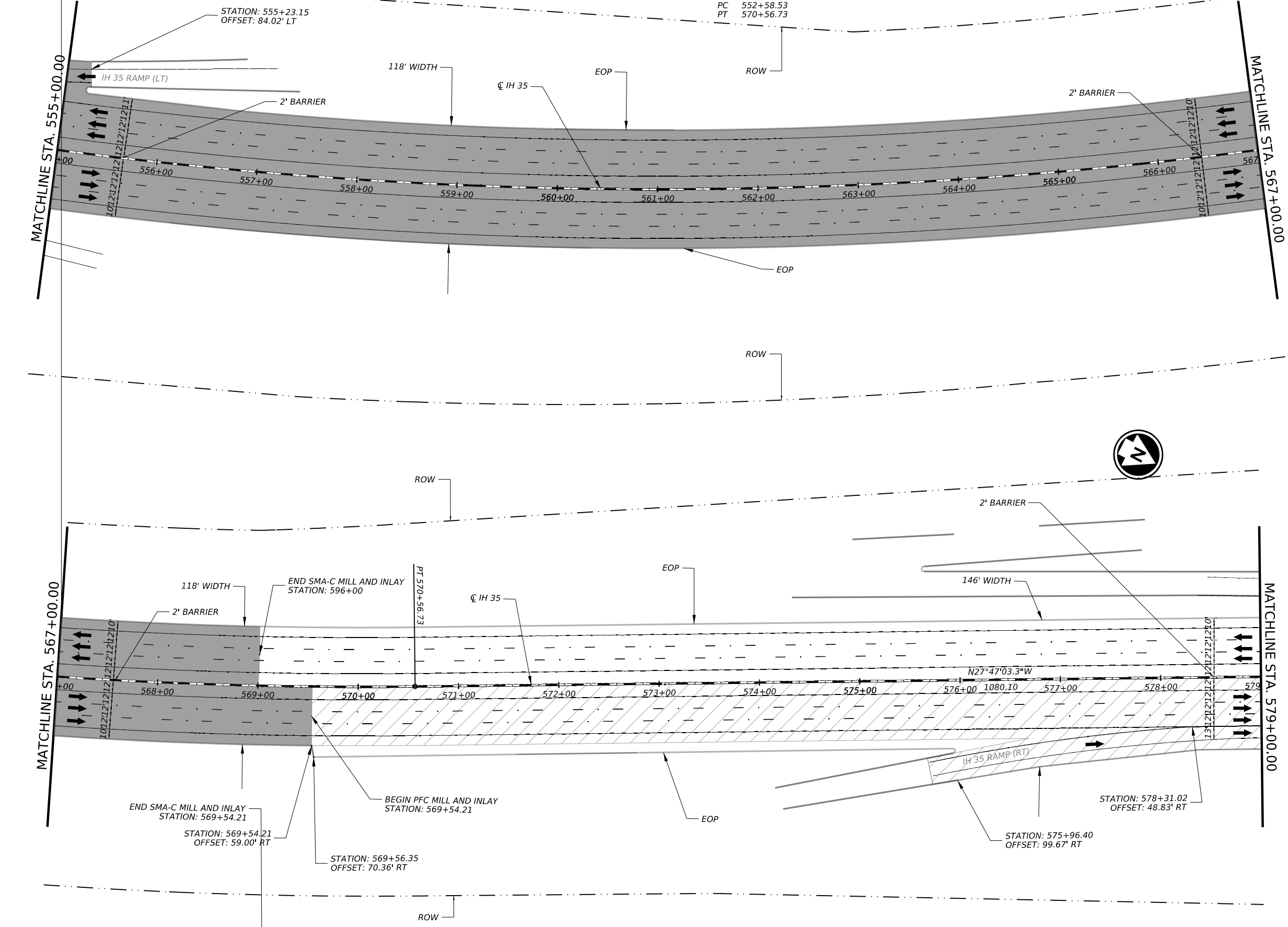
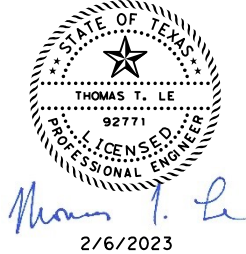


LEGEND

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



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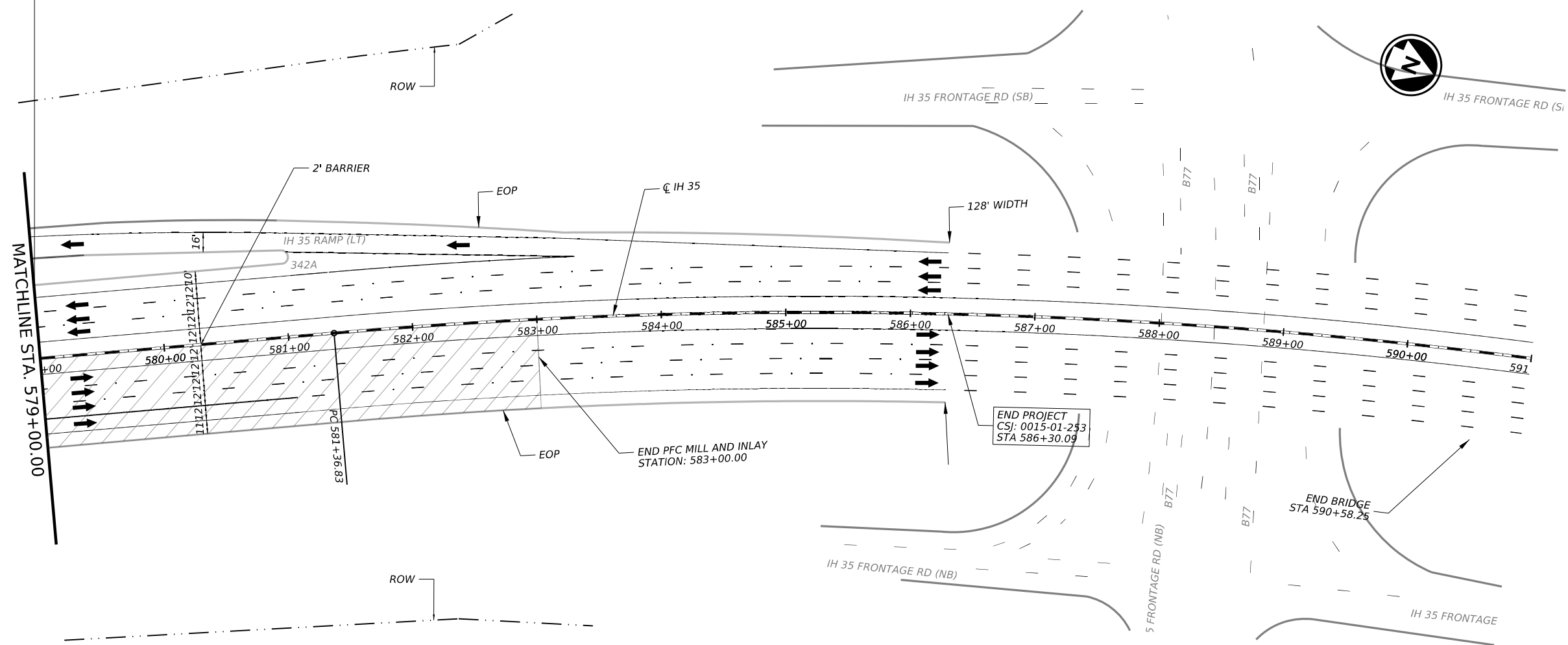
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**IH 35**

**PLAN LAYOUT**  
 STA: 555+00 TO 579+00

SHEET 7 OF 8

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	43	

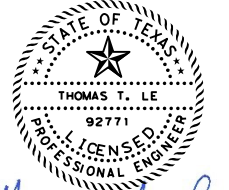


LEGEND

- MILL AND OVERLAY
- BRIDGE OVERLAY
- PFC OVERLAY

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING
2. PAVEMENT MARKINGS, RAISED MARKERS, OR RAILROAD PRE-FAB MARKINGS MUST BE PLACED AS PER STANDARDS WHICH ARE AVAILABLE IN THE PLAN SET



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2/6/2023

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**IH 35**

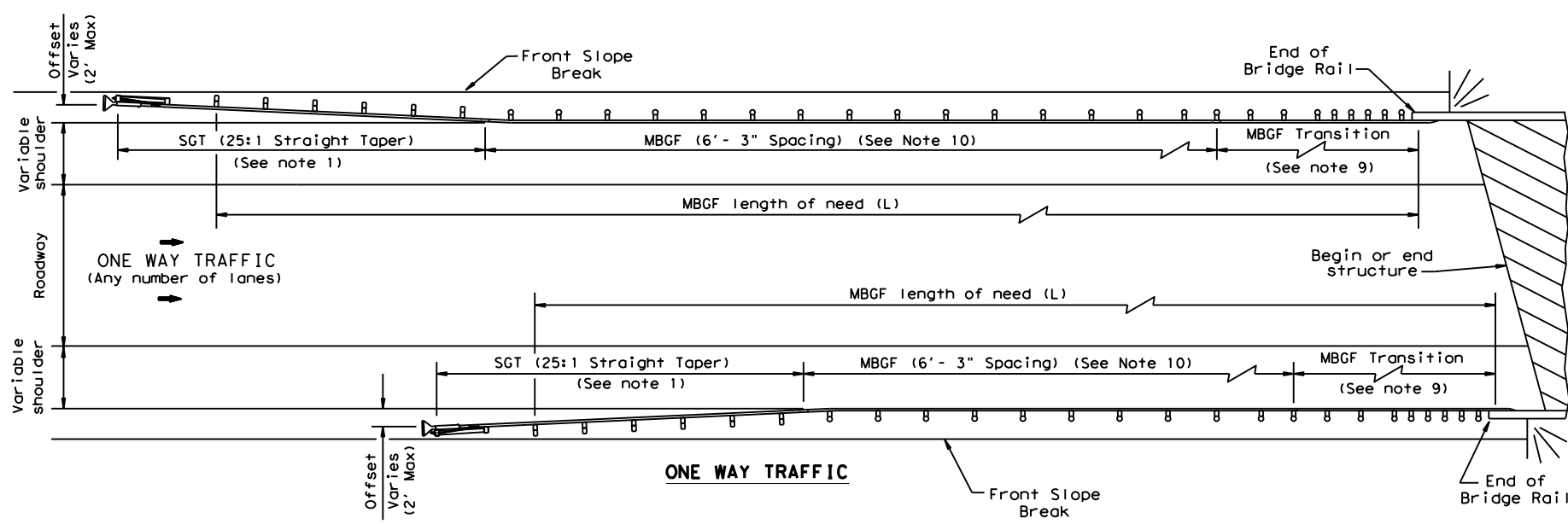
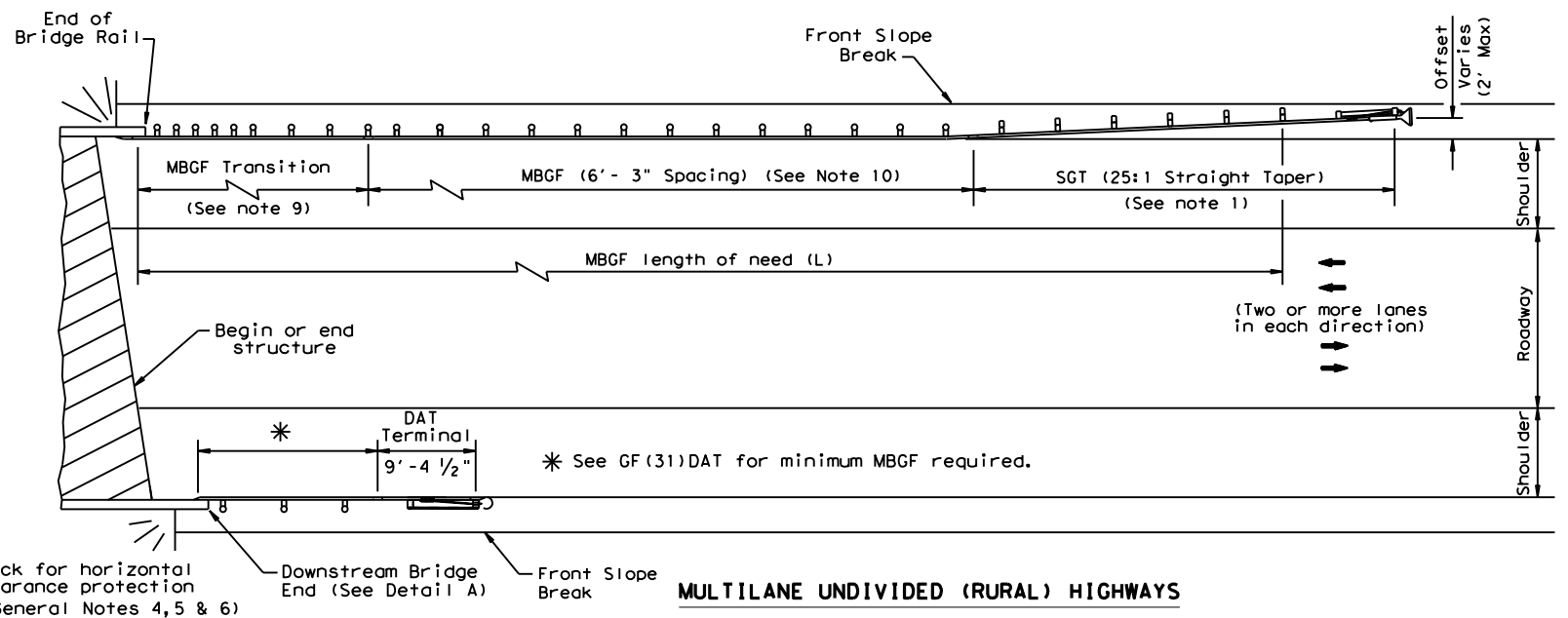
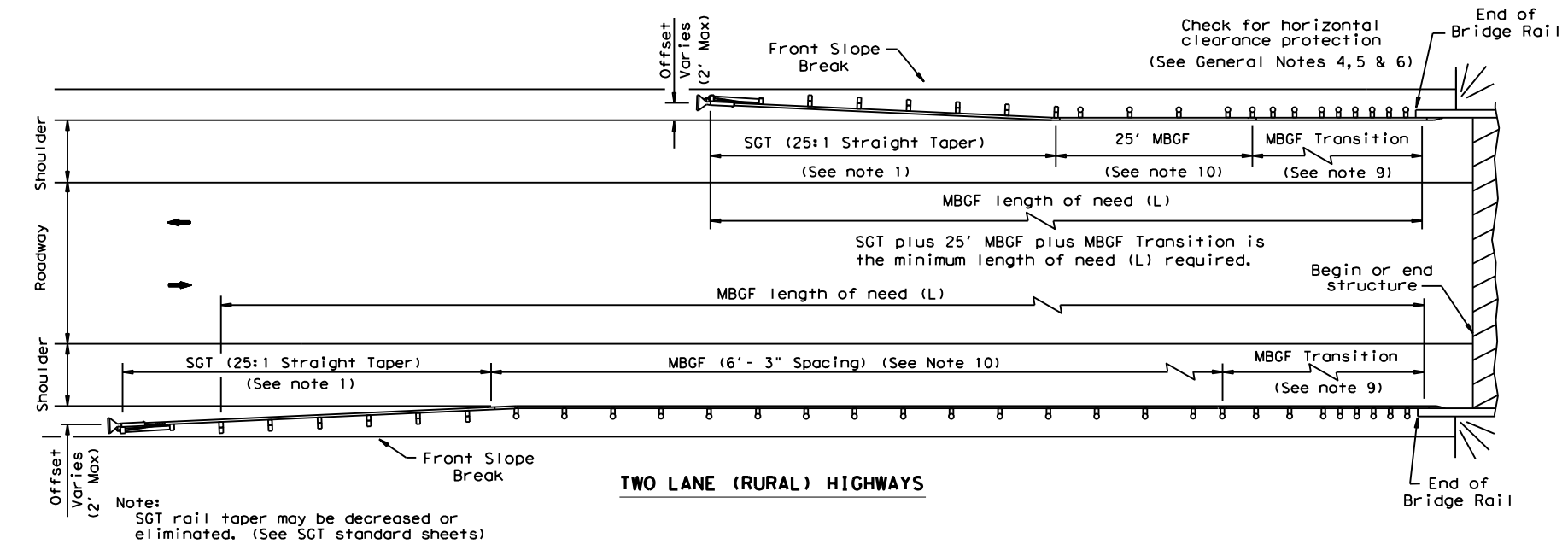
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STA: 579+00 TO  
END OF PROJECT**

SHEET 8 OF 8

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	44	

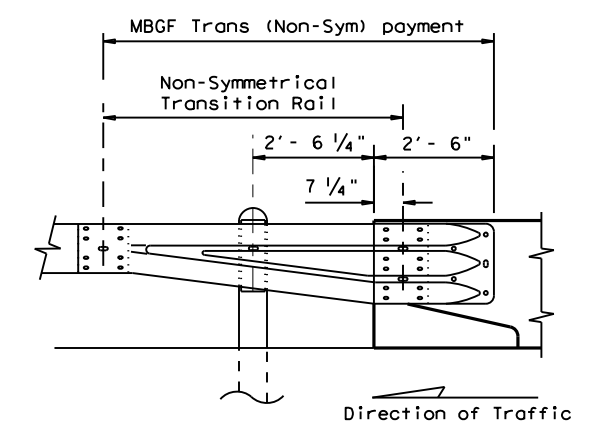
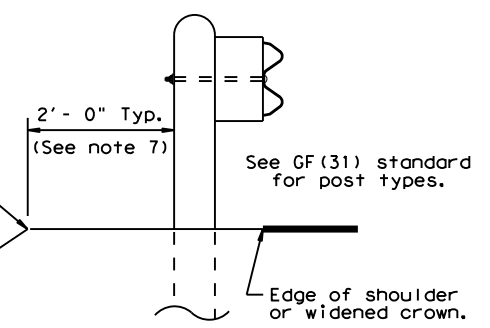
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**GENERAL NOTES**

- For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
- Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
- Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
- MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
- Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
- Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
- The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'-0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
- For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge locations shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft. "maximum" offset from the shoulder edge in the approach direction.
- Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
- A minimum 25' length of MBGF will be required.



Note: All rail elements shall be lapped in the direction of adjacent traffic.

		<b>Design Division Standard</b>	
<b>BRIDGE END DETAILS</b> <b>(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)</b>			
<b>BED-14</b>			
FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP
© TxDOT: December 2011	CONT	SECT	JOB
REVISIONS	0015	01	253
REVISED APRIL 2014	DIST	COUNTY	SHEET NO.
SEE (MEMO 0414)	WAC	McLENNAN	45



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DATE: 2/6/2023 3:30:18 PM  
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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE	DOUBLE	INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX (XX)	
								NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRP = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount	
SHEETING: Yellow, White or Red Type B or C reflective sheeting				SHEETING: Yellow, White or Red Type B or C Reflective Sheeting				DIRECTION: If Required BI = Bi-Directional BR = Bi-Directional with red on back	
NOTE: 1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (fix). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE: WC, YFLX, WFLX, WC, YFLX, WFLX				INSTL OM ASSM (OM-XX) (XXXX)XXX (XX)	
				MOUNT TYPE: GND, GND, SRF, GND, GND, SRF				TYPE OF OBJECT MARKER: 1, 2, 3, or 4	

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

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

Texas Department of Transportation  
 Traffic Safety Division Standard

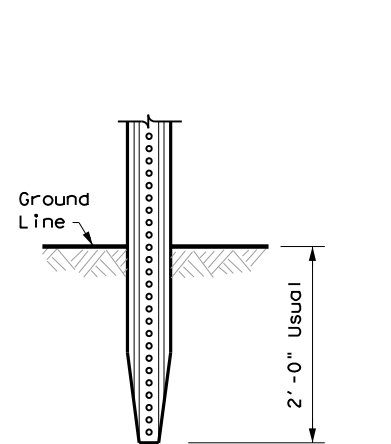
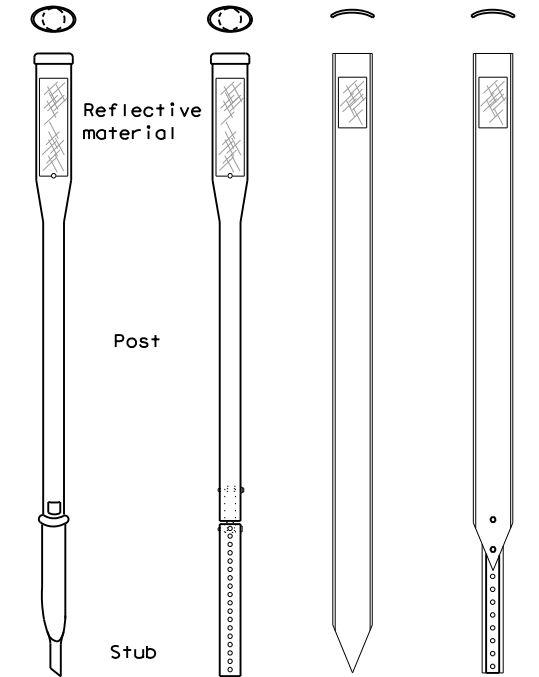
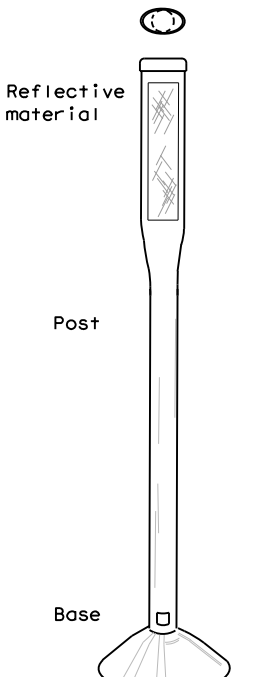
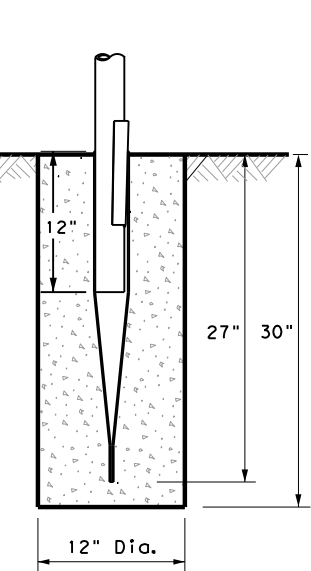
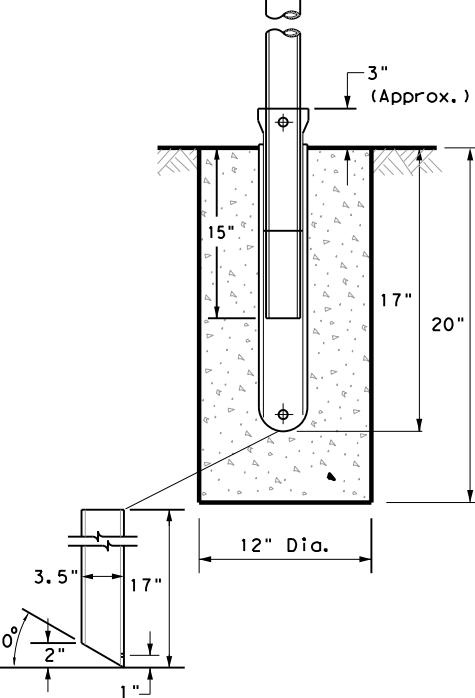
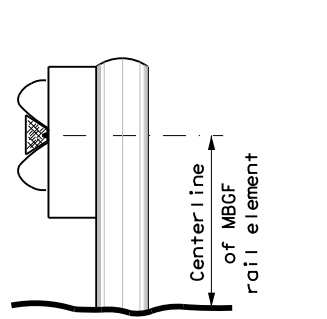
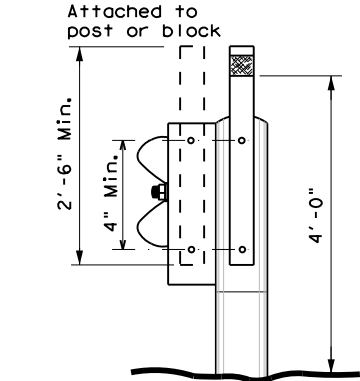
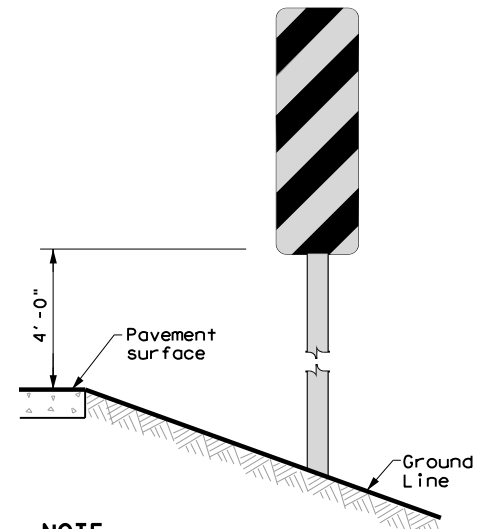
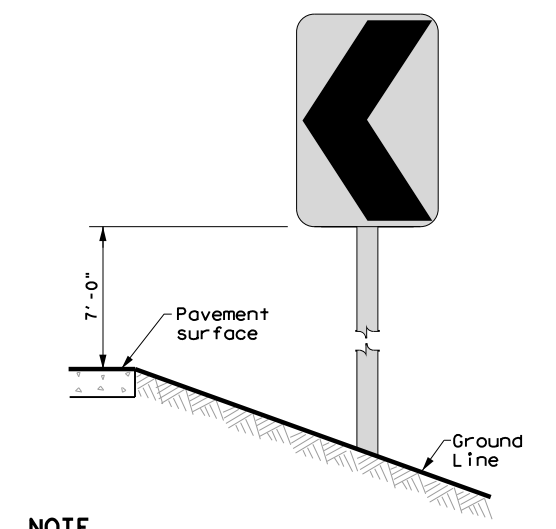
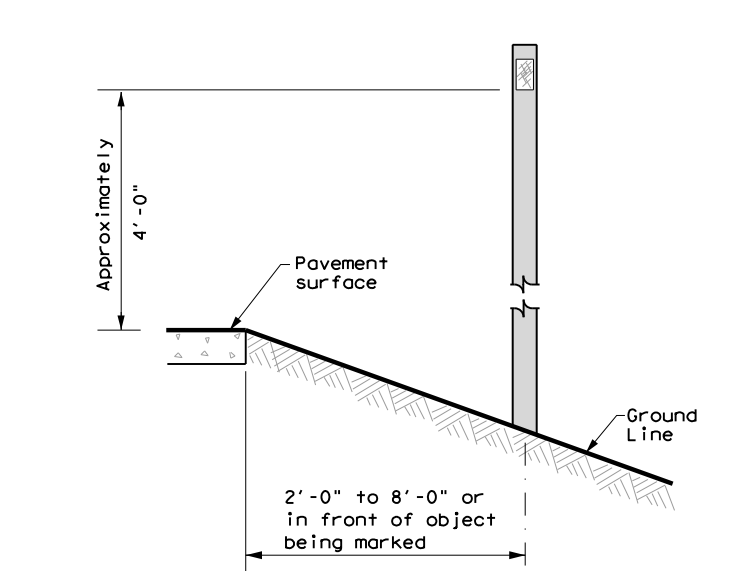
### DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION


#### D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WAC	McLENNAN		46

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DATE: 2/6/2023 3:30:36 PM  
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POST TYPE AND SUPPORT FOUNDATION DETAILS				TYPE OF BARRIER MOUNTS		
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT	
GND	GND	SRF	WAS	WAP	GF 1	
						
	EMBEDDED	SURFACE MOUNT	STEEL	PLASTIC	CONCRETE TRAFFIC BARRIER (CTB)	
<b>NOTES</b> 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only. 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.			<b>NOTE</b> 1. Install per manufacturer's recommendations.		<b>GENERAL NOTES</b> 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement. 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction. 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible. 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation. 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface. 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.	
<b>NOTES</b> 1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices. 2. Install per manufacturer's recommendations. 3. Post length may vary to meet field conditions. 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.						
TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS		CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN		DELINEATORS AND TYPE 2 OBJECT MARKERS		
						
<b>NOTE</b> Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)		<b>NOTE</b> Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.		See general notes 1, 2 and 3.		



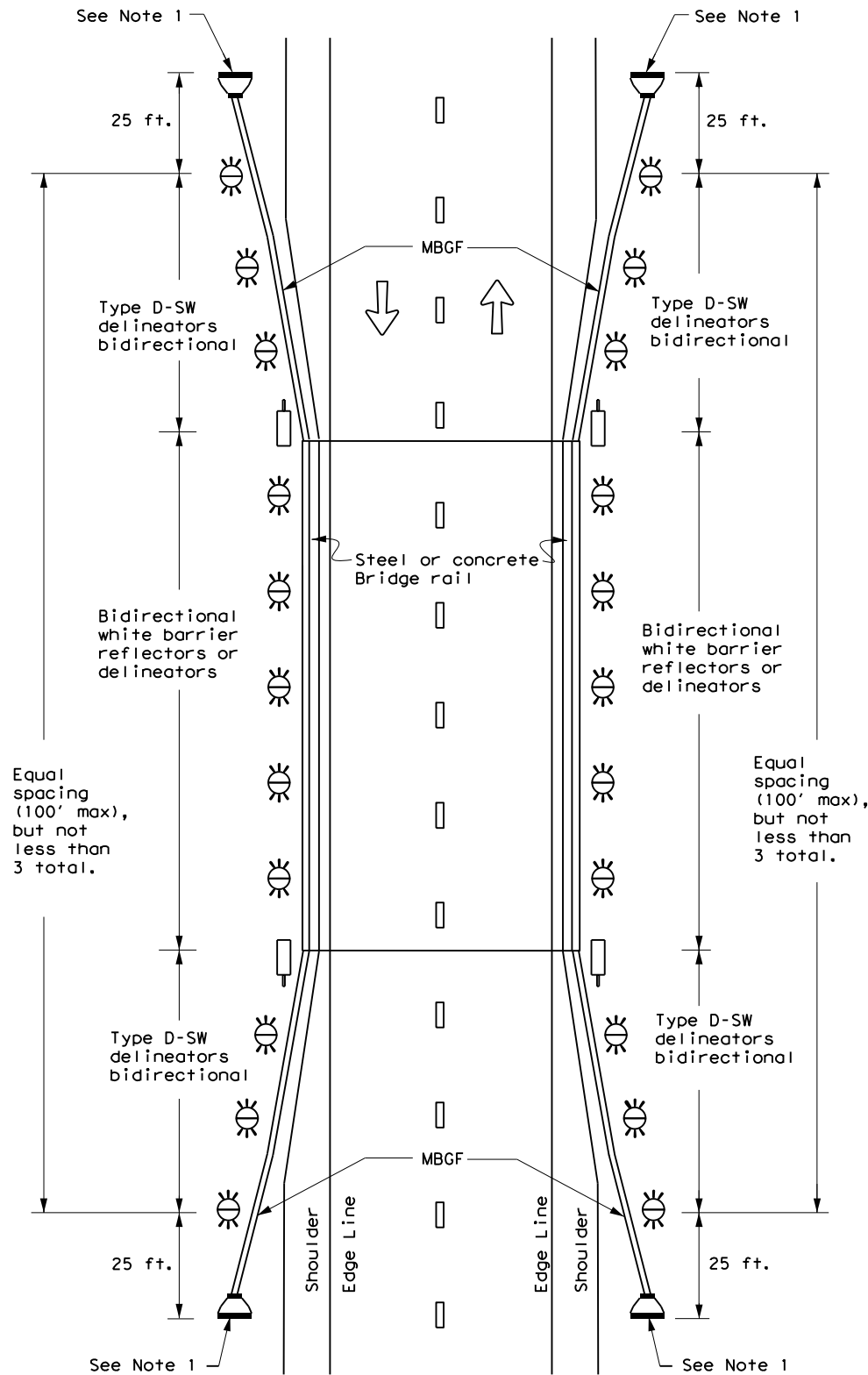
Traffic Safety Division Standard

## DELINEATOR & OBJECT MARKER INSTALLATION

### D & OM(2)-20

FILE: dom2-20.dgn	DW: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	WAC	McLENNAN	47	

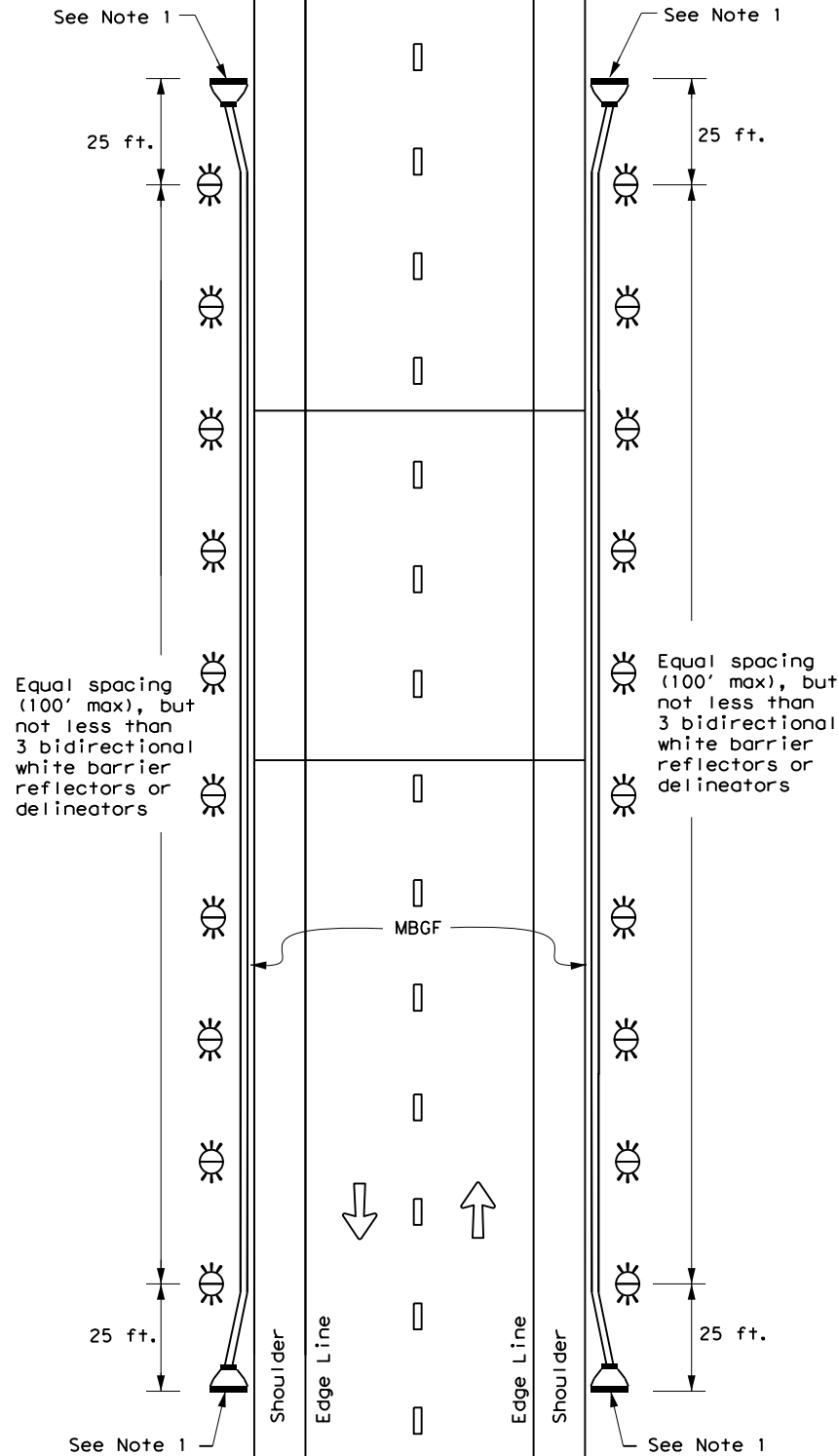
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**NOTE:**

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

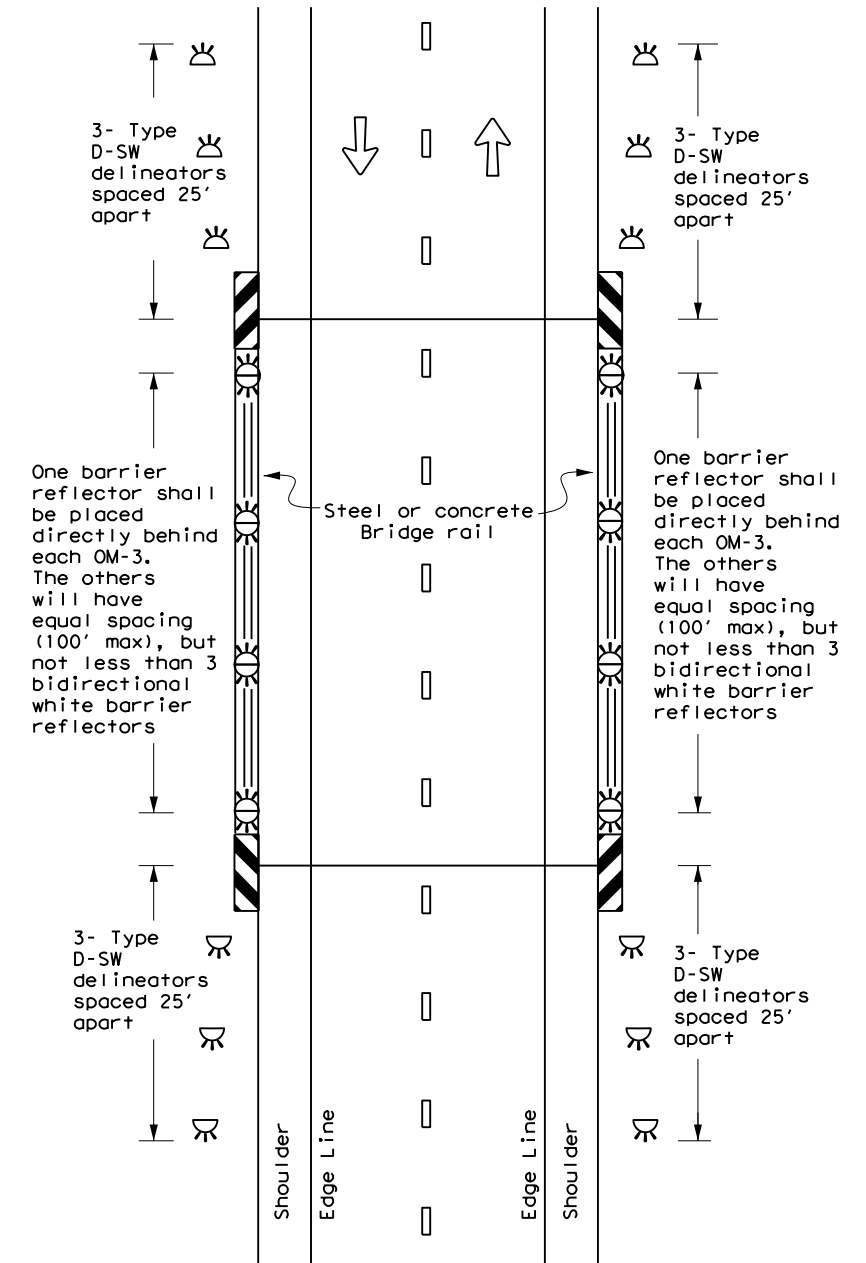
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**NOTE:**

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY  
BRIDGE WITH NO APPROACH RAIL**



**LEGEND**

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow



**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

**D & OM(5) - 20**

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
7-20	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	48	

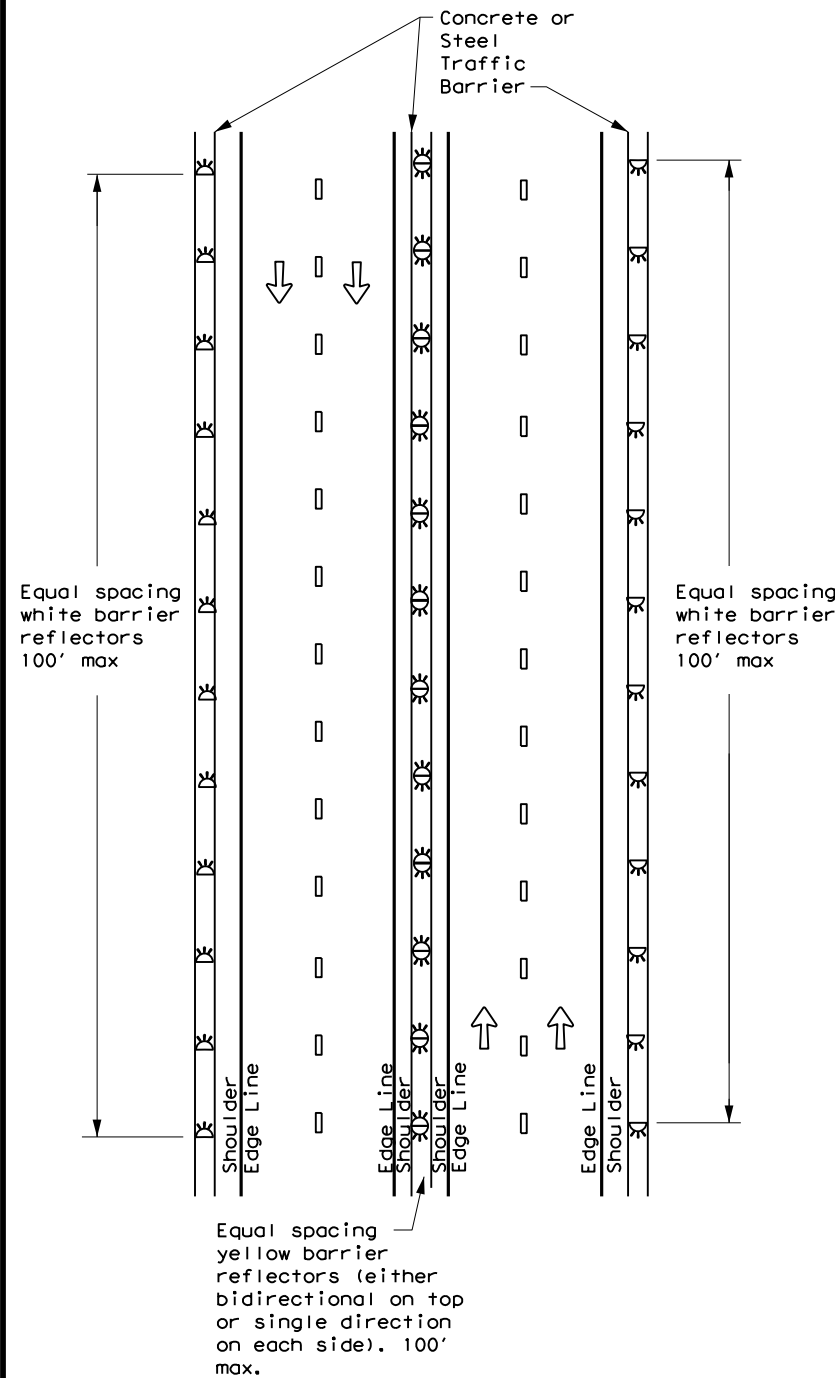
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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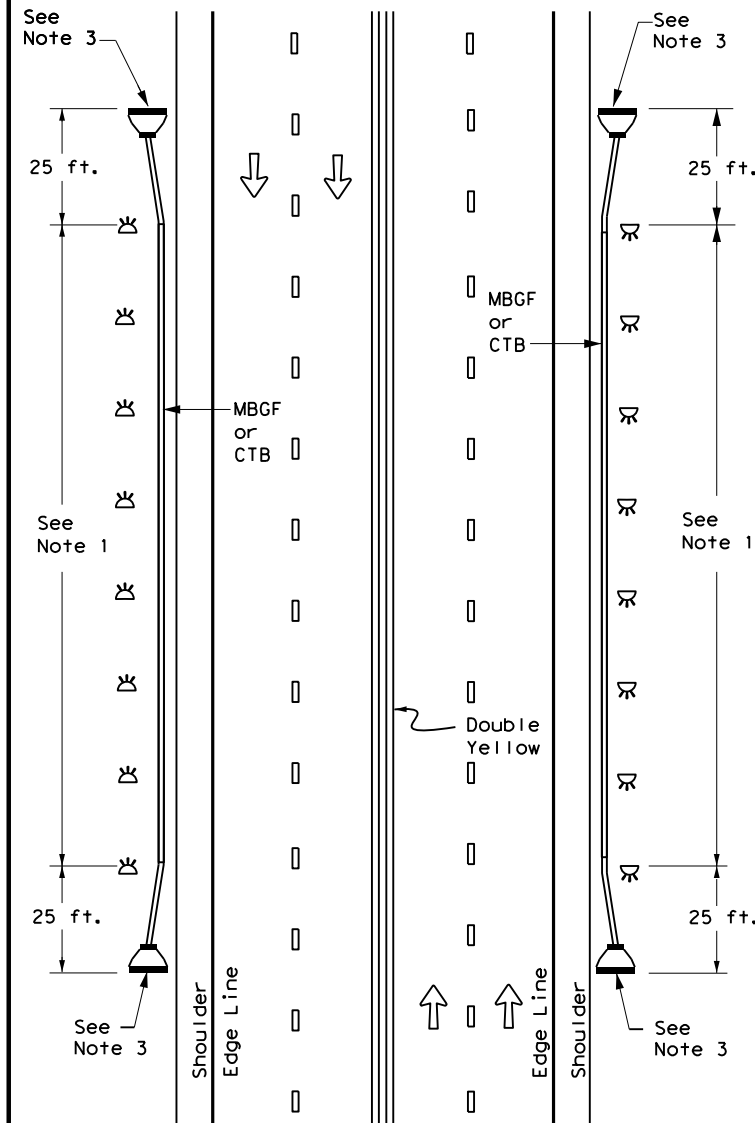
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2/6/2023 3:31:13 PM  
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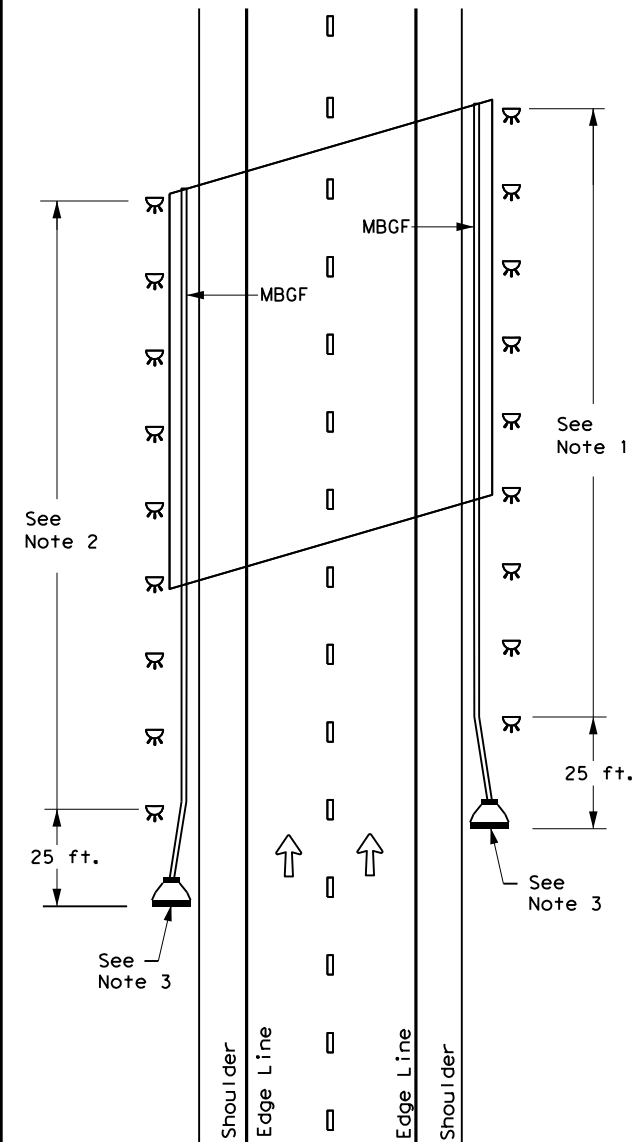
### CONTINUOUS CONCRETE OR STEEL BARRIER



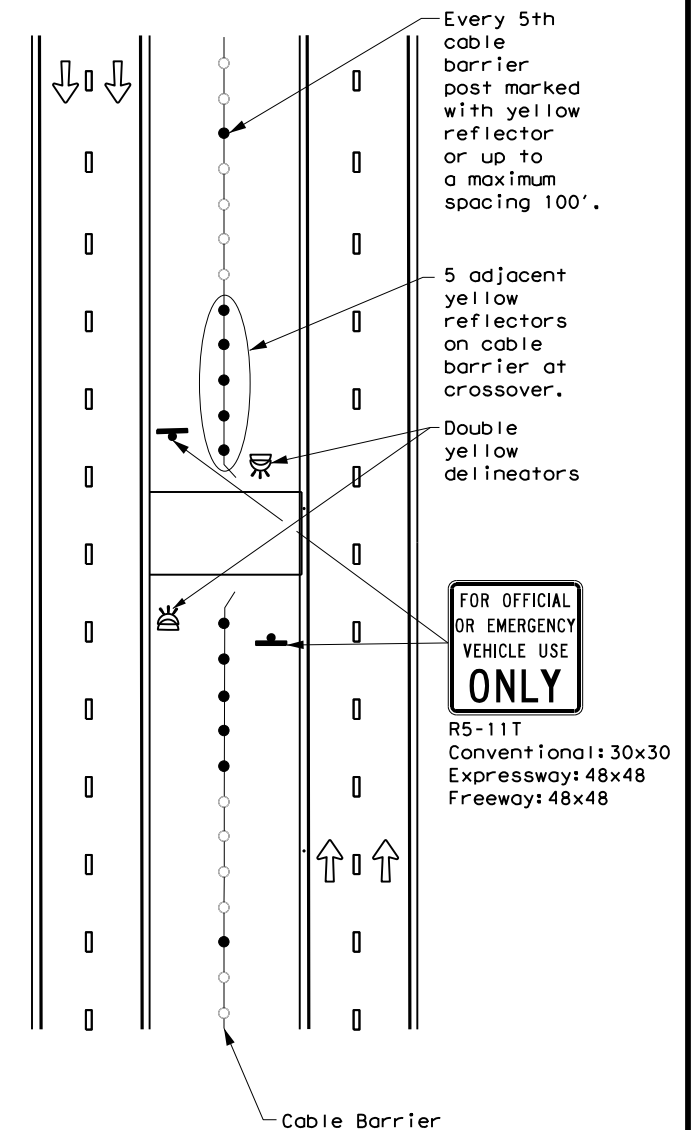
### MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



### DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



### EMERGENCY CROSSOVER



#### NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuous Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

#### LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow



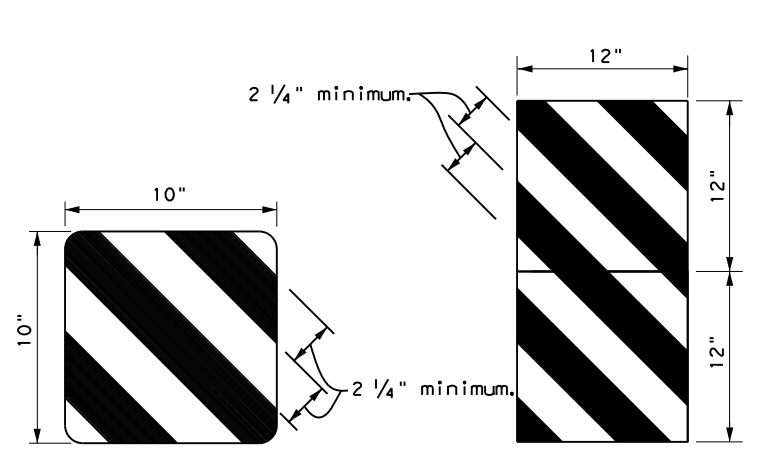
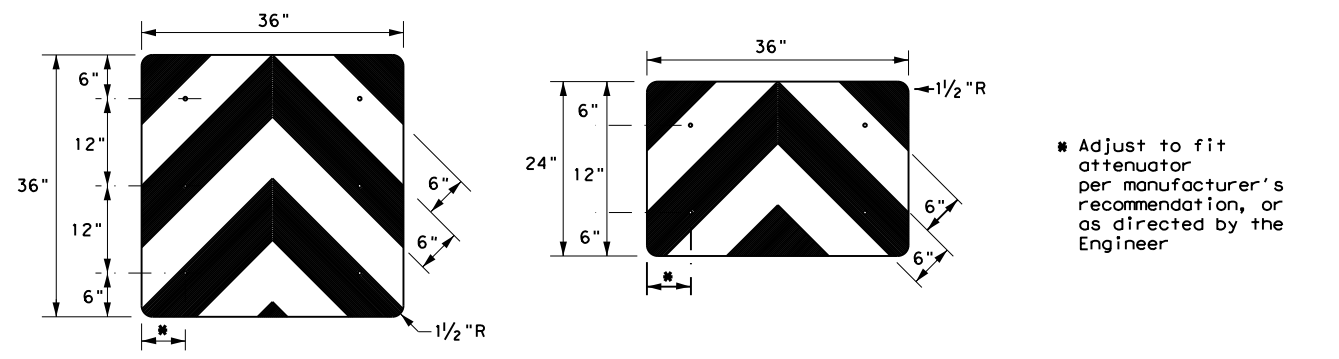
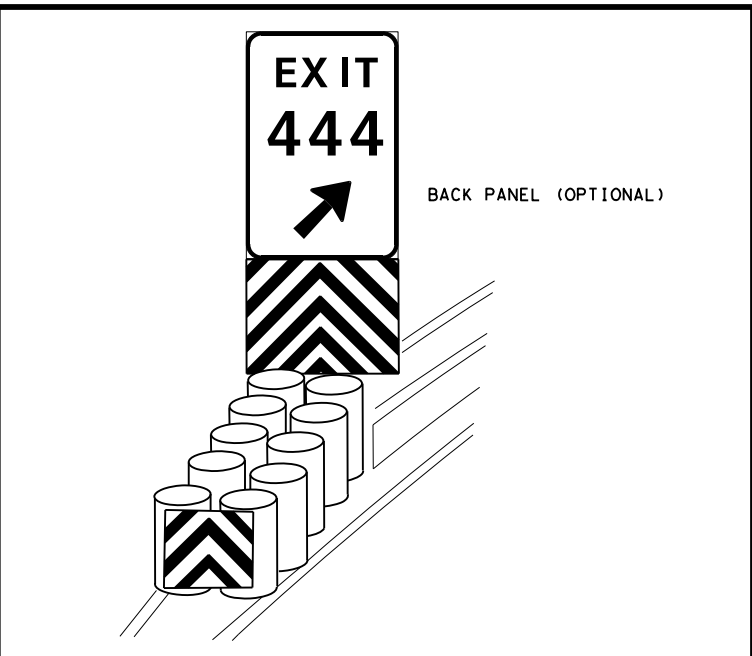
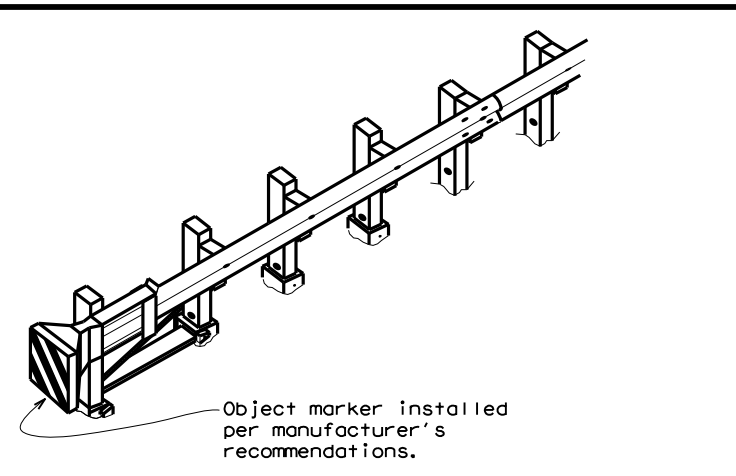
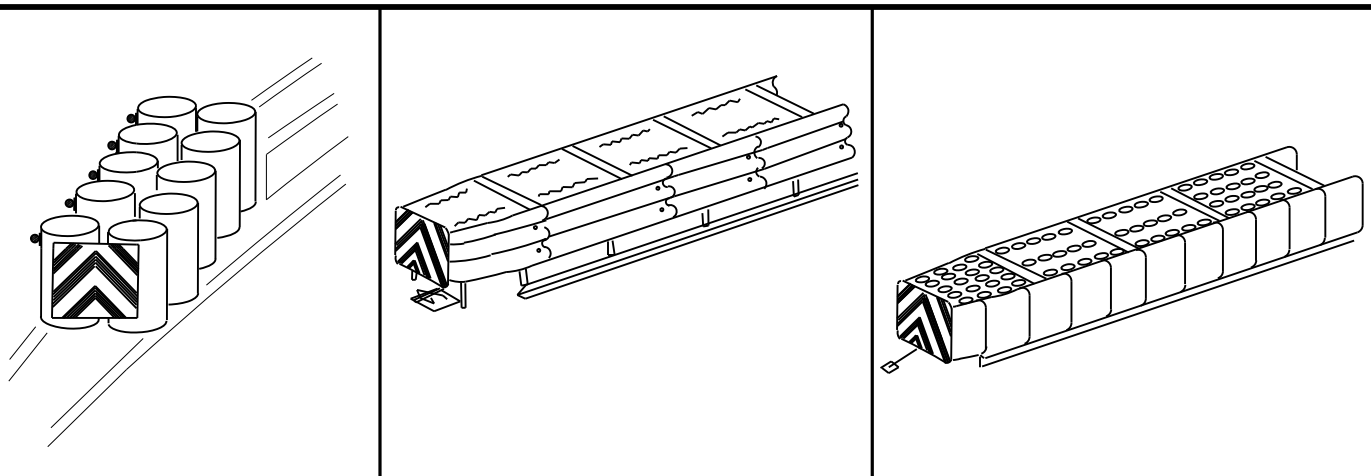
## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

### D & OM(6) - 20

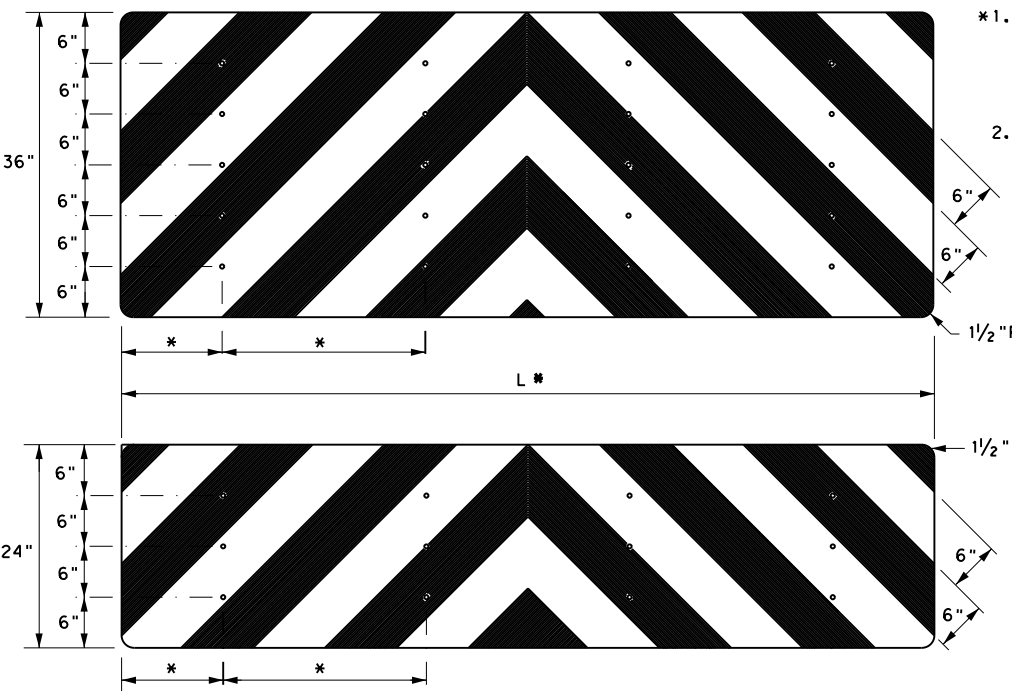
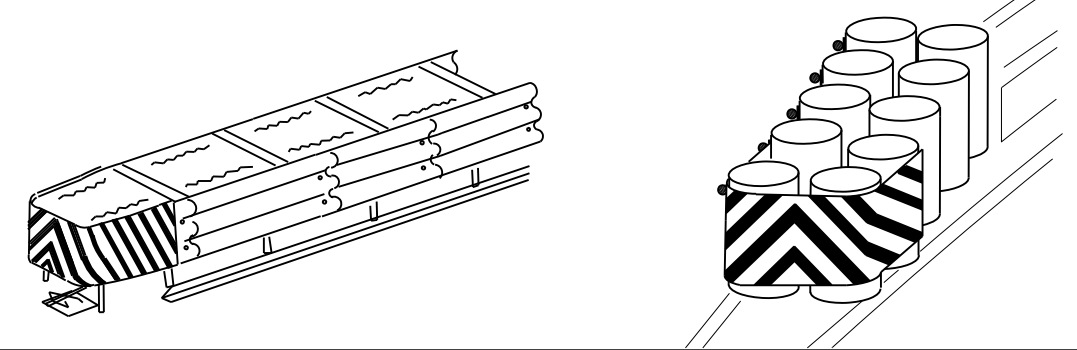
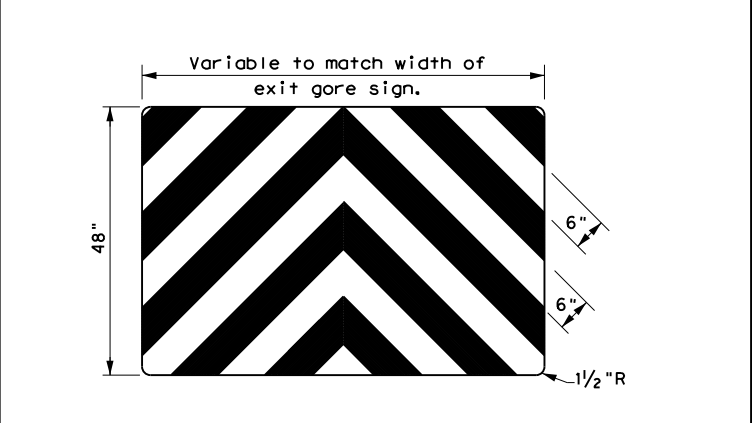
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© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
7-20	0015	01	253	IH 35
	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	49	

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DATE: 2/6/2023 3:31:30 PM  
 FILE: ...STD ROADWAY\domv1a-20.dgn



OBJECT MARKERS SMALLER THAN 3 FT<sup>2</sup>



- NOTES**
1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturer's recommendation, or as directed by the Engineer.
  2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

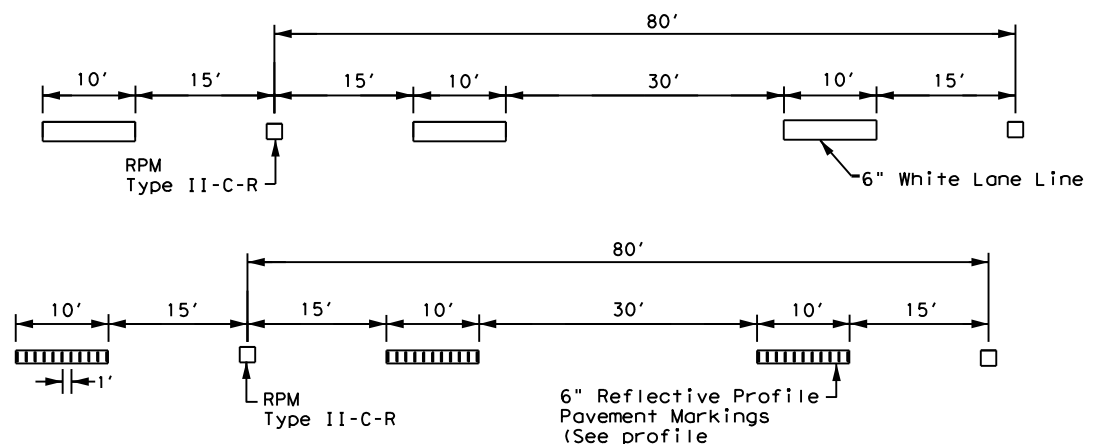
**NOTES**

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
5. Object Marker at nose of attenuator is subsidiary to the attenuator.
6. See D & OM (1-4) for required barrier reflectors.

		Traffic Safety Division Standard	
<b>DELINEATOR &amp; OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS</b> <b>D &amp; OM(VIA) -20</b>			
FILE: domv1a20.dgn	DW: TxDOT	CK: TxDOT	DR: TxDOT
© TxDOT December 1989	CONT	SECT	JOB
REVISIONS		0015 01	253 IH 35
4-92 8-04	DIST	COUNTY	SHEET NO.
8-95 3-15	WAC	McLENNAN	50
4-98 7-20			
20G			

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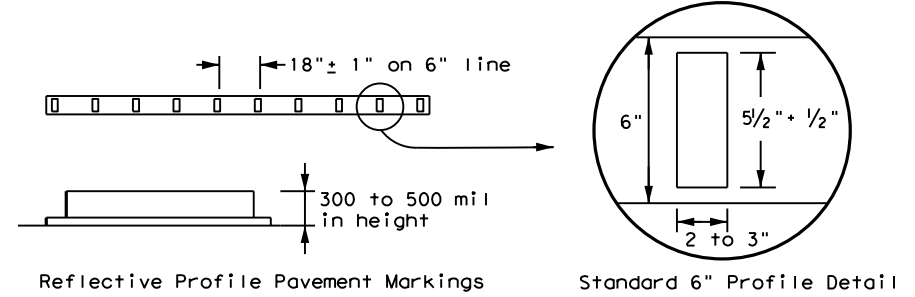
DATE: 2/6/2023 3:31:48 PM  
 FILE: ...STD\_ROADWAY\FPM(1)-22.dgn



**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.

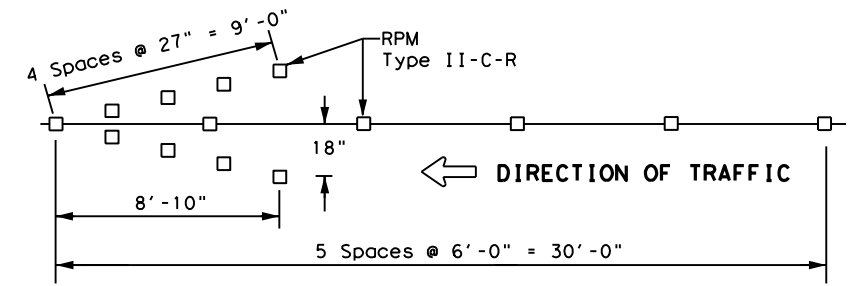
**TRAFFIC LANE LINES PAVEMENT MARKING**



**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.

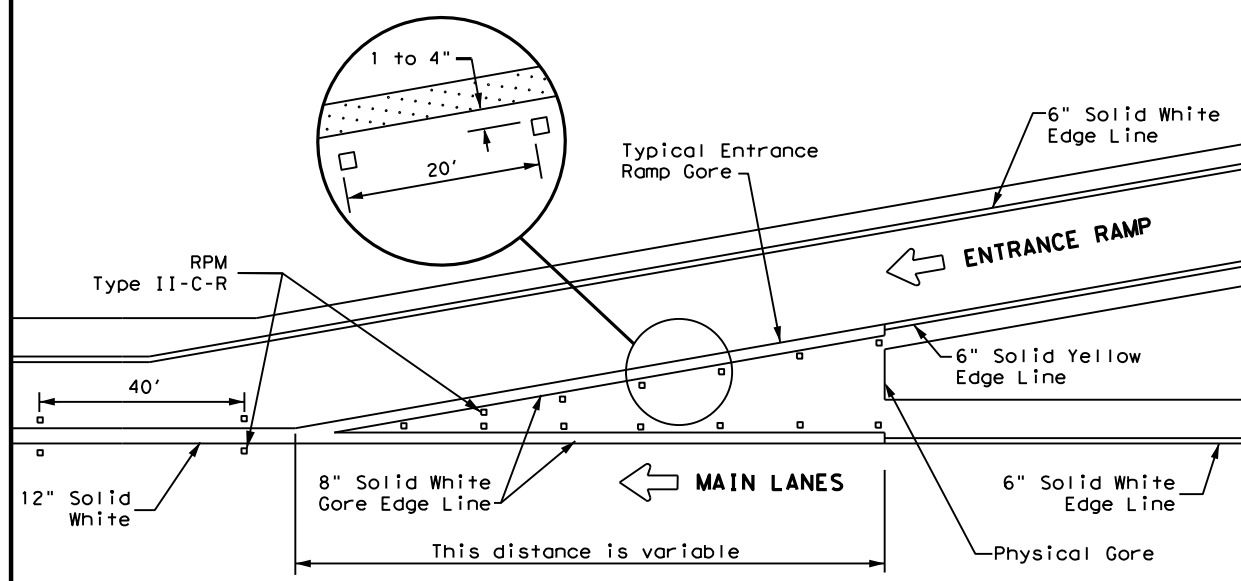
**EDGE LINE PAVEMENT MARKINGS**



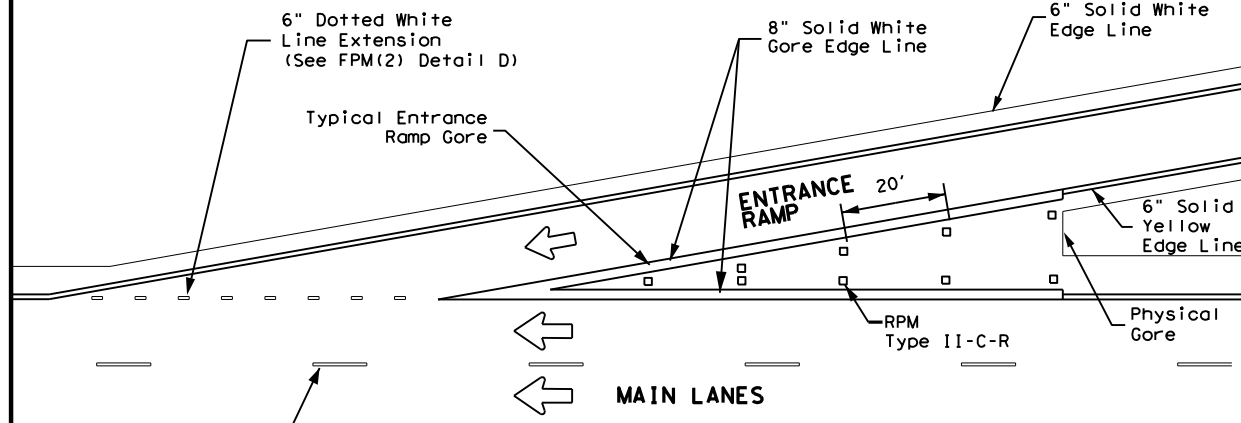
**NOTES**

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**



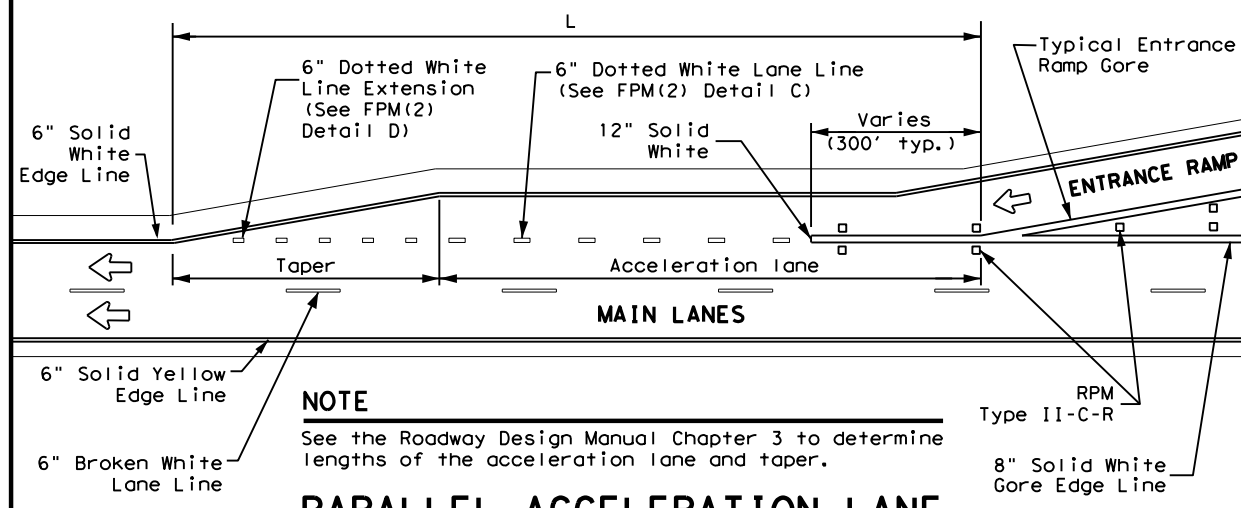
**TYPICAL ENTRANCE RAMP GORE MARKING**



**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**

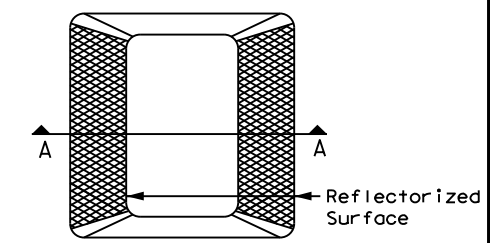
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

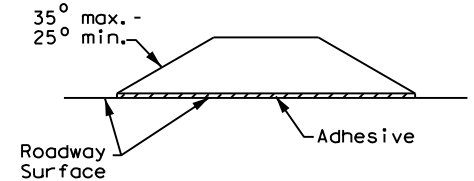
LEGEND	
	Traffic flow
	Pavement marking arrows (white)
	ReflectORIZED Raised Markers (RPM) Type II-C-R

**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)**

Texas Department of Transportation Traffic Safety Division Standard

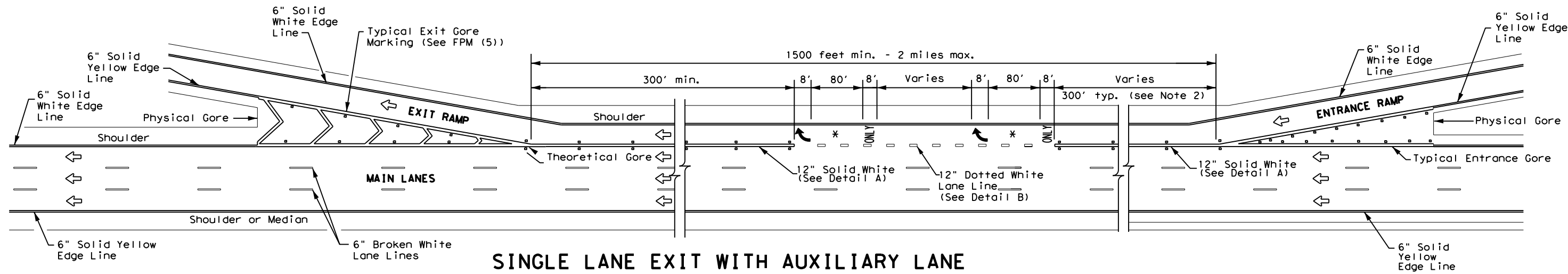
**TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS FPM(1)-22**

FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
5-74 8-00 2-12	DIST	COUNTY	SHEET NO.	
4-92 2-08 10-22	WAC	McLENNAN	51	
5-00 2-10				



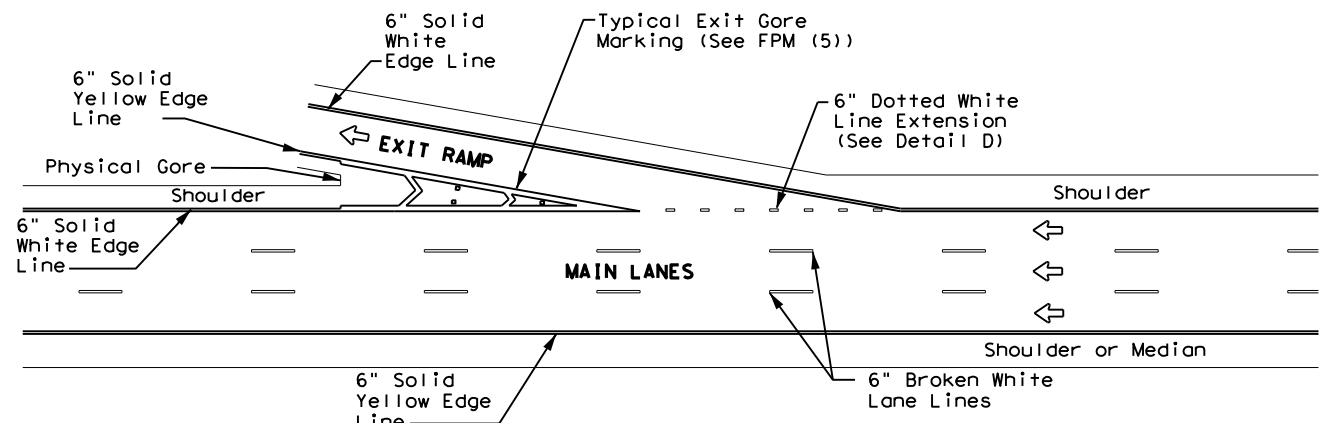
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 2/6/2023 3:32:05 PM  
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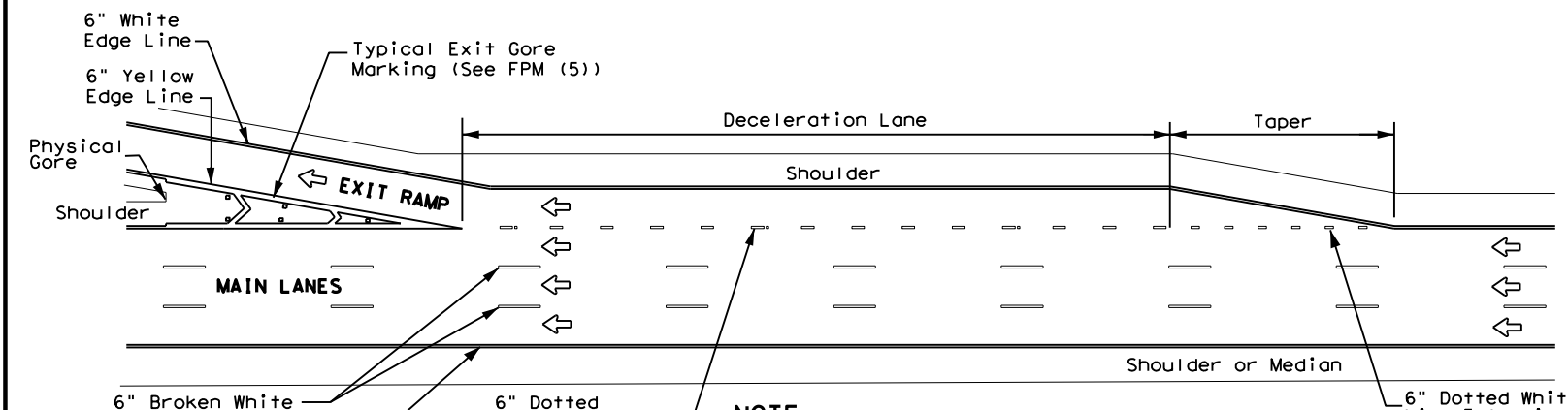
**SINGLE LANE EXIT WITH AUXILIARY LANE**

(See Note 2)



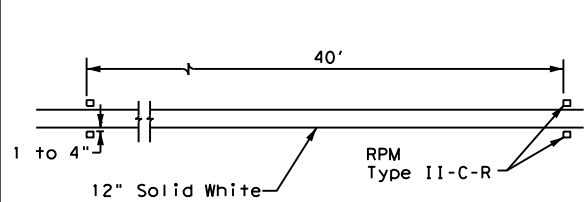
**TAPERED DECELERATION LANE**

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

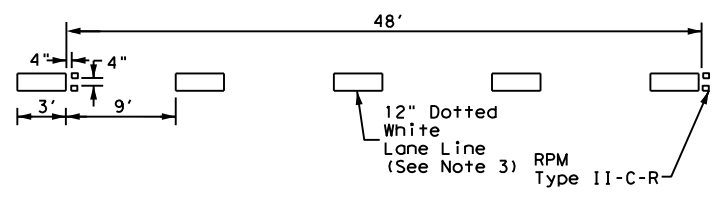


**PARALLEL DECELERATION LANE**

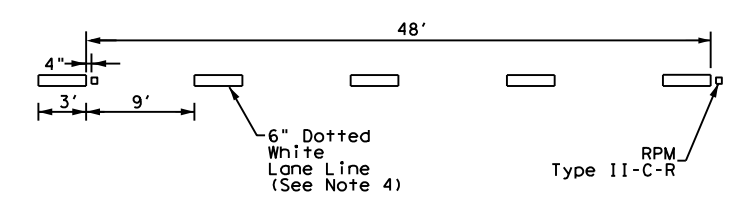
**NOTE**  
 Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.



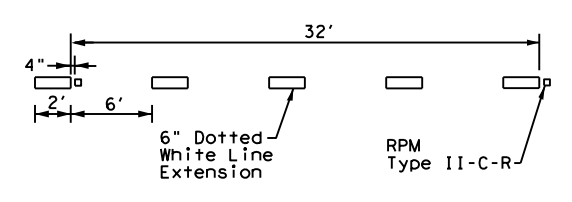
**DETAIL A**



**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.

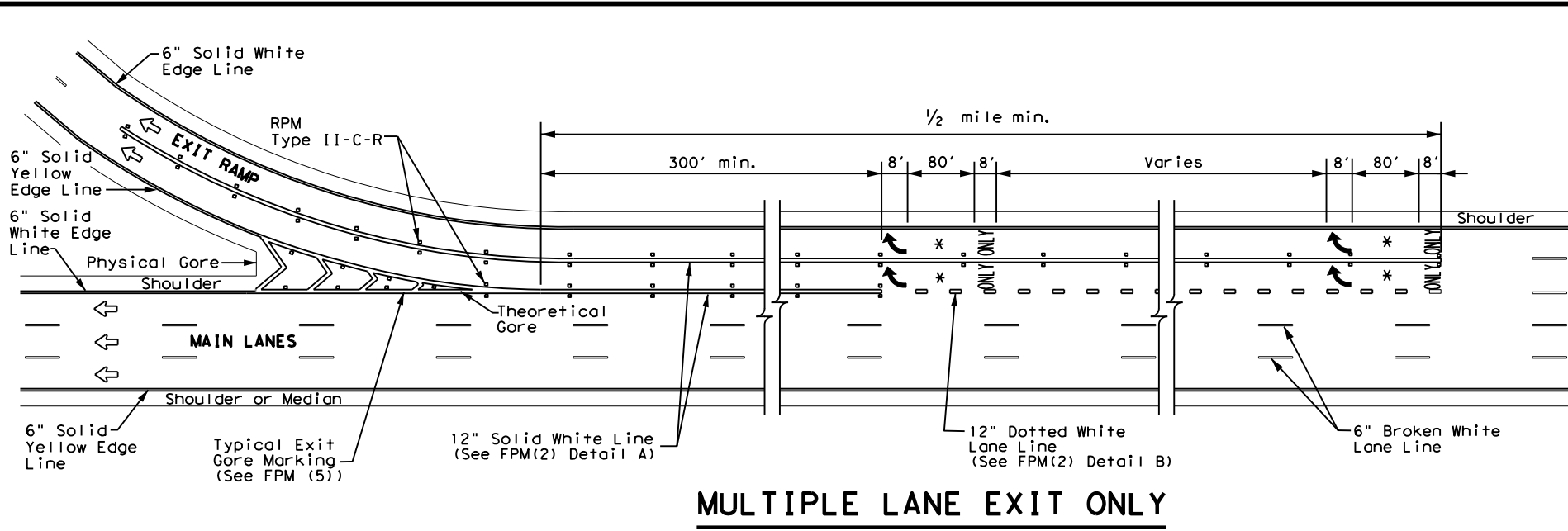


**TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMP**

**FPM(2)-22**

FILE: fpm(2)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
2-77 5-00 2-12	DIST	COUNTY	SHEET NO.	
4-92 8-00 10-22	WAC	McLENNAN	52	
8-95 2-10				





**MULTIPLE LANE EXIT ONLY**

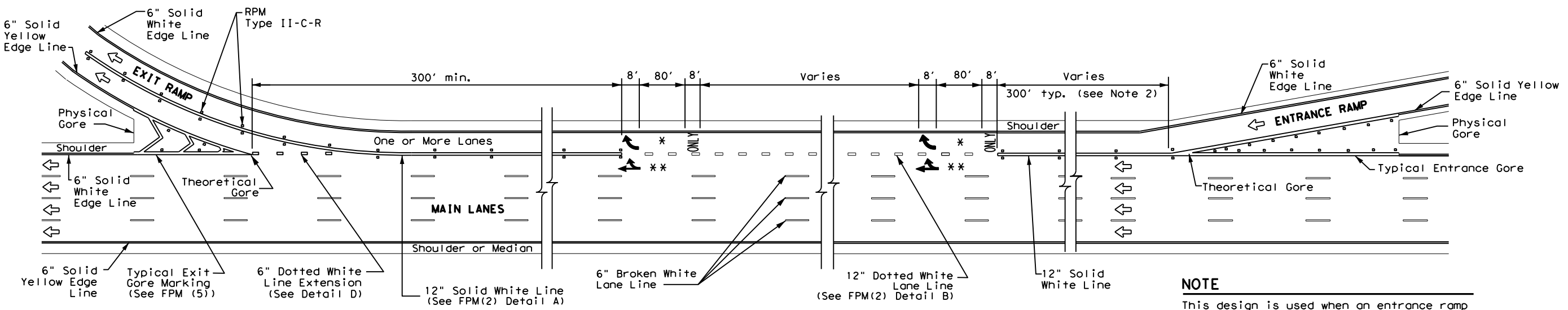
LEGEND	
↔	Traffic Flow
□	Reflectorized Raised Markers (RPM) Type II-C-R
↶	Pavement marking arrow (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used
**	Arrow markings are optional

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**

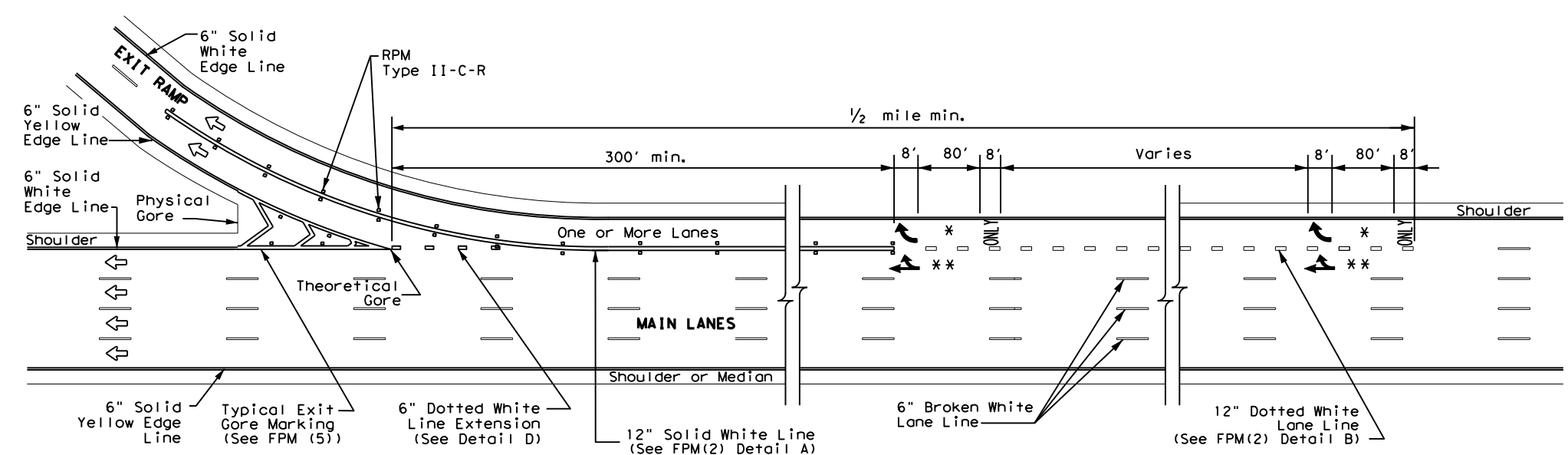
1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines 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**

DATE: 2/6/2023 3:32:40 PM  
FILE: ... \STD ROADWAY\ fpm(4) -22. dgn

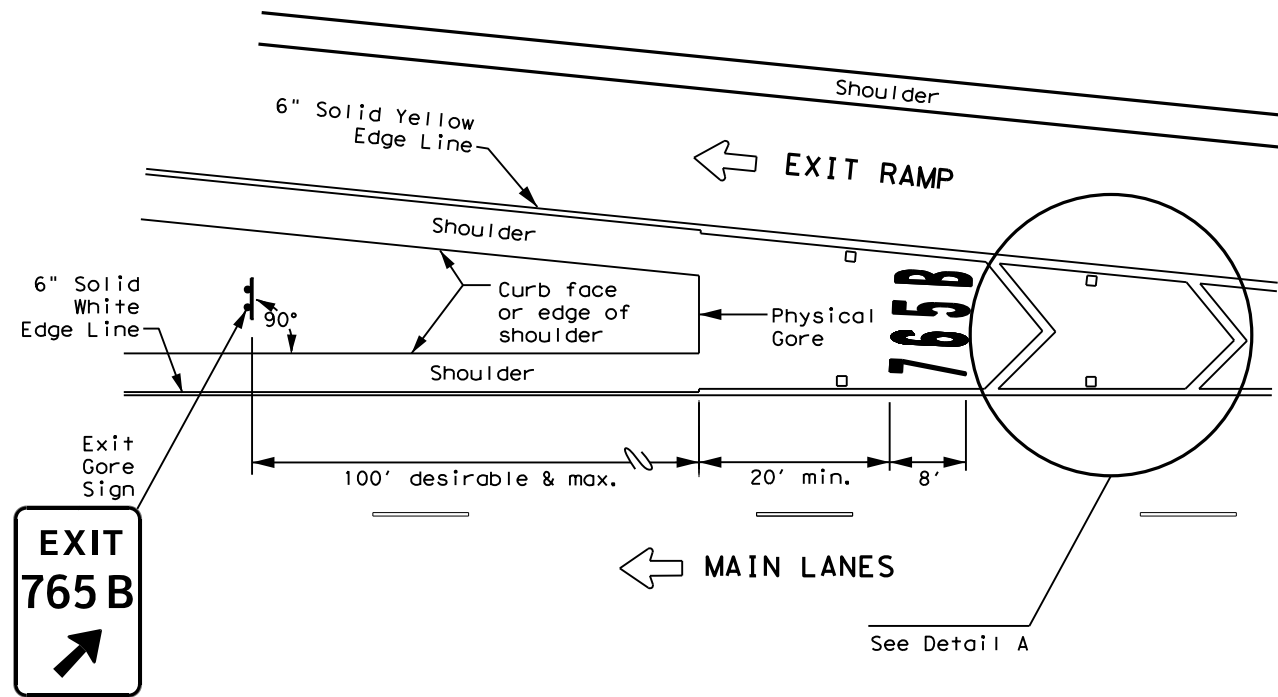
		<b>Traffic Safety Division Standard</b>	
<b>TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS MULTIPLE LANE DROP (EXIT) DETAILS FPM(4) -22</b>			
FILE: fpm(4) -22. dgn	DN:	CK:	DW:
© TxDOT October 2022	CONT	SECT	JOB
REVISIONS	0015	01	253
2-77 2-10			IH 35
5-00 2-12	DIST	COUNTY	SHEET NO.
8-00 10-22	WAC	McLENNAN	54

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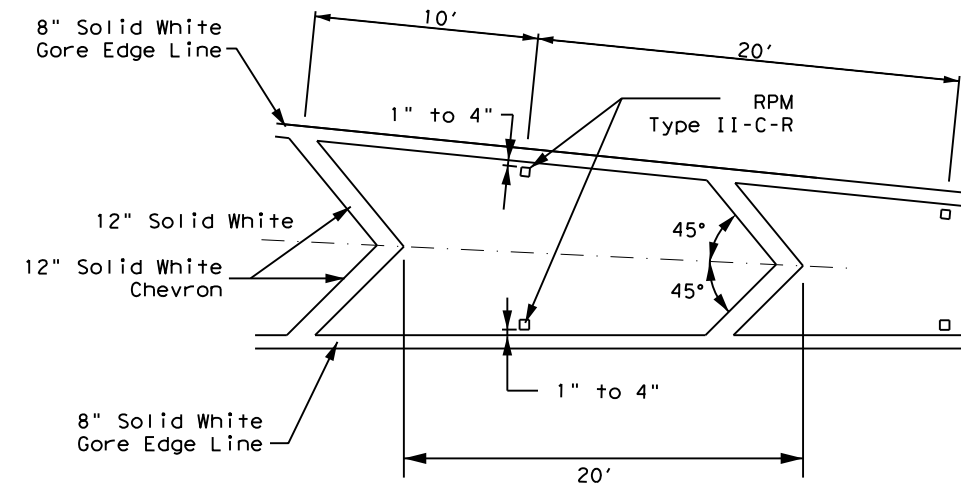
DATE: 2/6/2023 3:32:57 PM  
 FILE: ...STD\_ROADWAY\FPM(5)-22.dgn

**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>



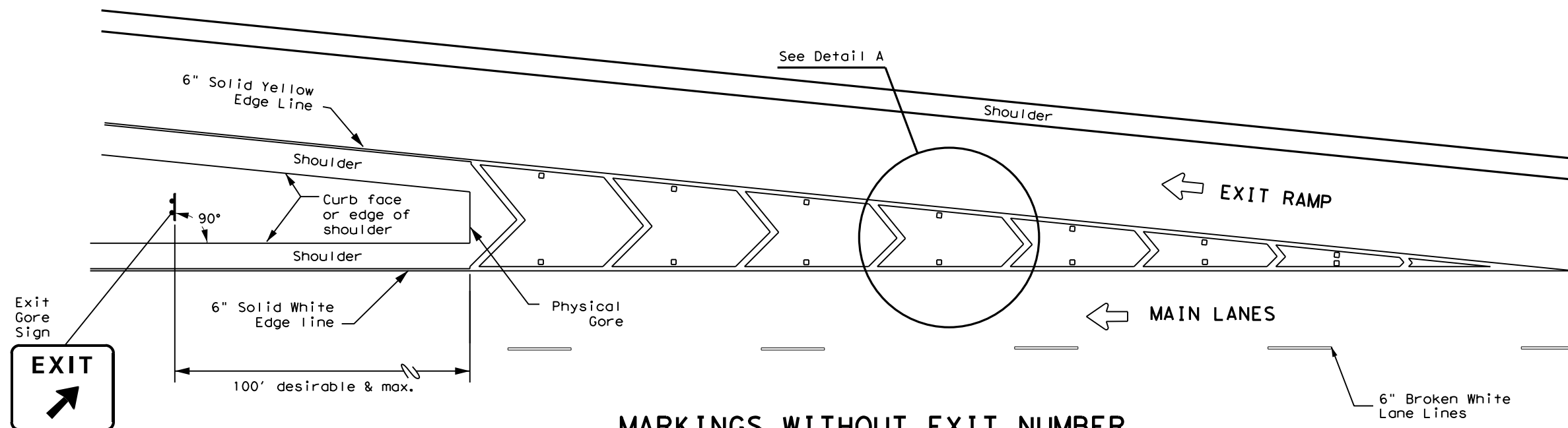
**MARKINGS WITH EXIT NUMBER**



**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**

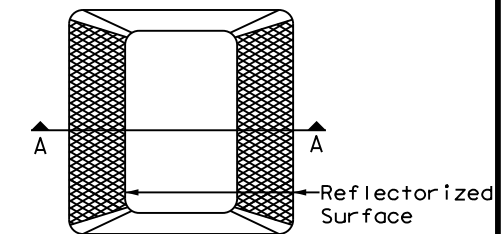


**MARKINGS WITHOUT EXIT NUMBER**

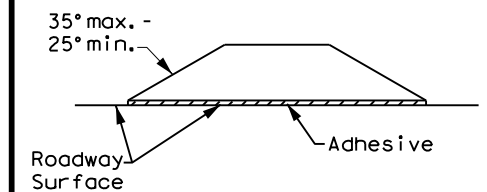
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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)**

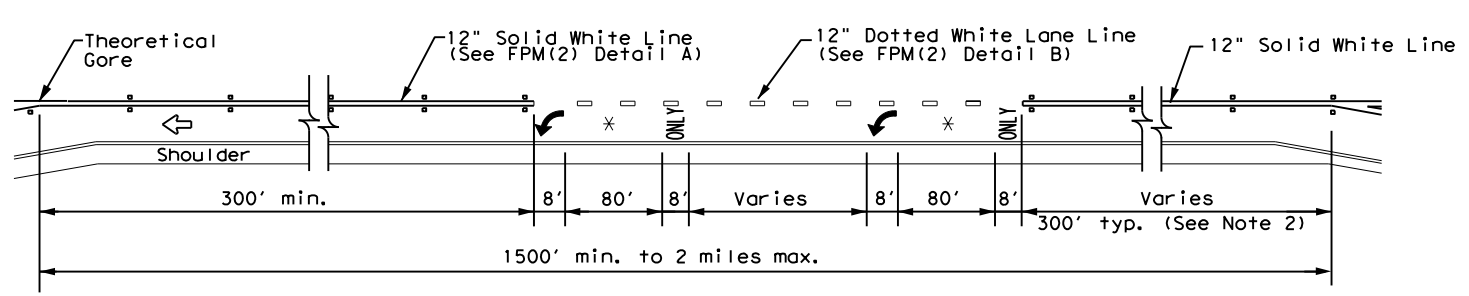
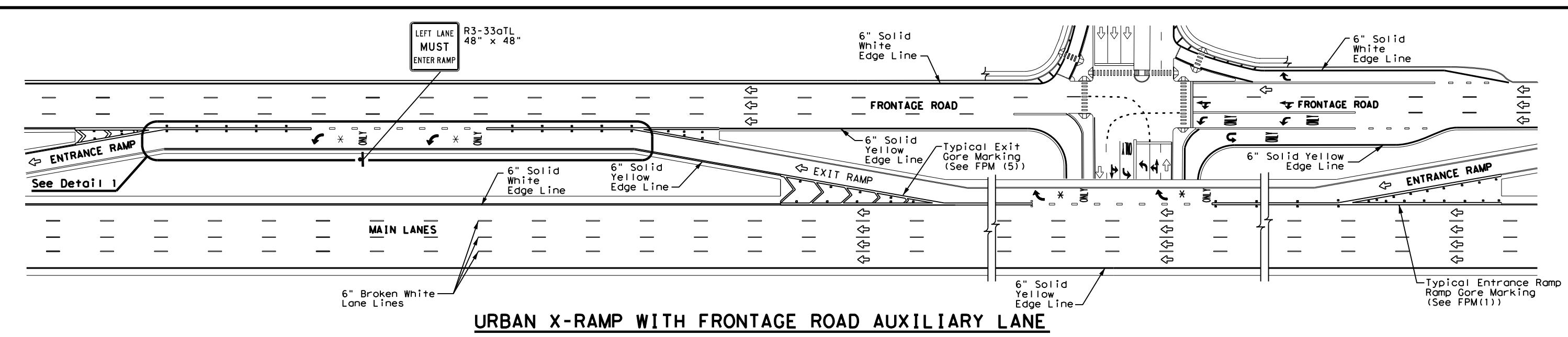
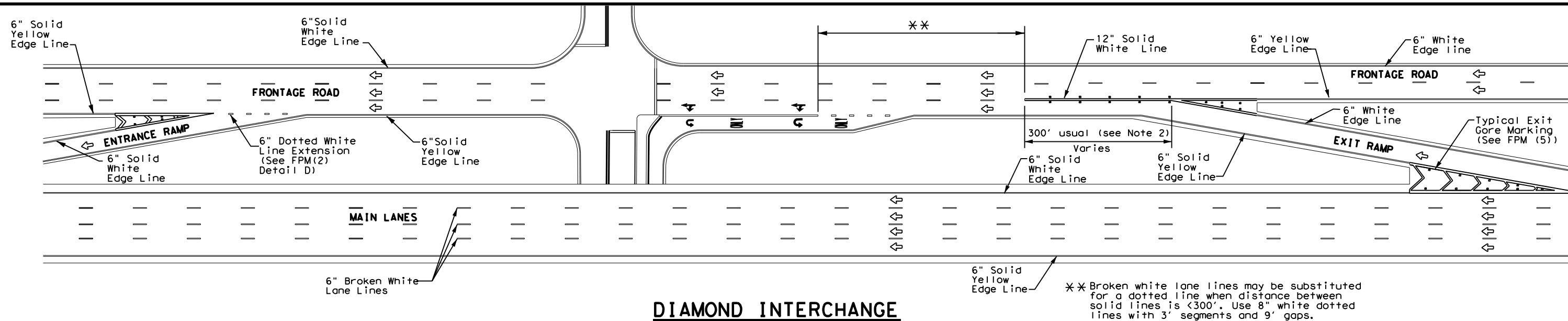


**EXIT GORE PAVEMENT MARKINGS**

**FPM(5) - 22**

FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
9-19	DIST	COUNTY	SHEET NO.	
10-22	WAC	McLENNAN	55	

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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**

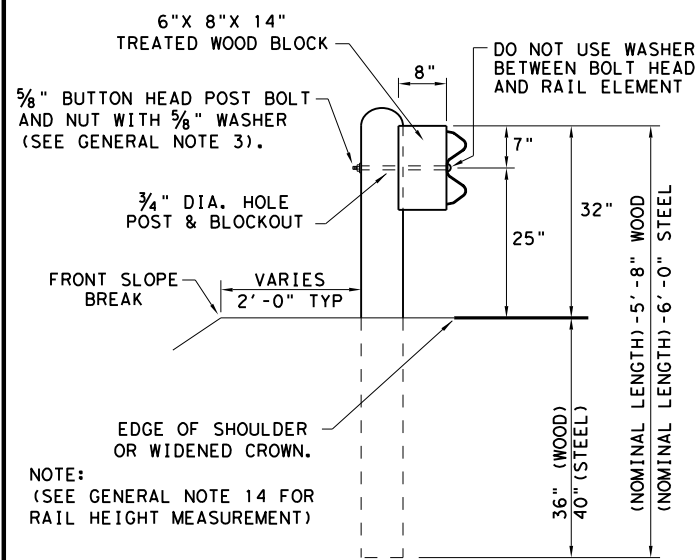
**FPM(6) -22**

FILE: fpm(6)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
10-22	REVISIONS	0015 01	253	IH 35
	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	56	

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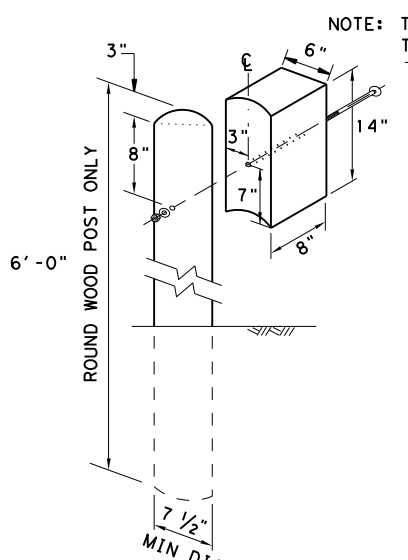
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DATE: 2/6/2023  
 FILE: ...STD. ROADWAY\gf3119.dgn

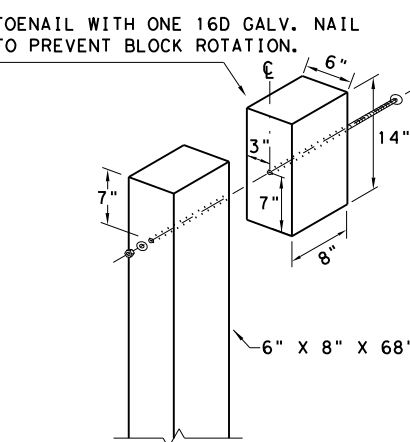


**TYPICAL POST PLACEMENT**

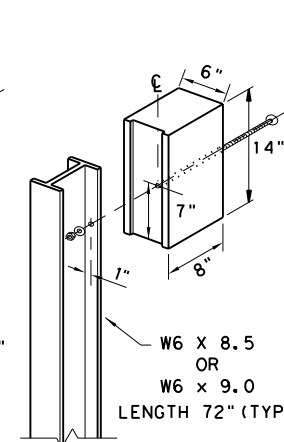
NOTE: (SEE GENERAL NOTE 14 FOR RAIL HEIGHT MEASUREMENT)



**WOOD BLOCK TO ROUND WOOD POST**

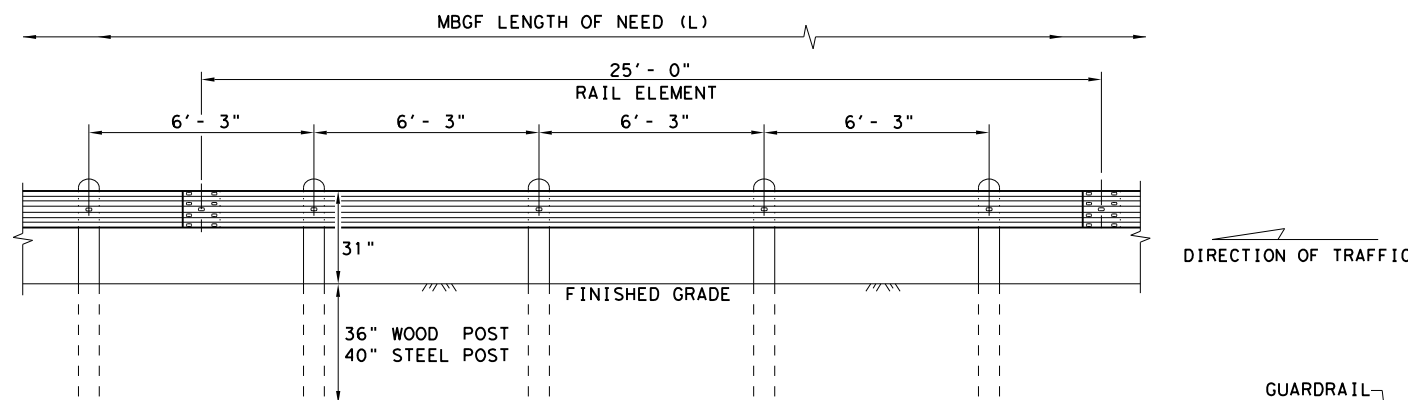


**WOOD BLOCK TO RECTANGULAR WOOD POST**



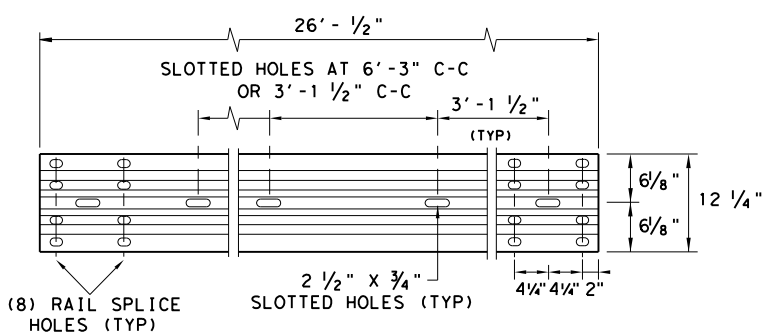
**ROUTED WOOD BLOCK TO I-BEAM STEEL POST**

NOTE: \*\* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



**ELEVATION MID-SPAN RAIL SPLICE**

SHOWING A 25' - 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



**ELEVATION 25' - 0" (NOM.) W-BEAM SECTION**

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES. SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

NOTE: FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECESSED NUT.

SPLICE BOLT LENGTH VARIES

FBB01 = 1 1/4"

FBB02 = 2"

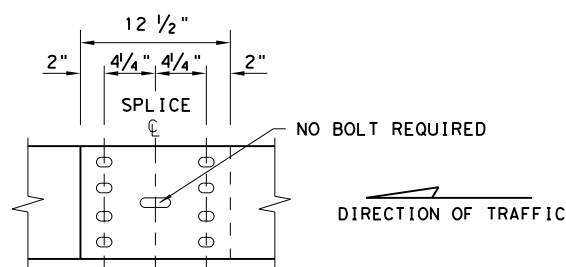
POST & BLOCK LENGTH

FBB03 = 10"

FBB04 = 18"

**BUTTON HEAD BOLT**

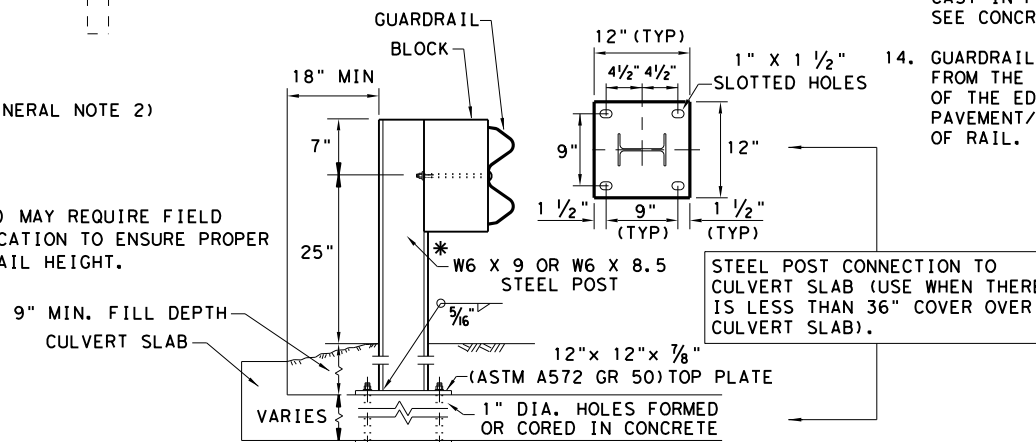
NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.



**MID-SPAN RAIL SPLICE DETAIL**

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

\* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.



**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

**GENERAL NOTES**

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25' - 0", OR 12' - 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3' - 1 1/2" C-C OR 6' - 3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 3/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

NOTE: TRANSITIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS. SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS. SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

		Design Division Standard	
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>			
FILE: gf3119.dgn	DN: TXDOT	CK: KM	DW: VP
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REVISIONS	0015 01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	57	



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DATE: 2/6/2023  
FILE: ...STD\_ROADWAY\gf31dot19.dgn

BREAKAWAY CABLE TERMINAL (BCT) CABLE ANCHOR ASSEMBLY WITH CABLE BRACKET, BEARING PLATE AND STANDARD HARDWARE.

C3 X 5 X 80" (3) GROUND STRUTS

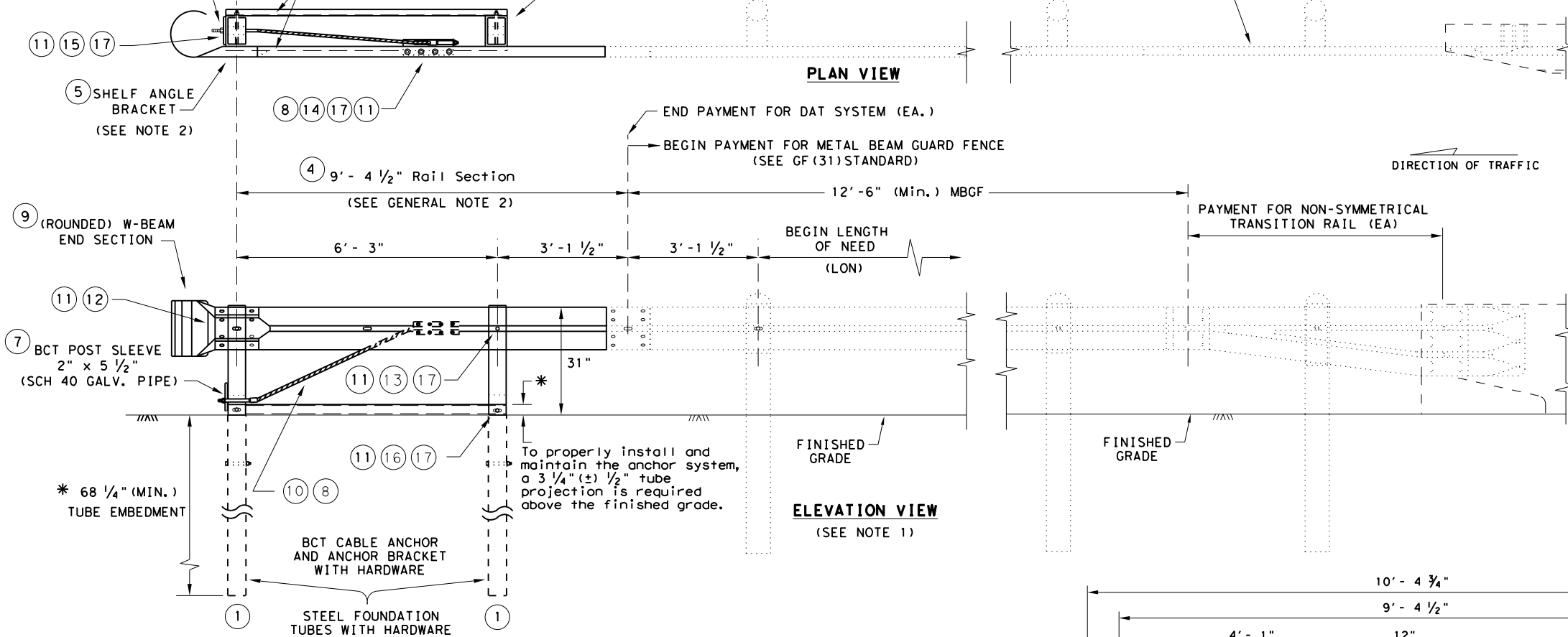
7 1/4" X 5 1/4" X 46" (2) DAT TERMINAL POST

NON-SYMMETRICAL TRANSITION RAIL SECTION (SEE APPLICABLE TRANSITION STANDARD)

**GENERAL NOTES**

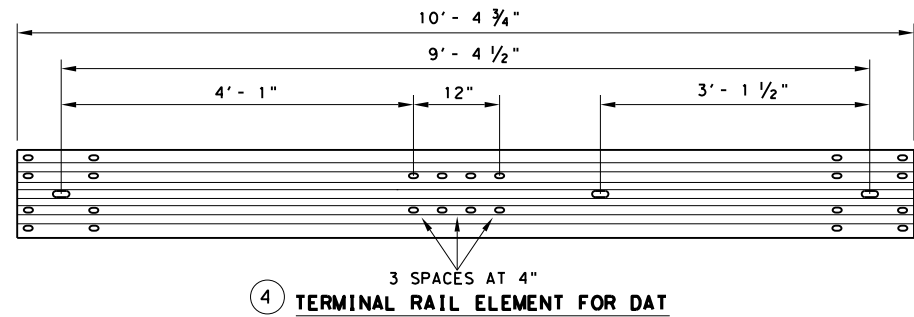
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

**MOW STRIP INSTALLATION**  
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

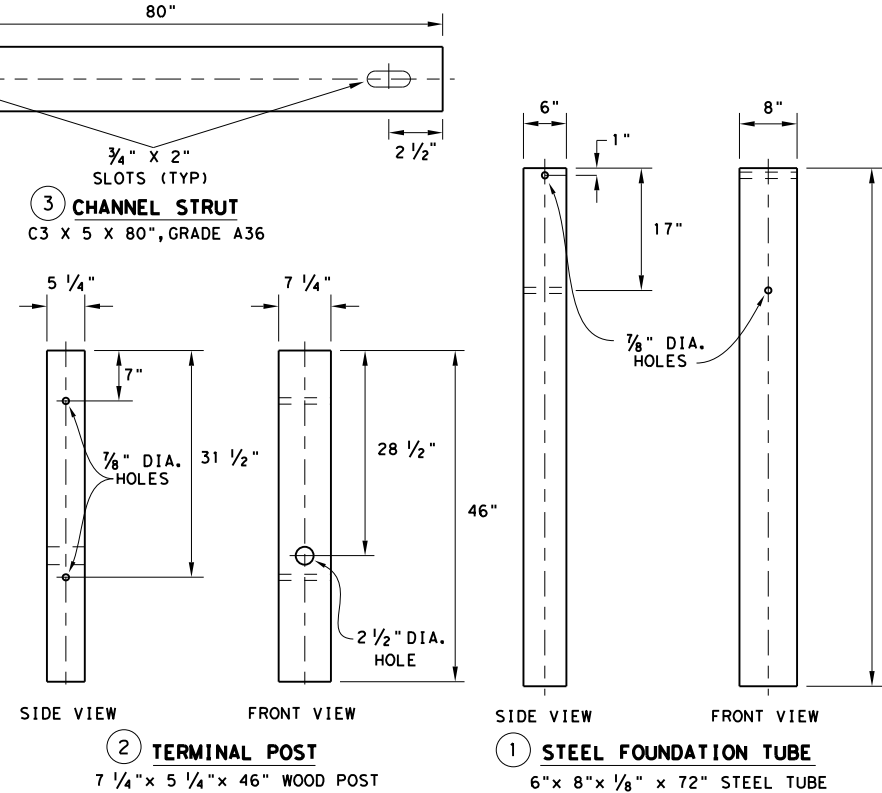
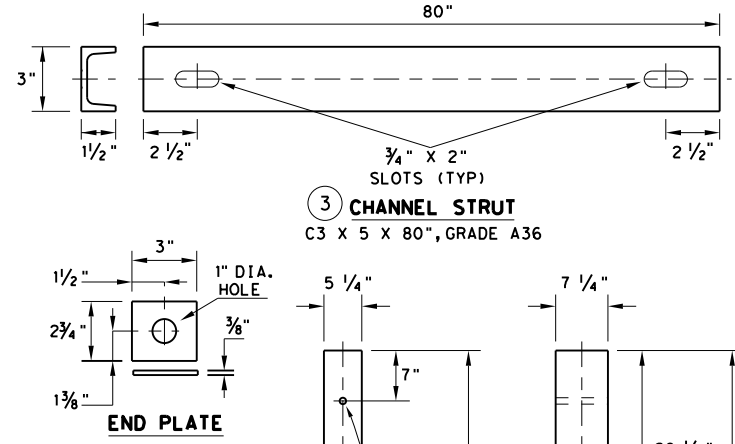
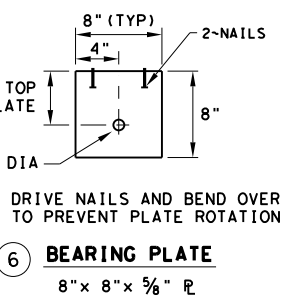
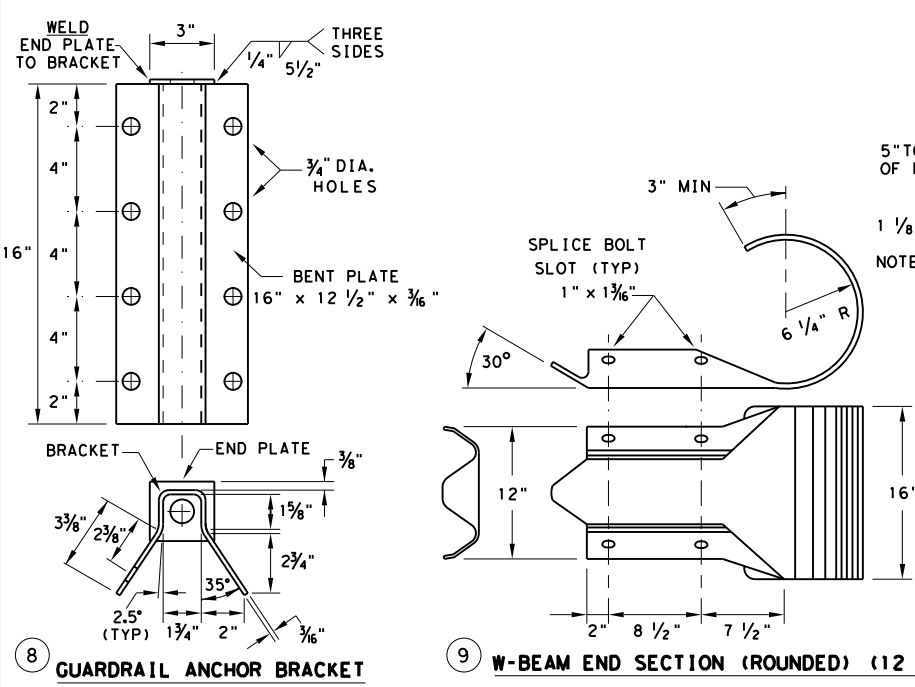


**DOWNSTREAM ANCHOR TERMINAL (DAT)**

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.



#	(DAT) PARTS LIST	QTY
1	STEEL FOUNDATION TUBE	2
2	DAT TERMINAL POST	2
3	CHANNEL STRUT	2
4	TERMINAL RAIL ELEMENT	1
5	SHELF ANGLE BRACKET	1
6	BCT BEARING PLATE	1
7	BCT POST SLEEVE	1
8	GUARDRAIL ANCHOR BRACKET	1
9	(ROUNDED) W-BEAM END SECTION	1
10	BCT CABLE ANCHOR	1
11	RECESSED NUT, GUARDRAIL	20
12	1 1/4" BUTTON HEAD BOLT	4
13	10" BUTTON HEAD BOLT	2
14	5/8" X 2" HEX HEAD BOLT	8
15	5/8" X 8" HEX HEAD BOLT	4
16	5/8" X 10" HEX HEAD BOLT	2
17	5/8" FLAT WASHER	18



Texas Department of Transportation  
Design Division Standard

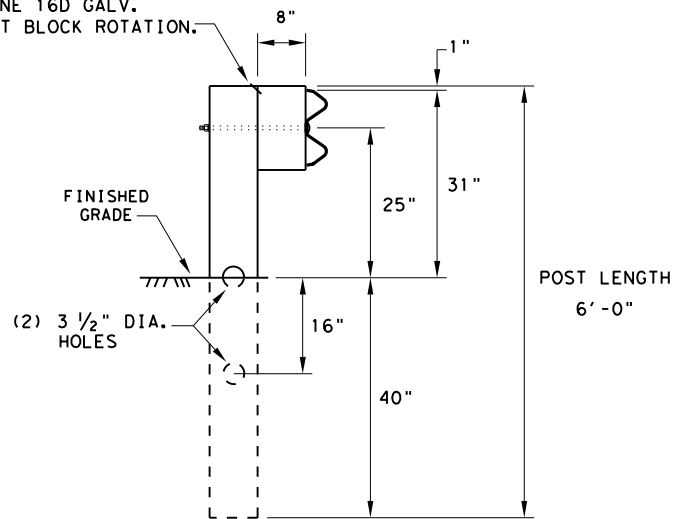
**METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL) TL-3 MASH COMPLIANT GF(31)DAT-19**

FILE: gf31dot19.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CGL/AG
© TXDOT: NOVEMBER 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0015	01	253	IH 35
	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	58	

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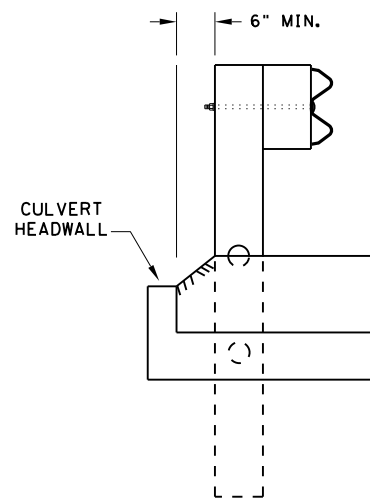
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NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



**RECTANGULAR CRT POST  
(6" X 8" X 6' LONG)**

(6) CRT REQUIRED  
SEE ELEVATION DETAIL FOR LOCATIONS



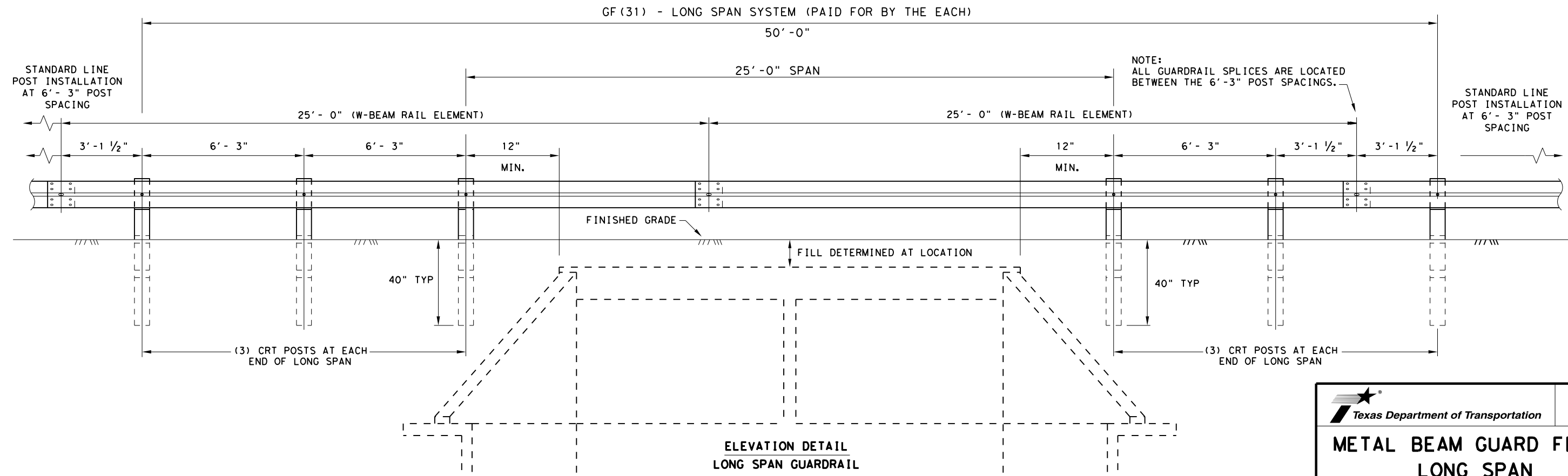
**LATERAL OFFSET BETWEEN THE  
GUARDRAIL AND THE CULVERT HEADWALL**

**GENERAL NOTES**

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'-6" OR 25'-0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'-1 1/2" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC160) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

DIRECTION OF TRAFFIC



**ELEVATION DETAIL  
LONG SPAN GUARDRAIL**



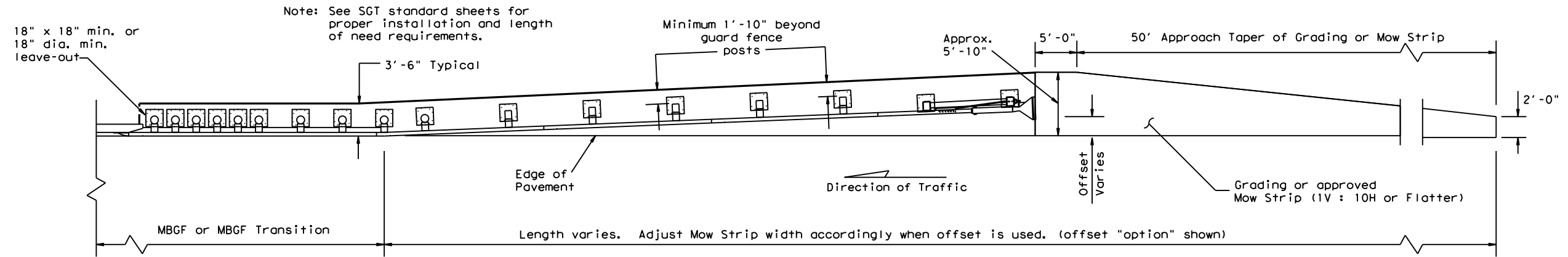
**METAL BEAM GUARD FENCE  
LONG SPAN  
TL-3 MASH COMPLIANT**

**GF(31)LS-19**

FILE: gf31\ls19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	59	

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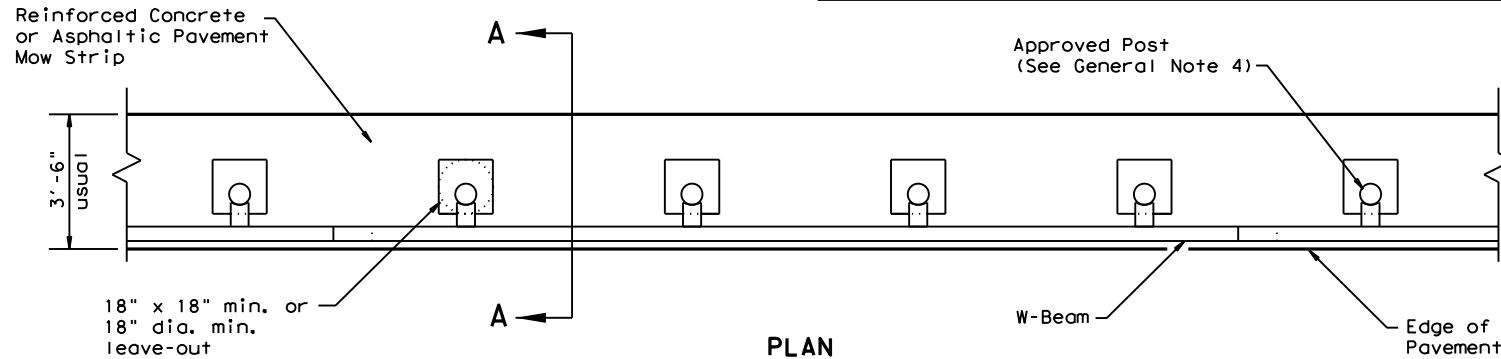
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Note: See SGT standard sheets for proper installation and length of need requirements.

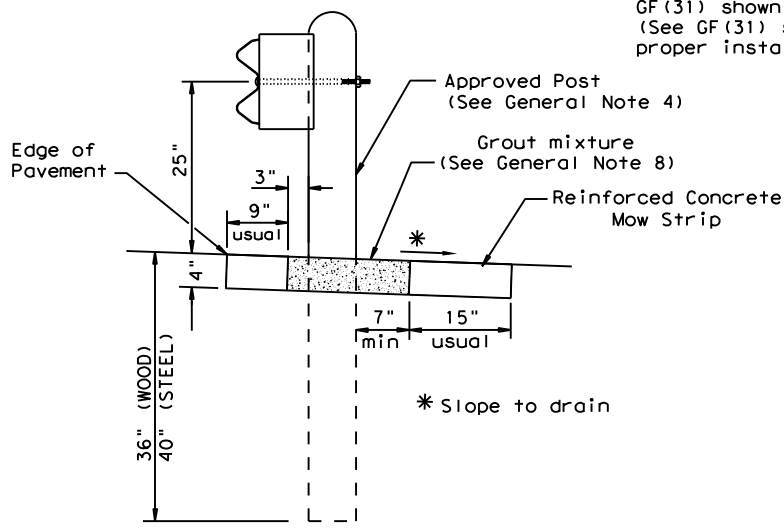
**GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS**

Note: Site Condition(s)  
Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.  
Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.



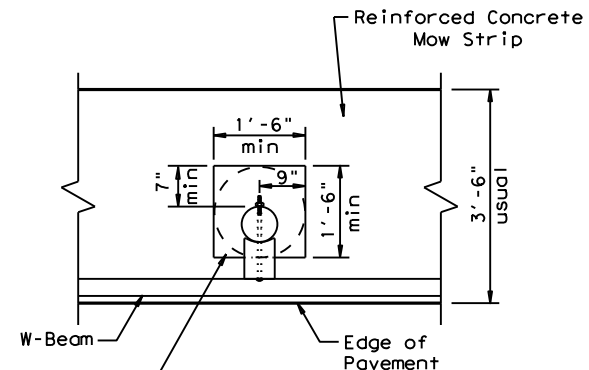
**PLAN**

GF(31) shown with Mow Strip  
(See GF(31) standard sheet for proper installation)



**SECTION A-A**

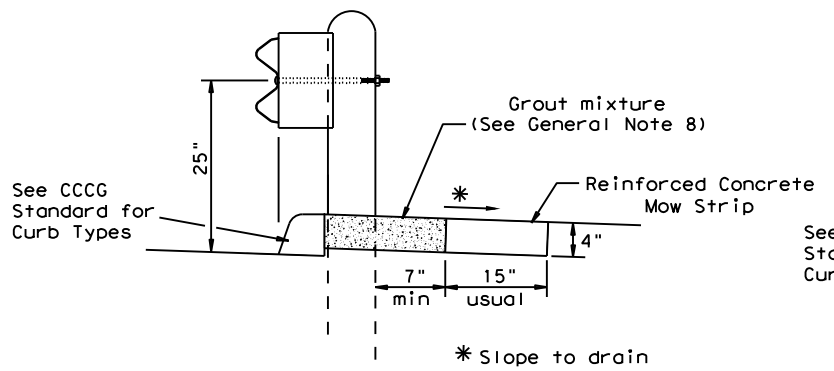
Typical



**MOW STRIP DETAIL**

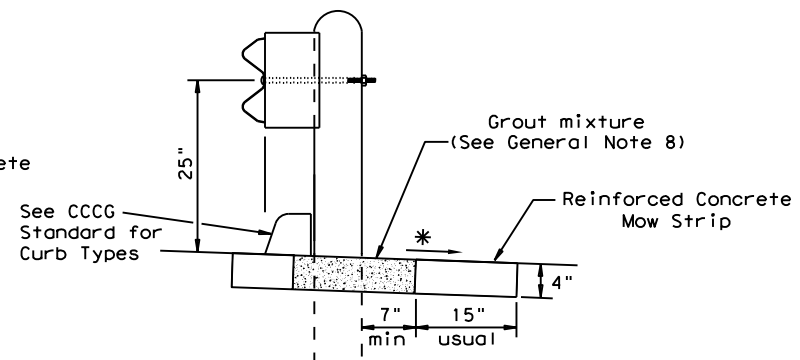
Reinforced Concrete Mow Strip with 18\"/>

- GENERAL NOTES**
1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
  2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
  3. The leave-out behind the post shall be a minimum of 7".
  4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
  5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
  6. Thickness of the mow strip will be 4".
  7. The limits of payment for reinforced concrete will include leave-outs for the posts.
  8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



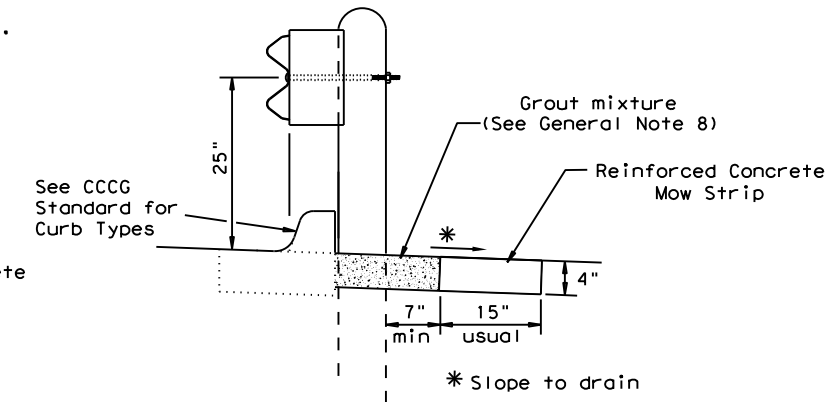
**CURB OPTION (1)**

This option will increase the post embedment throughout the system.



**CURB OPTION (2)**

Curb shown on top of mow strip

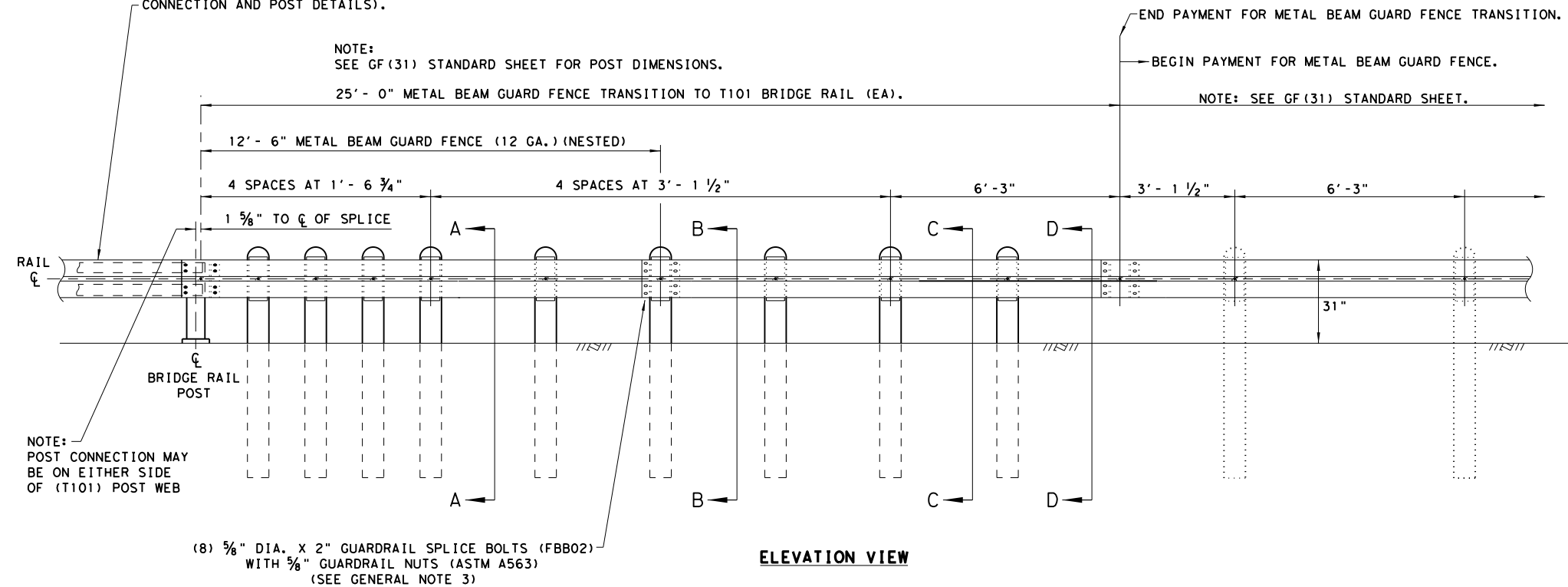
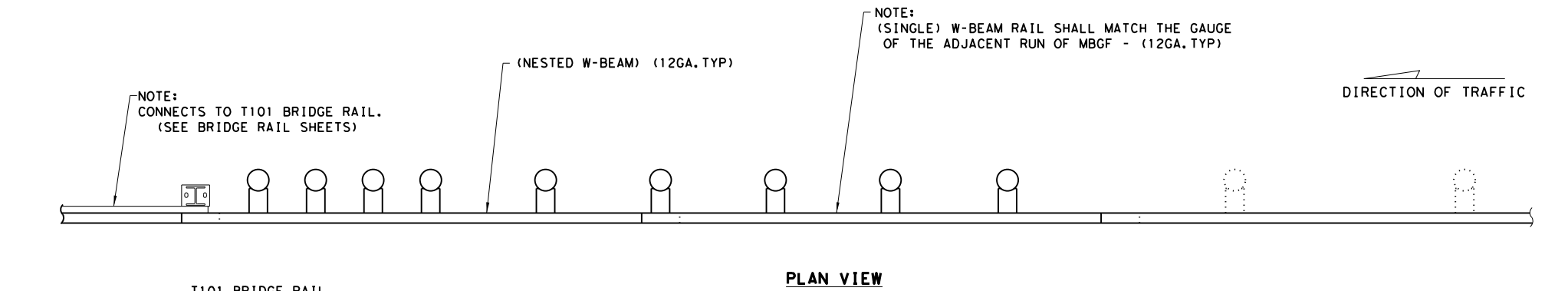


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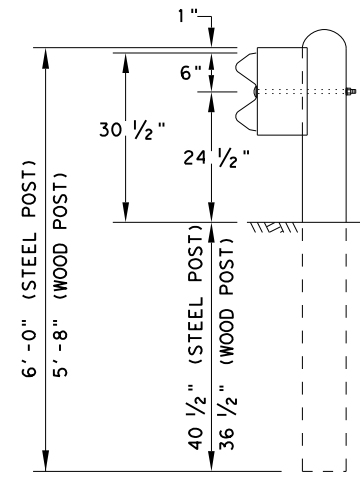
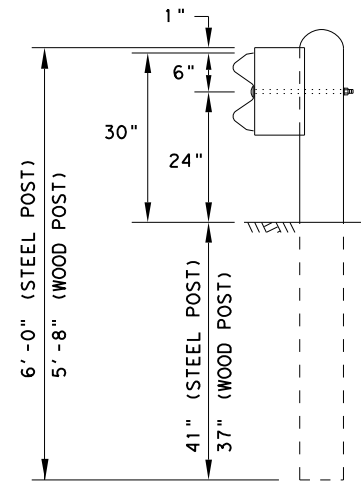
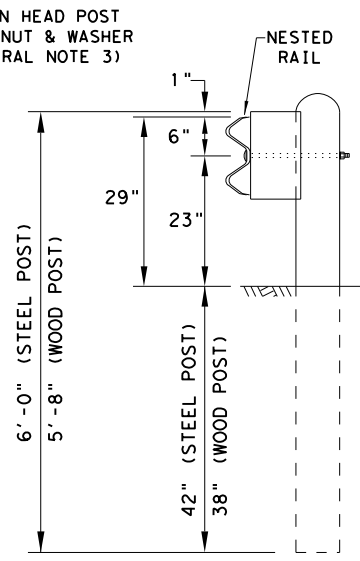
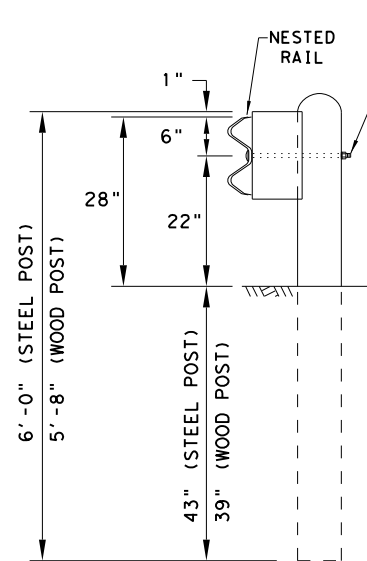
		Design Division Standard	
<b>METAL BEAM GUARD FENCE (MOW STRIP)</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)MS-19</b>			
FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP
©TXDOT: NOVEMBER 2019	CONT	SECT	JOB
REVISIONS	0015	01	253
	DIST	COUNTY	SHEET NO.
	WAC	McLENNAN	60

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 FILE: ...STD\_ROADWAY\gf31+10119.dgn



\* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



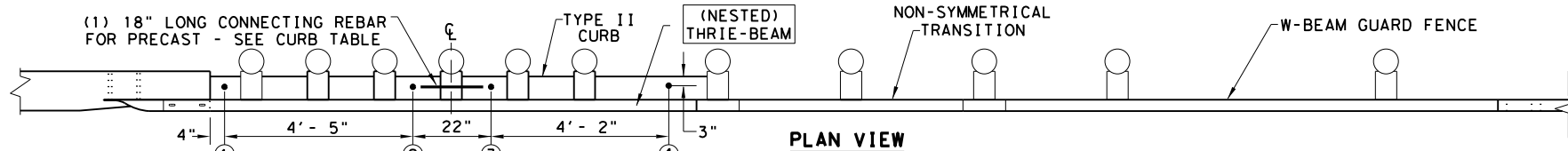
**GENERAL NOTES**

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST" BOLTS (ASTM A307 GR. A) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND 5/8" ROUND WASHER (ASTM F436) AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM A307) ARE 5/8" X 1-1/4" WITH 5/8" NUTS (ASTM A563).
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
9. REFER TO STANDARD GF(31) AND APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

				Design Division Standard	
<b>METAL BEAM GUARD FENCE TRANSITION (T101)</b> <b>GF(31)T101-19</b>					
FILE: gf31+10119	DN: TXDOT	CK: KM	DW: VP	CK: CGL/AG	
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0015	01	253	IH 35	
	DIST	COUNTY		SHEET NO.	
	WAC	McLENNAN		61	

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- (5) 1" DIA. HOLES.
- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:  
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

NOTE:  
CURB IS A REQUIRED COMPONENT FOR THE TRANSITION TO FUNCTION PROPERLY. SEE GENERAL NOTES: 2-4 AND 16-17.

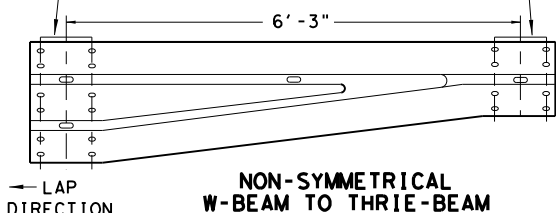
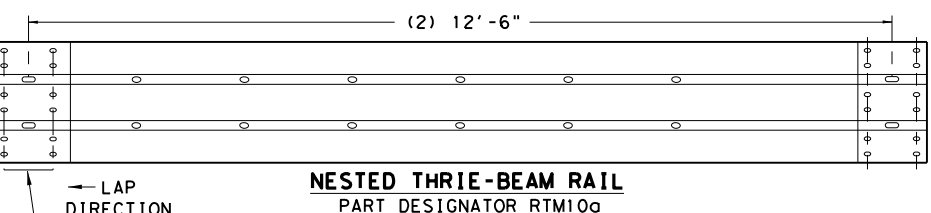
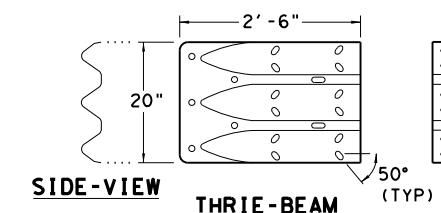
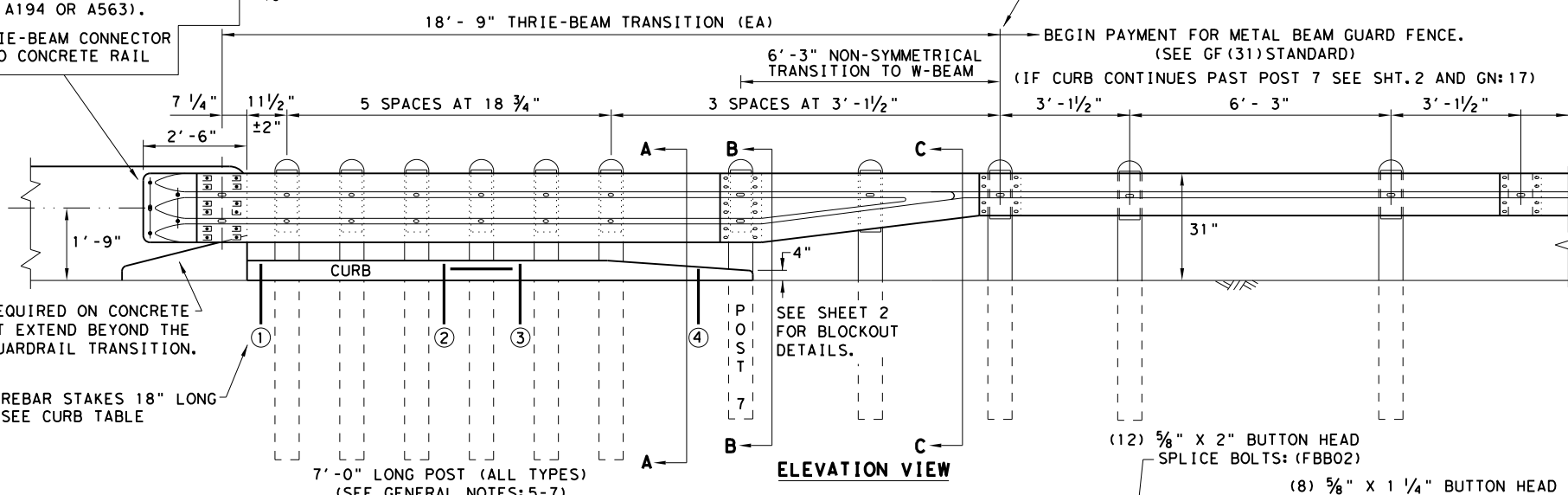
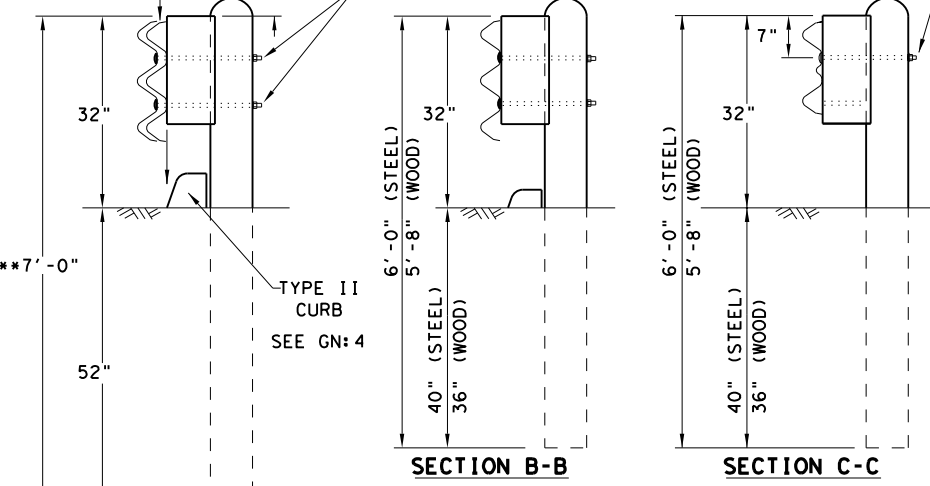


PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE NESTED RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.  
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

5/8" BUTTON HEAD POST BOLTS WITH 1 3/4" O.D. WASHER AND NUT.  
7/8" DIA. HOLE IN POST & BLOCKOUT.

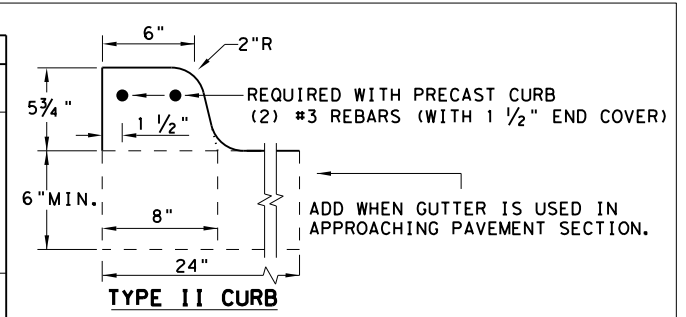
NOTE: ONLY (1) 5/8" BOLT REQUIRED AT THIS POST LOCATION.



NOTE: ALL POST TYPES, SEE GENERAL NOTE: 5 & 6  
NOTE: \*\* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.

THRIE-BEAM TERMINAL - CURB TABLE	
PRECAST CURB FULL LENGTH EQUALS 12'- 2"	
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.	
CURB (1) LENGTH	5'- 8"
CURB (2) LENGTH	6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7	
CONNECTING PRECAST CURB SECTIONS (1) & (2):	
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END.	
USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.	
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:	
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.	
FILL HOLES WITH APPROVED GROUT MIXTURE.	

\* NOTES: NOT NEEDED FOR CAST-IN-PLACE.  
SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS.  
PERCUSSION DRILLING IS NOT PERMITTED WITH:  
TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.



NOTE: OPTIONS FOR TYPE II CURB:  
1. PRECAST  
2. CAST-IN-PLACE

**GENERAL NOTES**

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCGG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF (31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16G) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TxDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

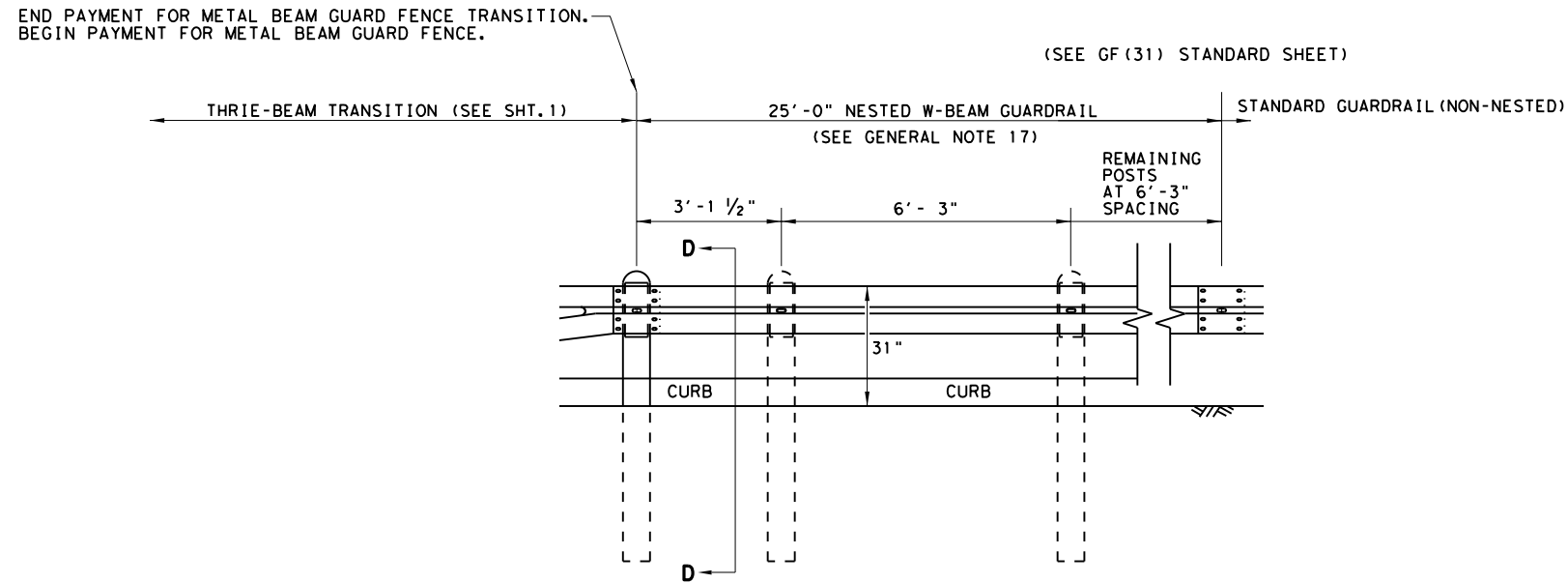
**HIGH-SPEED TRANSITION  
SHEET 1 OF 2**

		Design Division Standard	
<b>METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT</b>			
<b>GF (31) TR TL3-20</b>			
FILE: gf31tr+1320.dgn	DN: TxDOT	CK: KM	DW: VP
© TxDOT: NOVEMBER 2020	CONT	SECT	JOB
REVISIONS	0015	01	253
	DIST	COUNTY	SHEET NO.
	WAC	McLENNAN	62

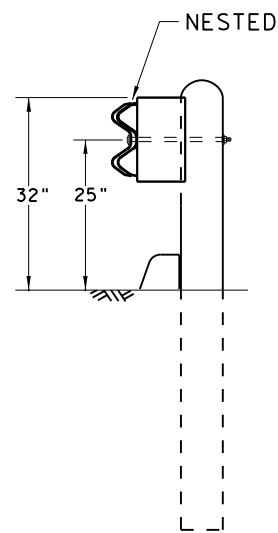
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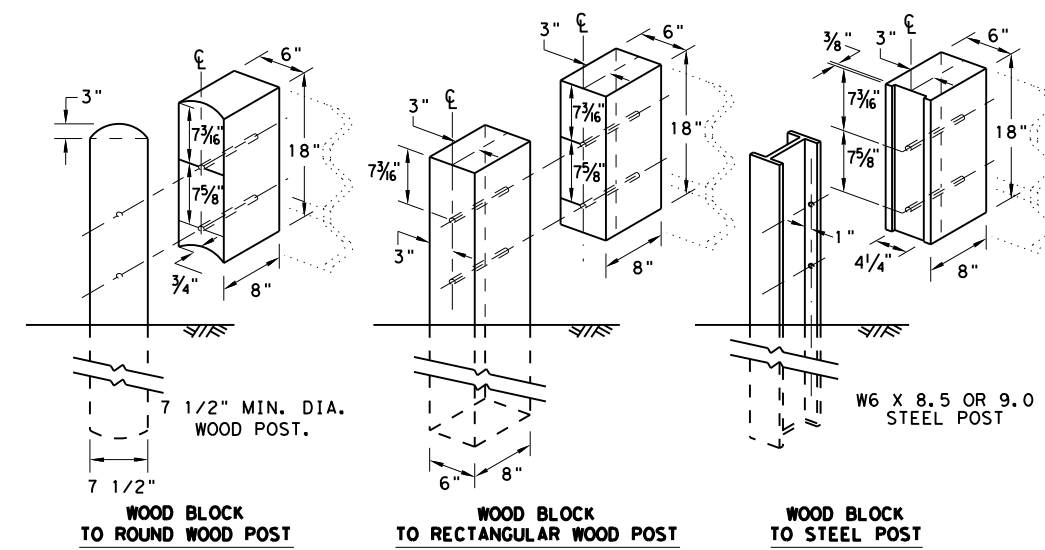
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THREE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2



METAL BEAM GUARD FENCE  
 THREE-BEAM TRANSITION  
 TL-3 MASH COMPLIANT

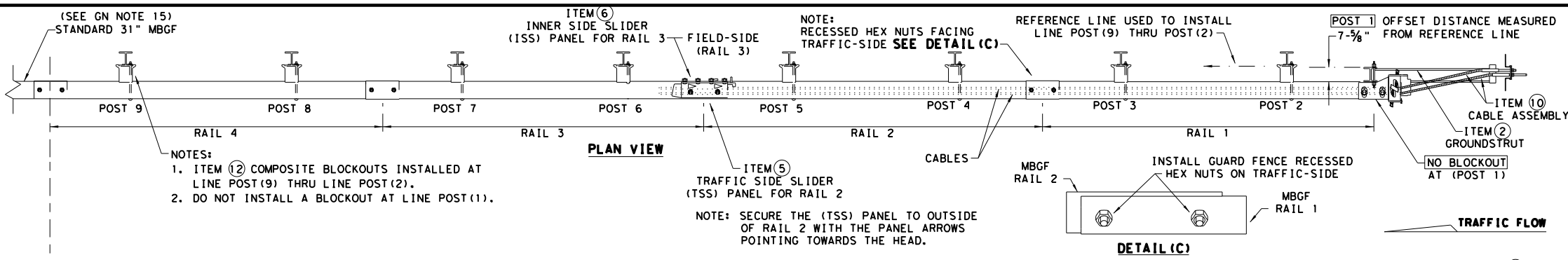
GF (31) TR TL3-20

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REVISIONS	0015	01	253	IH 35
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	WAC	McLENNAN	63	



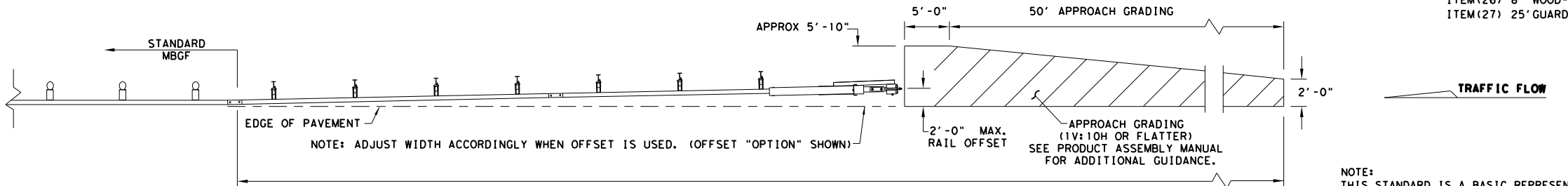
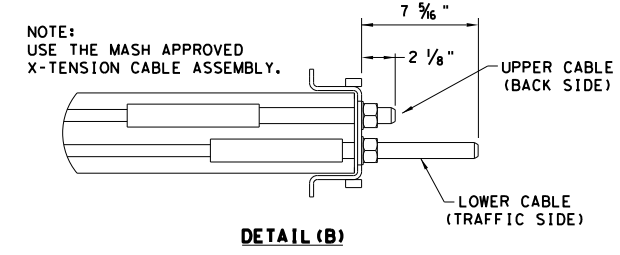
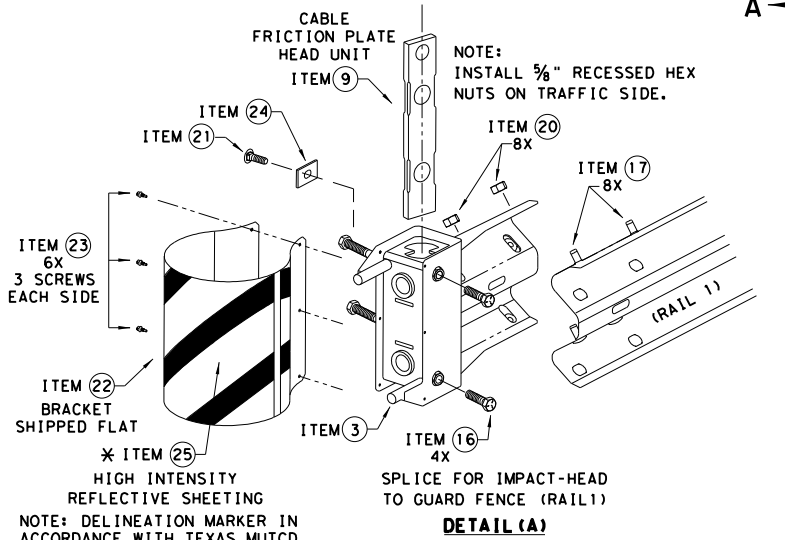
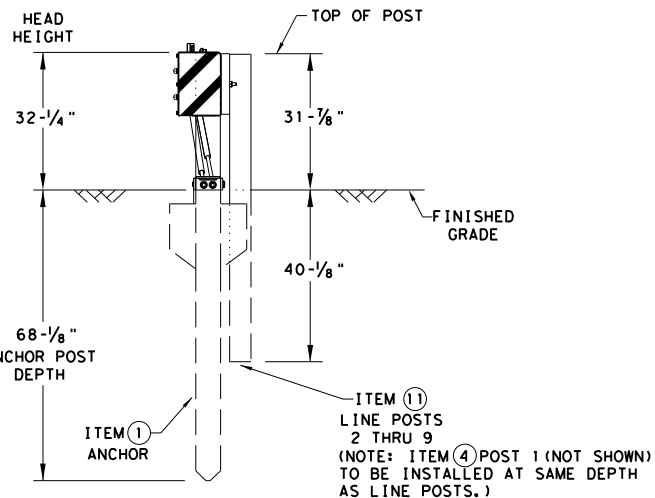
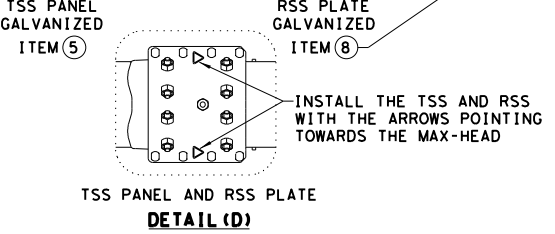
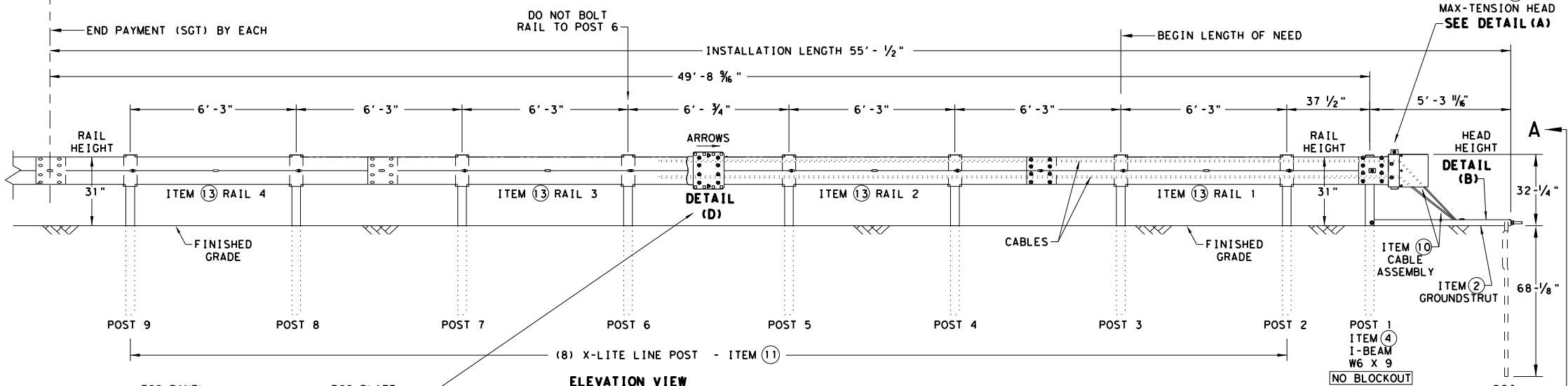
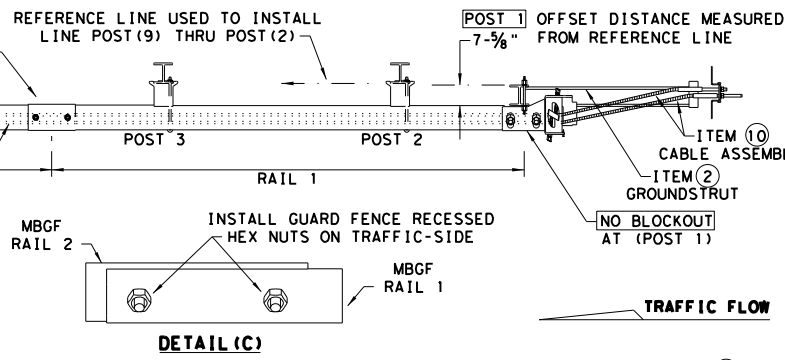
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NOTES:  
 1. ITEM ② COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (9) THRU LINE POST (2).  
 2. DO NOT INSTALL A BLOCKOUT AT LINE POST (1).

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.



NOTE: TxDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MAX-TENSION END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

**GENERAL NOTES**

- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
- FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE: MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
- APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
- FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
- ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
- SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
- COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
- REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
- IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
- POSTS SHALL NOT BE SET IN CONCRETE.
- A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
- MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
- IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
- THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
- A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT. -GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	3/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	3/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWRO3	1
25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL, 8-SPACE, 12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

\* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.  
 \*\* ALTERNATIVE ITEMS NOT SHOWN. ITEM (26) 8" WOOD-BLOCKOUTS ITEM (27) 25' GUARD FENCE PANELS

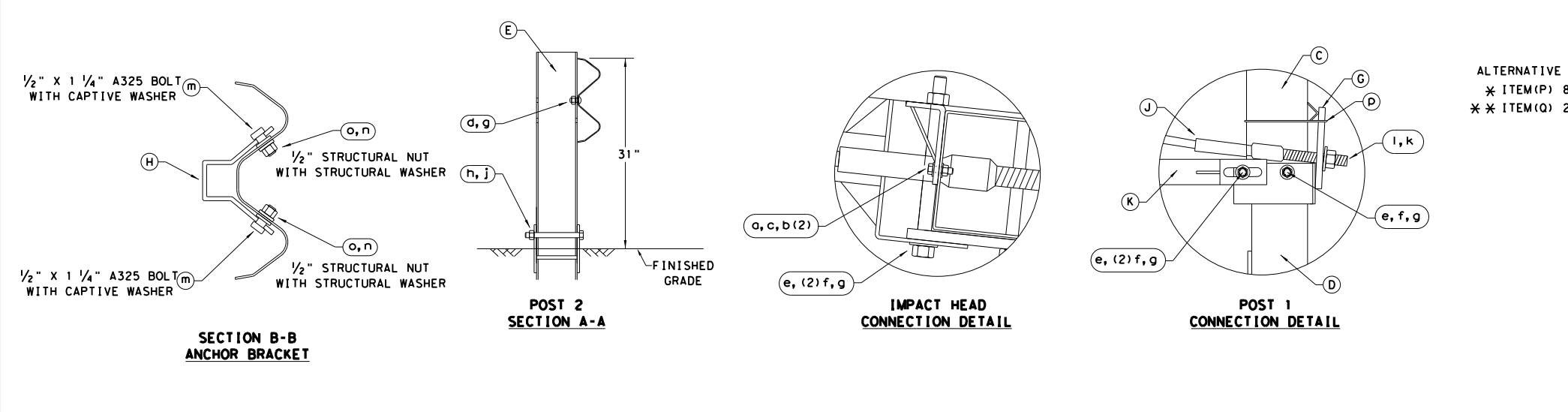
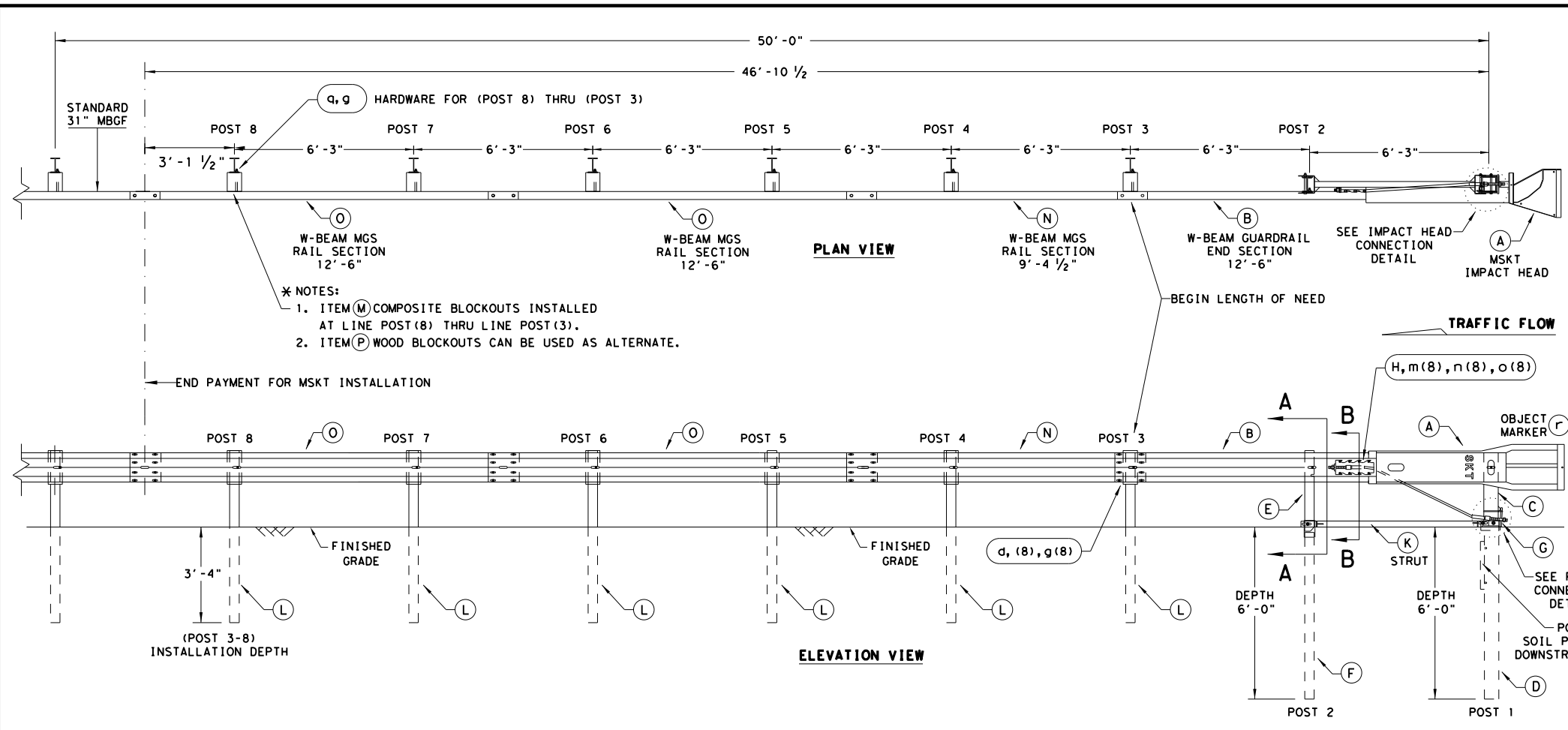
**Texas Department of Transportation**  
 Design Division Standard

**MAX-TENSION END TERMINAL**  
**MASH - TL-3**  
**SGT (11S) 31-18**

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
	DIST	COUNTY		SHEET NO.
	WAC	McLENNAN		64

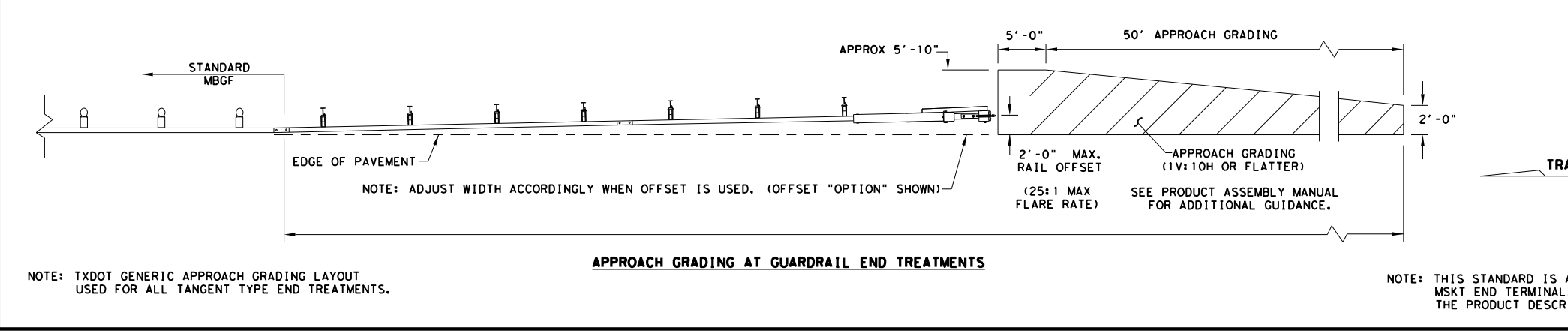
DISCLAIMER: THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TxDOT FOR ANY PURPOSE WHATSOEVER. THE USE OF THIS STANDARD ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 2/6/2023  
 FILE: ...STD\_ROADWAY\sgt12s3118.dgn



- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION-062717).
  - APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TxDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
  - A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
  - IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MOW STRIP STANDARD FOR INSTALLATION GUIDANCE.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
  - UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
  - A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCRANCHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
  - THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN ITS PLACE.
  - A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Go.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
SMALL HARDWARE			
a	2	3/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	3/8" WASHER	W0516
c	2	3/8" HEX NUT	N0516
d	25	3/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	3/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	3/8" WASHER	W050
g	33	3/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/8" O.D. x 3/8" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	3/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



Design Division Standard

## SINGLE GUARDRAIL TERMINAL

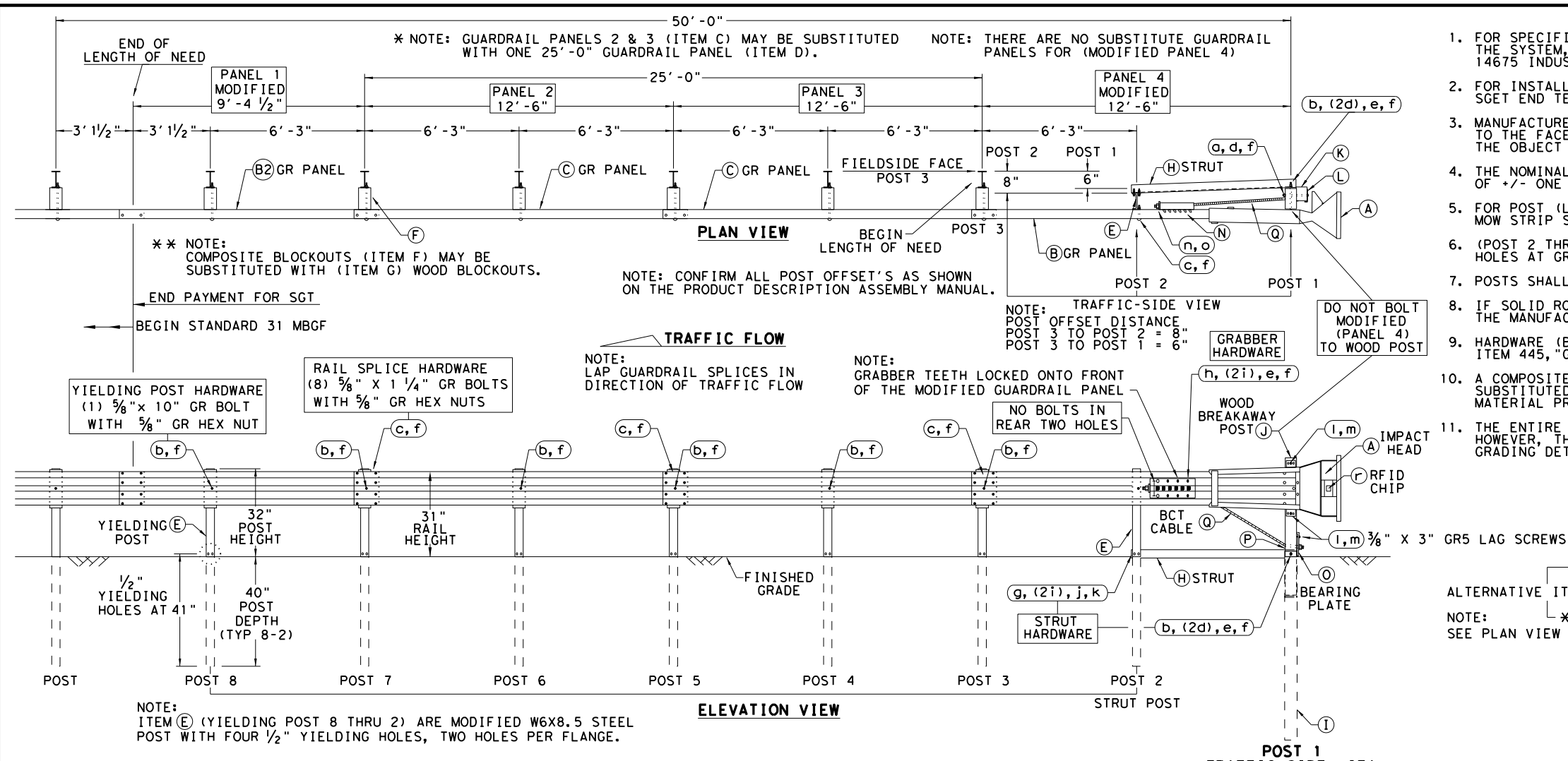
### MSKT-MASH-TL-3

### SGT (12S) 31-18

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© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
	DIST	COUNTY	SHEET NO.	
	WAC	MCLENNAN	65	

DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 2/6/2023  
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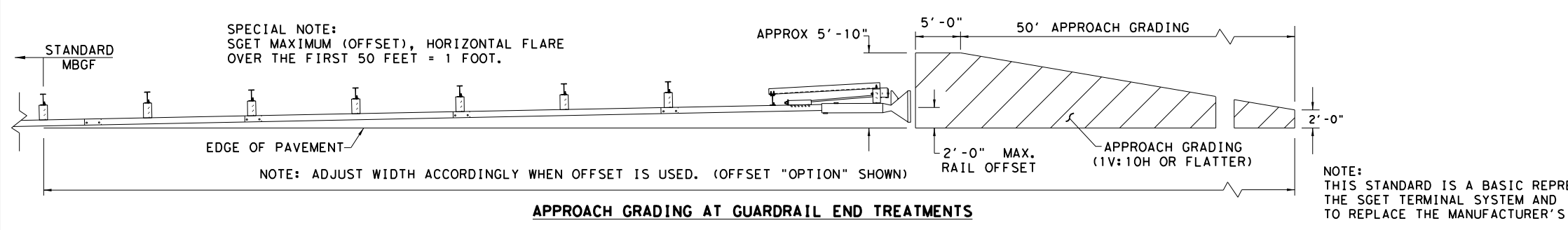
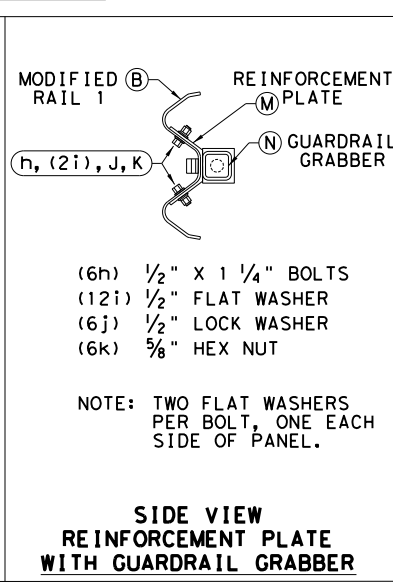
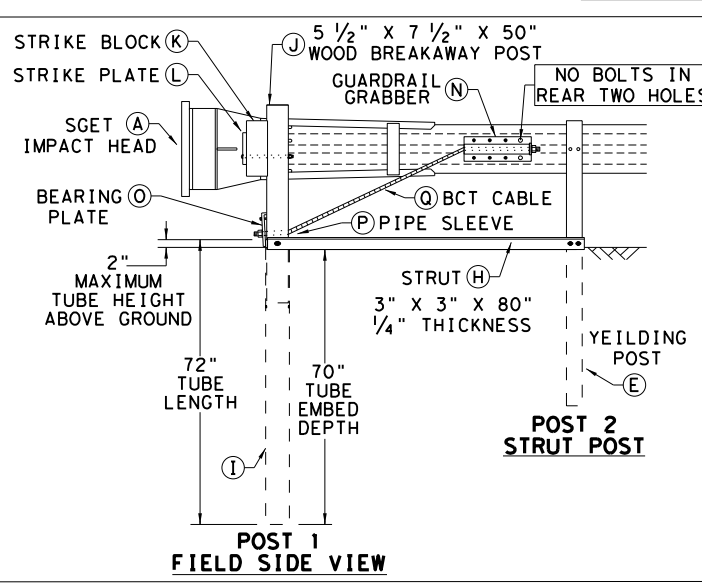
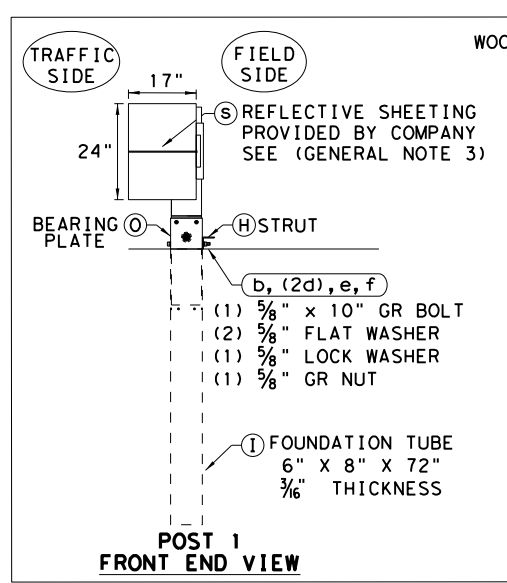
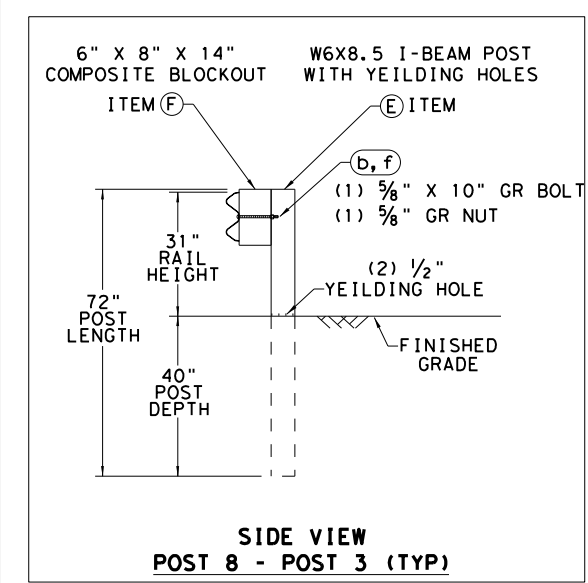


- ### GENERAL NOTES
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
  - MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
  - THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
  - FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
  - (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
  - POSTS SHALL NOT BE SET IN CONCRETE.
  - IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
  - HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
  - THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/8"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81

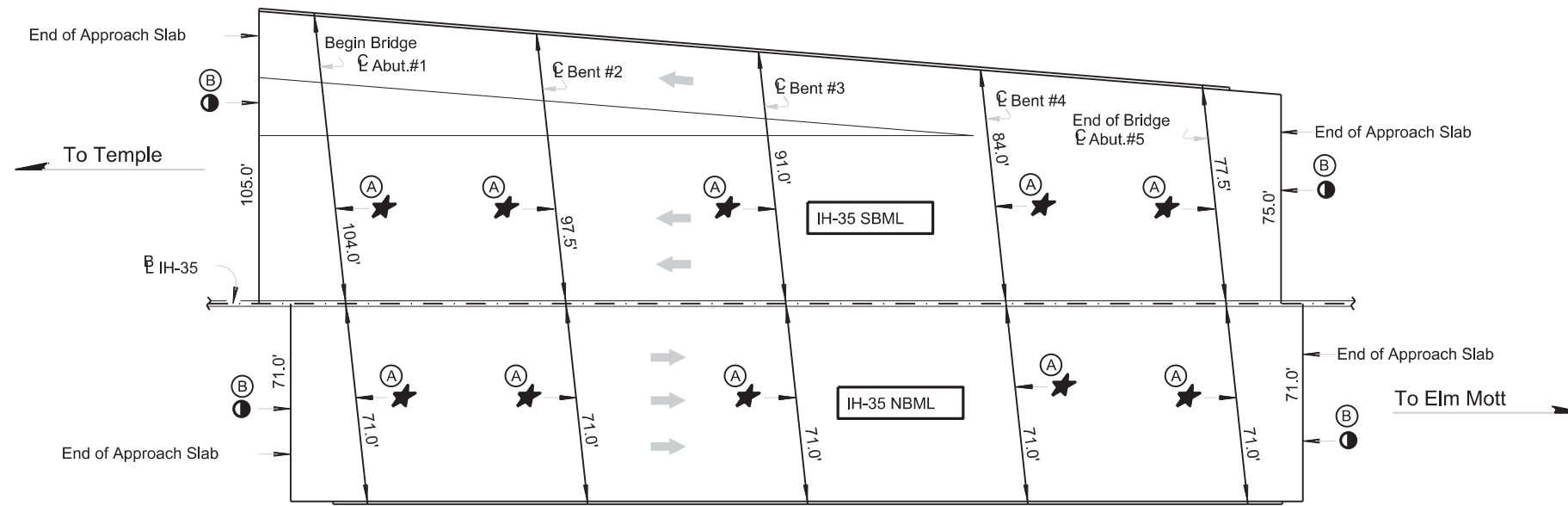
ITEM	QTY	SMALL HARDWARE	ITEM #
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPlice BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563HD HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M



**SPIG INDUSTRY, LLC**  
**SINGLE GUARDRAIL TERMINAL**  
**SGET - TL-3 - MASH**  
**SGT (15) 31-20**

FILE: sg153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT: 0015	SECT: 01	JOB: 253	HIGHWAY: IH 35
REVISIONS	DIST: WAC	COUNTY: McLENNAN	SHEET NO. 66	

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.



IH-35 (SB) OVER LP 340  
 320' ~ OVERALL LENGTH =  
 320'- (4 @ 80') PRESTR. CONC. BEAM SPANS  
 TYPE C BEAMS AND WIDENED W/TX34 GIRDERS  
 VARIABLE ROADWAY WIDTH 6° 13' RFS  
 RAIL TYPE T1F AND SSTR

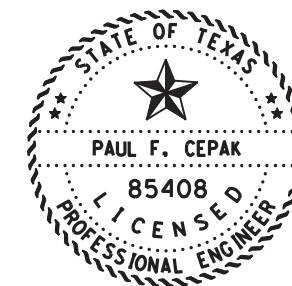
IH-35 (NB) OVER LP 340  
 320' ~ OVERALL LENGTH =  
 320'- (4 @ 80') PRESTR. CONC. BEAM SPANS  
 TYPE C BEAMS AND WIDENED W/TX34 GIRDERS  
 70'-10" ROADWAY WIDTH 6° 13' RFS  
 RAIL TYPE TY4(MOD) AND SSTR

Note:  
 An existing Overlay,  
 (Approx. 2"±) to be removed  
 off the Bridge Deck

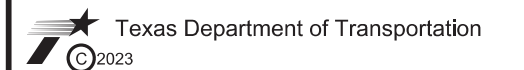
**LAYOUT PLAN**  
 IH-35 (NBML AND SBML) OVER LOOP 340  
 (NBML N.B.I.#09-161-0-0015-01-319)  
 (SBML N.B.I.#09-161-0-0015-01-318)

**ESTIMATED QUANTITIES**

	(A)	(A)	(B)
ITEM	356-6021	438-6002	438-6006
LOCATION	PAV JT UNDERSEAL (24")	CLEANING AND SEALING EXISTING JOINTS (CL 3)	CLEANING AND SEALING JOINTS (CL3)
	L.F.	L.F.	L.F.
STR. #318 (SBML)	454.0	454.0	180.0
STR. #319 (NBML)	284.0	284.0	142.0
TOTAL	738.0	738.0	322.0



Paul F. Cepak, P.E.  
 02/06/2023



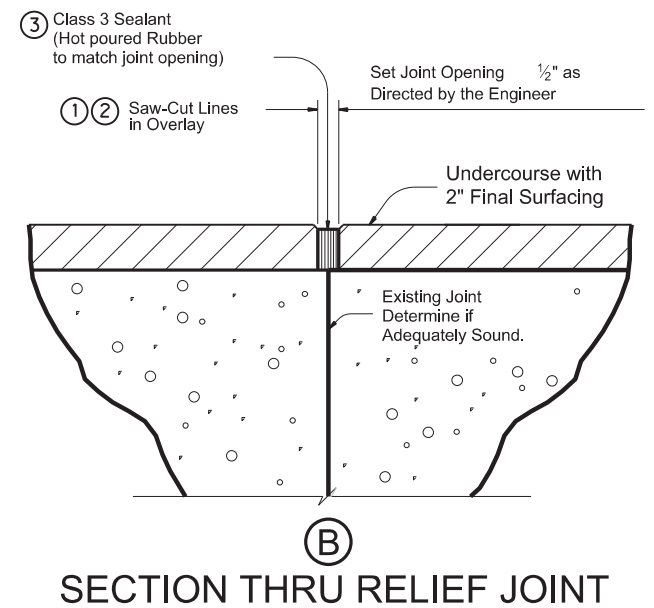
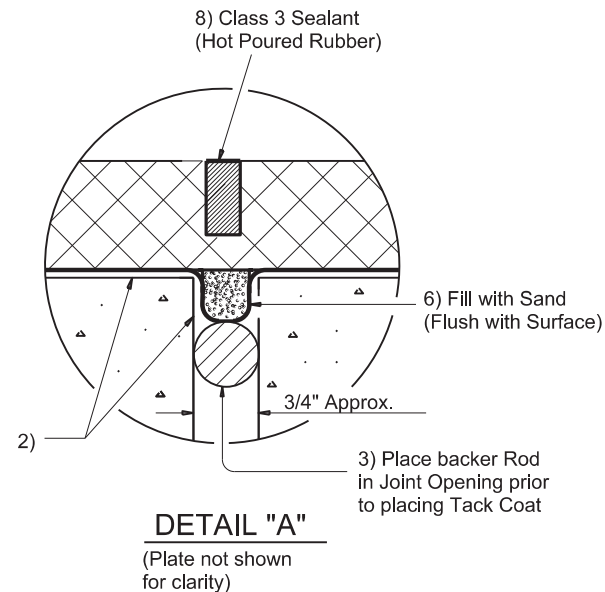
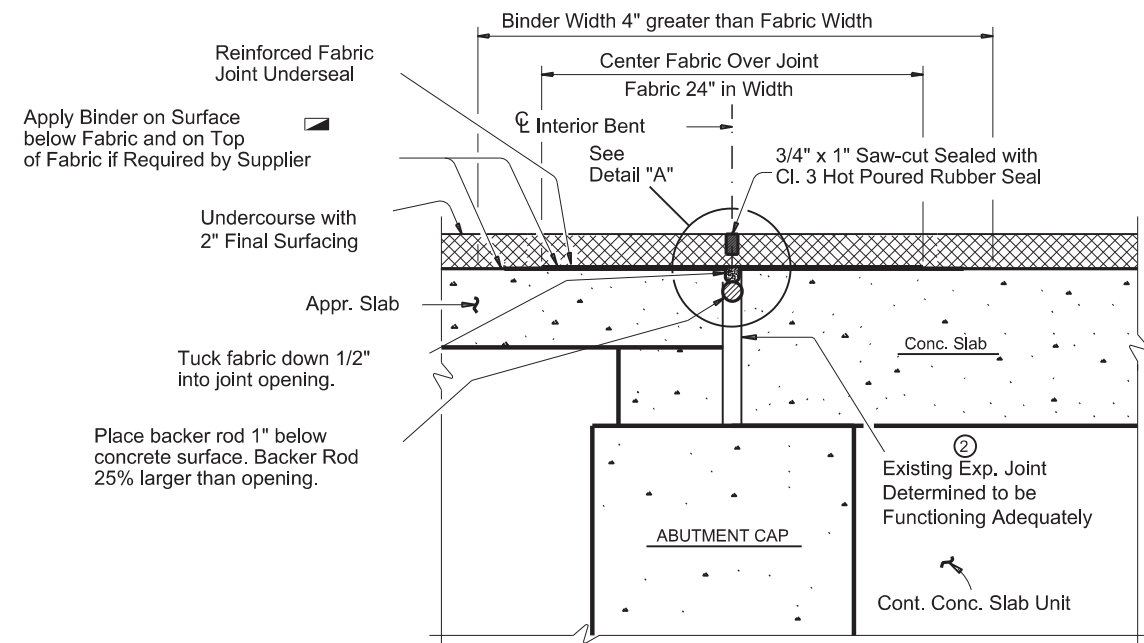
**LAYOUT & DETAILS**  
**FOR CLEANING AND SEALING**  
**EXPANSION JOINTS**

IH-35 (NBML & SBML) OVER LP 340

(STR'S #319, 318)

FILE:	IH35LP340JT.DGN	DN:	DOT	CK:	DOT	DW:	GNH	CK:	DOT
ORIG DATE:	JAN. 2023	DIST:	WACO	FED REG:	6	FEDERAL PROJECT NO.:	F2023(618)	SHEET:	67
REVISIONS:		COUNTY:	MCLENNAN	CONTROL:	0015	SECT:	01	JOB:	253
		HIGHWAY:							IH-35

LEVELS DISPLAYED  
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 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48  
 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63



PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE JOINT WITH HOT POURED RUBBER SEAL:

- 1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
- 2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
- 3) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."



**FABRIC JOINT SEAL WITH HOT POURED RUBBER**

NOTE: PREPARE EXISTING JOINT PRIOR TO INSTALLATION

- PROCEDURES:
- 1) PRIOR TO THE PLACEMENT OF THE FABRIC JOINT UNDERSEAL, CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE, AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
  - 2) REPAIR ANY SIGNIFICANT SPALLED OR CRACKED AREAS, AS DETERMINED BY THE ENGINEER, AROUND THE JOINT OPENING WITH TYPE II POLYMER CONCRETE IN ACCORDANCE WITH DMS-6140, "POLYMER CONCRETE FOR JOINT SYSTEMS". THIS WORK WILL BE PAID FOR BY ITEM 429 "CNC STR REP (STANDARD)".
  - 3) PLACE TACK COAT OR BINDER AS REQUIRED BY THE FABRIC JOINT UNDERSEAL MANUFACTURER'S INSTALLATION INSTRUCTIONS. PLACE BACKER ROD IN JOINT OPENING PRIOR TO PLACING TACK COAT.
  - 4) PLACE REINFORCED FABRIC JOINT UNDERSEAL CENTERED OVER JOINT OPENING. TUCK FABRIC DOWN APPROXIMATELY 1/2" INTO THE JOINT OPENING. INSTALL UNDERSEAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  - 5) WHEN USING THE SELF-ADHESIVE TYPE FABRIC UNDERSEAL, PRESSURE ROLL FABRIC JOINT UNDERSEAL TO IMPROVE ADHESION.
  - 6) JUST PRIOR TO PAVING, FILL TUCKED IN PORTION OF UNDERSEAL WITH SAND FLUSH WITH SURFACE. APPLY A TACK COAT TO FABRIC JOINT UNDERSEAL AS REQUIRED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MARK LOCATION OF CENTERLINE OF JOINT ON CURB OR BARRIER AS APPROVED.
  - 7) AFTER THE ASPHALTIC CONCRETE PAVEMENT OPERATIONS ARE COMPLETE, SAW CUT 1" INTO THE ASPHALT AT CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A 3/4" JOINT OPENING OR MATCH THE EXISTING JOINT OPENING, WHICHEVER IS GREATER. DO NOT DAMAGE THE UNDERSEAL.
  - 8) SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." SEAL FLUSH WITH THE TOP OF THE ASPHALTIC CONCRETE PAVEMENT.

GENERAL NOTES:

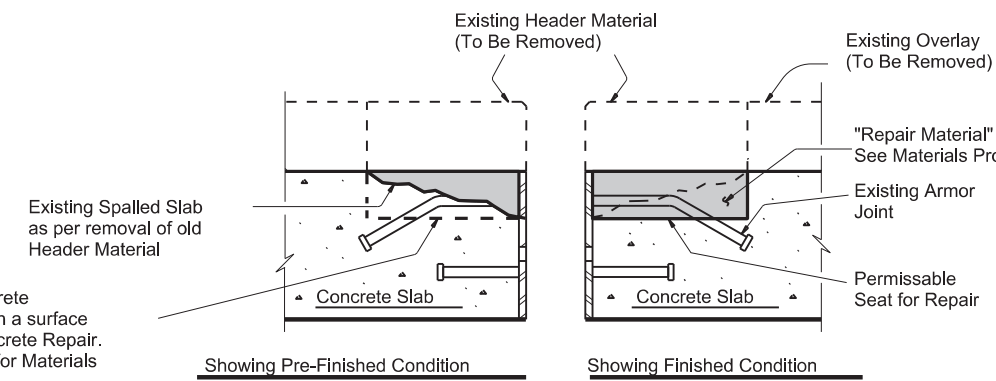
CLEANING EXISTING JOINT OPENING OF ALL DEBRIS, PROVIDING AND PLACING BACKER ROD, SAW-CUTTING JOINT OPENING, AND SEALING JOINT IS PAID FOR BY ITEM 438, "CLEANING AND SEALING JOINTS" AND MEASURED BY THE L.F. OF "CLEANING AND SEALING OF EXISTING JOINTS (CL 3)." PROVIDING AND APPLYING TACK COAT AND PROVIDING AND PLACING FABRIC JOINT UNDERSEAL IS PAID FOR BY ITEM 356, "FABRIC UNDERSEAL" AND MEASURED BY THE L.F. OF "PAV JT UNDERSEAL."

OBTAIN APPROVAL FOR ALL TOOLS, EQUIPMENT, MATERIALS AND TECHNIQUES PROPOSED FOR USE TO PREPARE THE JOINT.

PROVIDE THE REINFORCED FABRIC JOINT UNDERSEAL IN ACCORDANCE WITH DMS-6260, "REINFORCED FABRIC JOINT UNDERSEAL" OR DMS-6220, "FABRIC FOR UNDERSEALS."

PROVIDE THE CLASS 3 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS."

**EXISTING JOINT PREPARATION**



**SECTION THRU EXISTING NOSING/HEADER AT SEALED EXPANSION JOINT**

(SHOWING SPALLED SLAB EDGES - TYPICAL)

- GENERAL NOTES:
- "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Materials as outlined in the CONCRETE REPAIR MANUAL.
  - "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Repair materials suitable for the appropriate Horizontal or Vertical application meeting the requirements in DMS-4655, "Concrete Repair Materials".

Texas Department of Transportation  
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**LAYOUT & DETAILS FOR CLEANING AND SEALING EXPANSION JOINTS**

IH-35 (NBML & SBML) OVER LP 340

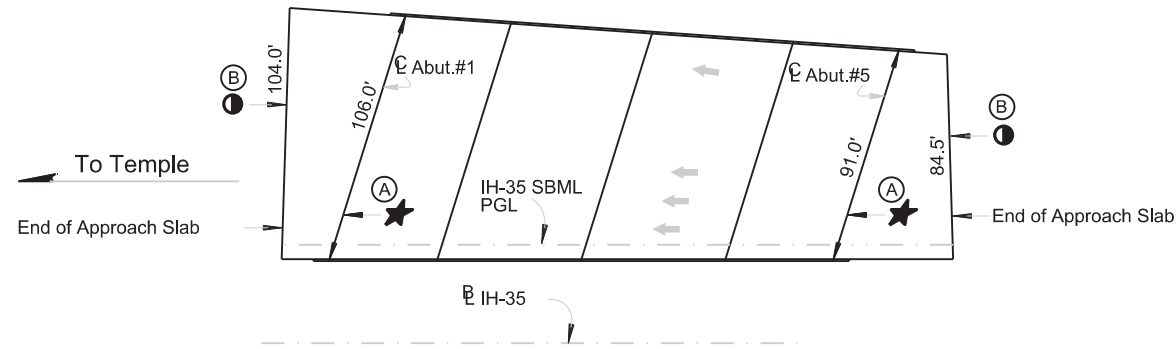
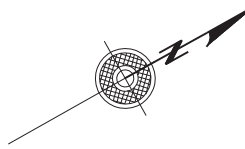
(STR'S #319, 318)

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REVISIONS		WACO:	6	F2023(618)			68		
		COUNTY:	MCLENNAN	CONTROL:	0015	SECT:	01	JOB:	253
				HIGHWAY:	IH-35				

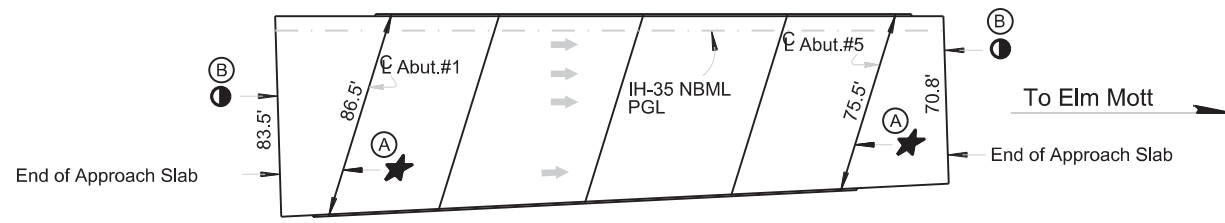
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49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	

ACC:



IH-35 (SB) OVER UPRR  
 210' ~ OVERALL LENGTH =  
 210'- (45', 60', 60', 45') CONTINUOUS CONC. SLAB UNIT  
 48'-0" ROADWAY 17' 02' LFS  
 RAIL TYPE T4



IH-35 (NB) OVER UPRR  
 210' ~ OVERALL LENGTH =  
 210'- (45', 60', 60', 45') CONTINUOUS CONC. SLAB UNIT  
 36'-0" ROADWAY 17' 02' LFS  
 RAIL TYPE T4

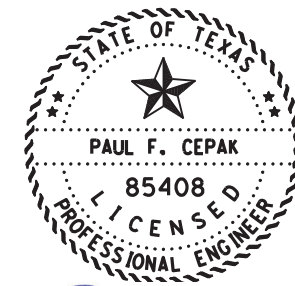
- Denotes Location for Cleaning and Sealing Joints.  
(See Relief Joint Detail)
- ★ Denotes Location for Cleaning and Sealing Expansion Joints.

**LAYOUT PLAN**  
 IH-35 (NBML AND SBML) OVER UPRR  
 (NBML N.B.I.#09-161-0-0015-01-321)  
 (SBML N.B.I.#09-161-0-0015-01-320)

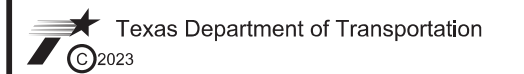
**Note:**  
 An existing Overlay,  
 (Approx. 2"±) to be removed  
 off the Bridge Deck

ESTIMATED QUANTITIES

	(A)	(A)	(B)
ITEM	356-6021	438-6002	438-6006
LOCATION	PAV JT UNDERSEAL (24")	CLEANING AND SEALING EXISTING JOINTS (CL 3)	CLEANING AND SEALING JOINTS (CL3)
	L.F.	L.F.	L.F.
STR. #320 (SBML)	197.0	197.0	188.5
STR. #321 (NBML)	162.0	162.0	154.3
<b>TOTAL</b>	<b>359.0</b>	<b>359.0</b>	<b>342.8</b>



*Paul F. Cepak, P.E.*  
 02/06/2023



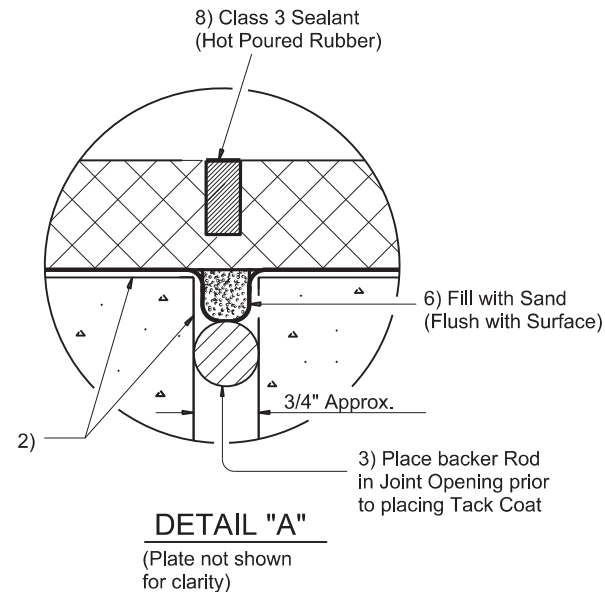
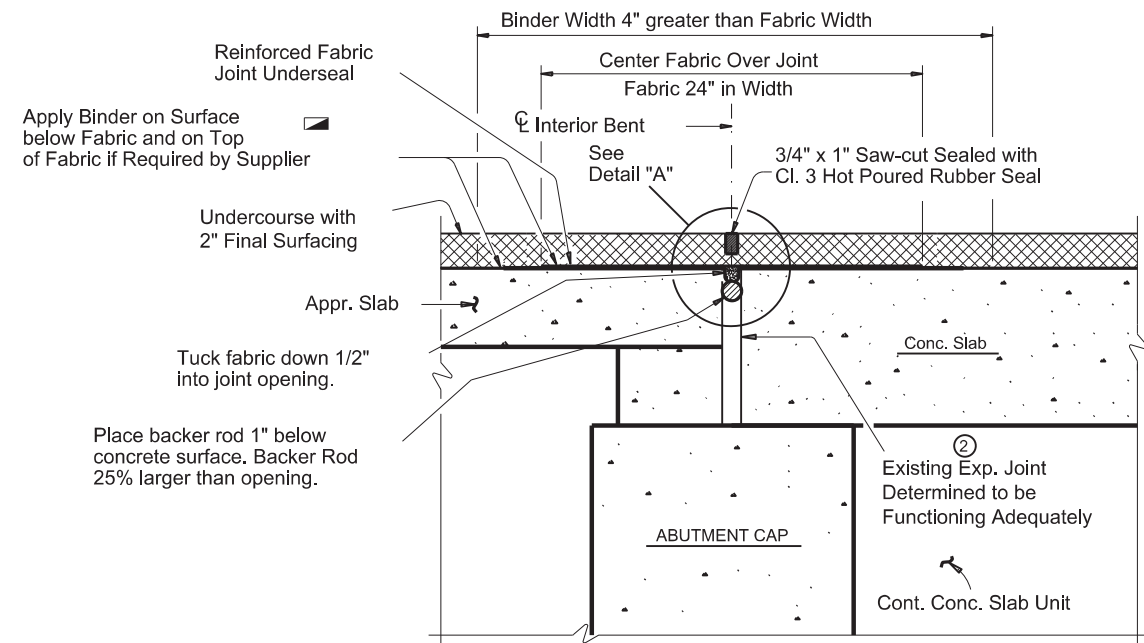
**LAYOUT & DETAILS**  
**FOR CLEANING AND SEALING**  
**EXPANSION JOINTS**  
 IH-35 (NBML & SBML) OVER UPRR

(STR'S #321, 320)

FILE: IH35UPRRJT.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: DEC. 2022	DIST: WACO	FED REG: 6	FEDERAL PROJECT NO. #: F2023(618)	SHEET: 69
REVISIONS		COUNTY: MCLENNAN	CONTROL: 0015	SECT: 01
		JOB: 253	HIGHWAY: IH-35	

LEVELS DISPLAYED	ACC:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	
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49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	

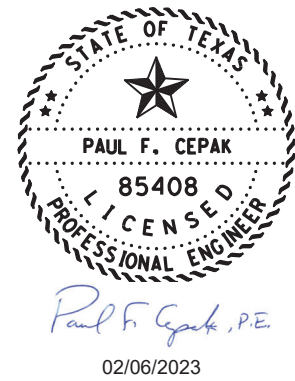




**SECTION THRU RELIEF JOINT**

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE JOINT WITH HOT POURED RUBBER SEAL:

- 1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
- 2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
- 3) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."



Sheet 2 of 2 Sheets

Texas Department of Transportation  
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**LAYOUT & DETAILS  
FOR CLEANING AND SEALING  
EXPANSION JOINTS**

IH-35 (NBML & SBML) OVER UPRR

(STR'S #321, 320)

FILE: IH35UPRRJT.DGN	DN: DOT	CR: DOT	DW: GNH	CK: DOT
ORIG DATE: DEC. 2022	DIST: WACO	FED REG: 6	FEDERAL PROJECT NO.: F2023(618)	SHEET: 70
REVISIONS		COUNTY: MCLENNAN	CONTROL: 0015	SECT: 01
		JOB: 253	HIGHWAY: IH-35	

**FABRIC JOINT SEAL WITH HOT POURED RUBBER**

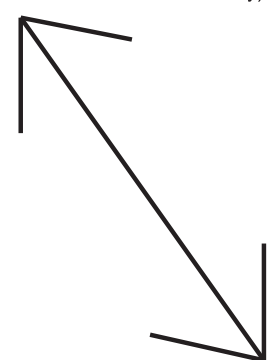
NOTE: PREPARE EXISTING JOINT PRIOR TO INSTALLATION

PROCEDURES:

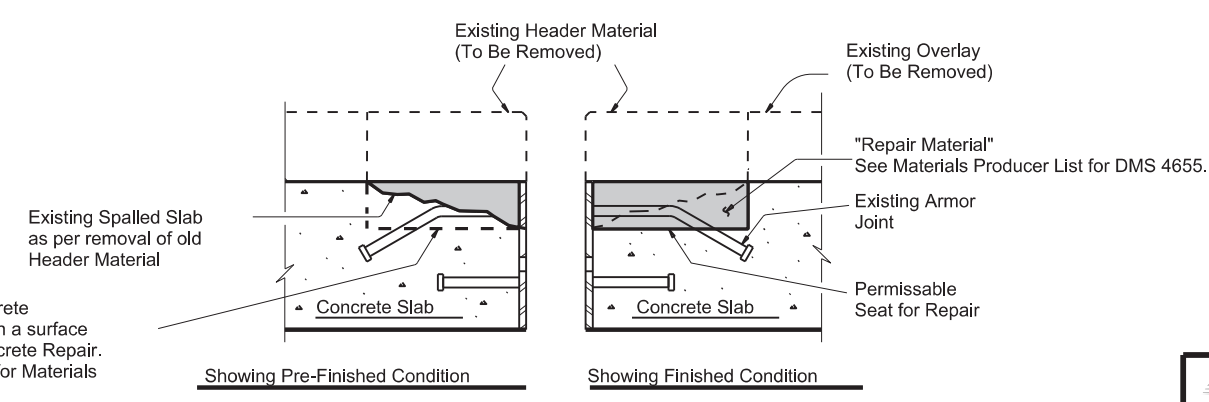
- 1) PRIOR TO THE PLACEMENT OF THE FABRIC JOINT UNDERSEAL, CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE, AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
- 2) REPAIR ANY SIGNIFICANT SPALLED OR CRACKED AREAS, AS DETERMINED BY THE ENGINEER, AROUND THE JOINT OPENING WITH TYPE II POLYMER CONCRETE IN ACCORDANCE WITH DMS-6140, "POLYMER CONCRETE FOR JOINT SYSTEMS". THIS WORK WILL BE PAID FOR BY ITEM 429 "CNC STR REP (STANDARD)".
- 3) PLACE TACK COAT OR BINDER AS REQUIRED BY THE FABRIC JOINT UNDERSEAL MANUFACTURER'S INSTALLATION INSTRUCTIONS. PLACE BACKER ROD IN JOINT OPENING PRIOR TO PLACING TACK COAT.
- 4) PLACE REINFORCED FABRIC JOINT UNDERSEAL CENTERED OVER JOINT OPENING. TUCK FABRIC DOWN APPROXIMATELY 1/2" INTO THE JOINT OPENING. INSTALL UNDERSEAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- 5) WHEN USING THE SELF-ADHESIVE TYPE FABRIC UNDERSEAL, PRESSURE ROLL FABRIC JOINT UNDERSEAL TO IMPROVE ADHESION.
- 6) JUST PRIOR TO PAVING, FILL TUCKED IN PORTION OF UNDERSEAL WITH SAND FLUSH WITH SURFACE. APPLY A TACK COAT TO FABRIC JOINT UNDERSEAL AS REQUIRED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MARK LOCATION OF CENTERLINE OF JOINT ON CURB OR BARRIER AS APPROVED.
- 7) AFTER THE ASPHALTIC CONCRETE PAVEMENT OPERATIONS ARE COMPLETE, SAW CUT 1" INTO THE ASPHALT AT CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A 3/4" JOINT OPENING OR MATCH THE EXISTING JOINT OPENING, WHICHEVER IS GREATER. DO NOT DAMAGE THE UNDERSEAL.
- 8) SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." SEAL FLUSH WITH THE TOP OF THE ASPHALTIC CONCRETE PAVEMENT.

GENERAL NOTES:

- CLEANING EXISTING JOINT OPENING OF ALL DEBRIS, PROVIDING AND PLACING BACKER ROD, SAW-CUTTING JOINT OPENING, AND SEALING JOINT IS PAID FOR BY ITEM 438, "CLEANING AND SEALING JOINTS" AND MEASURED BY THE L.F. OF "CLEANING AND SEALING OF EXISTING JOINTS (CL 3)." PROVIDING AND APPLYING TACK COAT AND PROVIDING AND PLACING FABRIC JOINT UNDERSEAL IS PAID FOR BY ITEM 356, "FABRIC UNDERSEAL" AND MEASURED BY THE L.F. OF "PAV JT UNDERSEAL."
- OBTAIN APPROVAL FOR ALL TOOLS, EQUIPMENT, MATERIALS AND TECHNIQUES PROPOSED FOR USE TO PREPARE THE JOINT.
- PROVIDE THE REINFORCED FABRIC JOINT UNDERSEAL IN ACCORDANCE WITH DMS-6260, "REINFORCED FABRIC JOINT UNDERSEAL" OR DMS-6220, "FABRIC FOR UNDERSEALS."
- PROVIDE THE CLASS 3 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS."



**EXISTING JOINT PREPARATION**



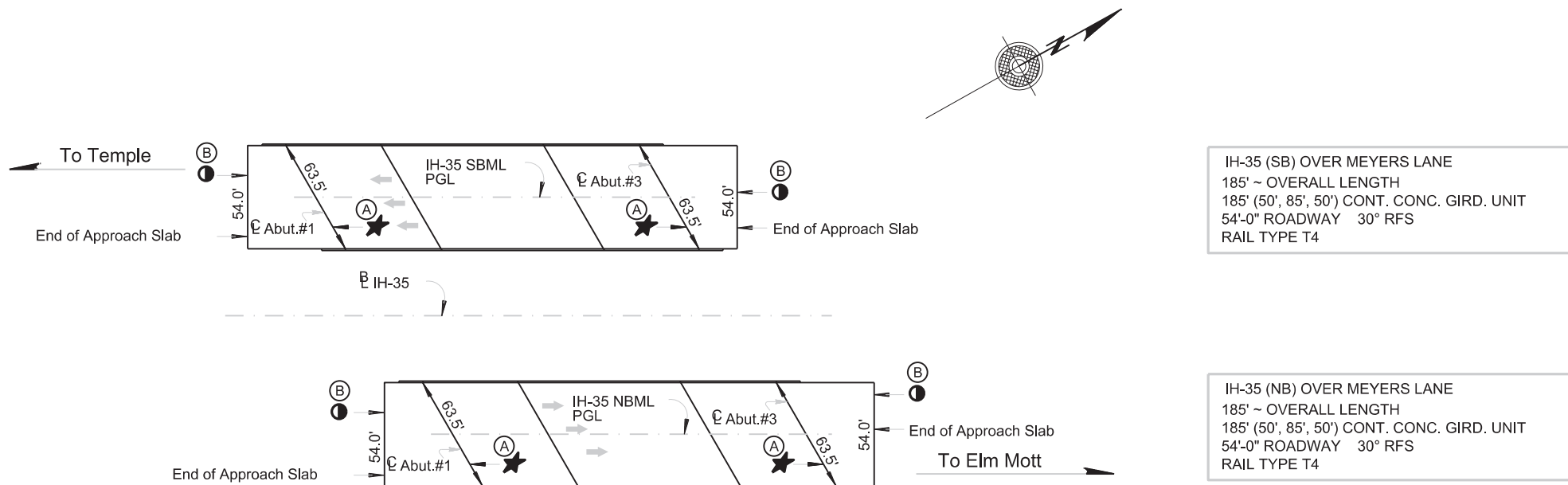
Chip existing concrete as shown, to obtain a surface applicable for Concrete Repair. Refer to Item 429 for Materials and procedures.

**SECTION THRU EXISTING NOSING/HEADER AT SEALED EXPANSION JOINT**

(SHOWING SPALLED SLAB EDGES - TYPICAL)

- GENERAL NOTES:
- "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Materials as outlined in the CONCRETE REPAIR MANUAL.
  - "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Repair materials suitable for the appropriate Horizontal or Vertical application meeting the requirements in DMS-4655, "Concrete Repair Materials".

LEVELS DISPLAYED	ACC:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	



**LAYOUT PLAN**

**IH-35 (NBML AND SBML) OVER MEYERS LANE**

(NBML N.B.I.#09-161-0-0015-01-325)  
(SBML N.B.I.#09-161-0-0015-01-324)

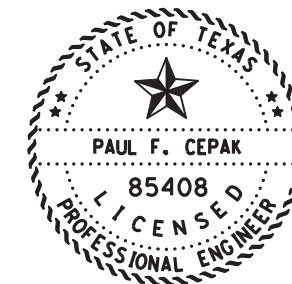
- Denotes Location for Cleaning and Sealing Joints. (See Relief Joint Detail)
- ★ Denotes Location for Cleaning and Sealing Expansion Joints.

**Note:**  
An existing Overlay, (Approx. 2"±) to be removed off the Bridge Deck

ESTIMATED QUANTITIES

	(A)	(A)	(B)
ITEM	356-6021	438-6002	438-6006
LOCATION	PAV JT UNDERSEAL (24")	CLEANING AND SEALING EXISTING JOINTS (CL 3)	CLEANING AND SEALING JOINTS (CL3)
	L.F.	L.F.	L.F.
STR. #324 (SBML)	127.0	127.0	108.0
STR. #325 (NBML)	127.0	127.0	108.0
<b>TOTAL</b>	<b>254.0</b>	<b>254.0</b>	<b>216.0</b>

LEVELS DISPLAYED	ACC:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	



*Paul F. Cepak, P.E.*

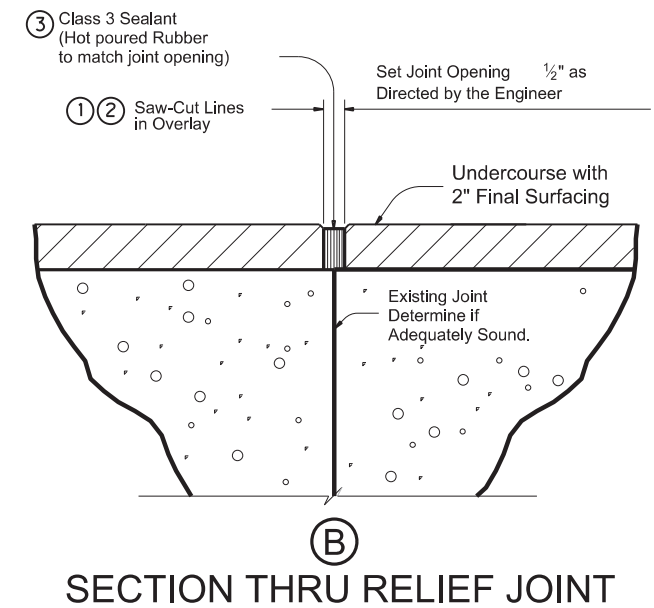
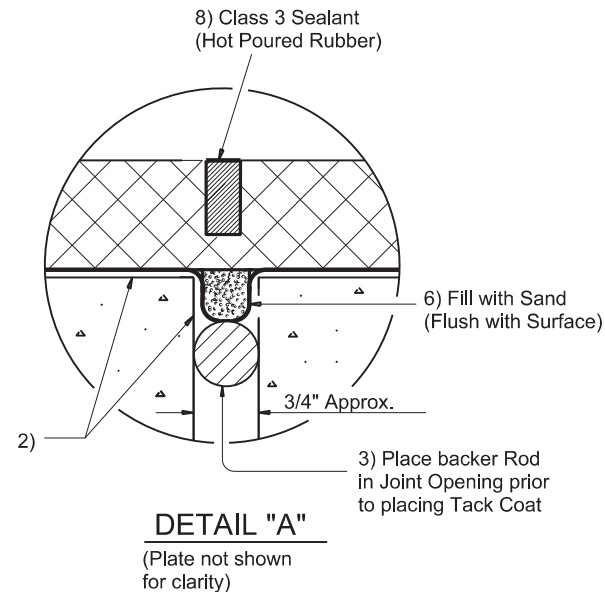
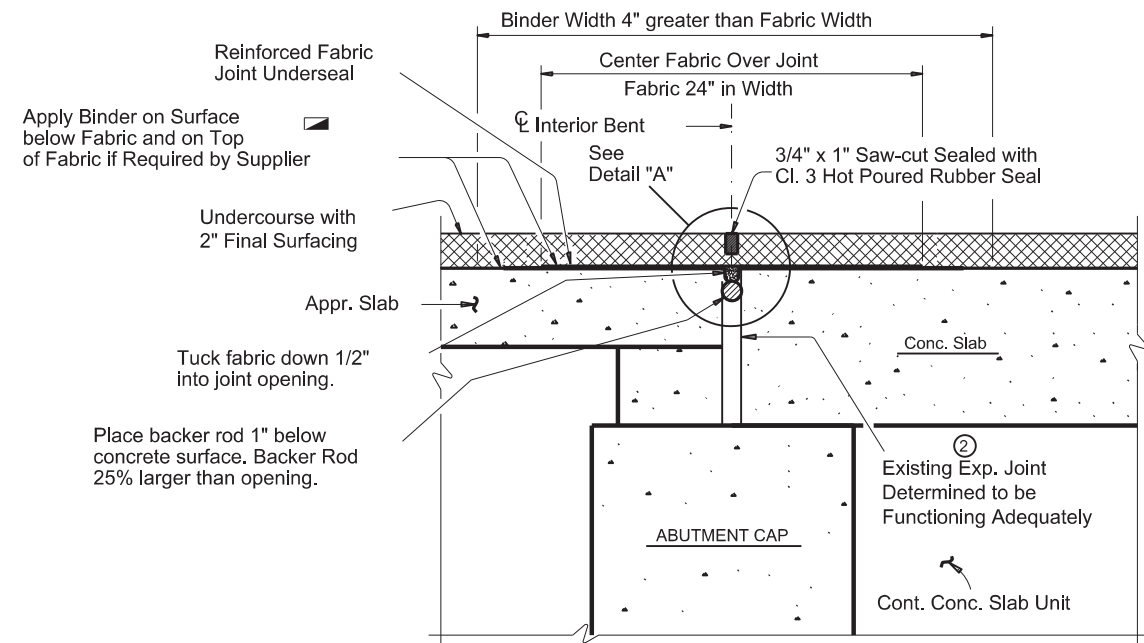
02/06/2023

**LAYOUT & DETAILS  
FOR CLEANING AND SEALING  
EXPANSION JOINTS**

**IH-35 (NBML & SBML) OVER MEYERS LANE**

(STR'S #325, 324)

FILE: IH35UPRRJT.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: DEC. 2022	DIST: WACO	FED REG: 6	FEDERAL PROJECT NO. #: F2023(618)	SHEET: 71
REVISIONS		COUNTY: MCLENNAN	CONTROL: 0015	SECT: 01
		JOB: 253	HIGHWAY: IH-35	



**SECTION THRU RELIEF JOINT**

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE JOINT WITH HOT POURED RUBBER SEAL:

- 1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
- 2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
- 3) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."



Sheet 2 of 2 Sheets

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**LAYOUT & DETAILS  
FOR CLEANING AND SEALING  
EXPANSION JOINTS**

IH-35 (NBML & SBML) OVER MEYERS LANE

(STR'S #325, 324)

FILE: IH35UPRRJT.DGN	DN: DOT	CR: DOT	DW: GNH	CK: DOT
ORIG DATE: DEC. 2022	DIST: WACO	FED REG: 6	FEDERAL PROJECT NO.: F2023(618)	SHEET: 72
REVISIONS		COUNTY: MCLENNAN	CONTROL: 0015	SECT: 01
		JOB: 253	HIGHWAY: IH-35	

**FABRIC JOINT SEAL WITH HOT POURED RUBBER**

NOTE: PREPARE EXISTING JOINT PRIOR TO INSTALLATION

PROCEDURES:

- 1) PRIOR TO THE PLACEMENT OF THE FABRIC JOINT UNDERSEAL, CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE, AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
- 2) REPAIR ANY SIGNIFICANT SPALLED OR CRACKED AREAS, AS DETERMINED BY THE ENGINEER, AROUND THE JOINT OPENING WITH TYPE II POLYMER CONCRETE IN ACCORDANCE WITH DMS-6140, "POLYMER CONCRETE FOR JOINT SYSTEMS". THIS WORK WILL BE PAID FOR BY ITEM 429 "CNC STR REP (STANDARD)".
- 3) PLACE TACK COAT OR BINDER AS REQUIRED BY THE FABRIC JOINT UNDERSEAL MANUFACTURER'S INSTALLATION INSTRUCTIONS. PLACE BACKER ROD IN JOINT OPENING PRIOR TO PLACING TACK COAT.
- 4) PLACE REINFORCED FABRIC JOINT UNDERSEAL CENTERED OVER JOINT OPENING. TUCK FABRIC DOWN APPROXIMATELY 1/2" INTO THE JOINT OPENING. INSTALL UNDERSEAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- 5) WHEN USING THE SELF-ADHESIVE TYPE FABRIC UNDERSEAL, PRESSURE ROLL FABRIC JOINT UNDERSEAL TO IMPROVE ADHESION.
- 6) JUST PRIOR TO PAVING, FILL TUCKED IN PORTION OF UNDERSEAL WITH SAND FLUSH WITH SURFACE. APPLY A TACK COAT TO FABRIC JOINT UNDERSEAL AS REQUIRED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MARK LOCATION OF CENTERLINE OF JOINT ON CURB OR BARRIER AS APPROVED.
- 7) AFTER THE ASPHALTIC CONCRETE PAVEMENT OPERATIONS ARE COMPLETE, SAW CUT 1" INTO THE ASPHALT AT CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A 3/4" JOINT OPENING OR MATCH THE EXISTING JOINT OPENING, WHICHEVER IS GREATER. DO NOT DAMAGE THE UNDERSEAL.
- 8) SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." SEAL FLUSH WITH THE TOP OF THE ASPHALTIC CONCRETE PAVEMENT.

GENERAL NOTES:

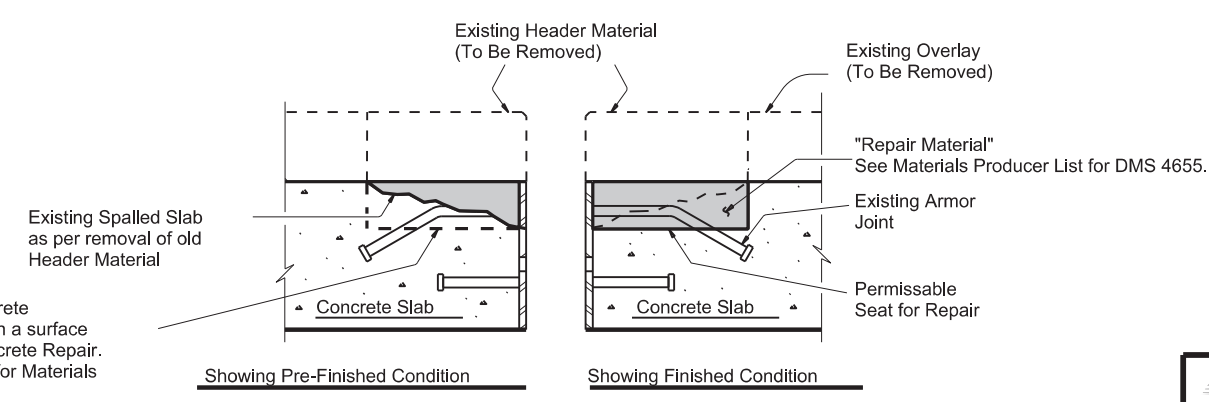
CLEANING EXISTING JOINT OPENING OF ALL DEBRIS, PROVIDING AND PLACING BACKER ROD, SAW-CUTTING JOINT OPENING, AND SEALING JOINT IS PAID FOR BY ITEM 438, "CLEANING AND SEALING JOINTS" AND MEASURED BY THE L.F. OF "CLEANING AND SEALING OF EXISTING JOINTS (CL 3)." PROVIDING AND APPLYING TACK COAT AND PROVIDING AND PLACING FABRIC JOINT UNDERSEAL IS PAID FOR BY ITEM 356, "FABRIC UNDERSEAL" AND MEASURED BY THE L.F. OF "PAV JT UNDERSEAL."

OBTAIN APPROVAL FOR ALL TOOLS, EQUIPMENT, MATERIALS AND TECHNIQUES PROPOSED FOR USE TO PREPARE THE JOINT.

PROVIDE THE REINFORCED FABRIC JOINT UNDERSEAL IN ACCORDANCE WITH DMS-6260, "REINFORCED FABRIC JOINT UNDERSEAL" OR DMS-6220, "FABRIC FOR UNDERSEALS."

PROVIDE THE CLASS 3 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS."

**EXISTING JOINT PREPARATION**



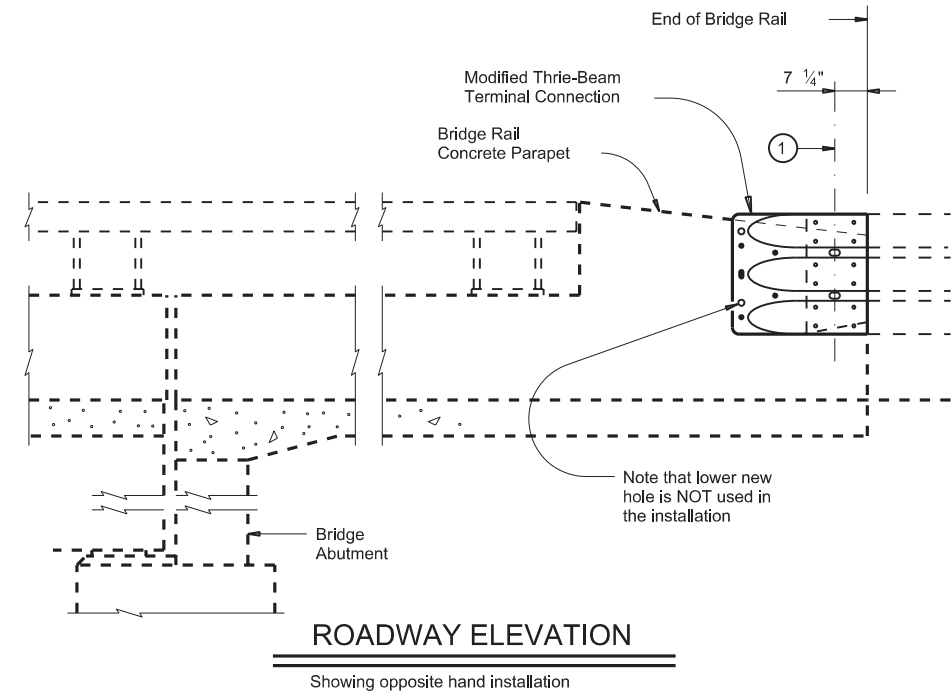
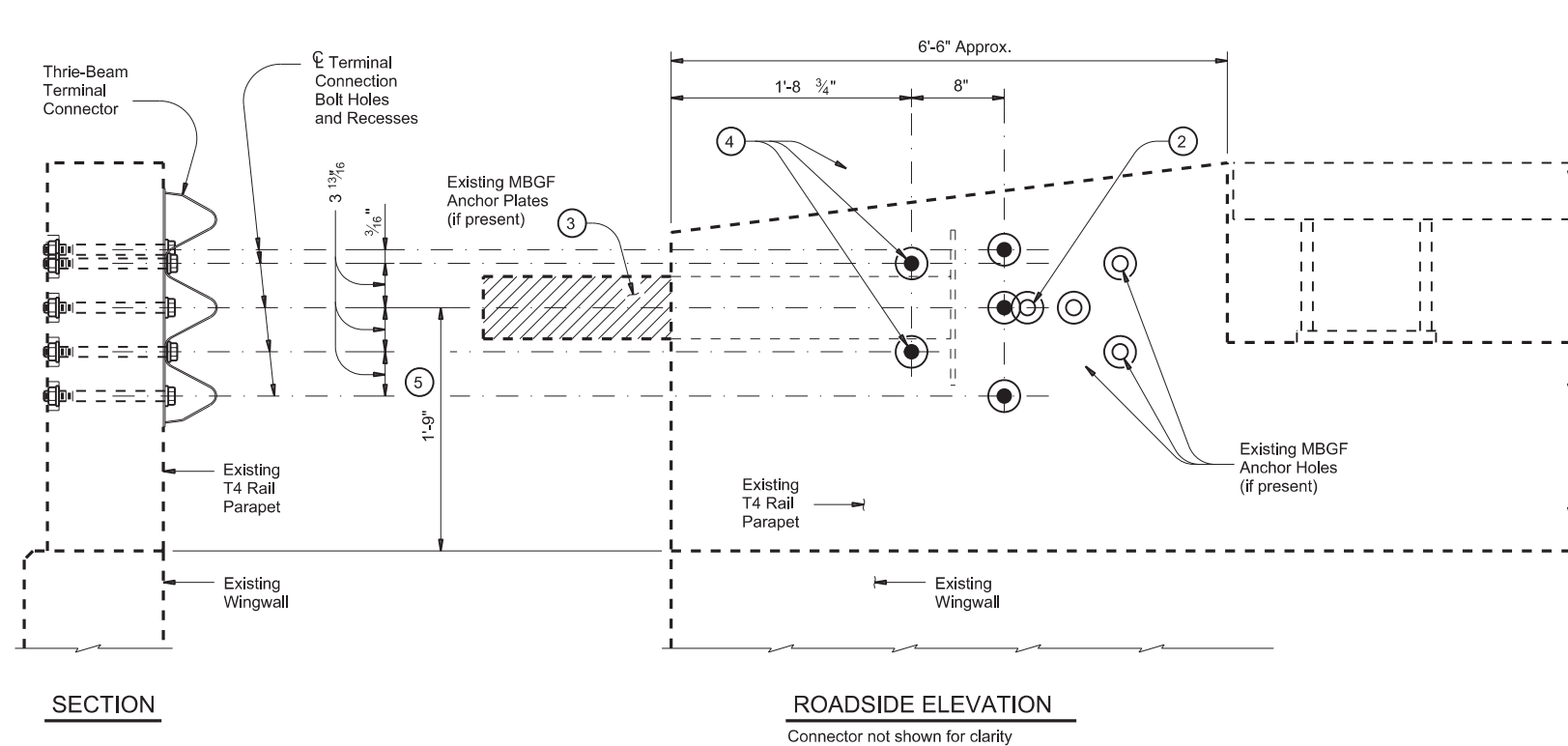
Chip existing concrete as shown, to obtain a surface applicable for Concrete Repair. Refer to Item 429 for Materials and procedures.

**SECTION THRU EXISTING NOSING/HEADER AT SEALED EXPANSION JOINT**

(SHOWING SPALLED SLAB EDGES - TYPICAL)

- GENERAL NOTES:
- "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Materials as outlined in the CONCRETE REPAIR MANUAL.
  - "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Repair materials suitable for the appropriate Horizontal or Vertical application meeting the requirements in DMS-4655, "Concrete Repair Materials".

LEVELS DISPLAYED	ACC:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	



**END TREATMENT AT MBGF TERMINAL CONNECTION**

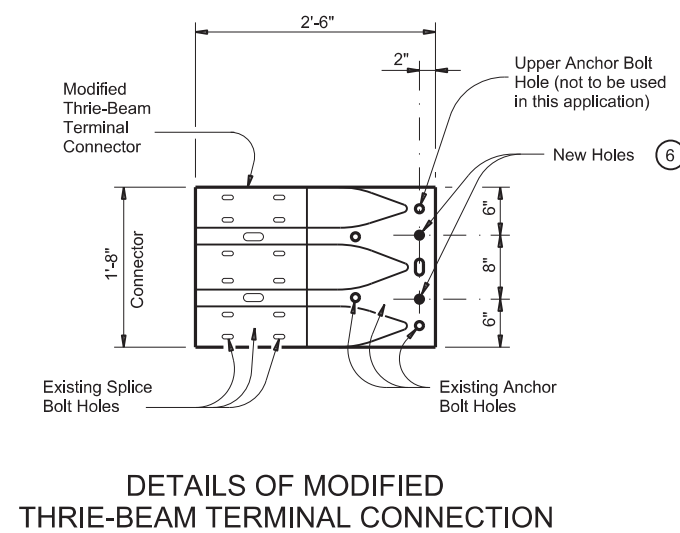
**MBGF TERMINAL CONNECTION SPECIAL NOTES:**

Metal Beam Guard Fence shall be attached to the pavement rail and extend along the embankment using the modified Thrie-Beam Terminal Connection shown herein unless shown otherwise on the plans. The Thrie-Beam Terminal Connection shall be attached to the railing using 5 - 7/8" diameter A325 Hex Head Bolts, each with 2 - 1 3/4" O.D. washers. Place washer under each head and nut.

The 5 Terminal Connection Bolts shall be tightened in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Bolts shall be cut off after installation so as to extend no more than 3/4" beyond nut. End of cut-off bolt shall be painted with Zinc-rich paint.

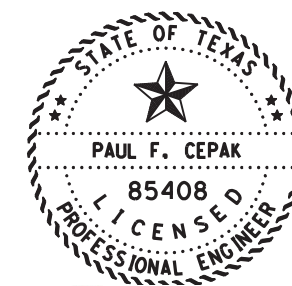
The splice between the Approach Guard Rail and the Terminal Connection shall be with the normal 12 Connection Bolts. The Terminal Connector shall receive the same protective coating as the attached Metal Beam Guard Fence.

METAL BEAM GUARD FENCE TRANSITION and METAL BEAM GUARD FENCE detail sheets must be referred to for additional details and information not shown herein.

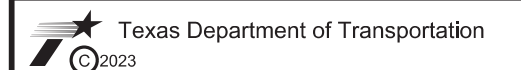


Note that the modification is required because the Anchor Bolt hole (as identified in the detail) does not provide for adequate cover to edge of existing concrete.

- ① Centerline of splice between Thrie-Beam Terminal Connector and MBGF Transition member. Metal Beam Guard Fence Transitions must be attached to the Pavement Rail and extended along the embankment unless shown otherwise on the plans. See plan sheet for details and length for payment.
- ② Existing anchor bolt holes in Rail that cannot be utilized and are within 3" of a new bolt hole shall be filled with epoxy grout prior to coring new holes.
- ③ MBGF Anchorage Plates (if present) shall be cut flush with the surface of the existing concrete at the end of rail. Paint the cut ends of the Anchorage Plates with zinc-rich paint.
- ④ Drill new 1" diameter holes, each with a 2 1/2" diameter x 1" deep, back-side recess, through existing railing parapet. Holes shall normally be perpendicular to the road-side face of the parapet. Holes and recesses shall be drilled with coring type equipment. Percussion (star) or masonry drilling shall not be used. Spalls in the parapet concrete exceeding 1/2" in size shall be patched. (Note that recesses are only required when pedestrian sidewalks are adjacent to back of rail.) Note that new holes may pass through an existing MBGF Anchorage. Care shall be taken when coring to ensure that a misalignment of the holes does not occur.  
Prior to the coring of bolt holes in the existing, concrete, rail parapet, contractor shall verify, by direct comparison, that the locations of anchor bolt holes match those in the Thrie-Beam Terminal Connector that will be installed in that location.
- ⑤ May be increased 2" maximum for structures with overlay.
- ⑥ The Terminal Connection shall be modified with the addition of two (2) 1" diameter anchor bolt holes as shown. The upper new hole will be used in the actual installation. In those situations that are opposite hand to the details shown, the lower hole will be on the upper side. Damage to galvanizing caused by this modification shall be repaired in accordance with Item 445, "Galvanizing".



Paul F. Cepak, P.E.  
02/07/2023

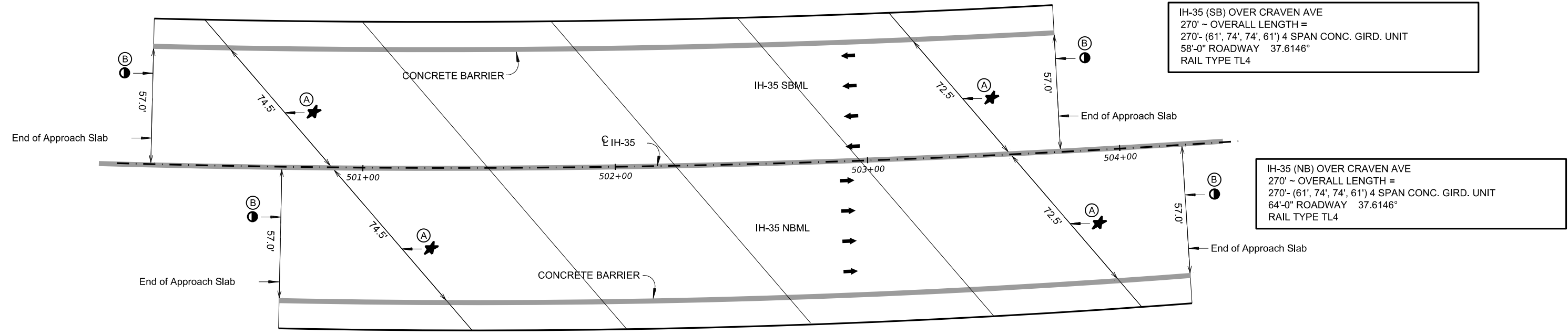
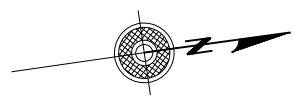


**RETROFIT DETAILS FOR MBGF TRANSITION TO EXISTING T4 RAIL**

FILE: IH35T4RETRO.DGN	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2023	DIST: FED REG	FEDERAL PROJECT NO.:	SHEET	
REVISIONS	WACO 6	F2023(618)	73	
	COUNTY	CONTROL	SECT	JOB
	MCLENNAN	0015	01	253
				HWY
				IH-35

LEVELS DISPLAYED	ACC:
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17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63	





- Denotes Location for Cleaning and Sealing Joints.  
(See Relief Joint Detail)
- ★ Denotes Location for Cleaning and Sealing  
Expansion Joints.

**LAYOUT PLAN**  
 IH-35 (NBML AND SBML) OVER CRAVEN AVE  
 (NBML N.B.I.#09-161-0-0015-01-467)  
 (SBML N.B.I.#09-161-0-0015-01-468)

**Note:**  
 An existing Overlay,  
 (Approx. 2"±) to be removed  
 off the Bridge Deck

ESTIMATED QUANTITIES

	(A)	(A)	(B)
ITEM	356-6021	438-6002	438-6006
LOCATION	PAV JT UNDERSEAL (24")	CLEANING AND SEALING EXISTING JOINTS (CL 3)	CLEANING AND SEALING JOINTS (CL3)
	L.F.	L.F.	L.F.
STR. #468 (SBML)	147.0	147.0	114.0
STR. #467 (NBML)	147.0	147.0	114.0
<b>TOTAL</b>	<b>294.0</b>	<b>294.0</b>	<b>228.0</b>

Thomas T. Le  
 2/6/2023

ATKINS

MEMBER OF THE SNC-LAVALIN GROUP  
TBPE REG. # F-474

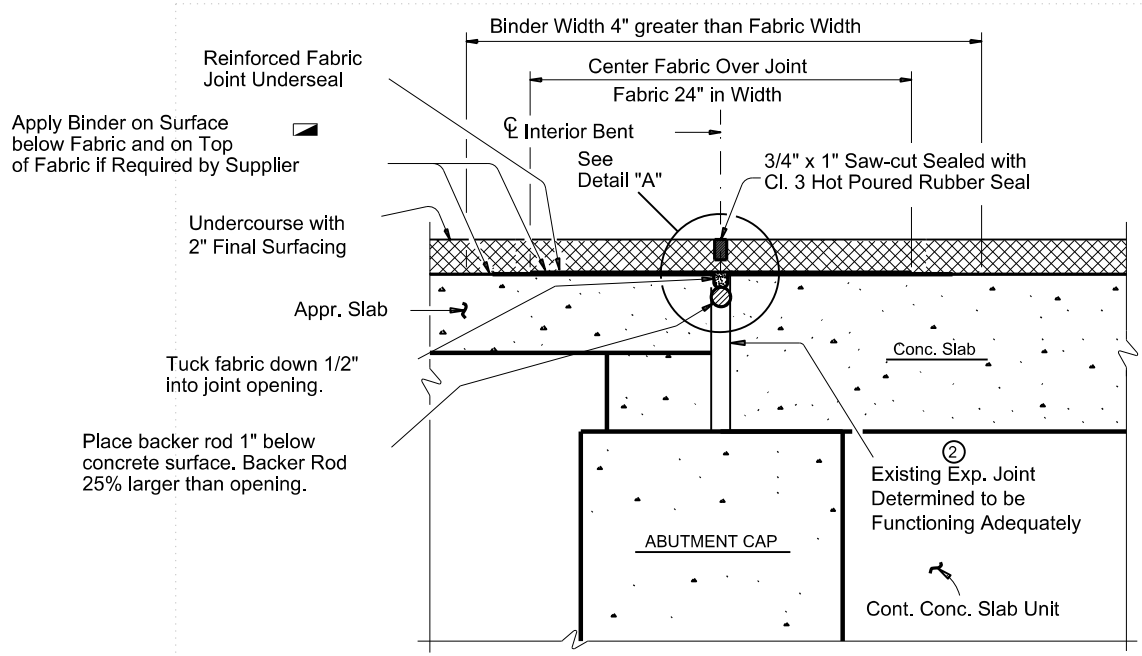
Texas Department of Transportation

IH 35  
LAYOUT & DETAILS FOR  
CLEANING AND SEALING  
EXPANSION JOINTS  
IH 35 (NBML & SBML) OVER  
CRAVEN AVE

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	74	

DATE: 2/6/2023 3:37:41 PM  
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**(A)**  
 ABUTMENT LOCATION

**FABRIC JOINT SEAL WITH HOT POURED RUBBER**

NOTE: PREPARE EXISTING JOINT PRIOR TO INSTALLATION

- PROCEDURES:
- 1) PRIOR TO THE PLACEMENT OF THE FABRIC JOINT UNDERSEAL, CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE, AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
  - 2) REPAIR ANY SIGNIFICANT SPALLED OR CRACKED AREAS, AS DETERMINED BY THE ENGINEER, AROUND THE JOINT OPENING WITH TYPE II POLYMER CONCRETE IN ACCORDANCE WITH DMS-6140, "POLYMER CONCRETE FOR JOINT SYSTEMS". THIS WORK WILL BE PAID FOR BY ITEM 429 "CNC STR REP (STANDARD)".
  - 3) PLACE TACK COAT OR BINDER AS REQUIRED BY THE FABRIC JOINT UNDERSEAL MANUFACTURER'S INSTALLATION INSTRUCTIONS. PLACE BACKER ROD IN JOINT OPENING PRIOR TO PLACING TACK COAT.
  - 4) PLACE REINFORCED FABRIC JOINT UNDERSEAL CENTERED OVER JOINT OPENING. TUCK FABRIC DOWN APPROXIMATELY 1/2" INTO THE JOINT OPENING. INSTALL UNDERSEAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  - 5) WHEN USING THE SELF-ADHESIVE TYPE FABRIC UNDERSEAL, PRESSURE ROLL FABRIC JOINT UNDERSEAL TO IMPROVE ADHESION.
  - 6) JUST PRIOR TO PAVING, FILL TUCKED IN PORTION OF UNDERSEAL WITH SAND FLUSH WITH SURFACE. APPLY A TACK COAT TO FABRIC JOINT UNDERSEAL AS REQUIRED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MARK LOCATION OF CENTERLINE OF JOINT ON CURB OR BARRIER AS APPROVED.
  - 7) AFTER THE ASPHALTIC CONCRETE PAVEMENT OPERATIONS ARE COMPLETE, SAW CUT 1" INTO THE ASPHALT AT CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A 3/4" JOINT OPENING OR MATCH THE EXISTING JOINT OPENING, WHICHEVER IS GREATER. DO NOT DAMAGE THE UNDERSEAL.
  - 8) SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." SEAL FLUSH WITH THE TOP OF THE ASPHALTIC CONCRETE PAVEMENT.

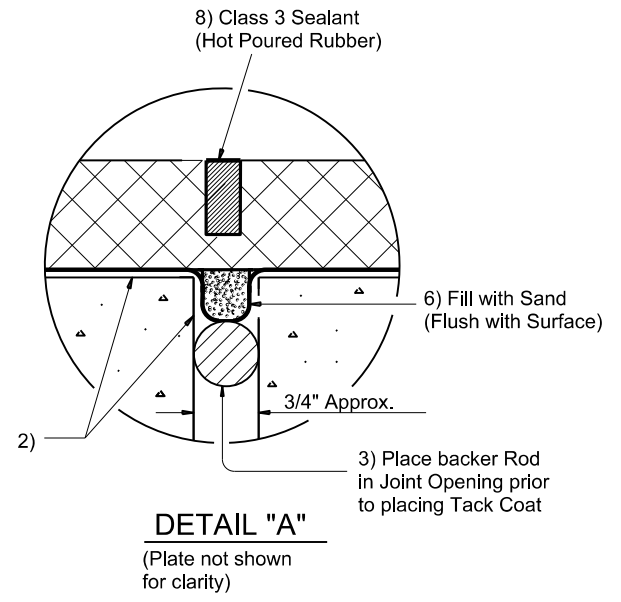
GENERAL NOTES:

CLEANING EXISTING JOINT OPENING OF ALL DEBRIS, PROVIDING AND PLACING BACKER ROD, SAW-CUTTING JOINT OPENING, AND SEALING JOINT IS PAID FOR BY ITEM 438, "CLEANING AND SEALING JOINTS" AND MEASURED BY THE L.F. OF "CLEANING AND SEALING OF EXISTING JOINTS (CL 3)." PROVIDING AND APPLYING TACK COAT AND PROVIDING AND PLACING FABRIC JOINT UNDERSEAL IS PAID FOR BY ITEM 356, "FABRIC UNDERSEAL" AND MEASURED BY THE L.F. OF "PAV JT UNDERSEAL."

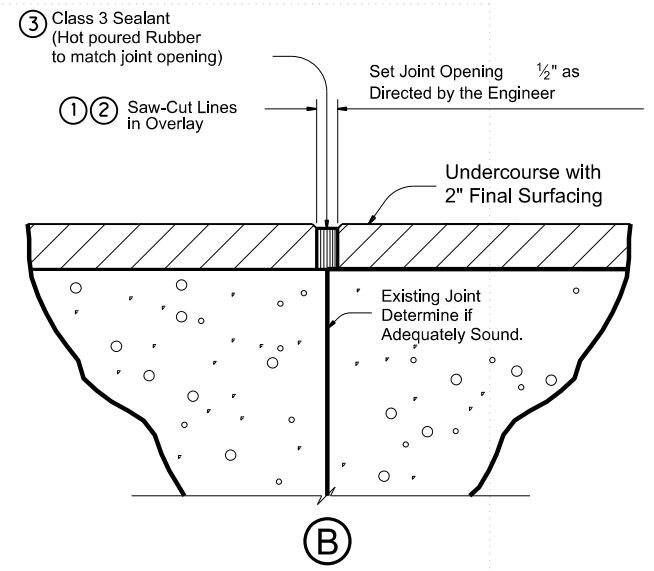
OBTAIN APPROVAL FOR ALL TOOLS, EQUIPMENT, MATERIALS AND TECHNIQUES PROPOSED FOR USE TO PREPARE THE JOINT.

PROVIDE THE REINFORCED FABRIC JOINT UNDERSEAL IN ACCORDANCE WITH DMS-6260, "REINFORCED FABRIC JOINT UNDERSEAL" OR DMS-6220, "FABRIC FOR UNDERSEALS."

PROVIDE THE CLASS 3 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS."



**DETAIL "A"**  
 (Plate not shown for clarity)

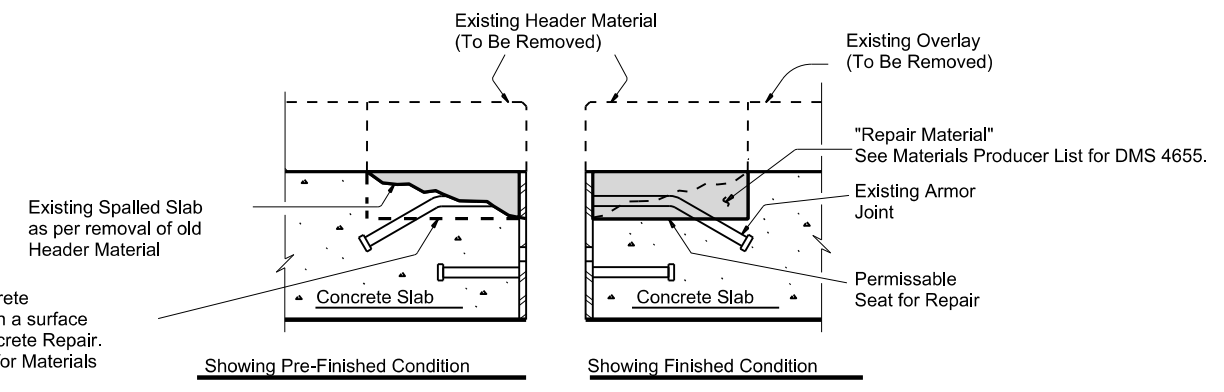


**(B)**  
 SECTION THRU RELIEF JOINT

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE JOINT WITH HOT POURED RUBBER SEAL:

- 1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
- 2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
- 3) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."

**EXISTING JOINT PREPARATION**



**SECTION THRU EXISTING NOSING/HEADER AT SEALED EXPANSION JOINT**

(SHOWING SPALLED SLAB EDGES - TYPICAL)

- GENERAL NOTES:
- "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Materials as outlined in the CONCRETE REPAIR MANUAL.
  - "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Repair materials suitable for the appropriate Horizontal or Vertical application meeting the requirements in DMS-4655, "Concrete Repair Materials".



*Thomas T. Le*  
 2/6/2023

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 TBPE REG. # F-474

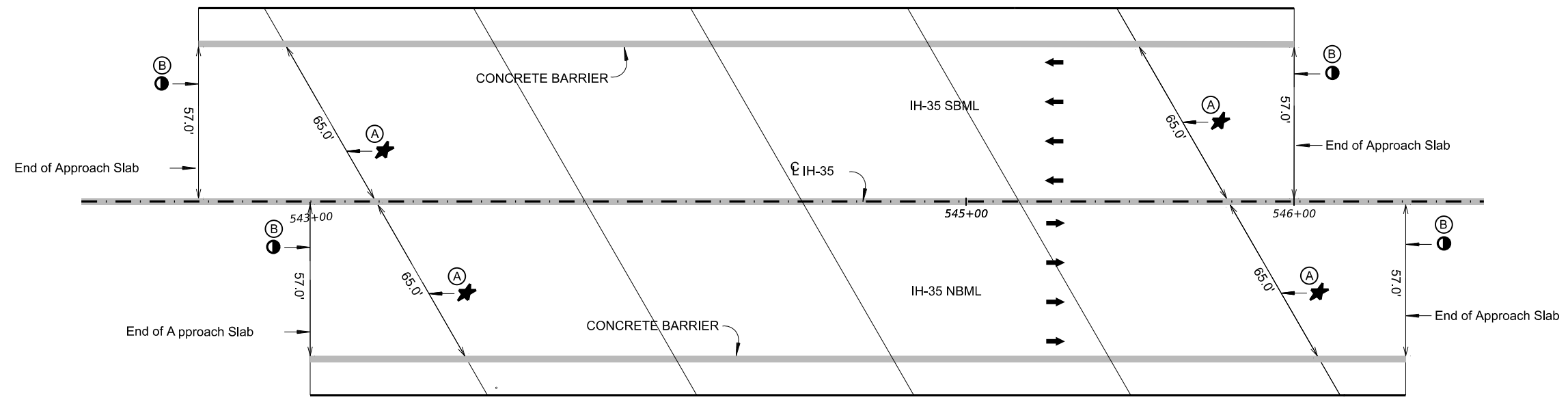
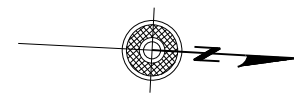
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 Texas Department of Transportation

**IH 35  
 LAYOUT & DETAILS FOR  
 CLEANING AND SEALING  
 EXPANSION JOINTS  
 IH 35 (NBML & SBML) OVER  
 CRAVEN AVE**

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	75	





IH-35 (SB) OVER FM 2417  
 260' ~ OVERALL LENGTH  
 260' (64', 66', 66', 64') 4 SPAN CONC. GIRD. UNIT  
 58'-0" ROADWAY 30"  
 RAIL TYPE TL4

IH-35 (NB) OVER FM 2417  
 260' ~ OVERALL LENGTH  
 260' (64', 66', 66', 64') 4 SPAN CONC. GIRD. UNIT  
 58'-0" ROADWAY 30"  
 RAIL TYPE TL4

- Denotes Location for Cleaning and Sealing Joints.  
(See Relief Joint Detail)
- ★ Denotes Location for Cleaning and Sealing Expansion Joints.

**LAYOUT PLAN**  
 IH-35 (NBML AND SBML) OVER FM 2417  
 (NBML N.B.I.#09-161-0-0015-01-469)  
 (SBML N.B.I.#09-161-0-0015-01-470)

**Note:**  
 An existing Overlay,  
 (Approx. 2"±) to be removed  
 off the Bridge Deck

**ESTIMATED QUANTITIES**

ITEM	(A)	(A)	(B)
	356-6021	438-6002	438-6006
LOCATION	PAV JT UNDERSEAL (24")	CLEANING AND SEALING EXISTING JOINTS (CL 3)	CLEANING AND SEALING JOINTS (CL3)
	L.F.	L.F.	L.F.
STR. #470 (SBML)	130.0	130.0	114.0
STR. #469 (NBML)	130.0	130.0	114.0
TOTAL	260.0	260.0	228.0

STATE OF TEXAS  
 THOMAS T. LE  
 92771  
 LICENSED PROFESSIONAL ENGINEER  
*Thomas T. Le*  
 2/6/2023

**ATKINS**  
 MEMBER OF THE SNC-LAVALIN GROUP  
 TBPE REG. # F-474

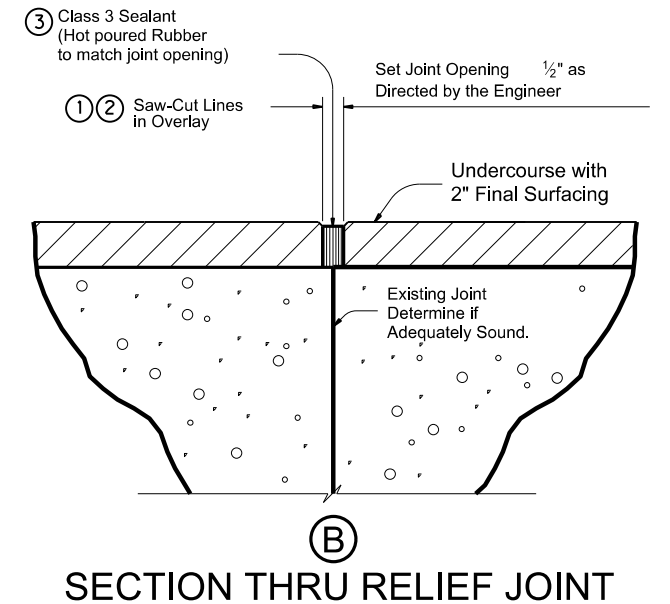
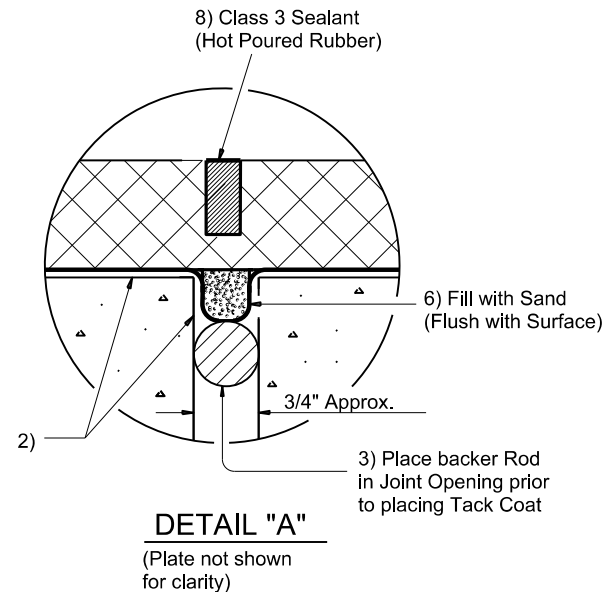
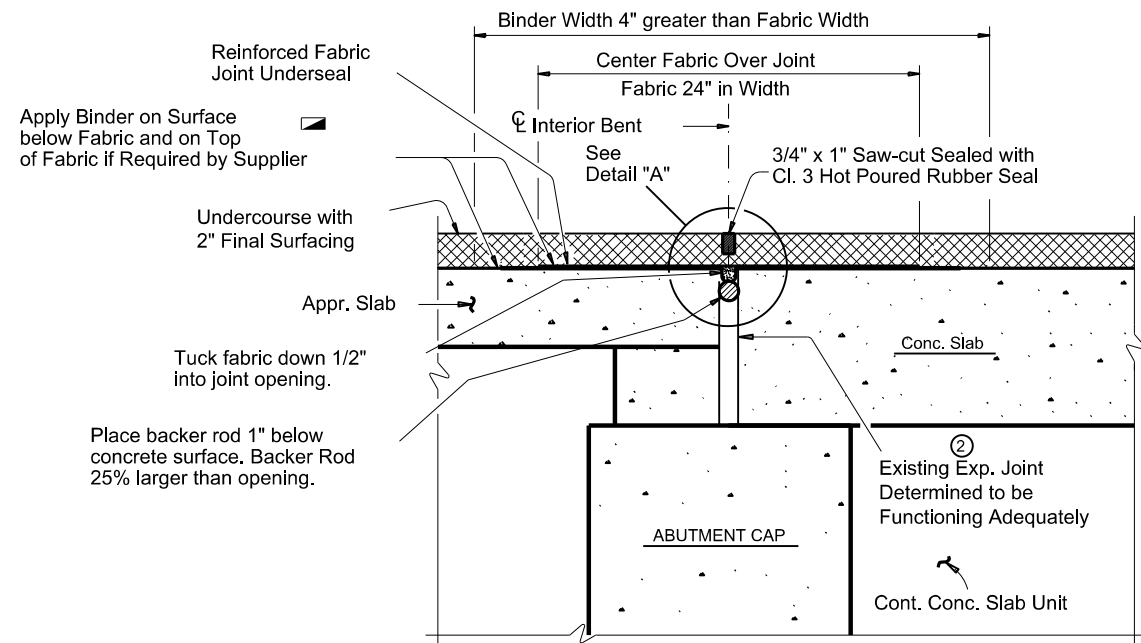
Texas Department of Transportation

IH 35  
 LAYOUT & DETAILS FOR  
 CLEANING AND SEALING  
 EXPANSION JOINTS  
 IH 35 (NBML & SBML) OVER  
 FM 2417

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	76	

DATE: 2/6/2023 3:37:44 PM  
 FILE: ...IH35 Cavern FM2417(CREST).dgn



**FABRIC JOINT SEAL WITH HOT POURED RUBBER**

NOTE: PREPARE EXISTING JOINT PRIOR TO INSTALLATION

- PROCEDURES:
- 1) PRIOR TO THE PLACEMENT OF THE FABRIC JOINT UNDERSEAL, CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE, AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."
  - 2) REPAIR ANY SIGNIFICANT SPALLED OR CRACKED AREAS, AS DETERMINED BY THE ENGINEER, AROUND THE JOINT OPENING WITH TYPE II POLYMER CONCRETE IN ACCORDANCE WITH DMS-6140, "POLYMER CONCRETE FOR JOINT SYSTEMS". THIS WORK WILL BE PAID FOR BY ITEM 429 "CNC STR REP (STANDARD)".
  - 3) PLACE TACK COAT OR BINDER AS REQUIRED BY THE FABRIC JOINT UNDERSEAL MANUFACTURER'S INSTALLATION INSTRUCTIONS. PLACE BACKER ROD IN JOINT OPENING PRIOR TO PLACING TACK COAT.
  - 4) PLACE REINFORCED FABRIC JOINT UNDERSEAL CENTERED OVER JOINT OPENING. TUCK FABRIC DOWN APPROXIMATELY 1/2" INTO THE JOINT OPENING. INSTALL UNDERSEAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
  - 5) WHEN USING THE SELF-ADHESIVE TYPE FABRIC UNDERSEAL, PRESSURE ROLL FABRIC JOINT UNDERSEAL TO IMPROVE ADHESION.
  - 6) JUST PRIOR TO PAVING, FILL TUCKED IN PORTION OF UNDERSEAL WITH SAND FLUSH WITH SURFACE. APPLY A TACK COAT TO FABRIC JOINT UNDERSEAL AS REQUIRED BY THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. MARK LOCATION OF CENTERLINE OF JOINT ON CURB OR BARRIER AS APPROVED.
  - 7) AFTER THE ASPHALTIC CONCRETE PAVEMENT OPERATIONS ARE COMPLETE, SAW CUT 1" INTO THE ASPHALT AT CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A 3/4" JOINT OPENING OR MATCH THE EXISTING JOINT OPENING, WHICHEVER IS GREATER. DO NOT DAMAGE THE UNDERSEAL.
  - 8) SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." SEAL FLUSH WITH THE TOP OF THE ASPHALTIC CONCRETE PAVEMENT.

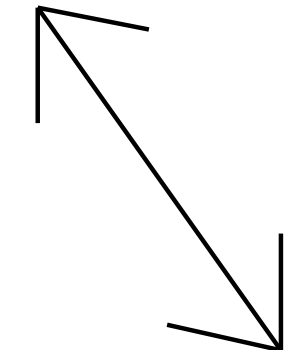
GENERAL NOTES:

CLEANING EXISTING JOINT OPENING OF ALL DEBRIS, PROVIDING AND PLACING BACKER ROD, SAW-CUTTING JOINT OPENING, AND SEALING JOINT IS PAID FOR BY ITEM 438, "CLEANING AND SEALING JOINTS" AND MEASURED BY THE L.F. OF "CLEANING AND SEALING OF EXISTING JOINTS (CL 3)." PROVIDING AND APPLYING TACK COAT AND PROVIDING AND PLACING FABRIC JOINT UNDERSEAL IS PAID FOR BY ITEM 356, "FABRIC UNDERSEAL" AND MEASURED BY THE L.F. OF "PAV JT UNDERSEAL."

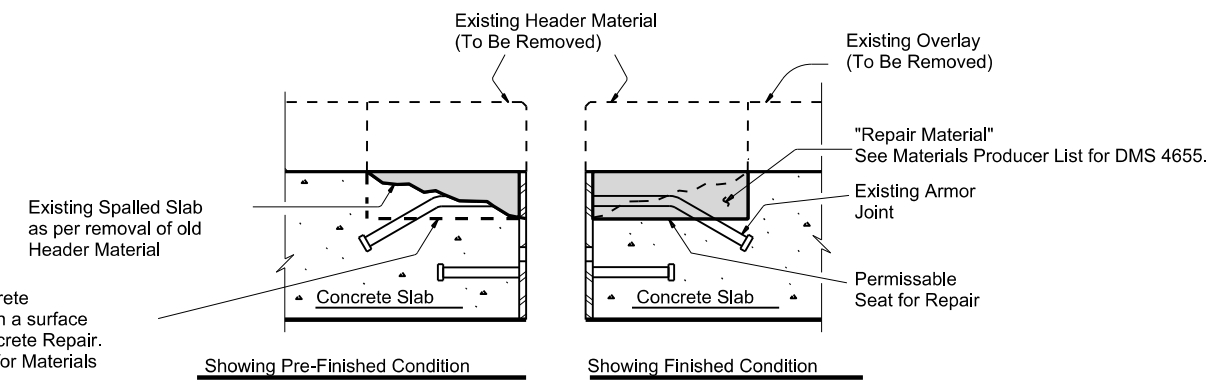
OBTAIN APPROVAL FOR ALL TOOLS, EQUIPMENT, MATERIALS AND TECHNIQUES PROPOSED FOR USE TO PREPARE THE JOINT.

PROVIDE THE REINFORCED FABRIC JOINT UNDERSEAL IN ACCORDANCE WITH DMS-6260, "REINFORCED FABRIC JOINT UNDERSEAL" OR DMS-6220, "FABRIC FOR UNDERSEALS."

PROVIDE THE CLASS 3 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS."



**EXISTING JOINT PREPARATION**



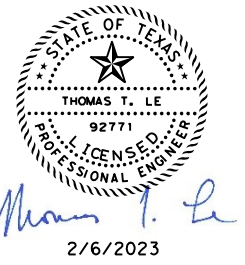
**SECTION THRU EXISTING NOSING/HEADER AT SEALED EXPANSION JOINT**

(SHOWING SPALLED SLAB EDGES - TYPICAL)

- GENERAL NOTES:
- "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Materials as outlined in the CONCRETE REPAIR MANUAL.
  - "Concrete Chipping" for Joint preparation is subsidiary to Item 429.
  - Provide Repair materials suitable for the appropriate Horizontal or Vertical application meeting the requirements in DMS-4655, "Concrete Repair Materials".

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE JOINT WITH HOT POURED RUBBER SEAL:

- 1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
- 2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
- 3) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."



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Texas Department of Transportation

IH 35  
LAYOUT & DETAILS FOR  
CLEANING AND SEALING  
EXPANSION JOINTS  
IH 35 (NBML & SBML) OVER  
FM 2417

SHEET 2 OF 2

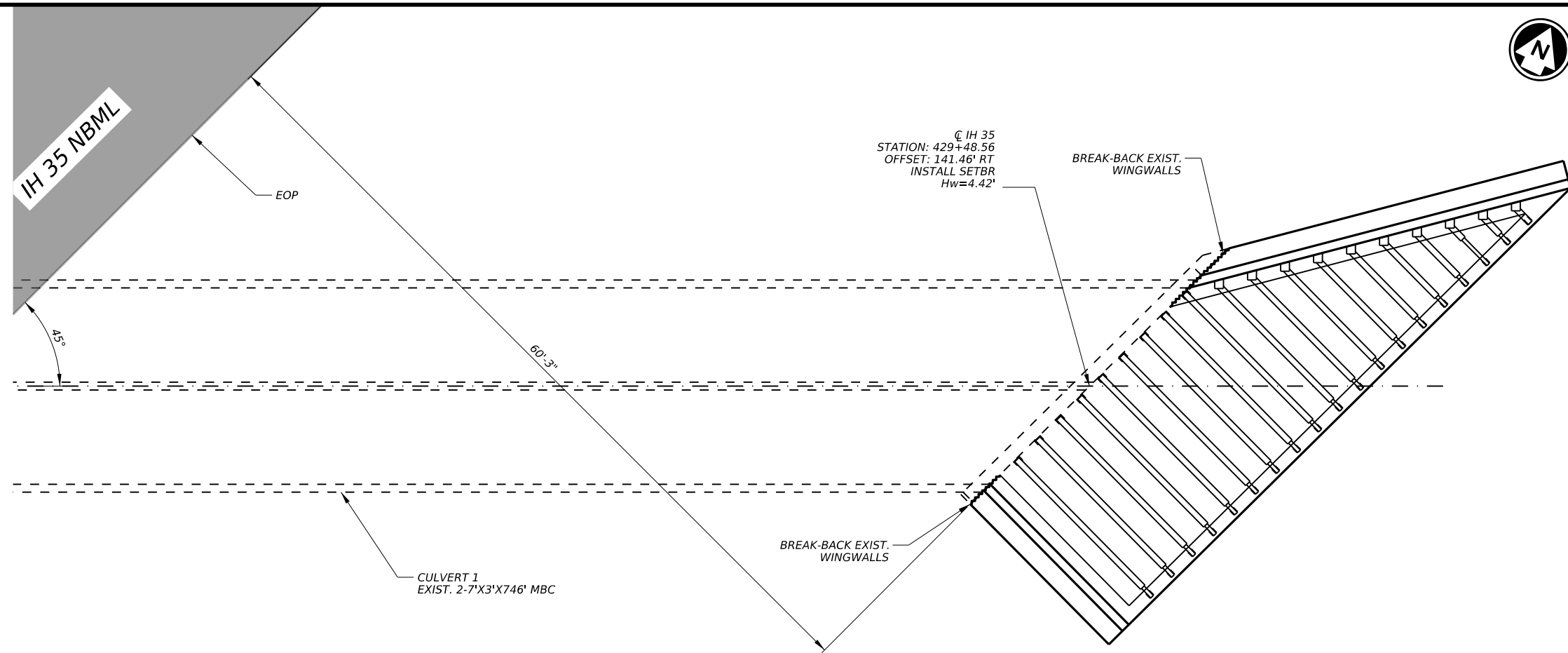
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DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	77	

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**NOTES:**

1. CULVERT LENGTH WAS ESTIMATED USING AERIAL IMAGES.



© IH 35  
STATION: 429+48.56  
OFFSET: 141.46' RT  
INSTALL SETBR  
Hw=4.42'

BREAK-BACK EXIST.  
WINGWALLS

BREAK-BACK EXIST.  
WINGWALLS

CULVERT 1  
EXIST. 2-7'X3'X746' MBC



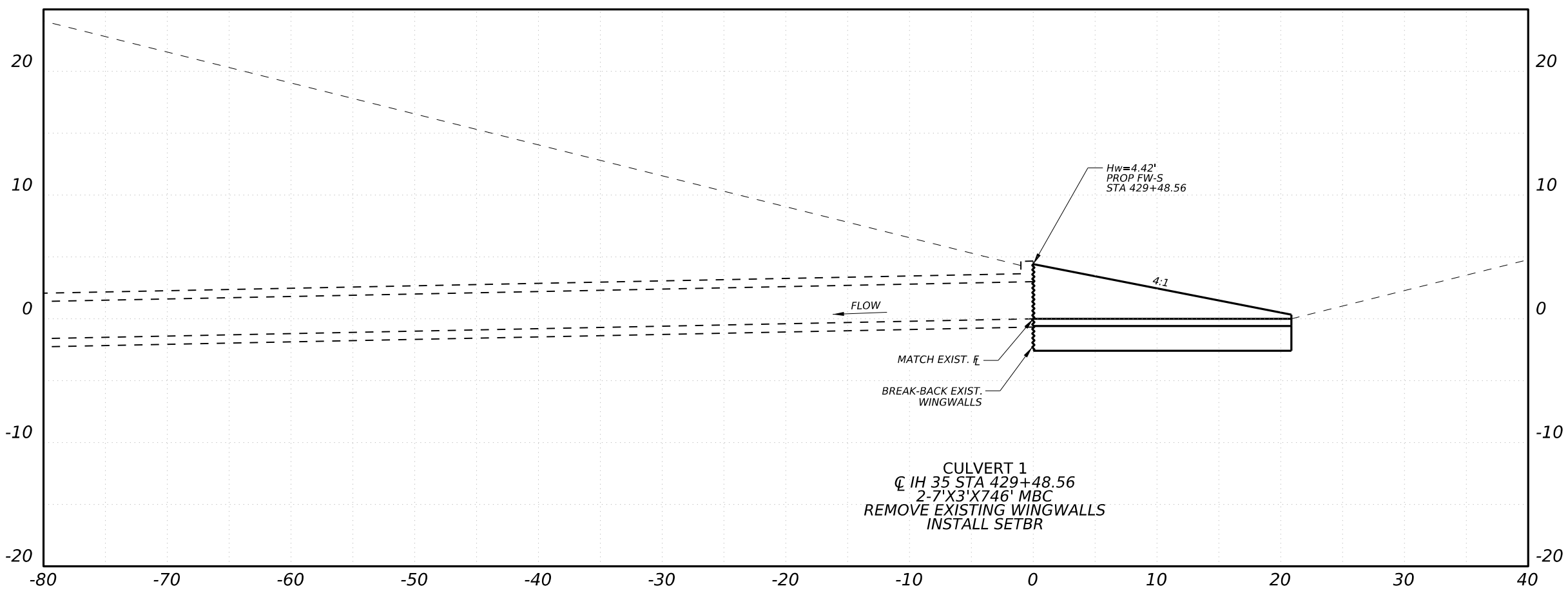
STATE OF TEXAS  
THOMAS T. LE  
92771  
LICENSED PROFESSIONAL ENGINEER  
*Thomas T. Le*  
2/15/2023

**ATKINS**  
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TBPE REG. # F-474

Texas Department of Transportation

IH 35  
CULVERT LAYOUT  
2-7'X3' MBC SET (RT)

CONT	SECT	JOB	HIGHWAY
0015	01	253	IH 35
DIST	COUNTY	SHEET NO.	
WAC	McLENNAN	77A	



Hw=4.42'  
PROP FW-S  
STA 429+48.56

4:1

FLOW

MATCH EXIST. E

BREAK-BACK EXIST.  
WINGWALLS

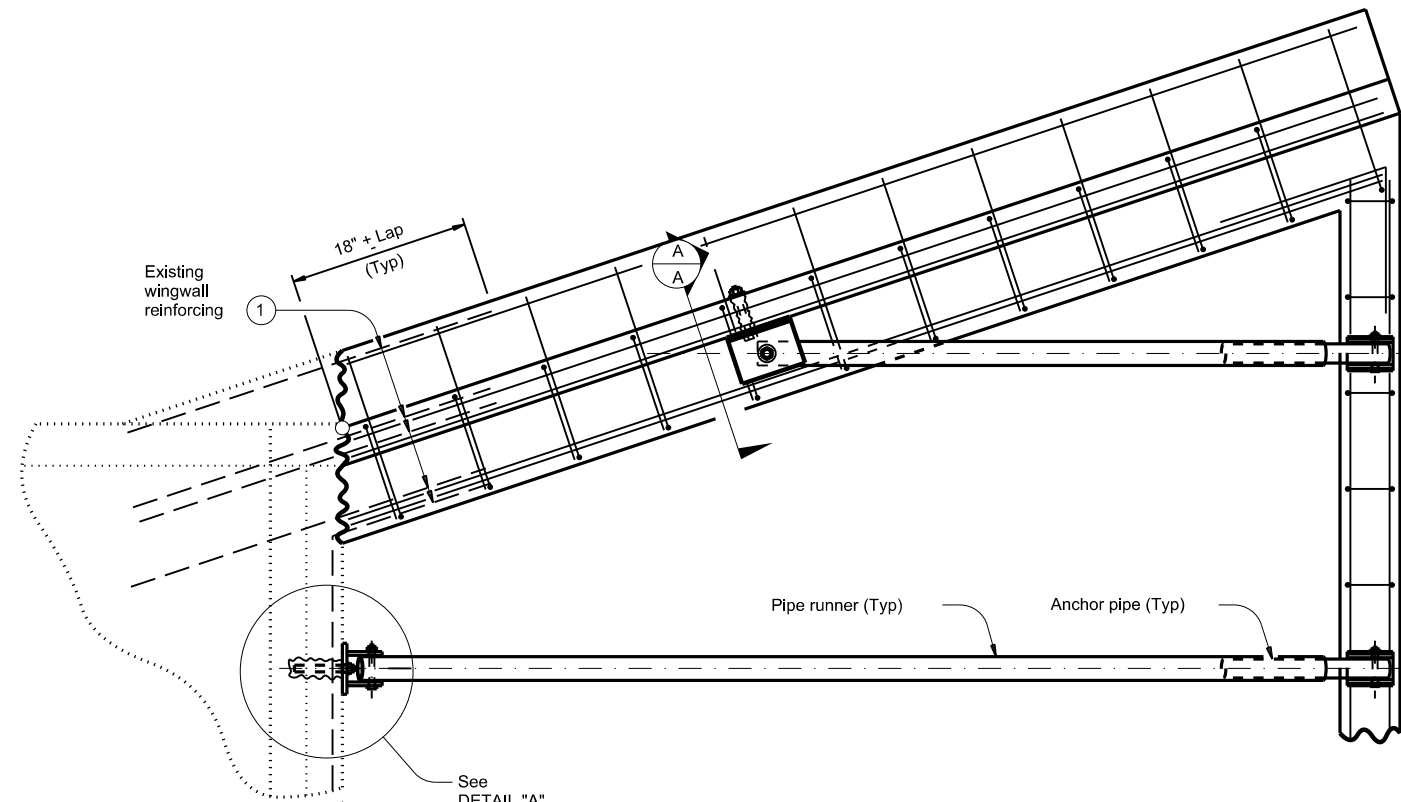
CULVERT 1  
© IH 35 STA 429+48.56  
2-7'X3'X746' MBC  
REMOVE EXISTING WINGWALLS  
INSTALL SETBR

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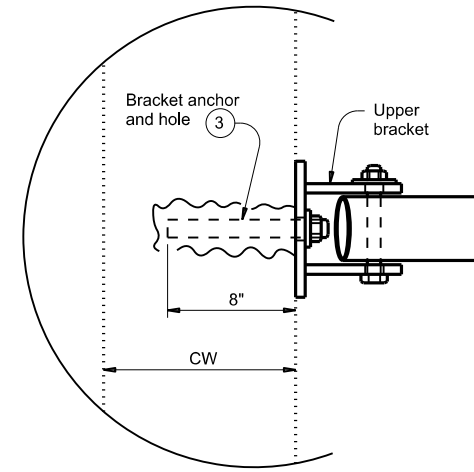


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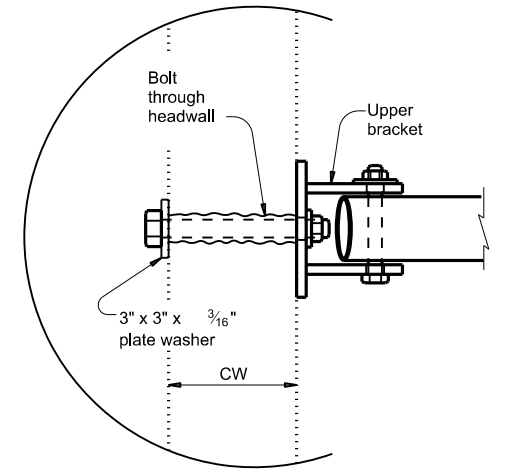
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**PARTIAL PLAN**

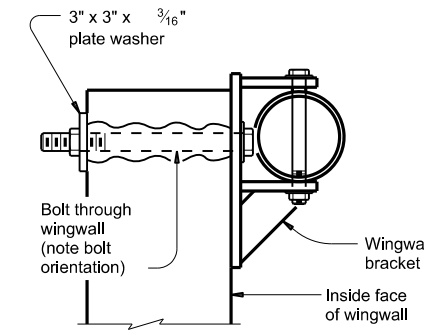


For CW greater than 8"

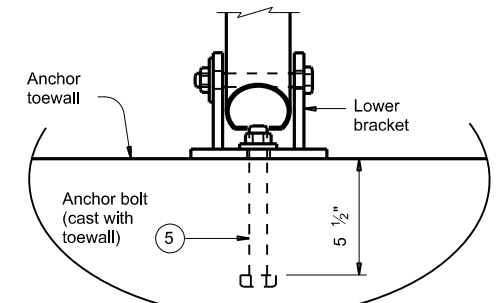


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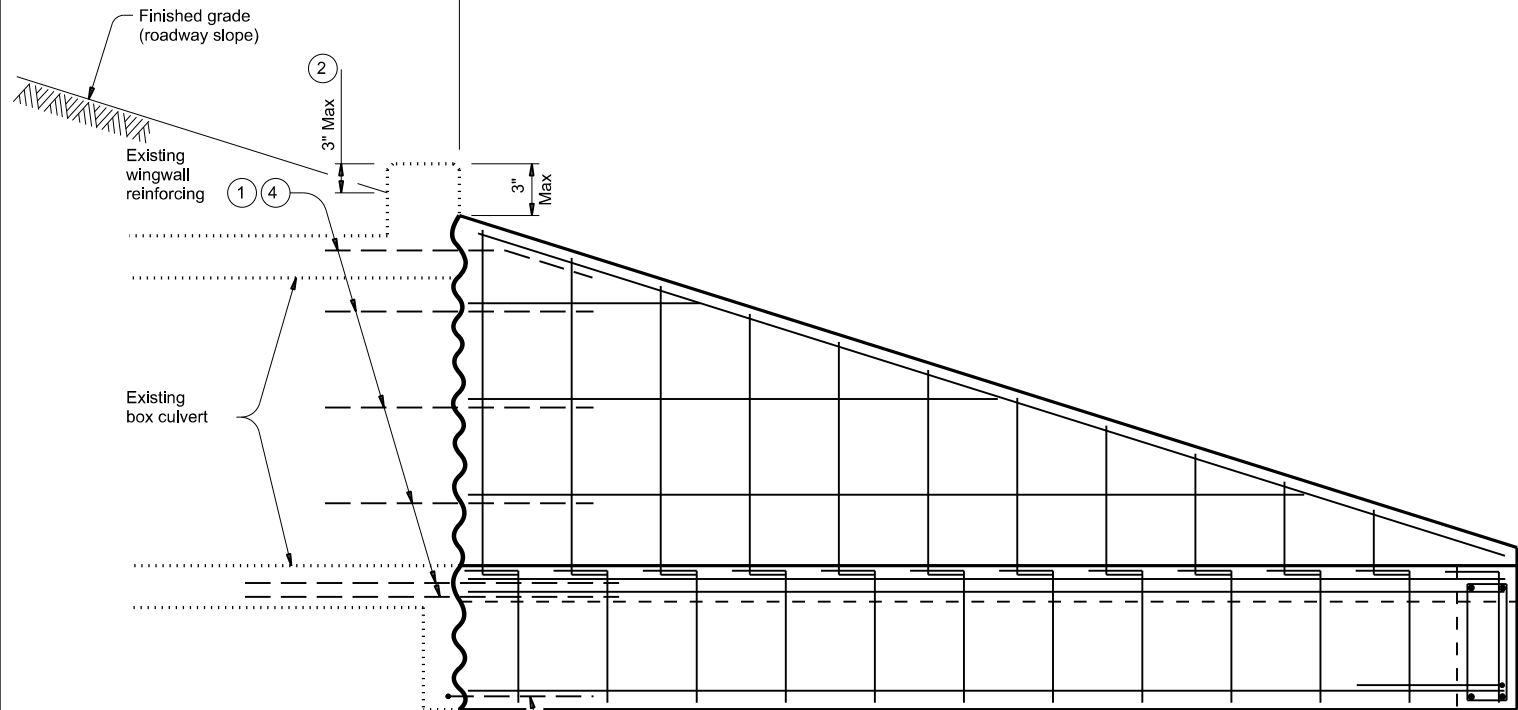
**DETAIL "A"**



**SECTION A-A**



**SECTION B-B**



**ELEVATION**

- ① Clean and straighten existing reinforcing to lap with new reinforcing as shown. The Engineer may require additional dowels to lap with the new reinforcing if the existing reinforcing is damaged or is not suitably located to lap with new reinforcing. These additional dowels must be #5 x 2'-0".
- ② For vehicle safety, reduce curb height, if necessary to provide a maximum 3" projection above finished grade. No quantity changes or additional compensation will be allowed for this work.
- ③ Provide 3/4" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rod with one hex head nut and one hardened steel washer. Embed threaded rods into curb, wingwall, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.
- ④ If required, embed wingwall anchor dowels into existing box culvert using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8".
- ⑤ At Contractor's option, adhesive anchors may be used. Provide adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

**MATERIAL NOTES:**

Install epoxy adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing epoxy, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Anchorage bars or bolts must be clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

**GENERAL NOTES:**

Use these details in conjunction with the SETB standard sheets. Shorten reinforcing Bars D, M, P, and R when utilizing existing reinforcing, as shown. If required, add dowels to lap with new reinforcing, as shown. No increase or decrease to the pay quantities is permitted for these adjustments in the reinforcing steel or concrete quantities.

				Bridge Division Standard	
<b>SAFETY END TREATMENT</b> <b>RETROFIT DETAILS FOR EXISTING BOX CULVERTS</b> <b>SETBR</b>					
FILE:	setbrste-20.dgn	DN:	GAF	CK:	TxDOT
©TxDOT	February 2020	CON:	0015	SECT:	01
REVISIONS		JOB:	253	HIGHWAY:	IH 35
		DIST:	WAC	COUNTY:	McLENNAN
				SHEET NO.:	77C

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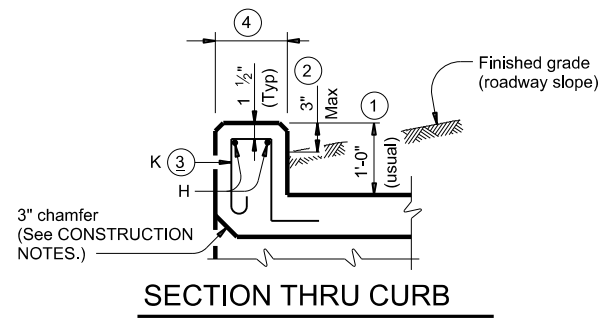
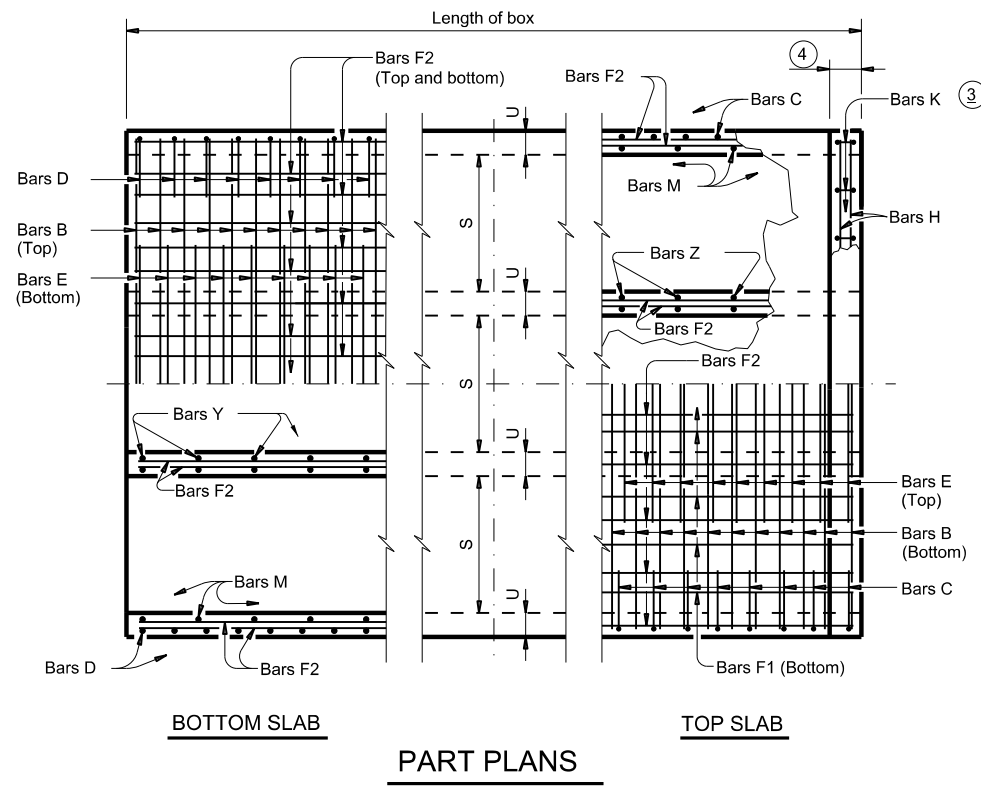
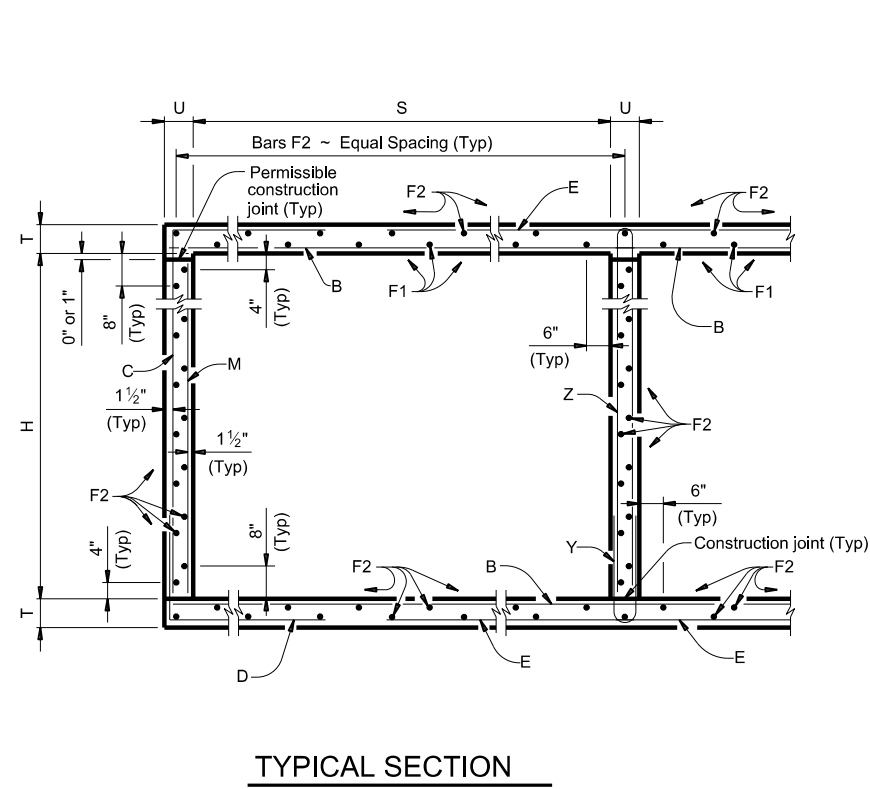
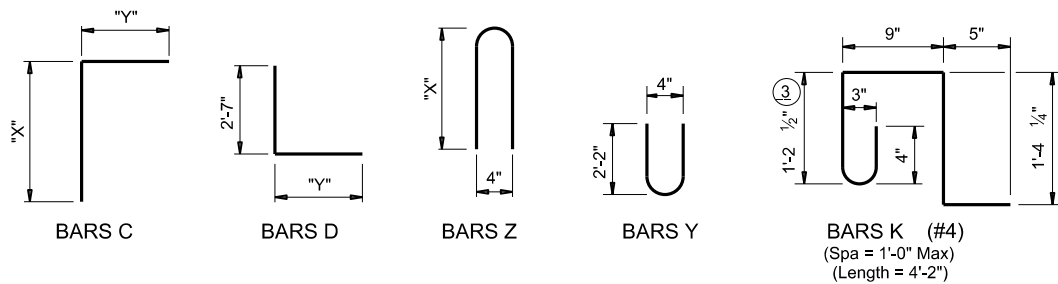


TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
3'-0"	3'-6 1/2"	4'-5"
4'-0"	4'-6 1/2"	4'-5"
5'-0"	5'-6 1/2"	4'-5"
6'-0"	6'-6 1/2"	4'-5"
7'-0"	7'-6 1/2"	4'-5"



- ① 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
- ② For vehicle safety, the following requirements must be met:
  - For structures without bridge rail, construct curbs no more than 3" above finished grade.
  - For structures with bridge rail, construct curbs flush with finished grade. Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ③ For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- ④ 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR  
 Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.  
 If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

**CONSTRUCTION NOTES:**  
 Do not use permanent forms.  
 Chamfer the bottom edge of the top slab 3" at the entrance.  
 Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel.  
 Provide galvanized reinforcing steel if required elsewhere in the plans.  
 Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb.  
 Provide bar laps, where required, as follows:  
 · Uncoated or galvanized ~ #4 = 1'-8" Min  
 · Uncoated or galvanized ~ #5 = 2'-1" Min  
 · Uncoated or galvanized ~ #6 = 2'-6" Min

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.  
 See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING SHEET 1 OF 2

**Texas Department of Transportation**  
 Bridge Division Standard

**MULTIPLE BOX CULVERTS  
 CAST-IN-PLACE  
 7'-0" SPAN  
 2' TO 16' FILL**

**MC-7-16**


FILE: mc716ste-20.dgn	DN: TBE	CK: BMP	DWR: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0015	01	253	IH 35
DIST	COUNTY		SHEET NO.	
WAC	McLENNAN		78	



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DATE: 2/6/2023 3:38:13 PM  
 FILE: \\...\.5. Drainage\mc716ste-20.dgn

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																								QUANTITIES																				
					Bars B				Bars C & D				Bars E				Bars F1 ~ #4			Bars F2 ~ #4			Bars M ~ #4			Bars Y & Z ~ #4				Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total											
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C		Bars D		No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y		Bars Z		Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)				
2	7' - 0"	3' - 0"	8"	7"	108	#6	9"	15' - 6"	2,514	162	#5	6"	7' - 11"	1,338	7' - 0"	1,183	108	#6	9"	7' - 5"	1,203	10	18"	39' - 9"	266	54	18"	39' - 9"	1,434	108	9"	3' - 0"	216	54	9"	4' - 7"	165	7' - 3"	262	15' - 6"	41	34	95	0.972	214.5	1.2	136	40.0	8,717
3	7' - 0"	3' - 0"	8"	7"	108	#6	9"	23' - 1"	3,744	162	#5	6"	7' - 11"	1,338	7' - 0"	1,183	108	#6	9"	14' - 5"	2,339	15	18"	39' - 9"	398	77	18"	39' - 9"	2,045	108	9"	3' - 0"	216	108	9"	4' - 7"	331	7' - 3"	523	23' - 1"	62	50	139	1.412	302.9	1.7	201	58.2	12,318
4	7' - 0"	3' - 0"	8"	7"	108	#6	9"	30' - 8"	4,975	162	#5	6"	7' - 11"	1,338	7' - 0"	1,183	108	#6	9"	21' - 5"	3,474	20	18"	39' - 9"	531	100	18"	39' - 9"	2,655	108	9"	3' - 0"	216	162	9"	4' - 7"	496	7' - 3"	785	30' - 8"	82	64	178	1.851	391.3	2.3	260	76.3	15,913
5	7' - 0"	3' - 0"	8"	7"	108	#6	9"	38' - 3"	6,205	162	#5	6"	7' - 11"	1,338	7' - 0"	1,183	108	#6	9"	28' - 5"	4,610	25	18"	39' - 9"	664	123	18"	39' - 9"	3,266	108	9"	3' - 0"	216	216	9"	4' - 7"	661	7' - 3"	1,046	38' - 3"	102	80	223	2.290	479.7	2.8	325	94.4	19,514
6	7' - 0"	3' - 0"	8"	7"	108	#6	9"	45' - 10"	7,435	162	#5	6"	7' - 11"	1,338	7' - 0"	1,183	108	#6	9"	35' - 5"	5,745	30	18"	39' - 9"	797	146	18"	39' - 9"	3,877	108	9"	3' - 0"	216	270	9"	4' - 7"	827	7' - 3"	1,308	45' - 10"	122	94	262	2.729	568.2	3.4	384	112.6	23,110
2	7' - 0"	4' - 0"	8"	7"	108	#6	9"	15' - 6"	2,514	162	#5	6"	8' - 11"	1,507	7' - 0"	1,183	108	#6	9"	7' - 5"	1,203	10	18"	39' - 9"	266	54	18"	39' - 9"	1,434	108	9"	4' - 0"	289	54	9"	4' - 7"	165	9' - 3"	334	15' - 6"	41	34	95	1.037	222.4	1.2	136	42.6	9,031
3	7' - 0"	4' - 0"	8"	7"	108	#6	9"	23' - 1"	3,744	162	#5	6"	8' - 11"	1,507	7' - 0"	1,183	108	#6	9"	14' - 5"	2,339	15	18"	39' - 9"	398	77	18"	39' - 9"	2,045	108	9"	4' - 0"	289	108	9"	4' - 7"	331	9' - 3"	667	23' - 1"	62	50	139	1.498	312.6	1.7	201	61.6	12,704
4	7' - 0"	4' - 0"	8"	7"	108	#6	9"	30' - 8"	4,975	162	#5	6"	8' - 11"	1,507	7' - 0"	1,183	108	#6	9"	21' - 5"	3,474	20	18"	39' - 9"	531	100	18"	39' - 9"	2,655	108	9"	4' - 0"	289	162	9"	4' - 7"	496	9' - 3"	1,001	30' - 8"	82	64	178	1.959	402.8	2.3	260	80.6	16,371
5	7' - 0"	4' - 0"	8"	7"	108	#6	9"	38' - 3"	6,205	162	#5	6"	8' - 11"	1,507	7' - 0"	1,183	108	#6	9"	28' - 5"	4,610	25	18"	39' - 9"	664	123	18"	39' - 9"	3,266	108	9"	4' - 0"	289	216	9"	4' - 7"	661	9' - 3"	1,335	38' - 3"	102	80	223	2.420	493.0	2.8	325	99.6	20,045
6	7' - 0"	4' - 0"	8"	7"	108	#6	9"	45' - 10"	7,435	162	#5	6"	8' - 11"	1,507	7' - 0"	1,183	108	#6	9"	35' - 5"	5,745	30	18"	39' - 9"	797	146	18"	39' - 9"	3,877	108	9"	4' - 0"	289	270	9"	4' - 7"	827	9' - 3"	1,668	45' - 10"	122	94	262	2.881	583.2	3.4	384	118.6	23,712
2	7' - 0"	5' - 0"	8"	7"	108	#6	9"	15' - 6"	2,514	162	#5	6"	9' - 11"	1,676	7' - 0"	1,183	108	#6	9"	7' - 5"	1,203	10	18"	39' - 9"	266	60	18"	39' - 9"	1,593	108	9"	5' - 0"	361	54	9"	4' - 7"	165	11' - 3"	406	15' - 6"	41	34	95	1.102	234.2	1.2	136	45.2	9,503
3	7' - 0"	5' - 0"	8"	7"	108	#6	9"	23' - 1"	3,744	162	#5	6"	9' - 11"	1,676	7' - 0"	1,183	108	#6	9"	14' - 5"	2,339	15	18"	39' - 9"	398	85	18"	39' - 9"	2,257	108	9"	5' - 0"	361	108	9"	4' - 7"	331	11' - 3"	812	23' - 1"	62	50	139	1.584	327.5	1.7	201	65.1	13,302
4	7' - 0"	5' - 0"	8"	7"	108	#6	9"	30' - 8"	4,975	162	#5	6"	9' - 11"	1,676	7' - 0"	1,183	108	#6	9"	21' - 5"	3,474	20	18"	39' - 9"	531	110	18"	39' - 9"	2,921	108	9"	5' - 0"	361	162	9"	4' - 7"	496	11' - 3"	1,217	30' - 8"	82	64	178	2.067	420.9	2.3	260	85.0	17,094
5	7' - 0"	5' - 0"	8"	7"	108	#6	9"	38' - 3"	6,205	162	#5	6"	9' - 11"	1,676	7' - 0"	1,183	108	#6	9"	28' - 5"	4,610	25	18"	39' - 9"	664	135	18"	39' - 9"	3,585	108	9"	5' - 0"	361	216	9"	4' - 7"	661	11' - 3"	1,623	38' - 3"	102	80	223	2.549	514.2	2.8	325	104.8	20,893
6	7' - 0"	5' - 0"	8"	7"	108	#6	9"	45' - 10"	7,435	162	#5	6"	9' - 11"	1,676	7' - 0"	1,183	108	#6	9"	35' - 5"	5,745	30	18"	39' - 9"	797	160	18"	39' - 9"	4,248	108	9"	5' - 0"	361	270	9"	4' - 7"	827	11' - 3"	2,029	45' - 10"	122	94	262	3.032	607.5	3.4	384	124.7	24,685
2	7' - 0"	6' - 0"	8"	7"	108	#6	9"	15' - 6"	2,514	162	#5	6"	10' - 11"	1,845	7' - 0"	1,183	108	#6	9"	7' - 5"	1,203	10	18"	39' - 9"	266	66	18"	39' - 9"	1,752	108	9"	6' - 0"	433	54	9"	4' - 7"	165	13' - 3"	478	15' - 6"	41	34	95	1.167	246.0	1.2	136	47.8	9,975
3	7' - 0"	6' - 0"	8"	7"	108	#6	9"	23' - 1"	3,744	162	#5	6"	10' - 11"	1,845	7' - 0"	1,183	108	#6	9"	14' - 5"	2,339	15	18"	39' - 9"	398	93	18"	39' - 9"	2,469	108	9"	6' - 0"	433	108	9"	4' - 7"	331	13' - 3"	956	23' - 1"	62	50	139	1.671	342.5	1.7	201	68.6	13,899
4	7' - 0"	6' - 0"	8"	7"	108	#6	9"	30' - 8"	4,975	162	#5	6"	10' - 11"	1,845	7' - 0"	1,183	108	#6	9"	21' - 5"	3,474	20	18"	39' - 9"	531	120	18"	39' - 9"	3,186	108	9"	6' - 0"	433	162	9"	4' - 7"	496	13' - 3"	1,434	30' - 8"	82	64	178	2.175	438.9	2.3	260	89.3	17,817
5	7' - 0"	6' - 0"	8"	7"	108	#6	9"	38' - 3"	6,205	162	#5	6"	10' - 11"	1,845	7' - 0"	1,183	108	#6	9"	28' - 5"	4,610	25	18"	39' - 9"	664	147	18"	39' - 9"	3,903	108	9"	6' - 0"	433	216	9"	4' - 7"	661	13' - 3"	1,912	38' - 3"	102	80	223	2.679	535.4	2.8	325	110.0	21,741
6	7' - 0"	6' - 0"	8"	7"	108	#6	9"	45' - 10"	7,435	162	#5	6"	10' - 11"	1,845	7' - 0"	1,183	108	#6	9"	35' - 5"	5,745	30	18"	39' - 9"	797	174	18"	39' - 9"	4,620	108	9"	6' - 0"	433	270	9"	4' - 7"	827	13' - 3"	2,390	45' - 10"	122	94	262	3.183	631.9	3.4	384	130.7	25,659
2	7' - 0"	7' - 0"	8"	7"	108	#6	9"	15' - 6"	2,514	162	#5	6"	11' - 11"	2,014	7' - 0"	1,183	108	#6	9"	7' - 5"	1,203	10	18"	39' - 9"	266	66	18"	39' - 9"	1,752	108	9"	7' - 0"	505	54	9"	4' - 7"	165	15' - 3"	550	15' - 6"	41	34	95	1.231	253.8	1.2	136	50.4	10,288
3	7' - 0"	7' - 0"	8"	7"	108	#6	9"	23' - 1"	3,744	162	#5	6"	11' - 11"	2,014	7' - 0"	1,183	108	#6	9"	14' - 5"	2,339	15	18"	39' - 9"	398	93	18"	39' - 9"	2,469	108	9"	7' - 0"	505	108	9"	4' - 7"	331	15' - 3"	1,100	23' - 1"	62	50	139	1.757	352.1	1.7	201	72.0	14,284
4	7' - 0"	7' - 0"	8"	7"	108	#6	9"	30' - 8"	4,975	162	#5	6"	11' - 11"	2,014	7' - 0"	1,183	108	#6	9"	21' - 5"	3,474	20	18"	39' - 9"	531	120	18"	39' - 9"	3,186	108	9"	7' - 0"	505	162	9"	4' - 7"	496	15' - 3"	1,650	30' - 8"	82	64	178	2.283	450.4	2.3	260	93.6	18,274
5	7' - 0"	7' - 0"	8"	7"	108	#6	9"	38' - 3"	6,205	162	#5	6"	11' - 11"	2,014	7' - 0"	1,183	108	#6	9"	28' - 5"	4,610	25	18"	39' - 9"	664	147	18"	39' - 9"	3,903	108	9"	7' - 0"	505	216	9"	4' - 7"	661	15' - 3"	2,200	38' - 3"	102	80	223	2.809	548.6	2.8	325	115.2	22,270
6	7' - 0"	7' - 0"	8"	7"	108	#6	9"	45' - 10"	7,435	162	#5	6"	11' - 11"	2,014	7' - 0"	1,183	108	#6	9"	35' - 5"	5,745	30	18"	39' - 9"	797	174	18"	39' - 9"	4,620	108	9"	7' - 0"	505	270	9"	4' - 7"	827	15' - 3"	2,750	45' - 10"	122	94	262	3.334	646.9	3.4	384	136.8	26,260

		<i>Bridge Division Standard</i>	
<b>MULTIPLE BOX CULVERTS          CAST-IN-PLACE          7'-0" SPAN          2' TO 16' FILL</b>			
<b>MC-7-16</b>			
FILE: mc716ste-20.dgn	DN: TBE	CK: BMP	DWG: TxDOT
©TxDOT February 2020	CONT: 0015	SECT: 01	JOB: 253
REVISIONS	COUNTY: WAC		HIGHWAY: IH 35
	SHEET NO.:		79



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

**TABLE OF DIMENSIONS AND REINFORCING STEEL**  
(Wings for One Structure End)

Maximum Wingwall Height (10)Hw	Dimensions				Variable Reinforcing				Estimated Quantities per ft of wing length (Two-Wings) (3)	
	W	X	Y	Z	Bars J1		Bars J2		Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721

**TABLE OF WINGWALL REINFORCING (Two-Wings)**

Bar	Size	No.	Spa
DL & DS	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
RL	#5	3	~
RS	#5	3	~
V	#4	~	1'-0"

**TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES**

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)	2.45		
Conc (CY/Ft)	0.037		

**TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES**

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	3	~
OS	#4	3	~
Reinf (Lb/Ft)	9.82		
Conc (CY/Ft)	0.074		

- Extend Bars P 3'-0" Min into bottom slab of box culvert.
- Adjust to fit as necessary to maintain 11#2" clearcover and 4" Min between bars.
- Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by 0.5 (A+Lw).
- Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.
- When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.
- At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.
- 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet.
- For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Culvert skew (limit to 15° or 30°)
- See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.
- Typical wingwall angle for all skews.

**TABLE OF MAXIMUM WING HEIGHTS** (10)

Side Slope	Hw Max
3:1	11'-5"
4:1	8'-10"
6:1	6'-1"

**WING DIMENSION CALCULATIONS:**

Formulas:  
 $Hw = H + T + C - 0.250^{(10)}$   
 $A = (Hw - 0.333') (SL)$   
 $B = (A) [\tan(\theta + 15^\circ)]$   
 $Lw = (A) + [\cos(\theta + 15^\circ)]$   
 For cast-in-place culverts:  
 $Ltw = [(N)(S) + (N + 1)(U)] \div (\cos \theta)$   
 For precast culverts:  
 $Ltw = [(N)(2U + S) + (N - 1)(0.500')] \div (\cos \theta)$   
 $Lc = (Ltw) - (2U) \div (\cos \theta)$   
 $Atw = (Lc) + (B)$   
 Total Wingwall Area (two wings ~ S.F.)  
 $= (0.5) (Hw + 0.333') (Lw + A)$

Hw = Height of wingwall (feet)  
 SL:1 = Side slope ratio (horizontal : 1 vertical)  
 Lw = Length of wingwall (feet)  
 Ltw = Culvert toewall length (feet)  
 Lc = Culvert curb between wings (feet)  
 Atw = Anchor toewall length (feet)  
 N = Number of culvert spans  
 θ = Culvert skew  
 See applicable box culvert standard for H, S, T, and U values.  
 See Table of Maximum Wall Heights for limits on Hw.

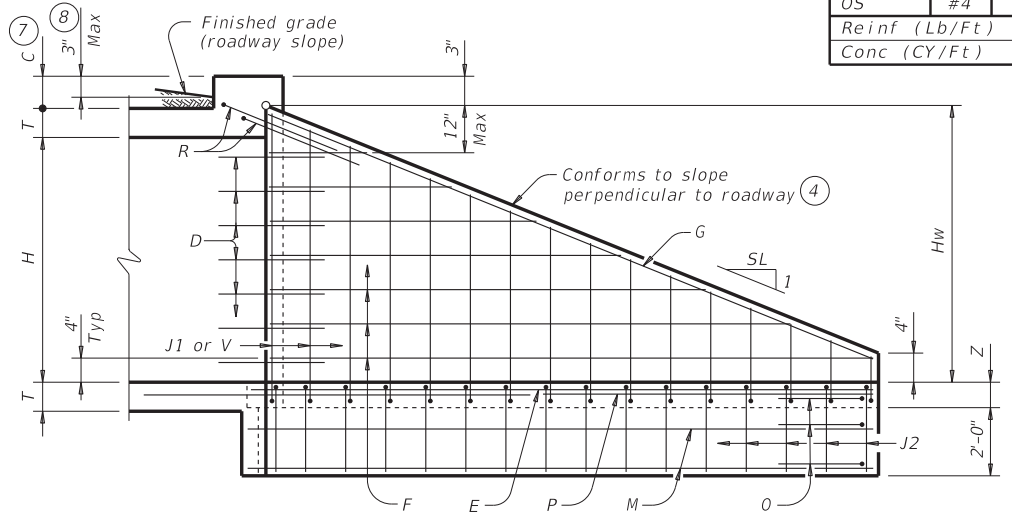
**MATERIAL NOTES:**

Provide Grade 60 reinforcing steel.  
 Provide galvanized reinforcing steel if required elsewhere in the plans.  
 Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
 Provide Class "C" concrete (f'c = 3,600 psi).  
 Adjust reinforcing as necessary to provide a minimum clear cover of 1 1/2".  
 Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.  
 Provide ASTM A307 bolts and nuts.  
 Provide ASTM A36 steel plates.  
 Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.  
 Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".  
 For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

**GENERAL NOTES:**

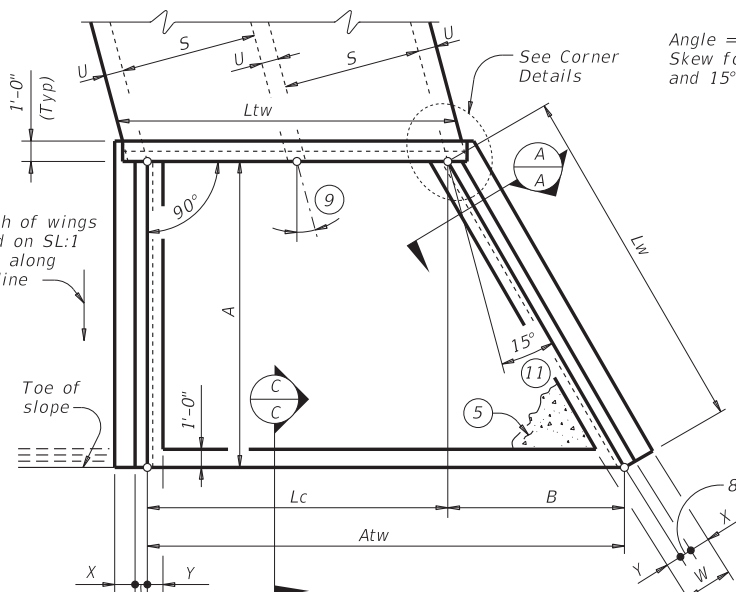
Designed according to AASHTO LRFD Bridge Design Specifications.  
 The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.  
 Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.  
 When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.  
 All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.  
 The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.  
 See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



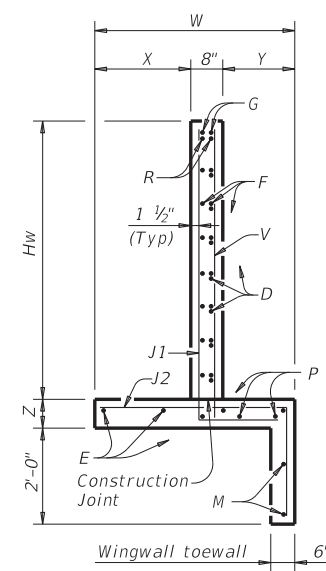
**INSIDE ELEVATION OF WINGWALL**

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

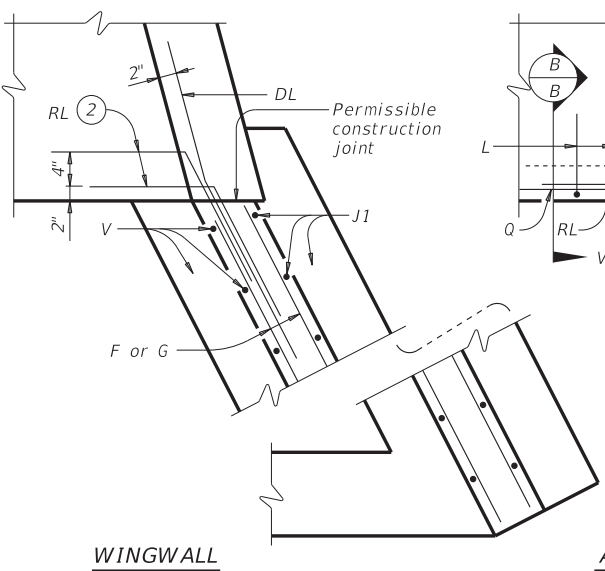


**PLAN**

(Showing dimensions and 15° skew.)

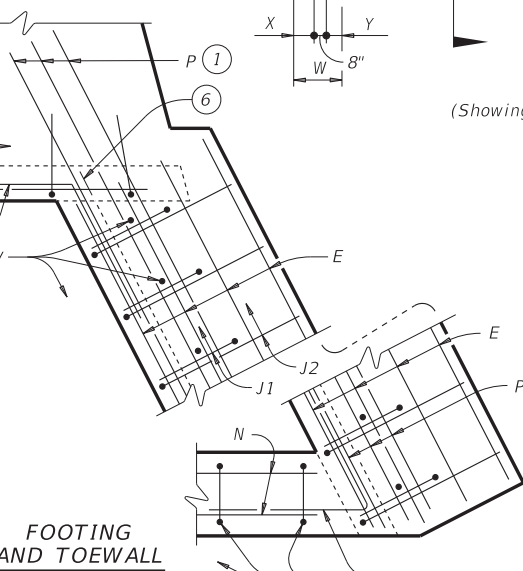


**SECTION A-A**

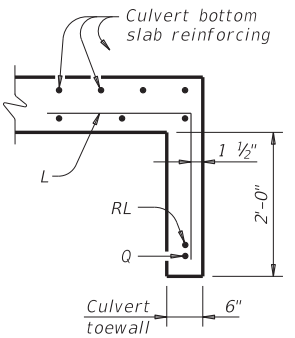


**CORNER DETAILS**

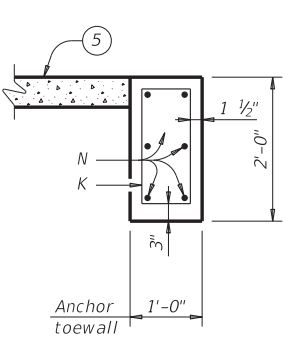
(Culvert and culvert toewall reinforcing not shown for clarity.)



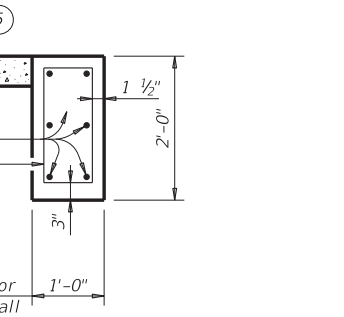
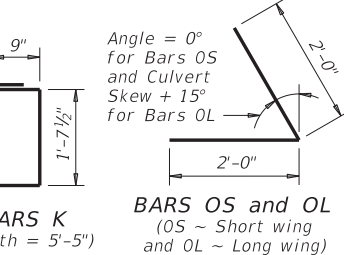
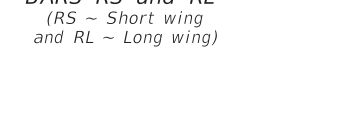
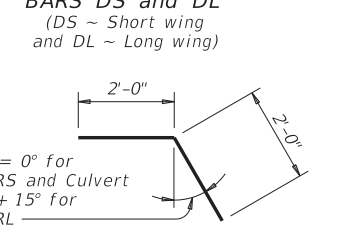
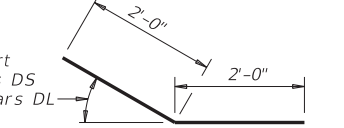
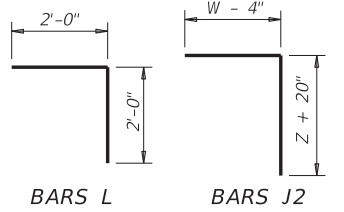
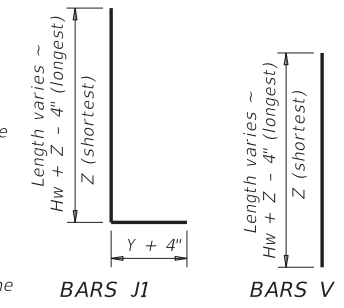
**FOOTING AND TOEWALL**



**SECTION B-B**



**SECTION C-C**



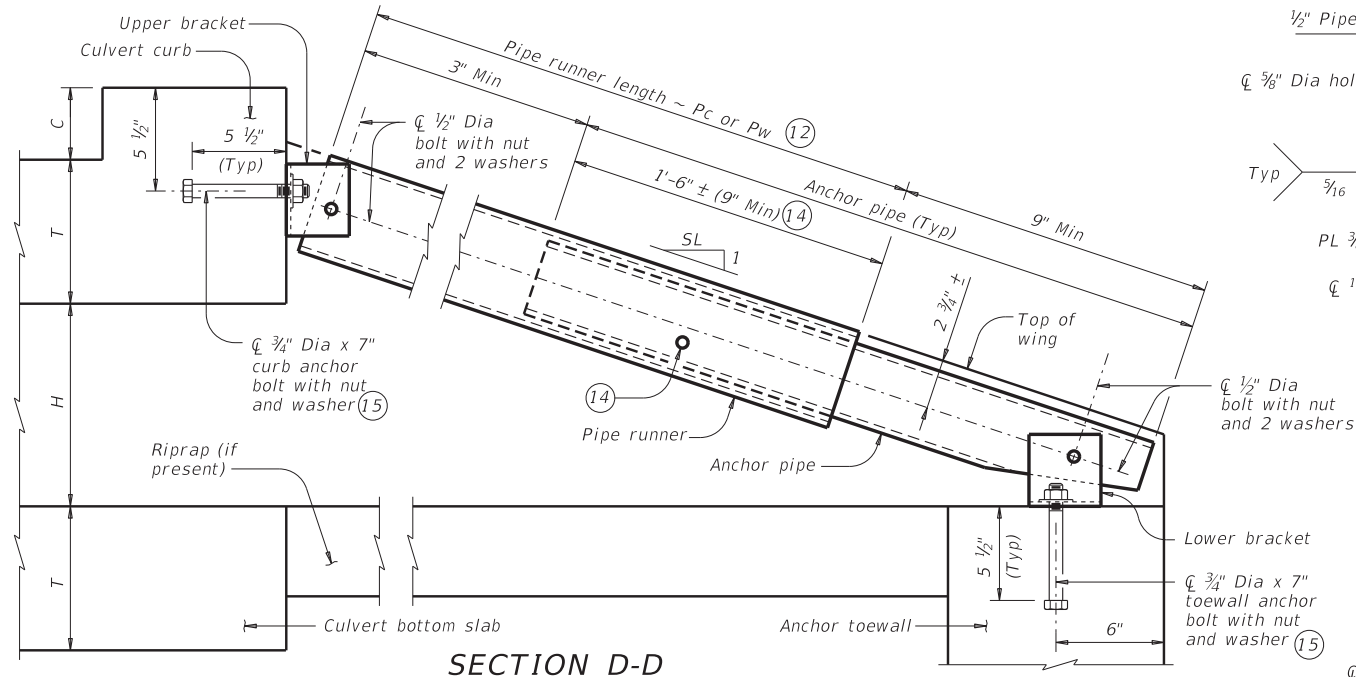
Texas Department of Transportation  
**SAFETY END TREATMENT WITH FLARED WINGS**  
 FOR 15° AND 30° SKEW BOX CULVERTS  
 TYPE I ~ CROSS DRAINAGE

**SETB-FW-S**

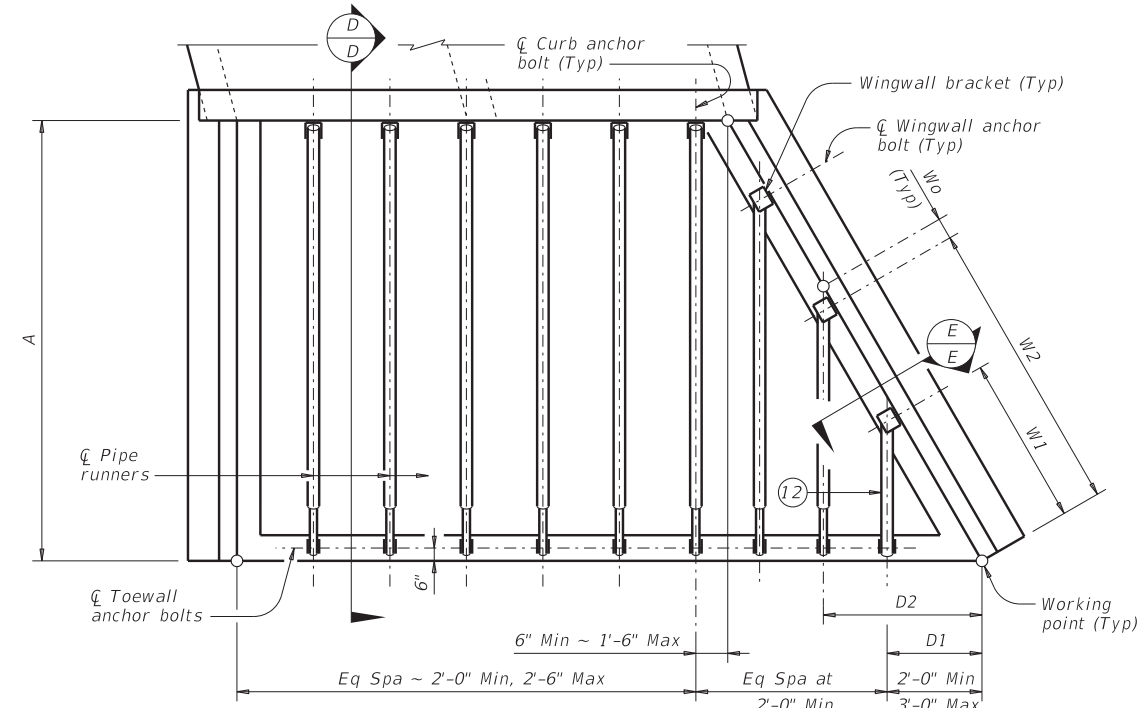
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REVISIONS	CONT	SECT	JOB	HIGHWAY
	001501	253	IH 35	
	DIST	COUNTY	SHEET NO.	
	WAC	MCLENNAN	80	

DATE: FILE:

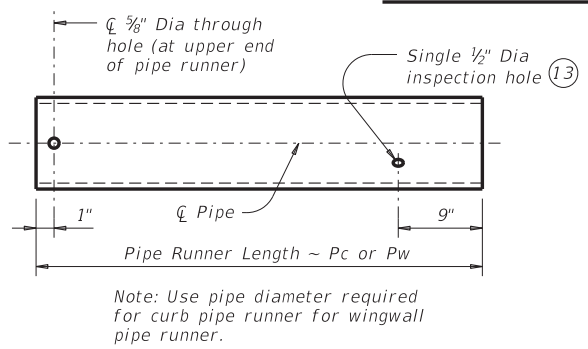
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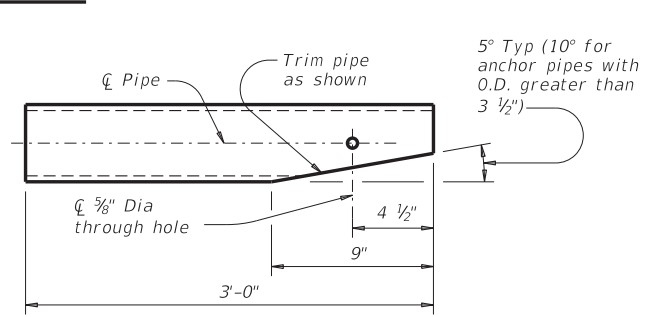
**SECTION D-D**  
(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)



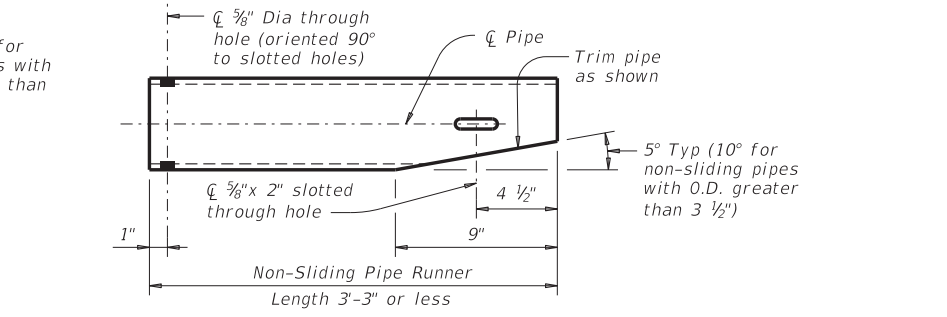
**PIPE RUNNER PLAN**



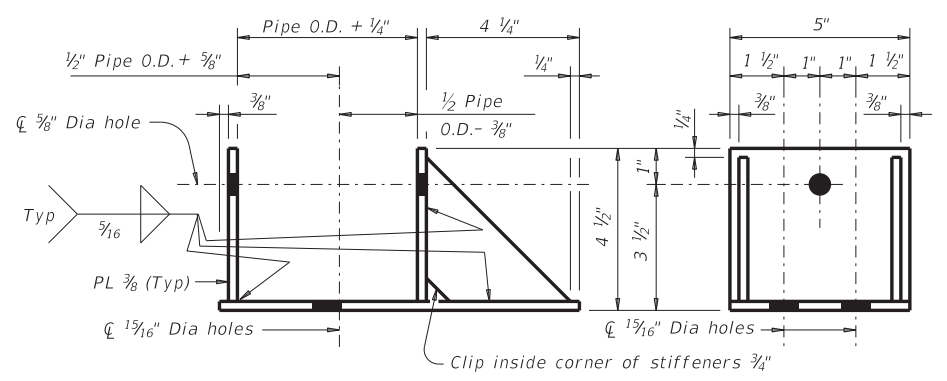
**PIPE RUNNER DETAILS**



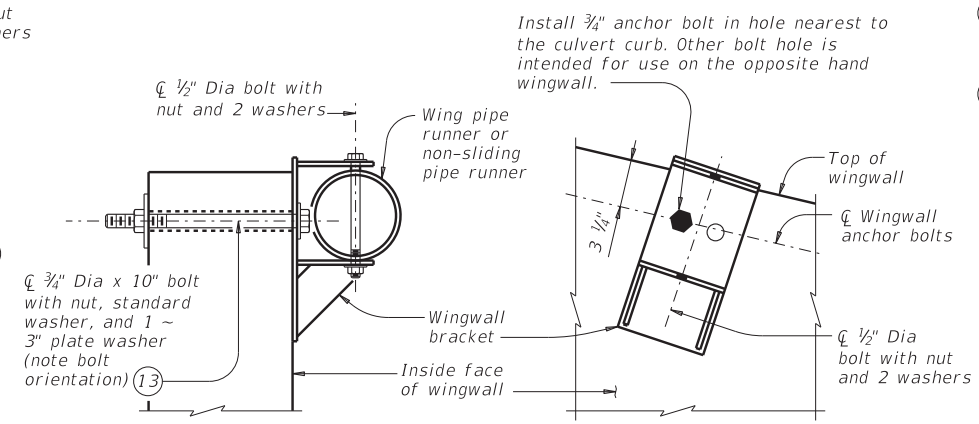
**ANCHOR PIPE DETAILS**



**NON-SLIDING PIPE RUNNER DETAILS**



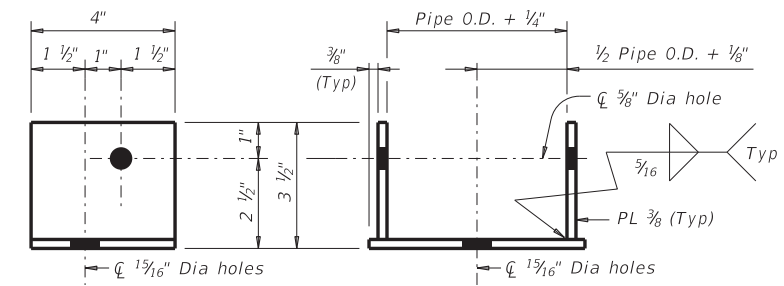
**ELEVATION** **SIDE VIEW**



**SECTION E-E** **ELEVATION**  
(Showing installed bracket.) (Showing installed bracket normal to wall. Pipe not shown for clarity.)

Note: Match wingwall bracket to the upper curb bracket size.

**WINGWALL BRACKET DETAILS**



**SIDE VIEW** **ELEVATION**

Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

**UPPER AND LOWER BRACKET DETAILS**

**MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES**

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

- 12 If pipe runner length (Pw) is 1'-9" or less, replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.
- 13 At Contractor's option, 7/8" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.
- 14 After installation of pipe runner, use the 1/2" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.
- 15 At Contractor's option, an adhesive anchor may be used. Provide 3/4" Dia adhesive anchors that meet the requirements of ASTM A307, Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 1/2". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

**PIPE RUNNER DIMENSION CALCULATIONS:**

$Wn = (K3) (Dn) - (Wo)$   
 $Pwn = (Dn) (K2) - (2.063')$   
 $Pw1 \text{ Non-Sliding Pipe Runner (If required)} = (D1) (K2) - (0.563')$   
 $Pc = (A) (K1) - (1.688')$

- $Wn$  = Distance from working point to centerline anchor bolt measured along bottom inside face of wing (feet)  
 $Dn$  = Distance from working point to centerline pipe runner measured along outside face of anchor toewall (feet)  
 $Pw$  = Wingwall pipe runner length (feet)  
 $Pc$  = Curb pipe runner length (feet)  
 $K$  = Constant values for use in formulas  
 Slope SL:1 K1 K2-15° Skew K2-30° Skew  
 3:1 ~ 1.054 ~ 1.826 ~ 1.054  
 4:1 ~ 1.031 ~ 1.785 ~ 1.031  
 6:1 ~ 1.014 ~ 1.756 ~ 1.014  
 $K3 = 15^\circ \text{ Skew} \sim 2.000$   
 $30^\circ \text{ Skew} \sim 1.414$   
 $n$  = Wing pipe runner number  
 $Wo = 15^\circ \text{ Skew} \sim 5"$   
 $30^\circ \text{ Skew} \sim 2 \frac{1}{2}"$

**Texas Department of Transportation** **Bridge Division Standard**

**SAFETY END TREATMENT WITH FLARED WINGS**  
FOR 15° AND 30° SKEW BOX CULVERTS  
TYPE I ~ CROSS DRAINAGE

**SETB-FW-S**

FILE: setbfssse-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
	001501	253	IH 35	
	DIST	COUNTY	SHEET NO.	
	WAC	McLENNAN	81	

DATE: FILE:





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DATE: 2/6/2023  
FILE: ...9\_Environmental\epic.dgn

**I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402**

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

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

- 1.
2.  No Action Required  Required Action

Action No.

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

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

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

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

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

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

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

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

**Best Management Practices:**

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

**III. CULTURAL RESOURCES**

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

- No Action Required  Required Action

Action No.

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

**IV. VEGETATION RESOURCES**

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

- No Action Required  Required Action

Action No.

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

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

- No Action Required  Required Action

Action No.

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

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

**LIST OF ABBREVIATIONS**

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

- Yes  No

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

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

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

- Yes  No

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

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

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

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

- No Action Required  Required Action

Action No.

- 1.
- 2.
- 3.


**VII. OTHER ENVIRONMENTAL ISSUES**

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

- No Action Required  Required Action

Action No.

- 1.
- 2.
- 3.

 Texas Department of Transportation		<i>Design Division Standard</i>	
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC</b>			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
©TxDOT: February 2015	CONT	SECT	JOB
12-12-2011 (DS) REVISIONS	0015	01	253
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	WAC	McLENNAN	83

**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 all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

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**

FOR THE CONSTRUCTION OF  
REHABILITATION OF EXISTING ROAD  
CONSISTING OF MILL AND INLAY

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**

0015-01-253

**1.2 PROJECT LIMITS:**

From: 12TH STREET

To: BU 77

**1.3 PROJECT COORDINATES:**

BEGIN: (REFER TO LOCATION  
END: MAP ON TITLE SHEET)

**1.4 TOTAL PROJECT AREA (Acres):** 37.6

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 0.1

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

FOR THE CONSTRUCTION CONSISTING  
OF MILL AND INLAY

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
CLAY	THE EXISTING VEGETATION IS GRASSED COVER AND IS IN GOOD CONDITION

**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: \_\_\_\_\_
- 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
- 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

\* 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: \_\_\_\_\_

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

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	F 2023(618)		84
STATE	STATE DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0015	01	253	IH 35

**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
- Other: \_\_\_\_\_

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

- Other: \_\_\_\_\_
- Other: \_\_\_\_\_
- Other: \_\_\_\_\_

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

**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 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 .

**2.9 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.

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



FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	F 2023(618)		85
STATE	STATE DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0015	01	253	IH 35

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DATE: \_\_\_\_\_  
 FILE: \_\_\_\_\_

**I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)**

DOT #: 416 105 R  
 Crossing Type: **\*\* RR UNDER**  
 RR Company Owning Track at Crossing: UPRR  
 Operating RR Company at Track: UPRR  
 RR MP: 166.460  
 RR Subdivision: FT. WORTH  
 City: BELLMEAD  
 County: MCLENNAN  
 CSJ at this Crossing: 0015-01-253  
 Highway/Roadway name crossing the railroad: IH 35  
 # of regularly scheduled trains per day at this crossing: 2  
 # of switching movements per day at this crossing: 0  
 % of estimated contract cost of work within railroad ROW: <1%

Scope of Work at this Crossing to Be Performed by State Contractor:  
MILL AND INLAY, CLEAN AND SEAL EXISTING JOINTS

Scope of Work at this Crossing to Be Performed by Railroad Company:

\*\* Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

**II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)**

**III. FLAGGING & INSPECTION**

# of Days of Railroad Flagging Expected: \_\_\_\_\_

On this project, night or weekend flagging is:

- Expected  
 Not Expected

Flagging services will be provided by:

- Railroad Company: TxDOT will pay flagging invoices  
 Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- UPRR - UP.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 - UP.request@nrssinc.net  
 Call Center 877-984-6777  
  
 BNSF - BNSF.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
  
 KCS - KCS.info@railpros.com  
 Call Center 877-315-0513, Select #1 for flagging  
 - Bottom Line On-Track Safety Services  
 bottomline076@aol.com, 903-767-7630

OTHERS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- Not Required  
 Required: Contact Information for Construction Inspection:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD**

On this project, construction work to be performed by a railroad company is:

- Required  
 Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

**V. RAILROAD INSURANCE REQUIREMENTS**

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	\$500,000 / \$500,000 / \$500,000
Commercial General Liability	\$2,000,000 / \$4,000,000
Business Automobile	\$2,000,000 combined single limit

Railroad Protective Liability		
<input type="checkbox"/>	Not Required	
<input checked="" type="checkbox"/>	Non - Bridge Projects	\$2,000,000 / \$6,000,000
<input type="checkbox"/>	Bridge Projects	\$5,000,000 / \$10,000,000
<input type="checkbox"/>	Other	

**VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT**

On this project, an ROE agreement is:

- Not Required  
 Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)  
 Required: UPRR Maintenance Consent Letter. TxDOT CST to assist.

- Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: \_\_\_\_\_

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

<http://www.txdot.gov/inside-txdot/division/rail/samples.html>

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

**VII. RAILROAD COORDINATION MEETING**

On this project, a Railroad Coordination Meeting is:

- Not Required  
 Required


See Item 5, Article 8.1 for more details.

**VIII. SUBCONTRACTORS**

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

**IX. EMERGENCY NOTIFICATION**

IN CASE OF EMERGENCY  
 CALL UNION PACIFIC RAILROAD (UPRR)  
 RAILROAD EMERGENCY LINE AT 888-877-7267  
 LOCATION: DOT 416 105 R  
 RR MILEPOST: 166.460  
 SUBDIVISION: FT. WORTH

				Rail Division	
<b>RAILROAD SCOPE OF WORK PROJECT SPECIFIC DETAILS</b>					
FILE:	RR Scope of Work.dgn	DN: TxDOT	CK:	DN:	CK:
© TxDOT	June 2014	CONT	SECT	JOB	HIGHWAY
9/2021	REVISIONS	0015	01	253	IH 35
		DIST	COUNTY	SHEET NO.	
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**PART 1 - GENERAL**

**1.01 DESCRIPTION**

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

**1.02 REQUEST FOR INFORMATION / CLARIFICATION**

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

**1.03 PLANS / SPECIFICATIONS**

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

**PART 2 - UTILITIES AND FIBER OPTIC**

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

**PART 3 - CONSTRUCTION**

**3.01 GENERAL**

- A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.
- B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.
- C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.
- D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.
- E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.
- F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.
- G. All permanent clearances shall be verified before project closing.

**3.02 RAILROAD OPERATIONS**

- A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.
- B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. Railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.
- C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:
  - 1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.
  - 2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

**3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES**

- A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.
- B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.
- C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.
- D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
  - 1. Exactly what the work entails.
  - 2. The days and hours that work will be performed.
  - 3. The exact location of work, and proximity to the tracks.
  - 4. The type of window requested and the amount of time requested.
  - 5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.
- E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

**3.04 INSURANCE**

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

**3.05 RAILROAD SAFETY ORIENTATION**

- A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.
 

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."
- B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

**3.06 COOPERATION**

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.


**3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES**

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF) (UPRR) and 14' - 0" (KCS) horizontal from centerline of track.
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

**3.08 APPROVAL OF REDUCED CLEARANCES**

- A. Maintain minimum track clearances during construction as specified in Section 3.07.
- B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.
- C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

		Rail Division	
<b>RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS</b>			
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REVISIONS March 2020	0015 01	253	IH 35
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	WAC	MCLENNAN	87

**3.09 MAINTENANCE OF RAILROAD FACILITIES**

- A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.
- B. Perform all such maintenance and repair of damages due to the Contractor's operations at Contractor's expense.
- C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

**3.10 SITE INSPECTIONS BY RAILROAD'S DESIGNATED REPRESENTATIVE**

- A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
  1. Pre-construction meetings.
  2. Pile driving/drilling of caissons or drilled shafts.
  3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
  4. Erection of precast concrete or steel bridge superstructure.
  5. Placement of waterproofing (prior to placing ballast on bridge deck).
  6. Completion of the bridge structure.
- B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.
- C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

**3.11 RAILROAD REPRESENTATIVES**

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

- A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.
- B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.
- C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.
- D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.
- E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

**3.12 COMMUNICATIONS AND SIGNAL LINES**

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

**3.13 TRAFFIC CONTROL**

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

**3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK**

- A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".
- B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

UPRR 1-800-336-9193  
7:00 AM to 9:00 PM CST Monday-Friday except holidays,  
staffed 24 hrs/day for emergencies  
48 hrs notice required

BNSF 1-800-533-2891  
24 hour number  
5 working days notice required

KCS 1-800-344-8377  
Texas One Call, a 24 hour number  
48 hrs notice required, excluding weekends and holidays

If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.


- C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

**3.15 RAILROAD FLAGGING**

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

**3.16 CLEANING OF RIGHT-OF-WAY**

When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

 Texas Department of Transportation		Rail Division		
RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS				
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