

20	CONT	SECT	JOB	HIGHWAY
1234	01	013, etc	FM 1100	
	DIST	COUNTY	SHEET NO.	
AUS		TRAVIS	1	

# STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

## PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NUMBER  
STP 2023(881)HES, ETC.  
CSJ 1234-01-013, ETC.

CSJ	ROADWAY LENGTH		BRIDGE LENGTH		TOTAL LENGTH	
	(FT)	(MI)	(FT)	(MI)	(FT)	(MI)
1234-01-013	4,300.00	0.814	-	.	4,300	0.814
1234-01-012	30,124.68	5.706	219.58	0.040	30,344.26	5.747
TOTAL	34,424.68	6.520	219.58	0.040	34,644.26	6.561

### DESIGN SPEED

MAIN LANES: \*50 MPH  
\*FOR HSIP ELEMENTS ONLY

### A. D. T.

2022: 2,367 VPD  
2023: 3,314 VPD

### FINAL PLANS

DATE OF LETTING: \_\_\_\_\_  
DATE WORK BEGAN: \_\_\_\_\_  
DATE WORK COMPLETED AND ACCEPTED: \_\_\_\_\_  
FINAL CONTRACT COST: \$ \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_  
LIST OF APPROVED CHANGE ORDERS:

## TRAVIS COUNTY FM 1100

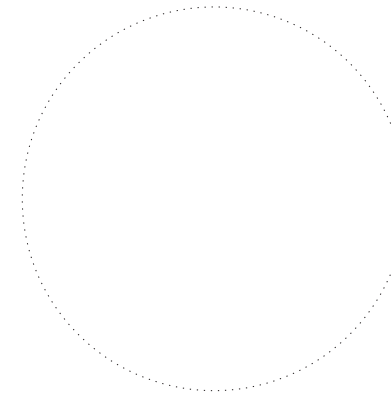
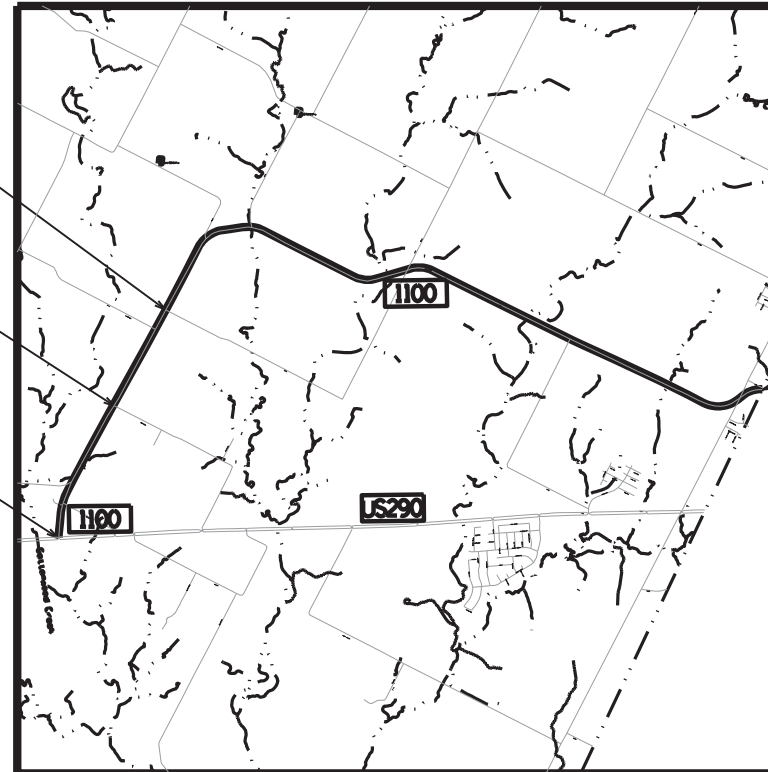
FROM: ABRAHAMSON RD, ETC  
TO: GIESE LN, ETC.

FOR THE CONSTRUCTION OF SAFETY IMPROVEMENT PROJECT & OVERLAY PROJECT  
CONSISTING OF PROVIDING ADDITIONAL PAVED SURFACE WIDTH,  
PROFILE EDGELINE MARKINGS, PROFILE CENTERLINE MARKINGS,  
LEVEL-UP, FULL DEPTH REPAIR, BONDING COURSE AND TOM.

END CSJ: 1234-01-013  
STA 105+00.00  
REF MRKR: 552+1.702  
MILE PT: 1.754  
RESUME CSJ: 1234-01-012

END CSJ: 1234-01-012  
BEGIN CSJ: 1234-01-013  
STA 62+00.00  
REF MRKR: 552+0.952  
MILE PT: 1.004

BEGIN CSJ: 1234-01-012  
STA 11+30.22  
REF MRKR: 552-0.044  
MILE PT: 0.008  
DFO: 0.052



END CSJ: 1234-01-012  
STA 357+74.48  
REF MRKR: 558+0.359  
MILE PT: 6.34  
DFO: 5.981

I CERTIFY THAT THIS PROJECT  
WAS CONSTRUCTED IN SUBSTANTIAL  
COMPLIANCE WITH THE FINAL AS-BUILT  
PLANS AND SPECIFICATIONS.

\_\_\_\_\_  
P. E. DATE

EXCEPTIONS: NONE  
EQUATIONS: NONE  
RAILROAD CROSSINGS: NONE

SUBMITTED FOR LETTING: 3/27/2023

RECOMMENDED FOR LETTING: 3/27/2023

DocuSigned by:  
*[Signature]*  
C2754FBFB7A143C  
DIRECTOR OF TRANSPORTATION OPERATIONS

DocuSigned by:  
*Susana Ceballos P.E.*  
E1016107B5C7414  
DISTRICT DESIGN ENGINEER

SUBMITTED FOR LETTING: 3/26/2023

APPROVED FOR LETTING: 3/27/2023

DocuSigned by:  
*Jason R Carnese P.E.*  
8FD2437873B54C4  
AREA ENGINEER

DocuSigned by:  
*Heather Ashby-Nguyen*  
8912AF18E45A416  
DIRECTOR OF TRANSPORTATION  
PLANNING & DEVELOPMENT

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DATE: 3/22/2023 10:08:10 AM

PLANS WERE SENT TO THE LOCAL FLOODPLAIN ADMINISTRATOR SHAWN SNYDER ON 02/17/2023.

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 2022).



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** 89	PW		
** 90	SETP-PD		




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

DocuSigned by:  P. E. 3/20/2023  
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**Austin District  
Central Design**

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 **Texas Department of Transportation**

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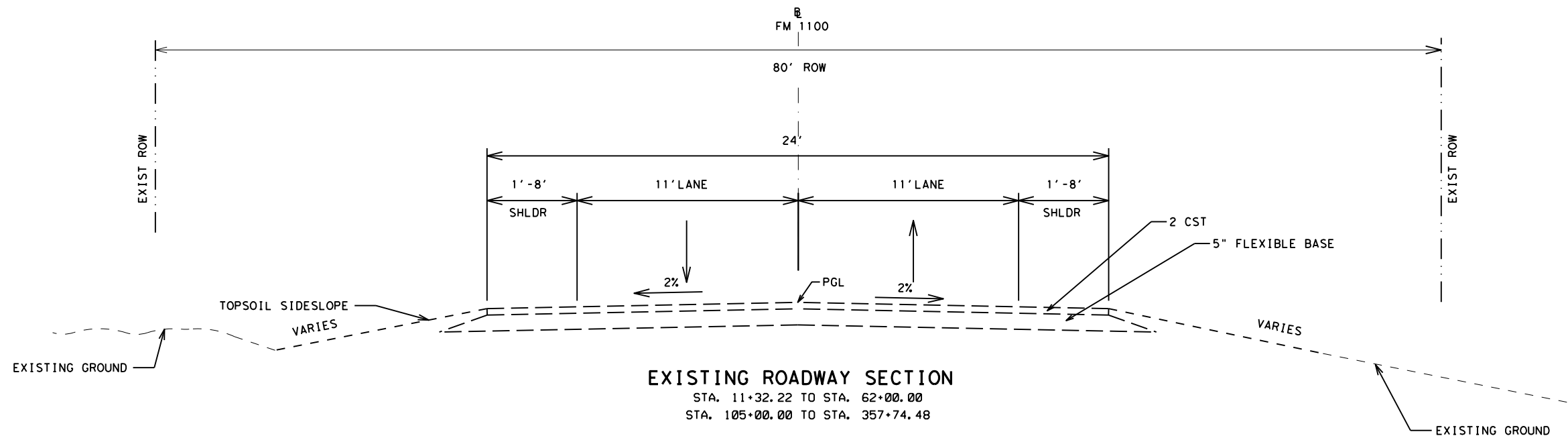
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INDEX OF SHEETS**

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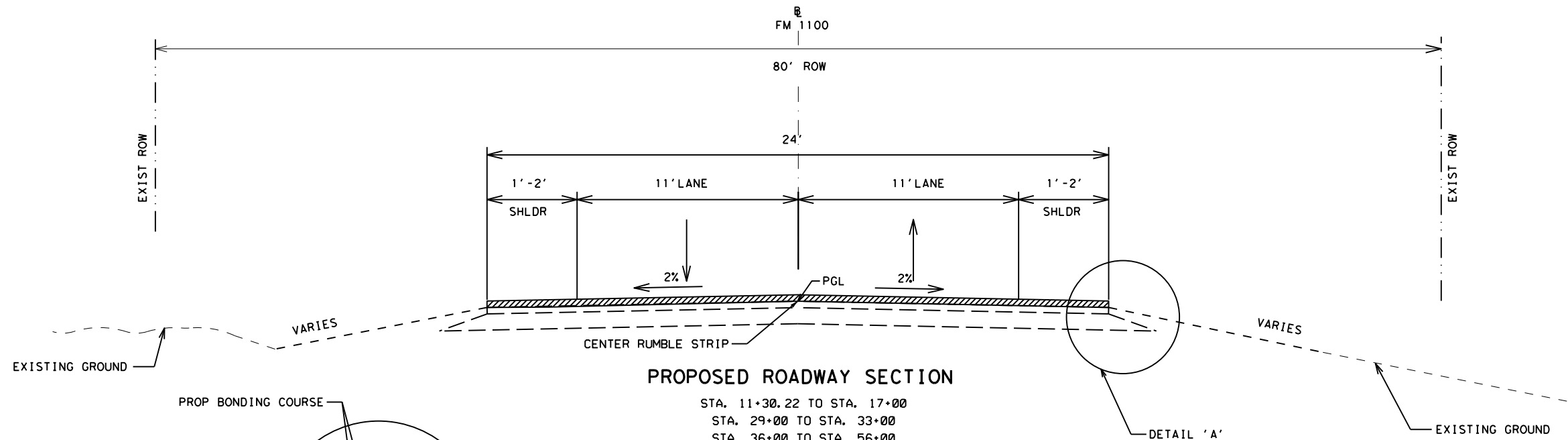
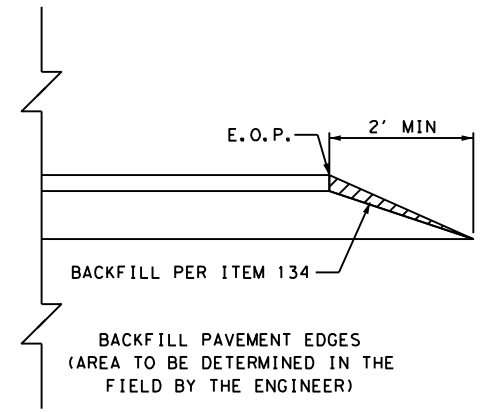
SHEET 1 OF 1

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST	COUNTY		SHEET NO.
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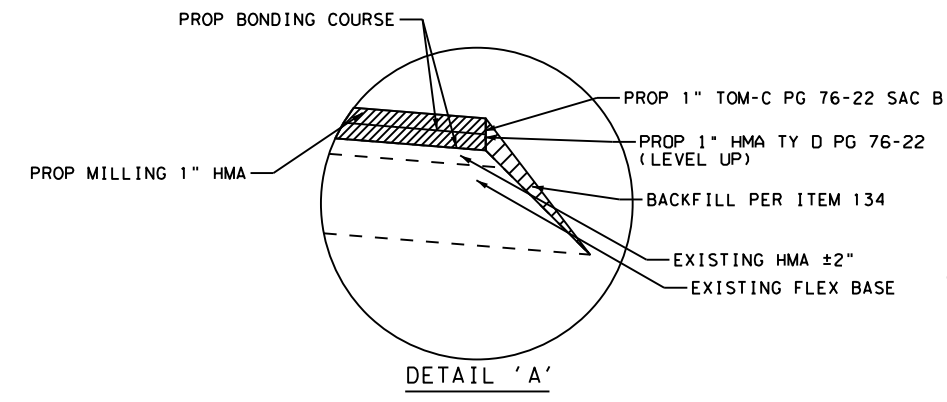
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**EXISTING ROADWAY SECTION**  
 STA. 11+32.22 TO STA. 62+00.00  
 STA. 105+00.00 TO STA. 357+74.48



**PROPOSED ROADWAY SECTION**



- STA. 11+30.22 TO STA. 17+00
- STA. 29+00 TO STA. 33+00
- STA. 36+00 TO STA. 56+00
- STA. 61+00 TO STA. 62+00
- STA. 105+00 TO STA. 113+00
- STA. 116+00 TO STA. 148+00
- STA. 153+00 TO STA. 185+00
- STA. 213+00 TO STA. 253+00
- STA. 270+00 TO STA. 285+00
- STA. 289+00 TO STA. 315+00
- STA. 320+00 TO STA. 357+74.48

NOTE: TYPICAL SECTIONS ON THIS SHEET IS FOR CSJ:1234-01-012 ONLY.

1. THE CENTER LINE MARKING, INCLUDING SOLID AND BROKEN LINES, SHALL BE SEPARATED LATERALLY BY 24 IN.
2. MAILBOX TURNOUTS AND DRIVEWAYS SHALL BE DRESSED UP TO PROVIDE A CROSS SLOPE TO MATCH THE ADJACENT ROADWAY. USE ITEM 3076 TO PERFORM THIS WORK. THIS WORK WILL BE PAID USING ITEM 3076.



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**Austin District  
 Central Design**

Texas Department of Transportation

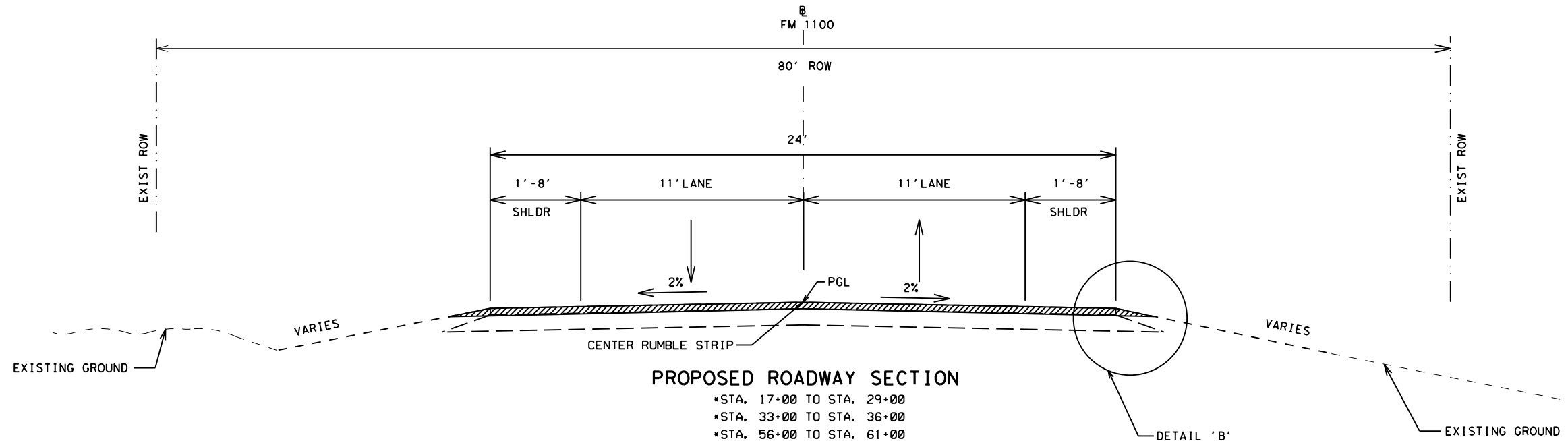
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**TYPICAL SECTIONS**  
 CSJ\_1234-01-012

NOT TO SCALE SHEET 1 OF 2

© 2023		CONT	SECT	JOB	HIGHWAY
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DW:	CK:	AUS		TRAVIS	SHEET NO. 3

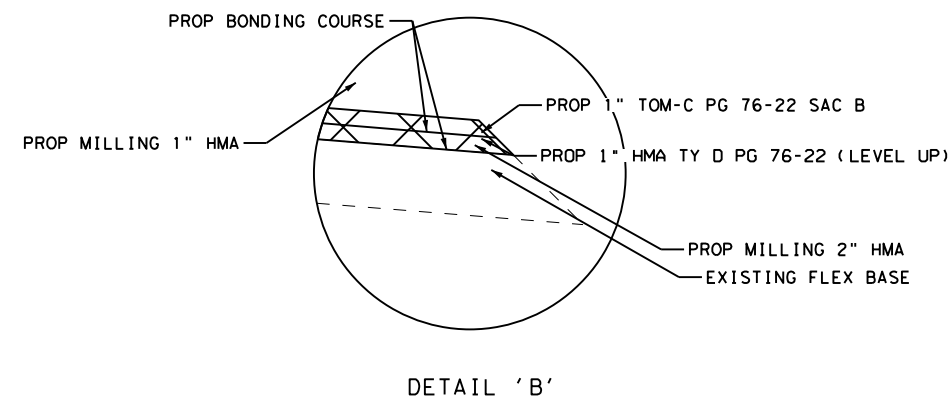
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**PROPOSED ROADWAY SECTION**

- \*STA. 17+00 TO STA. 29+00
- \*STA. 33+00 TO STA. 36+00
- \*STA. 56+00 TO STA. 61+00
- \*STA. 113+00 TO STA. 116+00
- \*STA. 148+00 TO STA. 153+00
- \*STA. 185+00 TO STA. 213+00
- \*STA. 253+00 TO STA. 270+00
- \*STA. 285+00 TO STA. 289+00
- \*STA. 315+00 TO STA. 320+00

\* FEMA ZONES TO BE MILLED & INLAYED WITH NO ADVERSE IMPACTS.



NOTE: TYPICAL SECTIONS ON THIS SHEET IS FOR CSJ:1234-01-012 ONLY.

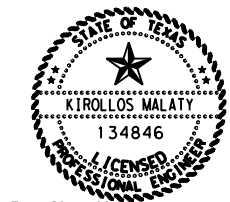
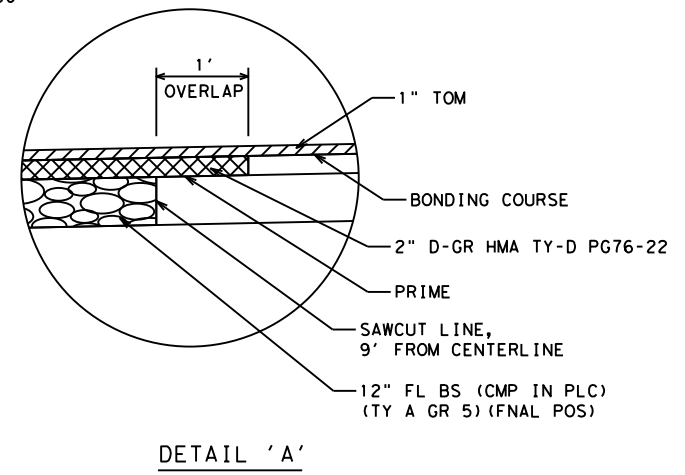
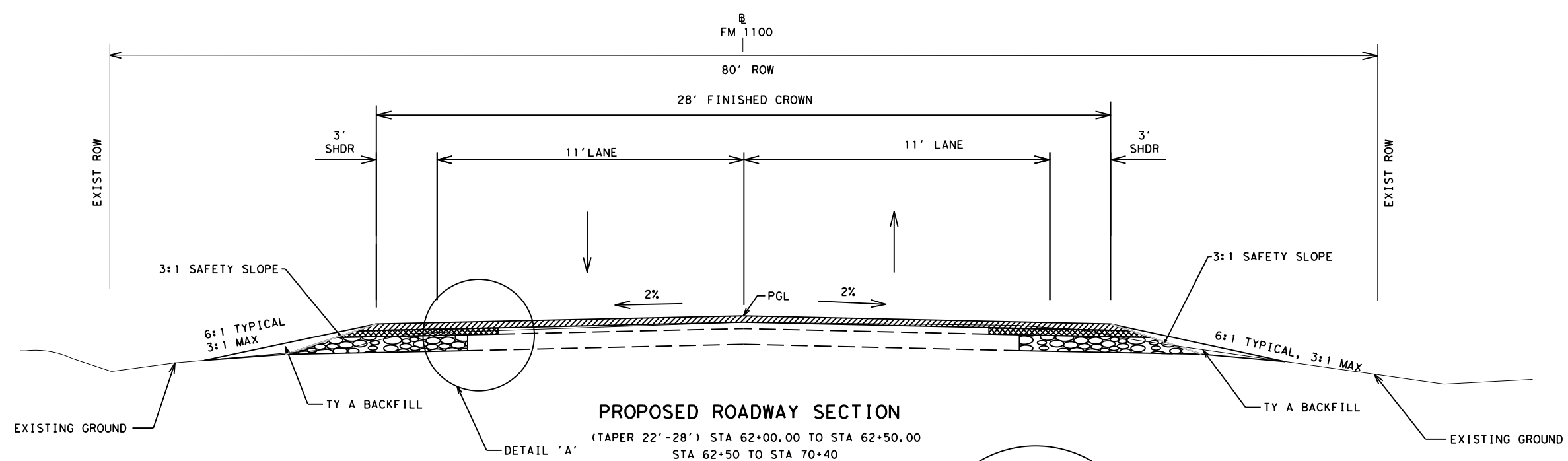
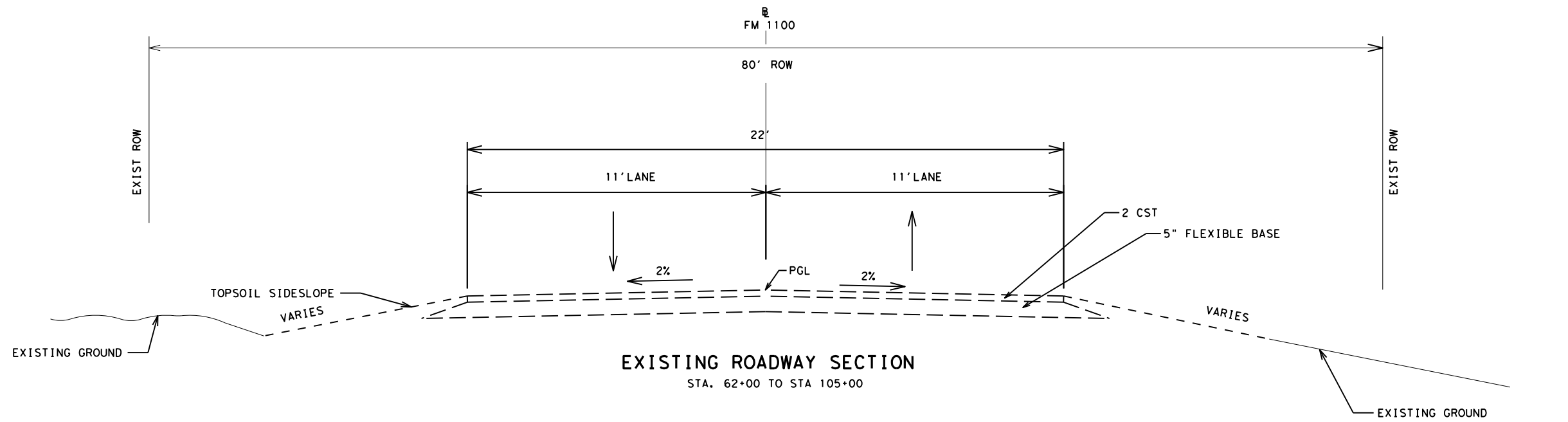
1. THE CENTER LINE MARKING, INCLUDING SOLID AND BROKEN LINES, SHALL BE SEPARATED LATERALLY BY 24 IN.
2. MAILBOX TURNOUTS AND DRIVEWAYS SHALL BE DRESSED UP TO PROVIDE A CROSS SLOPE TO MATCH THE ADJACENT ROADWAY. USE ITEM 3076 TO PERFORM THIS WORK. THIS WORK WILL BE PAID USING ITEM 3076.



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 3/17/2023  
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<b>Austin District Central Design</b>			
Texas Department of Transportation			
<b>FM 1100</b>			
<b>TYPICAL SECTIONS</b>			
NOT TO SCALE		SHEET 2 OF 2	
© 2023	CONT	SECT	JOB
DS: 1234	CK: 01	013, ETC.	FM 1100
DIST	COUNTY	SHEET NO.	
AUS	TRAVIS	4	

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**Austin District  
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**Texas Department of Transportation**

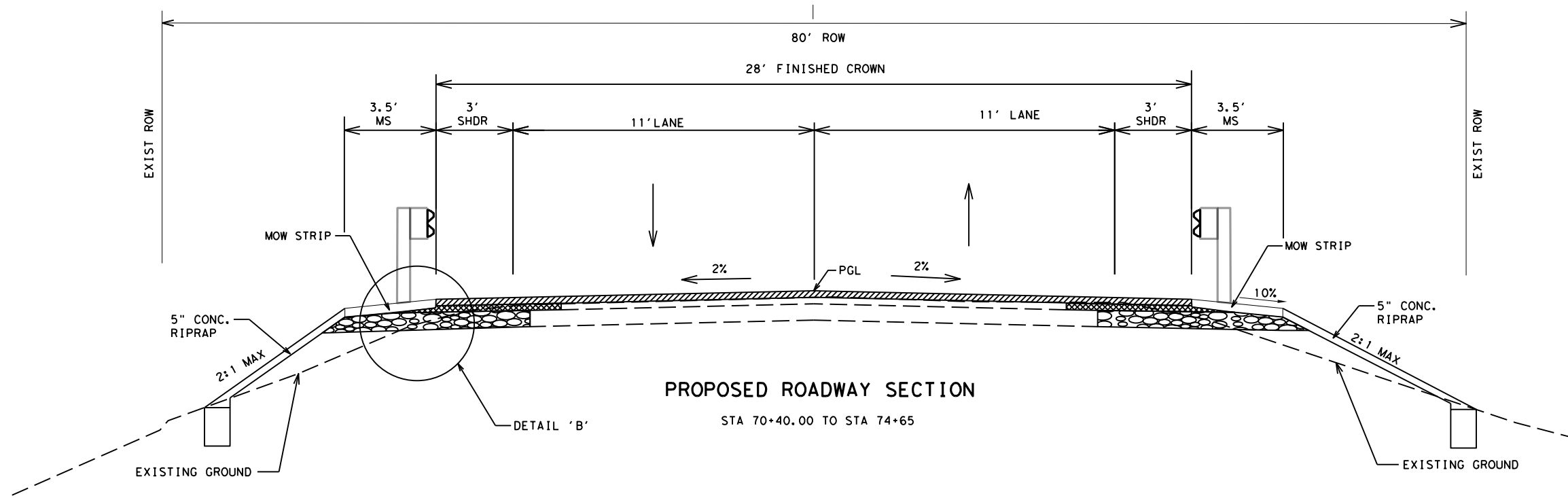
**FM 1100**

**TYPICAL SECTIONS**

NOT TO SCALE SHEET 1 OF 2

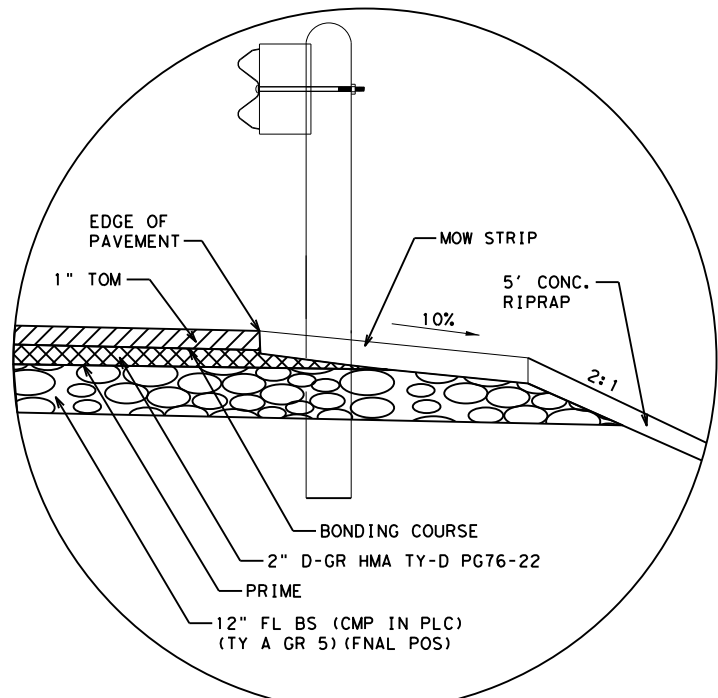
DS:	CK:	CONT	SECT	JOB	HIGHWAY
		1234	01	013, etc	FM 1100
DW:	CK:	DIST		COUNTY	SHEET NO.
		AUS		TRAVIS	5

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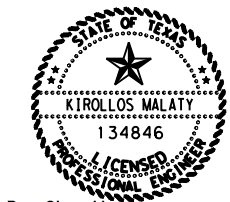


**PROPOSED ROADWAY SECTION**

STA 70+40.00 TO STA 74+65



**DETAIL "B" (TYP.)**



DocuSigned by:  
 [Signature]  
 3/17/2023  
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**Austin District  
 Central Design**

**Texas Department of Transportation**

**FM 1100**

**TYPICAL SECTIONS**

NOT TO SCALE SHEET 2 OF 2

© 2023	CONT	SECT	JOB	HIGHWAY
DS:	CK:	1234	01 013, etc	FM 1100
DW:	CK:	DIST	COUNTY	SHEET NO.
		AUS	TRAVIS	6

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**GENERAL NOTES: Version: March 9, 2023**

Item	Description	**Rate
**204	<b>Sprinkling</b> (Dust) (Item 132) (Item 247)	30 GAL/CY 30 GAL/CY 30 GAL/CY
**210	<b>Rolling (Flat Wheel)</b> (Item 247) (Item 316)	1 HR/200 TON 1 HR/6000 SY
**210	<b>Rolling (Tamping and Heavy Tamping)</b>	1 HR/200 CY
**210	<b>Rolling (Lt Pneumatic Tire)</b> (Item 132) (Item 247) (Item 316 - Seal Coat) (Item 316 - Two Course)	1 HR/500 CY 1 HR/200 TON 1 HR/6000 SY 1 HR/3000 SY
247	<b>Flexible Base (CMP IN PLC)</b>	132 LB/CF
310	<b>Prime Coat</b>	0.20 GAL/SY
314	<b>Emulsified Asphalt Treatment (SS-1 or MS-2)</b>	0.30 GAL/SY
316	<b>Underseals Asphalts (Multi Option)</b>	0.20 GAL/SY
	<b>Surface Treatments</b>	
	<b>Seal Coat</b>	
	<b>Grade 4</b>	
	Asphalt	0.38 GAL/SY
	Aggregate	1 CY/120 SY
	<b>Grade 5</b>	
	Asphalt	0.32 GAL/SY
	Aggregate	1 CY/150 SY
	<b>Two Course Surface Treatment</b>	
	Asphalt 1st Application	0.28 GAL/SY
	Asphalt 2nd Application	0.24 GAL/SY
	Aggregate 1st Application Grade 4	1 CY/110 SY
	Aggregate 2nd Application Grade 4	1 CY/130 SY
341/3076, 344/3077	<b>Dense-Graded Hot-Mix Asphalt and Superpave</b>	110 LB/SY/IN
342/3079	<b>Permeable Friction Course (PFC)</b>	90.0 LB/SY/IN
346/3080	<b>Stone-Matrix Asphalt</b>	113 LB/SY/IN
347/3081	<b>Thin Overlay Mixtures (TOM)</b> SAC B SAC A	113.0 LB/SY/IN 116.0LB/SY/IN
350	<b>Microsurfacing</b>	25 LB/SY
3084	<b>Bonding Course</b>	0.09 GAL/SY
3085	<b>UnderSeal Course</b>	0.20 GAL/SY
	<b>Tack Coat</b>	0.08 GAL/SY

\*\* For Informational Purposes Only

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**The following standard detail sheet or sheets have been modified:**

**Modified Standards**

**Extended Curb Details: ECD is modified in this plan set to: ECD(MOD)**

**GENERAL**

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

North Austin [Matthew.Kelly@txdot.gov](mailto:Matthew.Kelly@txdot.gov)  
North Austin [Kevin.Mackan@txdot.gov](mailto:Kevin.Mackan@txdot.gov)

Questions and requests for documents will be accepted via the Letting Pre-Bid Q&A web page. All questions and any corresponding responses that are generated will be posted through the same 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>

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.

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

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Contact the supervisor for the passenger facility at Capital Metro and request the relocation of Capital Metro signs. Contact the supervisor at (512) 385-0190.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Intelligent Transportation Systems (ITS) Infrastructure may exist within the limits of this project and that the system must remain operational throughout construction. The exact location of ITS Infrastructure is not known. Contact the TxDOT Area Engineer's or Inspection Team's Office for the location(s) at least 48 hours before commencing any work that might affect present ITS Infrastructure. Use caution if working in these areas to avoid damaging or interfering with existing facilities. Repair any damage to this system within 8 hours of occurrence at no cost to the Department. In the event of system damage, notify TxDOT/CTECC at (512) 974-0883

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within one hour of occurrence. Failure of the Contractor to repair damage to any infrastructure that conveys any corridor information to TxDOT/CTECC will result in the Contractor being billed for the full cost of emergency repairs.

Provide a smooth, clean sawcut along the existing asphalt or concrete pavement structure, as directed. Consider subsidiary to the pertinent Items.

Construct all manholes/valves to final pavement elevations prior to the placement of final surface. If the manholes/valves are going to be exposed to traffic, place temporary asphalt around the manhole/valve to provide a 50:1 taper. The asphalt taper is subsidiary to the ACP work.

Keep the roadway free of debris and sediment caused by construction activities. Dispose of all material in accordance with federal, state, and local regulations. This work is subsidiary.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

Coordinate and obtain approval for all bridgework over existing roadways.

**Bridge Vertical Clearance and Traffic Handling.**

Notify TxDOT project staff and the local bridge engineer 10 business days prior to the following: change in vertical clearance, placing beams/girders over traffic, opening or removing traffic from a bridge or portion of a bridge, and completion of bridge work. This requirement includes bridge class culverts. Provide vertical clearance for all structures (including signal mast arms, span wires, and overhead sign bridge structures) within the project limit. Submit information and notices to local bridge engineer at [AUS\\_BRG\\_Notify@txdot.gov](mailto:AUS_BRG_Notify@txdot.gov).

During evacuation periods for Hurricane events the Contractor will cooperate with Department for the restricting of Lane Closures and arranging for Traffic Control to facilitate Coastal Evacuation Efforts.

**ITEM 5 – CONTROL OF THE WORK**

Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Provide a 72 hour advance email notice to [AUS\\_Locate@TxDOT.gov](mailto:AUS_Locate@TxDOT.gov) to request illumination, traffic signal, ITS, or toll equipment utility locates. Provide [AUS\\_Locate@TxDOT.gov](mailto:AUS_Locate@TxDOT.gov) an electronic pdf of as-builts within 21 calendar days of illumination, traffic signal, ITS, or toll

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equipment being placed into operation. As-built shall include GPS coordinates of manholes and junction boxes. Include final version of RFI's and revised plan sheets.

**Precast Alternate Proposals.**

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at [Alternate Precast Proposal Submission \(txdot.gov\)](http://www.txdot.gov/alternate-precast-proposal-submission). Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

**Electronic Shop Drawing Submittals.**

Submit electronic shop drawing submittals according to the current [Guide to Electronic Shop Drawing Submittal](http://www.txdot.gov/business/resources/highway/bridge/shop-drawing-submittal-cycle.html), <https://www.txdot.gov/business/resources/highway/bridge/shop-drawing-submittal-cycle.html>. Pre-approved producers can be found online at <https://www.txdot.gov/business/resources/materials/material-producer-list.html>. Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.

**Submittal Contact List**

North Austin [Matthew.Kelly@txdot.gov](mailto:Matthew.Kelly@txdot.gov) AUS\_NA-ShopReview@txdot.gov

**Alignment and Profile.**

Unless shown in the plans, profile and alignment data for roadways being overlaid or widened are for design verification only. Provide survey and construct the roadway in accordance with the typical section. Bid items and data may be provided to adjust cross slope and super elevations.

**ITEM 6 - CONTROL OF MATERIALS**

Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

For structures with paint containing hazardous materials, provide locations of material removal 60 days prior to begin removal. For metal elements to be removed, mechanical shear or unbolting for removal and disposal does not require paint abatement but requires 60 day advance notice.

For removal, tie, or tap of asbestos concrete (AC) pipe, contact TxDOT and the local utility company 60 days prior to performing the work. Expose the AC pipe to provide a minimum of 1 ft. of clearance around the top and sides. A minimal amount of soil may remain around the AC pipe to avoid disturbance. The local utility company will be responsible for the demo notice to DSHS and removal of the AC pipe. Tie or tap into existing AC pipe may require removing an entire section of pipe from collar to collar and replacement of pipe with new pipe using existing bid items.

For Federally Funded Contracts, comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, by submitting a notarized



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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, located at the following link, for clarification on material categorization. [Buy America material classification sheet \(txdot.gov\)](#)

**ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES**

TxDOT will coordinate with TDLR regarding pedestrian elements and sidewalks. The contractor will procure and provide all permits, licenses, and inspections; pay all charges, fees, and taxes regarding TDLR rules governing industrialized housing and buildings.

Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

**Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).**

Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. Install and maintain traffic control devices to maintain a navigable corridor for water traffic, except during bridge demo and beam placement. This work is subsidiary.

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Obtain written approval from the Engineer for temporary fill or crossings not specifically addressed in the plans. Provide a signed sketch of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Unapproved work is not a compensable impact.

**Tree and Brush Trimming and Removal.**

Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat, and tree/brush requirements.

**Law Enforcement Personnel.**

Submit charge summary and invoices using the Department forms.

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.

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. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of \$70 per hour for the law enforcement personnel and the patrol vehicle will be allowed. Any scheduling fee is subsidiary per Standard Specification 502.4.2.

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.

Alterations to the cancellation and maximum rate must be approved by the Engineer or pre-determined by official policy of the officers governing authority.

**ITEM 8 – PROSECUTION AND PROGRESS**

The sequence of work shown on the plans demonstrates a volume of work available in each phase of construction that will ensure the Contractor is not impacted by the unclear ROW, railroad, and utilities. A deviation from the sequence of work shown on the plans must be approved by the Engineer.

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**ITEM 100 - PREPARING RIGHT OF WAY**

Prep ROW must not begin until accessible trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed in accessible areas.

Backfill material will be Type B Embankment using ordinary compaction.

Follow Item 752.4 Work Methods and Item 752 general notes when removing or working on or near trees and brush.

**ITEM 110 – EXCAVATION**

The Engineer will define unsuitable material.

**ITEM 132 – ALL EMBANKMENT**

At no time will the retaining wall backfill material exceed the adjacent embankment operation by more than one lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation. Embankment placed over the area of MSE backfill must meet the same backfill requirements for the type specified under Item 423.

The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., “Compaction Methods.” The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

**ITEM 134 - BACKFILLING PAVEMENT EDGES**

If seal coat is final surface, install backfill prior to placing seal coat.

For all backfill, compact using a light pneumatic roller, install at 3:1 slope to tie into existing terrain, and apply at rate of 0.12 GAL/SY a typical erosion control material per Item 300.

For TY A backfill, furnish flexible base meeting the requirement for any type or grade, except Grade 4, in accordance with Item 247. Compressive strengths and wet ball mill for flexible base are waived for this item. Alternate materials include RAP, salvaged material from Item 105, and salvaged material from Item 351. The alternate materials are not required to be tested but visually verified as 100% passing a 2.5 in. sieve.

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**ITEM 160 - TOPSOIL**

Off-site topsoil will have a minimum PI of 25.

No Sandy Loam allowed.

Obtain approval of the actual depth of the topsoil sources for both on-site and off-site sources.

Construct topsoil stockpiles of no more than five (5) feet in height.

It is permissible to use topsoil dikes for erosion control berms within the right of way, as directed.

Seed or track slopes within 14 days of placement.

Salvage topsoil from sites of excavation and embankment. Maximum salvage depth is 6 inches.

Windrowing of topsoil obtained from the Right of Way (ROW) is not allowed.

**ITEM 168 – VEGETATIVE WATERING**

Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater, but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer’s specifications showing the tank capacity for each truck used. Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

**ITEM 204 – SPRINKLING**

Apply water for dust control as directed. When dust control is not being maintained, cease operations until dust control is maintained. Consider subsidiary to the pertinent Items.

**ITEM 216 - PROOF ROLLING**

Correct and perform “Proof Rolling” retest at the Contractor’s expense, to the satisfaction of the Engineer, when initial “Proof Rolling” yields a failing result.

**ITEM 247 - FLEXIBLE BASE**

The layer thickness will be 4 in. to 6 in. unless shown on the plans. Placing in a single layer is allowed when total thickness of base is 8 in. or less. When placed in multiple layers, compact the bottom and middle layers to at least 95% and 98% of the maximum dry density, respectively. When placed in a single layer or the final layer, compact to at least 100%.

Correction of subgrade soft spots is subsidiary.

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Complete per plans the subgrade, ditches, slopes, and drainage structures prior to the placement of base.

Do not use a vibratory roller to compact base placed directly on top of a drainage structure. Grade 4 will have the same material requirements as Grade 5 except minimum compressive strength at lateral pressure 3 psi will be 70 psi and at lateral pressure 15 psi will be 150 psi. Grade 4 does not have a minimum compressive strength at lateral pressure 0 psi.

**ITEM 300s – SURFACE COURSES AND PAVEMENTS**

Asphalt season is May 1 thru September 15. Emulsified Asphalt season is April 1 thru October 15. The latest work start date for asphalt season is August 1.

If an under seal is not provided, furnish a tack coat. Apply tack coat at 0.08 GAL/SY (residual). Apply non-tracking tack coat using manufacturer recommend rates.

**ITEM 302 – AGGREGATES FOR SURFACE TREATMENTS**

Previously tested aggregates delivered to the project, which are found to contain excessive quantities of dust (more than 0.5 percent passing the no. 40 sieve) during pre-coating, stockpiling or hauling operations, will be rejected. Use test method Tex-200-F, Part II, for testing.

Table 3 Los Angeles Abrasion, % Max, is lowered from 35 to 30 and is applicable to all aggregates.

When TY E is allowed, furnish coarse fractionated recycled asphalt pavement (CF-RAP). CF-RAP aggregate stockpiles must be approved on a stockpile-by-stockpile basis, unless approved by the Engineer. Do not exceed stockpiles greater than 2000 tons. CF-RAP will meet the below gradation requirement (after ignition burn off of asphalt) or finer than Grade 4. CF-RAP will meet deleterious material and decantation requirements in accordance with Table 3.

Furnish SAC A or SAC B with a RSSM ST of 13 or less.

CF-RAP Requirements				
Percent Retained				
5/8"	1/2"	3/8"	#4	#8
0	10-25	60-80	85-100	90-100

**ITEM 310 – PRIME COAT**

Apply blotter material to all driveways and intersections. This work is subsidiary.

When Multi Option is allowed, provide MC 30, EC 30 or AE-P. MC 30 is not allowed in Travis County.

Rolling to ensure penetration is required.

**ITEM 316 – SEAL COAT**

Ensure that all underseals are covered by HMA CP before exposing to traffic for roadways listed in Table 1 of Item 502 or ADT greater than 5,000.

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Aggregates (Multi Option) for seal coats not exposed to traffic and underseals shall be Type E, PA, PB, A or B. The Grade shall range between 4 and 5.

Use a medium pneumatic roller in accordance with Item 210. Surface all transitions, tapers, climbing lanes and intersections to the limits as directed.

Remove and dispose of off the ROW the audible/profile markings, reflectorized markings, and raised markers. Blade pavement edges to remove vegetation. Any areas with excessive asphalt or aggregate will be removed. Continue sweeping excess aggregate off the roadway, riprap, and shoulder up to two weeks after completing the work. This work is subsidiary.

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

Use of motor grader is allowed for placement of mixtures greater than 10 inches from the riding surface, when hot-mix is used in lieu of flexible base, or as allowed.

**ITEMS 341, 344, & 3076 THRU 348/3082 - HOT-MIX ASPHALT PAVEMENT**

Core holes may be filled with an Asphaltic patching material meeting the requirements of DMS-9203 or with SCM meeting requirements of DMS-9202.

Install transverse butt joints with 50 ft. H: 1 in. V transition from the new ACP to the existing surface. Install a butt joint with 24 in. H: 1 in. V transition from the new ACP to a driveway, pullout or intersection. Saw cut the existing pavement at the butt joints. This work is subsidiary.

Use a device to create a maximum 3H:1V notched wedge joint on all longitudinal joints of 2 in. or greater. This work is subsidiary.

Prior to milling, core the existing pavement to verify thickness. This work is subsidiary.

Ensure placement sequence to avoid excess distance of longitudinal joint lap back not to exceed one day's production rates.

Submit any proposed adjustments or changes to a JMF before production of the new JMF.

Tack every layer. Do not dilute tack coat. Apply it evenly through a distributor spray bar.

Provide a minimum transition of 10' for intersections, 10' for commercial driveways, and 6' for residential driveways unless otherwise shown on the plans.

Irregularities will require the replacement of a full lane width using an asphalt paver. Replace the entire subplot if the irregularities are greater than 40% of the subplot area.

Lime or an approved anti-stripping agent must be used when crushed gravel is utilized to meet a SAC "A" requirement.

When using RAP or RAS, include the management methods of processing, stockpiling, and testing the material in the QCP submitted for the project. If RAP and RAS are used in the same

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mix, the QCP must document that both of these materials have dedicated feeder bins for each recycled material. Blending of RAP and RAS in one feeder bin or in a stockpile is not permitted.

Asphalt content and binder properties of RAP and RAS stockpiles must be documented when recycled asphalt content greater than 20% is utilized.

No RAS is allowed in surface courses.

Department approved warm-mix additives is required for all surface mix application when RAP is used. Dosage rates will be approved during JMF approval.

The Hamburg Wheel Test will have a minimum rut depth of 3mm except for SMA with HPG or PG 76.

**ITEMS 341/3076 - DENSE-GRADED HOT-MIX ASPHALT**

Use the SGC for design and production testing of all mixtures. Design all Type D mixtures as a surface mix, maximum 15% RAP and no RAS. Contractor may not use a substitute PG binder for 76-22. When using substitute binders, mold specimens for mix design and production at the temperature required for the substitute binder used to produce the HMA.

The Hamburg Wheel minimum number of passes for PG 64 or lower is reduced to 7,000. The Engineer may accept Hamburg Wheel test results for production and placement if no more than 1 of the 5 most recent tests is below the specified number of passes and the failing test is no more than 2,000 passes below the specified number of passes.

**ITEMS 347/3081 - THIN OVERLAY MIXTURES (TOM)**

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

When using a Thermal Imaging System follow the Weather Condition requirements for When Not Using a Thermal Imaging System.

Produce mixture with a Department approved WMA additive or process to facilitate compaction when the haul distance is greater than 40 miles or when the air temperature is 70°F and falling. WMA processes such as water or foaming processes are not allowed under these circumstances.

**ITEM 351 – FLEXIBLE PAVEMENT STRUCTURE REPAIR**

Use materials and lift thickness per SS3076. Type C and D mixes will receive an underseal per SS 3085 if the repair surface is the final surface. This work is subsidiary.

Unless otherwise shown on the plans, use the following for repairs:  
Type C and D mix will use PG 76 -22 and will be placed with a paver.  
Type B mix will use PG 64 -22 and may use a blade to place the mix.  
For up to 2 in. deep repairs use Type D PG 76-22 SAC B.  
For up to 6 in. deep repairs use Type C PG 76-22 SAC B.  
For greater than 6 in. deep repairs use 2 in. Type C or D surface and Type B for the bottom lifts.

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For greater than 6 in. deep repairs will be milled then overlaid, adjust the depth of the Type C or D to provide Type C or D to a depth 1.5 in. below the bottom of the milling.

**ITEM 354 - PLANING AND TEXTURING PAVEMENT**

Contractor retains ownership of salvaged materials.

**ITEM 432 - RIPRAP**

Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically. GFRP is allowed reinforcement for all applications.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary. Provide Type A Grade 3 or 5 flexible base for cement stabilized riprap. Compressive strengths for flexible base are waived.

SGT approach taper, paid for using mow strip item, will be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement will be ordinary compaction and does not require placement using an asphalt paver.

**ITEM 467 - SAFETY END TREATMENT**

Field adjust pipe end to maintain the necessary slope. Field cutting of pipe end is allowed. Coat all metal field cuts or exposed reinforcement with asphalt paint.

**ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING**

Table 1

Roadway	Limits	Allowable Closure Time
IH 35	All (1 lane closed)	9 P to 5 A
IH 35	All (2 lanes closed, see allowable work below)	9 P to 5 A
IH 35	All (2 lanes closed, all work)	11 P to 5 A
SH 45	US 183 to SH130	8 P to 5 A
LP 1	William Cannon to Parmer Lane	8 P to 5 A
US 183	SH 29 to FM 1327	8 P to 5 A
SH 71	SH 130 to IH 35	8 P to 5 A
SH 71	SH 304 to Tahitian Drive	8 P to 5 A
SH 71	US 290 W to RM 3238	8 P to 5 A
US 290 W	IH 35 to Nutty Brown Rd	8 P to 5 A
US 290 E	IH 35 to SH 95	8 P to 5 A
FM 734	FM 1431 to US 290 E	8 P to 5 A
US 79	IH 35 to Bus 79 in Taylor	8 P to 5 A
RM 1431	Lohmans Ford Rd to IH 35	8 P to 5 A
SH 29	LP 332 western terminus to SH 130	8 P to 5 A
SH 80	Charles Austin to River Road	8 P to 5 A
RM 2222	All	8 P to 5 A

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RM 620	All	8 P to 5 A
RM 2244	All	8 P to 5 A
SPUR 69	All	8 P to 5 A
LP 360	All	8 P to 5 A
LP 343	All	8 P to 5 A
LP 275	All	8 P to 5 A
FM 1325	All	8 P to 5 A
All	Within 200' of a signalized intersection	9 P to 5 A
All	All (Full Closure, see allowable work below)	11 P to 4 A

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 8 P to 6 A. Unless stated, daytime or Friday night lane closures will not be allowed and one lane in each direction will remain open at all times for all roadways.

Two lanes closed on IH 35 allowed to begin at 9 P for main lane (shoulder work not included) hotmix overlay or pavement repair operations (does not include bridge joint work).

Full closures only allowed Friday night thru Monday morning for bridge beam installation, bridge demolition, or OSB truss removal/installation. Full closures only allowed for roadways with frontage roads or if a designated detour route is provided in the plans.

No closures will be allowed on the weekends, working day prior, and working day after the National Holidays defined in the Standard Specifications, Good Friday, and Easter weekend. Closures the Sunday of the Super Bowl will not be allowed from 1 P to 11 P. No closures will be allowed on Friday and the weekends for projects within 20 miles of Formula 1 at COTA, ACL Fest, SXSW, ROT Rally, UT home football games (includes games not on a Friday or weekend), sales tax holiday, Dell Match Play (includes Thursday), Rodeo Austin, or other special events that could be impacted by the construction. All lanes will be open by noon of the day before these special events. Additional key dates or special events include the following:

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2 hour notice prior to implementation and immediately upon removal of the closure.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday. For all roadways: Submit request for traffic detours and full roadway closures 168 hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.

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Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify current and future traffic control, if at any time the queue becomes greater than 20 minutes.

Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Cover, relocate, or remove existing small, large, and overhead signs that conflict with traffic control. Cover large and overhead signs to remain using latest standard TS-CD. This work is subsidiary.

Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Place a 28-inch cone, meeting requirements of BC (10), on top of foundations that have protruding studs. This work is subsidiary.

Vertical panels used on roadways with speed limit 55mph or greater must be round in shape or have a self-righting mechanism. The "flat" or "oblong" shaped vertical panels are not allowed.

A series of sequential flashing warning lights, per BC(7), must be installed in a merging taper for long term stationary TCP. This includes all TCP setups, such as those shown on the plans or TCP setups per the standards.

Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

To determine a speed limit or an advisory speed limit, submit a request to TxDOT 60 business days prior to manufacture of the sign.

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.

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**ITEM 504 - FIELD OFFICE AND LABORATORY**

All labs and offices will include cleaning at least once a week. The cleaning will include sweeping and mopping of floors, cleaning the toilet and lavatory, and emptying wastebaskets. Space heaters are not considered adequate heating.

Projects with HMAC, furnish a Type D structure for the Engineer's exclusive use. The structure will include high speed internet service with WIFI signal, one desk, two chairs, and one file cabinet. Provide a minimum of three 120-volt circuits with 20-amp breakers and at most two grounded convenience outlets per circuit.

**ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS**

If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

**ITEM 508 – CONSTRUCTING DETOURS**

Detour typical section must match the adjacent roadway section, unless shown on the plans.

Flexible base will be Type A Grade 5 placed using ordinary compaction. Base compressive strengths are waived for roadways not listed in Item 502, Table 1.

**ITEMS 528, 529, 530, 531, & 536 – MISCELLANEOUS CONSTRUCTION**

Reinforcement will be in accordance with Section 432.3.1 unless shown on the plans. Fiber reinforcement is not allowed. GFRP is allowed reinforcement for all applications. Class A and B Concrete are allowed to use Coarse Aggregate Grades 1-8.

Unless shown on the plans, all concrete will be 5 in. thick and have 2 in. sand, base, or RAP bedding. Furnish base meeting the requirement for any type or grade in accordance with Item 247. Compressive strengths for flexible base are waived. RAP must be 100% passing a 1 in. sieve. Bedding and flexible base must be placed using ordinary compaction.

Expansion joints will be placed every 40 ft. Expansion joints must be 1 in. wide asphalt board and flush with the surface. The bottom of the asphalt board will be at half the depth of the concrete. The reinforcement will be continuous thru the expansion joint.

Sidewalk cross slope must not exceed 1.5%.

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If roots are encountered verify with the Engineer before accommodating or removing 2 in. diameter or larger roots. Root removal must be in accordance with Section 752.4.2. Roots may remain in the bedding or base. For improvements within 6 in. of a root, the concrete thickness may be reduced by 1 in. and the bedding increased by 1 in. to minimize impacts to the roots. Adjust bedding and surface profile to provide a 1 in. bedding cushion around the roots. The surface profile may be adjusted to the extent allowed by ADA. This work is subsidiary.

**ITEM 530 – INTERSECTIONS, DRIVEWAYS, AND TURNOUTS**

Notify property owners at least 48 hr. before beginning work on their driveway. Provide a list of each notification and contact before each closure. Only close driveways for reconstruction if duration and alternate access are approved. Install and maintain material across a work zone as temporary access. This work is subsidiary.

For ACP or SURF TREAT, the pavement structure will match the adjacent roadway unless detailed on the plans. HMA, including surface, may use a maximum allowable quantity of 40% RAP and 5% RAS for private driveways, public driveways for 2-lane roadways or smaller, and turnouts. Blending of 2 or more sources is allowed.

For CONC, the pavement structure will be 6 in. thick and have 3 in. flexible base bedding unless detailed on the plans.

**ITEMS 540, 542, & 544 - METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS**

Furnish round timber posts for guard fence. Steel posts for low fill culvert applications is subsidiary including use of low fill culvert application due to other concrete structures such as inlets. Long span application at inlets may be used as an alternate to low fill culvert. Unless otherwise specified on the plans, use of low fill culvert or long span at inlets will be subsidiary to pertinent items. Stake the locations for approval before installation. Adjust the limits of the fence to meet field conditions. Install delineators before opening the road to traffic.

Retain all materials. Existing materials that are structurally sound and dent free may be reused. All reused material will be from this project and in compliance with current standards. Structurally sound rust spots with the largest dimension of 4 in. may be cleaned and repaired in accordance with Section 540.3.5. Punch or field drill holes in the metal rail element to accommodate post spacing. Additional holes for splice or connections are not allowed. Space the field holes in accordance with the latest standard but no closer than the minimum spacing shown on the current standard.

Remove, replace, and install mow strip block out material. Construct new block outs and backfill unused block outs with class B concrete. This work is subsidiary.

Repair of mow strip damage, not caused by contractor negligence, and installation of new mow strip will be paid with appropriate bid items. Backfill and shoulder up of area around fence and mow strip will be paid using embankment item.

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**ITEMS 600s & 6000s – ITS, LIGHTING, SIGNING, MARKINGS, AND SIGNALS**

Meet the requirements of the NEC, Texas MUTCD, TxDOT standards, and TxDOT Standard Specifications. Notify the Engineer if existing elements to remain do not meet code or specification.

Contractor shall provide all service, equipment and material required to provide a functional item and interface with existing equipment and software.

For signal shop contact Charles Vaughn Jr ([Charles.Vaughn@txdot.gov](mailto:Charles.Vaughn@txdot.gov)) and Douglas Turner ([Douglas.L.Turner@txdot.gov](mailto:Douglas.L.Turner@txdot.gov)).

Use the TxDOT provided form to submit an electrical, illumination, and signal checklist prior to request for signal activation or a punch list.

Provide a 7 day advance email notice to the Engineer to request illumination or traffic signal punch list inspection.

Provide a 14 day advance email notice to the Engineer with signal technician contact information and signal locations prior to working or assuming operations of illumination or traffic signal.

Provide a 60 day advance email notice to the Engineer to request signal timing if timing is not provided in the plans.

Provide a 180 day advance email notice to the Engineer for equipment to be provided by TxDOT.

Provide equipment that requires TxDOT programming, etc. to TxDOT 180 day in advance.

Prior to relief of maintenance, a Test Period is required for signals and ITS equipment in accordance with Item 680.3.1.8. Response time to reported trouble calls shall be less than 2 hours. Complete repairs within 24 hours. Notify the Engineer and maintain a logbook in the controller cabinet of each trouble call. Do not clear the error log in the conflict monitor without approval.

Maintain the existing ITS equipment and HUB buildings operational during construction. ITS downtime is allowed from 12A to 4A. Downtime is restricted to one time per HUB or equipment.

Definitions of abbreviations used to designate ITS equipment, material, etc. can be provided by the Engineer.

Stakes or other physical method shall be installed to hold down conduit prior to placement of concrete/flow fill encasement.

Minimum distance between HDPE joints will be 200 ft.

For conduit mounted to bridges in hangers, fiberglass can be substituted for RMC. Furnish and install per Special Specification 6390.

County: TRAVIS  
Highway: FM 1100

Sheet: 7H  
Control: 1234-01-013, Etc

**ITEM 644 – SMALL ROADSIDE SIGN ASSEMBLIES**

Triangular slip base that use set screws to secure the post will require 1 of the set screws to penetrate the post by drilling a hole in the post at the location of the screw. All set screws shall be treated with anti-seize compound.

**ITEM 658 – DELINEATOR AND OBJECT MARKER ASSEMBLIES**

Installation and maintenance of portable CTB reflectors will be subsidiary to the barrier.

Flexible posts YFLX and WFLX must be tubular in shape. The “flat” flexible posts are not allowed.

**ITEM 662 - WORK ZONE PAVEMENT MARKINGS**

Notify the Engineer at least 24 hours in advance of work for this item.

Maintain removable and short-term markings daily. Remove within 48 hours after permanent striping has been completed.

Item 668 is not allowed for use as Item 662.

Roadways with existing profile pavement markings or rumble strips must supplement work zone solid lines with traffic buttons spaced at 12 in. Traffic buttons used to supplement the work zone markings will be paid by the each in addition to the work zone item.

**ITEM 666 - RETROREFLECTORIZED PAVEMENT MARKINGS**

Notify the Engineer at least 24 hr. before beginning work.

The center-to-center width for double yellow solid stripes must be 18 in. for all roadways.

Place longitudinal markings nightly for IH 35 main lanes or roadways with AADT greater than 100,000. Use of temporary flexible reflective roadway marker tabs is subsidiary and at the Contractor’s option. Replace missing or damaged tabs nightly. If using tabs, place longitudinal markings weekly by 5 AM Friday for all weekday work and by 5 AM Monday for all weekend work. Failure to maintain tabs or place longitudinal markings by deadline will require nightly placement of longitudinal markings.

Place longitudinal markings no later than 7 calendar days after placement of the surface for roadways with AADT greater than 20,000.

When the raised portion of a profile marking is placed as a separate operation from the pavement marking, the raised portion must be placed first then covered with TY I.

When using black shadow to cover existing stripe apply a non-retroreflective angular abrasive bead drop. The marking color shall be adjusted to resemble the pavement color. If Item 677 is not used prior to placement of black shadow, scrape the top of the marking with a blade or large piece of equipment unless surface is a seal coat. The scraping of the marking is subsidiary.

**ITEM 3084 – BONDING COURSE**

The minimum application rates are listed in Table BC. Miscellaneous Tack is allowed for use with dense-graded Type B HMA. If a tack bid item is not provided, use bonding course item.

The target shear bond strengths are listed in Table BCS. The informational test cores shall be taken once a shift for first 5 lots of placement or a change to placement method of bonding course, bonding material, or hot mix material. The remaining informational test cores shall be taken once every 3 lots for surface mix. Informational tests are not required for non-surface mix beyond the first 5 lots unless there is a change to placement method of bonding course, bonding material, or hot mix material. Results from these informational tests will not be used for specification compliance.

Table BC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Emulsified Asphalt	0.06
TRAIL – Hot Asphalt	0.12
Spray Applied Underseal Membrane	0.10

Table BCS (For Informational Tests)

Material	Target Shear Bond Strength (Tex-249-F psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	N/A
All Other Materials	40.0

**ITEM 3085 – UNDERSEAL COURSE**

No emulsified asphalt material allowed under PFC or SMA, except for use with Item 316, on roadways with ADT greater than 100,000.

The minimum application rates are listed in Table UC. The target shear bond strengths are listed in Table UCS. The informational test cores shall be taken once a shift for first 5 lots of placement or a change to placement method of bonding course, bonding material, or hot mix material. The remaining informational test cores shall be taken once every 3 lots for surface mix. Informational tests are not required for non-surface mix beyond the first 5 lots unless there is a change to placement method of bonding course, bonding material, or hot mix material. Results from these informational tests will not be used for specification compliance.

Table UC

Material	Minimum Application Rate (mat >1” gal. per square yard)	Minimum Application Rate (mat <= 1” gal. per square yard)
----------	--	--

TRAIL – Hot Asphalt	0.15	0.10
Spray Applied Underseal Membrane	0.15	0.15
Seal Coat – Tier II emulsion	0.25	0.25
Seal Coat – Tier II asphalt	0.23	0.23

Table UCS

Material	Minimum Shear Strength (psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	40.0
All Other Materials	40.0

**ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN**

Provide 1 PCMS. Provide a replacement within 12 hours. PCMS will be available for traffic control, event notices, roadway conditions, service announcements, etc.

Place PCMS 10 calendar days prior to begin work stating “Road Work Begin Soon, Contact 832-7000 For Info”.

Place PCMS at time of LCN request. Place the PCMS at the expected end of queue caused by the closure. When the closure is active, revise the message to reflect the actual condition during the closure, such as “RIGHT LN CLOSED XXX FT”.

**ITEM 6056 – PREFORMED IN-LANE/CENTERLINE RUMBLE STRIPS**

For centerline applications, use option 3 for all roadways.

For edgeline applications, use option 7 unless option 8 required due to shoulder width.

**ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR**

The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.

TMA/TAs used to protect damaged attenuators will be paid by the day using the force account item for the repair.





# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1234-01-013

DISTRICT Austin  
HIGHWAY FM 1100

COUNTY Travis

CONTROL SECTION JOB				1234-01-012		1234-01-013		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00135293		A00177468			
COUNTY				Travis		Travis			
HIGHWAY				FM 1100		FM 1100			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL		
	100-6002	PREPARING ROW	STA			43.000		43.000	
	110-6001	EXCAVATION (ROADWAY)	CY			2,197.000		2,197.000	
	132-6005	EMBANKMENT (FINAL)(ORD COMP)(TY C)	CY			1,300.000		1,300.000	
	134-6001	BACKFILL (TY A)	STA	306.000		5.000		311.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY			16,328.000		16,328.000	
	164-6023	CELL FBR MLCH SEED(PERM)(RURAL)(CLAY)	SY			16,328.000		16,328.000	
	168-6001	VEGETATIVE WATERING	MG			129.000		129.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY			8,164.000		8,164.000	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	CY			2,443.000		2,443.000	
	310-6001	PRIME COAT (MULTI OPTION)	GAL			1,172.000		1,172.000	
	316-6005	ASPH (TIER II)	GAL			0.010		0.010	
	316-6240	AGGR(TY-PD GR-4 SAC-B)	CY			0.010		0.010	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	SY			2,500.000		2,500.000	
	351-6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	SY	8,770.000				8,770.000	
	354-6188	PLANE ASPH CONC PAV(MICRO-MLLING)(1")	SY	21,869.000				21,869.000	
	354-6208	PLANE ASPH CONC PAV(MICRO-MLLING)(2")	SY	23,693.000				23,693.000	
	400-6002	STRUCT EXCAV (BOX)	CY			188.000		188.000	
	400-6005	CEM STABIL BKFL	CY			206.000		206.000	
	400-6006	CUT & RESTORING PAV	SY			35.000		35.000	
	401-6001	FLOWABLE BACKFILL	CY			40.000		40.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF			75.000		75.000	
	420-6074	CL C CONC (MISC)	CY			2.000		2.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY			122.000		122.000	
	432-6025	RIRRAP (STONE COMMON)(DRY)(15 IN)	CY			31.000		31.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	4.500		47.000		51.500	
	451-6048	RETROFIT RAIL (ADD HSS)	LF	199.000				199.000	
	462-6005	CONC BOX CULV (4 FT X 4 FT)	LF			87.000		87.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF			208.000		208.000	
	466-6180	WINGWALL (PW - 1) (HW=5 FT)	EA			1.000		1.000	
	466-6181	WINGWALL (PW - 1) (HW=6 FT)	EA			1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA			8.000		8.000	
	496-6004	REMOV STR (SET)	EA			6.000		6.000	
	496-6006	REMOV STR (HEADWALL)	EA			1.000		1.000	
	496-6007	REMOV STR (PIPE)	LF			200.000		200.000	
	500-6001	MOBILIZATION	LS	0.685		0.315		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO			3.000		3.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	100.000		8,520.000		8,620.000	



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DISTRICT	COUNTY	CCSJ	SHEET
Austin	Travis	1234-01-013	8



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1234-01-013

DISTRICT Austin  
HIGHWAY FM 1100

COUNTY Travis

CONTROL SECTION JOB				1234-01-012		1234-01-013		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00135293		A00177468			
COUNTY				Travis		Travis			
HIGHWAY				FM 1100		FM 1100			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL		
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	100.000		8,520.000		8,620.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	100.000		1,000.000		1,100.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	100.000		1,000.000		1,100.000	
	508-6001	CONSTRUCTING DETOURS	SY			222.000		222.000	
	530-6005	DRIVEWAYS (ACP)	SY			846.800		846.800	
	530-6008	TURNOUTS (ACP)	SY			219.800		219.800	
	530-6011	INTRSCT, DRVWAYS, & TURNOUT (ACP)	SY	4,939.000				4,939.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	25.000		700.000		725.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	1.000				1.000	
	540-6037	MTL BM GD FEN TRANS (ANCHOR PLATE)	EA	1.000				1.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF			400.000		400.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		4.000		5.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA			4.000		4.000	
	560-6011	MAILBOX INSTALL-S (TWW-POST) TY 4	EA			7.000		7.000	
	644-6012	IN SM RD SN SUP&AM TY10BWG(1)SB(T)	EA			4.000		4.000	
	644-6020	IN SM RD SN SUP&AM TY10BWG(2)SB(P)	EA			1.000		1.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA			6.000		6.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	EA			30.000		30.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA			4.000		4.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF			8,600.000		8,600.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF			4,300.000		4,300.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	766.000				766.000	
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	65,926.000		8,600.000		74,526.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	195.000				195.000	
	666-6208	REFL PAV MRK TY II (Y) 6" (BRK)	LF			1,075.000		1,075.000	
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	65,926.000		4,300.000		70,226.000	
	666-6285	REF PROF PAV MRK TY I(W)6"(SLD)(090MIL)	LF	65,926.000				65,926.000	
	666-6289	REF PROF PAV MRK TY I(Y)6"(SLD)(090MIL)	LF	65,926.000				65,926.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF			8,600.000		8,600.000	
	666-6346	REF PROF PAV MRK TY I(Y)6"(BRK)(100MIL)	LF			1,075.000		1,075.000	
	666-6347	REF PROF PAV MRK TY I(Y)6"(SLD)(100MIL)	LF			4,300.000		4,300.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	1,653.000		54.000		1,707.000	
	3076-6051	D-GR HMA TY-D PG76-22 (LEVEL-UP)	TON	4,827.000		810.000		5,637.000	
	3076-6072	D-GR HMA TY-D PG 76-22 (EXEMPT)	TON			700.000		700.000	
	3081-6008	TOM-C PG76-22 SAC-B	TON	4,955.000		776.000		5,731.000	
	3084-6001	BONDING COURSE	GAL	15,780.000		2,676.000		18,456.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	100.000		24.000		124.000	



DISTRICT	COUNTY	CCSJ	SHEET
Austin	Travis	1234-01-013	8A



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1234-01-013

DISTRICT Austin  
HIGHWAY FM 1100

COUNTY Travis

CONTROL SECTION JOB				1234-01-012		1234-01-013		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00135293		A00177468			
COUNTY				Travis		Travis			
HIGHWAY				FM 1100		FM 1100			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL		
	6056-6002	PREFORMED CENTERLINE RUMBLE STRIP	LF	16,940.000				16,940.000	
	6185-6002	TMA (STATIONARY)	DAY	36.000		24.000		60.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	198.000		24.000		222.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000				1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000				1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000				1.000	

QUANTITIES ON THIS SHEET IS FOR CSJ:1234-01-012 ONLY.

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**SUMMARY OF ROADWAY ITEMS**

LOCATION	134 6001	351 6013	354 6188	354 6208	432 6045	451 6048	530 6011	540 6001	540 6006	540 6037	544 6001	3081 6008	3076 6051	3084 6001
	BACKFILL (TY A)	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	PLANE ASPH CONC PAV(MICRO-MLLI NG)(1")	PLANE ASPH CONC PAV(MICRO-MLLI NG)(2")	RIPRAP (MOW STRIP)(4 IN)	RETROFIT RAIL (ADD HSS)	INTRSCT. DRVWAYS, & TURNOUT (ACP)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	MTL BM GD FEN TRANS (ANCHOR PLATE)	GUARDRAIL END TREATMENT (INSTALL)	TOM-C PG76-22 SAC-B	D-GR HMA TY-D PG76-22 (LEVEL-UP)	BONDING COURSE
	STA	SY	SY	SY	CY	LF	SY	LF	EA	EA	EA	TON	TON	GAL
SHEET 01 OF 09	40	1118	4000	4334			707					632	616	2013
SHEET 02 OF 09	12	347	1334	1445			44					196	191	624
SHEET 03 OF 09	27	723	800	867			297					409	399	1300
SHEET 04 OF 09	40	1156	1334	1445	4.5	77	475	25	1	1	1	653	636	2080
SHEET 05 OF 09	40	1156	6667	7223			138					653	636	2080
SHEET 06 OF 09	40	1156	800	867			643					653	636	2080
SHEET 07 OF 09	40	1156	5600	6067		122	589					653	636	2080
SHEET 08 OF 09	40	1156	1334	1445			457					653	636	2080
SHEET 09 OF 09	27	802	0	0			1589					453	441	1443
<b>PROJECT TOTALS</b>	<b>306</b>	<b>8770</b>	<b>21869</b>	<b>23693</b>	<b>3.6</b>	<b>199</b>	<b>4939</b>	<b>25</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>4955</b>	<b>4827</b>	<b>15780</b>

**SUMMARY OF PAVEMENT MARKING ITEMS**

LOCATION	666 6174	666 6182	666 6210	666 6285	666 6289	672 6009	6056 6002
	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (Y) 6" (SLD)	REF PROF PAV MRK TY I (W) 6" (SLD) (Ø 90MIL)	REF PROF PAV MRK TY I (Y) 6" (SLD) (Ø 90MIL)	REFL PAV MRKR TY II-A-A	PREFORMED CENTERLINE RUMBLE STRIP
	LF	LF	LF	LF	LF	EA	LF
SHEET 01 OF 09	6378	45	6378	6378	6378	160	2452
SHEET 02 OF 09	1492	0	1492	1492	1492	38	1204
SHEET 03 OF 09	5296	0	5296	5296	5296	133	2204
SHEET 04 OF 09	9908	22	9908	9908	9908	248	256
SHEET 05 OF 09	7368	0	7368	7368	7368	185	2480
SHEET 06 OF 09	11900	22	11900	11900	11900	298	1524
SHEET 07 OF 09	4752	11	4752	4752	4752	119	3280
SHEET 08 OF 09	8924	0	8924	8924	8924	224	3540
SHEET 09 OF 09	9908	95	9908	9908	9908	248	0
<b>PROJECT TOTALS</b>	<b>65926</b>	<b>195</b>	<b>65926</b>	<b>65926</b>	<b>65926</b>	<b>1653</b>	<b>16940</b>


**SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS**

LOCATION	662 6111	6001 6001	6185 6002	6185 6003
	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	DAY	DAY	HR
<b>PROJECT TOTALS</b>	<b>766</b>	<b>100</b>	<b>36</b>	<b>198</b>

**SUMMARY OF EROSION CONTROL ITEMS**

LOCATION	506 6038	506 6039	506 6041	506 6043
	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF	LF	LF
<b>PROJECT TOTALS</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Austin District  
North Travis Area Office**



FM 1100  
QUANTITY SUMMARY

SHEET 01 OF 01

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, ETC.	FM 1100
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		5

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SUMMARY OF MOBILIZATION ITEMS		
LOCATION	500 6001	502 6001
	MOBILIZATION	BARRICADES, SIGNS AND TRAFFIC HANDLING
	LS	MO
<b>PROJECT TOTALS</b>	<b>1</b>	<b>3</b>

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS					
LOCATION	508 6001	662 6063	662 6095	6001 6001	6185 6002
	CONSTRUCTING DETOURS	WK ZN PAV MRK REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (SLD)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	SY	LF	LF	DAY	DAY
Plan & Profile Sheet 1 of 4	111	2000	1000	24	24
Plan & Profile Sheet 2 of 4	111	2400	1200		
Plan & Profile Sheet 3 of 4		2400	1200		
Plan & Profile Sheet 4 of 4		1800	900		
<b>PROJECT TOTALS</b>	<b>222</b>	<b>8600</b>	<b>4300</b>	<b>24</b>	<b>24</b>

SUMMARY OF REMOVAL ITEMS					
LOCATION	496 6004	496 6006	496 6007	542 6001	544 6003
	REMOV STR (SET)	REMOV STR (HEADWALL)	REMOV STR (PIPE)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)
	EA	EA	LF	LF	EA
	6	1	200	400	4
<b>PROJECT TOTALS</b>	<b>6</b>	<b>1</b>	<b>200</b>	<b>400</b>	<b>4</b>

SUMMARY OF ROADWAY ITEMS										
LOCATION	100 6002	110 6001	132 6005	134 6001	247 6366	310 6001	351 6002	432 6002	432 6045	530 6005
	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY C)	BACKFILL (TY A)	FL BS (CMP IN PLC) (TY A GR 5) (FNAL POS)	PRIME COAT (MULTI OPTION)	FLEXIBLE PAVEMENT STRUCTURE REPAIR (6")	RIPRAP (CONC) (5 IN)	RIPRAP (MOW STRIP) (4 IN)	DRIVEWAYS (ACP)
	STA	CY	CY	STA	CY	GAL	SY	CY	CY	SY
CSJ 1234-01-013	43	2197	1300	5	2443	1172	2500	122	47	847
<b>PROJECT TOTALS</b>	<b>43</b>	<b>2197</b>	<b>1300</b>	<b>5</b>	<b>2443</b>	<b>1172</b>	<b>2500</b>	<b>122</b>	<b>47</b>	<b>847</b>

SUMMARY OF ROADWAY ITEMS								
LOCATION	530 6008	540 6001	544 6001	560 6011	3076 6072	3076 6051	3081 6008	3084 6001
	TURNOUTS (ACP)	MTL W-BEAM GD FEN (TIM POST)	GUARDRAIL END TREATMENT (INSTALL)	MAILBOX INSTALL-S (TWW-POST) TY 4	D-GR HMA TY-D PG 76-22 (EXEMPT)	D-GR HMA TY-D PG76-22 (LEVEL-UP)	TOM-C PG76-22 SAC-B	BONDING COURSE
	SY	LF	EA	EA	TON	TON	TON	GAL
CSJ 1234-01-013	220	700	4	7	700	810	776	2676
<b>PROJECT TOTALS</b>	<b>220</b>	<b>700</b>	<b>4</b>	<b>7</b>	<b>700</b>	<b>810</b>	<b>776</b>	<b>2676</b>

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FM 1100  
QUANTITY SUMMARY

SHEET 1 OF 2

© 2023	CONT	SECT	JOB	HIGHWAY
DS: BB	CK: 1234	01	013, etc	FM 1100
DW: BB	CK: AUS	DIST	COUNTY	SHEET NO.
		AUS	TRAVIS	10

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SUMMARY OF DRAINAGE ITEMS											
LOCATION	400 6005	400 6006	401 6001	402 6001	420 6074	432 6025	462 6005	464 6003	466 6180	466 6181	467 6363
	CEM STABIL BKFL	CUT & RESTORING PAV	FLOWABLE BACKFILL	TRENCH EXCAVATION PROTECTION	CL C CONC (MISC)	RIRRAP (STONE COMMON) (DRY) (15 IN)	CONC BOX CULV (4 FT X 4 FT)	RC PIPE (CL III) (18 IN)	WINGWALL (PW - 1) (HW=5 FT)	WINGWALL (PW - 1) (HW=6 FT)	SET (TY II) (18 IN) (RCP) (6: 1) (P)
	CY	SY	CY	LF	CY	CY	LF	LF	EA	EA	EA
C1 (STA 71+87.78)	206	35	40	75	2	31	87	208	1	1	8
C2 (STA 86+13.98)											
<b>PROJECT TOTALS</b>	<b>206</b>	<b>35</b>	<b>40</b>	<b>75</b>	<b>2</b>	<b>31</b>	<b>87</b>	<b>208</b>	<b>1</b>	<b>1</b>	<b>8</b>

SUMMARY OF PAVEMENT MARKING ITEMS							
LOCATION	666 6174	666 6208	666 6210	666 6343	666 6346	666 6347	672 6009
	REFL PAV MRK TY II (W) 6" (SLD)	REFL PAV MRK TY II (Y) 6" (BRK)	REFL PAV MRK TY II (Y) 6" (SLD)	REF PROF PAV MRK TY I (W) 6" (SLD) (100 MIL)	REF PROF PAV MRK TY I (Y) 6" (BRK) (100 MIL)	REF PROF PAV MRK TY I (Y) 6" (SLD) (100 MIL)	REFL PAV MRKR TY II-A-A
	LF	LF	LF	LF	LF	LF	EA
1234-01-013	8600	1075	4300	8600	1075	4300	54
<b>PROJECT TOTALS</b>	<b>8600</b>	<b>1075</b>	<b>4300</b>	<b>8600</b>	<b>1075</b>	<b>4300</b>	<b>54</b>

SUMMARY OF SIGNING ITEMS					
LOCATION	644 6012	644 6020	658 6062	658 6100	658 6081
	IN SM RD SN SUP&AM TY10BWG (1) SB (T)	IN SM RD SN SUP&AM TY10BWG (2) SB (P)	INSTR DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)	INSTR OM ASSM (OM-2Z) (WFLX) GN D (BI)	INSTR DEL ASSM (D-SW) SZ 1 (WFLX) GND (BI)
	EA	EA	EA	EA	EA
CSJ 1234-01-013	4	1	6	4	30
<b>PROJECT TOTALS</b>	<b>4</b>	<b>1</b>	<b>6</b>	<b>4</b>	<b>30</b>

SUMMARY OF EROSION CONTROL ITEMS						
LOCATION	160 6003	164 6023	168 6001	169 6001	506 6038	506 6039
	FURNISHING AND PLACING TOPSOIL (4")	CELL FBR MLCH SEED (PERM) (RURA L) (CLAY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	MG	SY	LF	LF
1234-01-013	16328	16328	129	8164	8520	8520
<b>PROJECT TOTALS</b>	<b>16328</b>	<b>16328</b>	<b>129</b>	<b>8164</b>	<b>8520</b>	<b>8520</b>

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**FM 1100**  
**QUANTITY SUMMARY**

SHEET 2 OF 2

© 2023	CONT	SECT	JOB	HIGHWAY
BB	1234	01	013, etc	FM 1100
DIST	COUNTY		SHEET NO.	
BB	AUS		TRAVIS	11

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**GENERAL NOTES**

1. CONSTRUCT THE ROADWAY USING ONE-LANE TWO-WAY TRAFFIC CONTROL DURING DAYTIME WORKING HOURS (9:00 am - 4:00 pm). THIS WORK WILL BE CONSIDERED SUBSIDIARY TO ITEM 502. RESTORE TWO-LANE TRAFFIC FOR NIGHTTIME OPERATIONS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. LIMIT THE LENGTH OF THE WORK ZONE TO WHAT CAN BE CONSTRUCTED IN A SINGLE DAY (EXCEPT WORK ZONES USING TEMPORARY TRAFFIC SIGNALS). THERE SHALL BE NO EDGE DROP-OFF BETWEEN THE TRAFFIC LANES BEFORE OPENING TO TWO-LANE TRAFFIC. IN THE EVENT THAT CONSTRUCTION IS NOT ABLE TO BE COMPLETED BEFORE NIGHTTIME OPERATIONS, PROVIDE A TRANSITION BETWEEN THE TRAFFIC LANES AS APPROVED BY THE ENGINEER BEFORE OPENING TO TWO-LANE TRAFFIC. THIS WORK SHALL BE SUBSIDIARY TO ITEM 502.
3. CONSTRUCT 100:1 (OR AS APPROVED) VERTICAL TRANSITIONS BETWEEN WORK SECTIONS BEFORE OPENING TO TRAFFIC. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY.
4. CONSTRUCT PHASE 3 FOR EACH SECTION WITHIN 5 CALENDAR DAYS OF CONSTRUCTING PHASE 2 FOR THAT SECTION.
5. THE CONTRACTOR MAY WORK ON ADJACENT WORK SECTIONS SO LONG AS EACH INDIVIDUAL SECTION IS COMPLETED WITHIN THE TIME PERIODS SPECIFIED IN STEP 4.
6. SPRINKLE FOR DUST CONTROL AS DIRECTED. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY.
7. COMPLETE THE WORK IN ONE SECTION BEFORE MOVING TO ANOTHER SECTION. IF A SECTION IS NOT COMPLETED WITHIN THE TIME PERIODS SPECIFIED IN STEP 4, APPLY AN ASPHALT EMULSION TO THE SECTION AS SPECIFIED BY THE ENGINEER AND RESTORE IT TO A CONDITION APPROVED BY THE ENGINEER BEFORE PROCEEDING TO THE NEXT PHASE OF CONSTRUCTION. THIS WORK SHALL BE AT THE CONTRACTOR'S EXPENSE. THESE REQUIREMENTS DO NOT APPLY TO FULL-DEPTH HMA SECTIONS.
8. UTILIZE TCP(2-1)-18 FOR WORK IN THE RIGHT-OF-WAY THAT DOES NOT REQUIRE LANE CLOSURES. THIS WORK INCLUDES PREPARING ROW, GRADING, DRIVEWAY CONSTRUCTION, SEEDING, ETC.
9. INCORPORATE 3:1 SAFETY WEDGES FOR ALL DROP OFFS GREATER THAN TWO (2") INCHES LEFT OVERNIGHT. CONSIDER THIS SUBSIDIARY TO THE VARIOUS ITEMS.
10. MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT SITE TO REDUCE PONDING.

**SEQUENCE OF WORK**

TRAFFIC CONTROL: THE ANTICIPATED STEPS IN THE SEQUENCE OF WORK ARE AS FOLLOWS:

- A. SETUP ADVANCED WARNING SIGNS ACCORDING TO BC STANDARDS.
- B. INSTALL EROSION CONTROLS.
- C. PREPARE RIGHT OF WAY.
- D. FOLLOWING TCP(2-2b)-18 OR TCP(2-8b)-18 SETUP FOR CULVERT REPLACEMENT.
- E. OPEN CUT, EXCAVATE, AND INSTALL NEW PROPOSED 4'X4' BOX CULVERT ALONG 45 DEGREE SKEW AS SHOWN ON CULVERT LAYOUT STA. 72+53.21 UTILIZE ONE LANE TWO WAY TRAFFIC CONTROL WITH FLAGGERS AS PART OF A 24 HOUR CONTINUOUS OPERATION UNTIL BOX CULVERT IS INSTALLED, BACKFILLED, AND PAVEMENT IS RESTORED BEFORE RE-OPENING THIS SECTION OF THE ROAD TO TWO-LANE TRAFFIC. NO PLATING WILL BE ALLOWED DURING THIS PHASE.
- F. INSTALL PROPOSED PW HEADWALLS
- G. SEAL, FLOWFILL AND ABANDON EXISTING 4'X4' BOX CULVERT IN PLACE
- H. SAW CUT, EXCAVATE, PREPARE SUBGRADE AND CONSTRUCT PAVEMENT RIGHT OF FM-1100 CENTERLINE.
- I. SAW CUT, EXCAVATE, PREPARE SUBGRADE AND CONSTRUCT PAVEMENT LEFT OF FM-1100 CENTERLINE.
- J. PERFORM 4" PAVEMENT REPAIRS AS NEEDED.

**PHASE 1**

THIS PHASE CONSISTS OF REPLACING EXISTING CROSS DRAINAGE STRUCTURE , INSTALLING PW HEADWALLS, PERFORM FULL PAVEMENT REPAIR AND MICRO MILLING.

1. INSTALL UPSTREAM AND DOWNSTREAM TEMPORARY PAVEMENT WIDENING USING TCP(2-2b)-18.
2. USE ONE-LANE TWO-WAY TRAFFIC CONTROL DURING DAYTIME WORKING HOURS FOR PAVEMENT WIDENING, RESTORE TWO-LANE TRAFFIC FOR NIGHTTIME OPERATIONS.
3. PLACE THE DOWNSTREAM END OF THE PROPOSED CULVERT UTILIZING TCP(2-2b)-18. USE 24 HOUR CONTINUOUS OPERATION WITH FLAGGERS.
4. FOLLOWING TCP(2-2b)-18 OR TCP(2-8b)-18 SETUP FOR CULVERT PLACEMENT ON THE UPSTREAM SIDE.
5. PLACE THE UPSTREAM END OF THE PROPOSED CULVERT UTILIZING TCP(2-2b)-18. USE 24 HOUR CONTINUOUS OPERATION WITH FLAGGERS.
6. RESTORE TRAFFIC TO ITS ORIGINAL LOCATION AND STABILIZE SOIL UTILIZING TCP(2-1)-18 OR TCP(2-2b)-18.
7. PERFORM FULL DEPTH PAVEMENT REPAIRS. REPAIR LOCATIONS TO BE DETERMINED AND MARKED IN THE FIELD BY THE ENGINEER. THE CONTRACTOR SHALL BE PRESENT AT THE TIME THAT THE REPAIR AREAS ARE MARKED. ANY NECESSARY TRAFFIC CONTROL SHALL BE PROVIDED BY THE CONTRACTOR, AND SHALL BE CONSIDERED SUBSIDIARY TO THE VARIOUS BID ITEMS.
8. MICRO MILL ALL FEMA AREAS, PER DETAIL B, AS NOTED 2" MILLING ON THE PLAN LAYOUT SHEETS. CONTRACTOR TO INSTALL THE TYPE D PAVEMENT SECTION IN THE AREAS MILLED AND THE CONTRACTOR IS NOT TO MILL MORE THAN THEY ARE ABLE TO INLAY TYPE D IN A SINGLE SHIFT.
9. MICRO MILL 1" IN ALL REMAINING LOCATIONS. CONTRACTOR TO INSTALL THE TYPE D PAVEMENT SECTION (DETAIL A) IN THESE LOCATIONS AND IS NOT TO MILL BEYOND THE LIMITS THAT CAN BE INLAYED IN A WORKING DAY.

**PHASE 2**

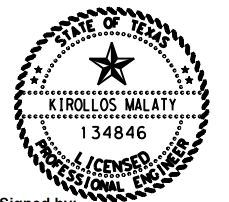
THIS PHASE CONSISTS OF CONSTRUCTING THE WIDENED PAVEMENT BY NOTCH AND WIDENING.

1. FOLLOWING TCP(2-2)-18 SETUP ONE-LANE TWO-WAY TRAFFIC CONTROL.
2. PERFORM TYPE D HOTMIX LEVEL UP TO THE NEW WIDENED PAVEMENT ELEVATIONS PER TYPICAL SECTION AND CROSS SECTIONS AT A 2% CROSS SLOPE.
3. SAW CUT, EXCAVATE, PREPARE SUBGRADE.
4. INSTALL 12" FLEXBASE IN TWO LAYERS OF 6" EACH. BLADE, SHAPE AND COMPACT THE MATERIAL IN EACH LAYER.
5. APPLY PRIME AND INSTALL 2" HMA TYPE D ON TOP OF NEW BASE MATERIAL.
6. BLADE, SHAPE AND COMPACT THE MATERIAL.
7. PERFORM TYPE D HOTMIX LEVEL UP TO THE NEW WIDENED PAVEMENT ELEVATIONS PER TYPICAL SECTION AND CROSS SECTIONS AT A 2% CROSS SLOPE.
8. PULL TOPSOIL UP TO TYP D HOTMIX EDGE.
9. UTILIZING TCP(2-2b)-18 AND TCP(7-1)-13, INSTALL SHORT TERM PAVEMENT MARKING PER WZ(STPM)-13.
10. UTILIZING TCP(2-1)-18, INSTALL SIGNS, TOPSOIL, AND SEEDING.

**PHASE 3**

UTILIZING APPLICABLE TCP STANDARD SHEETS PERFORM THE FOLLOWING WORK:

1. FOR ALL LOCATIONS, CONTRACTOR TO INSTALL TOM OVER THE TYPE D WITHIN 5 DAYS OF PLACING THE TYPE D. DUE TO THE THIN EXSITING PAVEMENT DEPTH, THE TYPE D SHALL NOT BE EXPOSED TO TRAFFIC FOR MORE THAN 5 CALENDAR DAYS BEFORE BEING COVERED WITH TOM.
2. INSTALL TEMPORARY PAVEMENT MARKINGS PRIOR TO REMOVAL OF LANE CLOSURES.
3. APPLY TYPE II PAVEMENT MARKINGS. FAILURE TO PERFORM STRIPING WITHIN THE ALLOTTED TIME PERIODS WILL RESULT IN THE CEASING OF ALL OPERATIONS UNTIL STRIPING IS ACCOMPLISHED.
4. BACKFILL PAVEMENT EDGES AS PER GENERAL NOTE FOR ITEM 134 AS NEEDED.
5. INSTALL RUMBLE STRIPS AND APPLY REFLECTIVE PAVEMENT MARKINGS TY I AND RAISED PAVEMENT MARKINGS A MINIMUM OF 10 DAYS AFTER FINAL PAVING. REFERENCE EXISTING STRIPING PRIOR TO COMMENCING WORK.
6. INSTALL ANY REMAINING SIGNS AND COMPLETE ALL MISCELLANEOUS WORK TO FINISH THE PROJECT AS DIRECTED BY THE ENGINEER.
7. REMOVE EROSION CONTROL DEVICES ONCE VEGETATION IS ESTABLISHED TO THE SATISFACTION OF THE ENGINEER.
8. PERFORM ANY NECESSARY CLEANUP OPERATIONS AND COMPLETE FINAL PUNCH-LIST. MAINTAIN BARRICADE THROUGH PUNCH-LIST. REMOVE BARRICADES AS DIRECTED BY THE ENGINEER.



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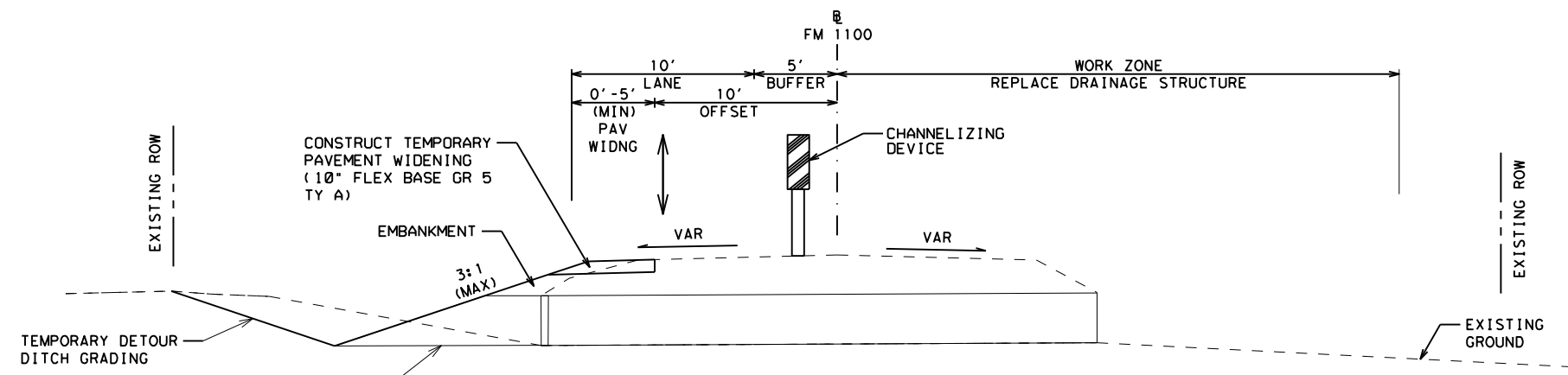
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**FM 1100  
SEQUENCE OF  
WORK**

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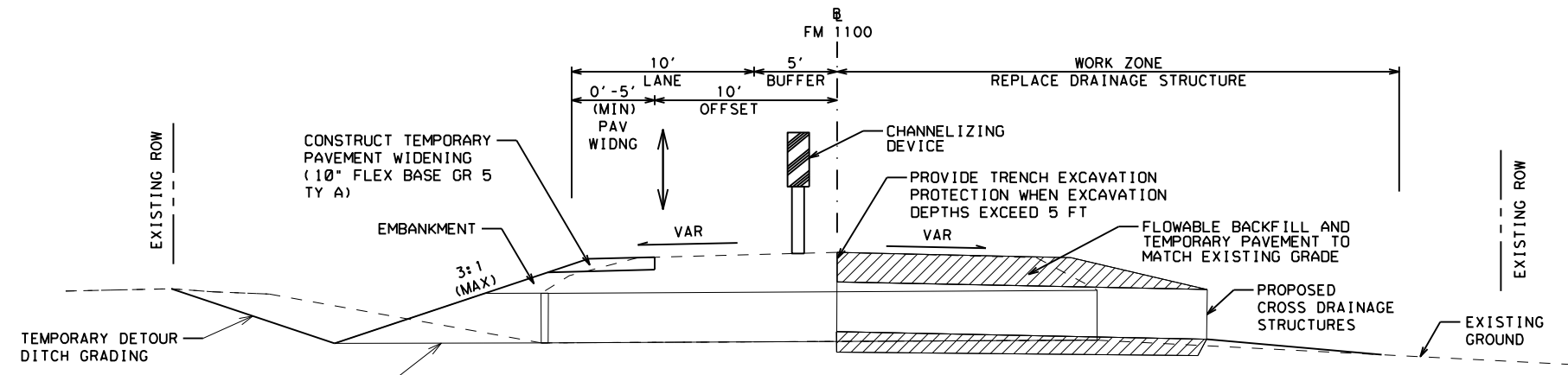
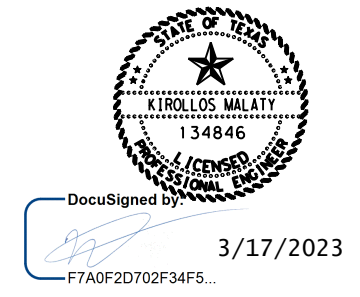
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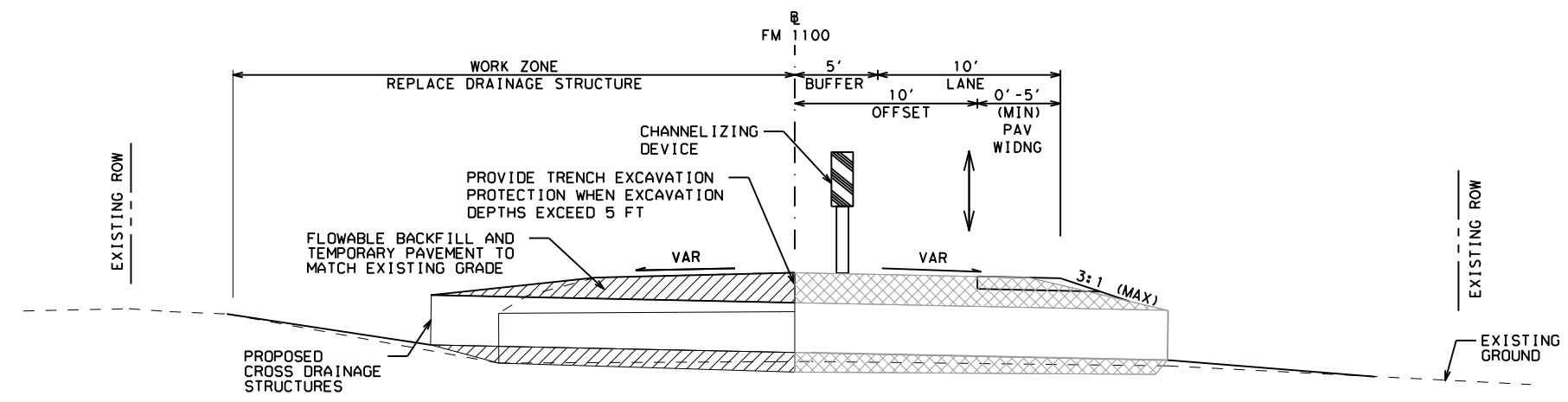
**PHASE 1, STEP 1**  
**CONSTRUCT TEMPORARY PAVEMENT WIDENING**  
 24 HOUR CONTINUOUS OPERATION  
 USE ONE LANE, TWO WAY TRAFFIC CONTROL WITH FLAGGERS

TCP DETOUR TABLE				
PROPOSED CULVERT STATION	BEGIN PAVEMENT WIDENING STATION	END PAVEMENT WIDENING STATION	PAVEMENT WIDENING WIDTH/SIDE (FT)	TOTAL PAVEMENT WIDENING (SY)
71+87.78	70+59.28	73+22.98	5'	222

NOTE:  
 UTILIZE TCP (2-8b)-12 FOR FULL PIPE CULVERT REPLACEMENT.  
 EXISTING CULVERT TO BE FLOWFILLED, SEALED & ABANDONED.  
 SEE CUTTING AND RESTORING PAVEMENT DETAILS FOR MORE INFORMATION AND EXCAVATION LIMITS.



**PHASE 1, STEP 2**  
**REPLACE DOWNSTREAM PORTION OF CULVERT**  
 24 HOUR CONTINUOUS OPERATION  
 USE ONE LANE, TWO WAY TRAFFIC CONTROL WITH FLAGGERS



**PHASE 1, STEP 3**  
**REPLACE UPSTREAM PORTION OF CULVERT**  
 24 HOUR CONTINUOUS OPERATION  
 USE ONE LANE, TWO WAY TRAFFIC CONTROL WITH FLAGGERS

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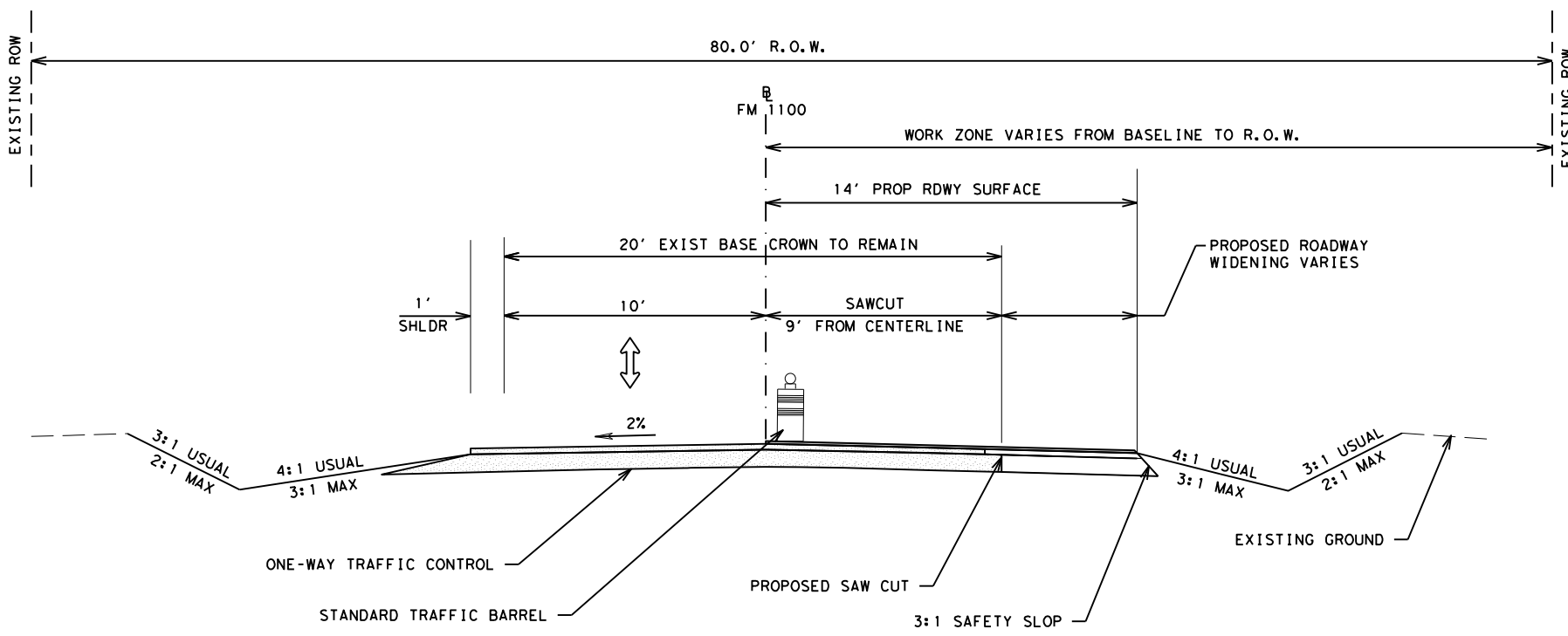
**TCP PHASE 1**  
**CULVERT REPLACEMENT**

SHEET 1 OF 3

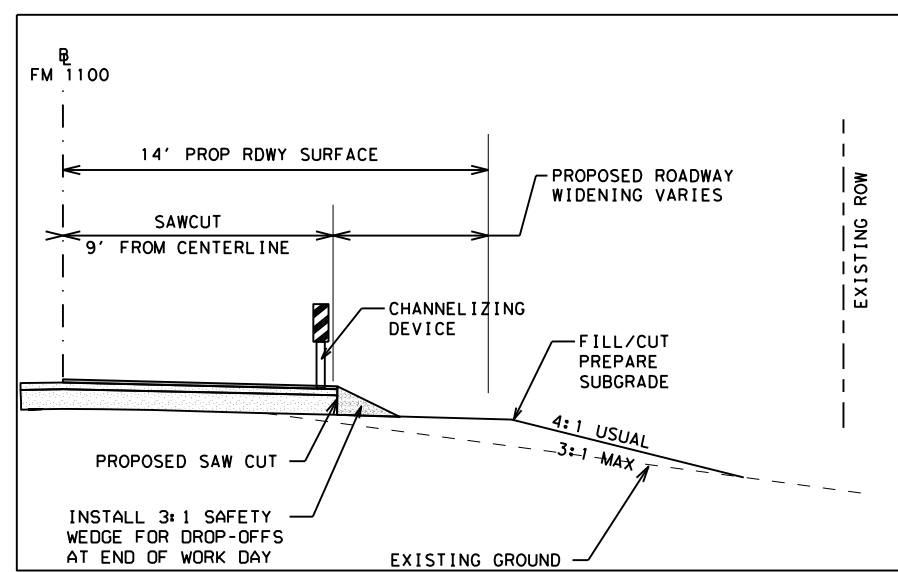
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**PHASE 2, STEP 1  
 PAVEMENT WIDENING AND LEVEL-UP  
 (WORK HOURS TRAFFIC FLOW)**



**PHASE 2  
 PAVEMENT WIDENING AND LEVEL-UP**

NOTE:  
 NO PLAN VIEW TCP PROVIDED. USE TCP(2-2)-18 FOR ONE-LANE TWO-WAY TRAFFIC CONTROL SETUP/LANE CLOSURE DETAILS.

WORKZONES WILL BE LIMITED TO WHAT CAN BE CONSTRUCTED IN A SINGLE DAY ON EACH SIDE.

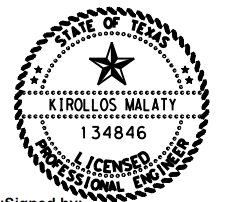
CONTRACTOR MAY USE VERTICAL PANELS OR BARRELS.

CONTRACTOR SHALL INSTALL 3:1 SAFETY WEDGE AT THE END OF EACH WORK DAY.

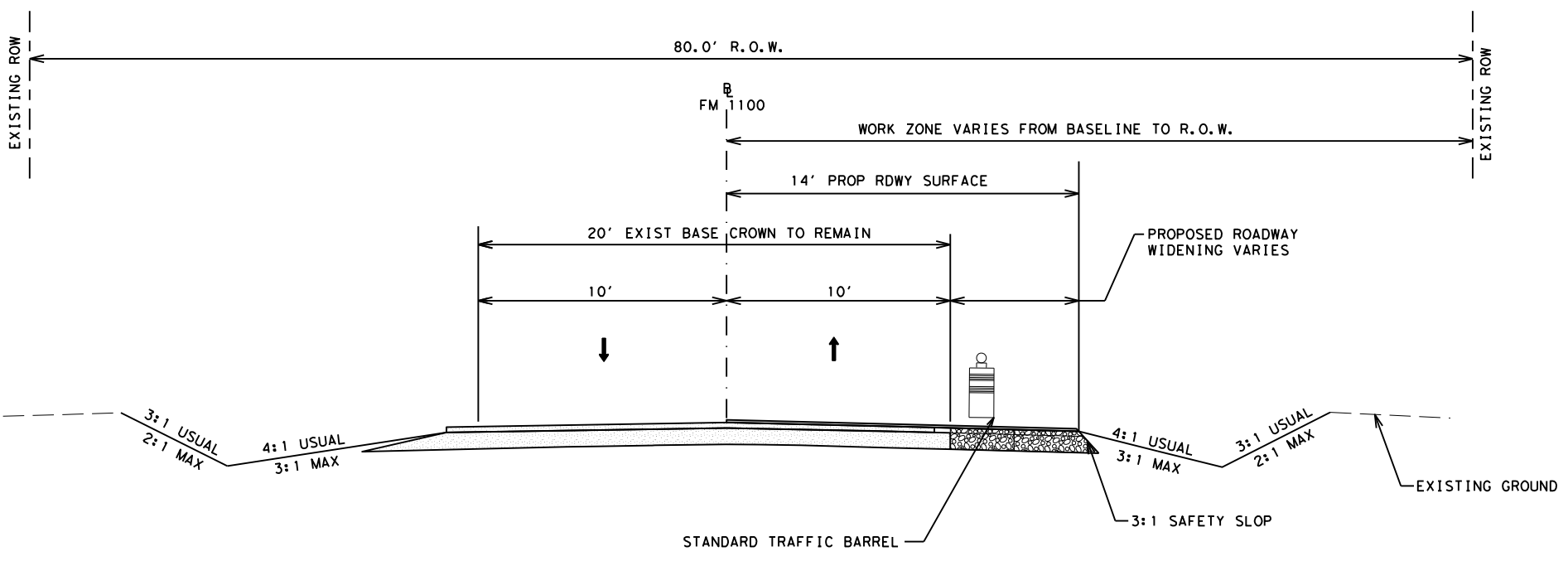
CONTRACTOR MAY CHANGE SEQUENCE OF CONSTRUCTION WITH PRIOR APPROVAL FROM THE ENGINEER.

WORK ON BOTH SIDES OF THE ROAD AT THE SAME TIME WILL NOT BE ALLOWED.

SEE ROADWAY CROSS SECTIONS FOR CROSS SLOPE AND SURFACE E.O.P. ELEVATIONS.



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**PHASE 2, STEP 1  
 PAVEMENT WIDENING AND LEVEL-UP  
 (NON-WORK HOURS TRAFFIC FLOW)  
 UTILIZE BC-(10)-21 DURING NON-WORK HOURS**

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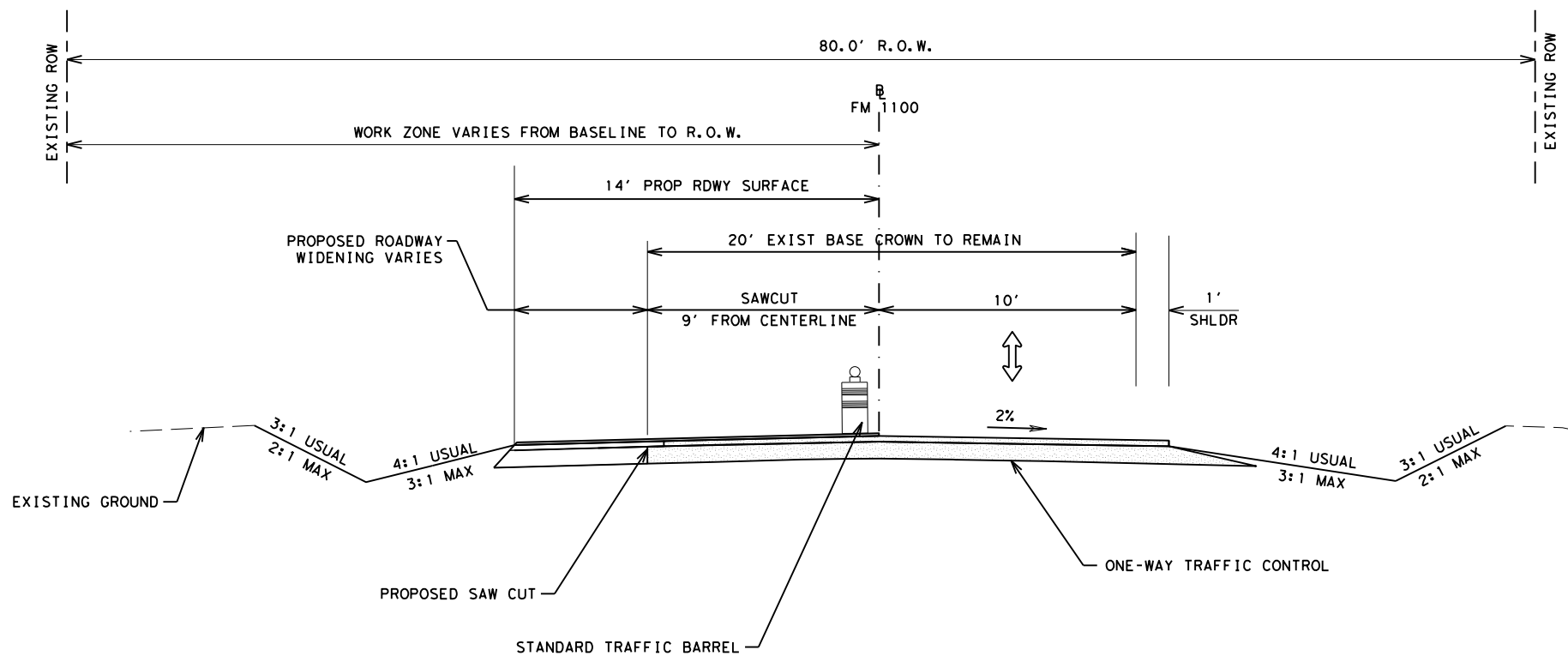
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**TCP PHASE 2  
 PAVEMENT WIDENING**

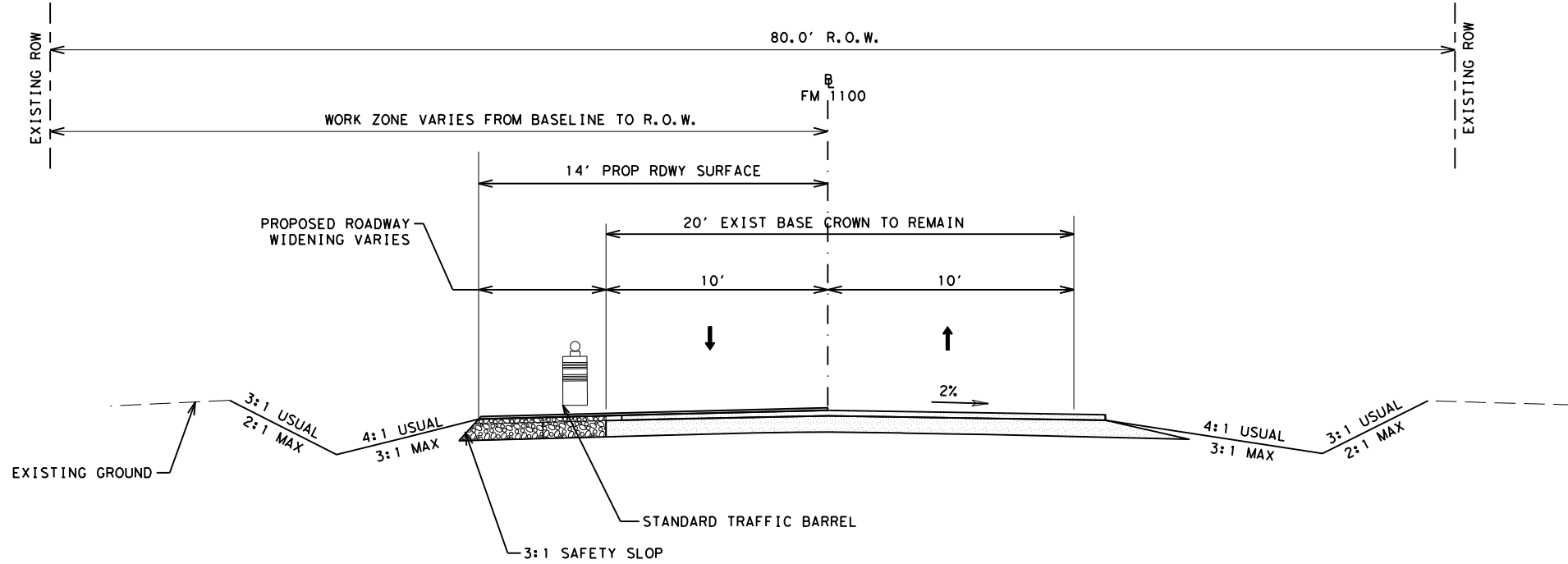
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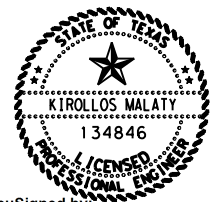
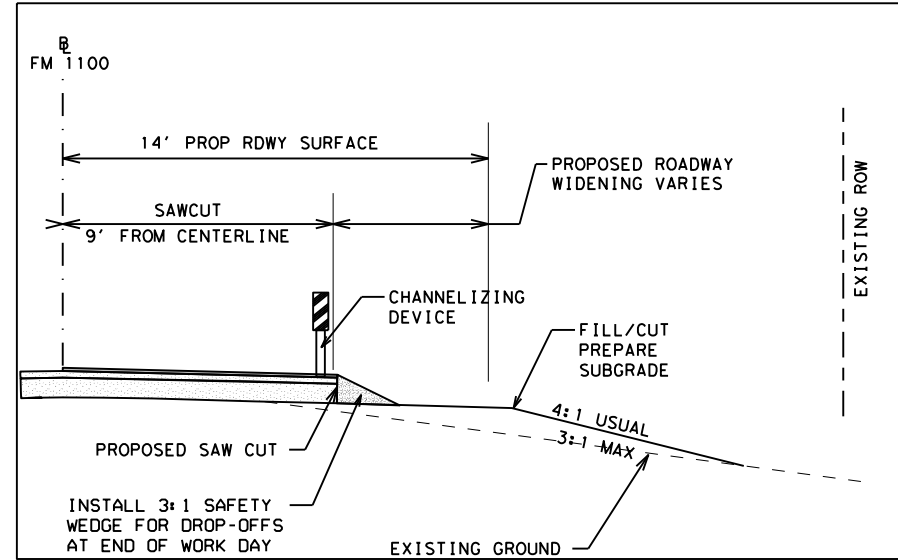
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**PHASE 2, STEP 2  
 PAVEMENT WIDENING AND LEVEL-UP  
 (WORK HOURS TRAFFIC FLOW)**



**PHASE 2, STEP 2  
 PAVEMENT WIDENING AND LEVEL-UP  
 (NON-WORK HOURS TRAFFIC FLOW)  
 UTILIZE BC-(10)-21 DURING NON-WORK HOURS**



**PHASE 2  
 PAVEMENT WIDENING AND LEVEL-UP**  
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**NOTE:**  
 NO PLAN VIEW TCP PROVIDED. USE TCP(2-2)-18 FOR ONE-LANE TWO-WAY TRAFFIC CONTROL SETUP/LANE CLOSURE DETAILS.  
 WORKZONES WILL BE LIMITED TO WHAT CAN BE CONSTRUCTED IN A SINGLE DAY ON EACH SIDE.  
 CONTRACTOR MAY USE VERTICAL PANELS OR BARRELS.  
 CONTRACTOR SHALL INSTALL 3:1 SAFETY WEDGE AT THE END OF EACH WORK DAY.  
 CONTRACTOR MAY CHANGE SEQUENCE OF CONSTRUCTION WITH PRIOR APPROVAL FROM THE ENGINEER.  
 WORK ON BOTH SIDES OF THE ROAD AT THE SAME TIME WILL NOT BE ALLOWED.  
 SEE ROADWAY CROSS SECTIONS FOR CROSS SLOPE AND SURFACE E.O.P. ELEVATIONS.

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**FM 1100  
 TCP PHASE 2  
 PAVEMENT WIDENING**

SHEET 3 OF 3

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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).

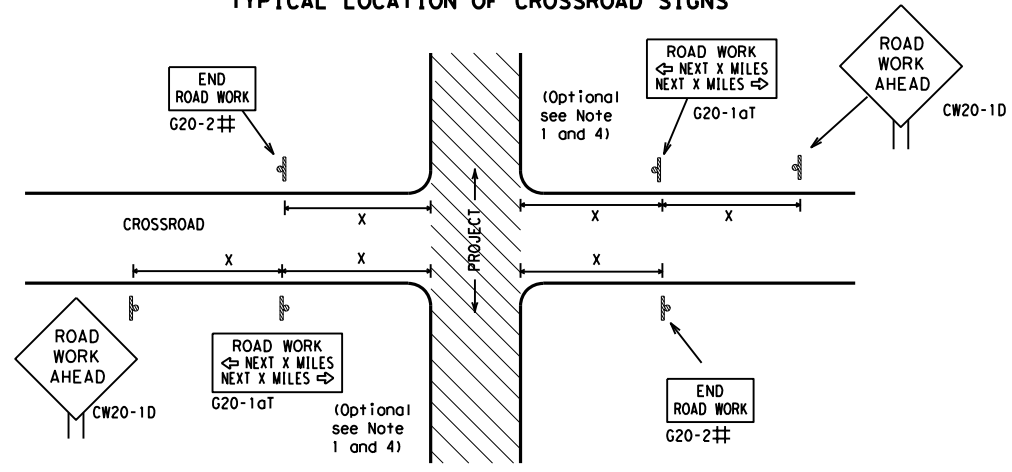
<b>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT</b> <a href="http://www.txdot.gov">http://www.txdot.gov</a>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD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

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard	
<b>BARRICADE AND CONSTRUCTION          GENERAL NOTES          AND REQUIREMENTS</b>			
<b>BC (1) - 21</b>			
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5-10	5-21	SHEET NO.	16

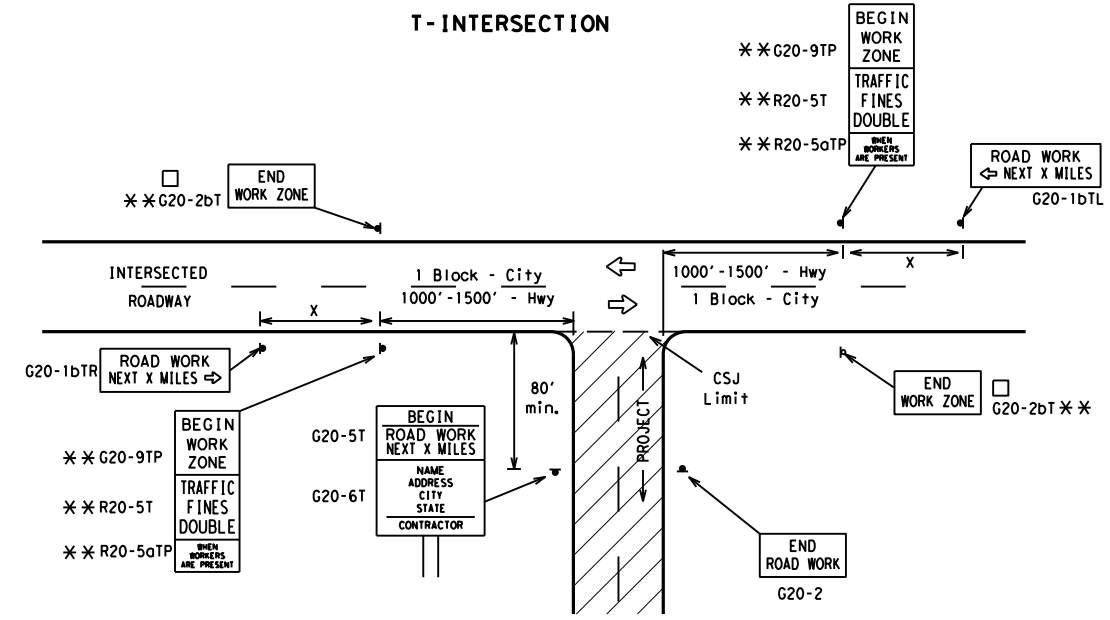
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- ## 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>

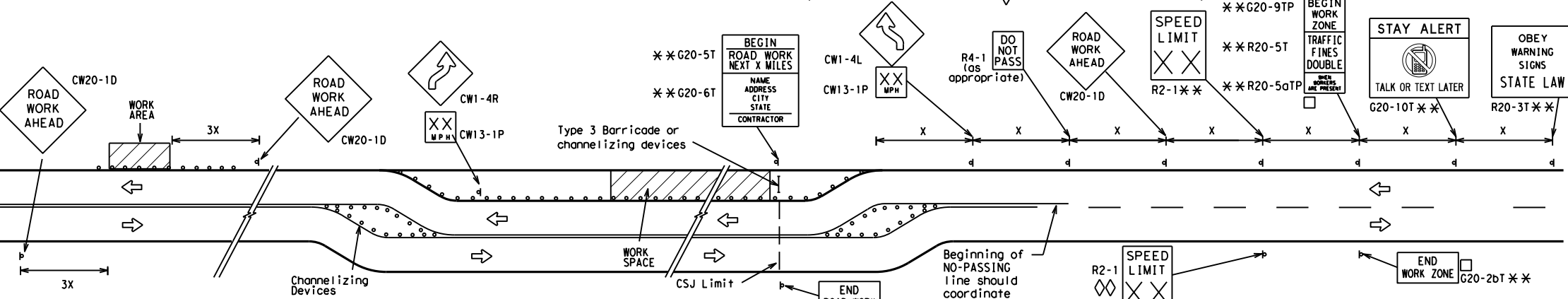
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

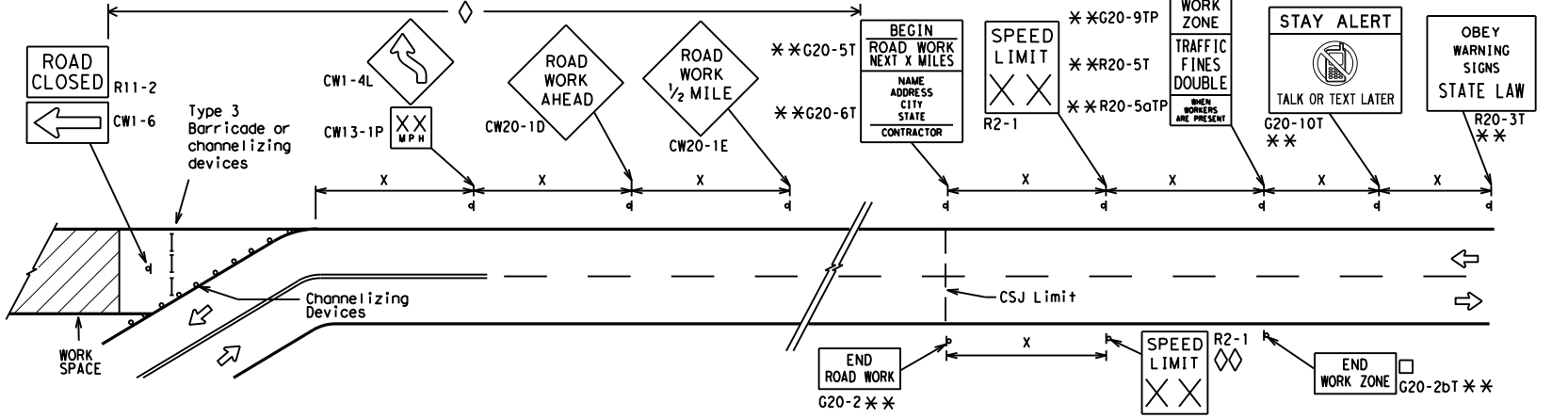
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

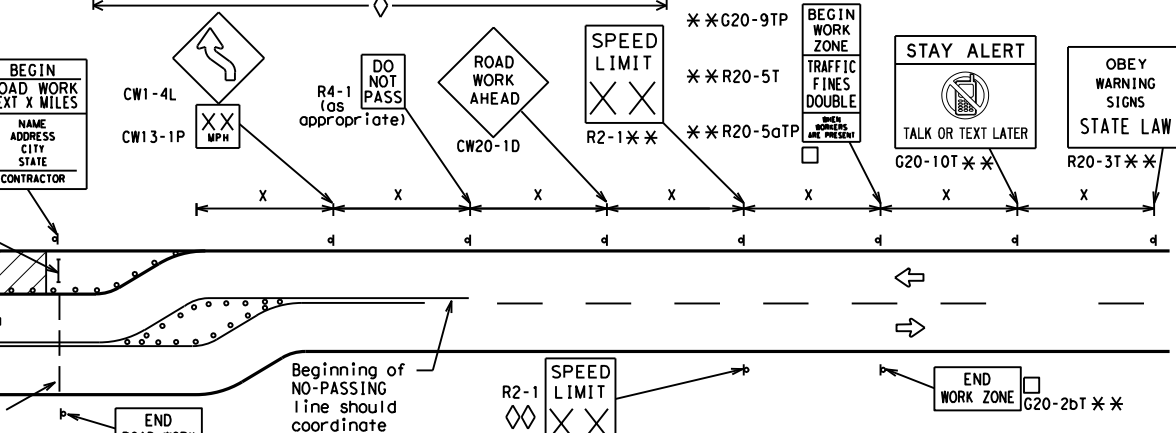


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

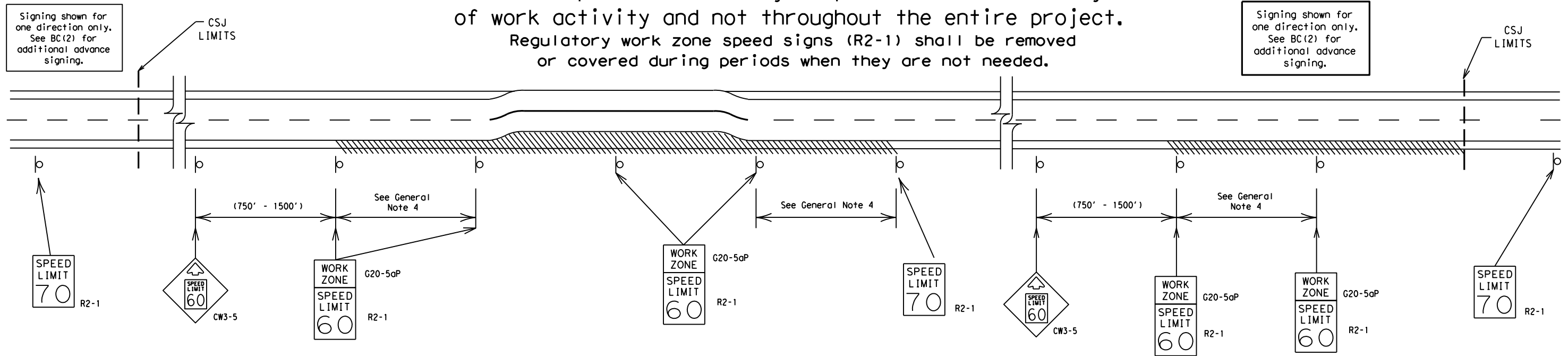
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9-07 8-14	DIST	COUNTY	SHEET NO.	
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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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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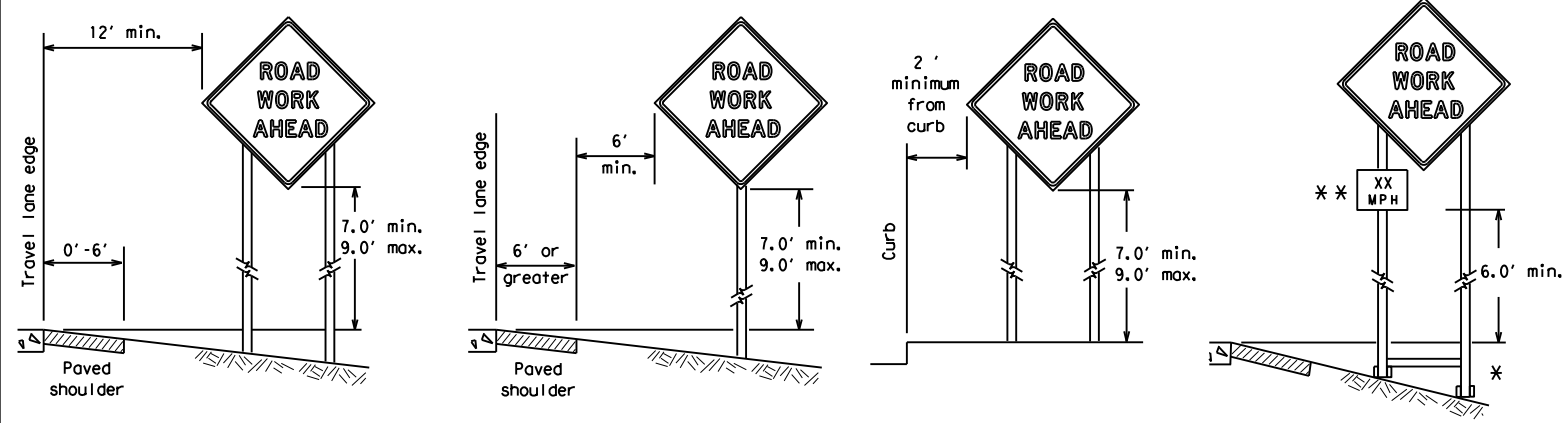
SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
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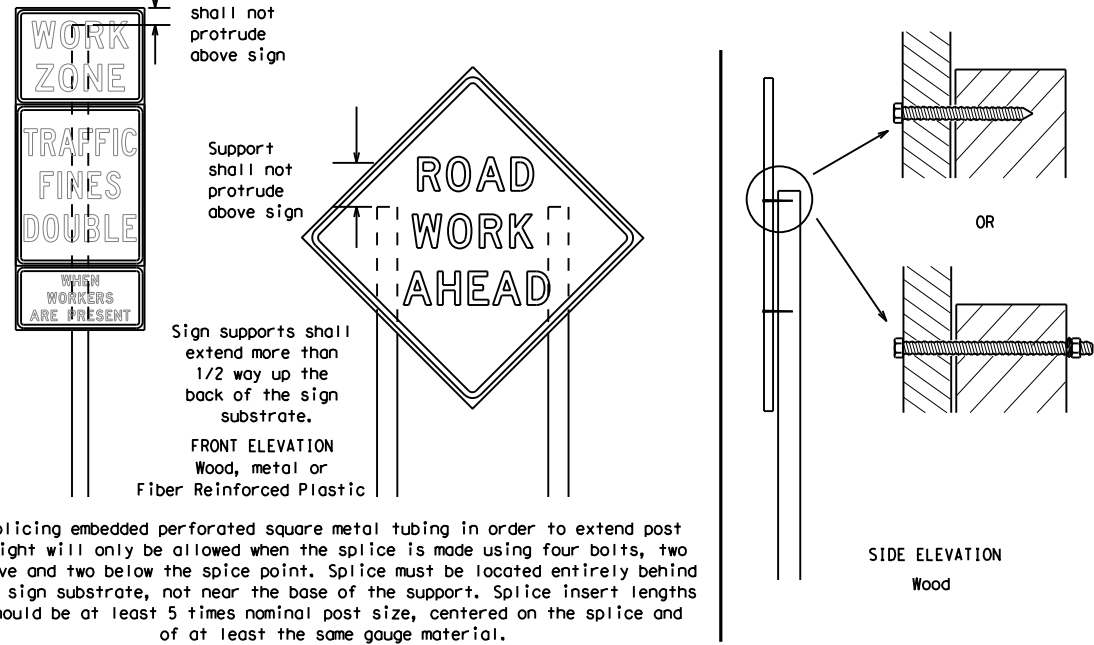
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* 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**

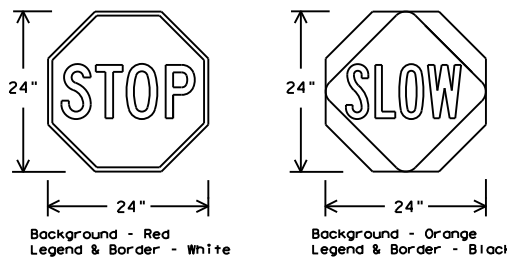
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not 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.

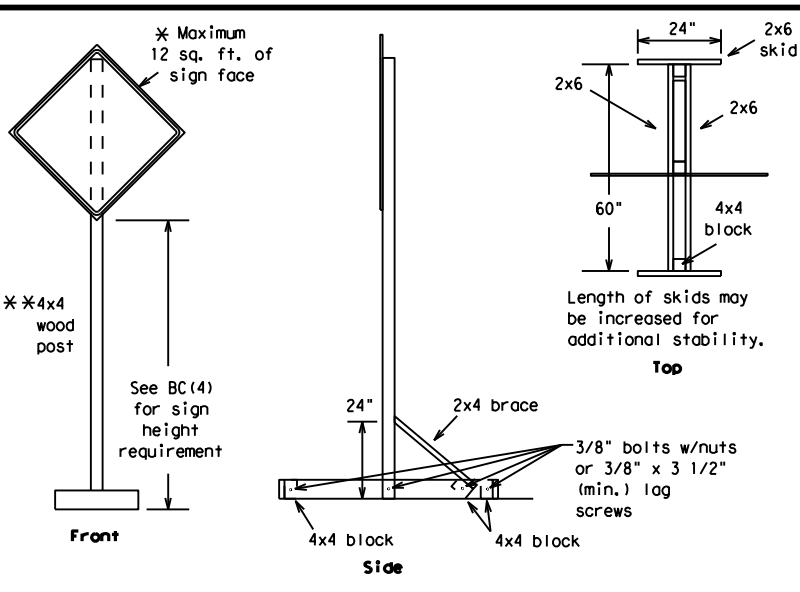
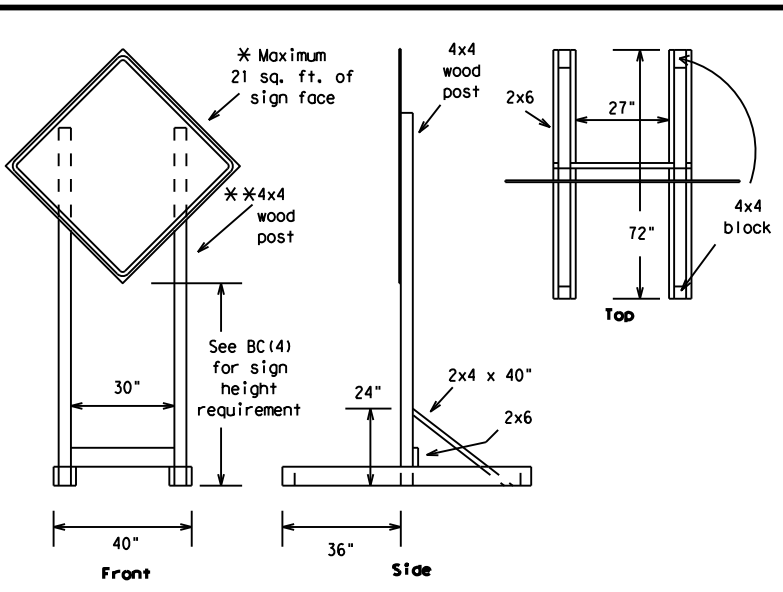


**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

**BC (4) - 21**

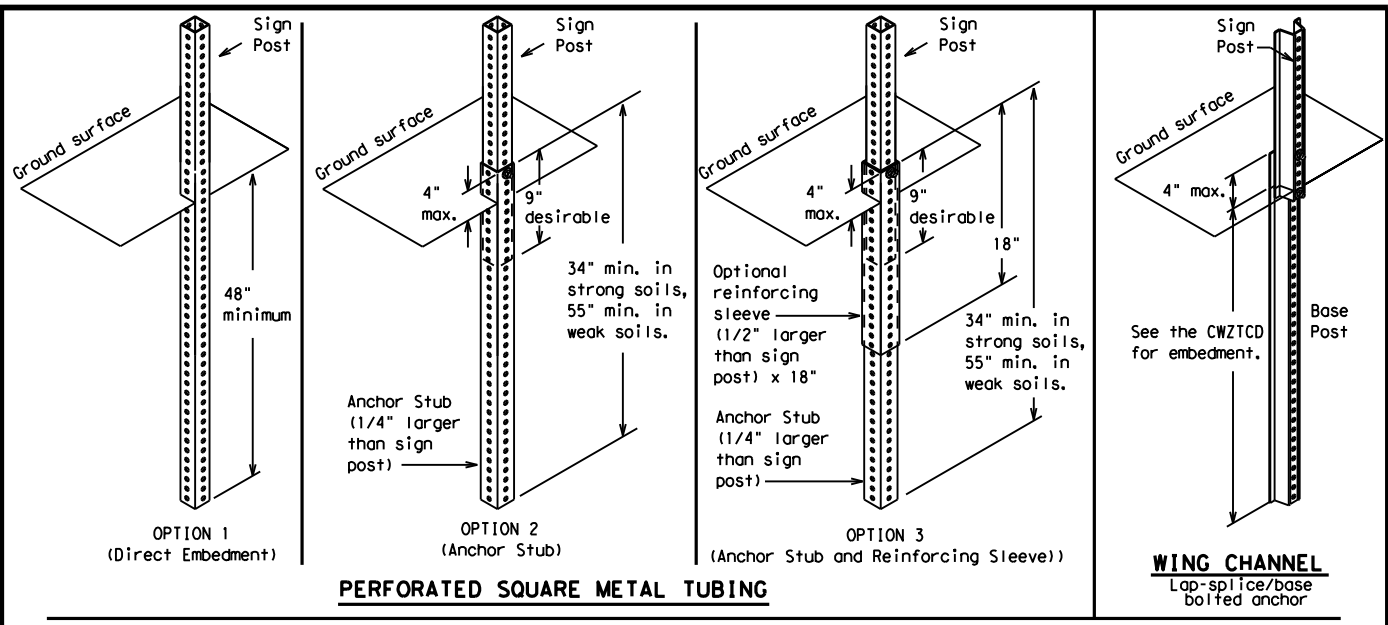
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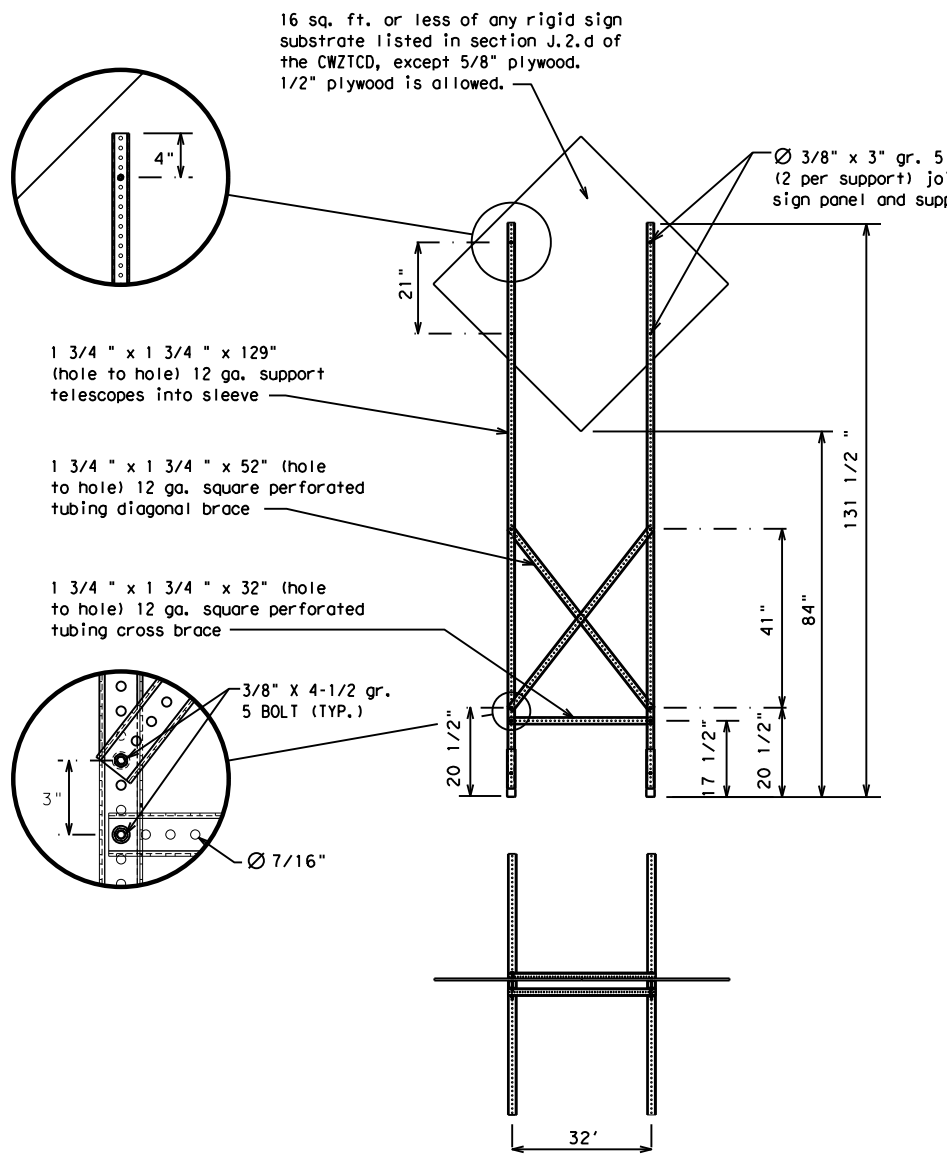
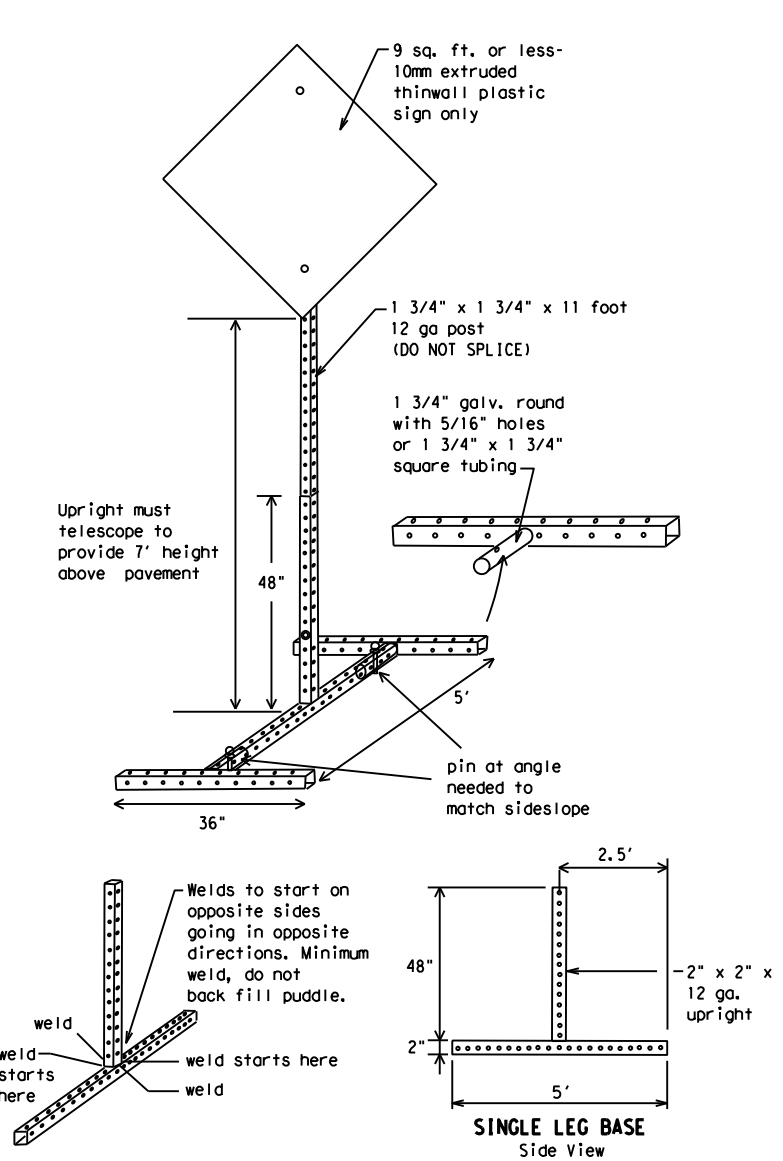
**SKID MOUNTED WOOD SIGN SUPPORTS**

\* 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.

**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**  
**BC(5) - 21**

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©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS	1234	01	013, etc	FM	1100				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	AUS	TRAVIS	20					

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
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
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

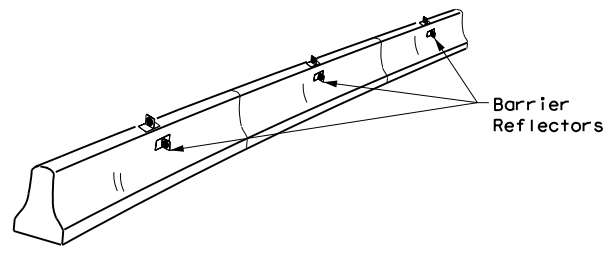
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<h2>BC (6) - 21</h2>			
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© TxDOT	November 2002	CR:	TxDOT
REVISIONS	1234 01	DW:	TxDOT
9-07	8-14	JOB	013, etc
7-13	5-21	HIGHWAY	FM 1100
		DIST	COUNTY
		AUS	TRAVIS
		SHEET NO.	21



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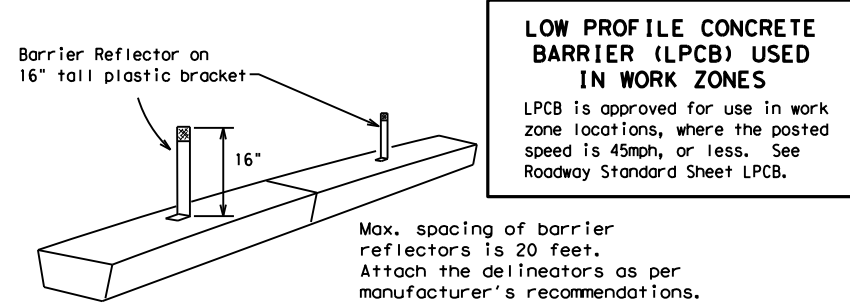
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



### CONCRETE TRAFFIC BARRIER (CTB)

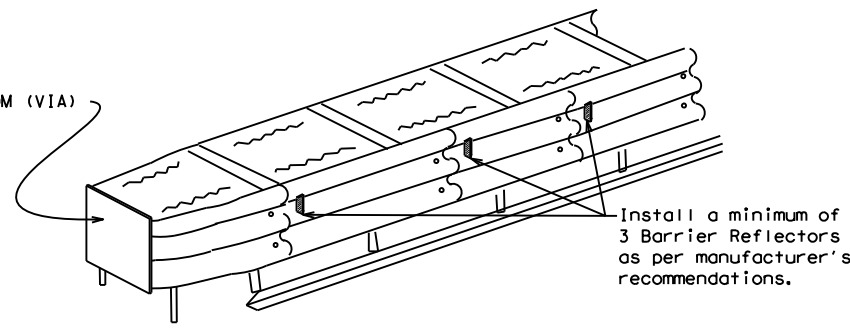
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
- Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional) while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
- When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
- Barrier Reflector units shall be yellow or white in color to match the 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.

### LOW PROFILE CONCRETE BARRIER (LPCB)

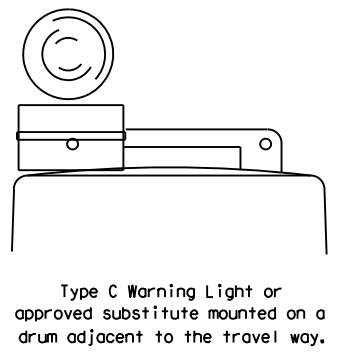


### DELINEATION OF END TREATMENTS

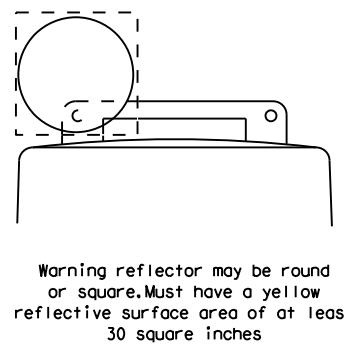
#### END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

## BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

### WARNING LIGHTS

- 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

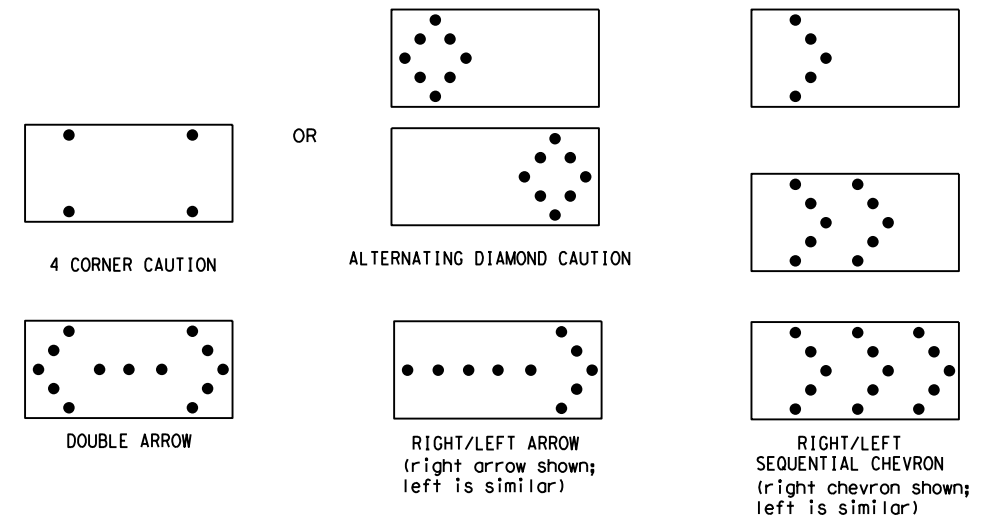
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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 CWZTCO.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
- The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

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

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



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

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

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

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

## FLASHING ARROW BOARDS

SHEET 7 OF 12

### TRUCK-MOUNTED ATTENUATORS

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



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

### BC (7) - 21

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© TxDOT	November 2002	CONT	SECT	JOB		HIGHWAY			
REVISIONS		1234	01	013, etc		FM 1100			
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	AUS	TRAVIS		22				

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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**

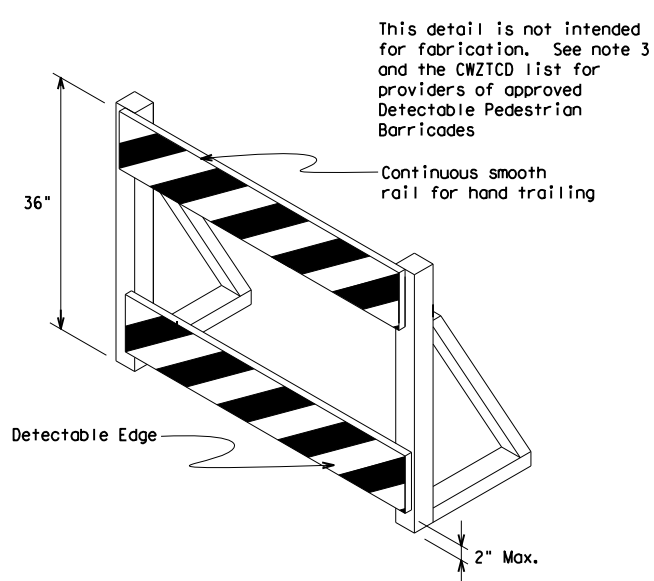
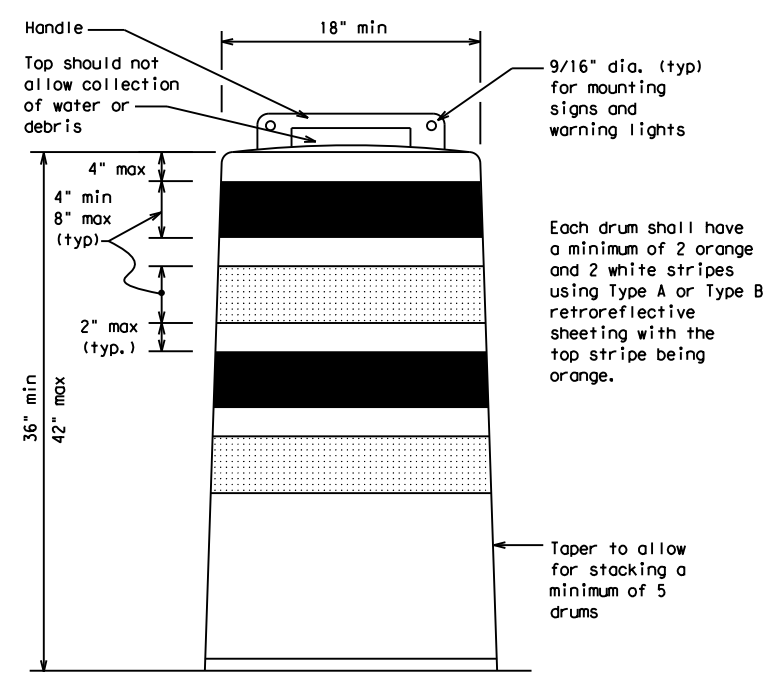
- Pre-qualified plastic drums shall meet the following requirements:
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
  - The body and base shall lock together in such a manner that the body separates from the base when impacted 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.

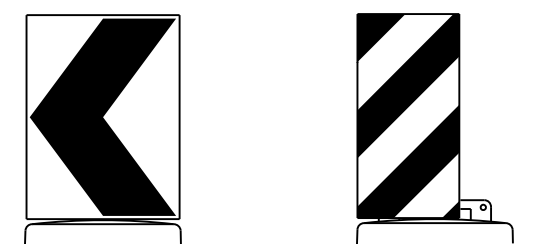
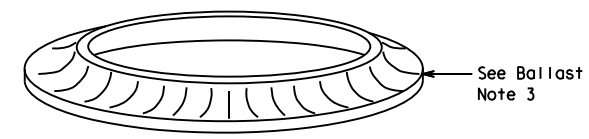
**BALLAST**

- 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.



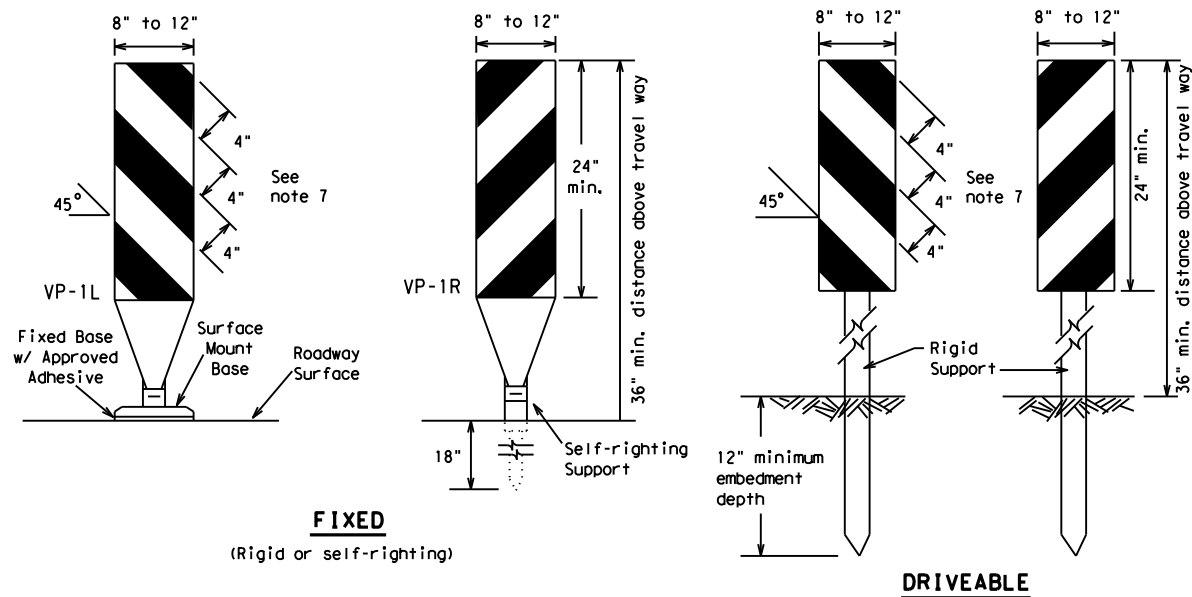
**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

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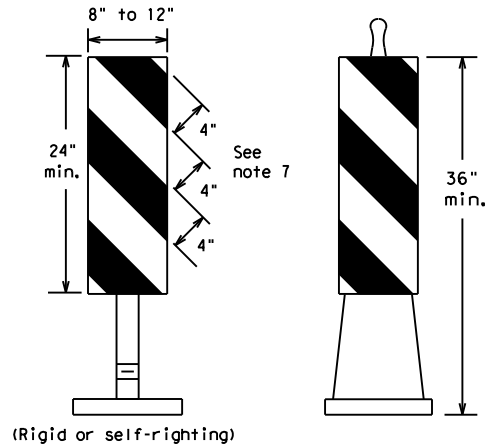
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**FIXED**  
(Rigid or self-righting)

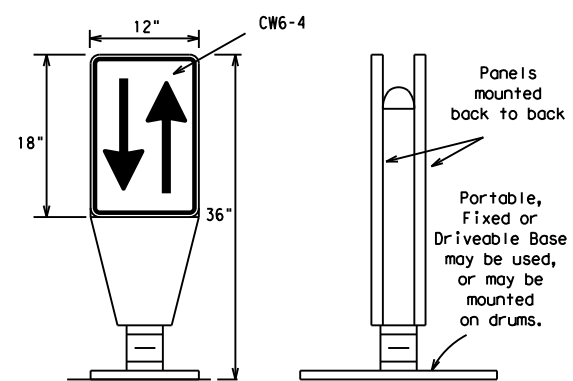
**DRIVEABLE**

- 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.



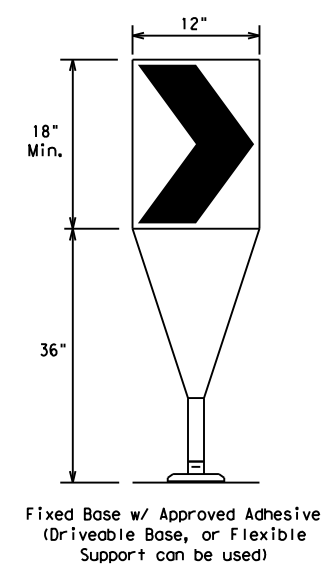
**PORTABLE**

**VERTICAL PANELS (VPs)**



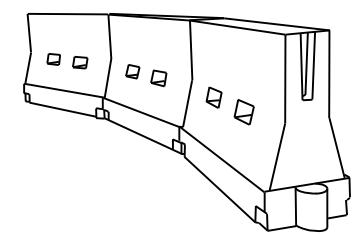
**OPPOSING TRAFFIC LANE DIVIDERS (OTLD)**

- 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

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**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

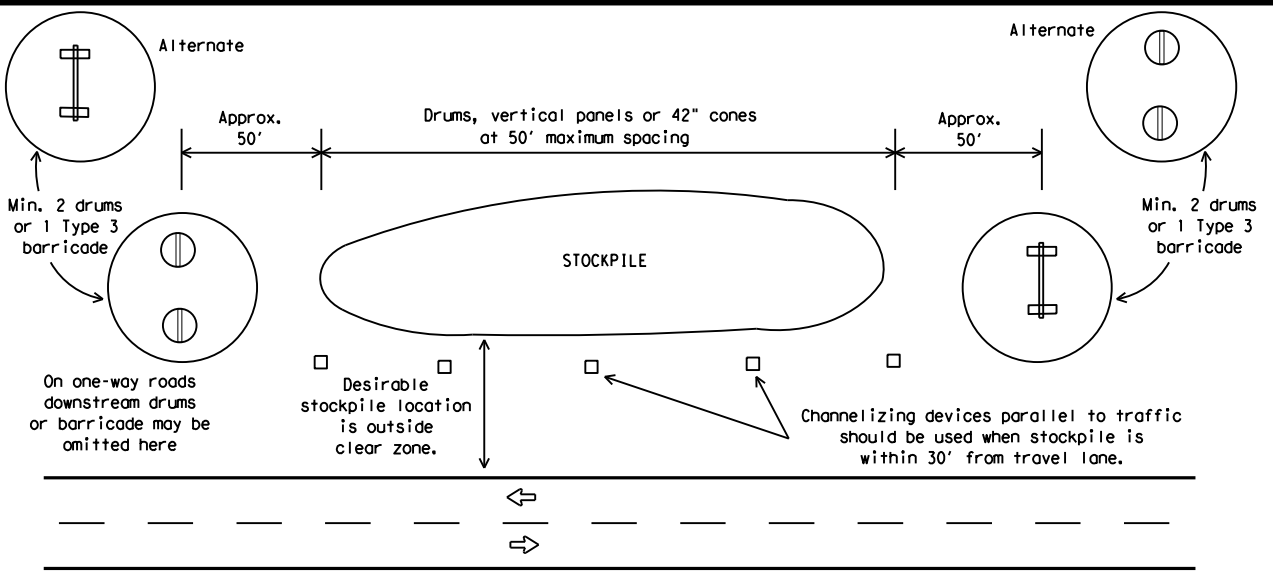


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



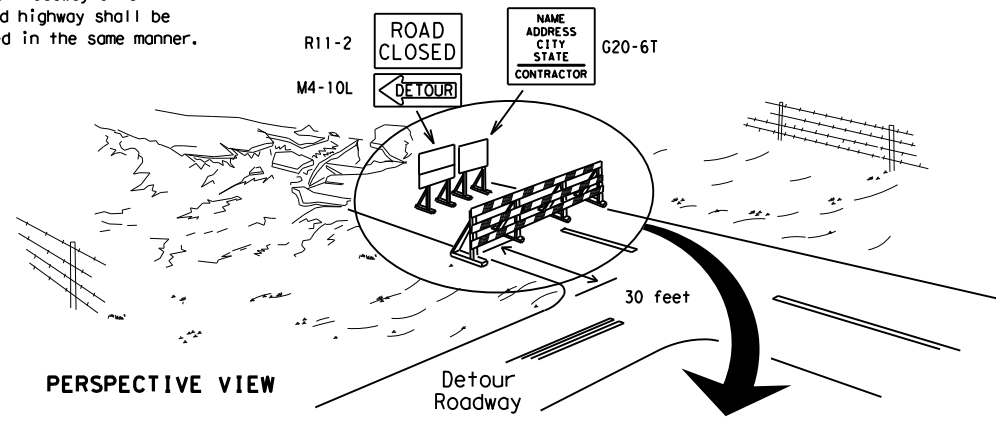
Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**

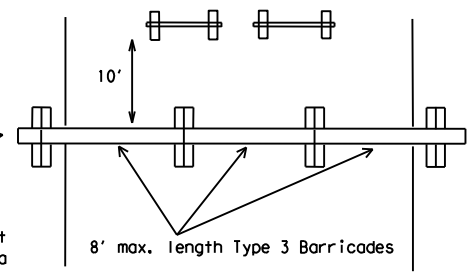
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

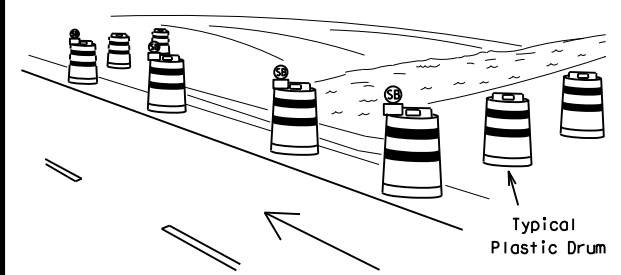
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.

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

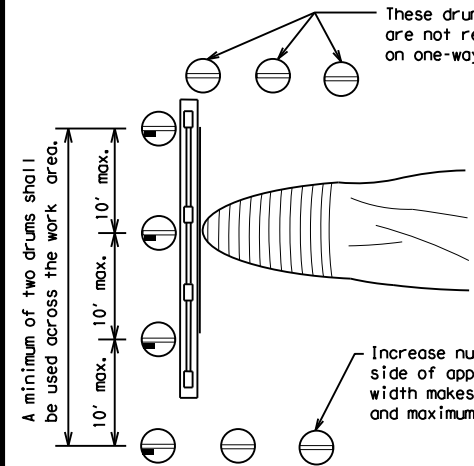


PLAN VIEW

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



PERSPECTIVE VIEW

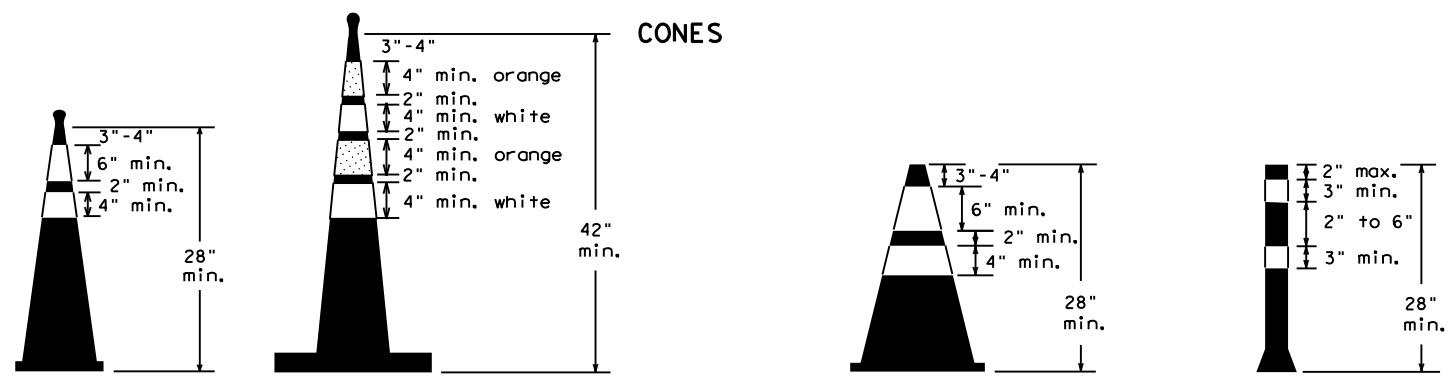


PLAN VIEW

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

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

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



Two-Piece cones

One-Piece cones

Tubular Marker

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

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A or Type B.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

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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.

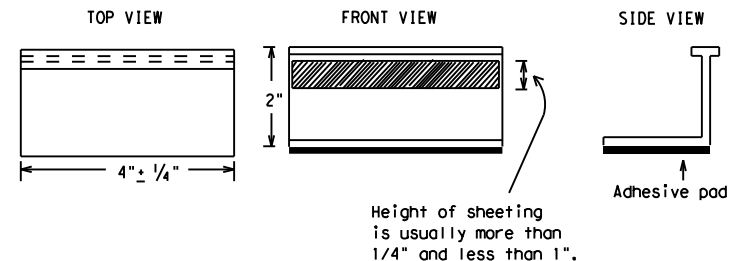
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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**

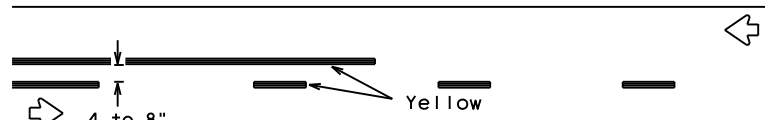
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© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, etc	FM 1100
2-98 9-07 5-21	DIST	COUNTY	SHEET NO.	
1-02 7-13	AUS	TRAVIS	26	
11-02 8-14				

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 DATE: 3/16/2023 4:22:35 PM  
 FILE: \\txdot.projectwiseonline.com:txdot14\Documents\14 - AUS\Design Projects\123401013\4 - Design\Plan Set\2 - TCP\Standards\bc-21.dgn

## PAVEMENT MARKING PATTERNS

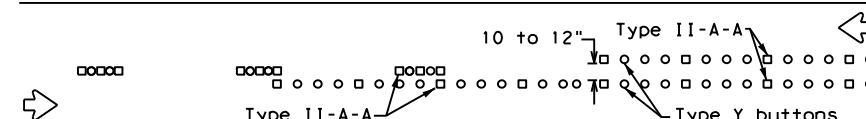


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

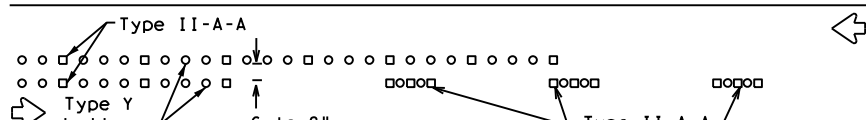


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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



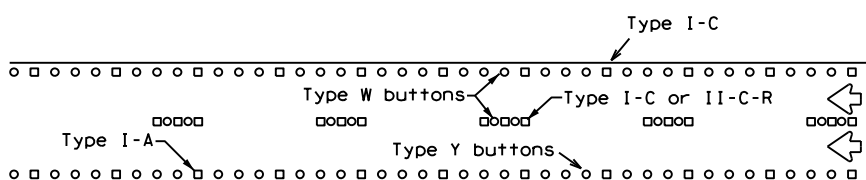
RAISED PAVEMENT MARKERS - PATTERN B

## 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.



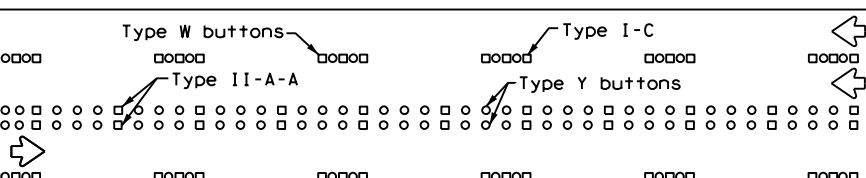
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



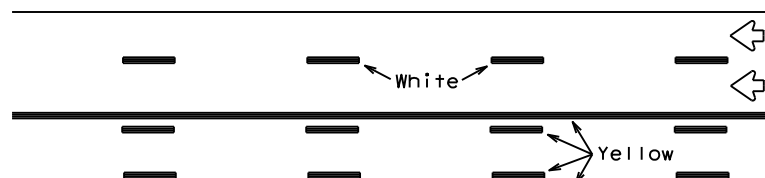
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



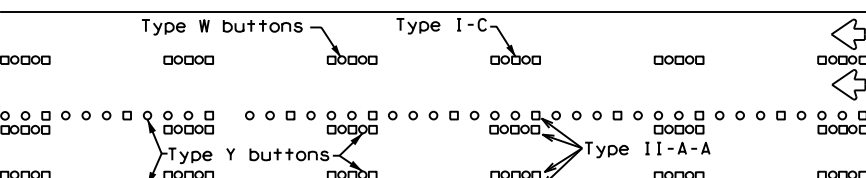
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



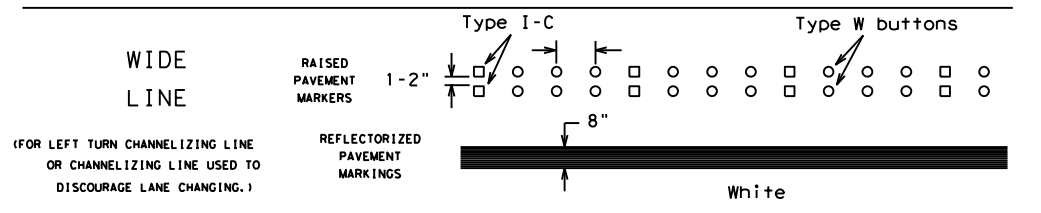
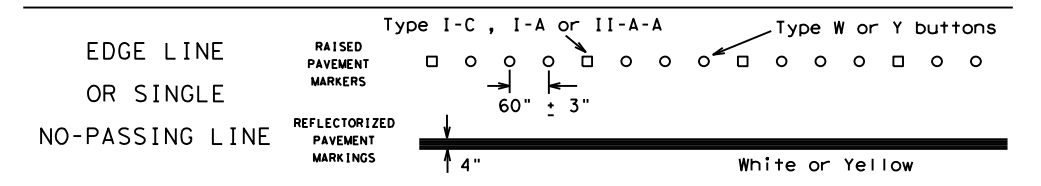
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

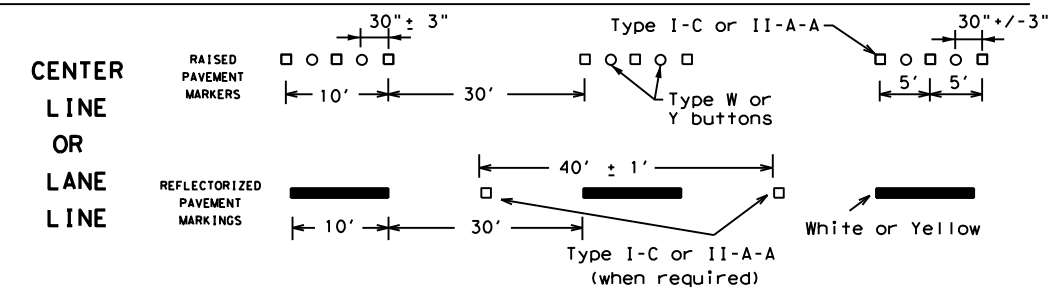
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



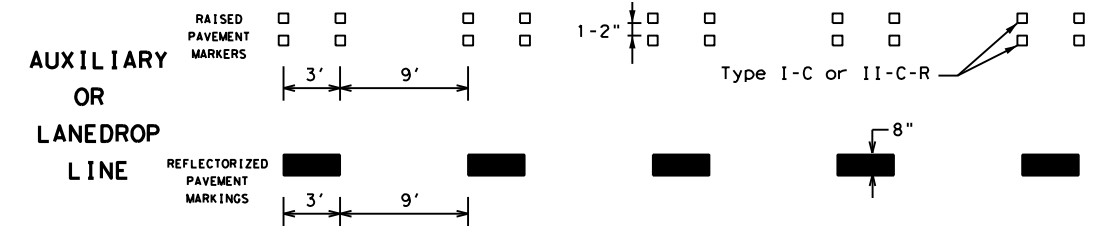
### SOLID LINES



(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

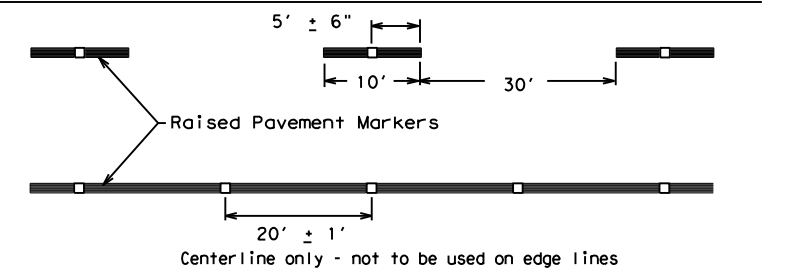


### BROKEN LINES



### REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



SHEET 12 OF 12



## BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

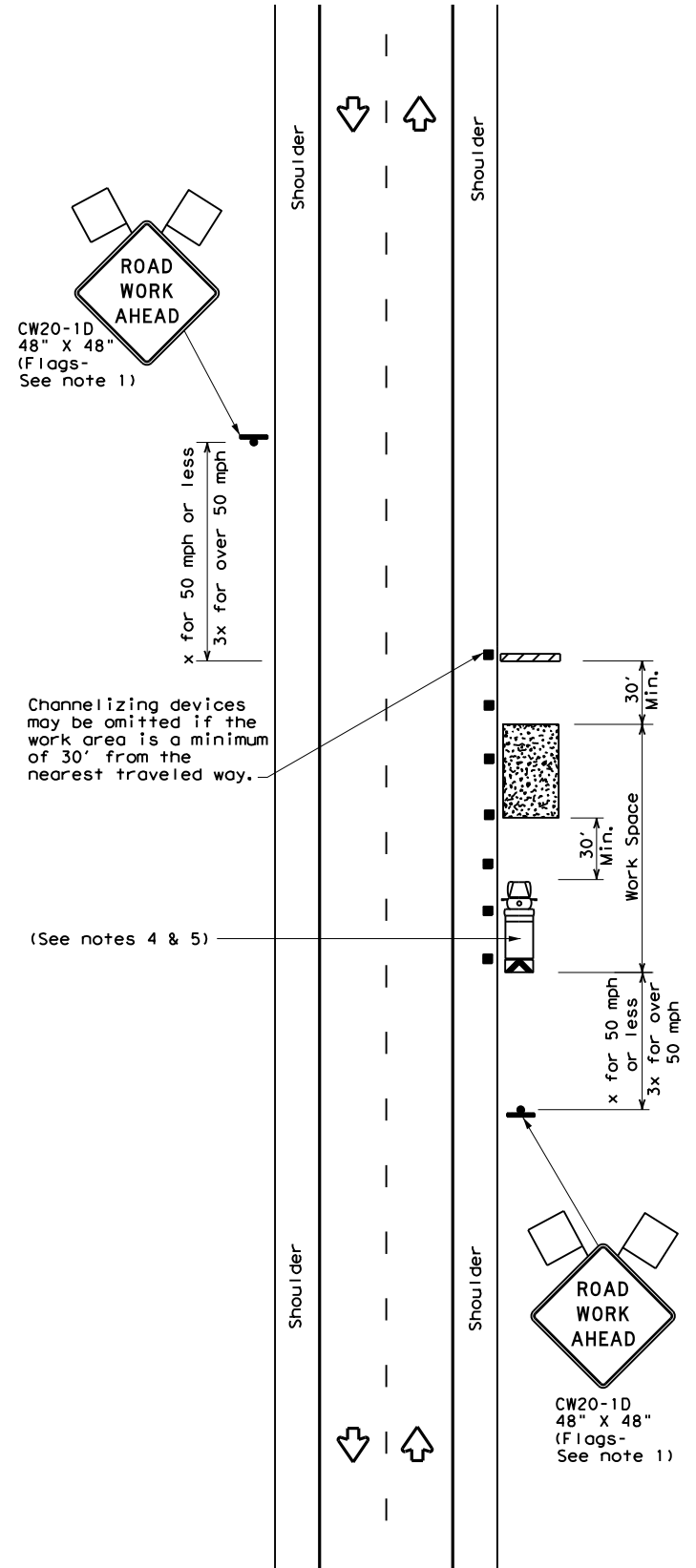
BC(12)-21

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, etc	FM 1100
1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	AUS	TRAVIS	27	
11-02 8-14				

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."

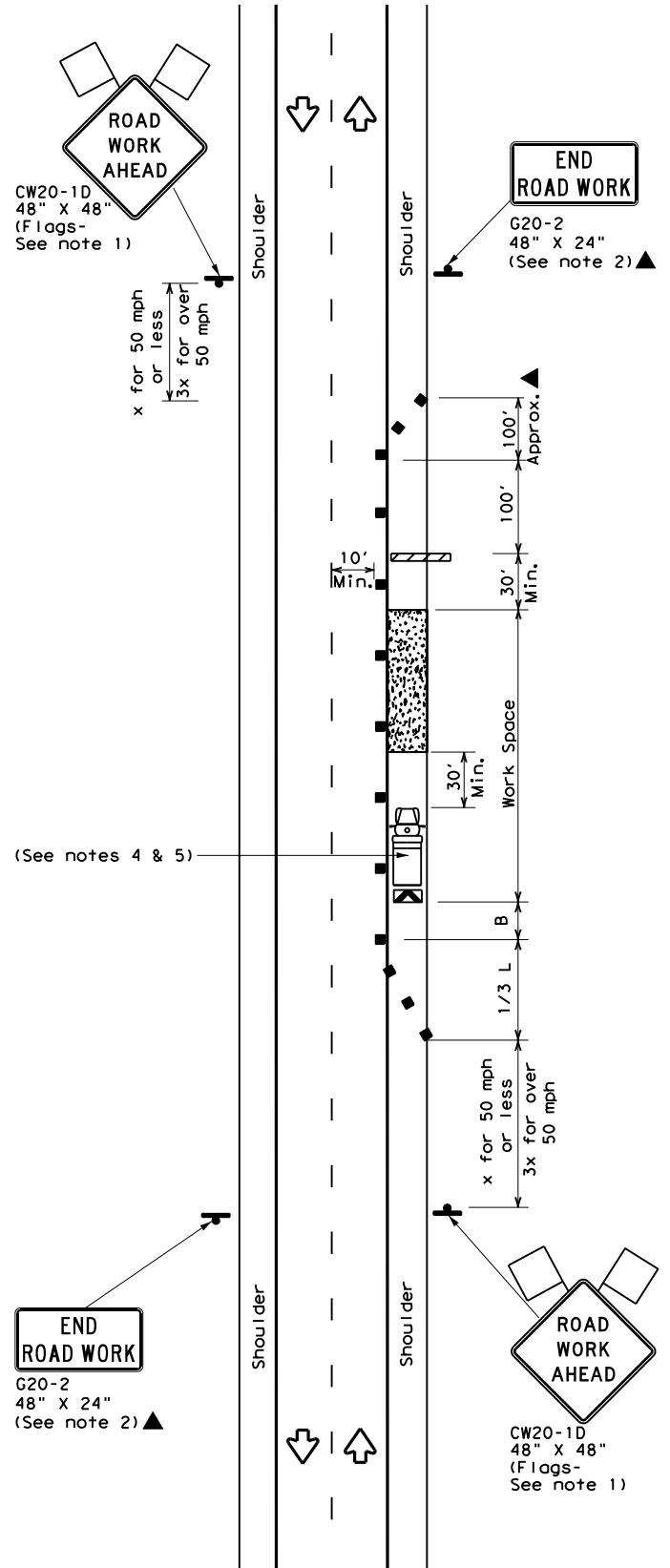
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DATE: 3/16/2023 4:22:45 PM  
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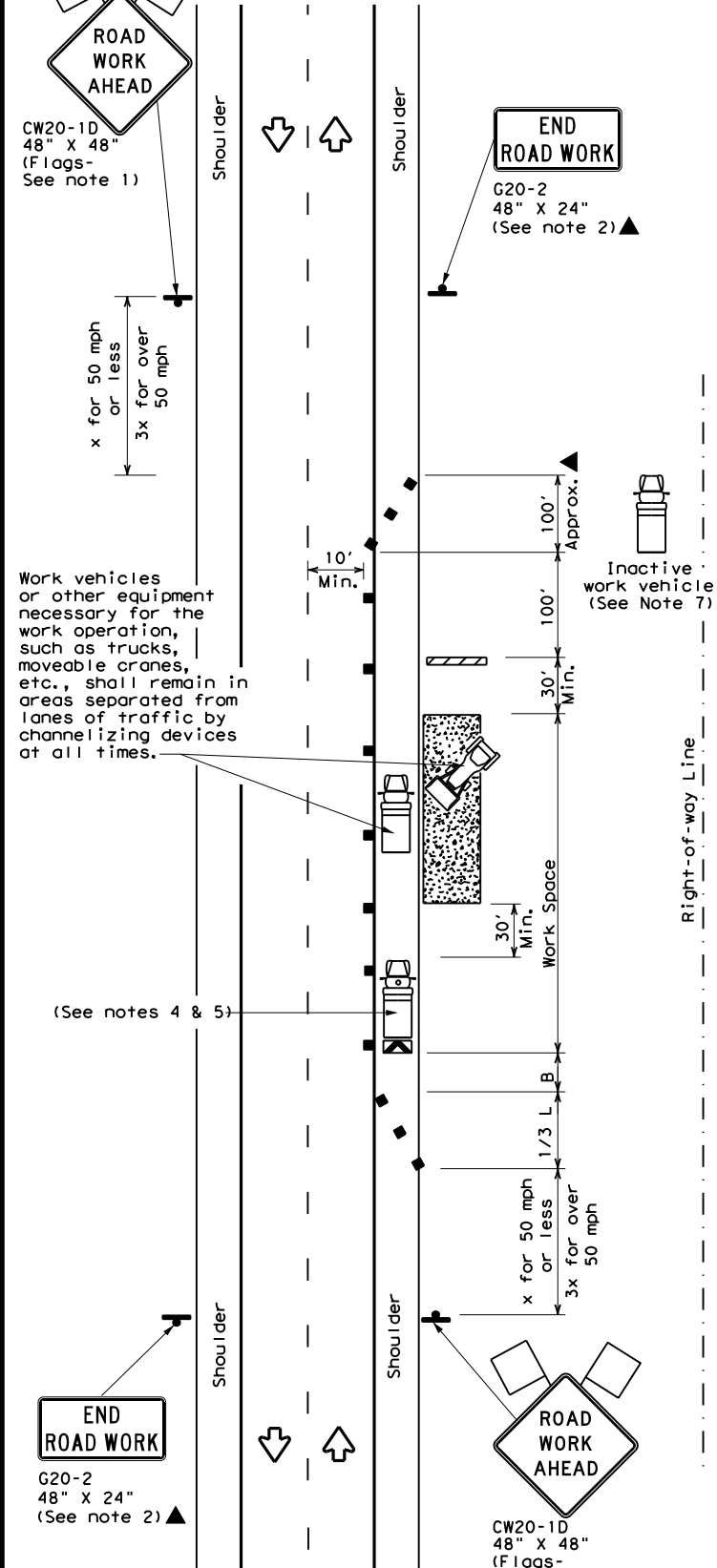
TCP (2-1a)

**WORK SPACE NEAR SHOULDER**  
 Conventional Roads



TCP (2-1b)

**WORK SPACE ON SHOULDER**  
 Conventional Roads



TCP (2-1c)

**WORK VEHICLES ON SHOULDER**  
 Conventional Roads

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

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

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

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

**GENERAL NOTES**

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

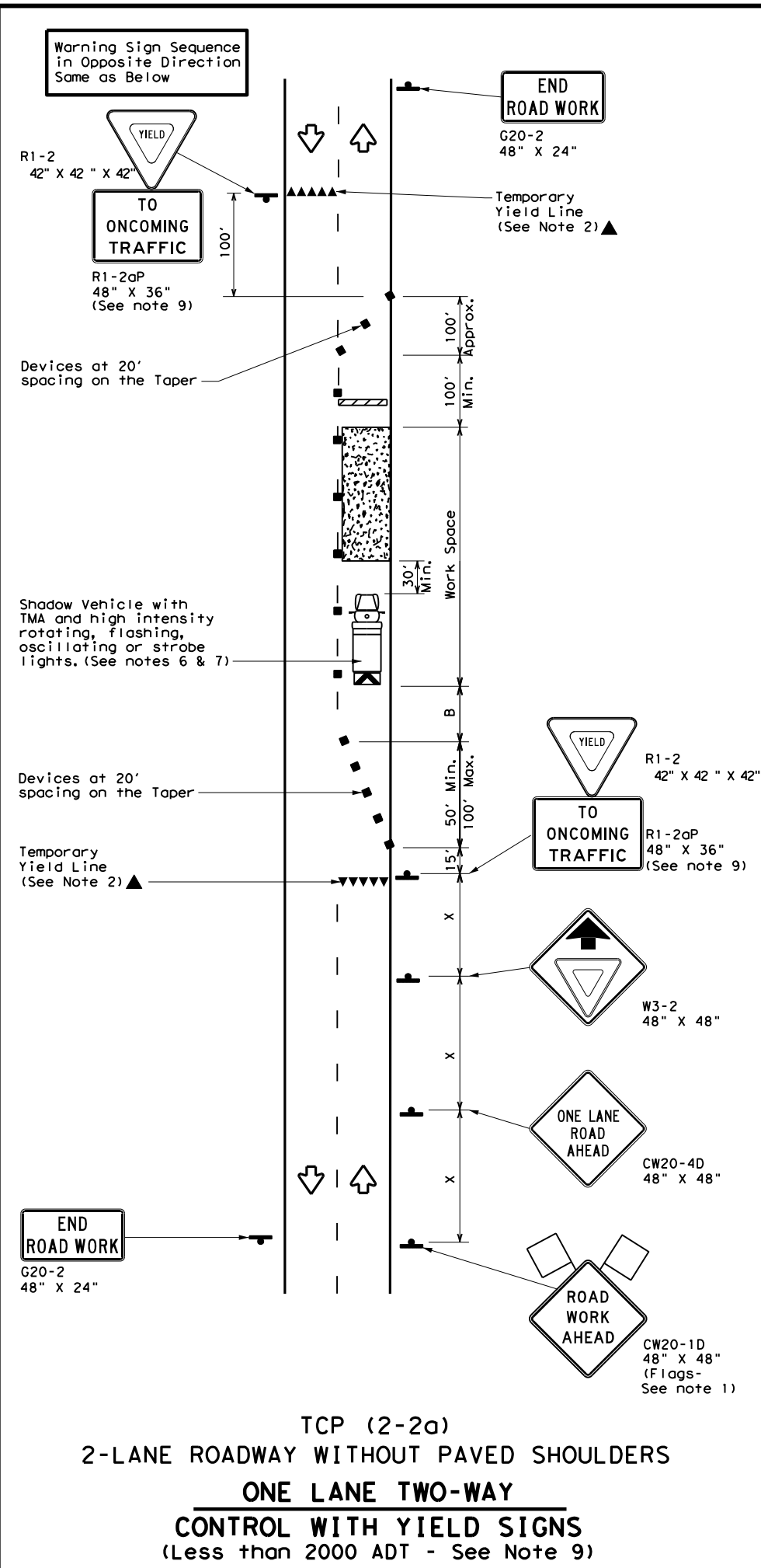


**TRAFFIC CONTROL PLAN**  
**CONVENTIONAL ROAD**  
**SHOULDER WORK**

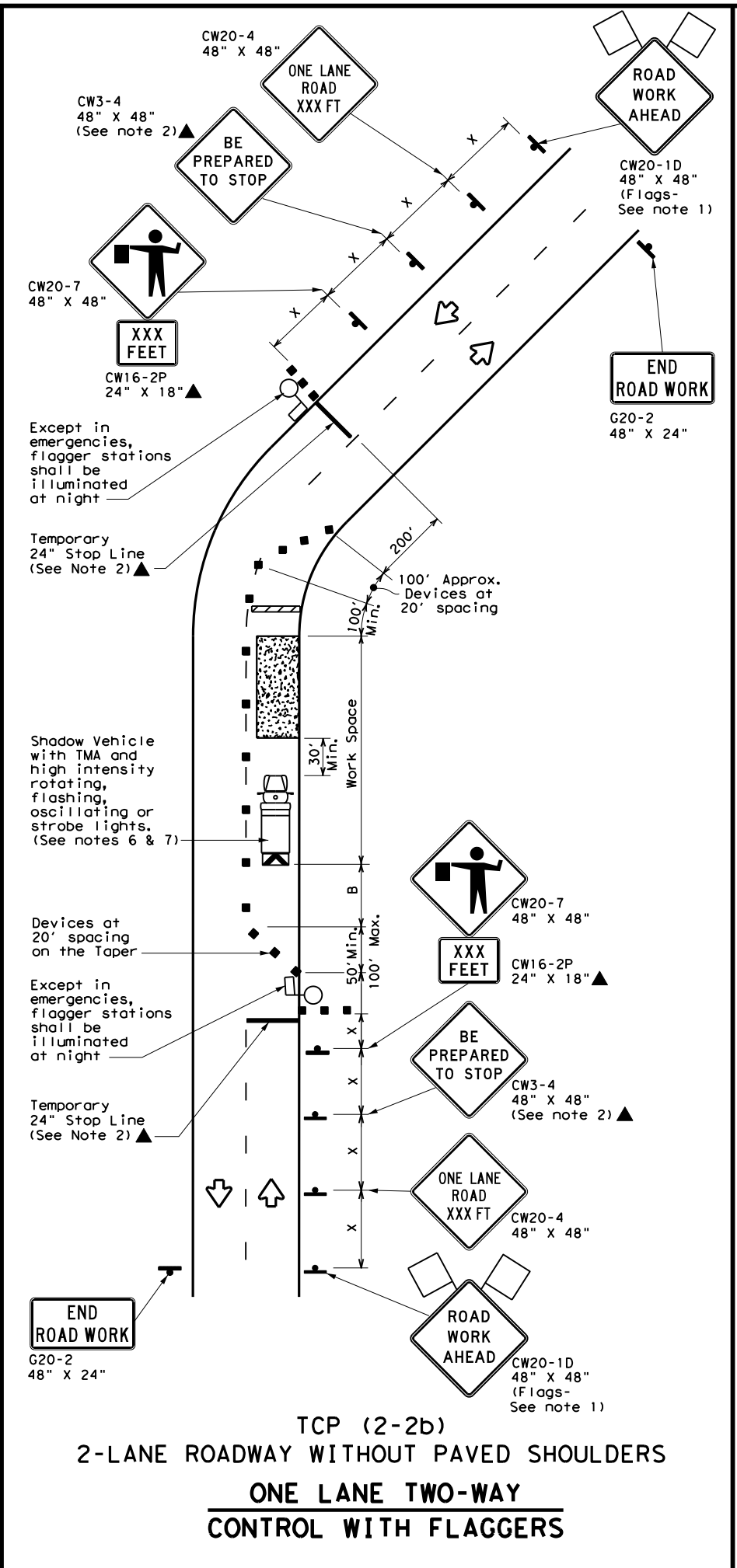
**TCP (2-1) - 18**

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, etc	FM 1100
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	AUS	TRAVIS	28	
1-97 2-18				

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



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

**LEGEND**

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

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

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

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

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

Texas Department of Transportation  
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN  
 ONE-LANE TWO-WAY  
 TRAFFIC CONTROL**

**TCP (2-2) - 18**

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© TxDOT December 1985	CON: 1234	SECT: 01	JOB: 013, etc	HIGHWAY: FM 1100
8-95 3-03	REVISIONS:	DIST: AUS	COUNTY: TRAVIS	SHEET NO.: 29
1-97 2-12				
4-98 2-18				



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 FILE: \\txdot.projectwiseonline.com:txdot14\Documents\14 - AUS\Design Projects\14-01-001\14-01-001.dgn

Traffic Control Devices shown for one direction

New pavement surface should extend to this point. (See note 2)

CW1-6  
48" X 24"  
(See note 2) ▲

OM-3 Object Markers

4" Solid White Edgeline

Type II-A-A Raised Pavement Markers on 40' C-C.

4" Double Yellow Line

New pavement surface should extend to this point. (See note 5)

END ROAD WORK G20-2  
48" X 24"

CW1-6  
48" X 24"  
(See note 2) ▲

Warning Reflectors may be added on top of channelizing devices for additional conspicuity at night. Warning Reflectors, chevrons or steady-burn warning lights may be added if drums or longitudinal channelizing devices are used. (Both directions)

Barricades may be offset to permit workers and equipment to enter and exit work space.

CW1-4R  
48" X 48"

XX MPH  
CW13-1P  
24" X 24"

ROAD CLOSED  
R11-2  
48" X 30"

CW1-6  
48" X 24"

CW1-4L  
48" X 48"

XX MPH  
CW13-1P  
24" X 24"  
(See note 2) ▲

ROAD WORK XXX FT  
CW20-1A, B or C  
48" X 48"

ROAD WORK AHEAD  
CW20-1D  
48" X 48"  
(Flags - See note 1)

TCP (2-7a)

**ROADWAY DIVERSION**

Traffic Control Devices shown for one direction

END ROAD WORK G20-2  
48" X 24"

PASS WITH CARE  
R4-2  
24" X 30"  
If applicable

CTB with safety end treatment, or other barrier system as detailed elsewhere in the plans.

4" Solid White Edgeline

4" Double Yellow Line  
1"-2"  
Type II-A-A Raised Pavement Markers on 40' C-C.

NARROW BRIDGE  
CW5-2  
48" X 48"  
(See note 6)

DO NOT PASS  
R4-1  
24" X 30"

ROAD WORK AHEAD  
CW20-1D  
48" X 48"  
(Flags - See note 1)

TCP (2-7b)

**BRIDGE WIDENING**

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

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

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

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.

- TCP (2-7a)**
- Raised pavement markers shall be placed 40 feet c-c on centerline throughout project.
  - Roadway diversion design requirements should be based on posted speed limit or prevailing speed.
  - New pavement surface should be extended across existing roadway edge to a point where existing pavement markings left in place during project do not conflict with construction area pavement marking.

- TCP (2-7b)**
- The CW5-2 "Narrow Bridge" sign may be omitted if lane and shoulder widths are maintained.

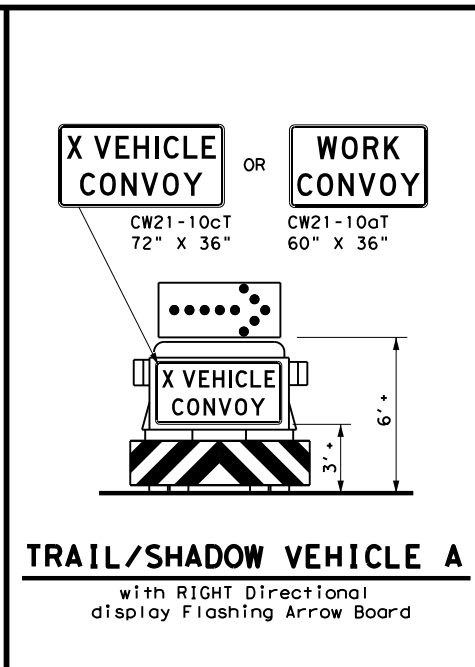
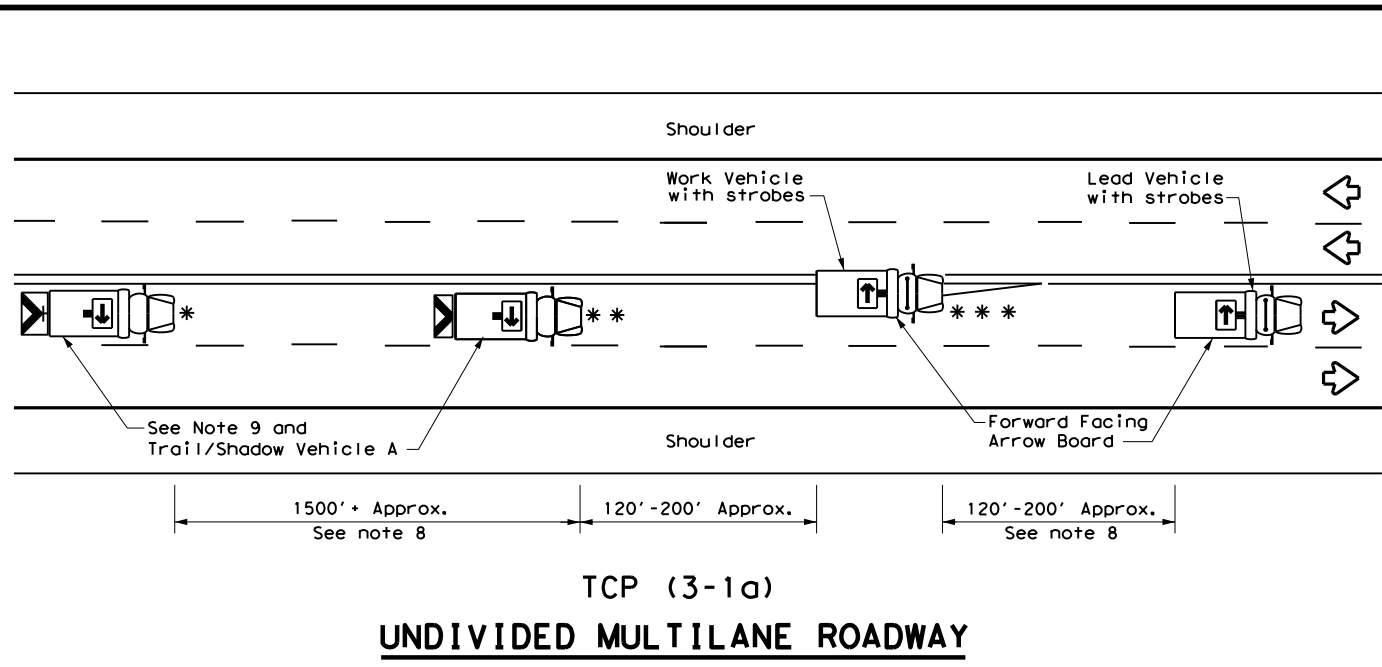
**TRAFFIC CONTROL PLAN  
 DIVERSIONS AND  
 NARROW BRIDGES**

**TCP (2-7) - 18**

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, etc	FM 1100
8-95 3-03	DIST	COUNTY	SHEET NO.	
1-97 2-12	AUS	TRAVIS	30	
4-98 2-18				



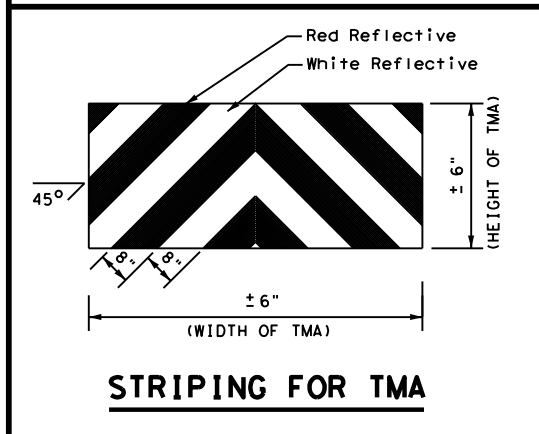
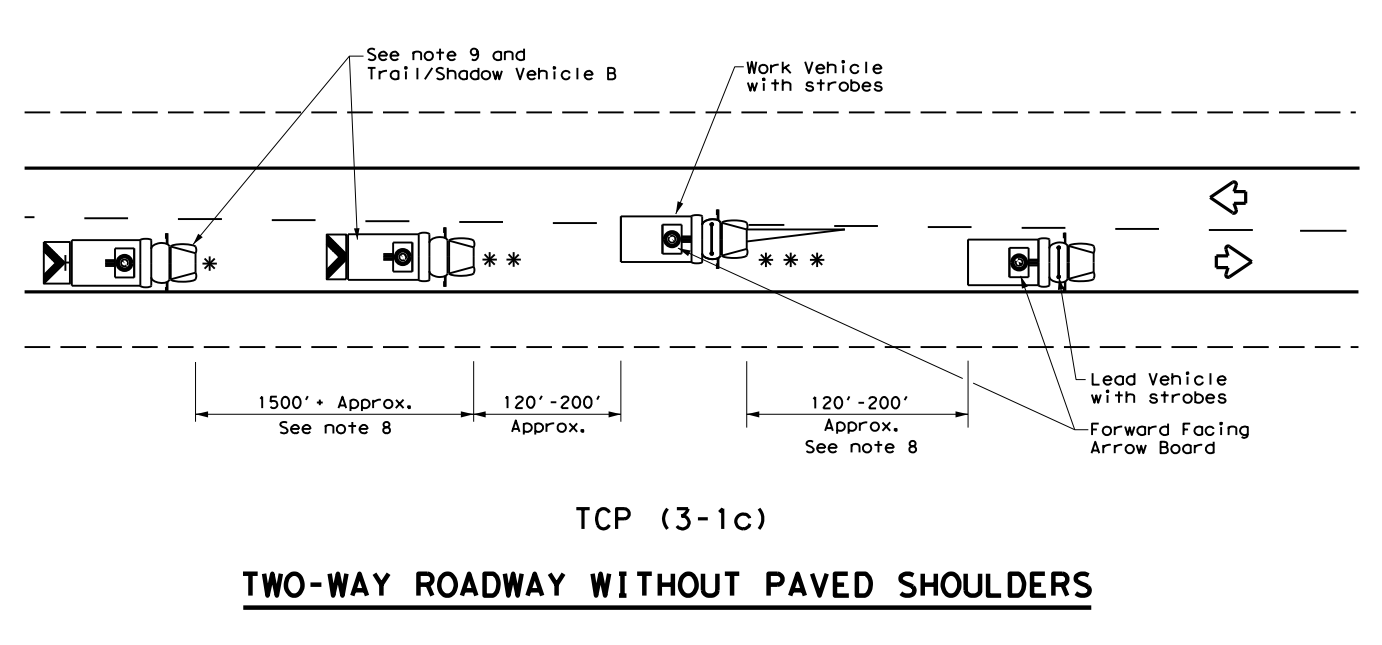
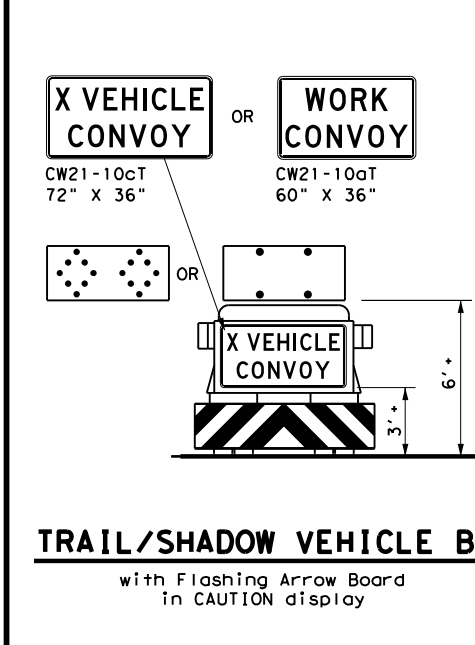
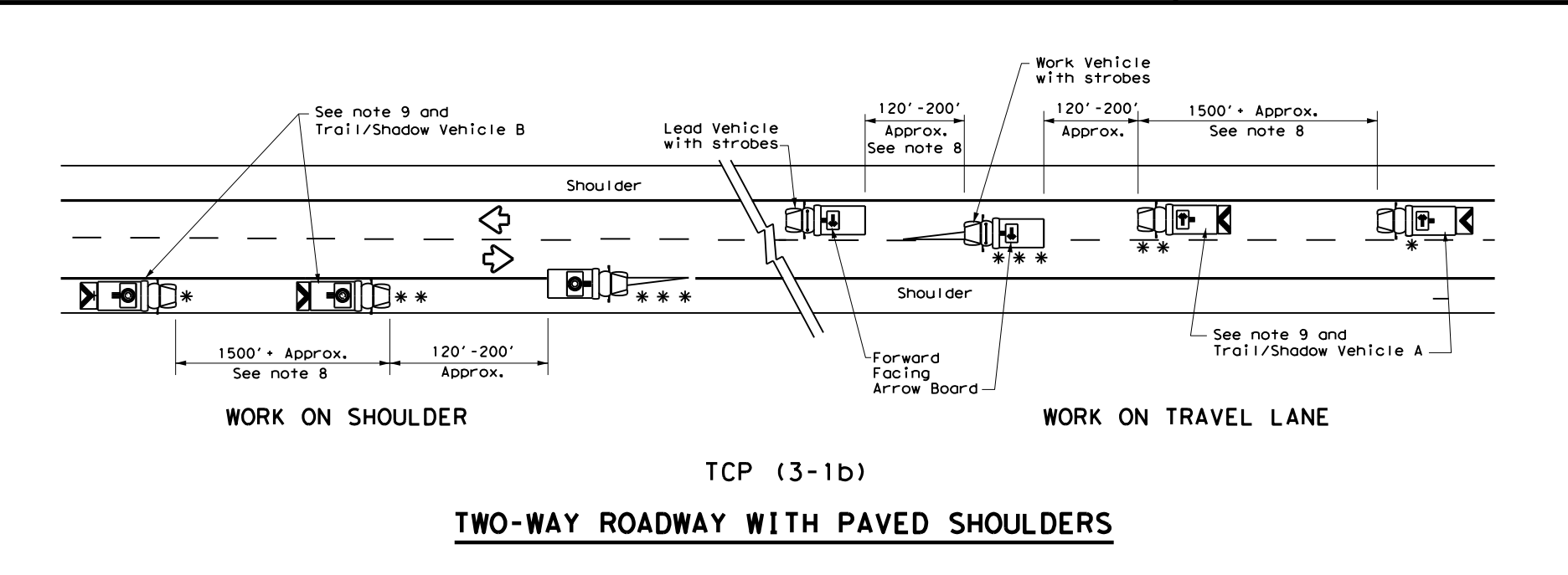
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 PROJECT: 14-11-2023  
 DRAWING: 14-11-2023-01  
 TITLE: TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS  
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LEGEND				
*	Trail Vehicle	ARROW BOARD DISPLAY		
**	Shadow Vehicle			
***	Work Vehicle		RIGHT Directional	
	Heavy Work Vehicle		LEFT Directional	
	Truck Mounted Attenuator (TMA)		Double Arrow	
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)	
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
✓				

**GENERAL NOTES**

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



Traffic Operations Division Standard

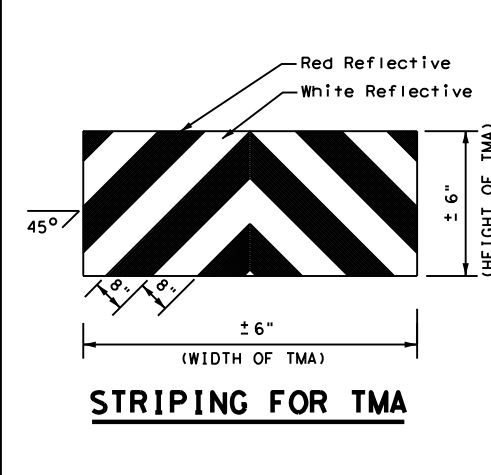
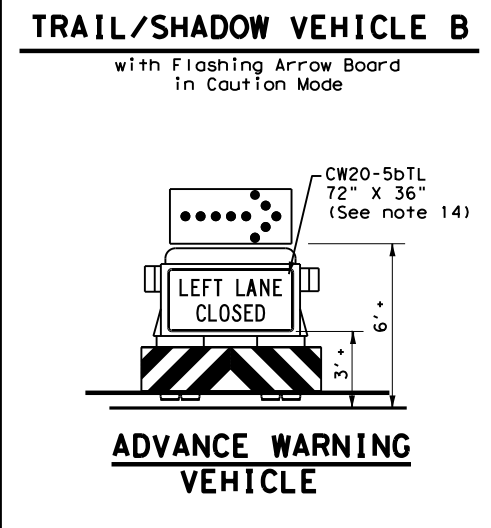
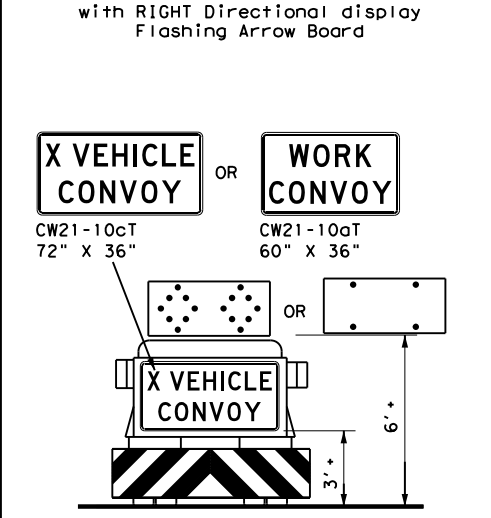
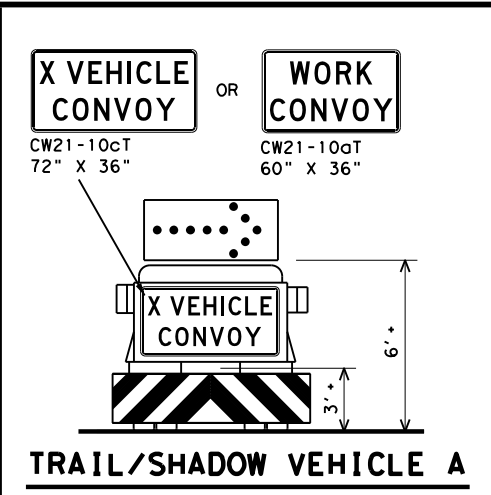
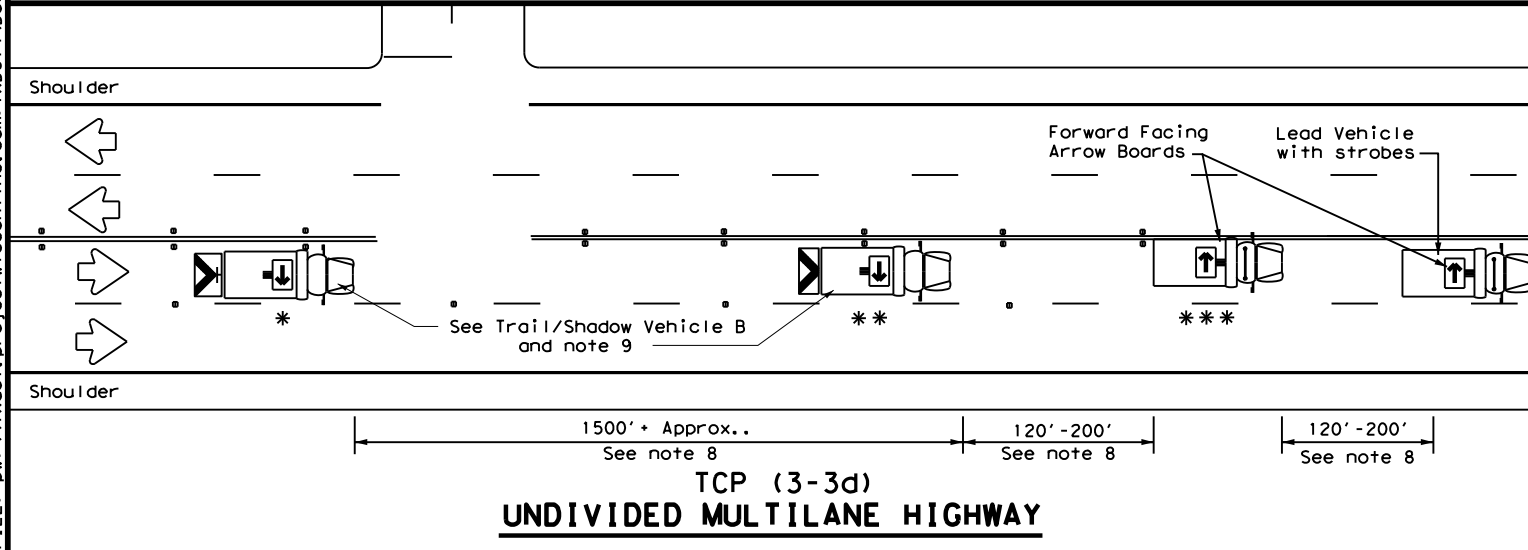
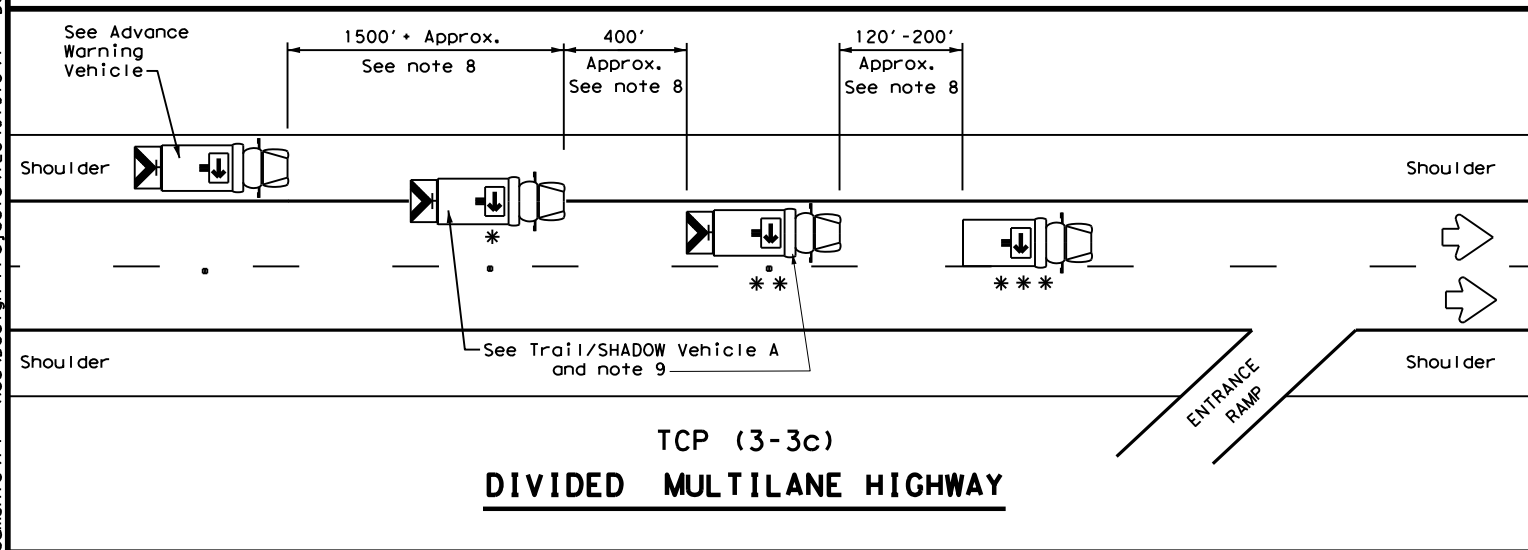
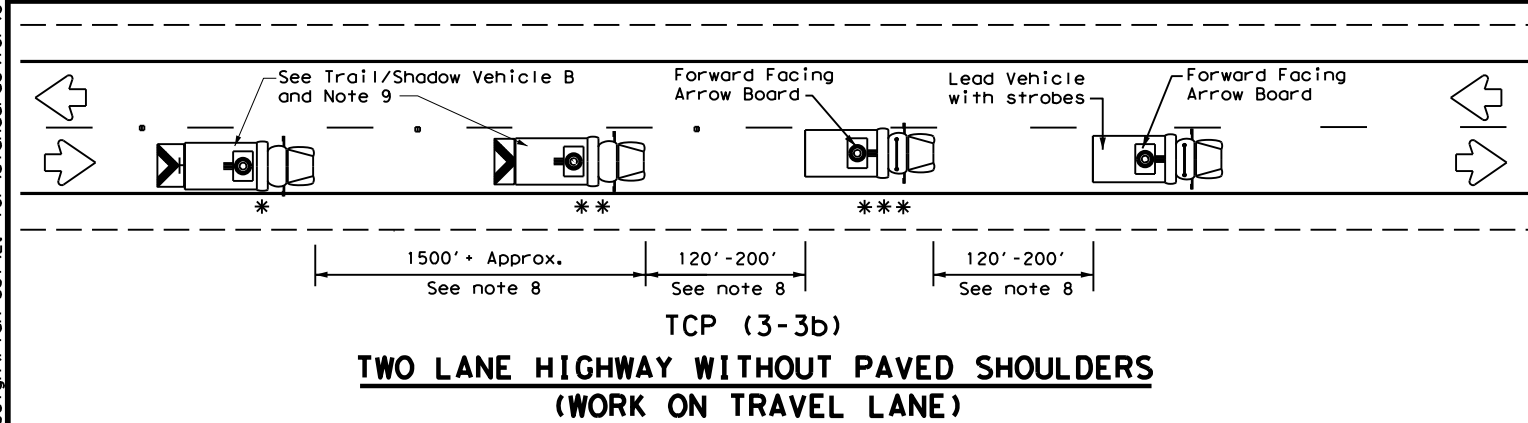
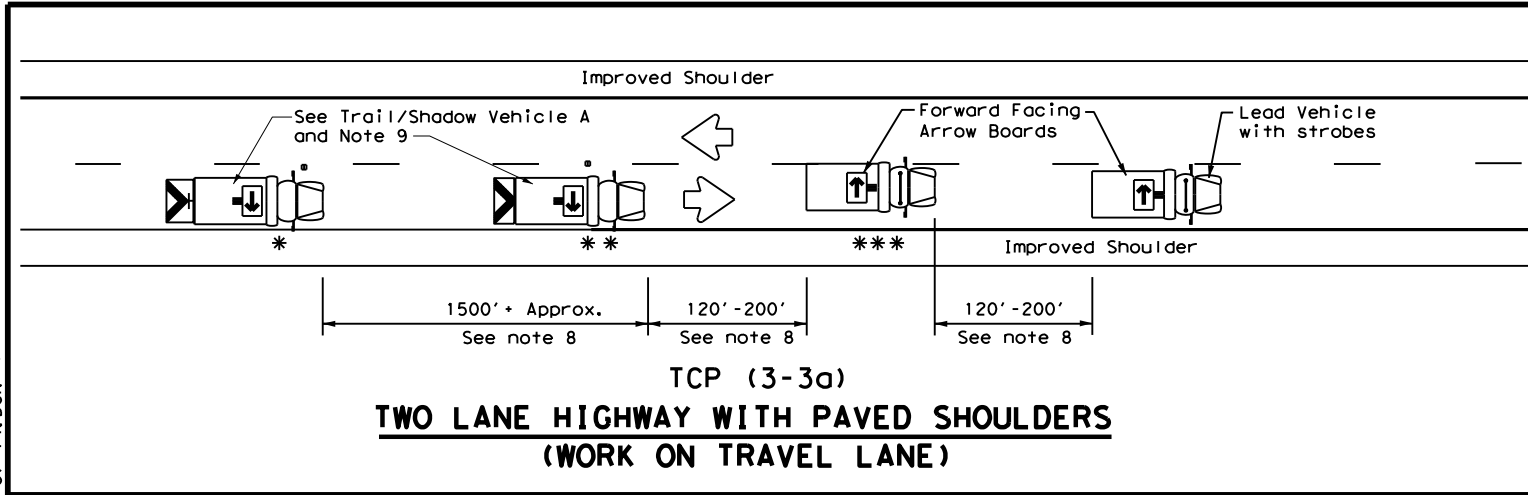
**Texas Department of Transportation**

**TRAFFIC CONTROL PLAN  
MOBILE OPERATIONS  
UNDIVIDED HIGHWAYS**

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

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**LEGEND**

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

**TYPICAL USAGE**

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

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

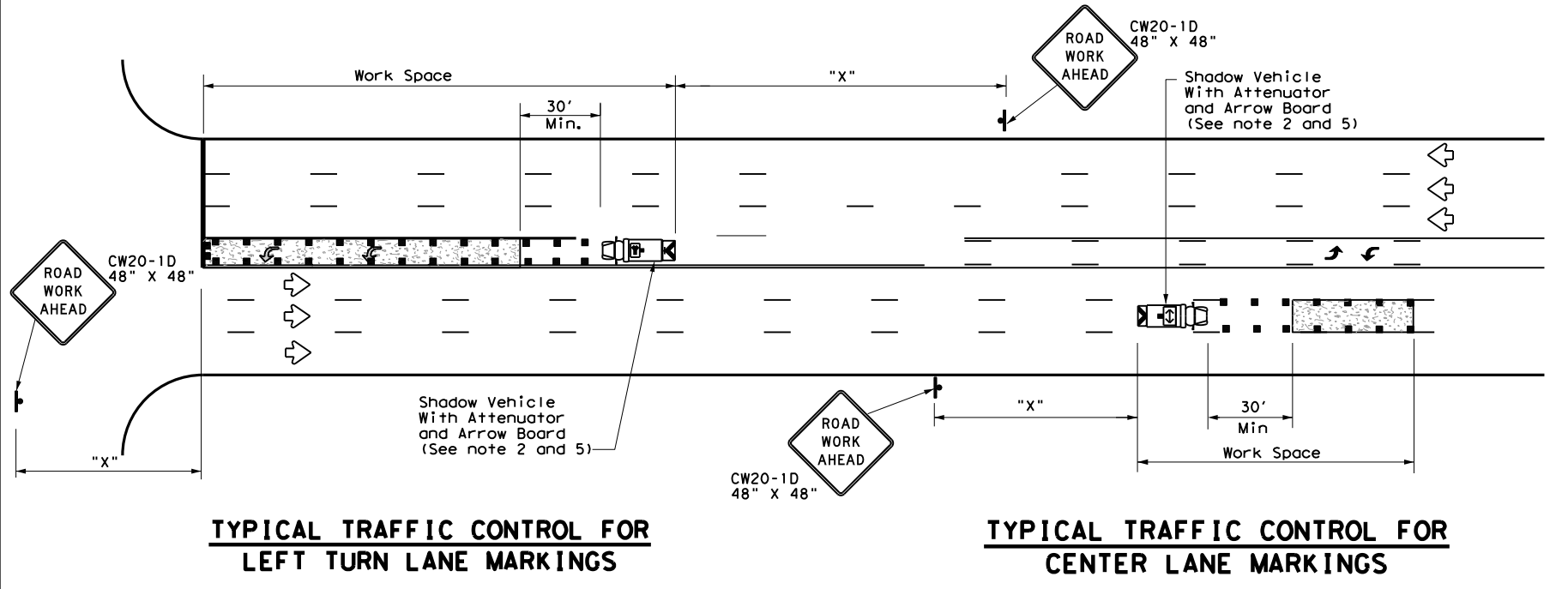
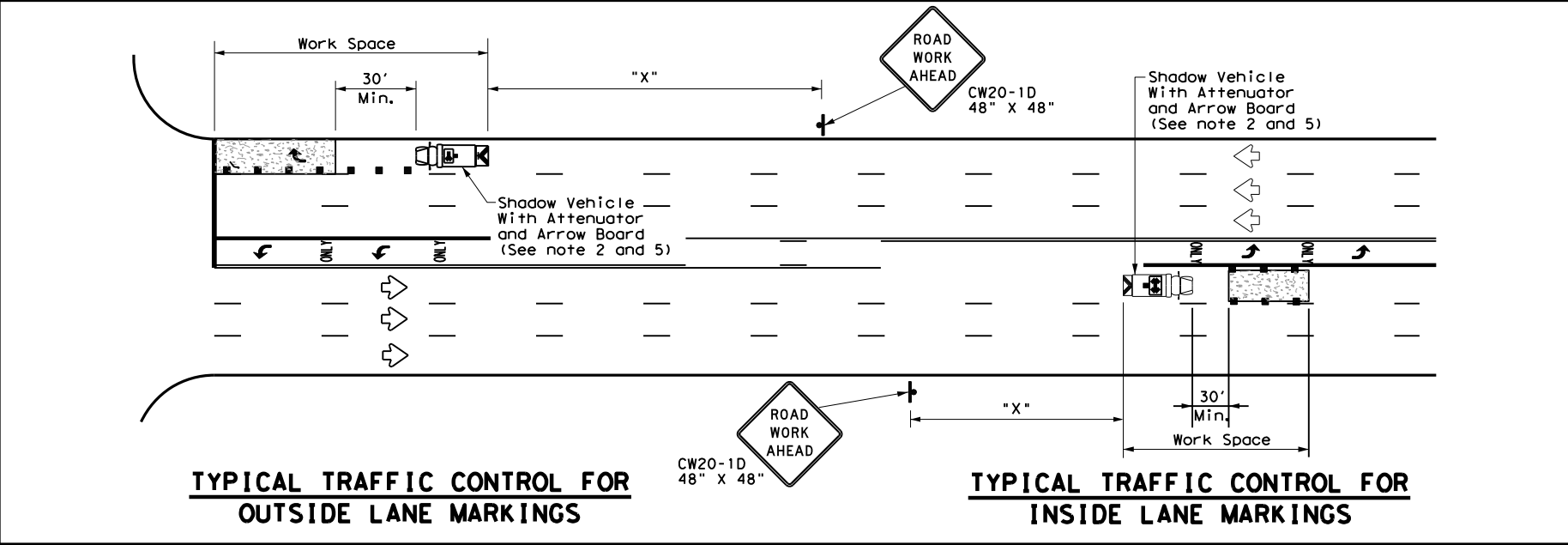
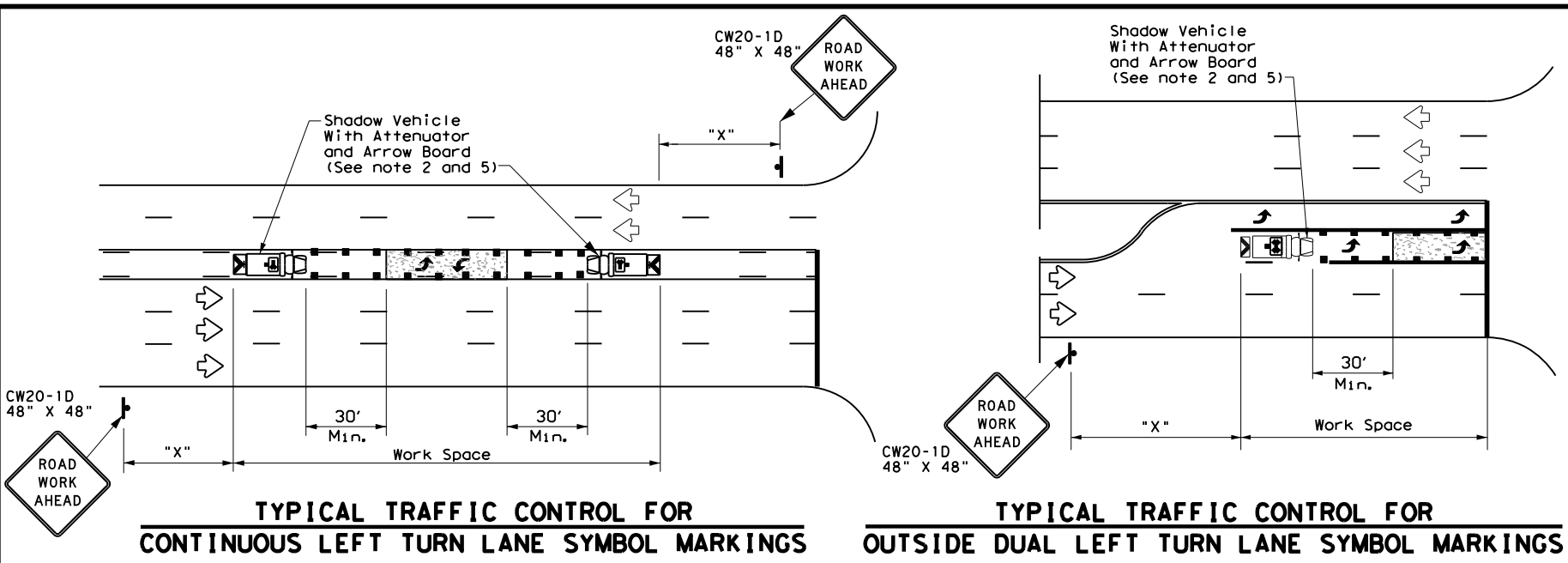
Texas Department of Transportation

Traffic Operations Division Standard

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

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

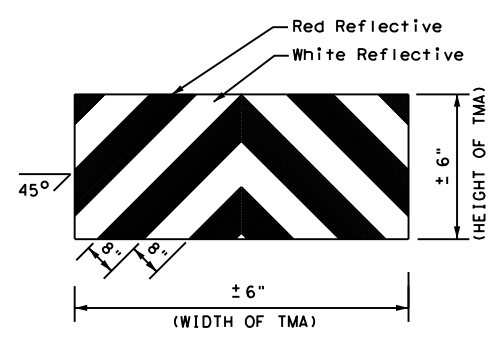
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <sup>2</sup> / 60	150'	165'	180'	30'	60'	120'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

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

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

**GENERAL NOTES**

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



Texas Department of Transportation  
 Traffic Operations Division Standard

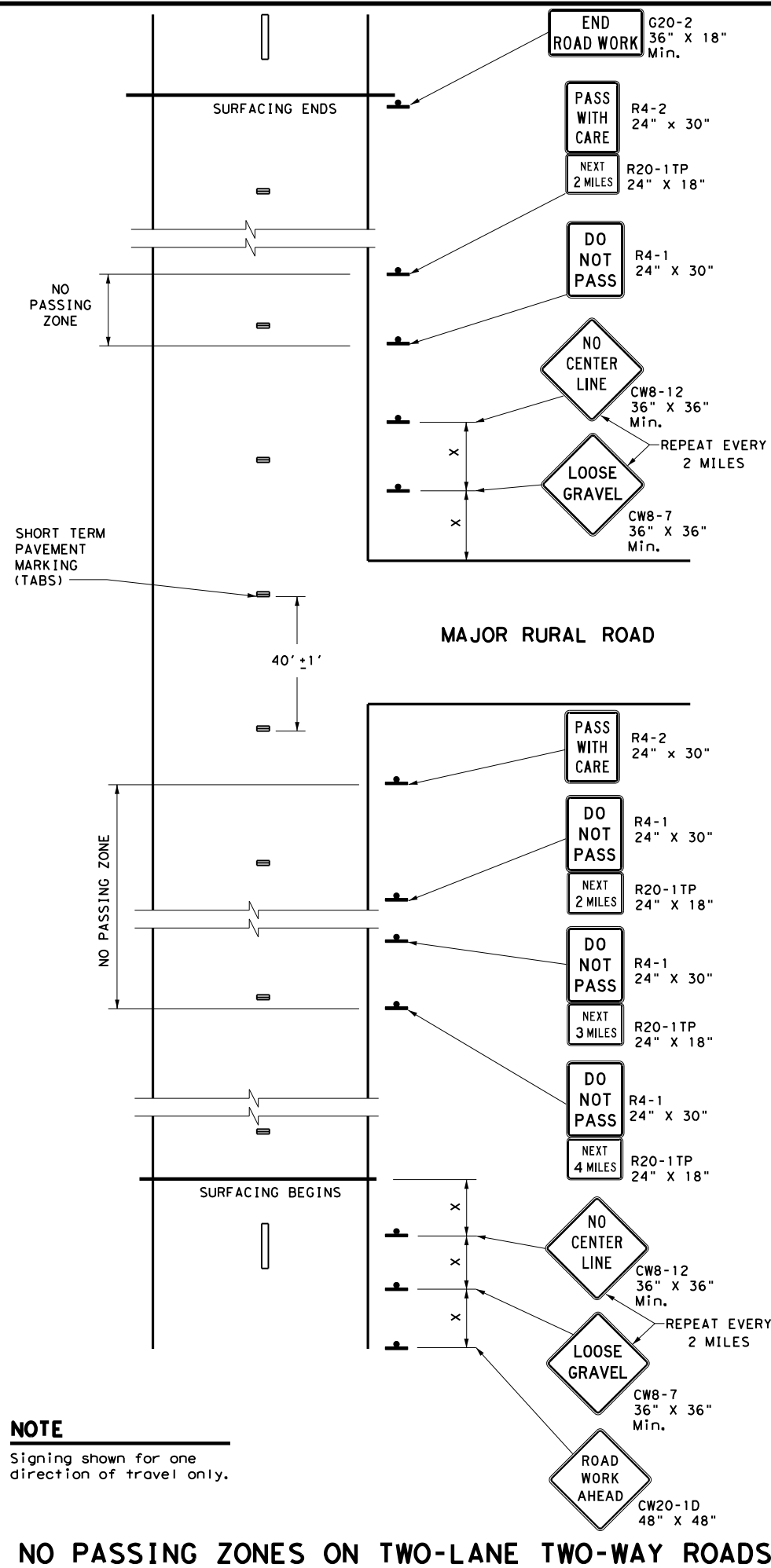
**TRAFFIC CONTROL PLAN  
 MOBILE OPERATIONS FOR  
 ISOLATED WORK AREAS  
 UNDIVIDED HIGHWAYS**

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

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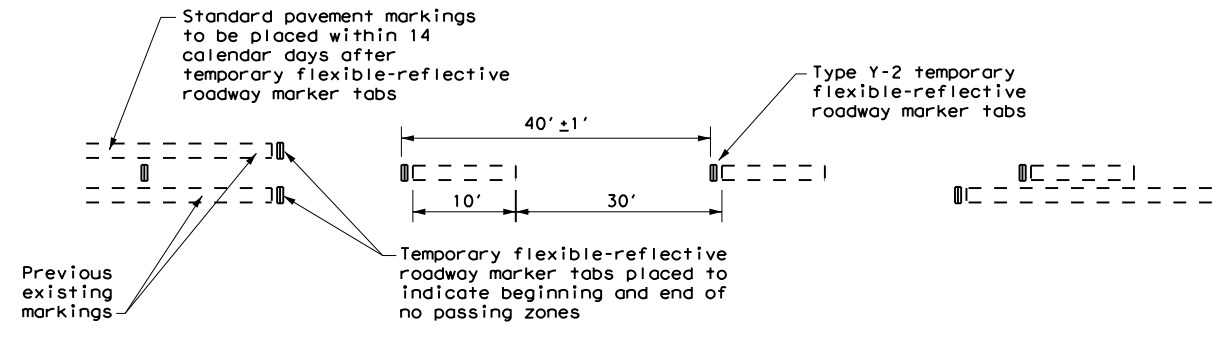
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**NOTE**  
 Signing shown for one direction of travel only.

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



**TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS**  
 For seal coat, micro-surface or similar operations

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

\* Conventional Roads Only

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

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

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

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

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

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

**PAVEMENT MARKINGS**

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

**COORDINATION OF SIGN LOCATIONS**

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

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

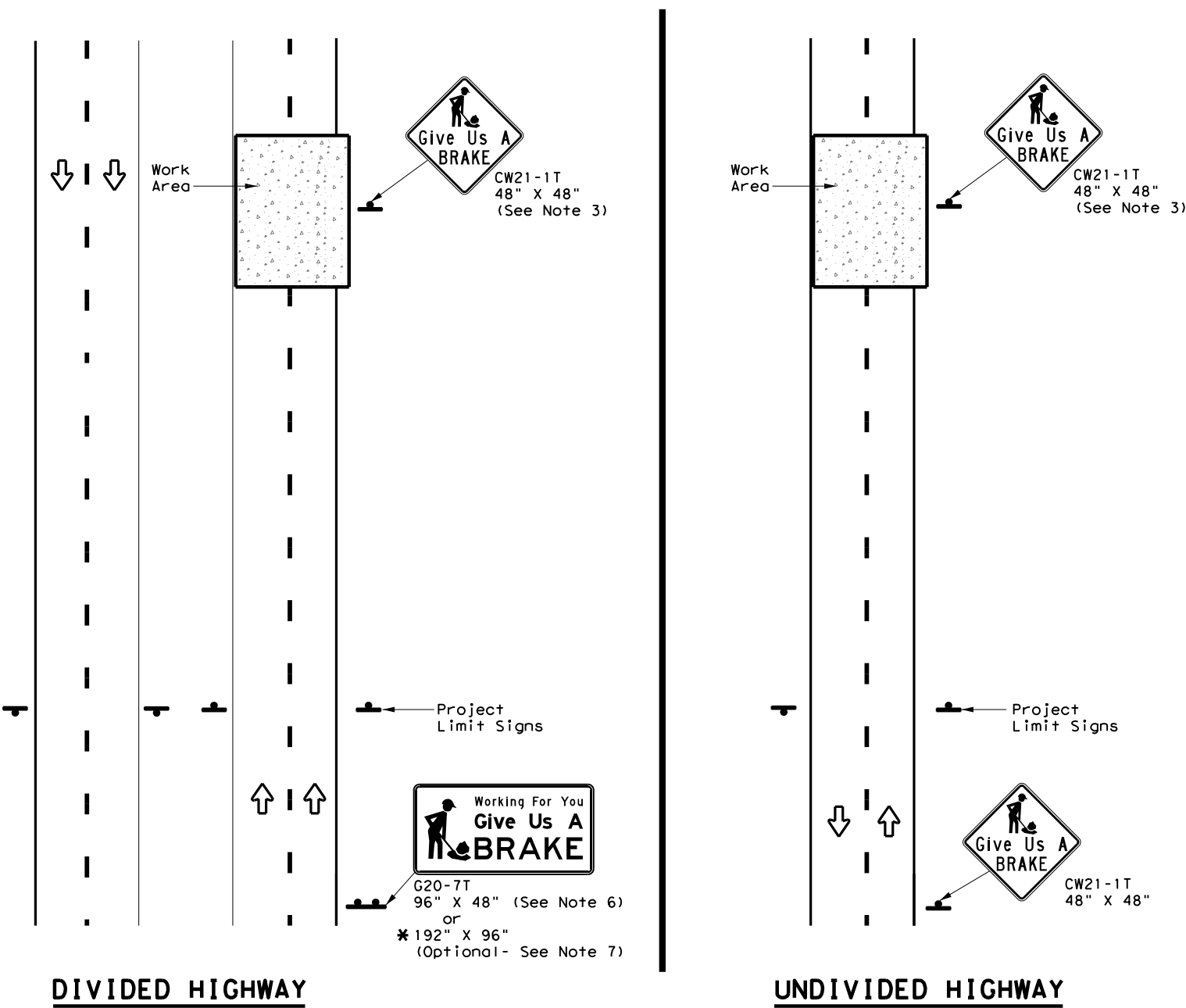
**GENERAL NOTES**

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

**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**  
**TCP (7-1) - 13**

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SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

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

▲ See Note 6 Below

**LEGEND**

	Sign
	Large Sign
	Traffic Flow

**DEPARTMENTAL MATERIAL SPECIFICATIONS**

PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

Texas Department of Transportation  
 Traffic Operations Division Standard

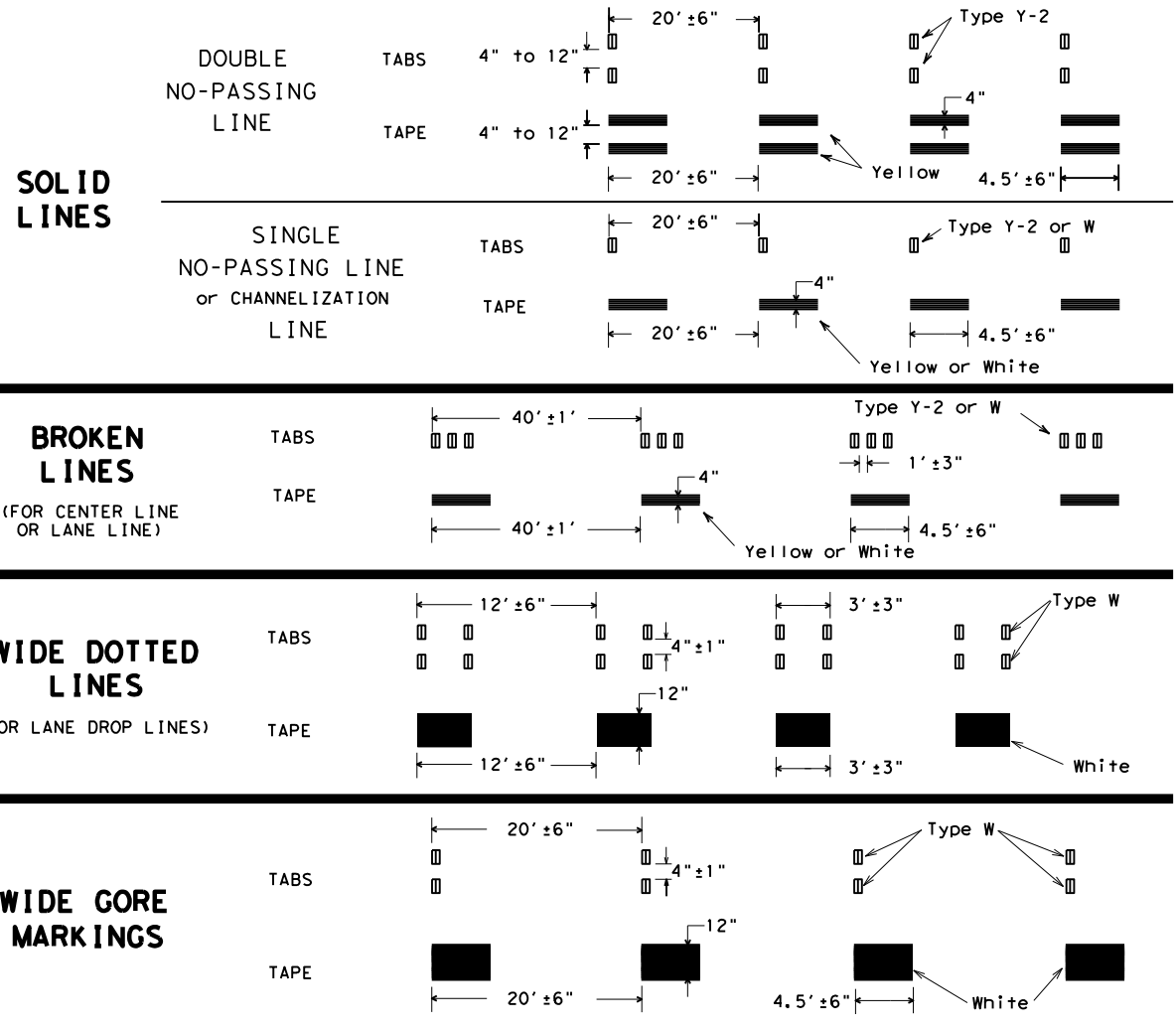
**WORK ZONE "GIVE US A BRAKE" SIGNS**

**WZ (BRK) - 13**

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## WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



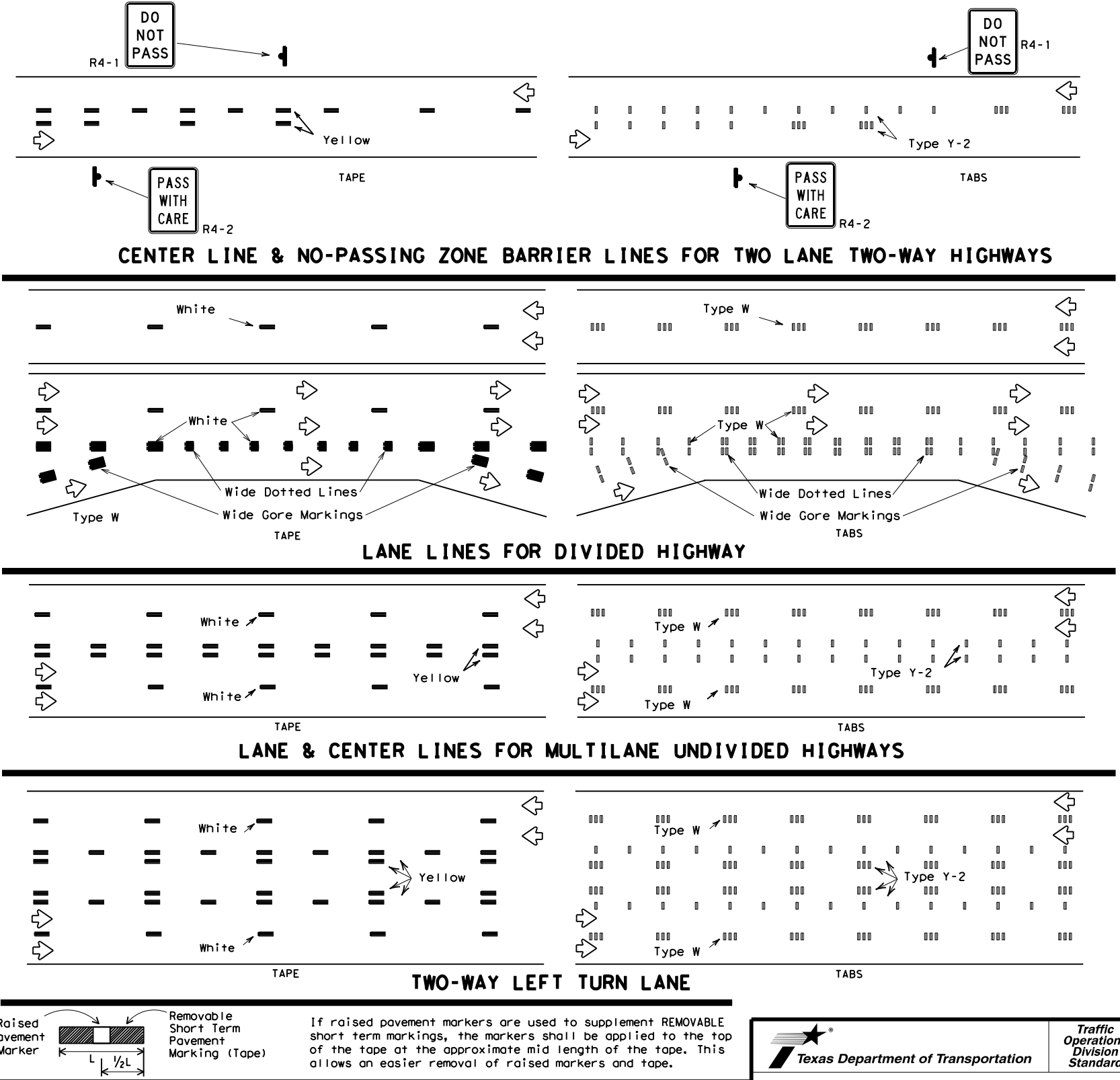
### NOTES:

- 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)



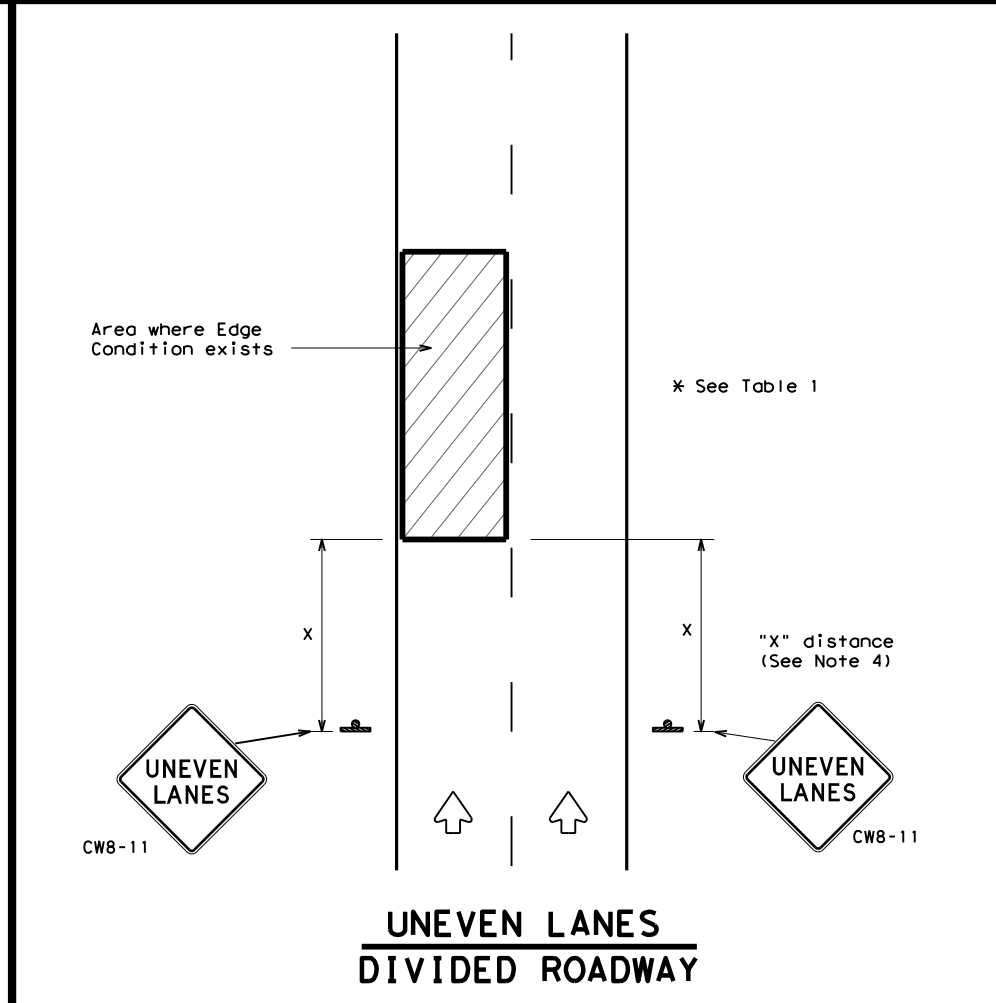
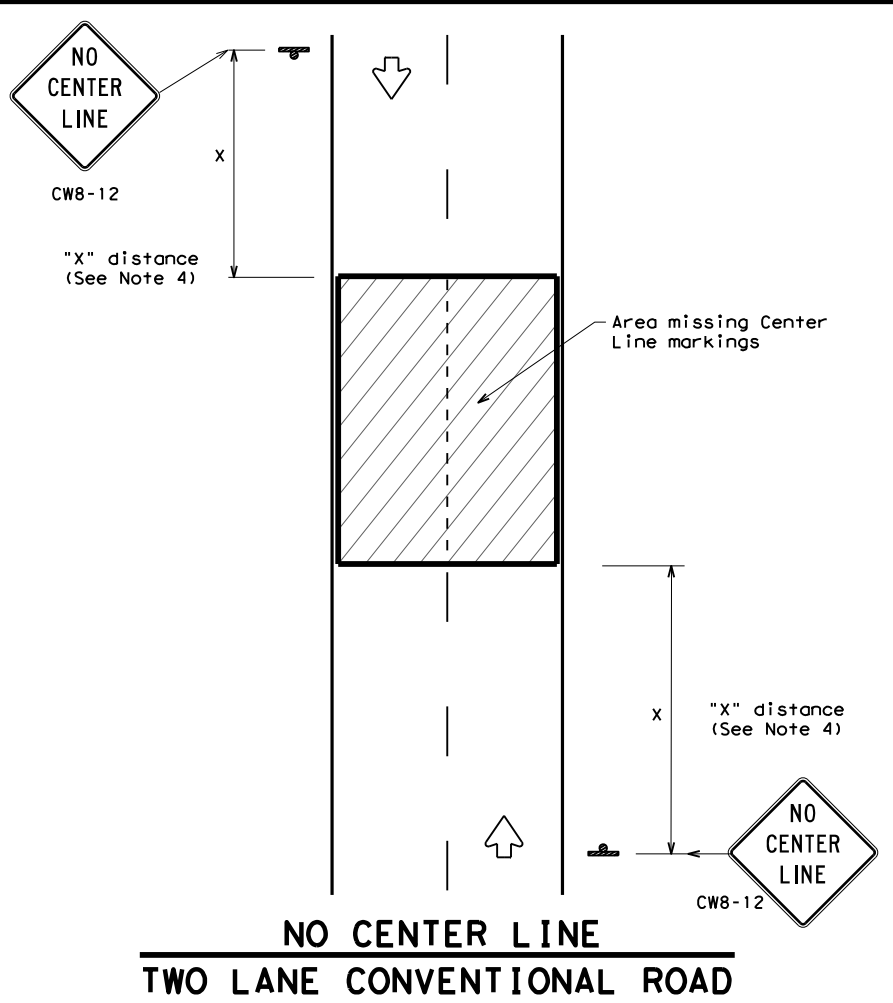
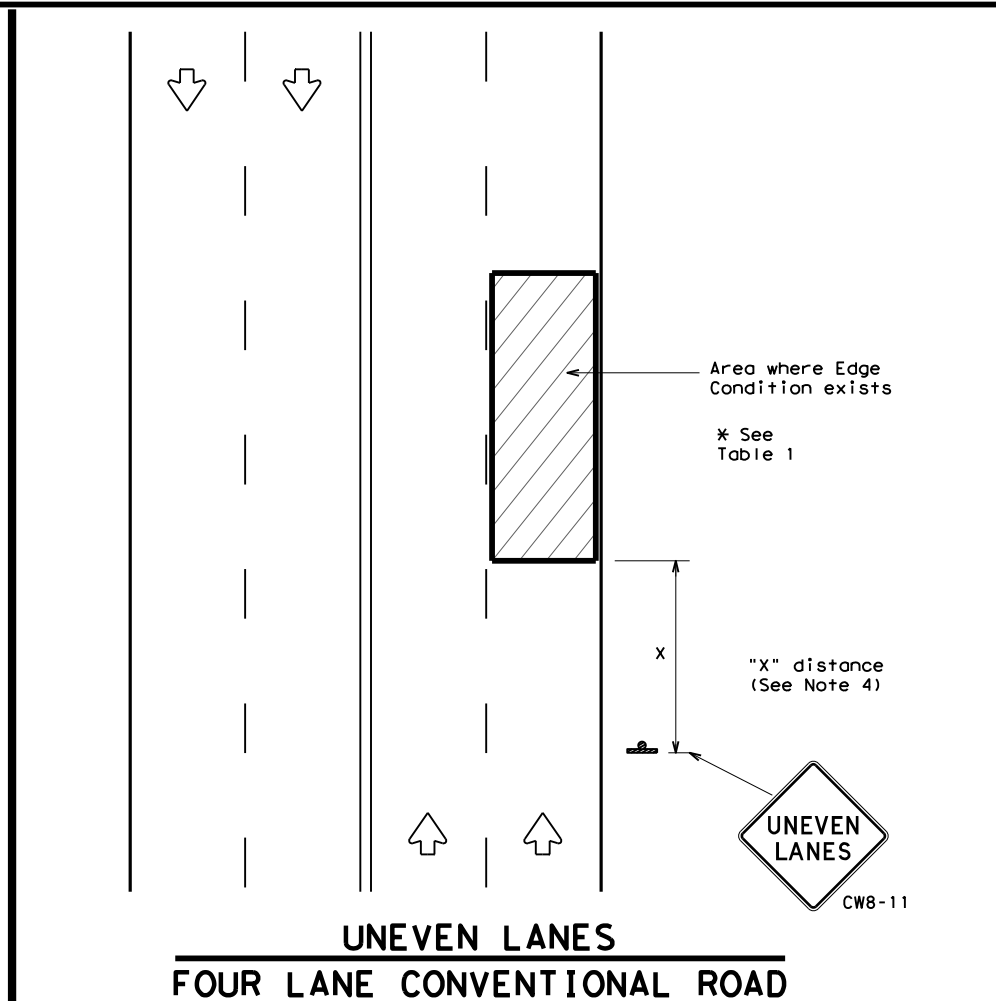
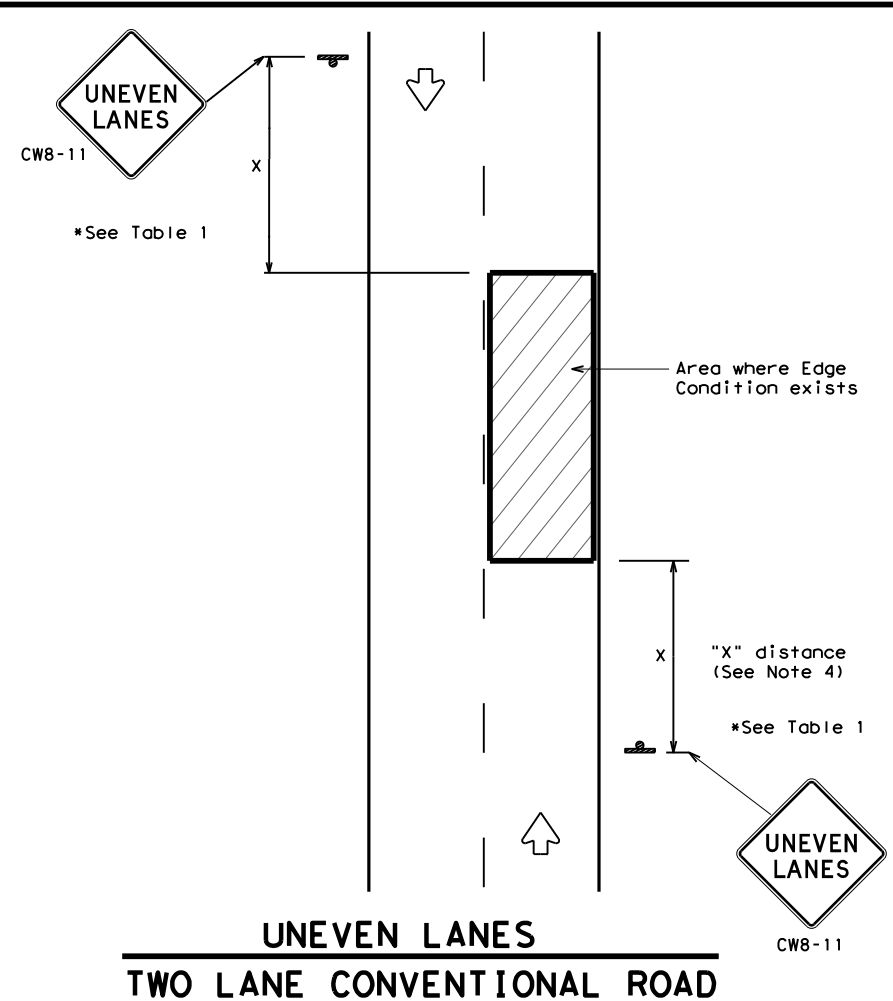
## WORK ZONE SHORT TERM PAVEMENT MARKINGS

### WZ (STPM) - 13

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© TxDOT	April 1992	CONT:	1234	SECT:	01	JOB:	013, etc	FM:	1100
REVISIONS:		DIST:		COUNTY:		SHEET NO.:			
1-97		AUS:		TRAVIS		WZ (STPM)			
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.

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

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

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

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**SIGNING FOR UNEVEN LANES**

**WZ (UL) - 13**

FILE: wzu1-13.dgn    DN: TxDOT    CK: TxDOT    DW: TxDOT    CR: TxDOT

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REVISIONS 1234 01 013, etc FM 1100

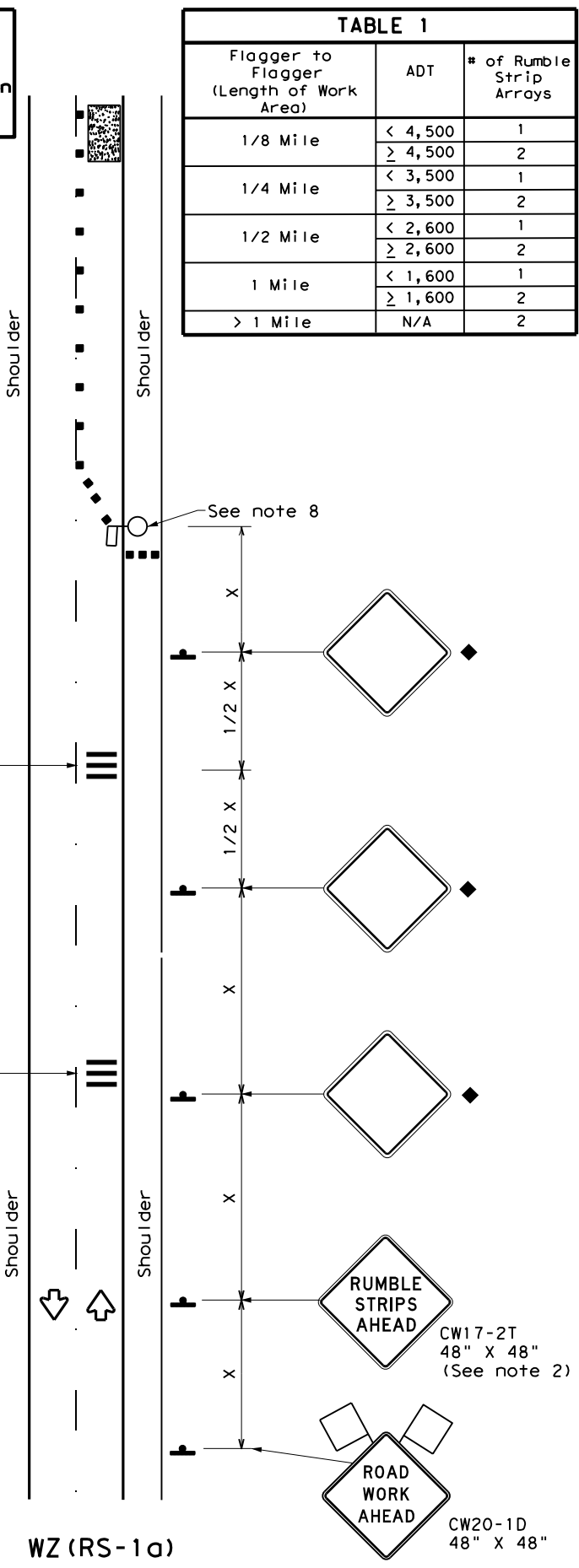
8-95 2-98 7-13    DIST COUNTY SHEET NO.

1-97 3-03    AUS TRAVIS **38**

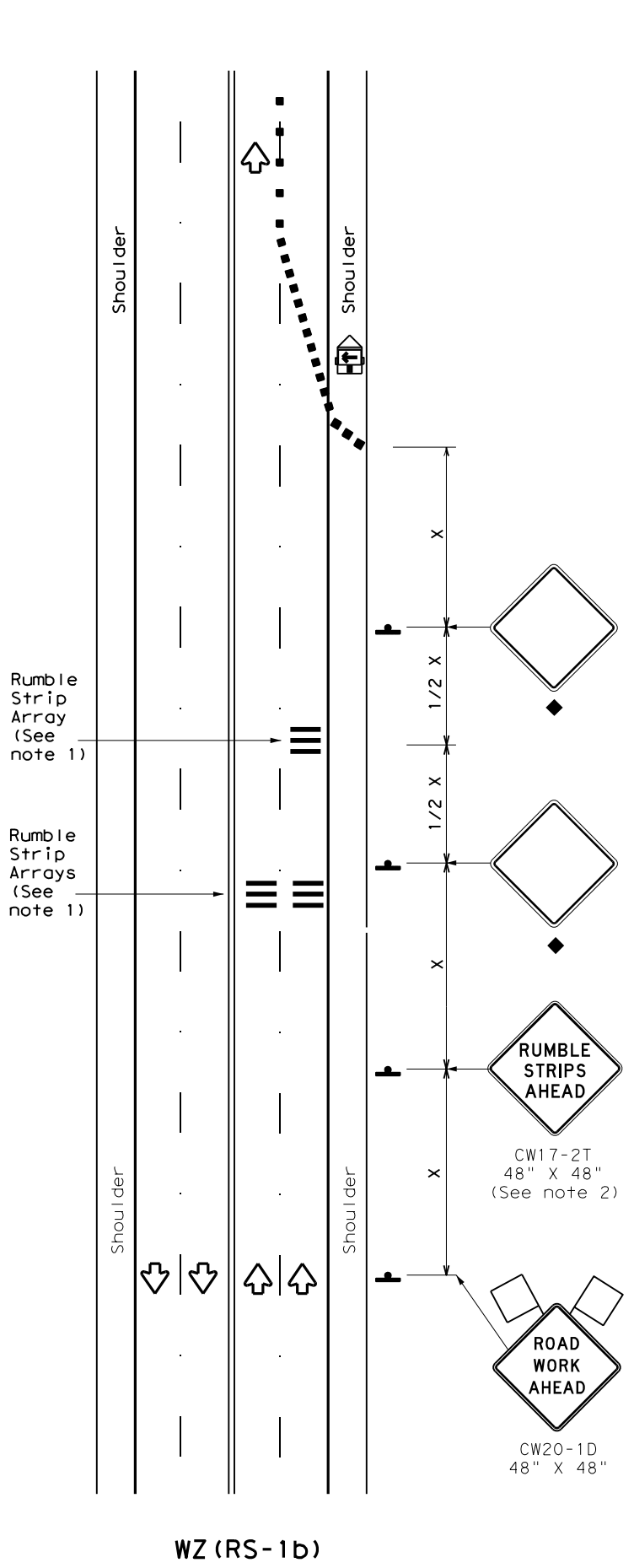
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Warning sign and rumble strip sequence in opposite direction is same as below.



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.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

LEGEND			
	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	L = WS	265'	295'	320'	40'	80'	240'	155'
45		450'	495'	540'	45'	90'	320'	195'
50		500'	550'	600'	50'	100'	400'	240'
55		550'	605'	660'	55'	110'	500'	295'
60	L = WS	600'	660'	720'	60'	120'	600'	350'
65		650'	715'	780'	65'	130'	700'	410'
70		700'	770'	840'	70'	140'	800'	475'
75		750'	825'	900'	75'	150'	900'	540'

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

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

◆ 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.

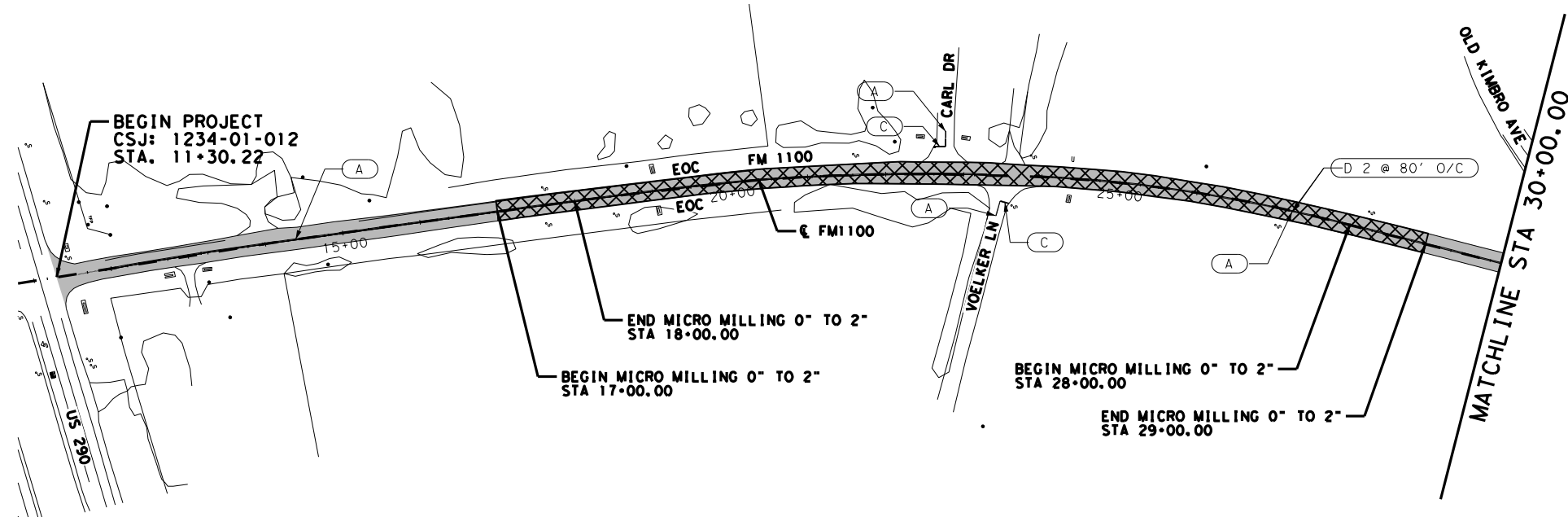


**TEMPORARY RUMBLE STRIPS**

**WZ (RS) - 22**

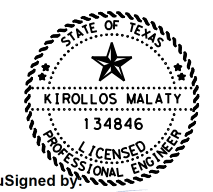
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2-14 1-22				
4-16			COUNTY: TRAVIS	SHEET NO.: 39

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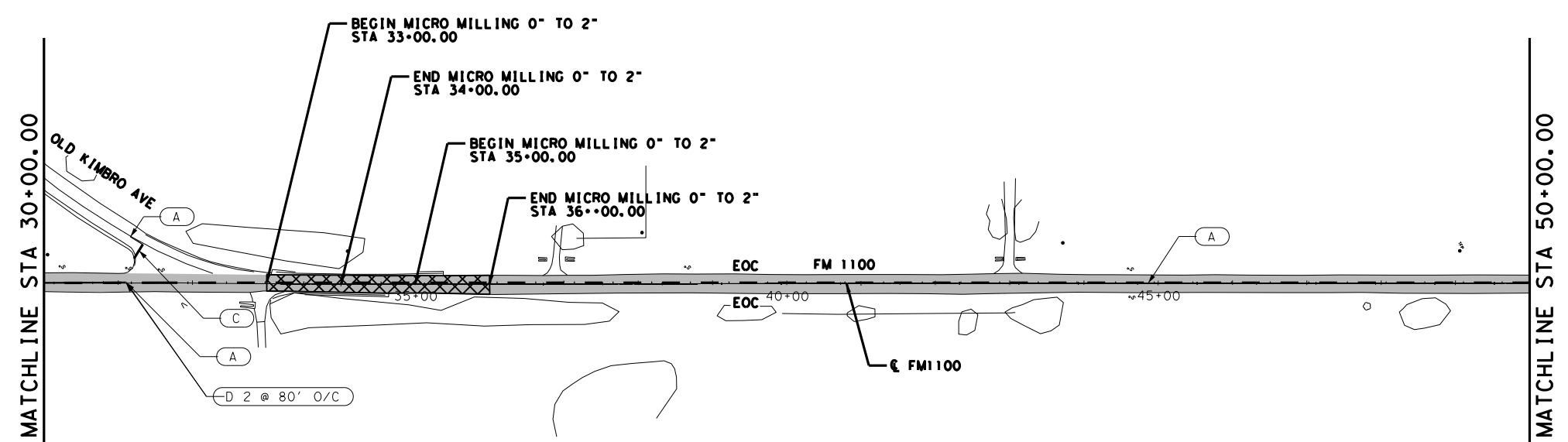
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- 2" MILLING



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Texas Department of Transportation

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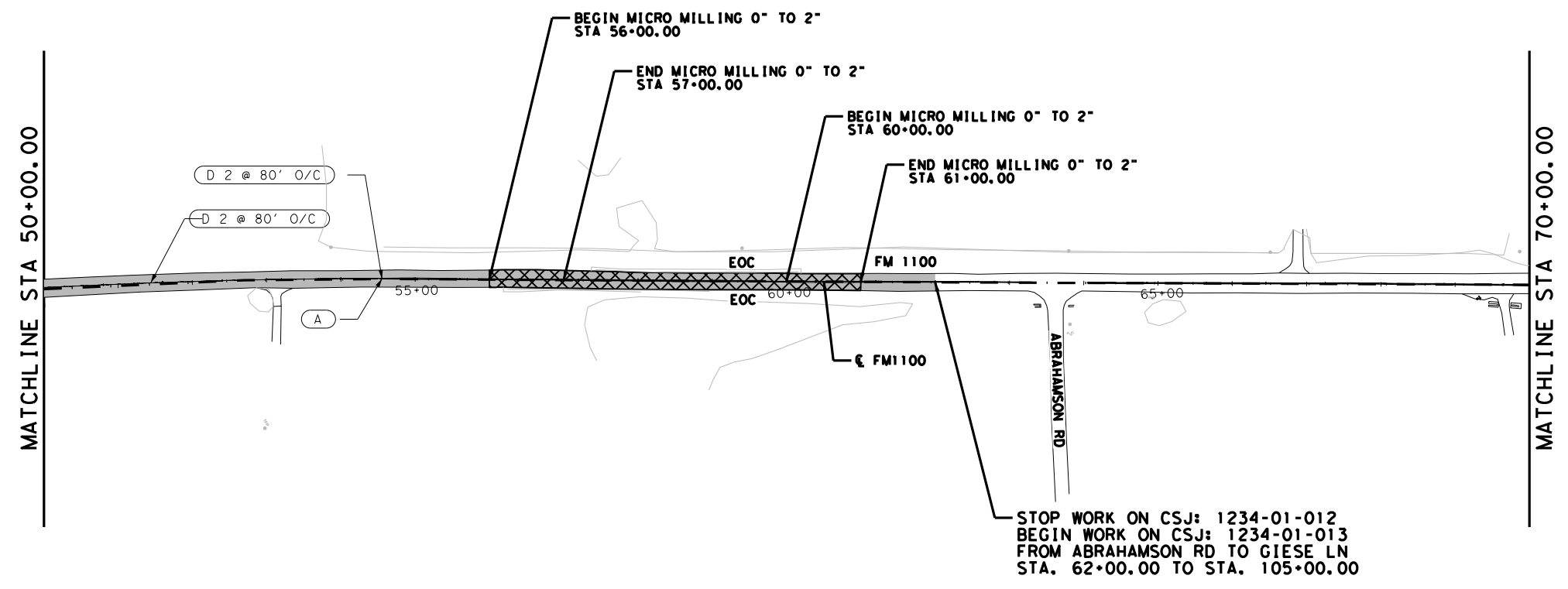
SHEET 01 OF 09

© 2023	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		40

**SUMMARY OF PAVEMENT MARKINGS**


ITEM 666			ITEM 672
REFLECTIVE PAVEMENT MARKINGS TY I & TY II			RAISED PAVEMENT MARKERS
(A)	(B)	(C)	(D)
6" YELLOW SLD	6" WHITE SLD	24" WHITE SLD	REFL PAV MRKR TY
LF	LF	LF	EA
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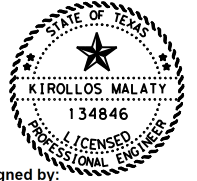
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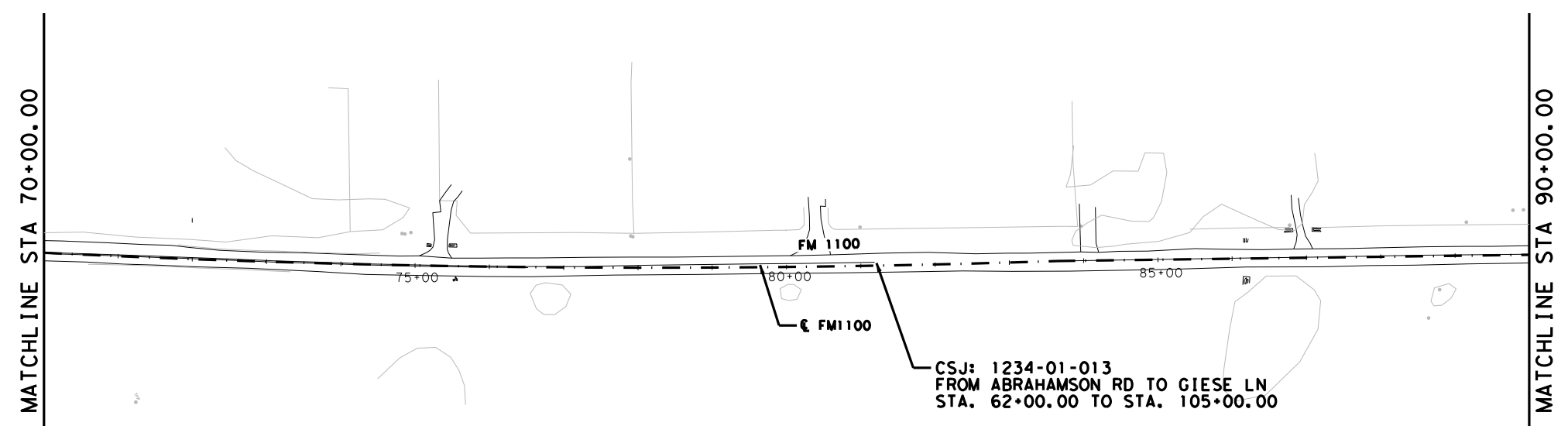
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- OVERLAY
- 2" MILLING


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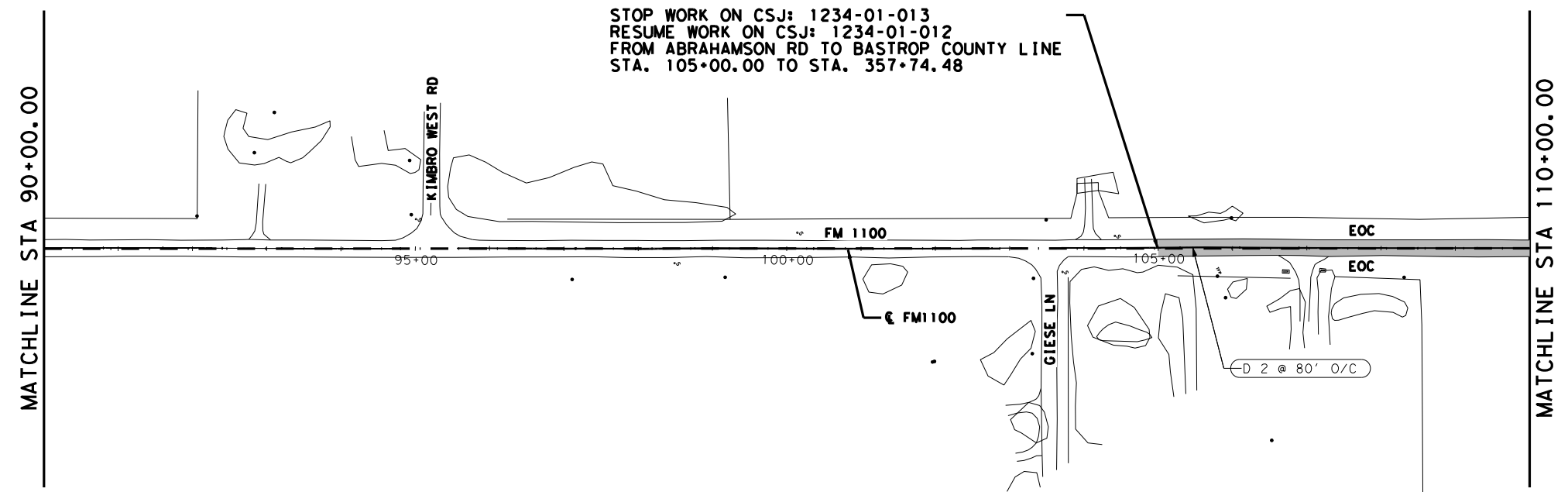
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**SUMMARY OF PAVEMENT MARKINGS**

ITEM 666			ITEM 672
REFLECTIVE PAVEMENT MARKINGS TY I & TY II			RAISED PAVEMENT MARKERS
(A)	(B)	(C)	(D)
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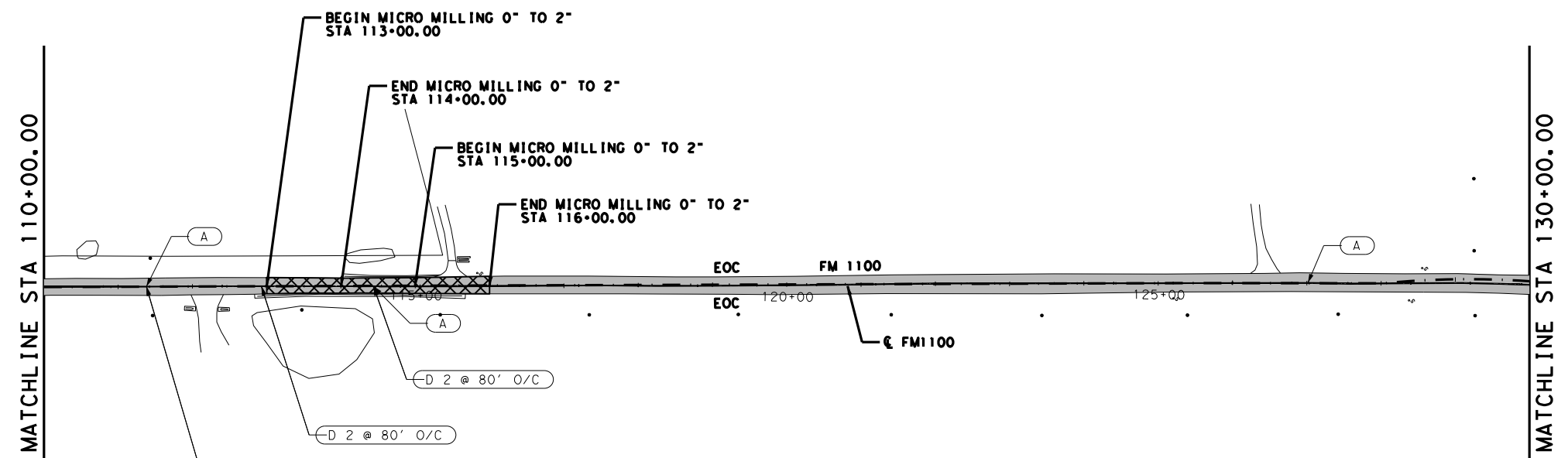
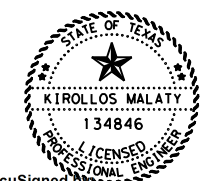
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**LEGEND**  
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 [Cross-hatched Box] 2" MILLING

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**SUMMARY OF PAVEMENT MARKINGS**

ITEM 666 REFLECTIVE PAVEMENT MARKINGS TY I & TY II			ITEM 672 RAISED PAVEMENT MARKERS
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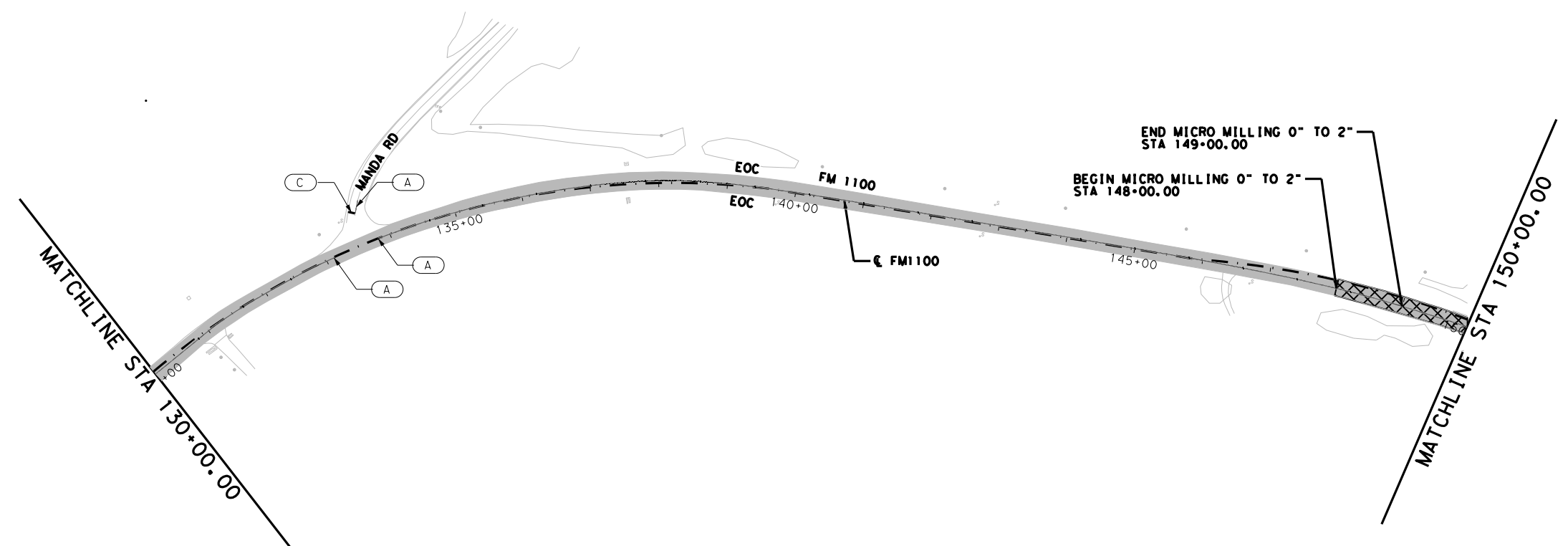
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**SHEET 03 OF 09**

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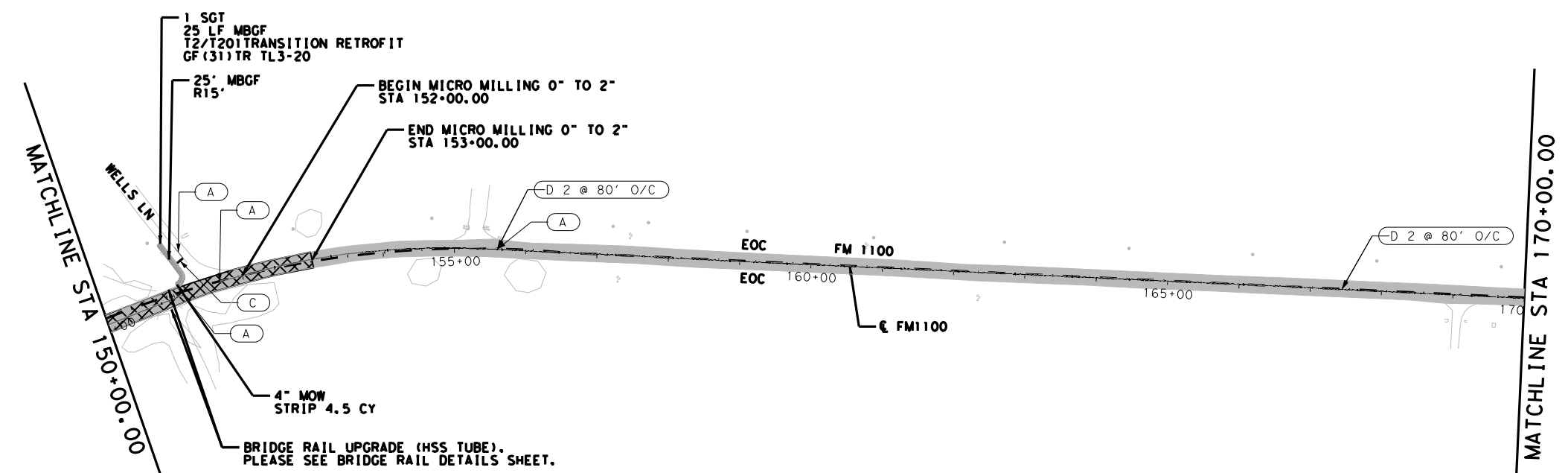
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- OVERLAY
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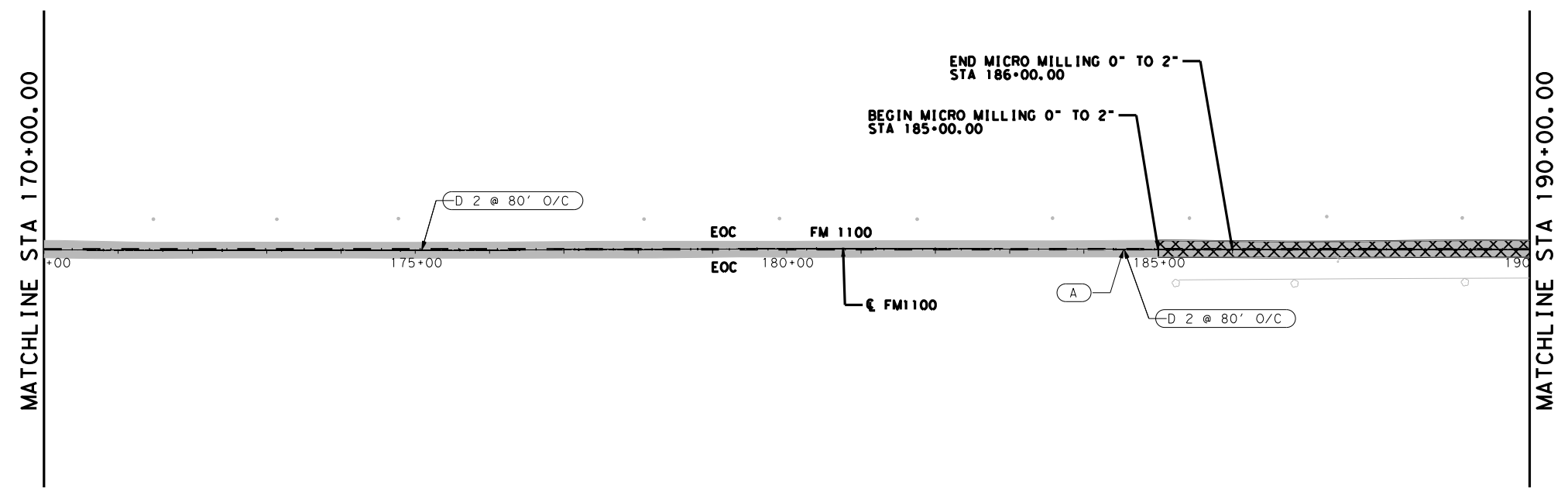
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SUMMARY OF PAVEMENT MARKINGS

ITEM 666 REFLECTIVE PAVEMENT MARKINGS TY I & TY II			ITEM 672 RAISED PAVEMENT MARKERS
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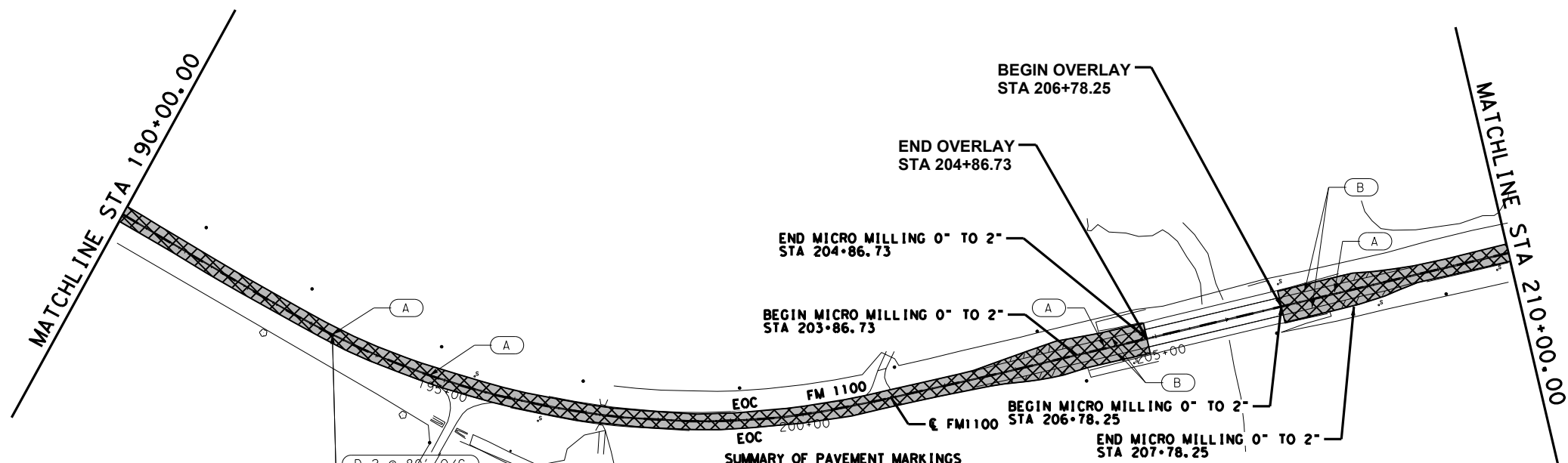
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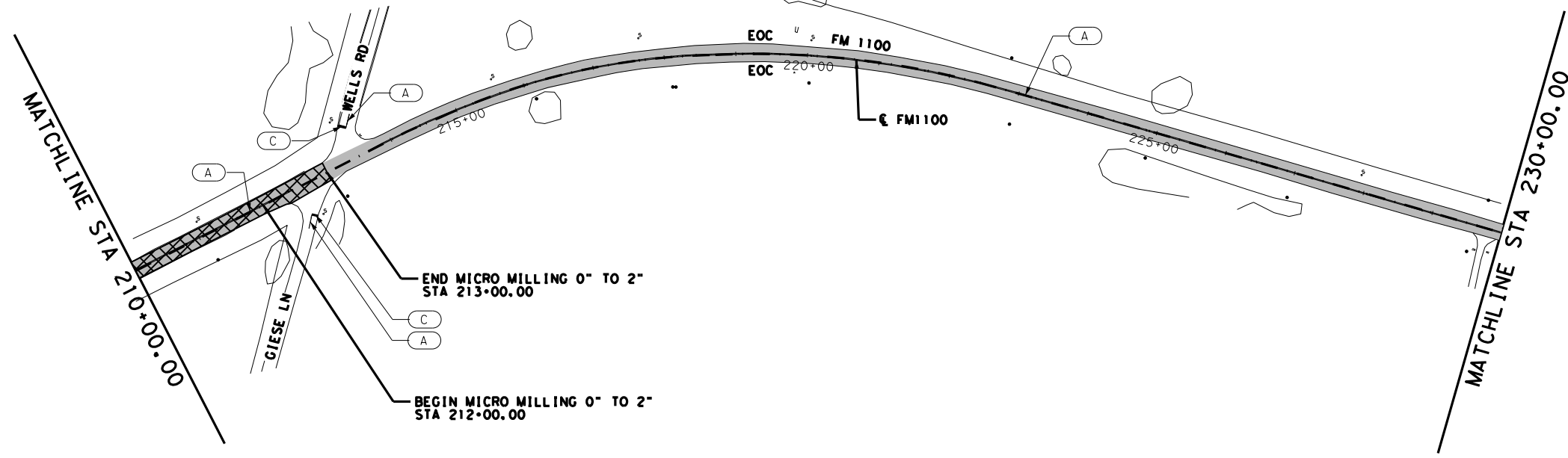
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REFLECTIVE PAVEMENT MARKINGS TY I & TY II			RAISED PAVEMENT MARKERS
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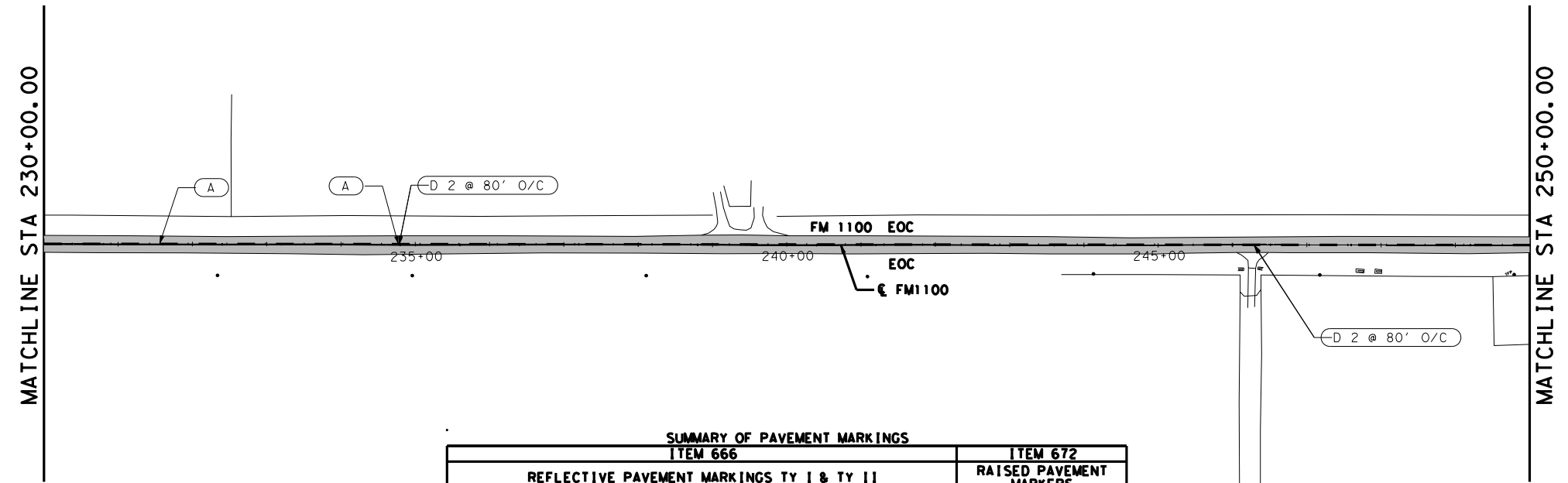
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- OVERLAY
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SUMMARY OF PAVEMENT MARKINGS			
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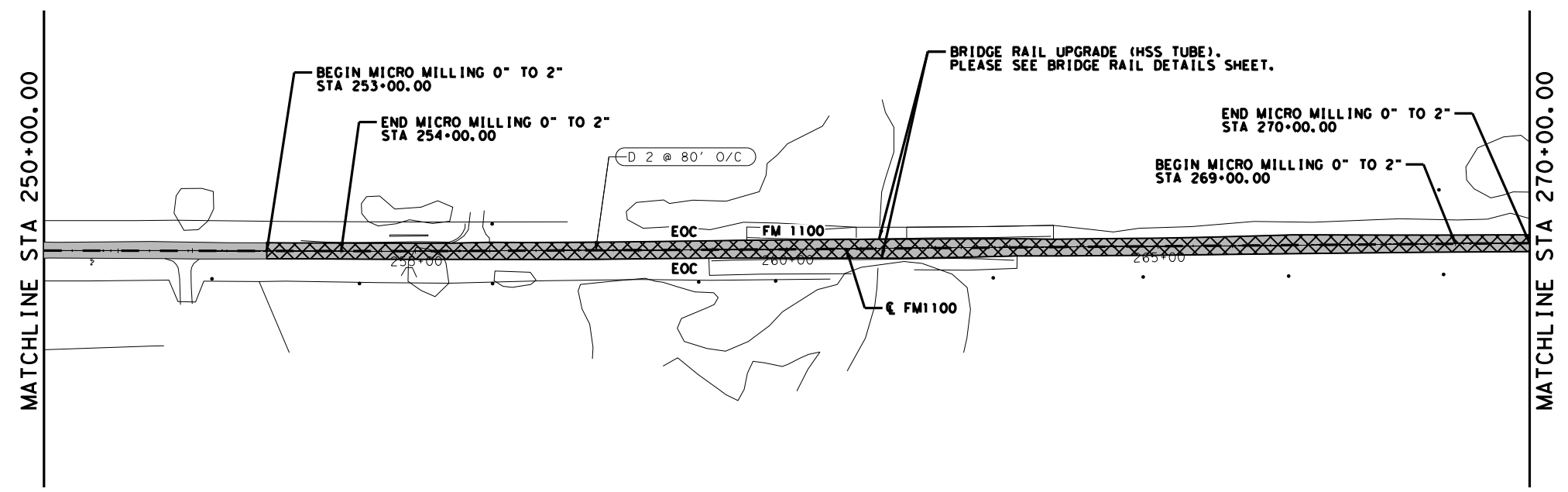
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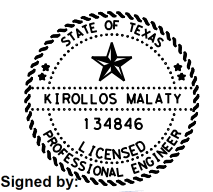


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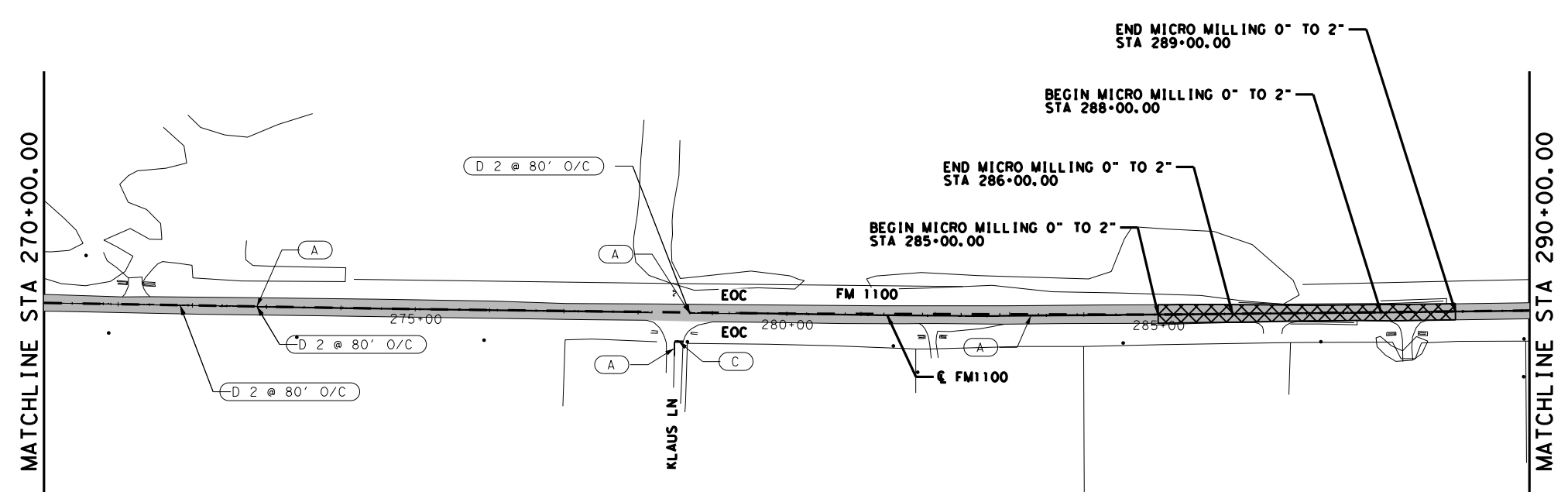
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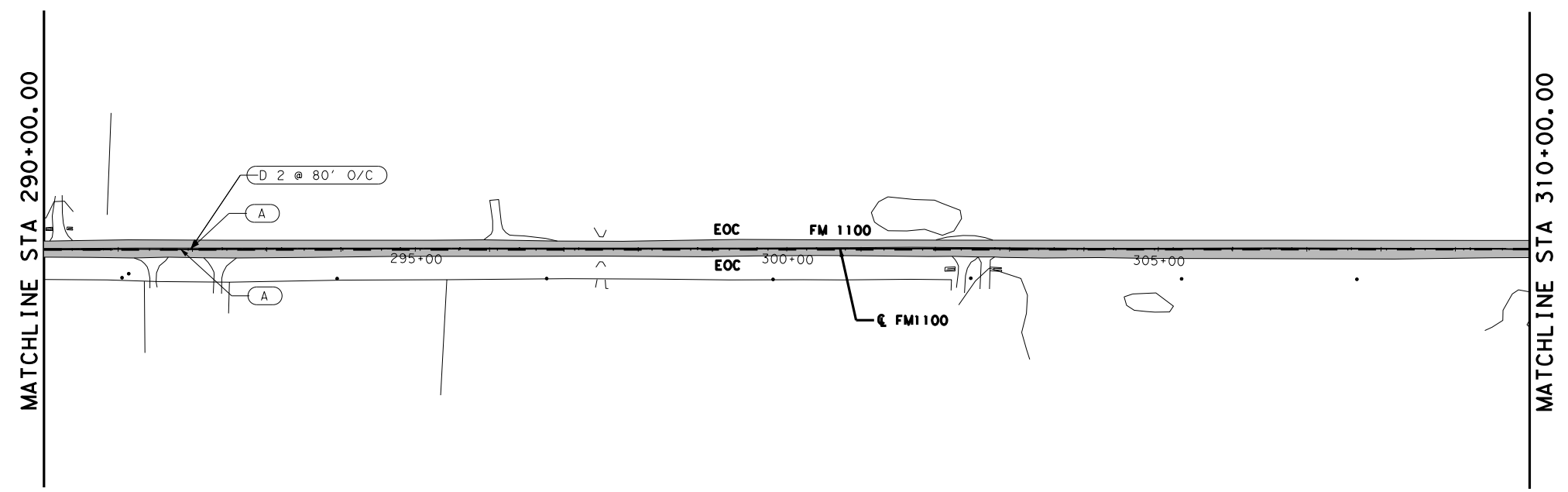
SHEET 07 OF 09

**SUMMARY OF PAVEMENT MARKINGS**

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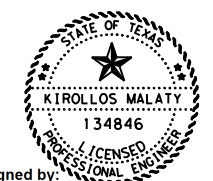
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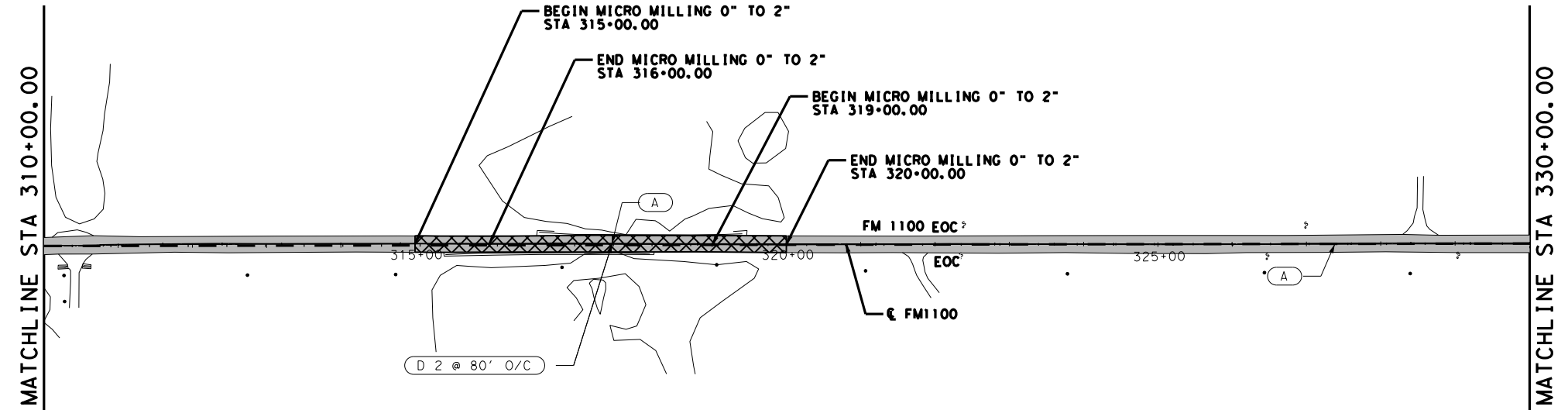
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- OVERLAY
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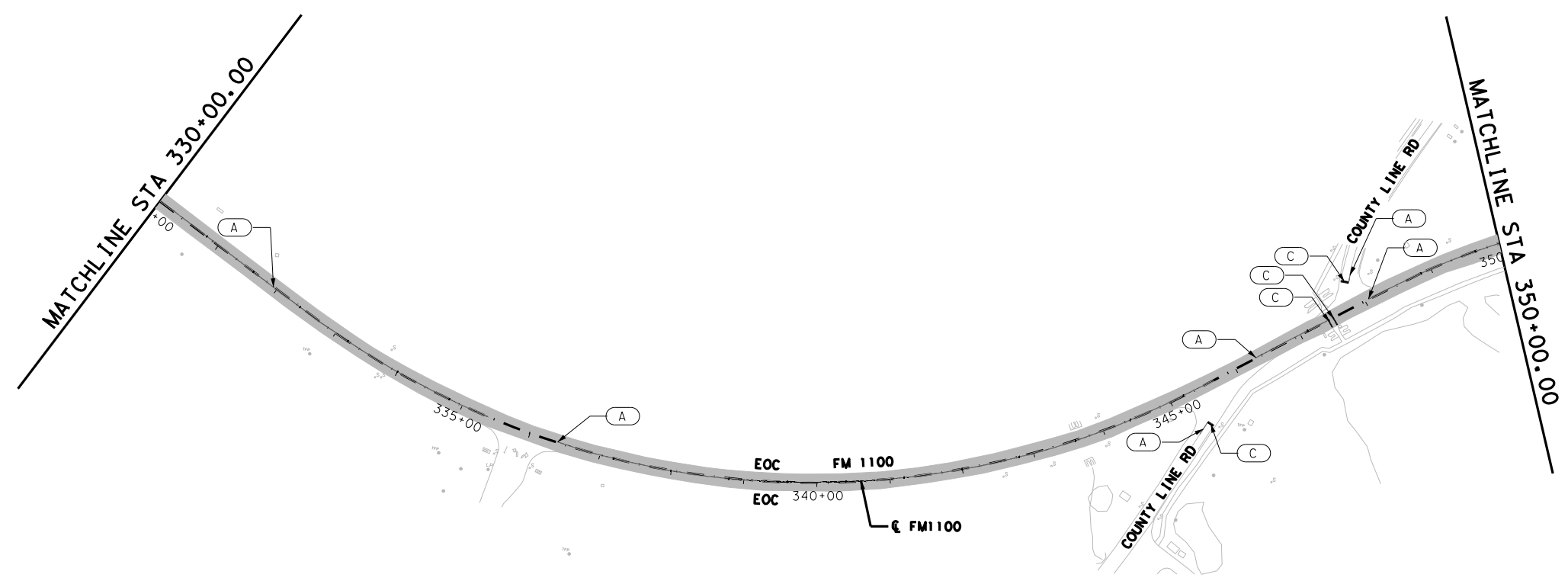
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SHEET 08 OF 09

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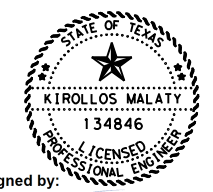
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REFLECTIVE PAVEMENT MARKINGS TY I & TY II			RAISED PAVEMENT MARKERS
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LEGEND

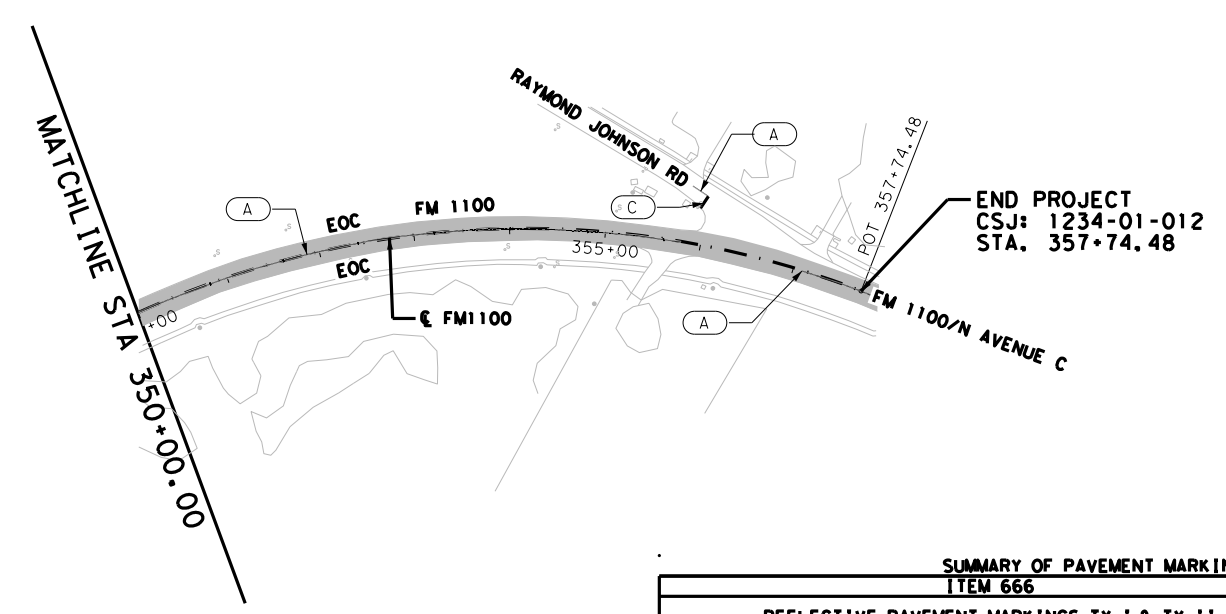
-  OVERLAY
-  2" MILLING



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PLAN LAYOUT DETAILS ON THIS SHEET IS FOR CSJ:1234-01-012 ONLY.




END PROJECT  
 CSJ: 1234-01-012  
 STA. 357+74.48



SUMMARY OF PAVEMENT MARKINGS			
ITEM 666			ITEM 672
REFLECTIVE PAVEMENT MARKINGS TY I & TY II			RAISED PAVEMENT MARKERS
(A)	(B)	(C)	(D)
6" YELLOW SLD	6" WHITE SLD	24" WHITE SLD	REFL PAV MRKR TY
LF	LF	LF	EA
4954	0	95	0

**Austin District**  
**North Travis Area Office**

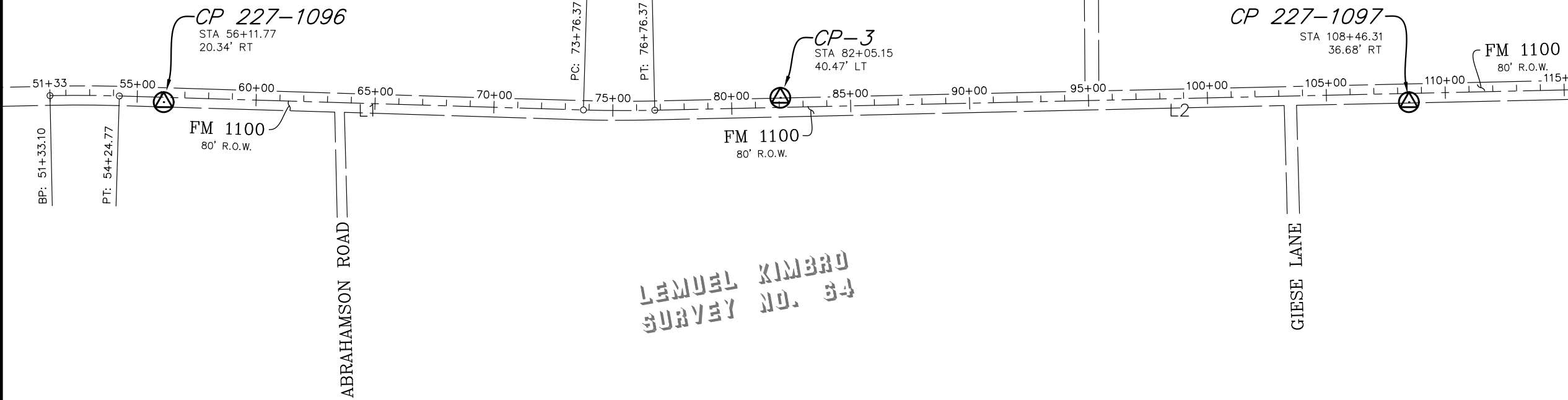


**FM 1100**  
**PLAN LAYOUT**

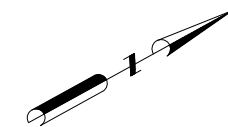
**SHEET 09 OF 09**

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, ETC.	FM 1100
	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		48

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LEMOEL KIMBRO  
SURVEY NO. 34

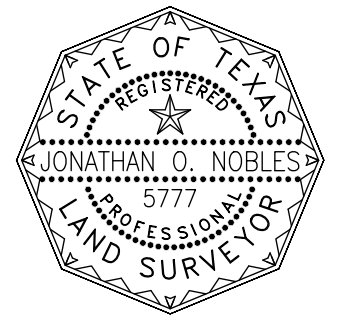


**GENERAL NOTES**

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE 4203, NAD 83 (2011 ADJ.; EPOCH 2010.00). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SITE SURFACE ADJUSTMENT FACTOR OF 1.000078.
2. ALL PROJECT CONTROL ELEVATIONS ARE REFERENCED TO THE NAVD88 VERTICAL DATUM, GEOID 18 AND ARE BASED ON GPS OBSERVATIONS USING THE TXDOT VRS SYSTEM. DIGITAL LEVEL LOOPS WERE RUN BETWEEN ALL CONTROL POINTS TO HOLD AN ELEVATION OF 509.16 ON CONTROL POINT 3.
3. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.
4. LAT/LONG GENERATED FROM GRID COORDINATES.
5. THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

0 500 1000

SCALE 1"=500' (11"X17")  
SCALE 1"=250' (22"X34")



2/10/2022

*Jonathan O. Nobles*

JONATHAN O. NOBLES RPLS NO. 5777  
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**BGE, Inc.**  
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Tel: 512-879-0400 • www.bgeinc.com  
TBPELS Licensed Surveying Firm No. 10106502

FM 1100  
FROM 150' SOUTH OF ABRAHAMSON RD  
TO 150' NORTH OF GIESE LN  
SURVEY CONTROL INDEX

SHEET 1 OF 2

FED. RD. DIV. NO.		PROJECT NO.		SHEET NO.	
6		1234-01-013		49	
STATE	DIST.	COUNTY			
TEXAS	AUS	TRAVIS			
CONT.	SECT.	JOB	HIGHWAY NO.		
1234	01	013	FM 1100		

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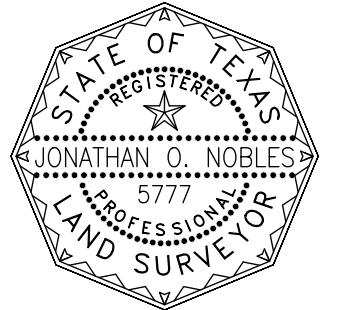
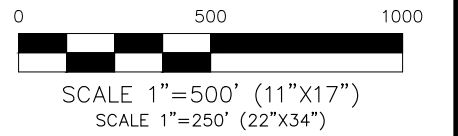
CONTROL BEARING TABLE			
FROM	TO	BEARING	DISTANCE
CP 227-1096	CP-3	N 28°26'10" E	2,592.19'
CP-3	CP 227-1097	N 29°14'16" E	2,642.29'

POINT TABLE (SURFACE COORDINATES)						
POINT NO.	NORTHING	EASTING	ELEVATION	STATION	OFFSET	DESCRIPTION
CP 227-1096	10,107,900.253	3,197,098.219	491.47'	56+11.77	20.34' RT	TXDOT ALUMINUM DISK IN CONCRETE STAMPED "227-1096"
CP 227-1097	10,112,485.351	3,199,623.151	528.64'	108+46.31	36.68' RT	TXDOT ALUMINUM DISK IN CONCRETE STAMPED "227-1097"
CP-3	10,110,179.694	3,198,332.561	509.16'	82+05.15	40.47' LT	BGE INC CONTROL ALUMINUM CAP IN CONCRETE STAMPED "3"

POINT TABLE (GRID/GEODETIC)				
POINT NO.	NORTHING	EASTING	LATITUDE	LONGITUDE
CP 227-1096	10,107,111.898	3,196,848.865	N30°21'44.84"	W97°28'42.55"
CP 227-1097	10,111,696.639	3,199,373.600	N30°22'29.56"	W97°28'12.39"
CP-3	10,109,391.161	3,198,083.111	N30°22'07.08"	W97°28'27.80"

**GENERAL NOTES**

- ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE 4203, NAD 83 (2011 ADJ.; EPOCH 2010.00). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SITE SURFACE ADJUSTMENT FACTOR OF 1.000078.
- ALL PROJECT CONTROL ELEVATIONS ARE REFERENCED TO THE NAVD88 VERTICAL DATUM, GEOID 18 AND ARE BASED ON GPS OBSERVATIONS USING THE TXDOT VRS SYSTEM. DIGITAL LEVEL LOOPS WERE RUN BETWEEN ALL CONTROL POINTS TO HOLD AN ELEVATION OF 509.16 ON CONTROL POINT 3.
- ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.
- LAT/LONG GENERATED FROM GRID COORDINATES.
- THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.



2/10/2022

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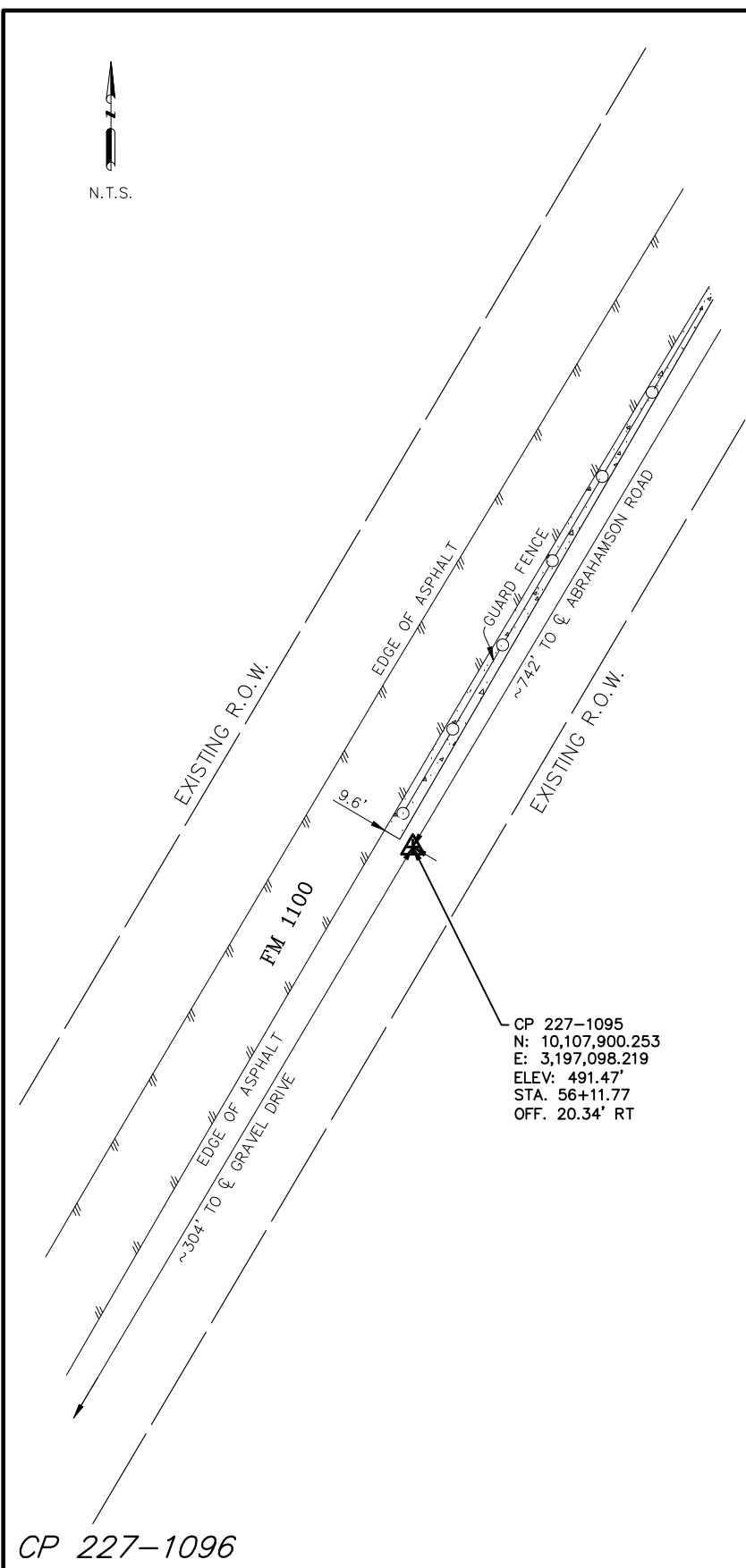
**BGE, Inc.**  
 101 West Louis Henna Blvd, Ste 400, Austin, TX 78728  
 Tel: 512-879-0400 • www.bgeinc.com  
 TBPELS Licensed Surveying Firm No. 10106502

FM 1100  
 FROM 150' SOUTH OF ABRAHAMSON RD  
 TO 150' NORTH OF GIESE LN  
 SURVEY CONTROL INDEX

SHEET 2 OF 2

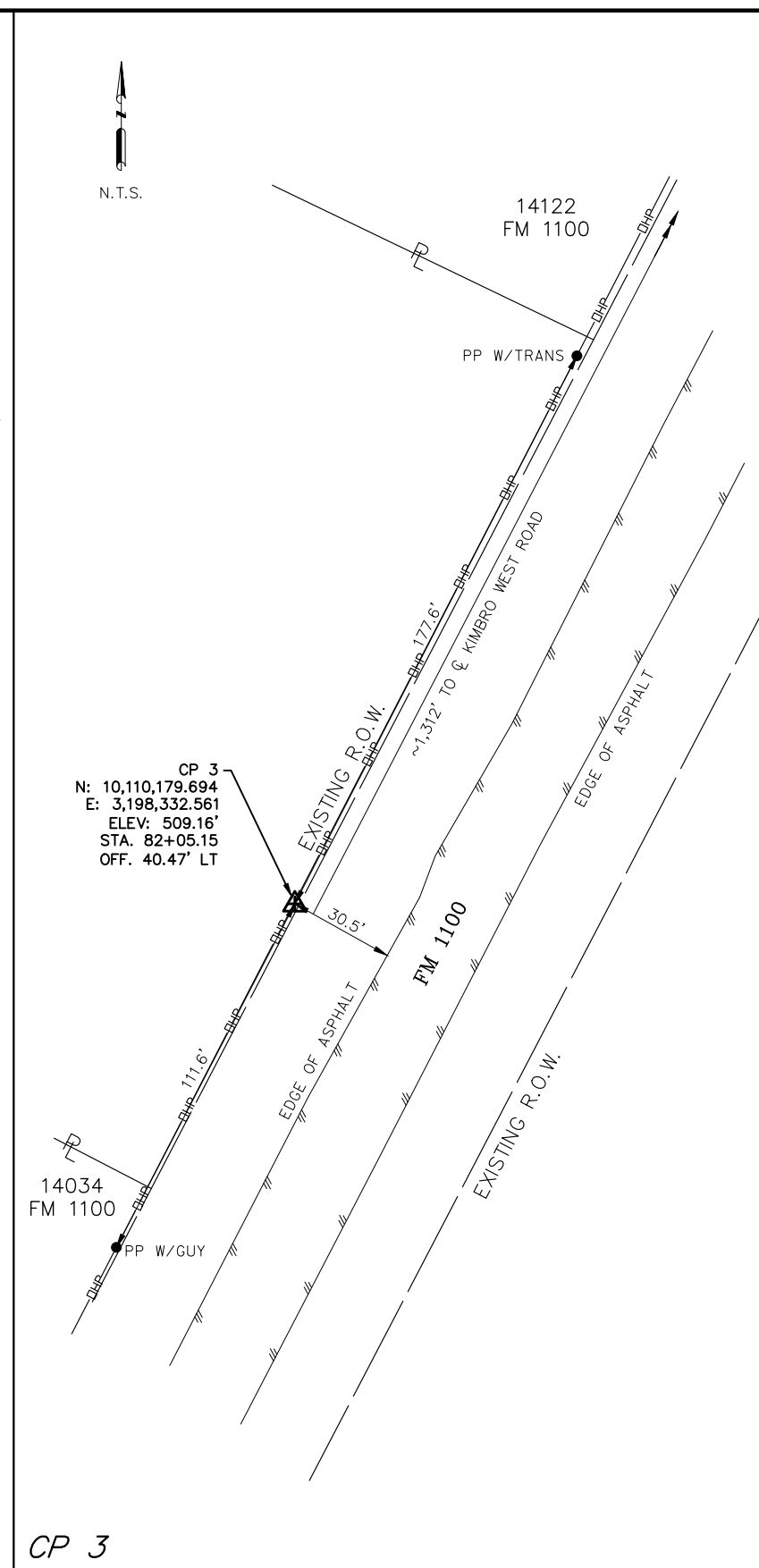
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6		1234-01-013		50
STATE	DIST.	COUNTY		
TEXAS	AUS	TRAVIS		
CONT.	SECT.	JOB	HIGHWAY NO.	
1234	01	013	FM 1100	

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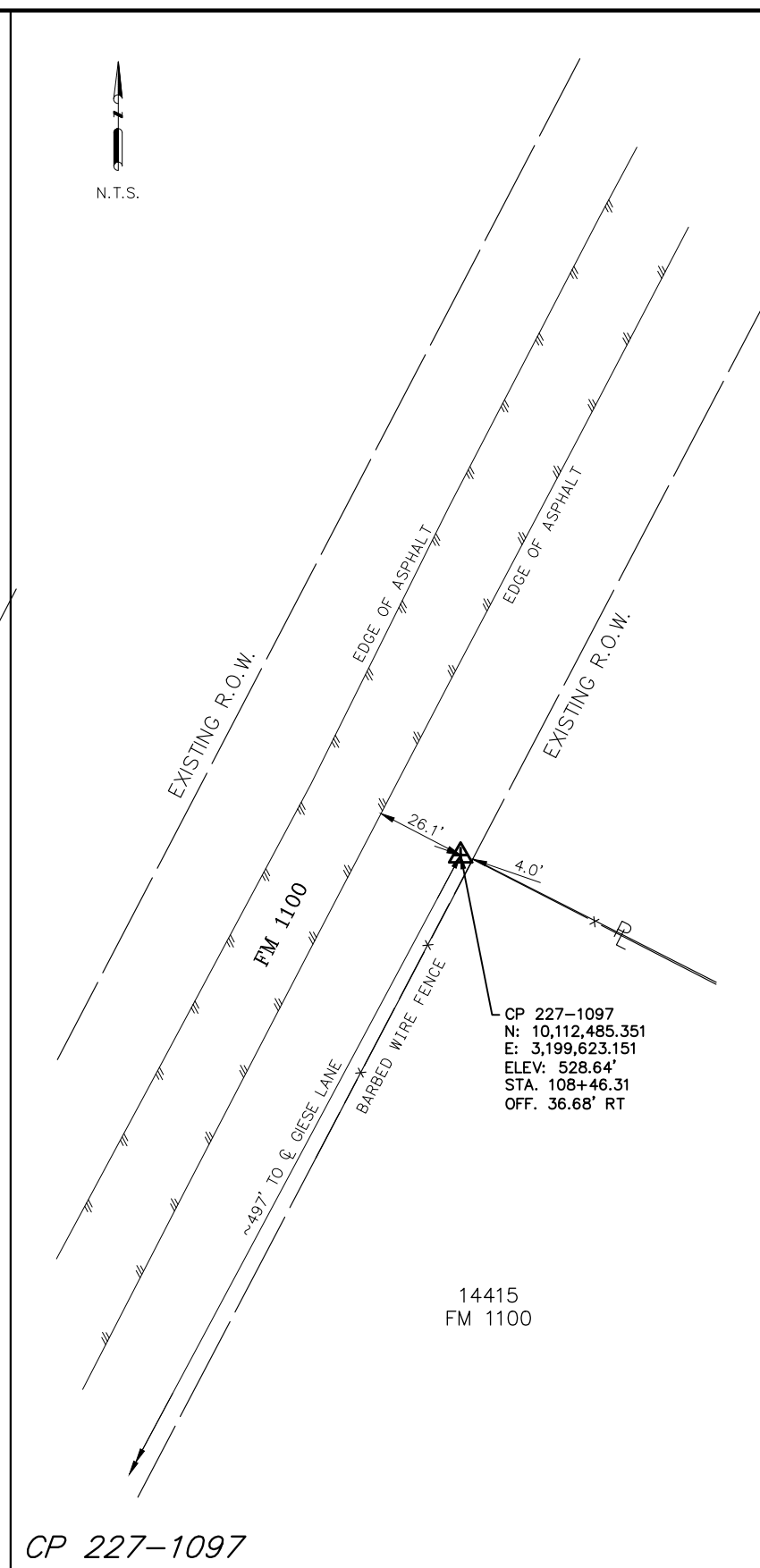
CP 227-1096

SET TXDOT ALUMINUM DISK IN CONCRETE STAMPED "227-1096" ON THE EAST SIDE OF FM 1100 IN LINE WITH A CONCRETE APRON FOR A GUARD FENCE, APPROXIMATELY 742 FEET SOUTH-SOUTHWEST OF THE CENTERLINE OF ABRAHAMSON ROAD, 304 FEET NORTH-NORTHEAST OF THE CENTER OF A GRAVEL DRIVEWAY, AND 9.6 FEET EAST-SOUTHEAST OF THE EDGE OF ASPHALT. (ESTABLISHED 12/22/2022)



CP 3

SET BGE INC CONTROL ALUMINUM DISK IN CONCRETE STAMPED "3" ON THE WEST SIDE OF FM 1100, APPROXIMATELY 1,312 FEET SOUTH-SOUTHWEST OF THE CENTERLINE OF KIMBRO WEST ROAD, 111.6 FEET NORTH-NORTHEAST OF A POWER POLE WITH GUY LOCATED NEAR THE NORTHEAST CORNER OF 14034 FM 1100, 177.6 FEET SOUTH-SOUTHWEST OF A POWER POLE WITH TRANSFORMER LOCATED NEAR THE SOUTHEAST CORNER OF 14122 FM 1100, AND 30.5 FEET WEST-NORTHWEST OF THE EDGE OF ASPHALT. (ESTABLISHED 12/22/2022)



CP 227-1097

SET TXDOT ALUMINUM DISK IN CONCRETE STAMPED "227-1097" ON THE EAST SIDE OF FM 1100 NEAR THE NORTHWEST CORNER OF 14415 FM 1100, APPROXIMATELY 497 FEET NORTH-NORTHEAST OF THE CENTERLINE OF GIESE LANE, 26.1 FEET EAST-SOUTHEAST OF THE EDGE OF ASPHALT, AND 4.0 FEET WEST-NORTHWEST OF A BARBED WIRE FENCE CORNER. (ESTABLISHED 12/22/2022)

**GENERAL NOTES**

1. ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS STATE PLANE COORDINATE SYSTEM OF 1983, TEXAS CENTRAL ZONE 4203, NAD 83 (2011 ADJ.; EPOCH 2010.00). ALL DISTANCES AND COORDINATES ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE SITE SURFACE ADJUSTMENT FACTOR OF 1.000078.
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3. ALL MEASUREMENTS ARE IN U.S. SURVEY FEET.
4. LAT/LONG GENERATED FROM GRID COORDINATES.
5. THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

SCALE 1"=500' (11"x17")  
SCALE 1"=250' (22"x34")

2/10/2022

*Jonathan O. Nobles*

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Texas Department of Transportation

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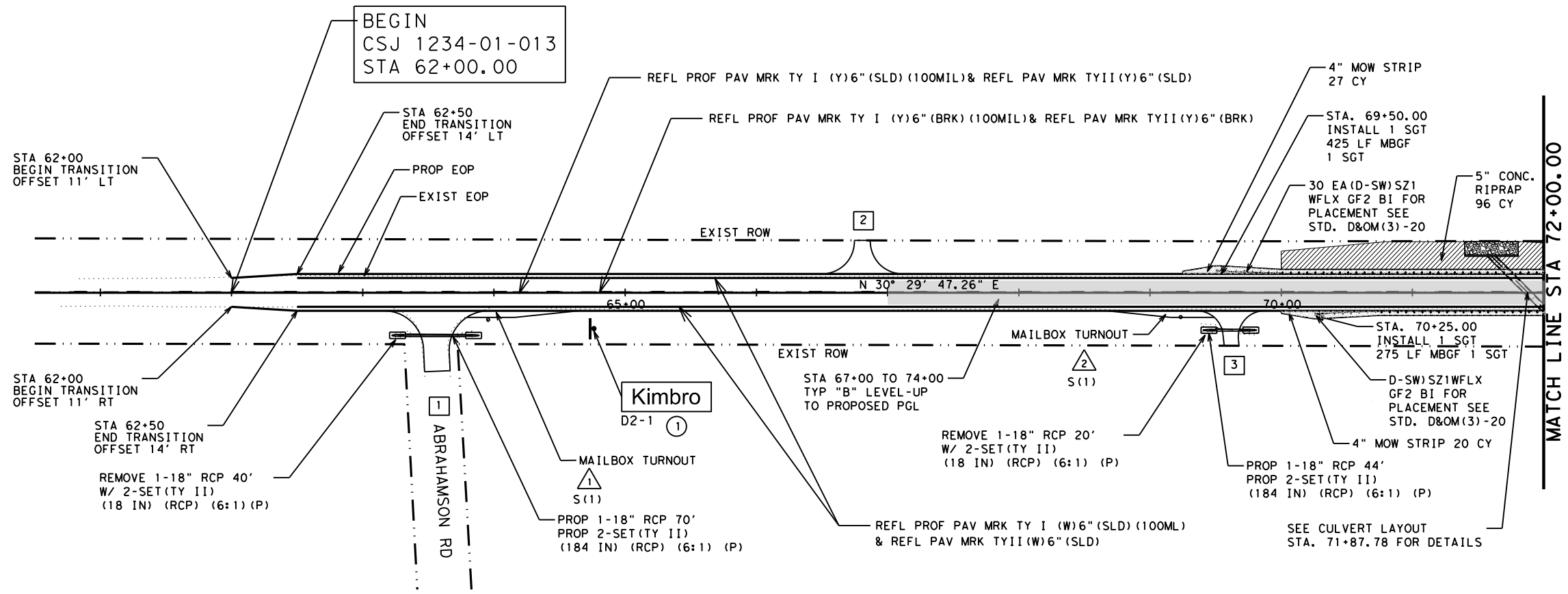
FM 1100  
FROM 150' SOUTH OF ABRAHAMSON RD  
TO 150' NORTH OF GIESE LN

HORIZONTAL AND  
VERTICAL CONTROL

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6	1234-01-013			51
STATE	DIST.	COUNTY		
TEXAS	AUS	TRAVIS		
CONT.	SECT.	JOB	HIGHWAY NO.	
1234	01	013	FM 1100	

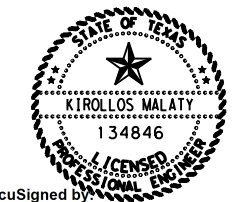
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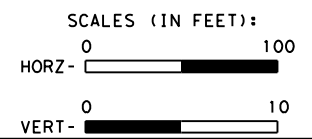
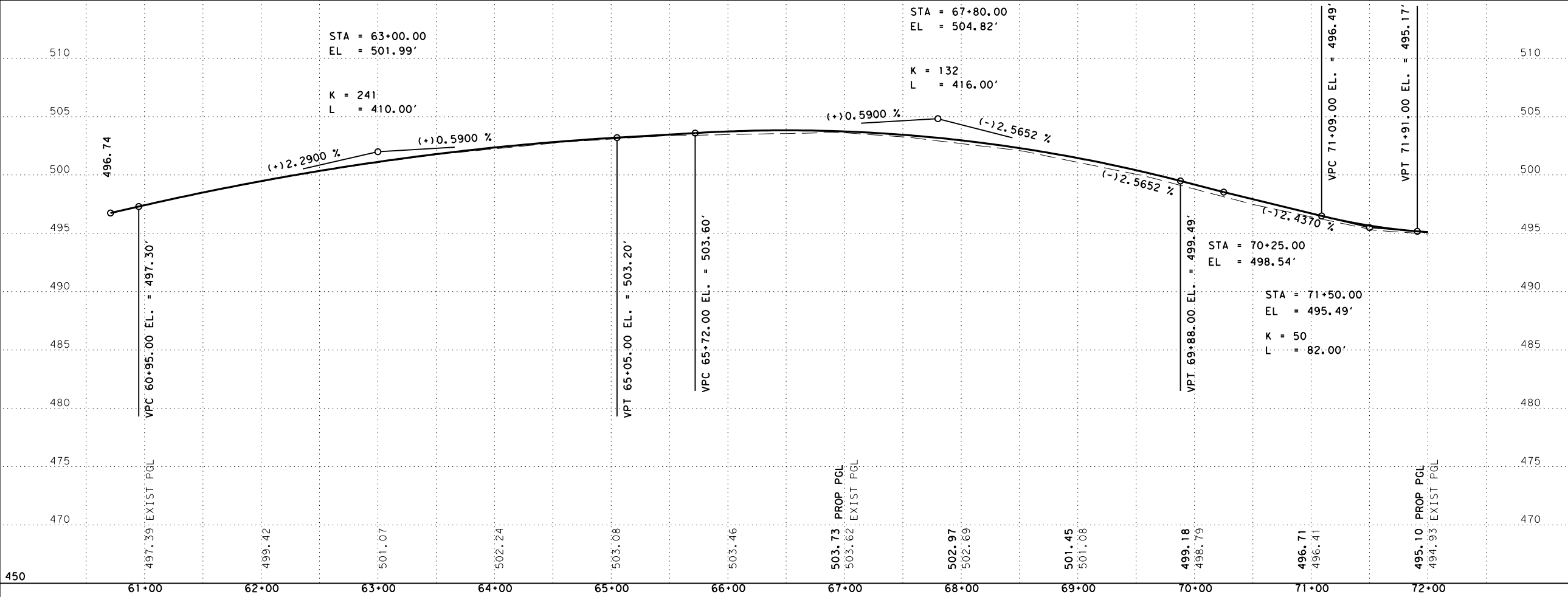
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TYPE "B" LEVEL-UP	
5" CONCRETE RIPRAP	
DRIVEWAY ID	
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	

**NOTE :**  
 PROPOSED VERTICAL CURVE DATA APPLIES TO AREAS FOR LEVEL-UP AND FULL DEPTH RECONSTRUCTION AT STA 67+00 TO STA 72+00. AREAS NOT CALLED OUT FOR LEVEL-UP TO PROPOSED PGL, WILL MATCH THE EXISTING GROUND PGL DATA. REFER TO CROSS SECTIONS FOR DETAILS.



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**Austin District**  
**North Travis Area Office**

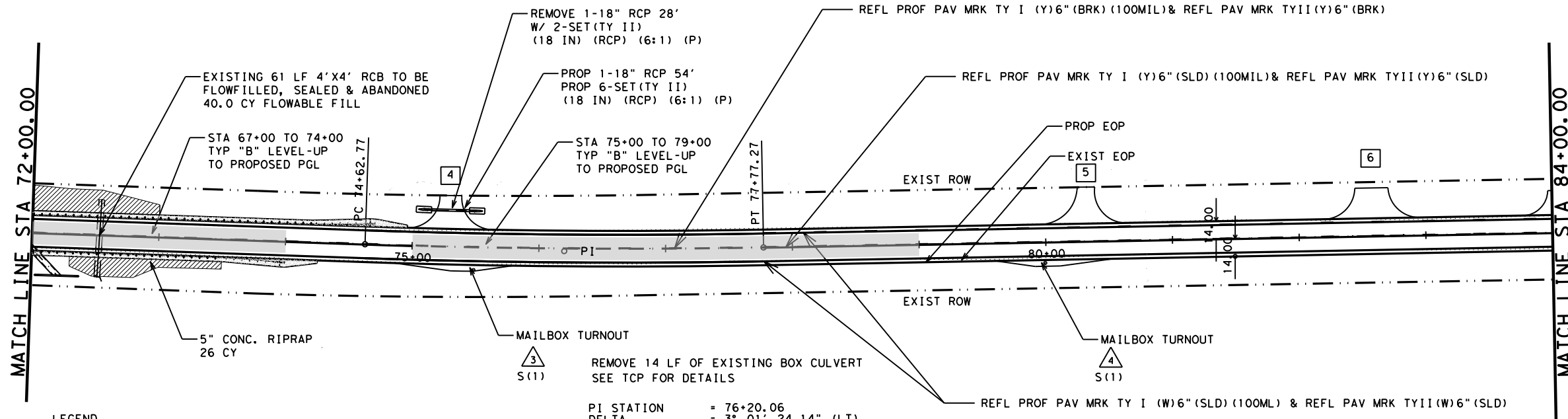
**FM 1100**

**PLAN AND PROFILE**

SHEET 1 OF 4

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	52	

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PROP RDWY X-SLOPE		
STATION	LEFT	RIGHT
62+00	MATCH EXIST.	MATCH EXIST.
62+50	-2.0	-2.0
74+02	-2.0	-2.0
74+46	-2.0	0.0
74+90	-2.0	2.0
77+50	-2.0	2.0
77+94	-2.0	0.0
78+38	-2.0	-2.0
104+50	-2.0	-2.0
105+00	MATCH EXIST.	MATCH EXIST.

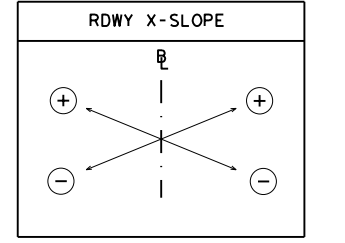
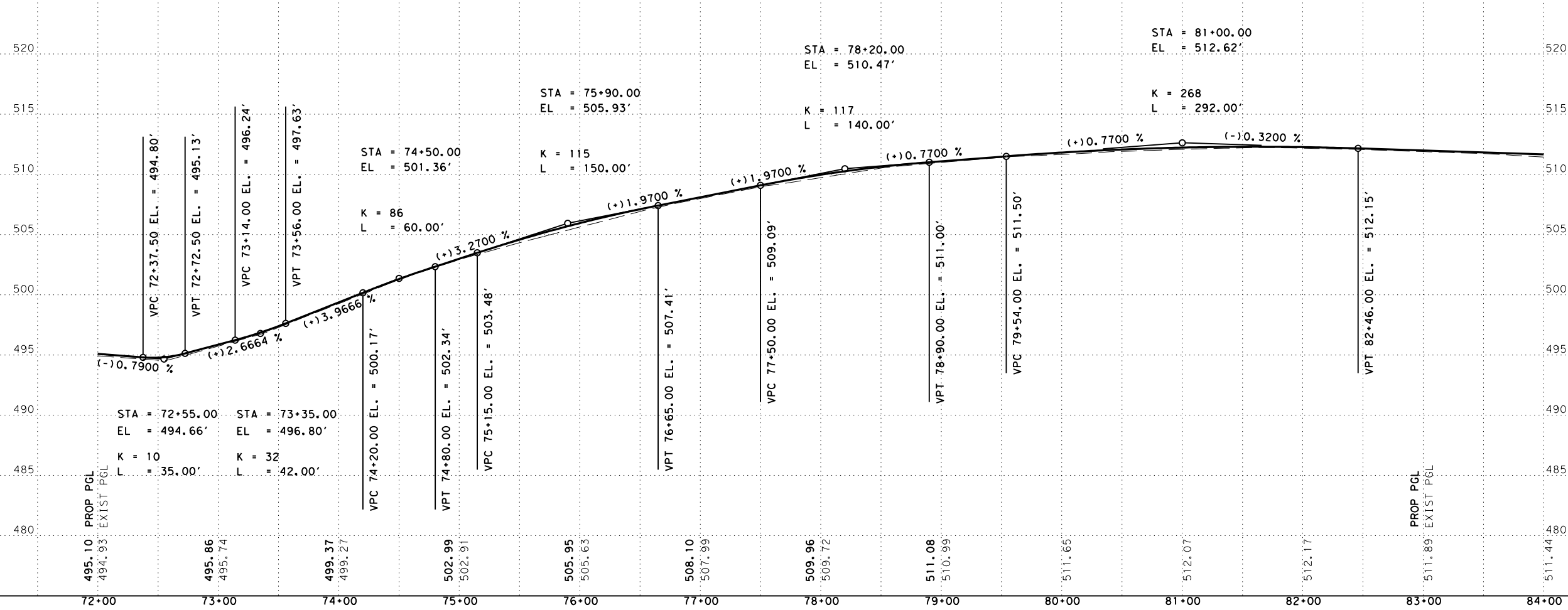
**LEGEND**

TYPE "B" LEVEL-UP	
5" CONCRETE RIPRAP	
DRIVEWAY ID	
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	

PI STATION = 76+20.06  
 DELTA = 3° 01' 24.14" (LT)  
 DEGREE OF CURVE = 0° 57' 40.82"  
 TANGENT = 157.28  
 LENGTH = 314.50  
 RADIUS = 5,960.00  
 PC STATION = 74+62.77  
 PT STATION = 77+77.27

**NOTE :** PROPOSED VERTICAL CURVE DATA APPLIES TO AREAS FOR LEVEL-UP AND FULL DEPTH RECONSTRUCTION AT STA 72+00 TO STA 74+00 & STA 75+00 TO STA 79+00. AREAS NOT CALLED OUT FOR LEVEL-UP TO PROPOSED PGL, WILL MATCH THE EXISTING GROUND PGL DATA. REFER TO CROSS SECTIONS FOR DETAILS.

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 3/17/2023



**Austin District**  
 North Travis Area Office

**Texas Department of Transportation**

**FM 1100**

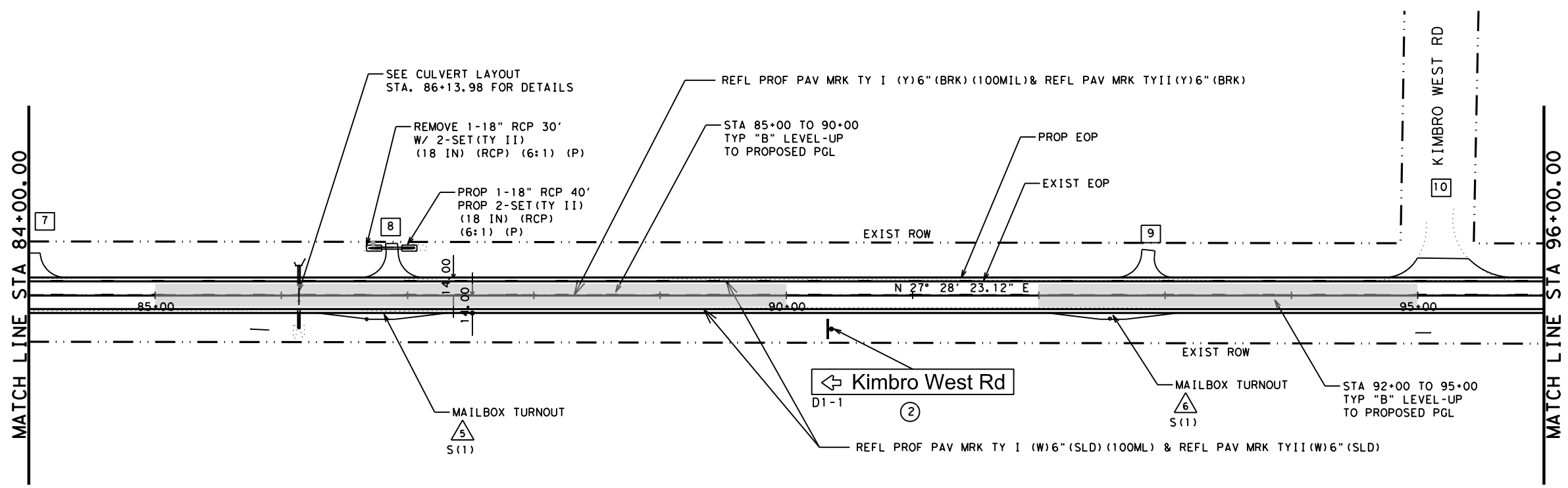
**PLAN AND PROFILE**

SHEET 2 OF 4

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	53	



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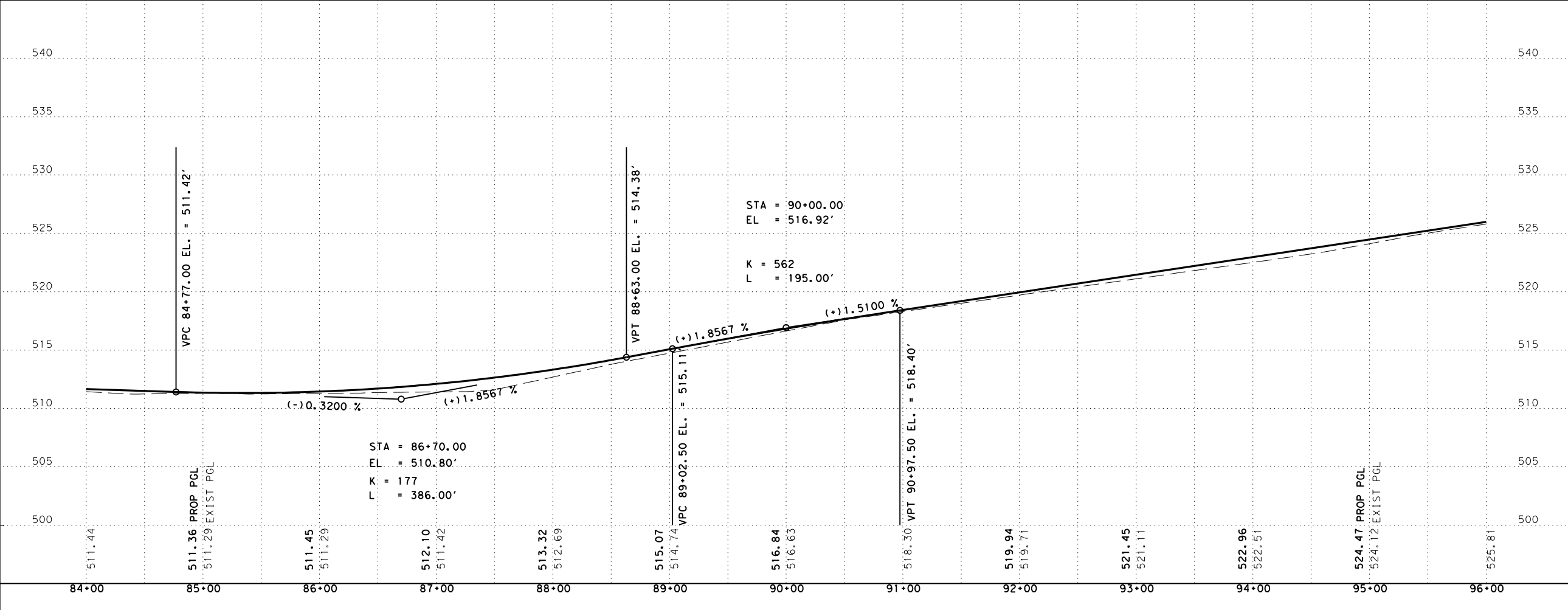
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TYPE "B" LEVEL-UP	
5" CONCRETE RIPRAP	
DRIVEWAY ID	
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	

NOTE : PROPOSED VERTICAL CURVE DATA APPLIES TO AREAS FOR LEVEL-UP AND FULL DEPTH RECONSTRUCTION AT STA 85+00 TO STA 90+00 & STA 92+00 TO STA 95+00. AREAS NOT CALLED OUT FOR LEVEL-UP TO PROPOSED PGL, WILL MATCH THE EXISTING GROUND PGL DATA. REFER TO CROSS SECTIONS FOR DETAILS.



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Austin District  
 North Travis Area Office

Texas Department of Transportation

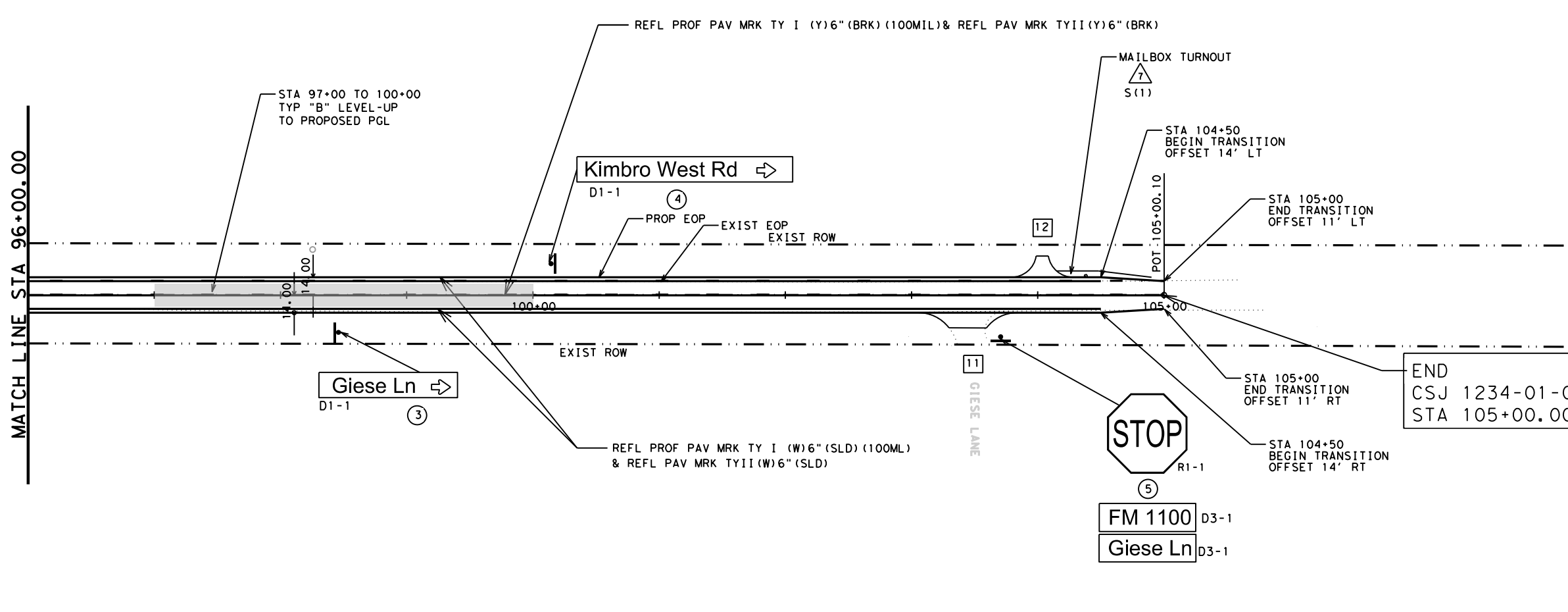
FM 1100

PLAN AND PROFILE

SHEET 3 OF 4

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	54	

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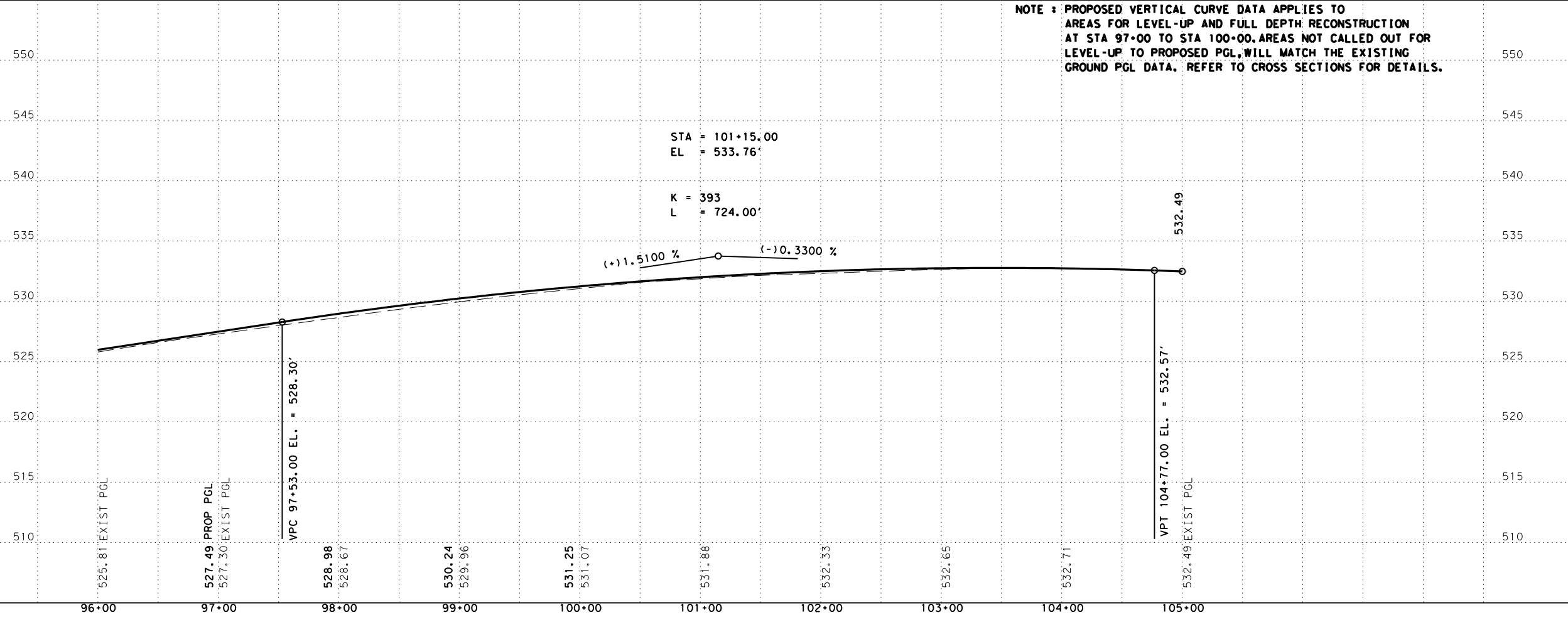
LEGEND

TYPE "B" LEVEL-UP	
5" CONCRETE RIPRAP	
DRIVEWAY ID	(DWX)
PROPOSED MAILBOX	
DIRECTION OF TRAFFIC	←



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 3/17/2023  
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NOTE: PROPOSED VERTICAL CURVE DATA APPLIES TO AREAS FOR LEVEL-UP AND FULL DEPTH RECONSTRUCTION AT STA 97+00 TO STA 100+00. AREAS NOT CALLED OUT FOR LEVEL-UP TO PROPOSED PGL, WILL MATCH THE EXISTING GROUND PGL DATA. REFER TO CROSS SECTIONS FOR DETAILS.



Austin District  
North Travis Area Office

Texas Department of Transportation

FM 1100

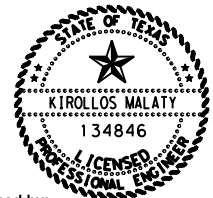
PLAN AND PROFILE


SHEET 4 OF 4

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	55	


DATE: 3/16/2023 12:34:17 PM  
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DRIVEWAY NO.	P&P SHEET NO.	DRIVEWAY TYPE	STATION	SIDE (LT/RT)	DWY LENGTH L (FT)	DWY WIDTH @ MOUTH (FT)	DWY WIDTH @ THROAT (FT)	SURFACE AREA (SY)	RADIUS LT (FT)	RADIUS RT (FT)	MAILBOX TURNOUT (SY)	PIPE LENGTH (FT)	NO. OF BARRELS	PIPE SIZE (IN)	S.E.T. SIDE SLOPE	DRIVEWAY CL OFFSET (FT)	CONSTRUCTION LICENSE AREA (SF)
1	1	ACP	63+53.91	RT	49.0	79.6	19.5	142.9	30	30	30.8	70.00	1	18	6:1	32.00	-
2	1	ACP	66+80.75	LT	27.5	62.0	12.0	63.9	25	25	-	-	-	-	-	-	-
3	1	ACP	69+57.86	RT	28.2	51.5	11.3	52.9	20	20	29.6	44.00	1	18	6:1	28.00	-
4	2	ACP	75+29.65	LT	27.6	67.5	17.2	80.0	25	25	31.0	54.00	1	18	6:1	28.00	-
5	2	ACP	80+26.88	LT	28.6	68.6	13.7	79.9	30	25	31.6	-	-	-	-	-	-
6	2	ACP	82+57.08	LT	24.5	76.1	26.1	99.4	25	25	-	-	-	-	-	-	-
7	3	ACP	84+02.89	LT	20.0	52.4	12.4	45.6	20	20	-	-	-	-	-	-	-
8	3	ACP	86+90.35	LT	27.5	49.6	9.4	47.6	20	20	34.4	40.00	1	18	6:1	38.00	-
9	3	ACP	92+82.91	LT	23.8	45.1	10.4	39.4	20	15	34.4	-	-	-	-	-	-
10	3	ACP	95+16.96	LT	17.4	102.4	40.5	99.7	30	50	-	-	-	-	-	-	-
11	4	ACP	103+46.90	RT	12.9	77.9	29.8	59.4	30	30	-	-	-	-	-	-	-
12	4	ACP	104+03.57	LT	19.8	49.2	9.7	36.1	20	20	27.8	-	-	-	-	-	-



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**Austin District  
 North Travis Area Office**

 **Texas Department of Transportation**

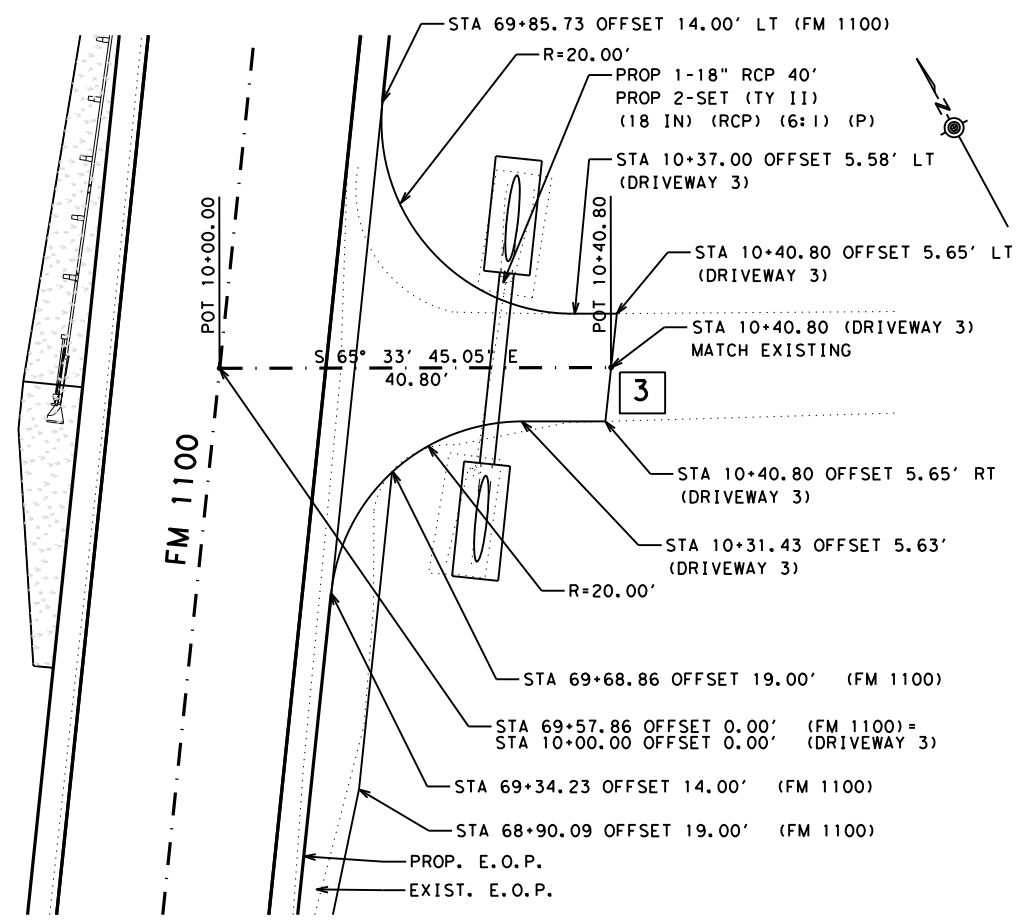
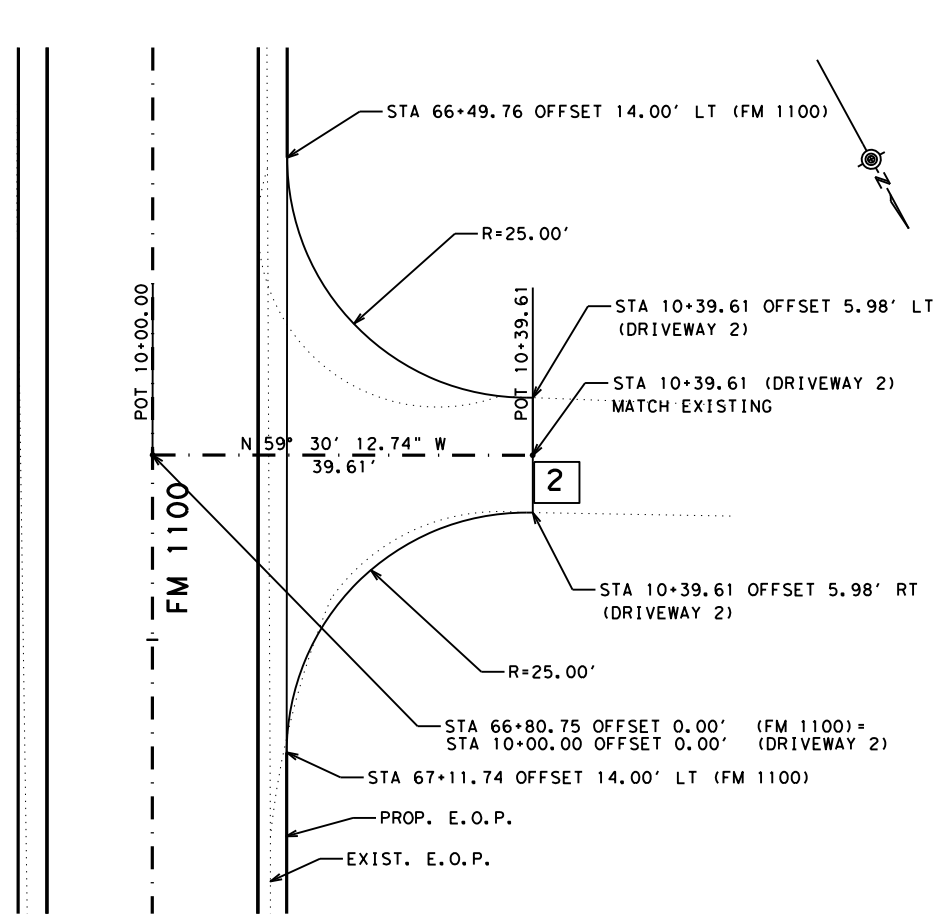
**FM 1100**

**DRIVEWAY SUMMARY**

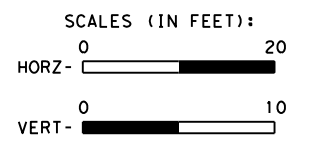
SHEET 1 OF 1

© 2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST COUNTY			SHEET NO.
	AUS TRAVIS			56

DATE: 3/16/2023 12:34:24 PM  
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DocuSign  
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 3/17/2023



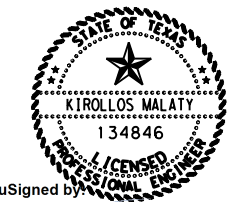
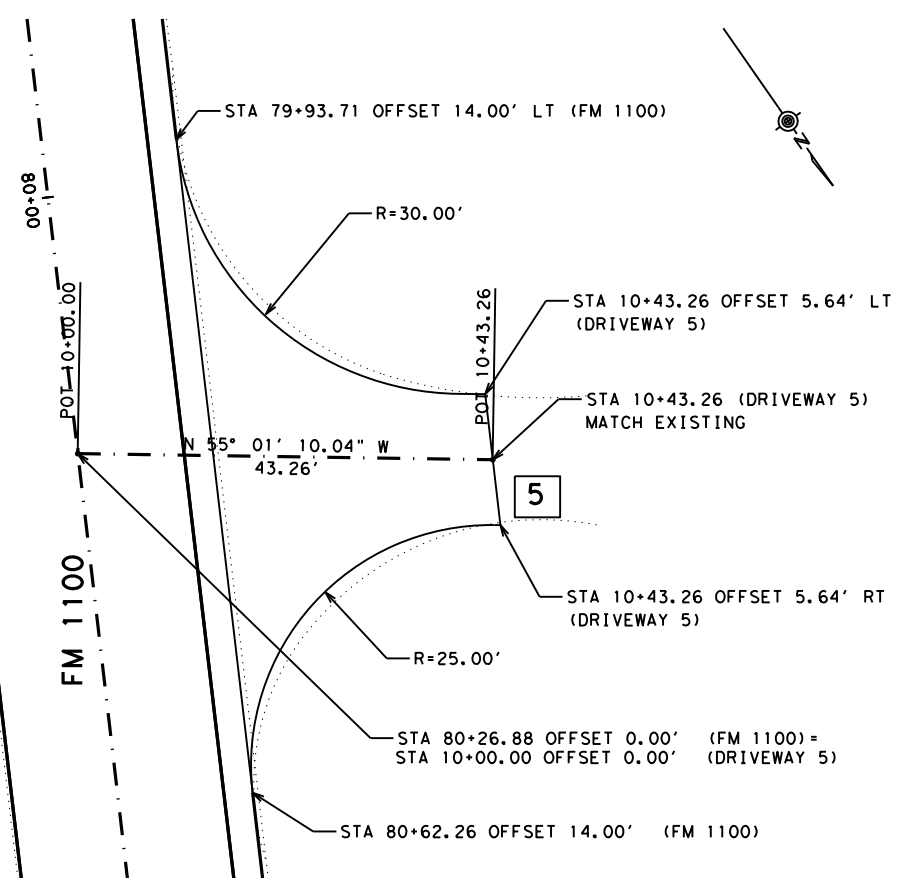
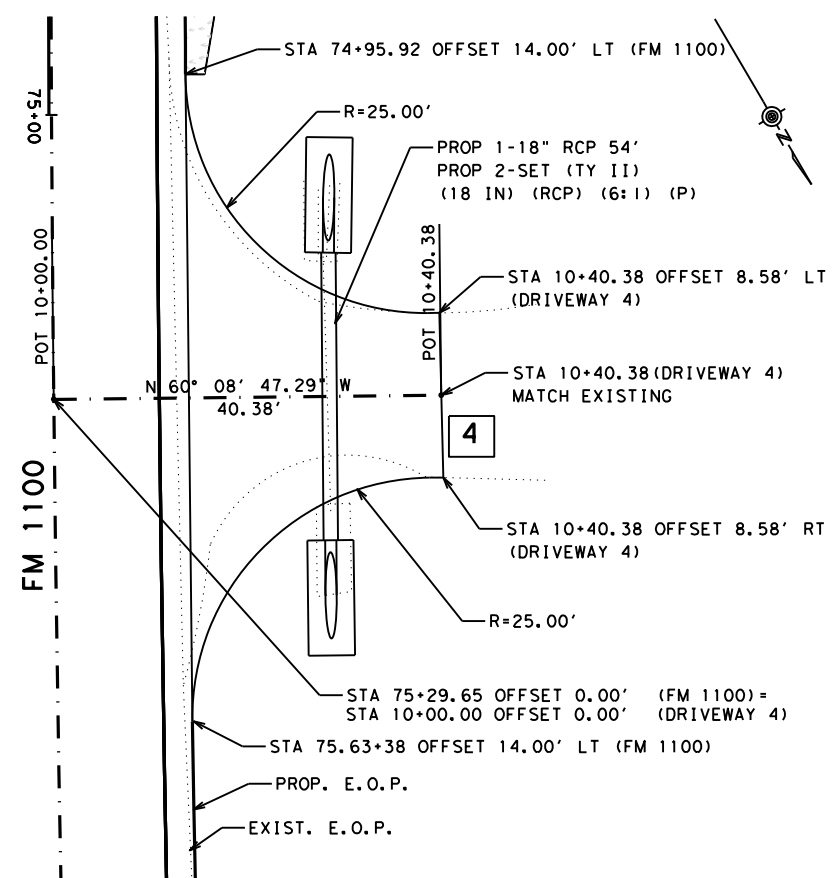
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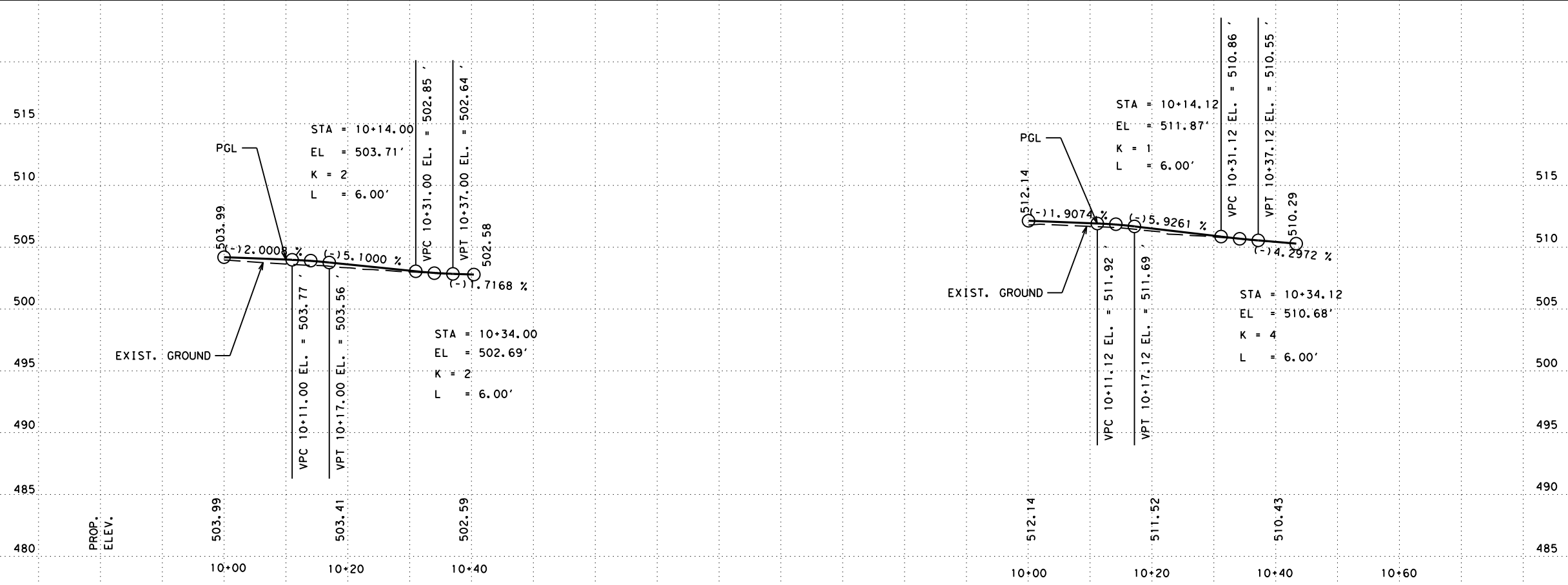
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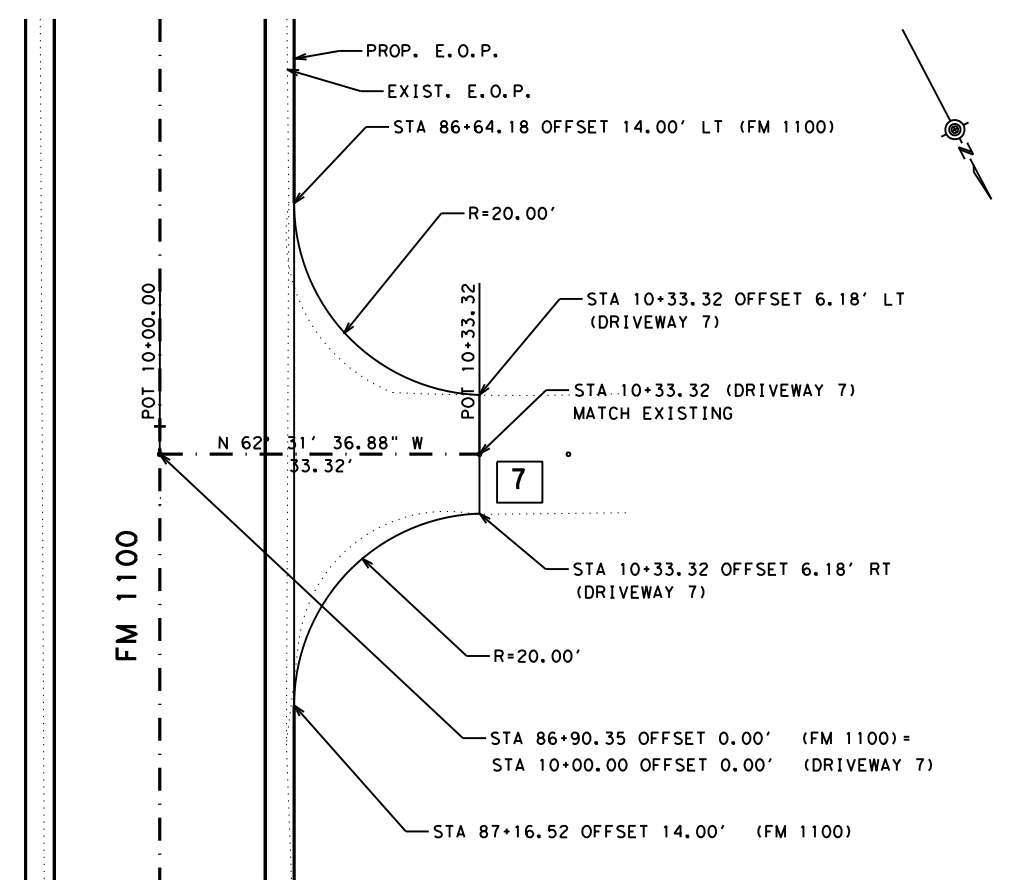
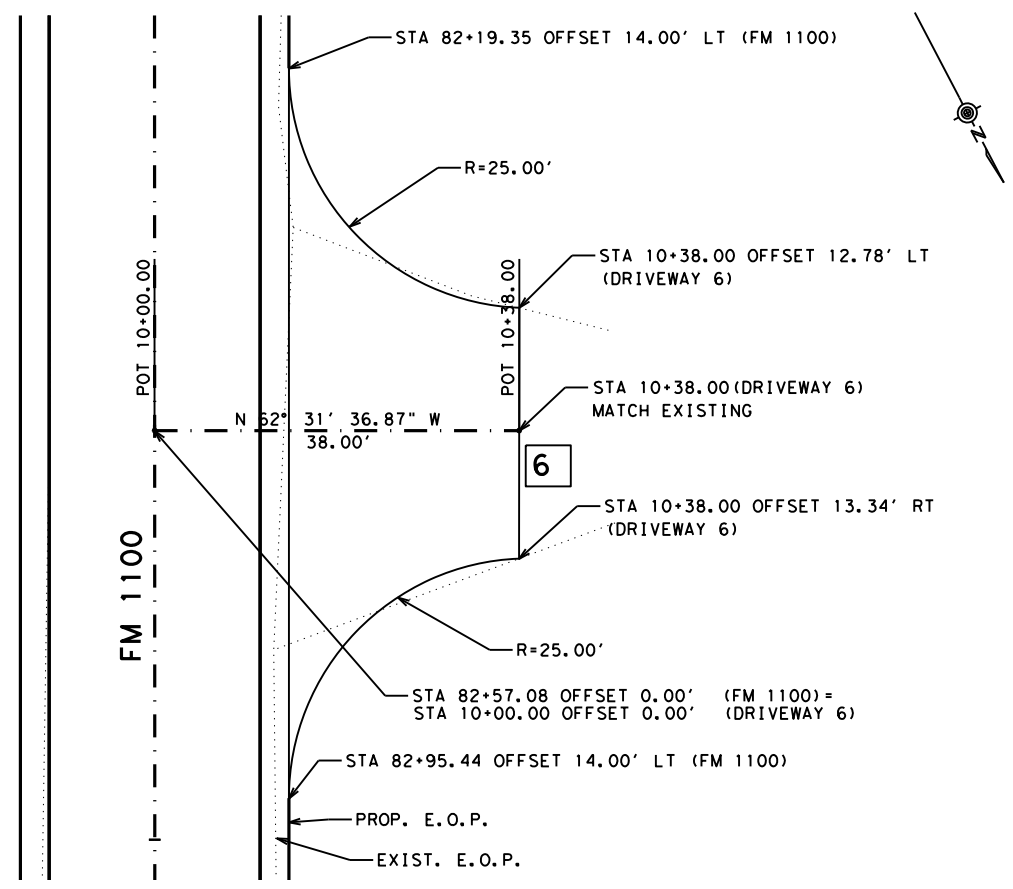
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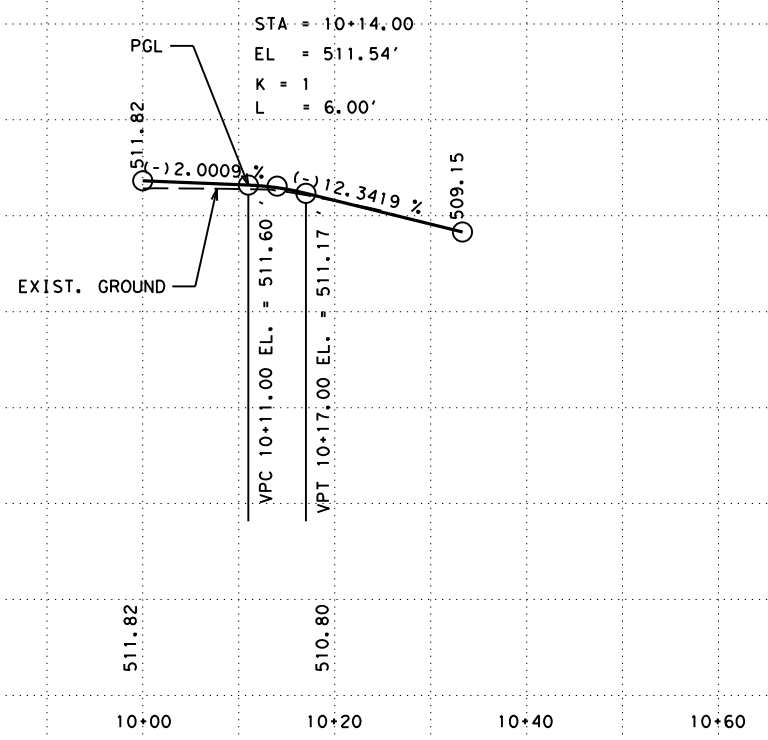
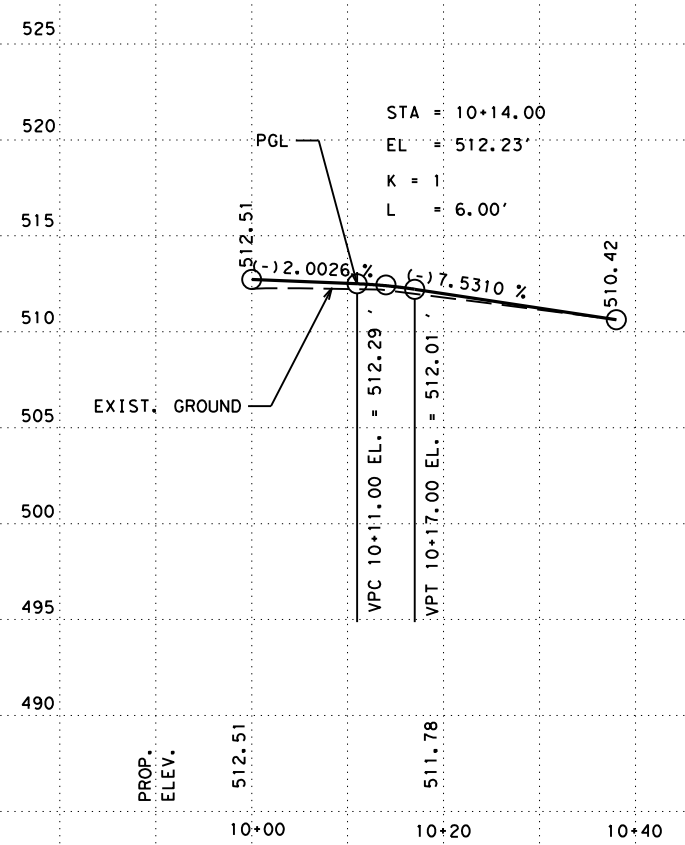
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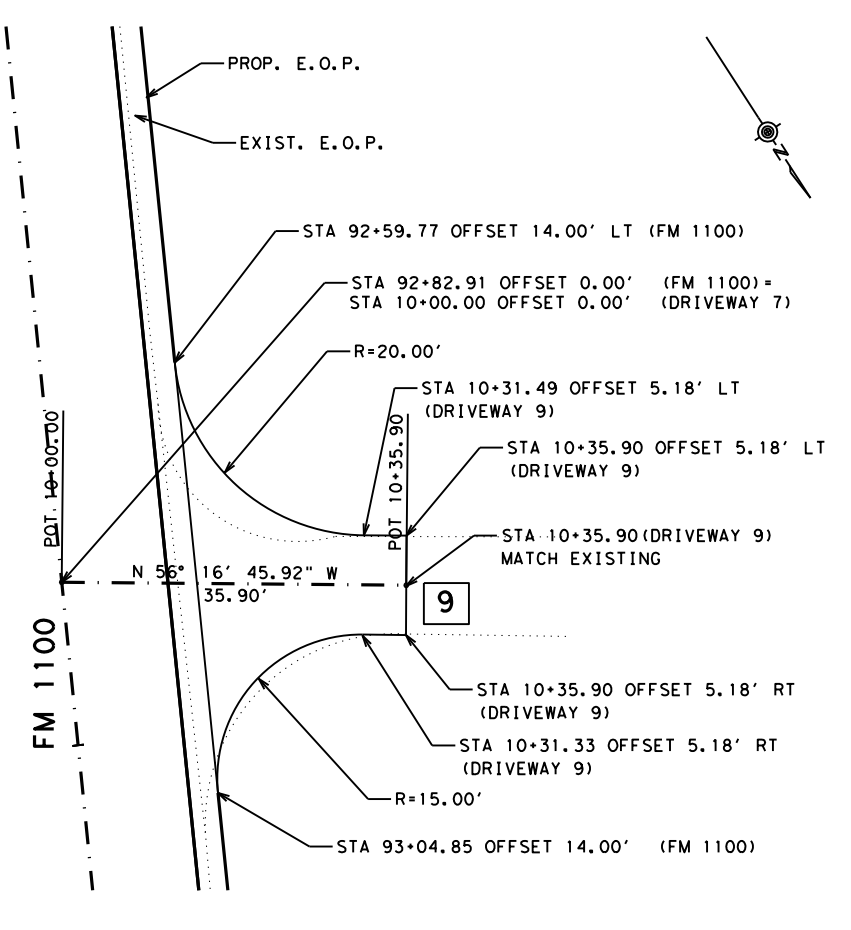
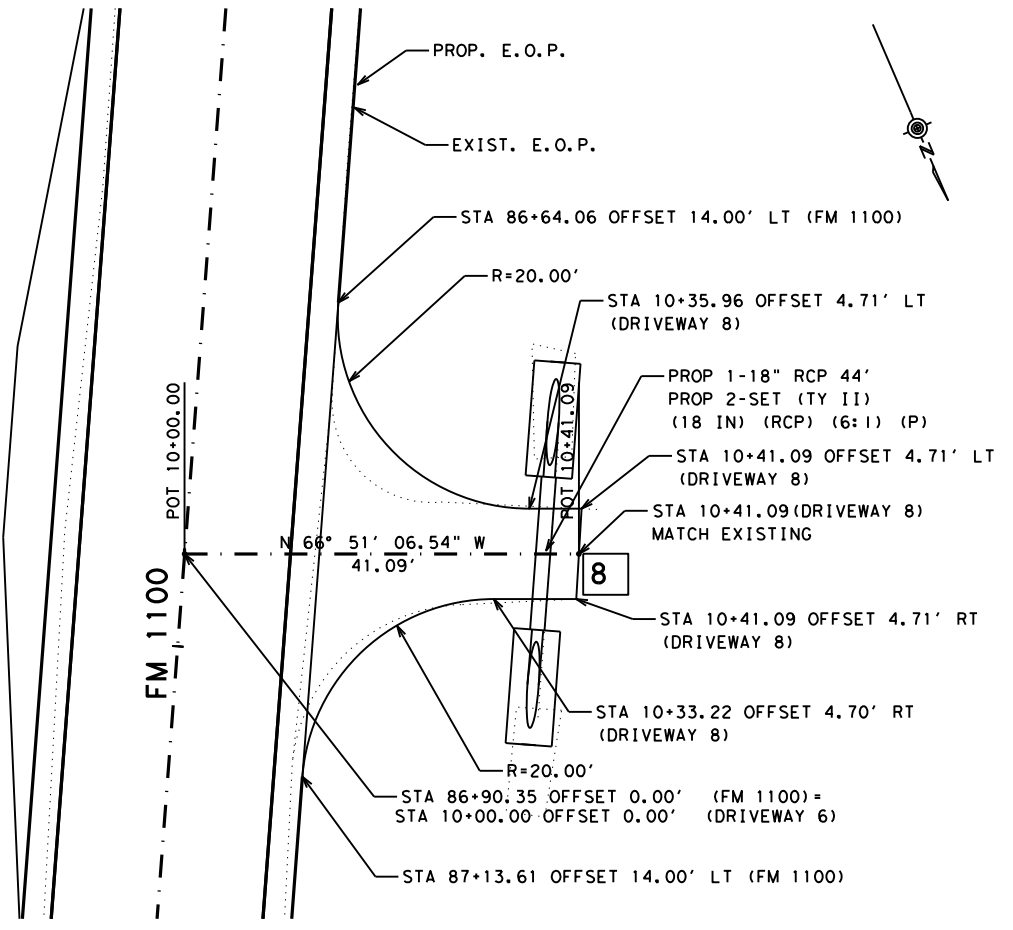


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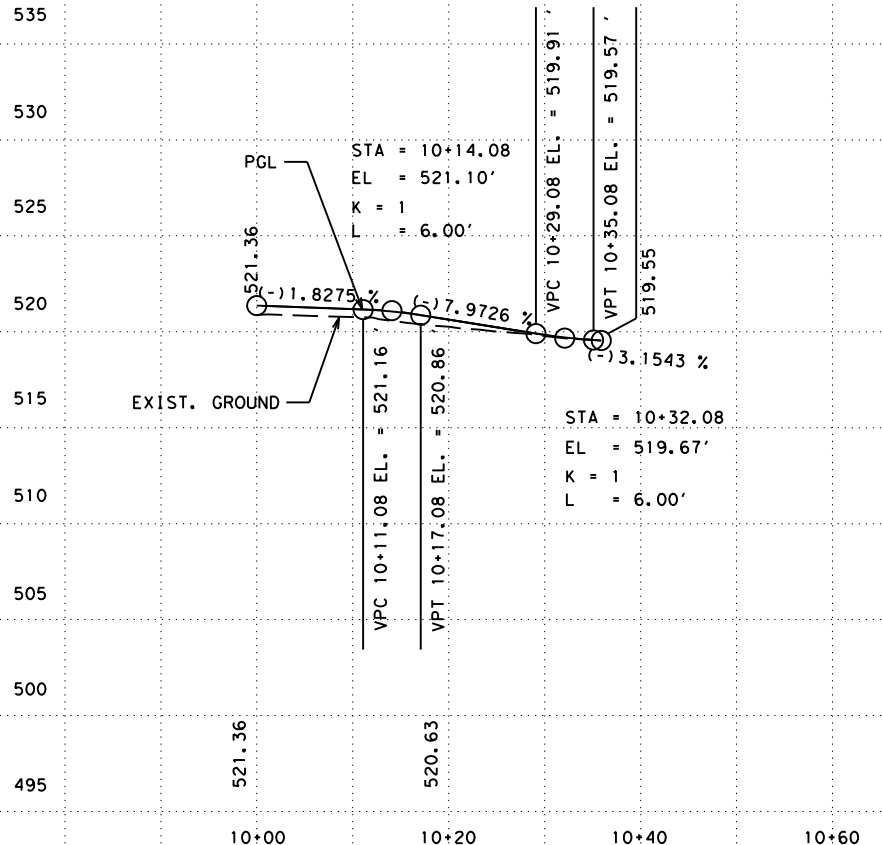
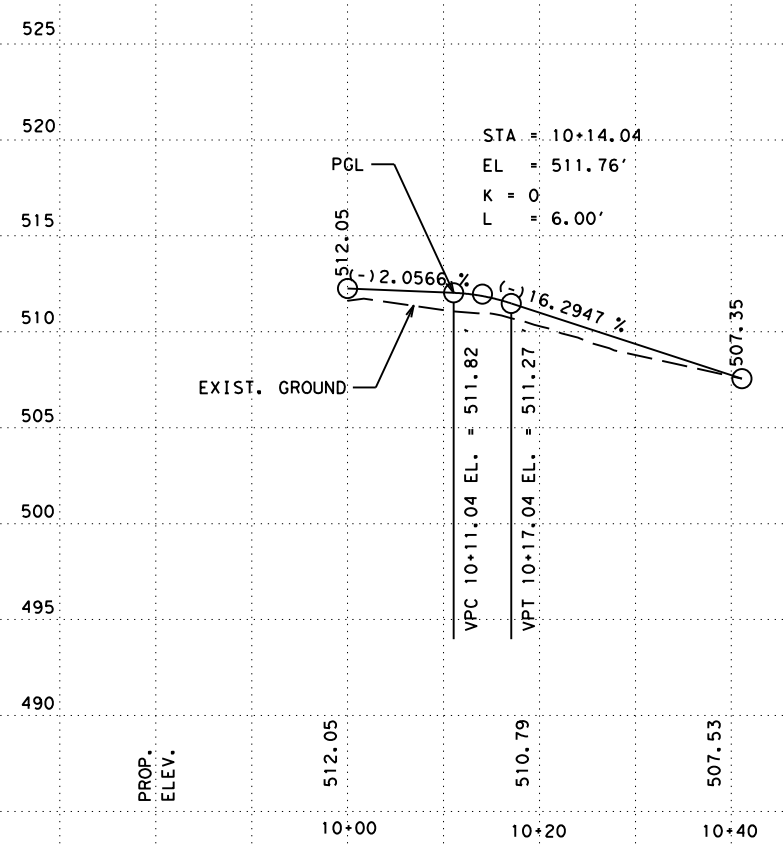
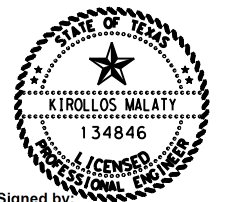
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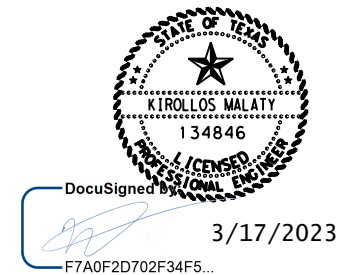
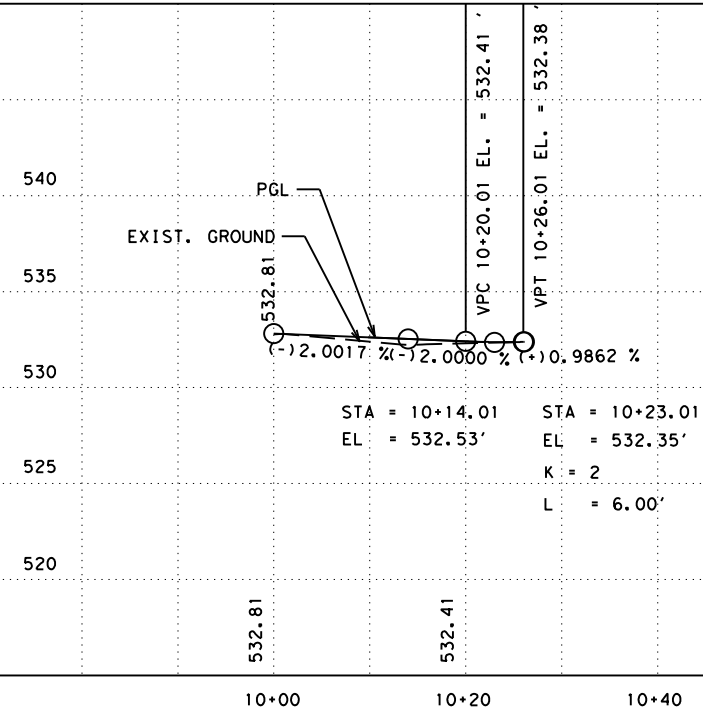
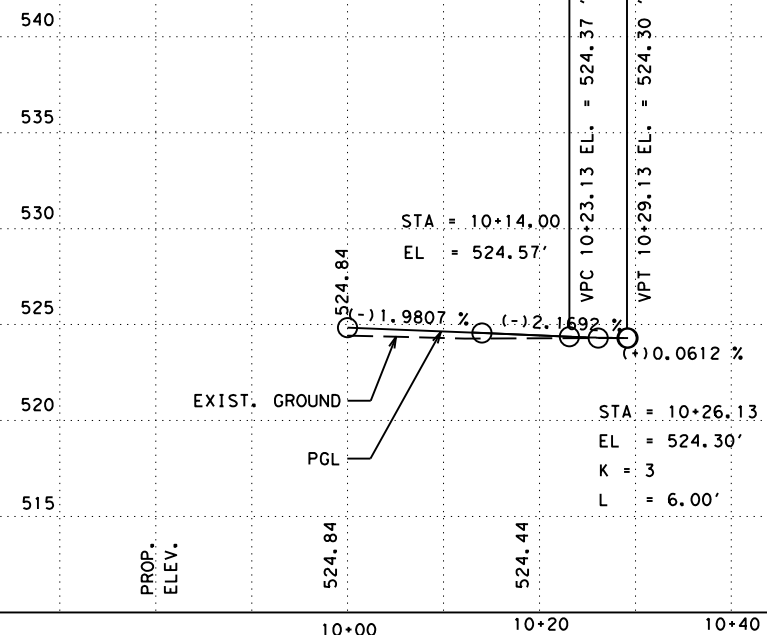
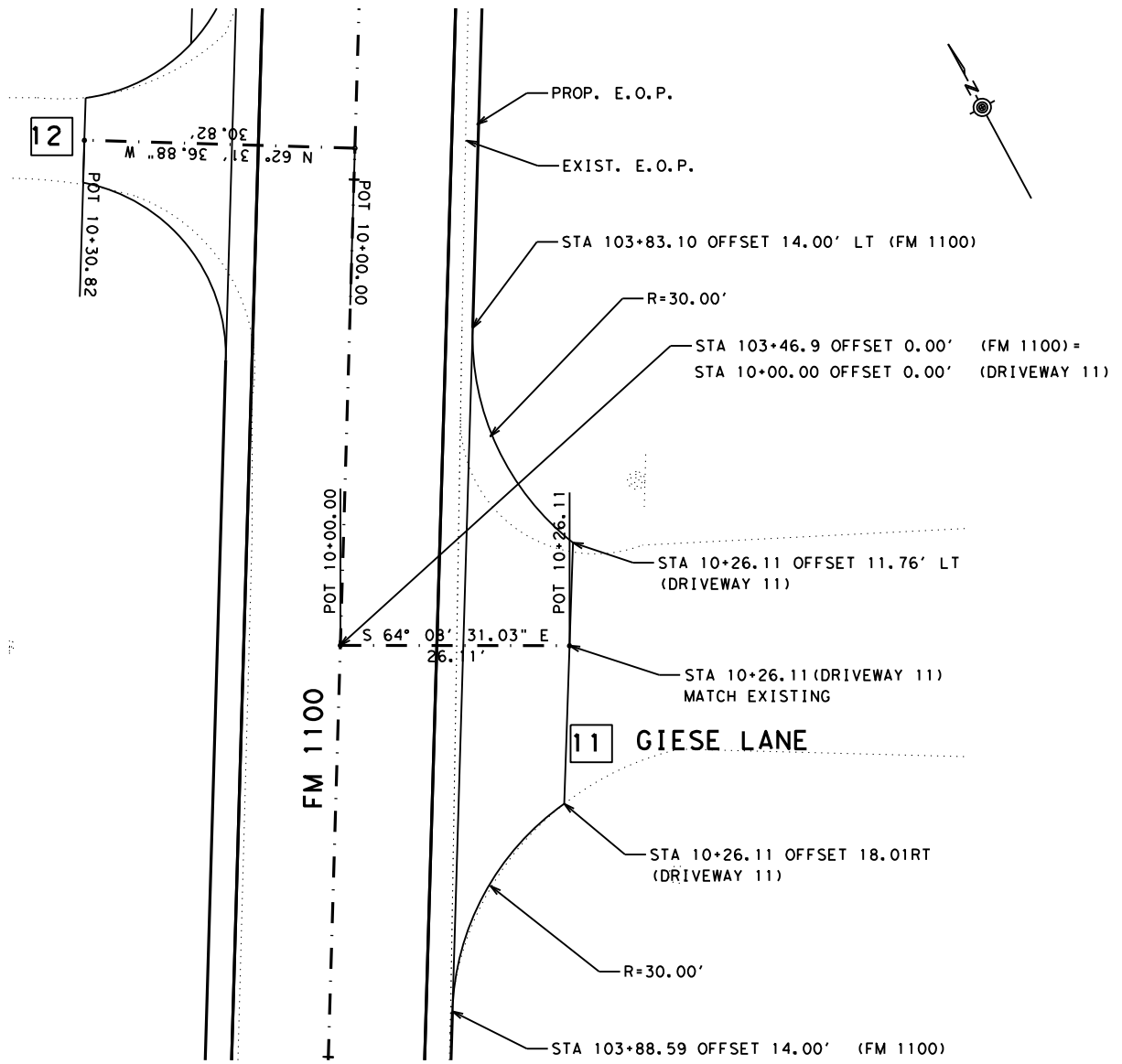
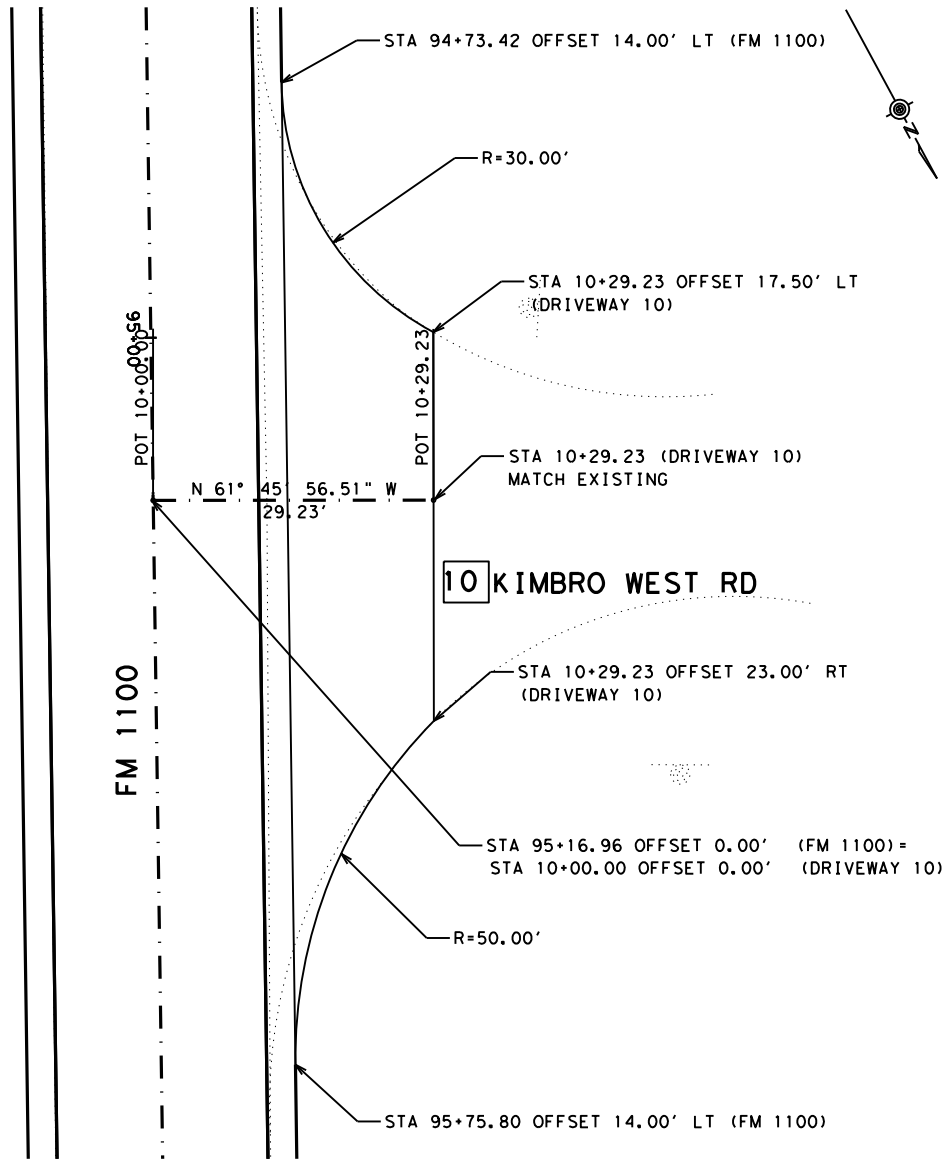
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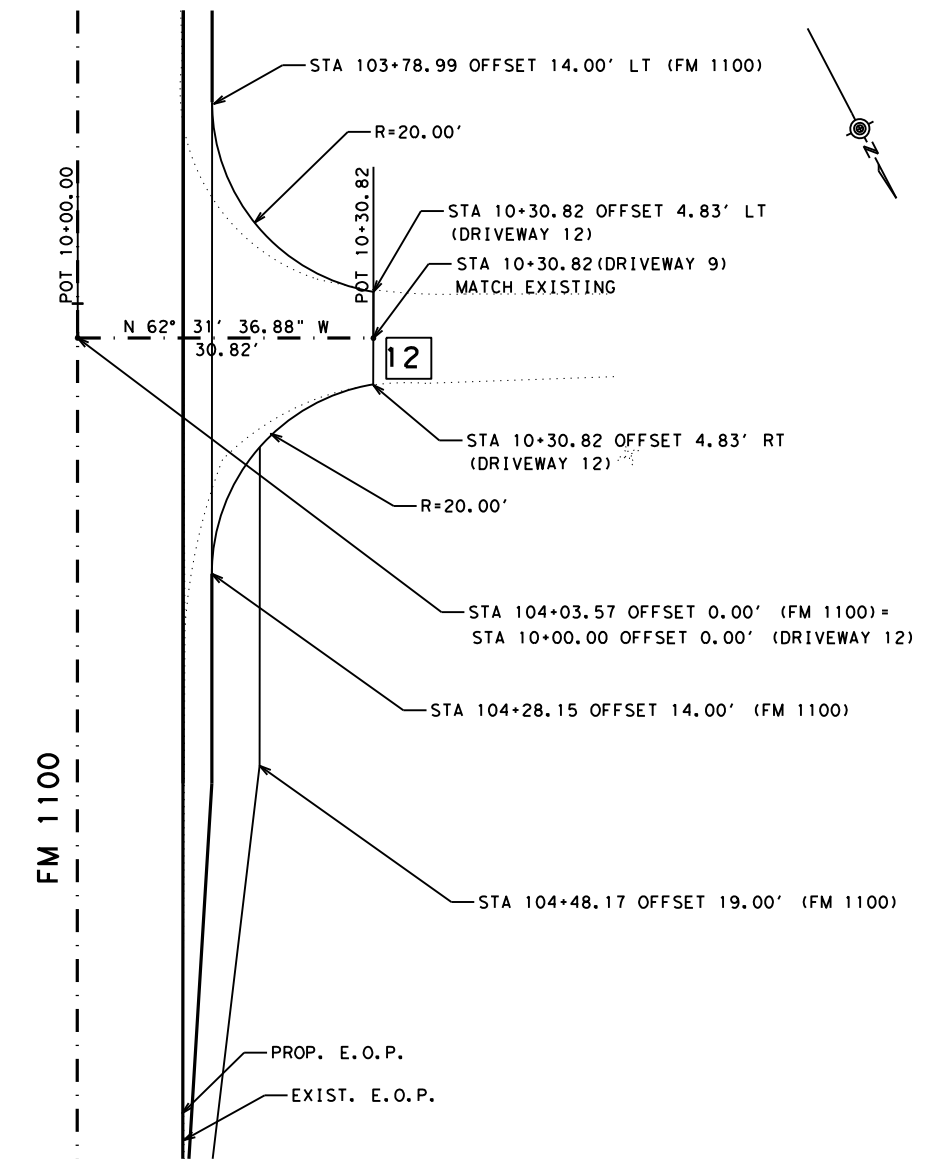
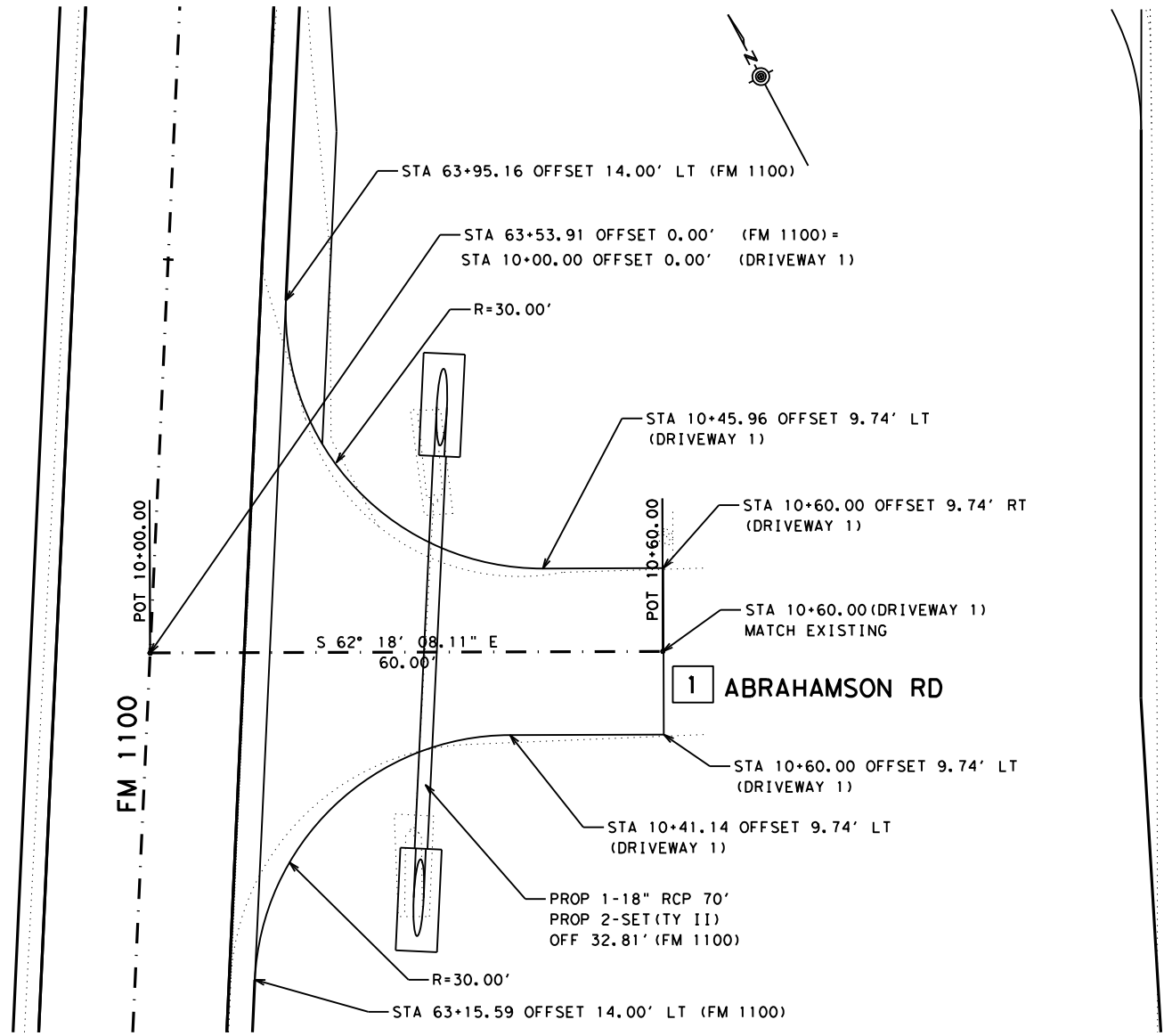
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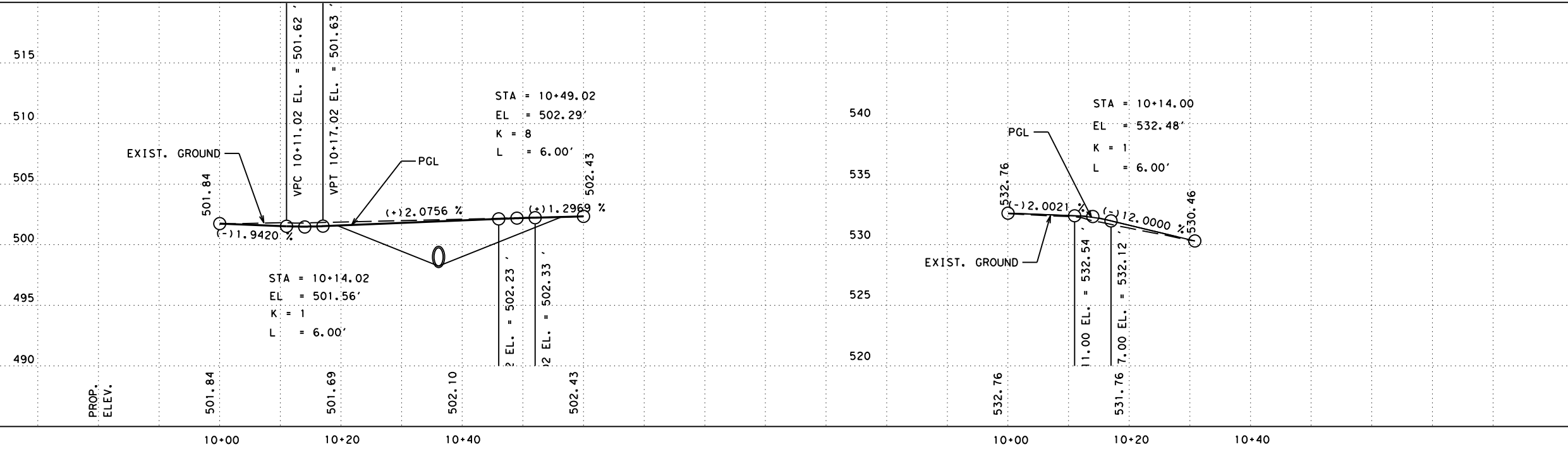
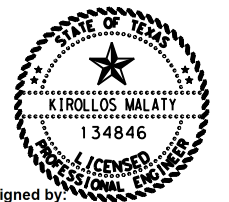
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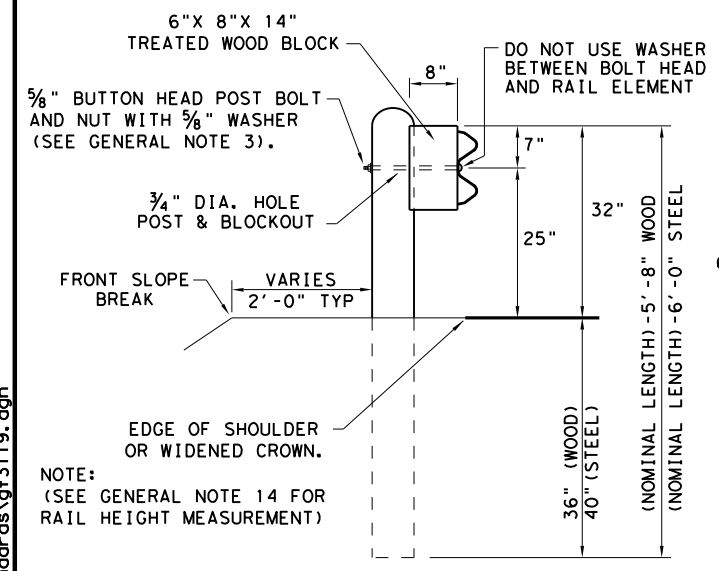
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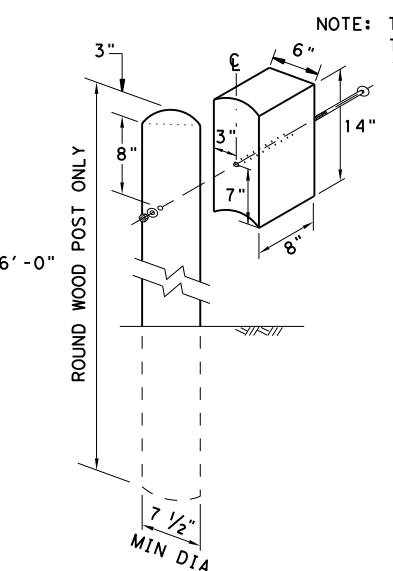
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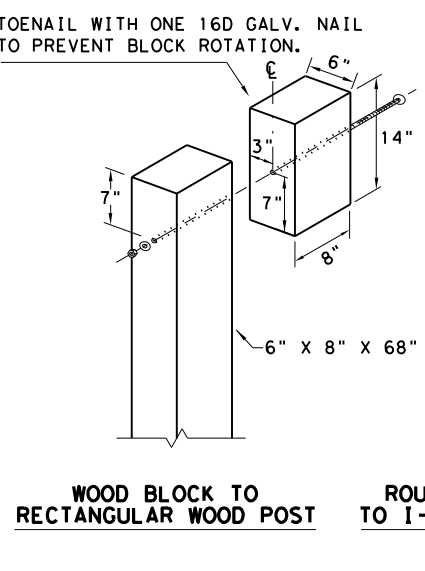
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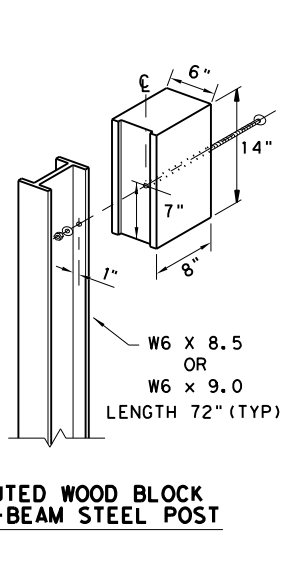
**TYPICAL POST PLACEMENT**



**WOOD BLOCK TO ROUND WOOD POST**



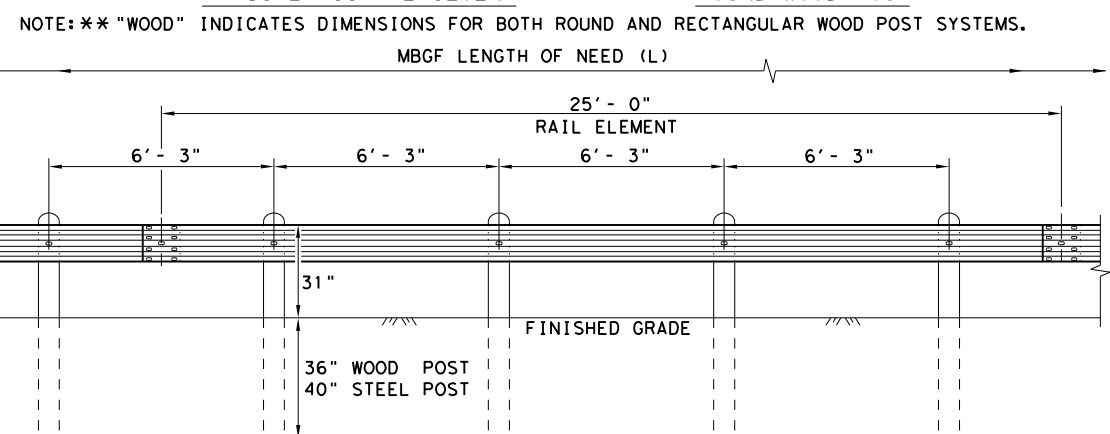
**WOOD BLOCK TO RECTANGULAR WOOD POST**



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

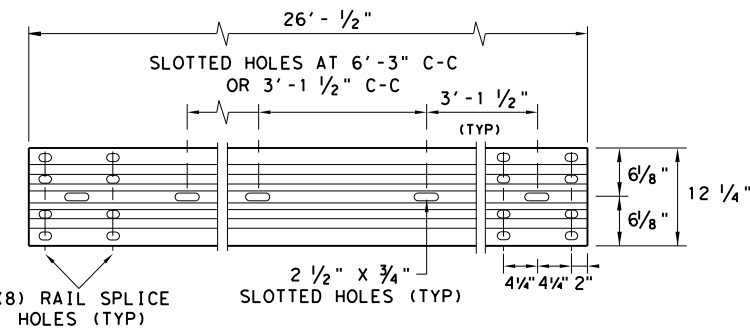
**GENERAL NOTES**

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.



**ELEVATION MID-SPAN RAIL SPLICE**

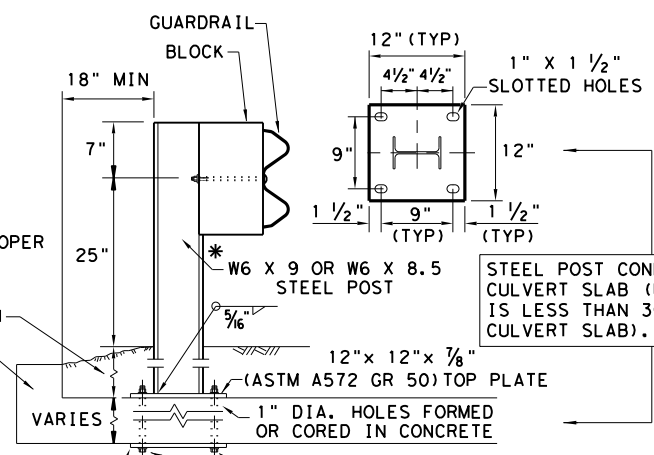
SHOWING A 25'-0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

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

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

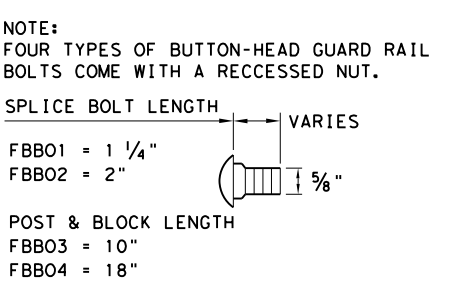


**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

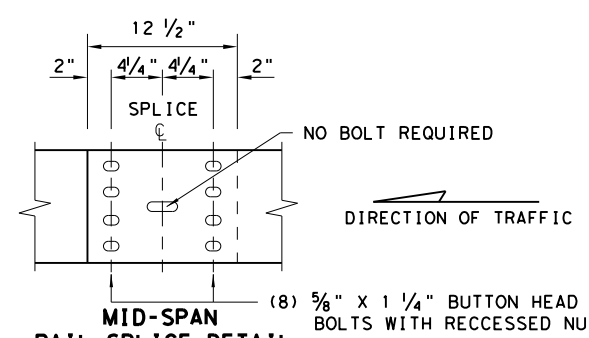
1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR 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.



**BUTTON HEAD BOLT**

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

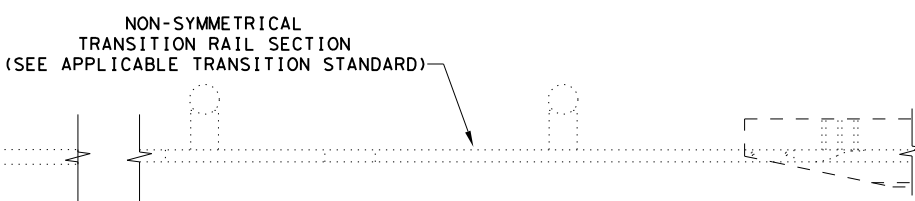
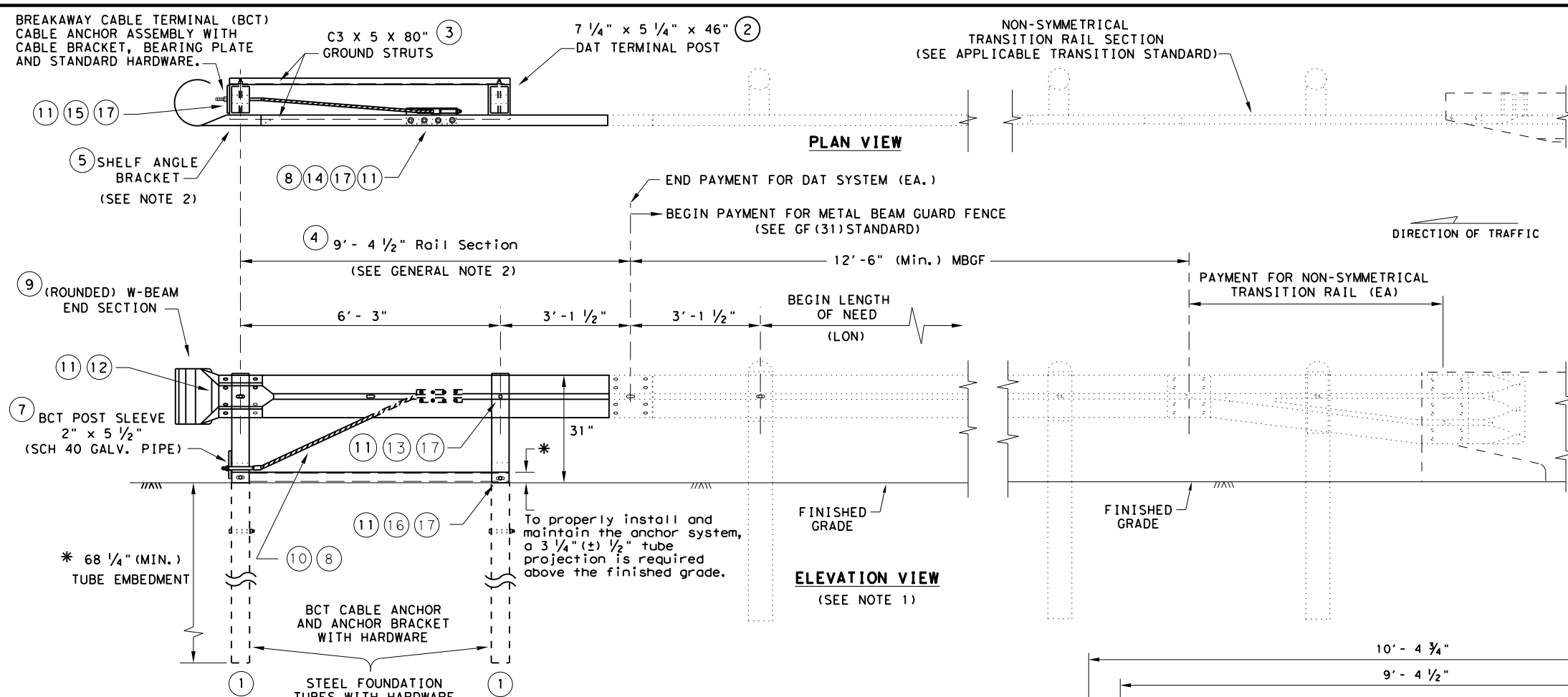


**MID-SPAN RAIL SPLICE DETAIL**

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

				Design Division Standard
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>				
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© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, etc	FM 1100
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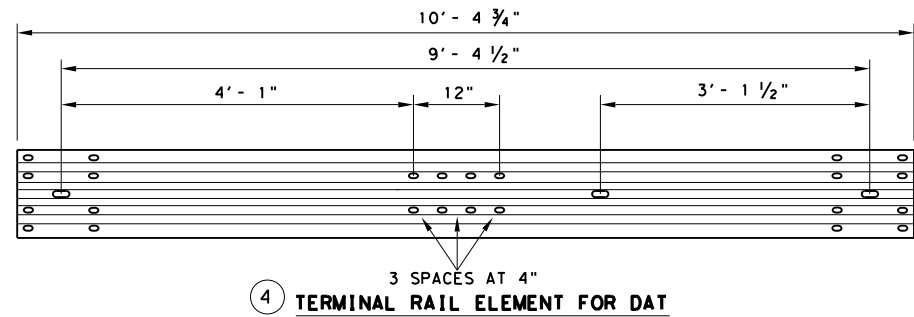


- GENERAL NOTES**
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
  2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
  3. THE FOUNDATION TUBES SHALL 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.

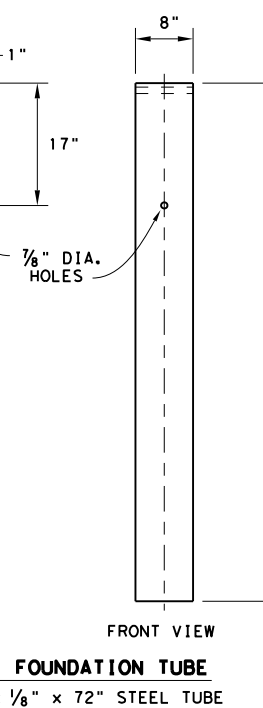
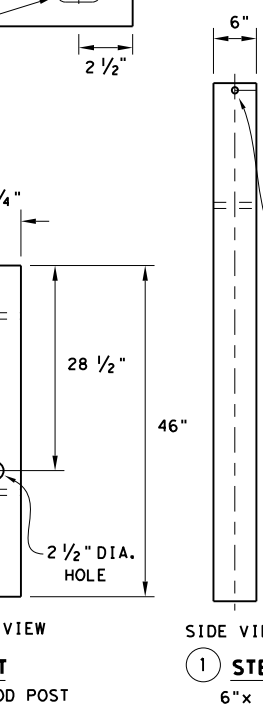
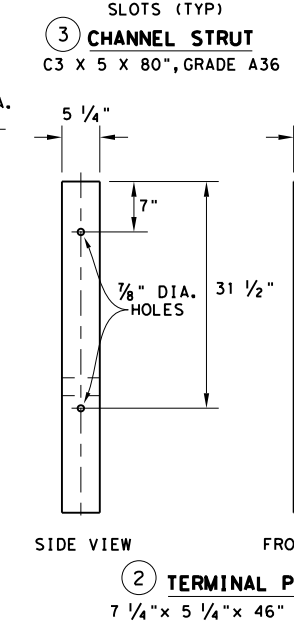
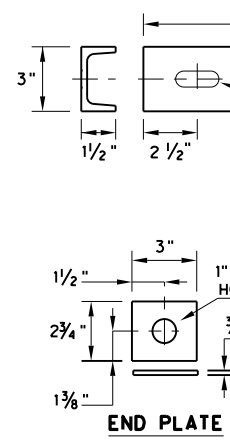
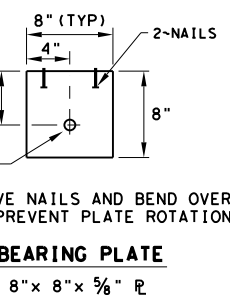
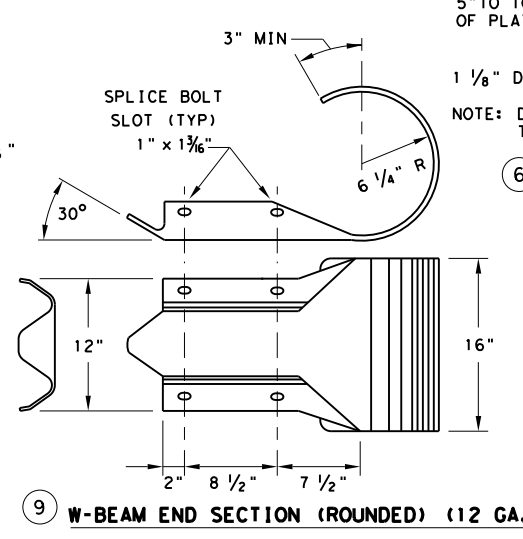
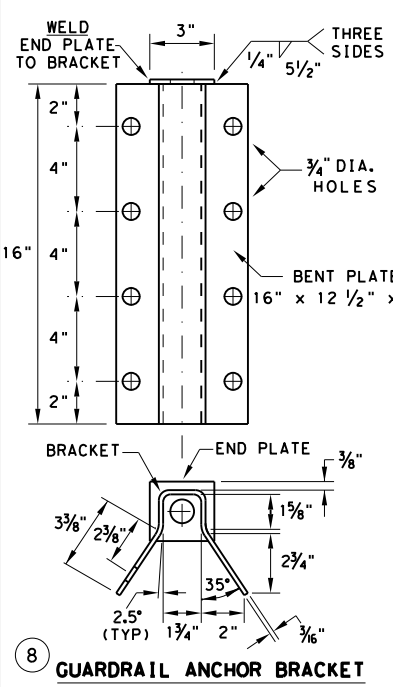
**MOW STRIP INSTALLATION**  
 IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

**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

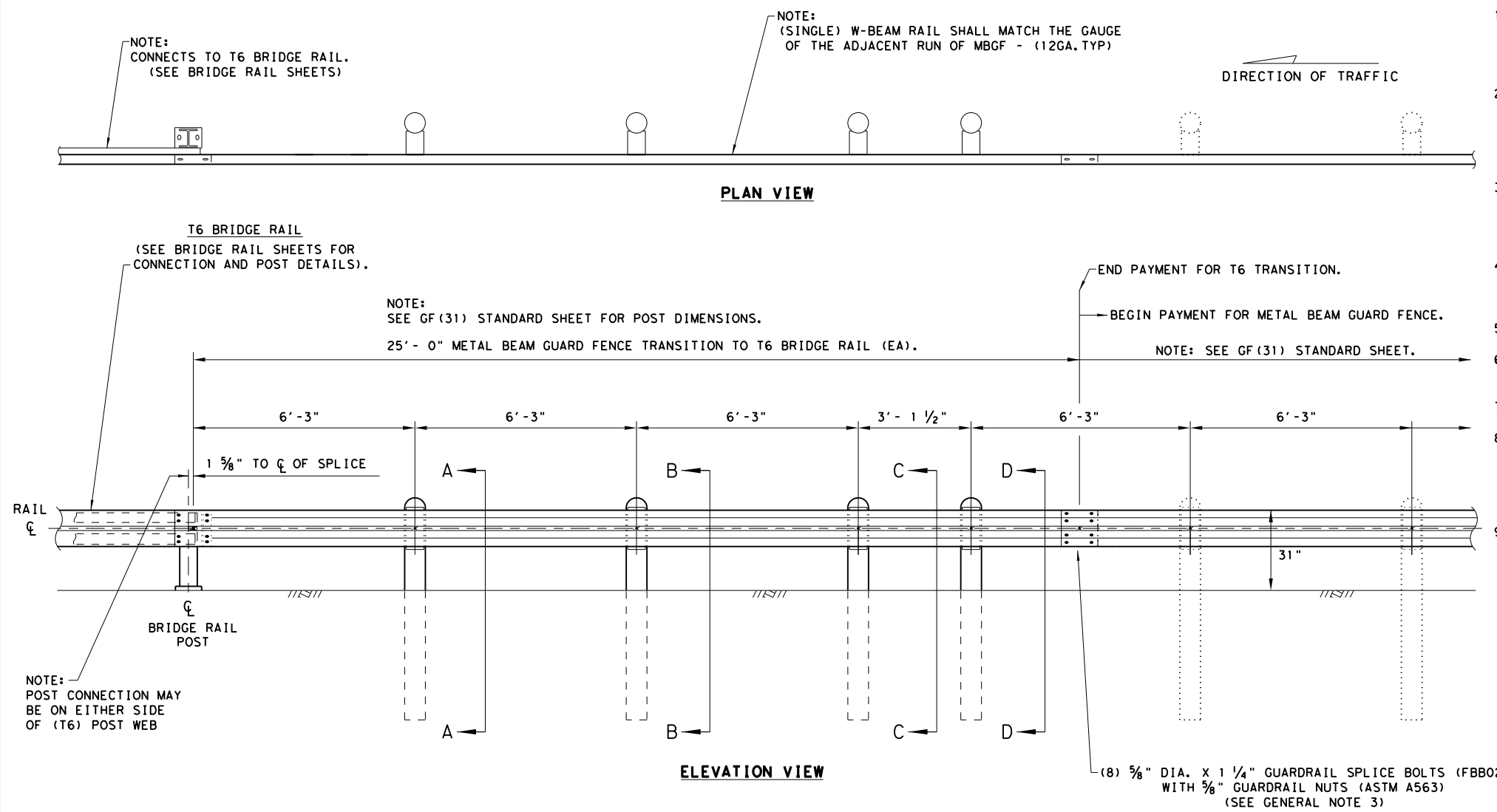


Design Division Standard

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

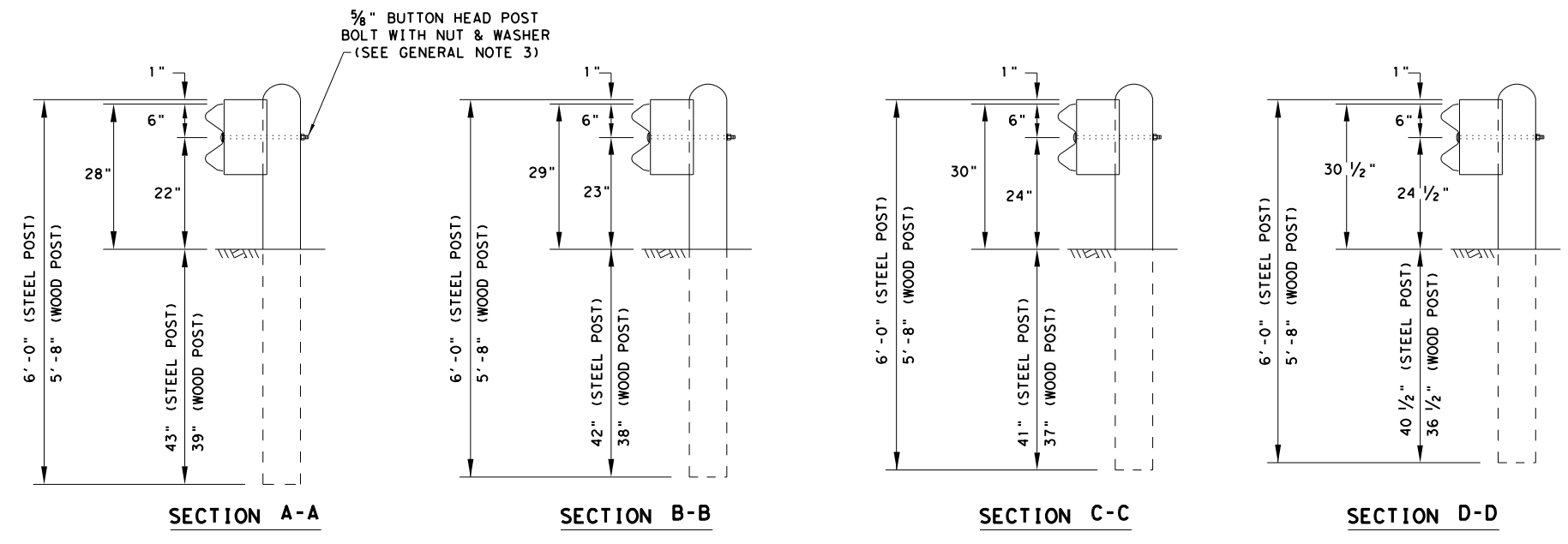
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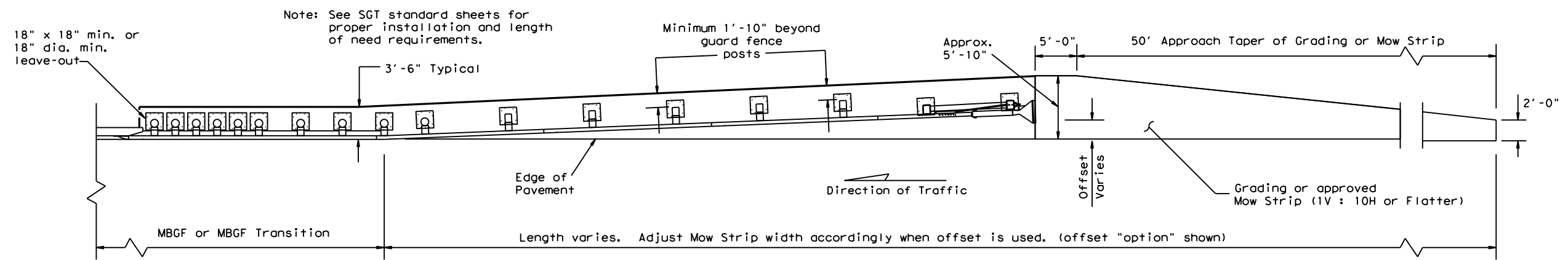
- GENERAL NOTES**
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
  2. RAIL ELEMENT 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) & APPLICABLE BRIDGE RAILING STANDARD FOR ADDITIONAL DETAILS.

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



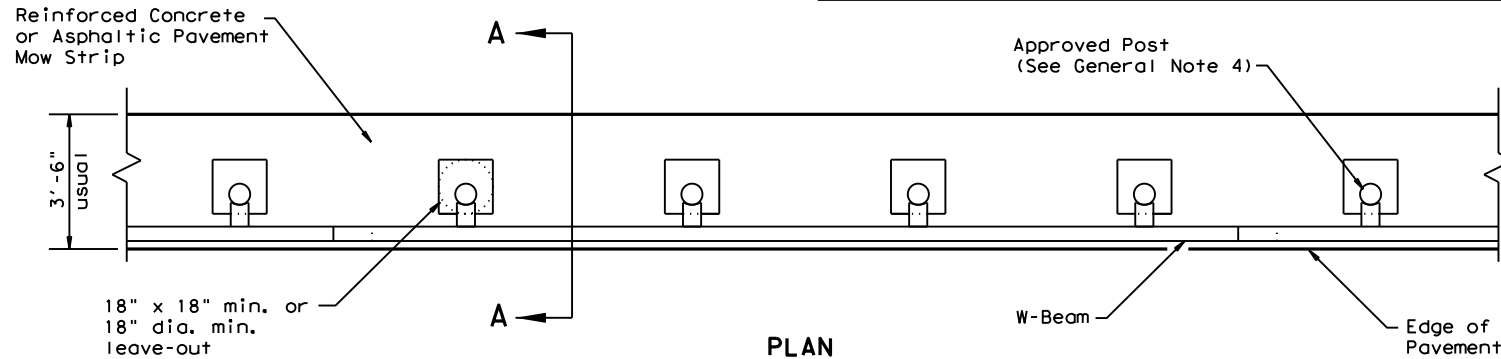
				Design Division Standard
<b>METAL BEAM GUARD FENCE TRANSITION (T6) GF (31) T6-19</b>				
FILE: gf311619.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
© TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, etc	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	65	

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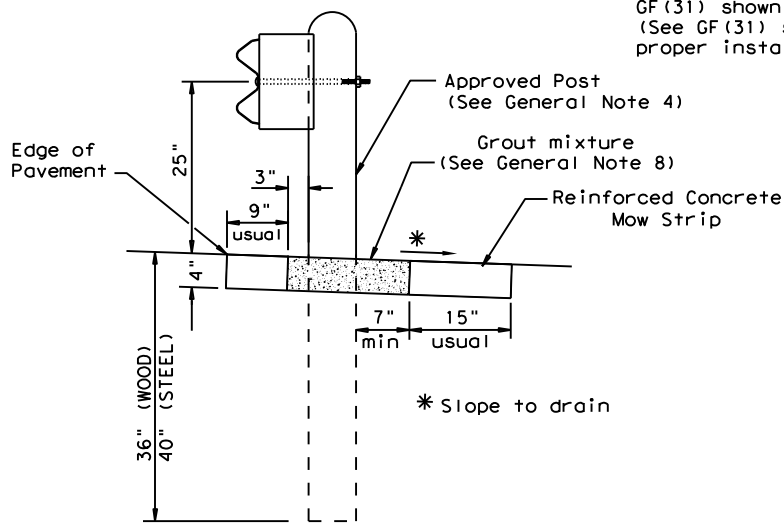
**GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS**

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.



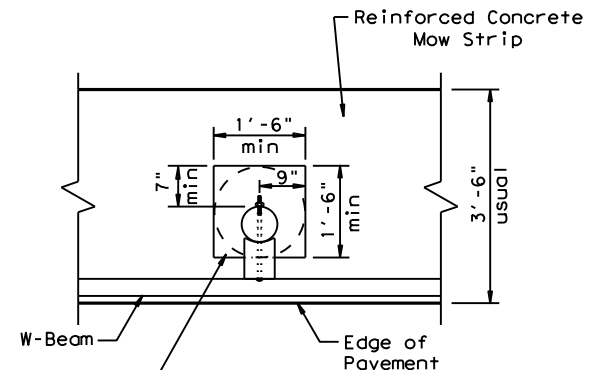
**PLAN**

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



**SECTION A-A**

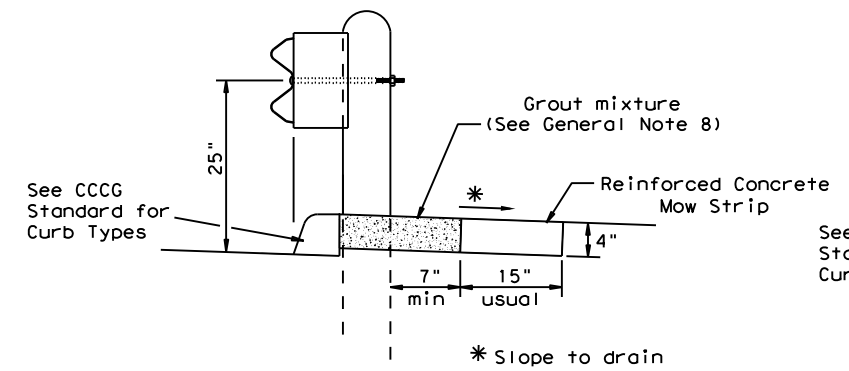
Typical



**MOW STRIP DETAIL**

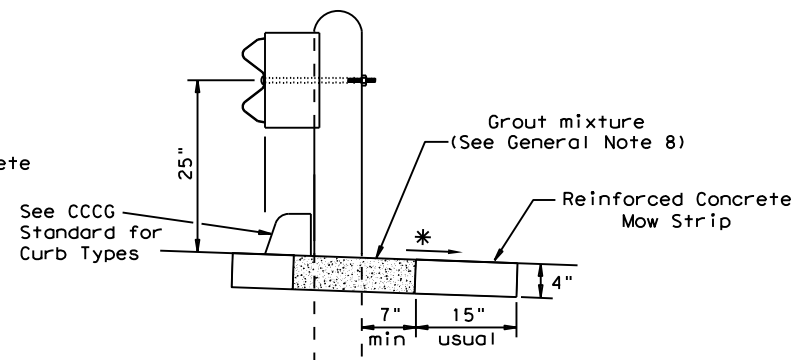
Reinforced Concrete Mow Strip with 18" x 18" Square or 18" Dia. minimum leave-out.

Fill leave-out with Grout mixture (See General Note 8)



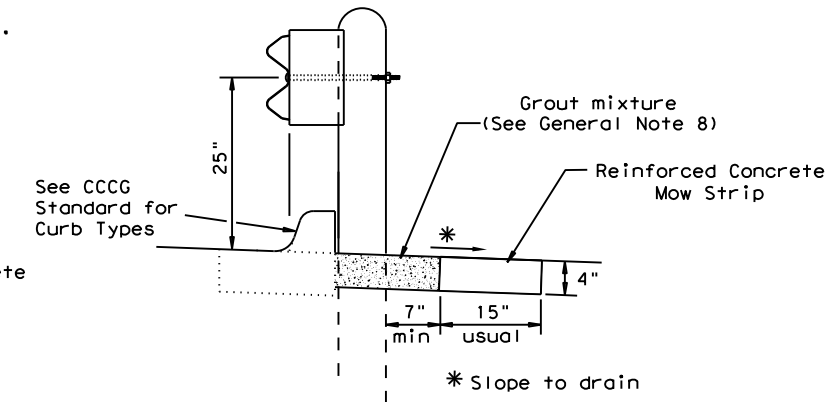
**CURB OPTION (1)**

This option will increase the post embedment throughout the system.



**CURB OPTION (2)**

Curb shown on top of mow strip



**CURB OPTION (3)**

**GENERAL NOTES**

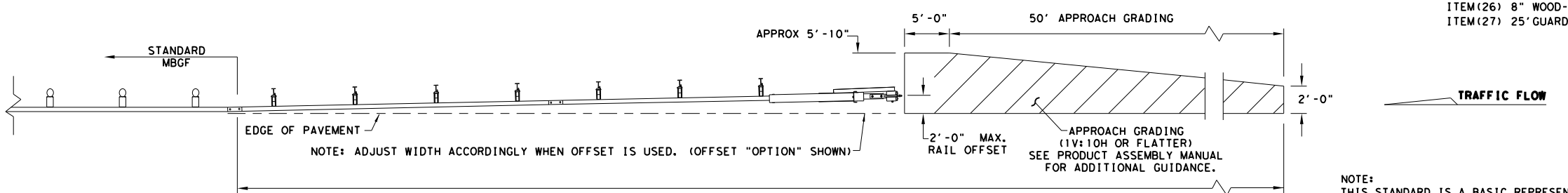
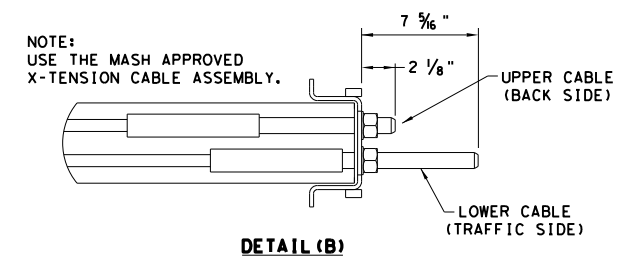
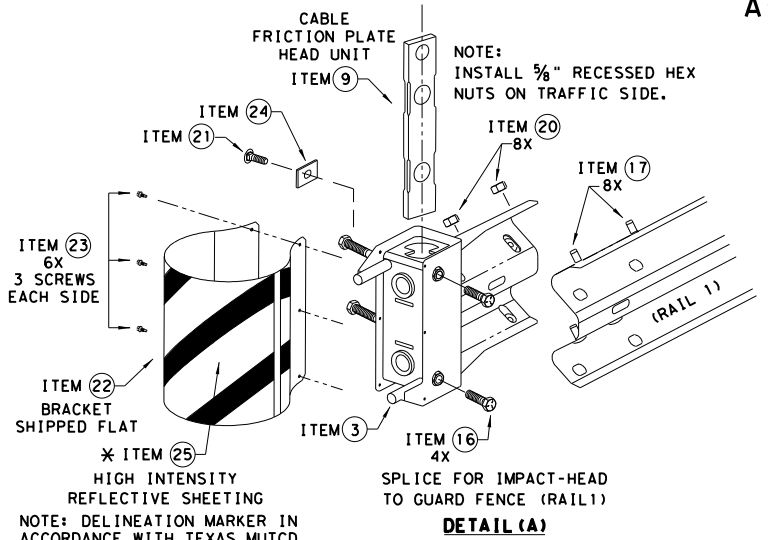
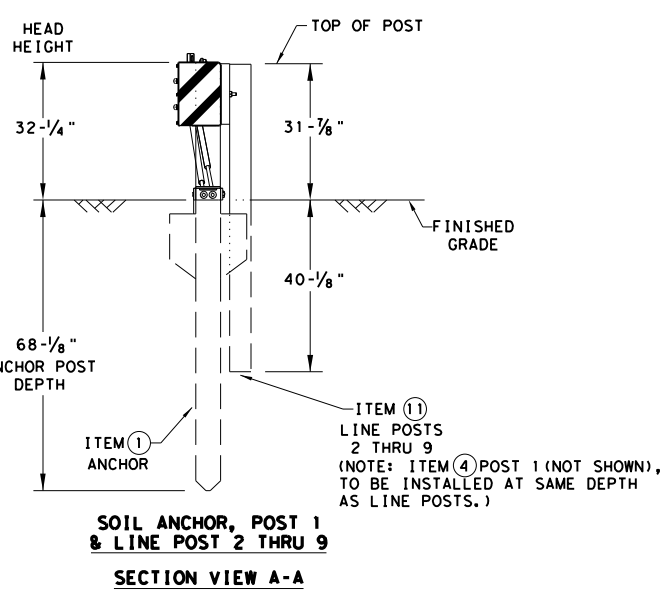
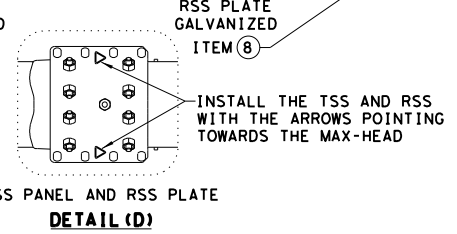
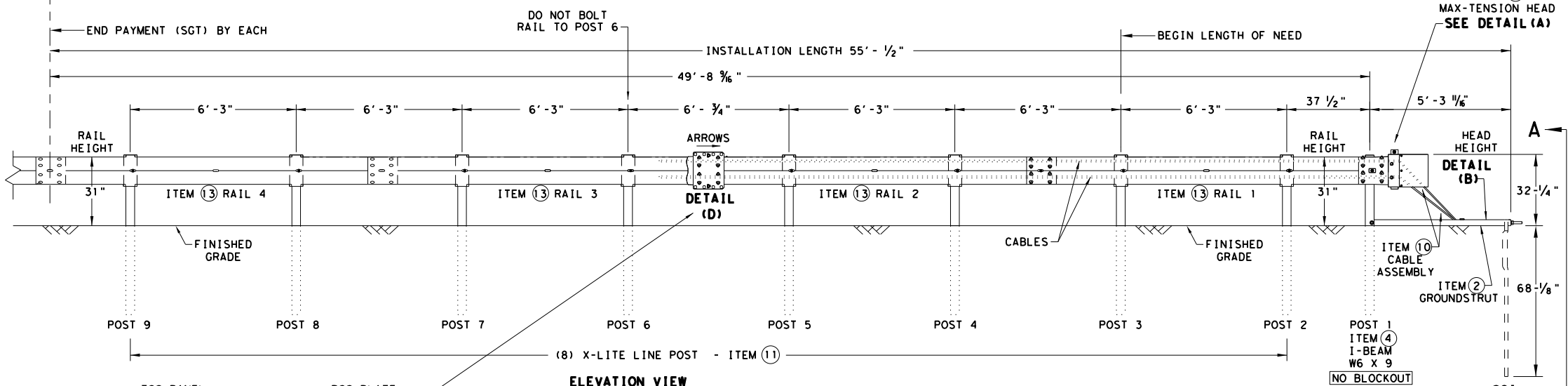
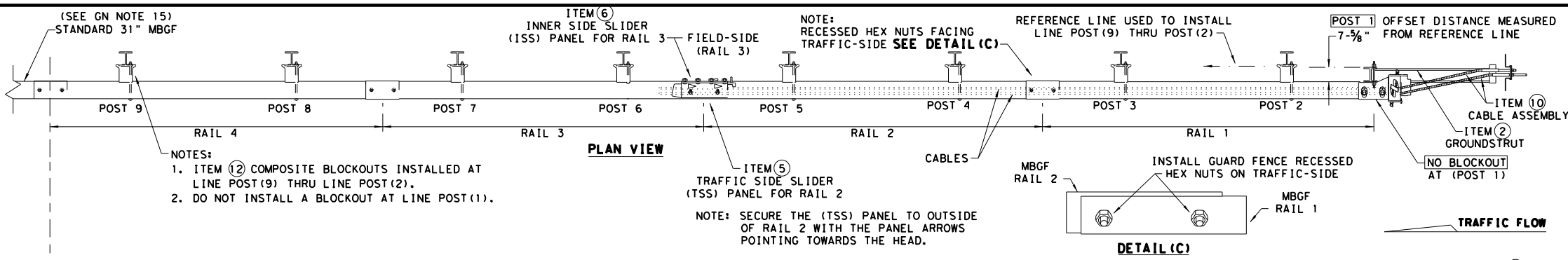
1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown 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.

		<b>Design Division Standard</b>	
<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
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**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	$\frac{5}{8}$ " X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	$\frac{3}{4}$ " X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	$\frac{5}{8}$ " X 1 $\frac{1}{4}$ " GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	$\frac{5}{8}$ " X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	$\frac{5}{8}$ " WASHER F436 STRUCTURAL MGAL	2
20	4001116	$\frac{5}{8}$ " RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	$\frac{5}{8}$ " X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	$\frac{1}{4}$ " X $\frac{3}{4}$ " 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

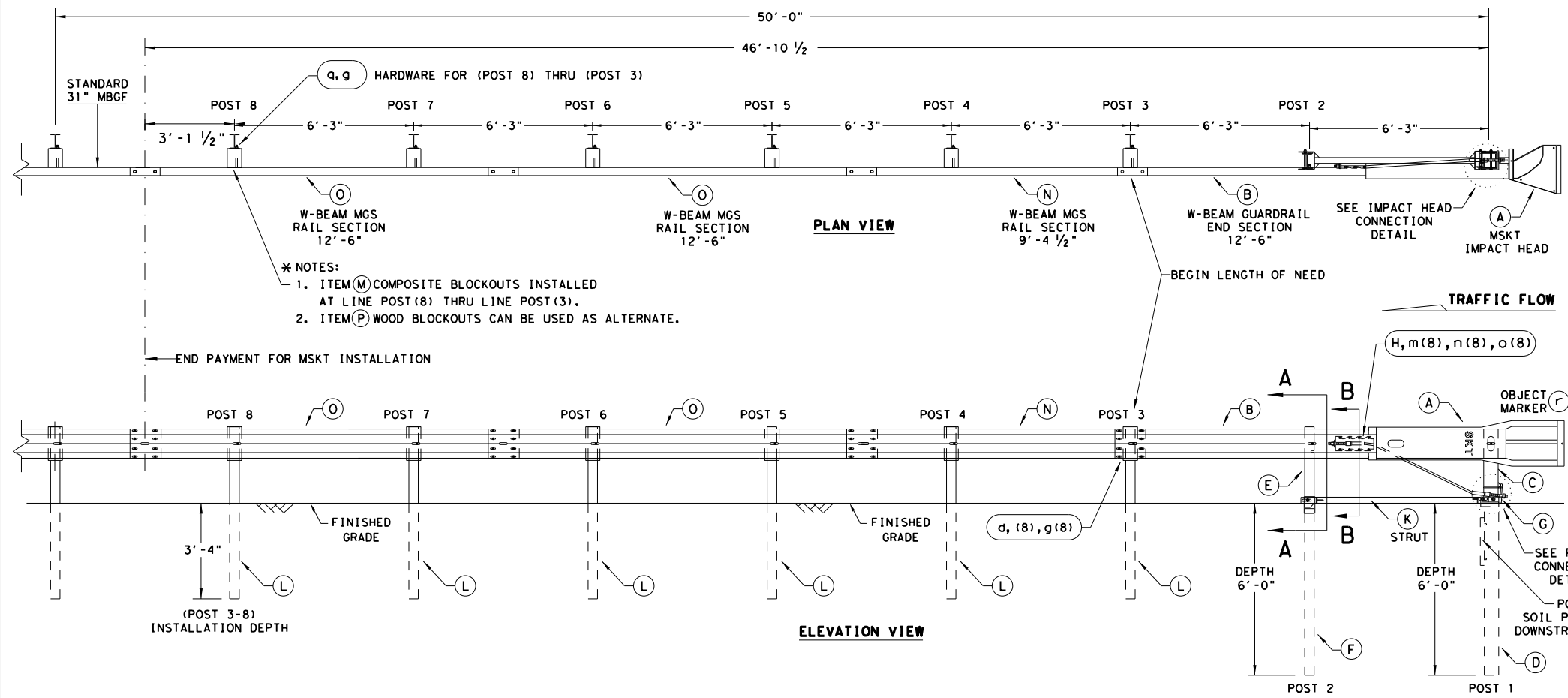
\* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.  
 \*\* ALTERNATIVE ITEMS NOT SHOWN. ITEM (26) 8" WOOD-BLOCKOUTS ITEM (27) 25' GUARD FENCE PANELS

**Texas Department of Transportation**  
 Design Division Standard

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

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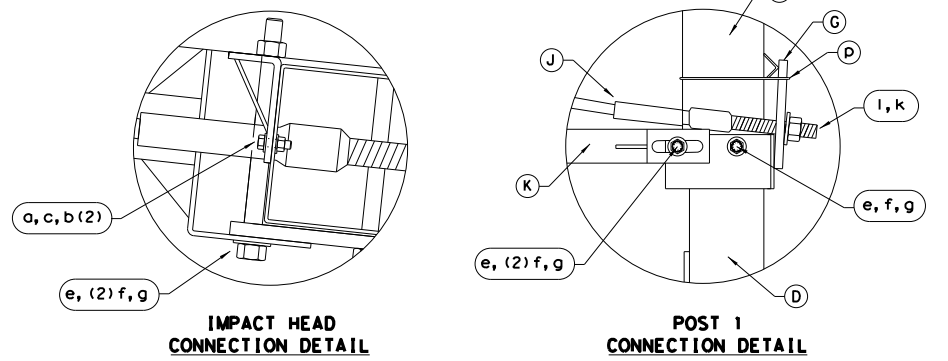
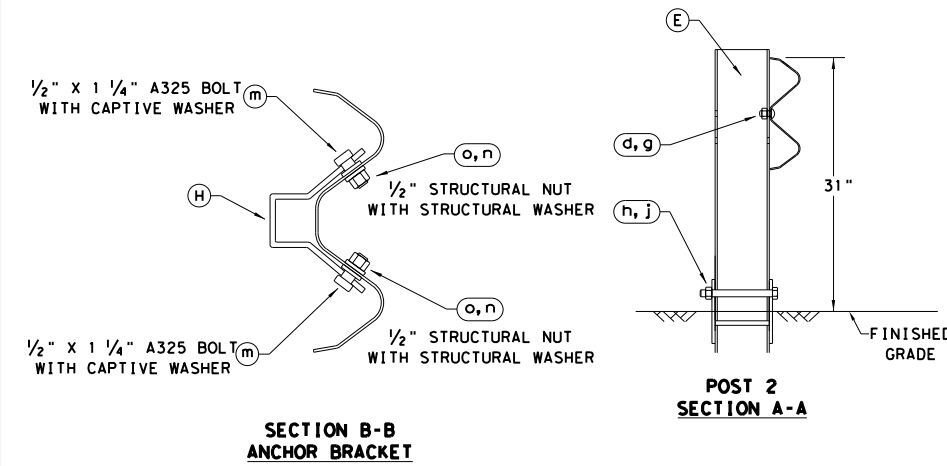
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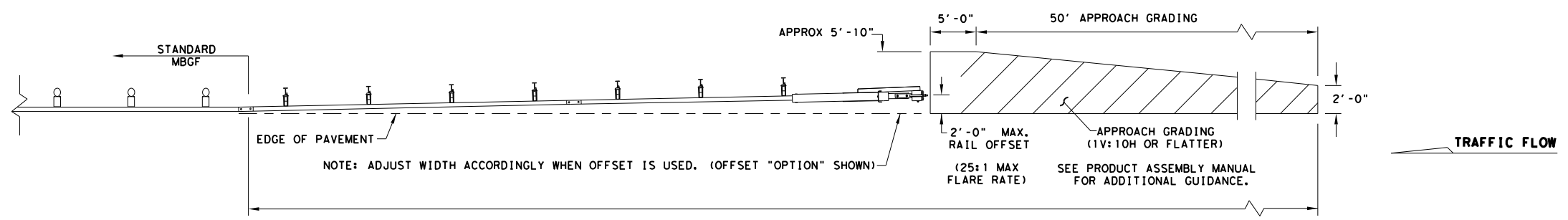
- \* NOTES:**
- ITEM (M) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST (8) THRU LINE POST (3).
  - ITEM (P) WOOD BLOCKOUTS CAN BE USED AS ALTERNATE.

- 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	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" 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	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



ALTERNATIVE ITEMS NOT SHOWN. \*  
 \* ITEM (P) 8" WOOD-BLOCKOUT  
 \*\* ITEM (Q) 25' GUARD FENCE PANEL



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

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

Design Division Standard

## SINGLE GUARDRAIL TERMINAL

### MSKT-MASH-TL-3

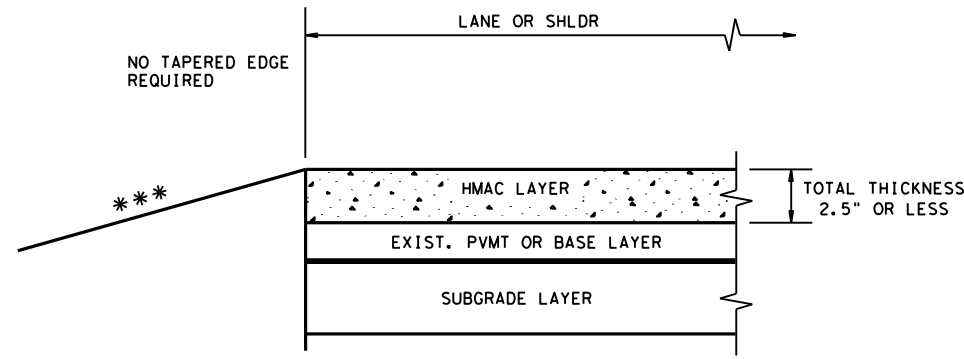
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AUS	TRAVIS			69



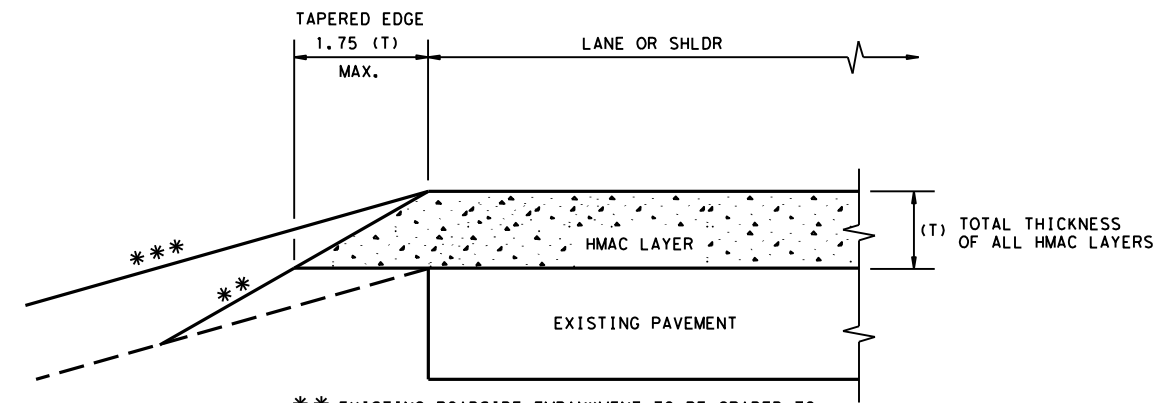
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\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

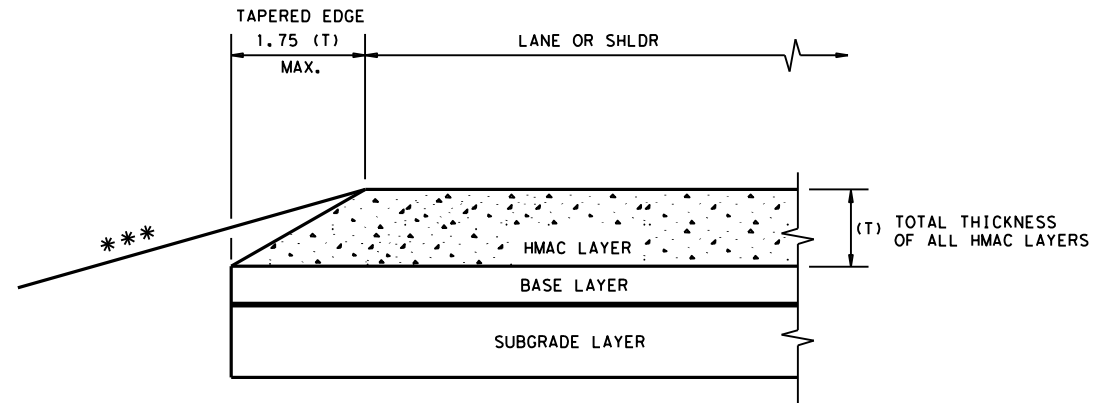
**CONDITION - 1**  
 THIN HMAC SURFACES OR HMAC OVERLAY  
 WITH THICKNESS OF 2.5" OR LESS



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

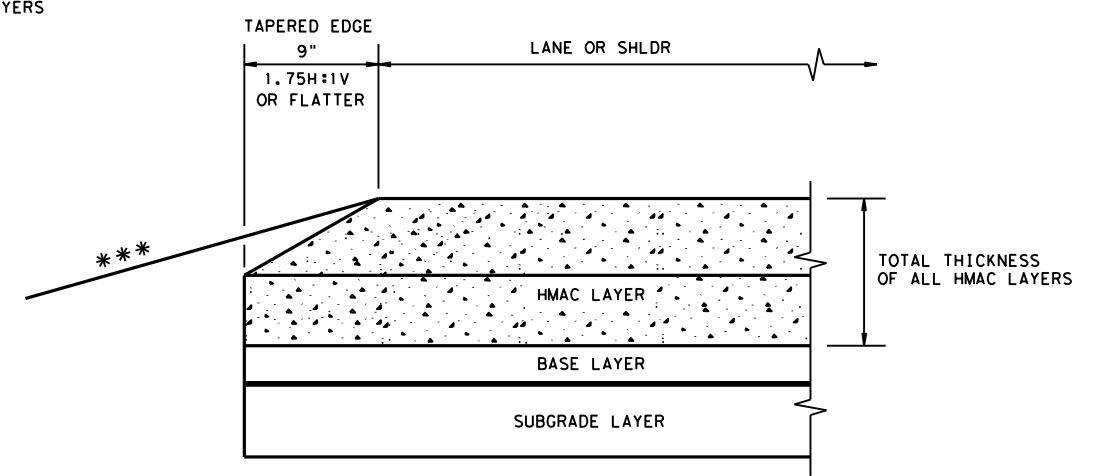
\*\*\* SEE TYPICAL SECTION FOR ROADSIDE DETAILS

**CONDITION - 2**  
 OVERLAY OF EXISTING PAVEMENT  
 HMAC THICKNESS 2.5" TO 5"



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

**CONDITION - 3**  
 NEW OR RECONSTRUCTED PAVEMENT  
 HMAC THICKNESS 2.5" TO 5"



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

**CONDITION - 4**  
 NEW OR RECONSTRUCTED PAVEMENT  
 HMAC THICKNESS 5" OR GREATER

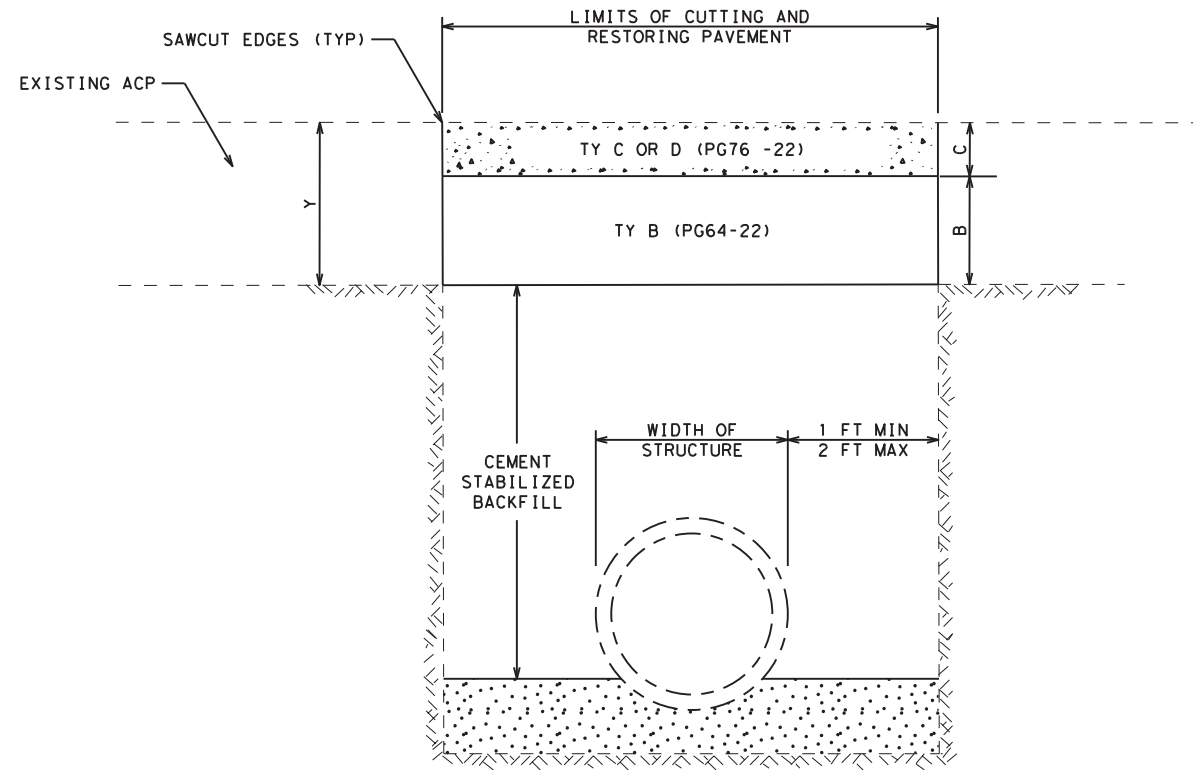
**GENERAL NOTES**

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

(NOT TO SCALE)

				Design Division Standard	
<b>TAPERED EDGE DETAILS          HMAC PAVEMENT</b>					
<b>TE (HMAC) - 11</b>					
FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:	
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY	
REVISIONS		1234 01	013, etc	FM 1100	
DIST	COUNTY	SHEET NO.			
AUS	TRAVIS	70			

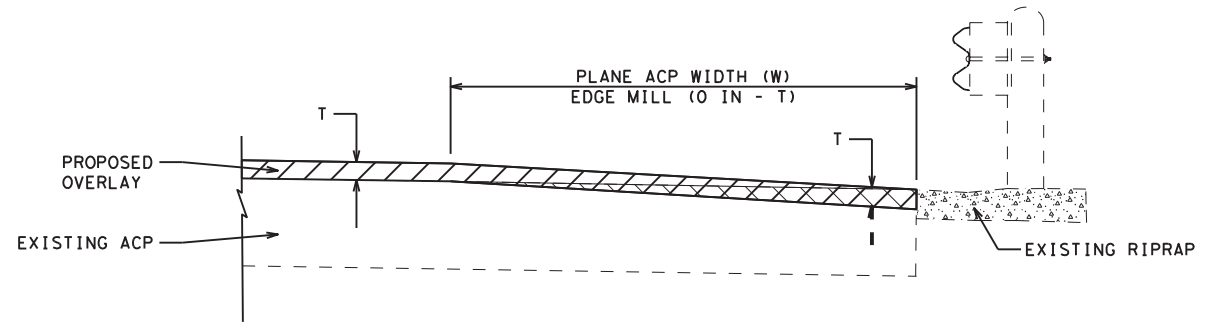
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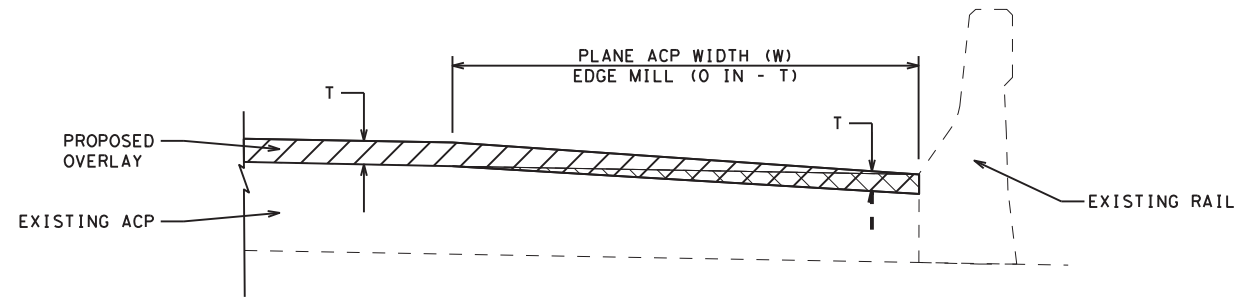
**CUTTING AND RESTORING PAVEMENT DETAIL**

**CUT AND RESTORE NOTES**

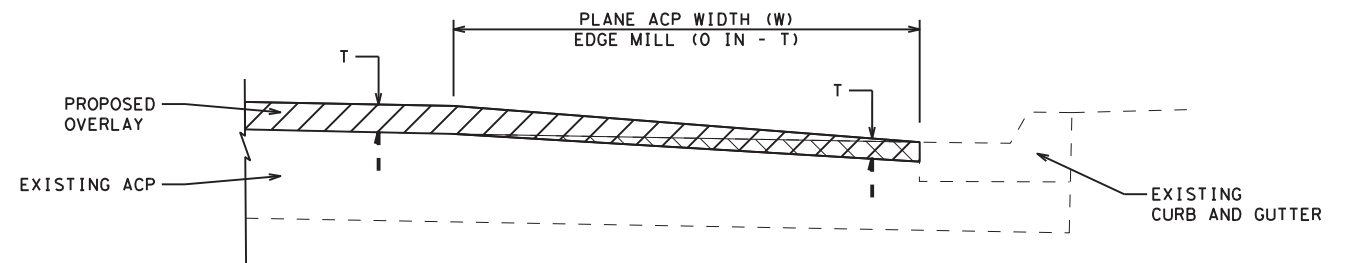
- Y = DEPTH OF EXISTING ACP (IN)
- Y = C + B
- C = MIN 2 IN AND MAX 4 IN THICKNESS
- CUTTING AND RESTORING PAVEMENT PER ITEM 400
- HMA MAY BE BLADE LAID
- ALL ACP PER ITEM 3076
- THE FOLLOWING WORK IS SUBSIDIARY:
- CEMENT STABILIZED BACKFILL
- SAWCUT EDGES
- TACK ALL ACP SURFACES IN CUT AND RESTORE



**MOWSTRIP OR RIPRAP EDGE MILL DETAIL**



**RAIL EDGE MILL DETAIL**

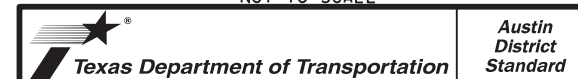


**CURB EDGE MILL DETAIL**

**EDGE REPAIR NOTES**

- T = OVERLAY/INLAY THICKNESS (IN)
- W = FULL LANE WIDTH OR MINIMUM 10 FT

NOT TO SCALE



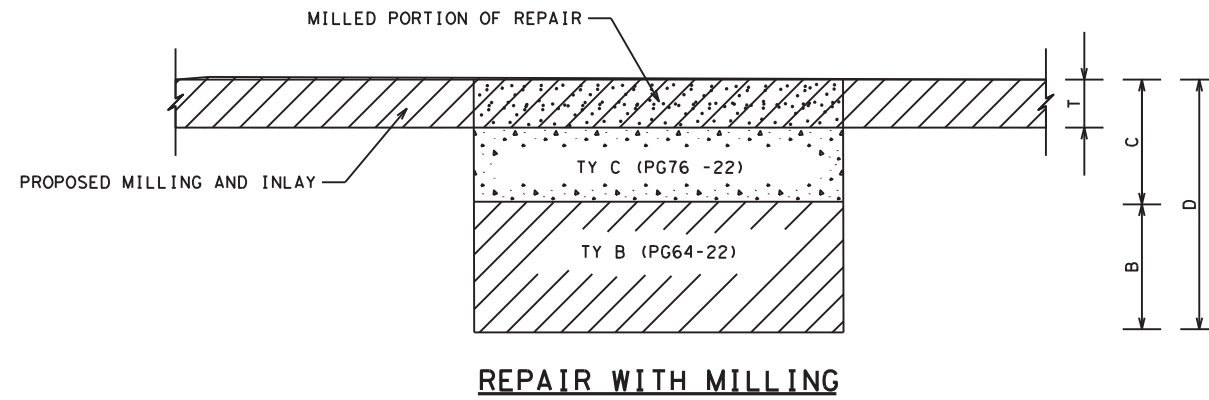
**FLEXIBLE PAVEMENT  
 DETAILS**

**FLEXPAVE (2) -22 (AUS)**

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	AUS	TRAVIS		71

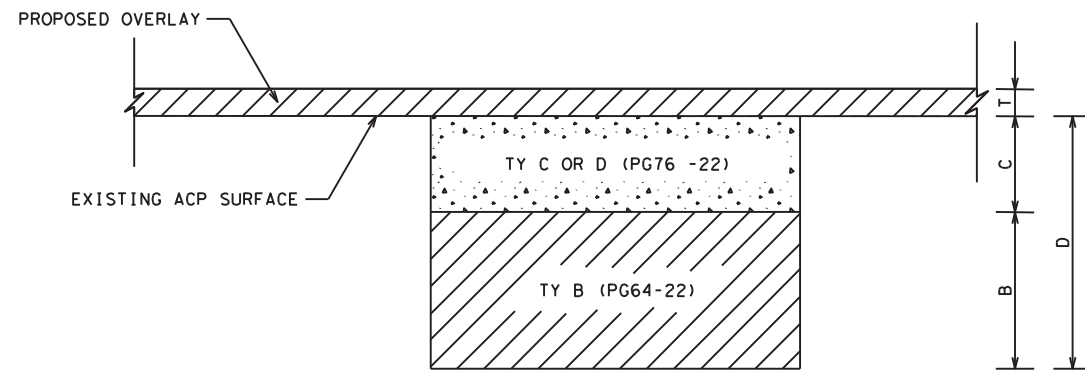
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REPAIR DEPTH W/ MILLING	T = 1 IN		T = 1.5 IN		T = 2 IN	
	TY C	TY B	TY C	TY B	TY C	TY B
<= 4	4	0	4	0	4	0
5	5	0	5	0	5	0
6	6	0	6	0	6	0
7	3	4	4	3	4	3
8	4	4	4	4	4	4
>= 9	4	D-4	4	D-4	4	D-4



**REPAIR WITH MILLING**

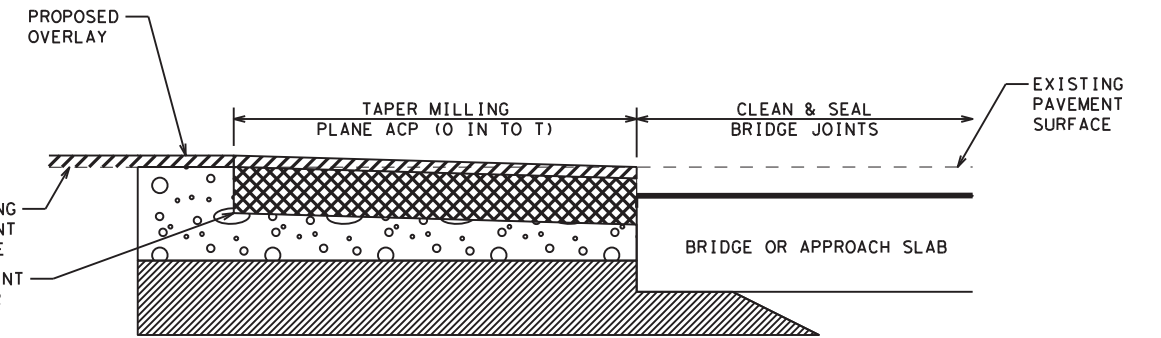
REPAIR DEPTH W/O MILLING	TY D	TY C	TY B
2	2	0	0
3	0	3	0
4	0	4	0
5	0	5	0
6	0	6	0
7	2	0	5
8	2	0	6
>= 9	2	0	D-4



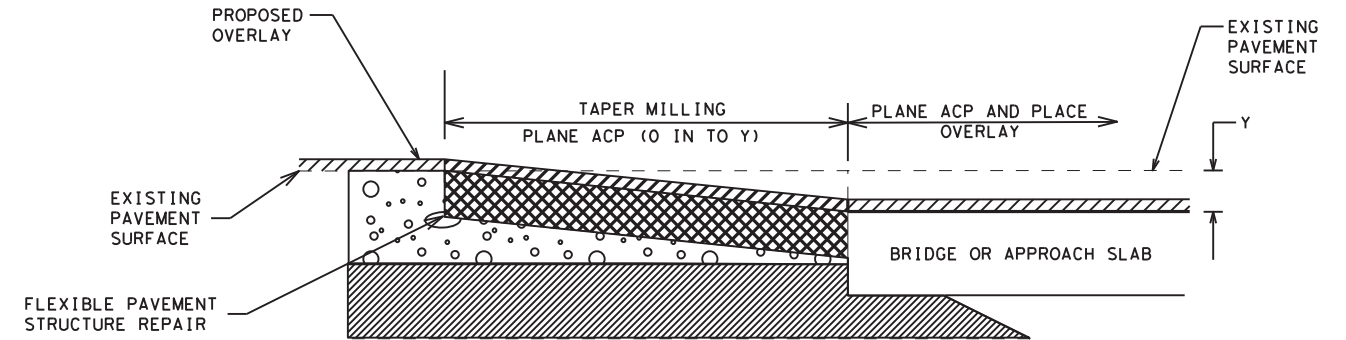
**REPAIR WITHOUT MILLING**

**FLEX PAV REPAIR NOTES**

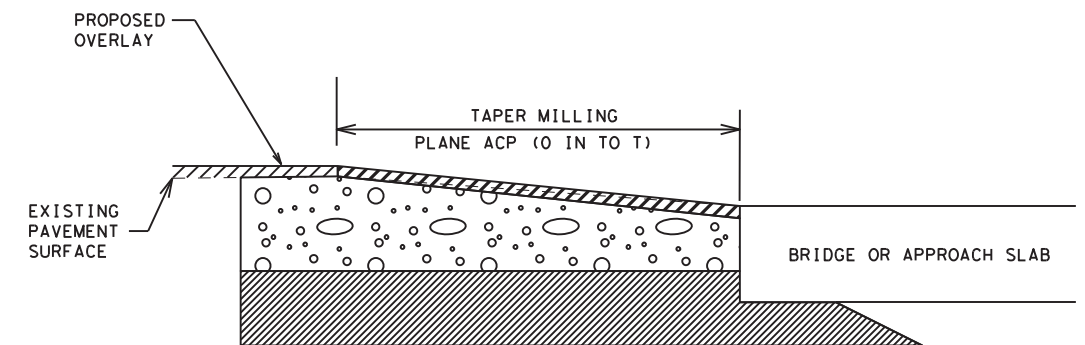
- T = OVERLAY/INLAY THICKNESS (IN)
- D = REPAIR DEPTH
- C = TY C/D ACP DEPTH
- B = TY B ACP DEPTH
- TY B MAY BE BLADE LAID.
- TY C/D MUST BE PAVER LAID.
- TY C/D MAX LIFT THICKNESS 3 IN
- TY B MAX LIFT THICKNESS 5 IN
- ALL ACP PER ITEM 3076.
- FOLLOWING WORK IS SUBSIDIARY:
  - SAW CUT ALL EDGES
  - TACK ALL ACP SURFACES AND LAYERS



**BRIDGE APPROACH/DEPARTURE TRANSITION**  
MATCHING EXISTING ACP ON BRIDGE



**BRIDGE APPROACH/DEPARTURE TRANSITION**  
REMOVING EXISTING ACP ON BRIDGE

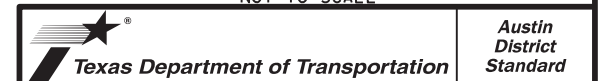


**BRIDGE APPROACH/DEPARTURE TRANSITION**  
MATCH EXISTING BRIDGE DECK

**BRIDGE APPROACH MILLING NOTES**

- T = OVERLAY/INLAY THICKNESS (IN)
- Y = DEPTH OF MILLING ON BRIDGE
- TAPER LENGTH = 100 FT PER 1 IN OF T OR Y
- ENGINEER SHOULD INCLUDE WORK TO ADJUST MBGF TO MEET STANDARD HEIGHT. ADJUSTMENT TO MBGF WILL BE PAID USING APPROPRIATE BID ITEMS.
- ENGINEER MUST INCLUDE WORK TO ADJUST MOWSTRIP TO ELIMINATE PONDING.

NOT TO SCALE

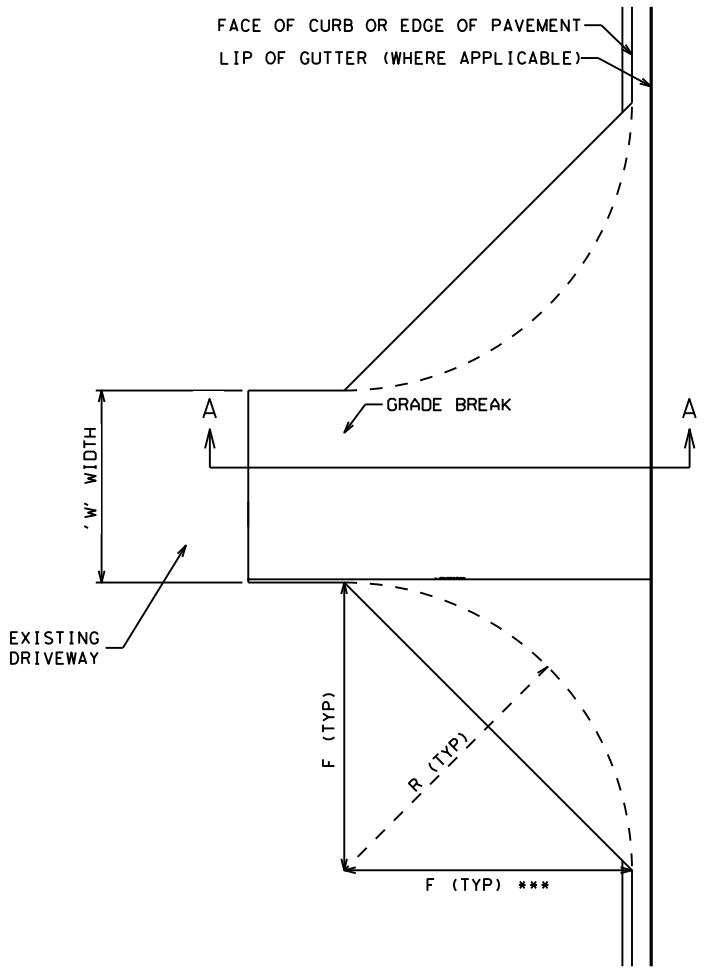


**FLEXIBLE PAVEMENT  
DETAILS**

**FLEXPAVE (3) -22 (AUS)**

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	DIST	COUNTY		SHEET NO.
	AUS	TRAVIS		72

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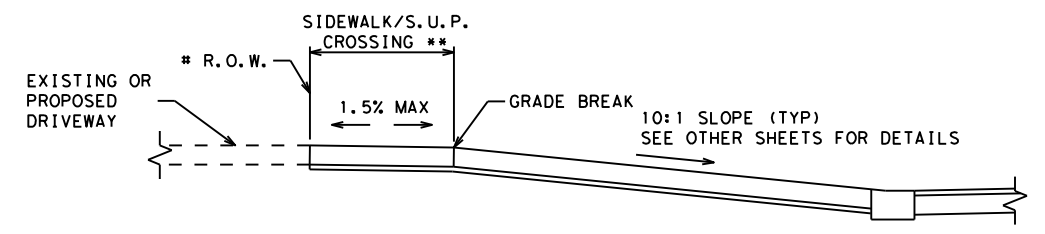
**DRIVEWAY PLAN**

FLARE OR RADIUS	FARM/RANCH	RESIDENTIAL	COMMERCIAL
"F" OR "R" (FT)	25	25	25

THESE ARE STANDARD DIMENSIONS UNLESS OTHERWISE SHOWN ELSEWHERE ON THE PLANS.

FLARES ARE TYPICALLY USED FOR SUBURBAN/URBAN (CURBED) ROADWAYS. RADII ARE TYPICALLY USED FOR RURAL OR UNCURBED ROADWAYS.

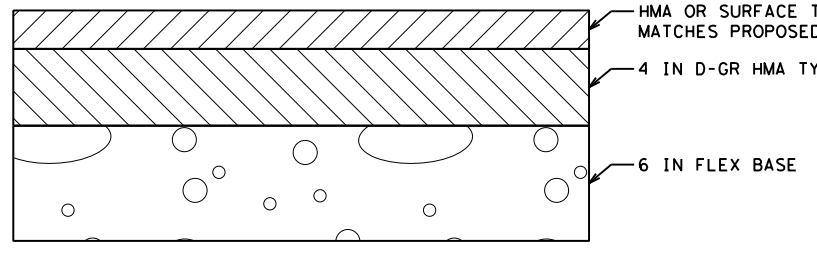
\*\*\* THIS 'F' DIMENSION MAY BE REDUCED TO KEEP WORK WITHIN THE ROW.



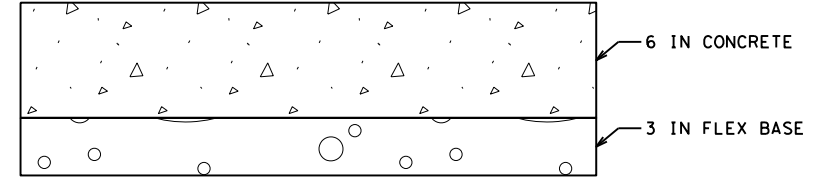
**DRIVEWAY WITH GUTTER SECTION A-A**

ENSURE GRADE BREAK DOES NOT EXCEED 8% UNLESS OTHERWISE DIRECTED. PROVIDE ABSOLUTE MINIMUM SIDEWALK CROSSING WIDTH OF 4' FOR DRIVEWAYS WIDTH OF 20' OR LESS

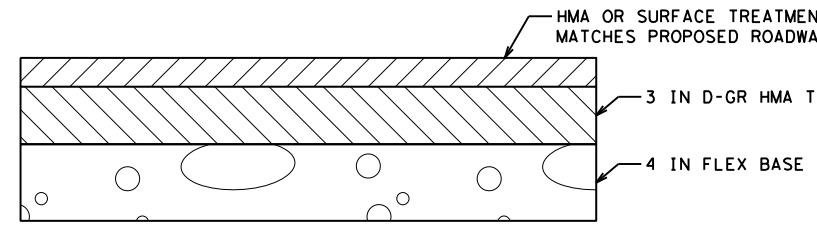
\*\* LOCATE SIDEWALK CROSSING TO ALIGN WITH ADJACENT SIDEWALK; SIDEWALK/S.U.P. WIDTH AND LOCATION SHOWN ELSEWHERE ON THE PLANS.



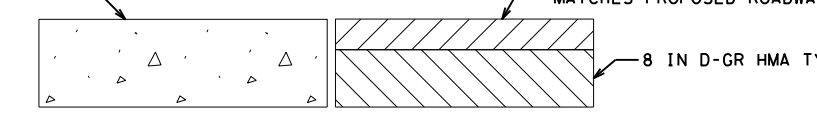
**HMA OR SURFACE TREATMENT - COMMERCIAL**



**CONCRETE - ALL DRIVEWAY TYPES**

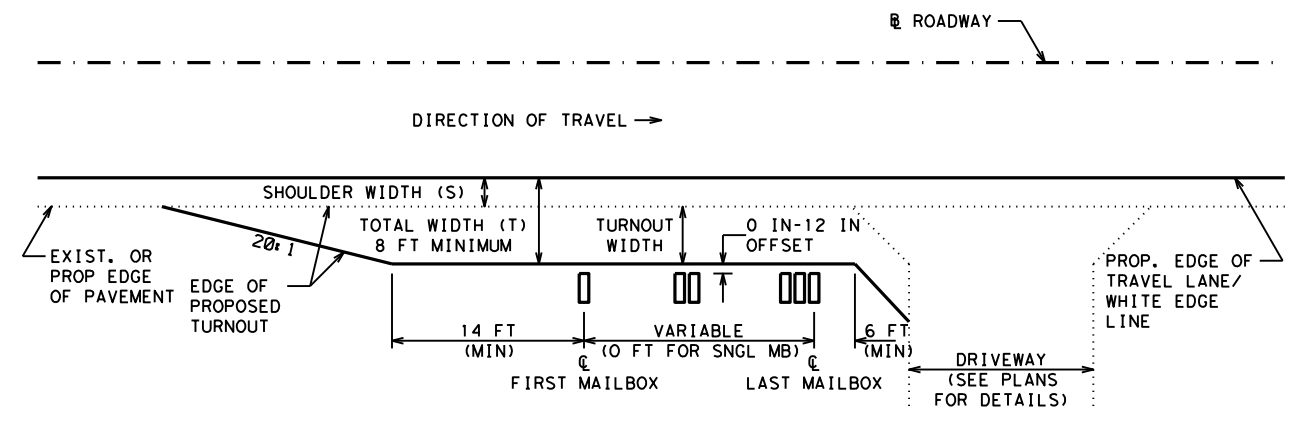


**HMA OR SURFACE TREATMENT - FARM/RANCH/RESIDENTIAL**

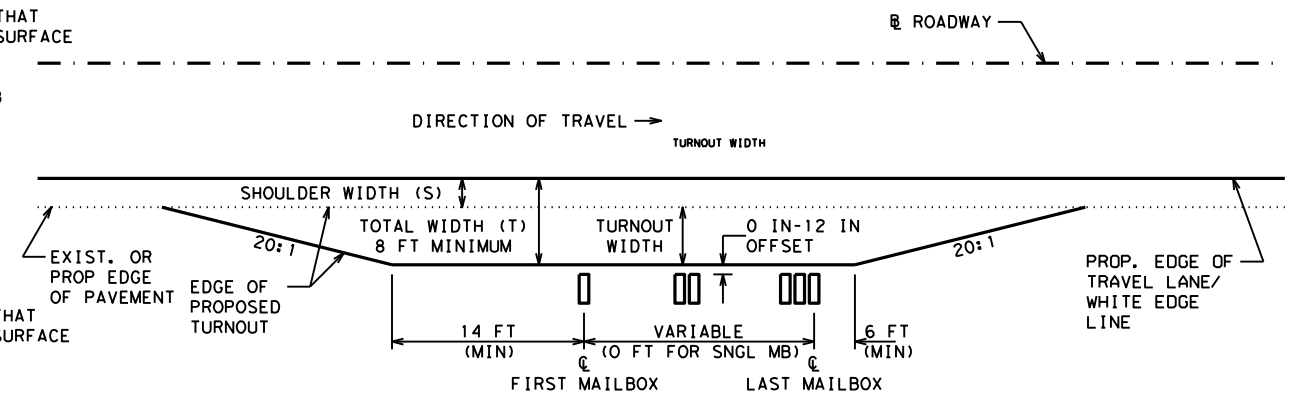


**FAST TRACK ACP (TYPE 3) OR CONCRETE**

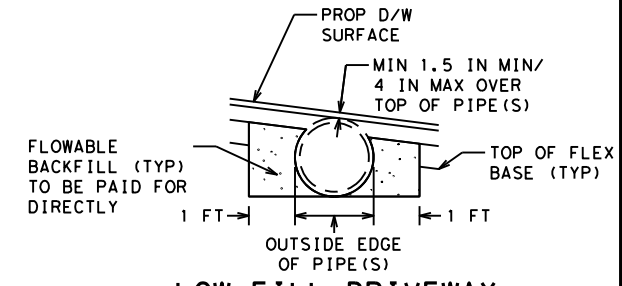
**DRIVEWAY AND TURNOUT TYPICAL SECTIONS**



**MAILBOX TURNOUT PLAN WITH DRIVEWAY**



**MAILBOX TURNOUT PLAN WITHOUT DRIVEWAY**



**LOW FILL DRIVEWAY**

ONLY ONE PIPE SHOWN SEE ELSEWHERE ON THE PLANS FOR SPECIFIC DRIVEWAY DETAILS

**GENERAL NOTES**

PROVIDE EXPANSION 20 FT C-C FOR WIDTH OR LENGTH OVER 25 FT. EXPANSION JOINT PER AUS STANDARD FOR SIDEWALK (MCPSWMD).

REINFORCEMENT WILL BE IN ACCORDANCE WITH ITEM 432.3.1 USING NO. 3 OR NO. 4 BARS.

FIBER REINFORCEMENT IS NOT ALLOWED. CLASS A CONCRETE IS ALLOWED TO USE COARSE AGGREGATE GRADES 1-8.

IN LIEU OF PFC OR TOM, SURFACE MUST BE 1.5" D-GR HMA TY D. IF SURFACE IS A MULTIPLE COURSE SURFACE TREATMENT, ALL COURSES MUST BE PLACED ON DRIVEWAY. SURFACE HMA IS PG 76-22. NON SURFACE HMA IS PG 64-22 AND MAY BE BLADE LAID.

FURNISH BASE MEETING THE REQUIREMENTS FOR ANY TYPE OR GRADE IN ACCORDANCE WITH ITEM 247. BASE COMPRESSIVE STRENGTHS ARE WAIVED.

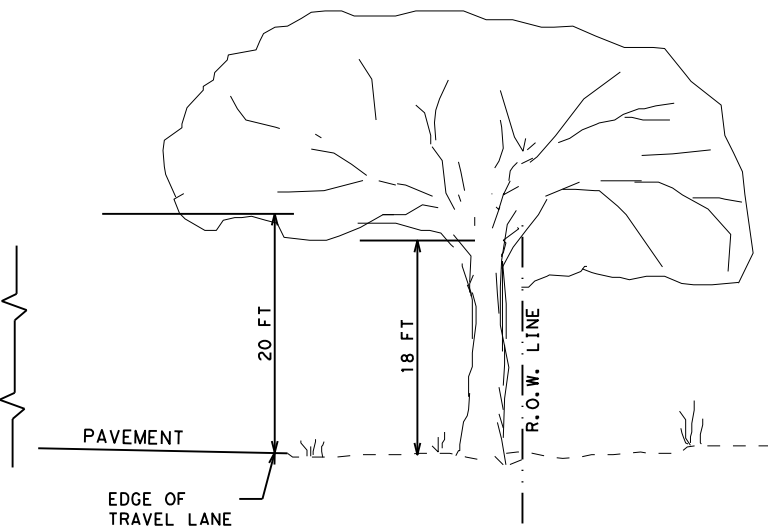
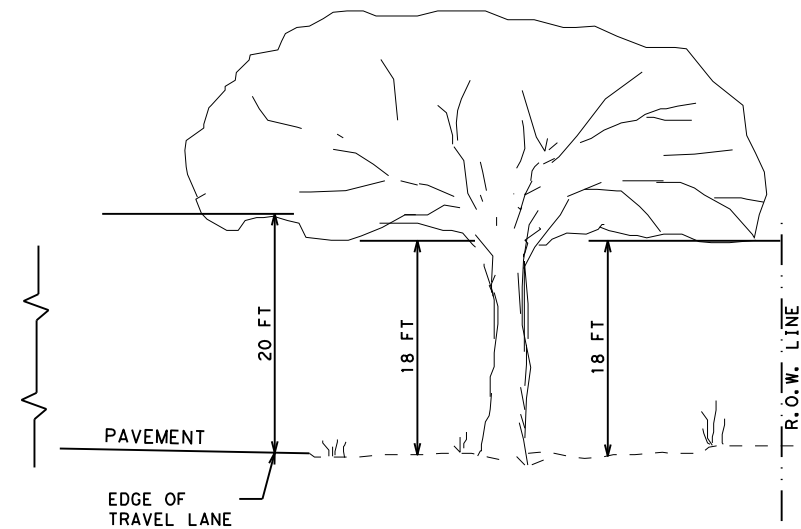
THE BASE UNDER THE CONCRETE MAY BE REPLACED WITH CONCRETE AT A RATIO OF 3 INCHES OF BASE EQUALS 2 INCHES OF CONCRETE.

FAST TRACK DRIVEWAYS MUST BE CLOSED, CONSTRUCTED, AND REOPENED WITHIN 24 HOURS.

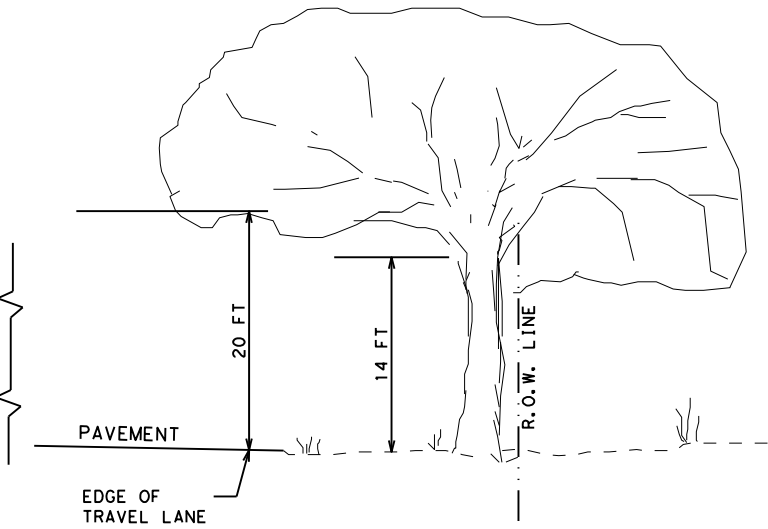
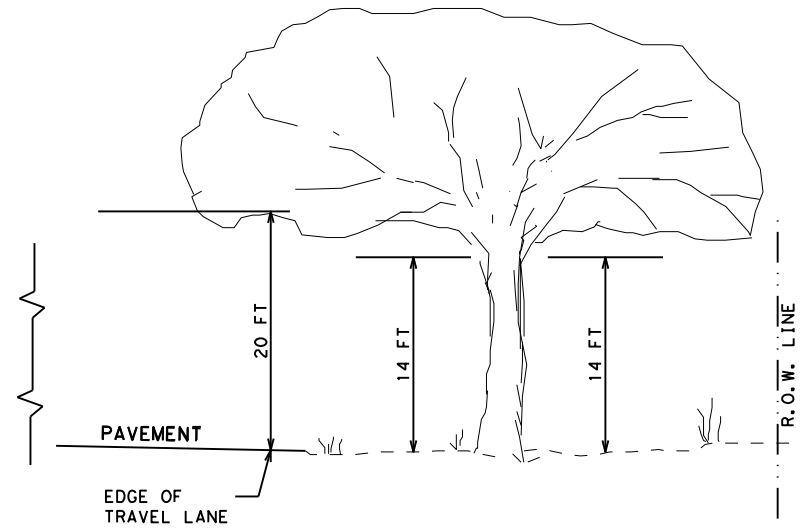
IF ROOTS ARE ENCOUNTERED VERIFY WITH THE ENGINEER PRIOR TO ACCOMMODATING OR REMOVING 2 IN. DIAMETER OR LARGER ROOTS. ROOT REMOVAL MUST BE IN ACCORDANCE WITH ITEM 752.4.2. ROOTS MAY REMAIN IN THE BASE. FOR IMPROVEMENTS WITHIN 6 IN. OF A ROOT, THE CONCRETE THICKNESS MAY BE REDUCED BY 1 IN. AND THE BASE INCREASED BY 1 IN. TO MINIMIZE IMPACTS TO THE ROOTS. ADJUST BASE AND SURFACE PROFILE TO PROVIDE A 1 IN. BASE CUSHION AROUND THE ROOTS. THE SURFACE PROFILE MAY BE ADJUSTED TO THE EXTENT ALLOWED BY ADA. THIS WORK IS SUBSIDIARY.

		<b>Austin District Standard</b>	
<p><b>DRIVEWAYS AND MAILBOX TURNOUTS</b></p> <p><b>DWMB-22 (AUS)</b></p>			
<small>©TxDOT 2023</small>	<small>REVISIONS</small> 01/16/ SHEET CREATED 04/19/ APPROVED 11/20/ TABLE REVISED, GN ADDED, PLAN & PROFILE MODIFIED 01/22/ ADDED TURNOUT INFO	CONT 1234 SECT 01 DIST AUS	JOB 013, etc COUNTY TRAVIS HIGHWAY FM 1100 SHEET NO. 73

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**NON-OAK SPECIES  
TREE PRUNING LIMITS**

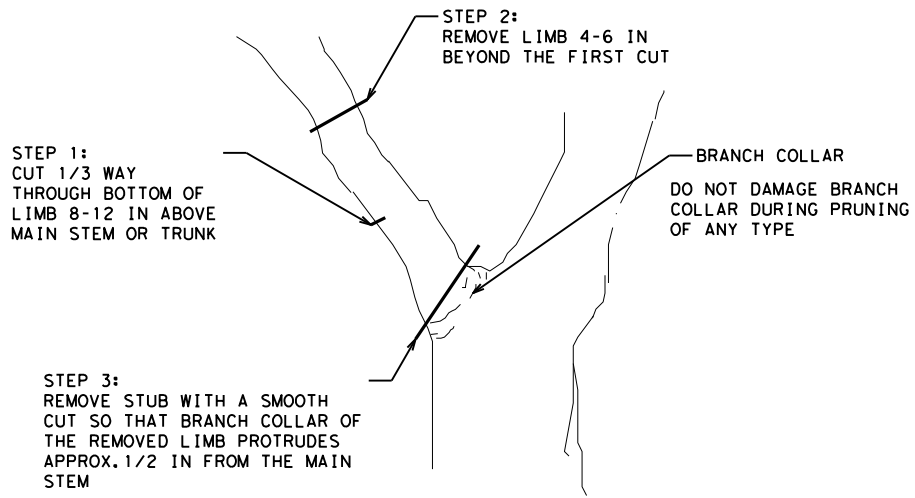


**OAK SPECIES  
TREE PRUNING LIMITS**

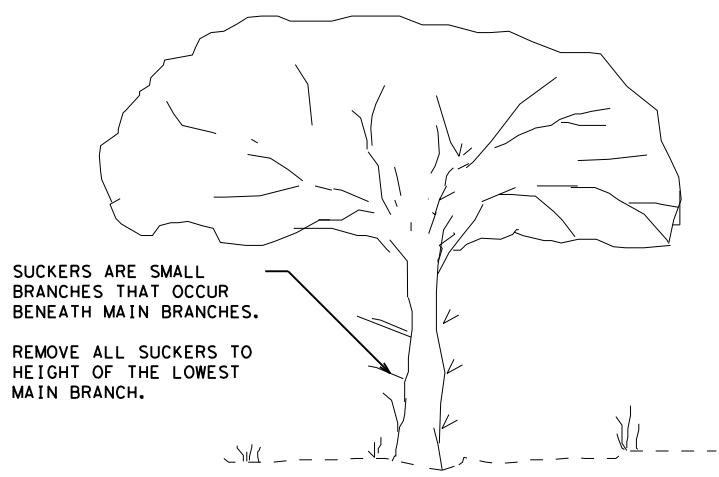
**GENERAL NOTES**

**PAYMENT FOR THIS WORK IS SUBSIDIARY TO PREP R.O.W.**

1. REMOVE ALL DEAD TREES, DEAD BRUSH, AND DEAD MULTI-TRUNKED TREES WITHIN THE R.O.W.. TREES, SHRUBS, OR MULTI-TRUNKED TREES THAT DIE DURING CONSTRUCTION SHALL BE REMOVED PRIOR TO COMPLETION OF THE PROJECT.
2. USE WORK METHODS IN ACCORDANCE WITH ANSI A300 STANDARDS AND ITEM 752.
3. FLAILING EQUIPMENT IS NOT ALLOWED ON OAK TREES.
4. REPAIR DAMAGE TO PRIVATE FENCES AND/OR PRIVATE PROPERTY.
5. PERFORM TREE PRUNING ONLY WITHIN THE R.O.W.. NO CUTS SHALL BE MADE OUTSIDE THE R.O.W..
6. PERFORM TREE PRUNING PER DETAIL FOR ENTIRE R.O.W. AREA WITHIN PROJECT LIMITS. THE ENGINEER MAY DEFINE AREAS TO RESTRICT TREE PRUNING.
7. REVIEW EPIC SHEETS FOR AREAS TO BE AVOIDED DUE TO ENVIRONMENTAL REASONS OR ADDITIONAL NOTES THAT PERTAIN TO TREE PRUNING.
8. MIGRATORY BIRDS AND BATS MAY BE NESTING WITHIN THE PROJECT LIMITS. PERFORM TREE TRIMMING OUTSIDE THE NESTING SEASON DATES LISTED IN THE GENERAL NOTES.
9. NO TRIMMING OF THE VEGETATION THAT CONTAINS AN ACTIVE NEST FOR MIGRATORY BIRDS IS ALLOWED.
10. THE TRIMMING OR CUTTING OF RED OAK AND LIVE OAK SPECIES FOR PURPOSES OTHER THAN PROTECTING PUBLIC SAFETY IS ONLY PERMITTED BETWEEN JULY 1ST AND JANUARY 31ST AND PROHIBITED BETWEEN FEBRUARY 1ST AND JUNE 30TH
11. ALL PRUNING CUTS MUST BE TREATED IMMEDIATELY WITH COMMERCIAL PRUNING PAINT TO SEAL THE EXPOSED SURFACE FROM CONTAMINATION. USE OF AEROSOL CAN IS THE PREFERRED METHOD OF APPLICATION FOR SEALING CUTS. ANY WOUNDS, WHETHER MADE BY TRIMMING, CONSTRUCTION OR ACCIDENT, SHALL BE TREATED IMMEDIATELY WITH COMMERCIAL PRUNING PAINT TO SEAL THE SURFACE FROM CONTAMINATION. THE TXDOT INSPECTOR MAY CONDUCT UNANNOUNCED INSPECTIONS TO ENSURE COMPLIANCE.
12. IF MORE THAN 25% OF THE TREE CANOPY WILL BE REMOVED CONTACT THE TXDOT ARBORIST OR INSPECTOR FOR APPROVAL PRIOR TO PROCEEDING.



**PROPER TREE PRUNING  
FOR LIMBS 2" IN DIA. AND GREATER**



**SUCKER REMOVAL DETAIL**



**PREP R.O.W.  
PRUNING  
DETAIL**

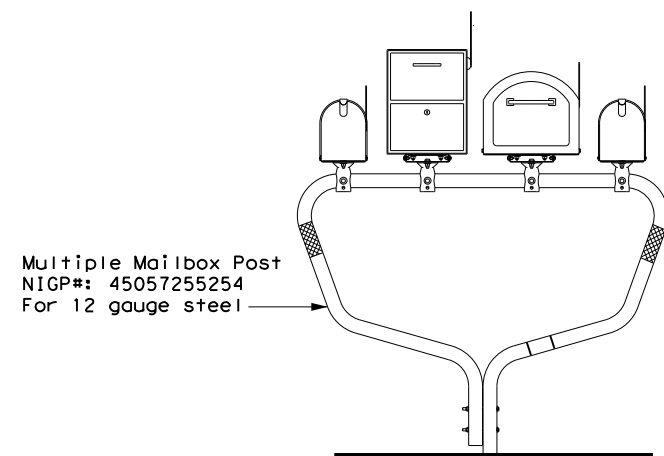
**PRWD-20 (AUS)**

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	AUS	TRAVIS		74

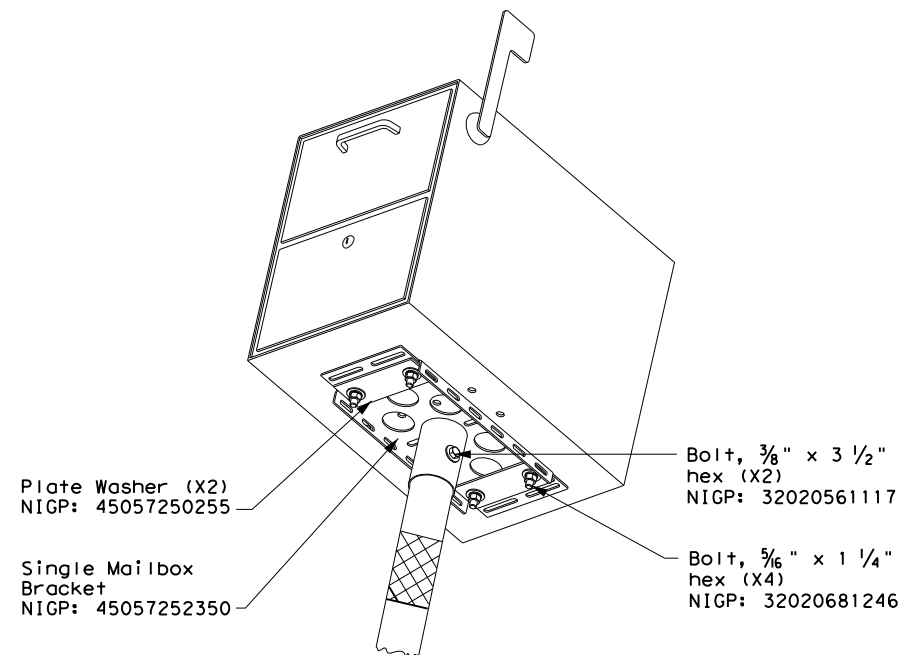


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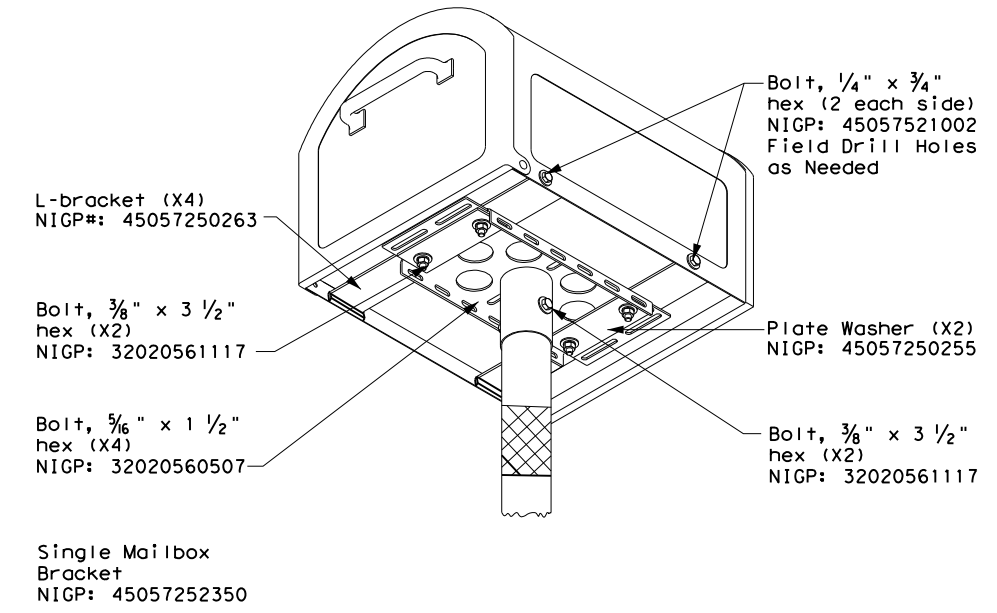
**TYPE 1 - MULTI LOCKABLE AND XL MAILBOX**



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

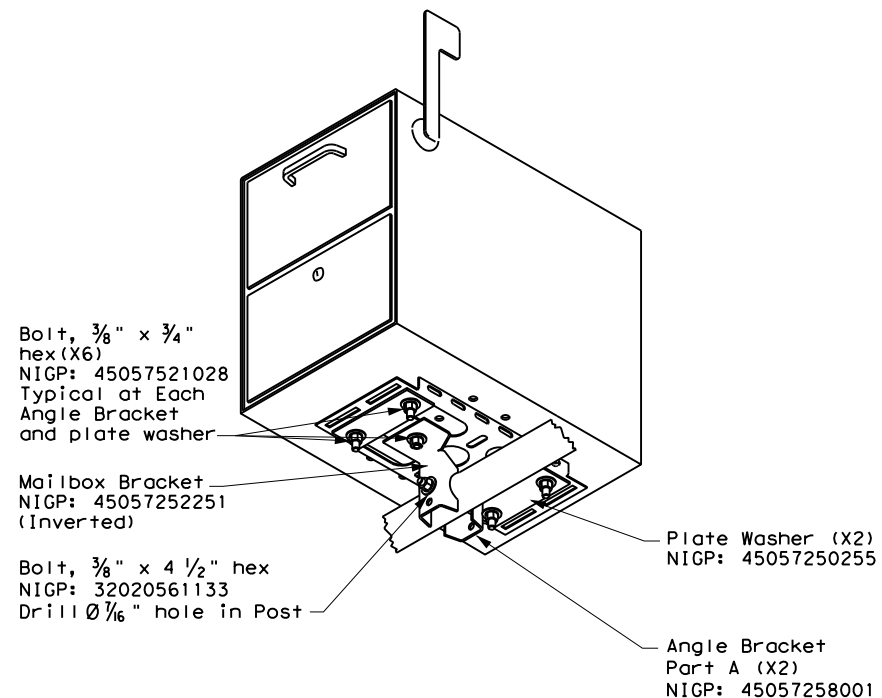


**TYPE 2/4 - SINGLE XL MAILBOX**

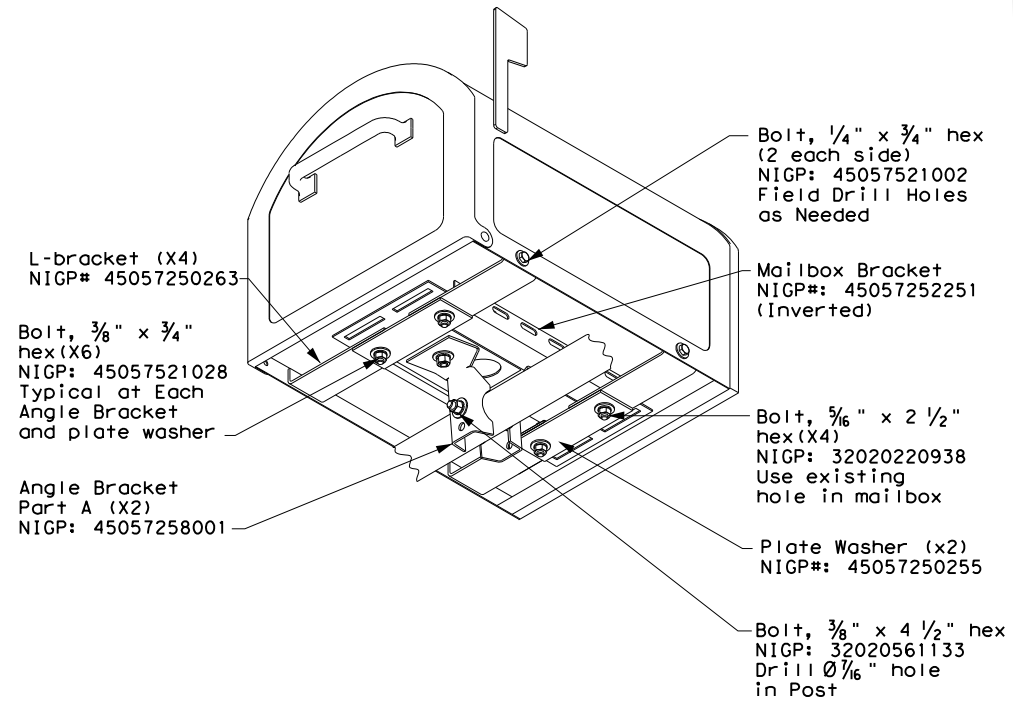


**NOTE:**  
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

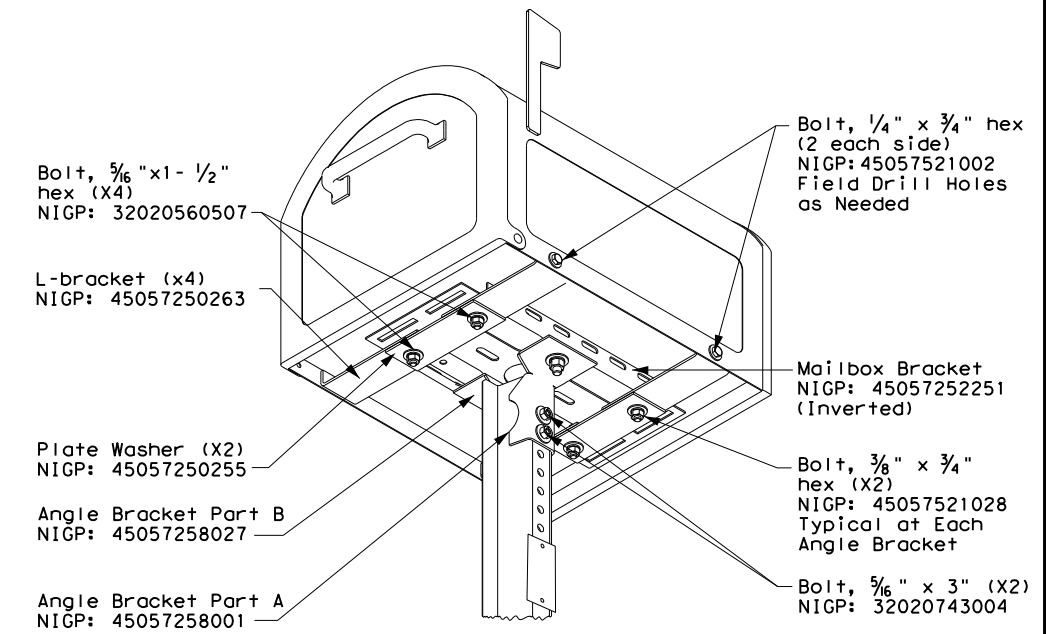
**TYPE 1 MULTI - LOCKABLE ARCHITECTURAL (LA)**



**TYPE 1 MULTI - XL MAILBOX**



**TYPE 3 - XL MAILBOX MOUNTING**



SHEET 2 OF 4

		Maintenance Division Standard	
<h2>XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY</h2> <h3>MB (2) - 21</h3>			
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT March 2004	CONT	SECT	JOB
2/2005	11/2009	4/2015	1234 01
6/2005	1/2011		013, etc
11/2006	7/2014		FM 1100
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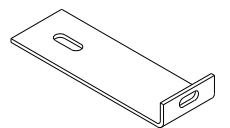




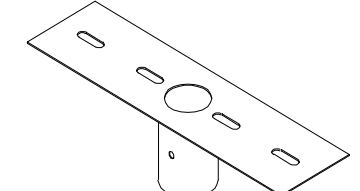
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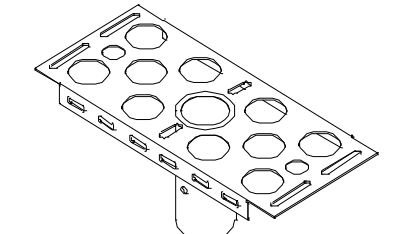
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M,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



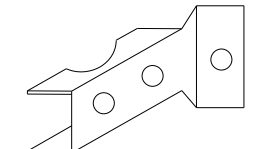
NIGP: 45057250263  
L-Bracket x4 for XL sized mailboxes



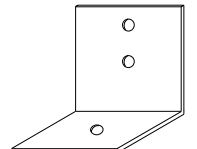
NIGP: 45057252343  
Double Mailbox Bracket For Type 2 and Type 4 double mount



NIGP: 45057252350  
Single Mailbox Bracket For Type 2 single and for Type 4 single and multi mount



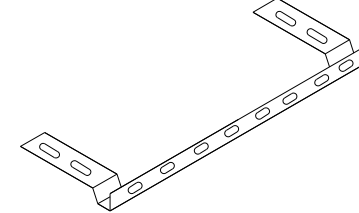
NIGP: 45057258001  
Part "A" Angle Bracket For Type 1 multi (2 per mailbox) and Type 3 single and double



NIGP: 45057251055  
Type 6 Angle Bracket (2 per mailbox)



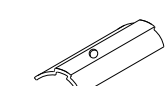
NIGP: 45057252251  
Mailbox Bracket For Type 1 multi and any double mount (use 2)




NIGP: 45057253002  
Bracket Extension Use 1 for a medium Mailbox Use 2 for a Large Mailbox



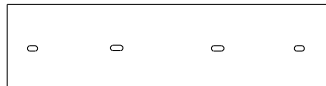
NIGP: 45057258027  
Part "B" Angle Bracket For Type 3 single and double



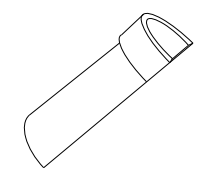
NIGP: 80130598701  
Wedge for Type 2



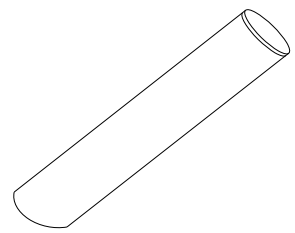
NIGP: 45057250255  
Plate Washer for Architecural and XL Mailboxes




NIGP: 45057541653  
Type 3 double mailbox bracket



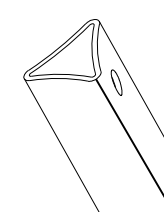
NIGP: 55083571053  
Type 4 Mailbox Wedge



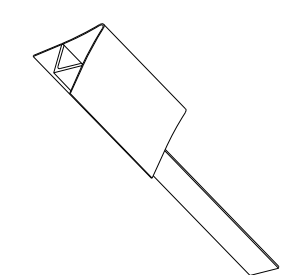
NIGP: 55083571004  
Type 4 Mailbox Socket



NIGP: 80130238407  
Type 2 Wedge Anchor



NIGP: 45057259009  
Wedge for Type 1 V-wing Socket



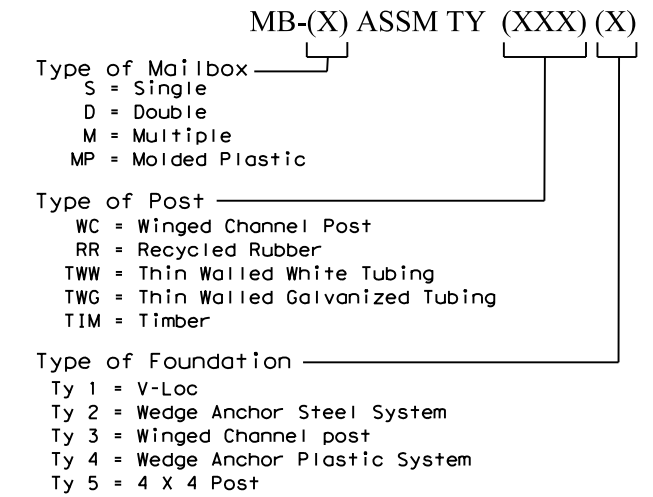
NIGP: 45057256500  
V-wing Socket for Type 1 Foundation

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


**NOTES:**

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

**BID CODES FOR CONTRACTS**



SHEET 4 OF 4

 Texas Department of Transportation				Maintenance Division Standard	
<h2>NIGP PARTS LIST AND COMPATIBILITY</h2> <h3>MB(4)-21</h3>					
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY	
2/2005	1234	01	013, etc	FM 1100	
6/2005				DIST	COUNTY
11/2006				AUS	TRAVIS
4/2015					SHEET NO.
					78

DATE: 3/1/2023 1:52:10 PM FILE: pw:\txdot\projectwiseonline.com\txdot4\Documents\14 - AUS\Design Projects\1234010134 - Design\Drainage\1100 HYDRAULIC DATA SHEET.dgn

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 YR	79.94	79.94	491.71	3.71	1.88	5-S2n	1.18	2.31	1.40	0.76	14.30	4.17
5 YR	108.21	108.21	493.07	5.07	3.15	5-S2n	1.46	2.83	1.78	0.89	15.24	4.53
10 YR	130.48	130.48	494.46	6.46	4.24	5-S2n	1.67	3.00	2.06	0.99	15.87	4.63
25 YR	161.18	139.21	495.08	7.08	4.69	5-S2n	1.76	3.00	2.16	1.08	16.14	4.93
50 YR	185.71	140.66	495.18	7.18	4.77	5-S2n	1.77	3.00	2.17	1.18	16.18	4.93
100 YR	211.73	141.93	495.28	7.28	4.84	5-S2n	1.78	3.00	2.19	1.27	16.23	4.91

\*\*\*\*\*  
 Straight Culvert  
 Inlet Elevation (invert): 487.00 ft, Outlet Elevation (invert): 485.00 ft  
 Culvert Length: 61.00 ft, Culvert Slope: 0.01  
 \*\*\*\*\*

Site Data - EXISTING  
 Site Data Option: Culvert Invert Data  
 Inlet Station: 61.00 ft  
 Inlet Elevation: 487.00  
 Outlet Station: 0.00 ft  
 Outlet Elevation: 485.00 ft  
 Number of Barrels: 1

Culvert Data Summary - EXISTING  
 Barrel Shape: Concrete Box  
 Barrel Span: 4.00 ft  
 Barrel Rise: 4.00 ft  
 Barrel Material: Concrete  
 Embedment: 0.00 in  
 Barrel Manning's n: 0.013  
 Culvert Type: Straight  
 Inlet Configuration: Square Edge (30-75% flare) Wingwall (Ke=0.4)  
 Inlet Depression: None

Tailwater Channel Data - STA. 72+53-EXIST  
 Tailwater Channel Option: Irregular Channel  
 Channel Slope: 0.0300  
 Channel Manning's n: 0.0400  
 Channel Invert Elevation: 485.00 ft

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
2 YR	79.94	79.94	492.08	4.08	1.95	5-S2n	1.19	2.31	1.40	0.72	14.26	4.55
5 YR	108.21	108.21	493.58	5.58	3.28	5-S2n	1.47	2.83	1.78	0.82	15.20	5.03
10 YR	130.48	130.48	495.08	7.08	4.44	5-S2n	1.69	3.00	2.06	0.91	15.83	5.23
25 YR	161.18	134.72	495.40	7.40	4.67	5-S2n	1.73	3.00	2.11	1.02	15.96	5.42
50 YR	185.71	136.04	495.50	7.50	4.74	5-S2n	1.74	3.00	2.13	1.09	15.99	5.65
100 YR	211.73	137.22	495.59	7.59	4.81	5-S2n	1.75	3.00	2.14	1.18	16.03	5.63

\*\*\*\*\*  
 Straight Culvert  
 Inlet Elevation (invert): 487.00 ft, Outlet Elevation (invert): 485.00 ft  
 Culvert Length: 87.00 ft, Culvert Slope: 0.023  
 \*\*\*\*\*

Site Data - PROPOSED  
 Site Data Option: Culvert Invert Data  
 Inlet Station: 87.00 ft  
 Inlet Elevation: 487.00 ft  
 Outlet Station: 0 ft  
 Outlet Elevation: 485.00 ft  
 Number of Barrels: 1

Culvert Data Summary - PROPOSED  
 Barrel Shape: Concrete Box  
 Barrel Span: 4.00 ft  
 Barrel Rise: 4.00 ft  
 Barrel Material: Concrete  
 Embedment: 0.00 in  
 Barrel Manning's n: 0.011  
 Culvert Type: Straight  
 Inlet Configuration: Square Edge (90% Headwall (Ke=0.5)  
 Inlet Depression: None

Tailwater Channel Data - STA. 71+78 - PROPOSED  
 Tailwater Channel Option: Irregular Channel  
 Channel Slope: 0.0300  
 Channel Manning's n: 0.035  
 Channel Invert Elevation: 485.00 ft

Discharge Names	Headwater Elevation (ft)	Total Discharge (cfs)	Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2 YR	491.71	79.94	79.94	0.00	1
5 YR	493.07	108.21	108.21	0.00	1
10 YR	494.46	130.48	130.48	0.00	1
25 YR	495.08	161.18	139.21	21.71	8
50 YR	495.18	185.71	140.66	44.90	5
100 YR	495.28	211.73	141.93	69.62	4
Overtopping	494.90	136.80	136.80	0.00	Overtopping

Roadway Data for Crossing: STA 72+53 - EXIST  
 Roadway Profile Shape: Constant Roadway Elevation  
 Crest Length: 100.00 ft  
 Crest Elevation: 494.90 ft  
 Roadway Surface: Paved  
 Roadway Top Width: 40.00 ft

Discharge Names	Headwater Elevation (ft)	Total Discharge (cfs)	Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2 YR	492.08	79.94	79.94	0.00	1
5 YR	493.58	108.21	108.21	0.00	1
10 YR	495.08	130.48	130.48	0.00	1
25 YR	495.40	161.18	134.72	26.34	8
50 YR	495.50	185.71	136.04	49.56	5
100 YR	495.59	211.73	137.22	74.36	4
Overtopping	495.20	132.10	132.10	0.00	Overtopping

Roadway Data for Crossing: STA 71+78 - PROPOSED  
 Roadway Profile Shape: Constant Roadway Elevation  
 Crest Length: 100.00 ft  
 Crest Elevation: 495.20 ft  
 Roadway Surface: Paved  
 Roadway Top Width: 40.00 ft

DRAINAGE AREA MAP

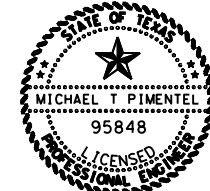


Basin Area (ac)	Composite C	Tc	Storm Events	Rainfall (in/hr)	Runoff (cfs)
22.4	84	11.90	2 year	4.27	79.94
			5 year	5.78	108.21
			10 year	6.97	130.48
			25 year	8.61	161.18
			50 year	9.92	185.71
			100 year	11.31	211.73

FM 1100 CROSS CULVERT ANALYSIS NOTES:

- PROJECT SURVEY OF EXISTING CULVERT INDICATES A 36 IN PIPE CULVERT WITH FLOWLINES OF 483.57 AND 482.25 WITH A FLOW FROM WEST TO EAST. WHEREAS THE CULVERT WAS DESIGNED TO FLOW FROM EAST TO WEST.
- TXDOT AS-BUILTS (DATED 1967) INDICATE THIS CULVERT IS A 4'X4' BOX CULVERT.
- TXDOT FIELD VISIT CONFIRMED BOX CULVERT AND UPSTREAM HEADWALL INUNDATED WITH WATER. CULVERT WAS NOT DRAINING.
- EXISTING ANALYSIS IS BASED ON ASSUMED FLOWLINES.
- HYDRAULIC ANALYSIS IS BASED ON NOAA ATLAS-14 VALUES.

3/1/2023



DocuSigned by:  
*Michael T Pimentel*

**Austin District  
 Central Design**

**Texas Department of Transportation**

**FM 1100  
 HYDRAULIC DATA  
 AT STA 71+87.78**

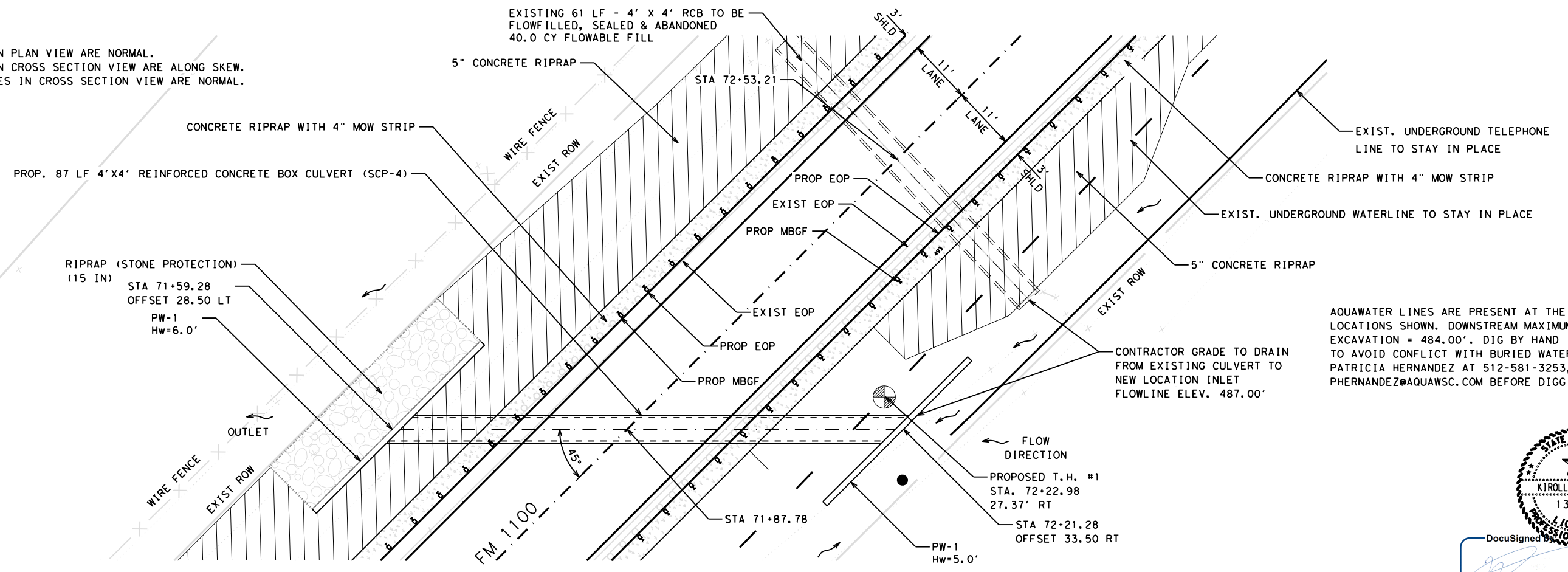
SHEET 1 OF 1

© 2023	CONT	SECT	JOB	HIGHWAY
DS: 1234	CK: 01		013	FM 1100
DW: AUS	CK: TRAVIS			SHEET NO. 79

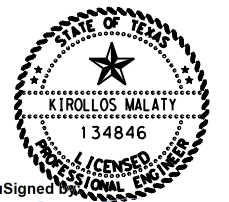
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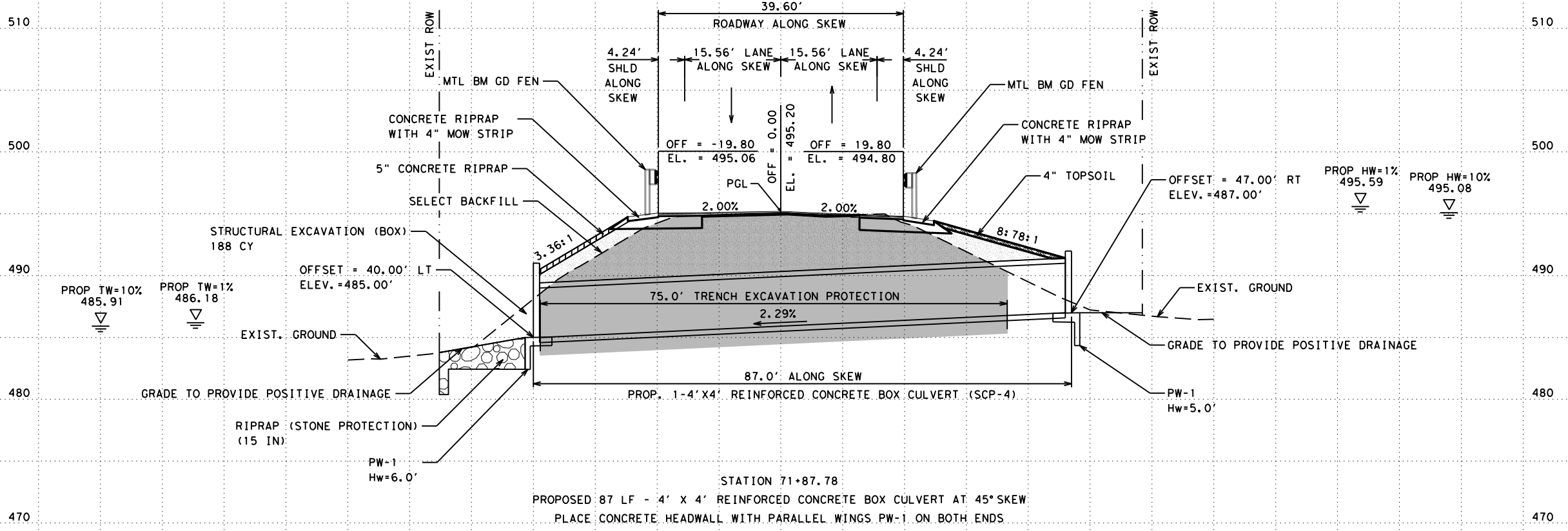
NOTE:  
 CALLOUTS IN PLAN VIEW ARE NORMAL.  
 CALLOUTS IN CROSS SECTION VIEW ARE ALONG SKEW.  
 CROSS SLOPES IN CROSS SECTION VIEW ARE NORMAL.



AQUAWATER LINES ARE PRESENT AT THE APPROXIMATE LOCATIONS SHOWN. DOWNSTREAM MAXIMUM DEPTH OF EXCAVATION = 484.00'. DIG BY HAND IN THIS AREA TO AVOID CONFLICT WITH BURIED WATER LINE. CONTACT PATRICIA HERNANDEZ AT 512-581-3253, PHERNANDEZ@AQUAWSC.COM BEFORE DIGGING.



DocuSigned by:  
 3/17/2023  
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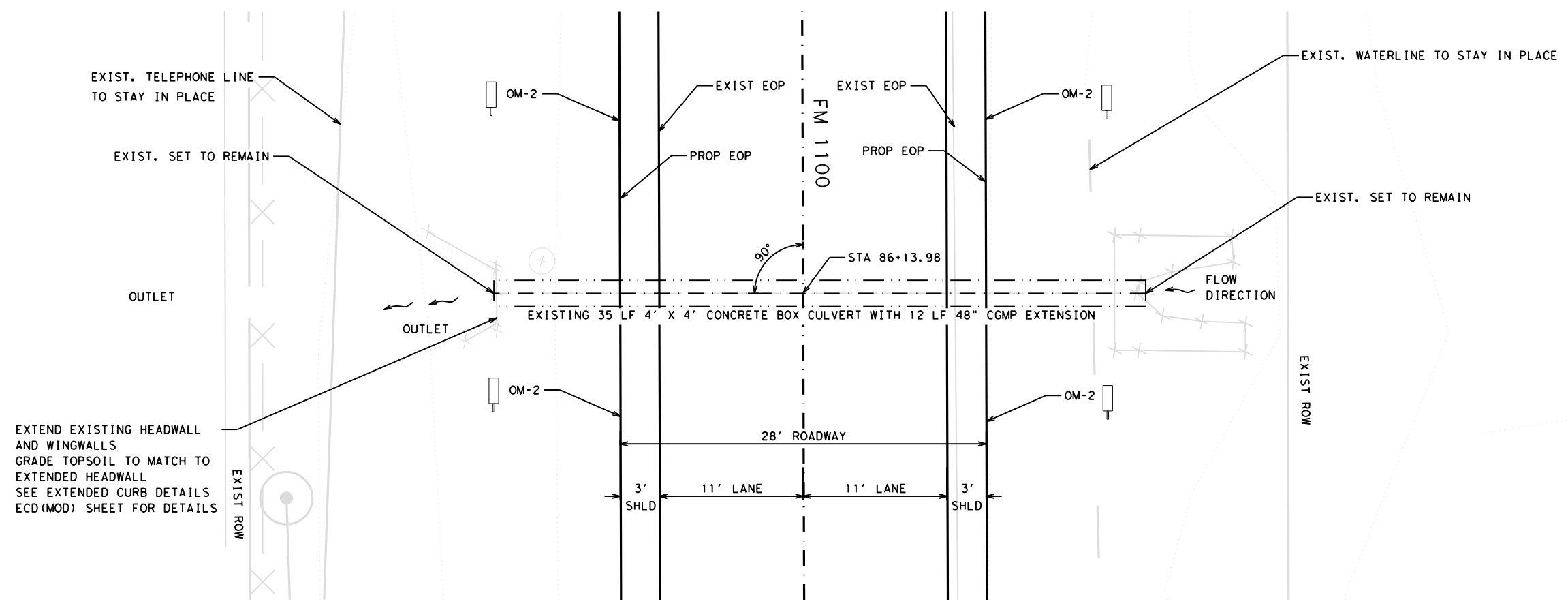
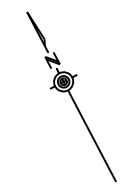
Austin District  
 North Travis Area Office



CULVERT LAYOUT  
 STA 71+87.78

SHEET 1 OF 2				
2023	CONT	SECT	JOB	HIGHWAY
	1234	01	013, etc	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	80	

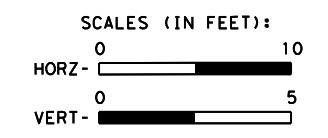
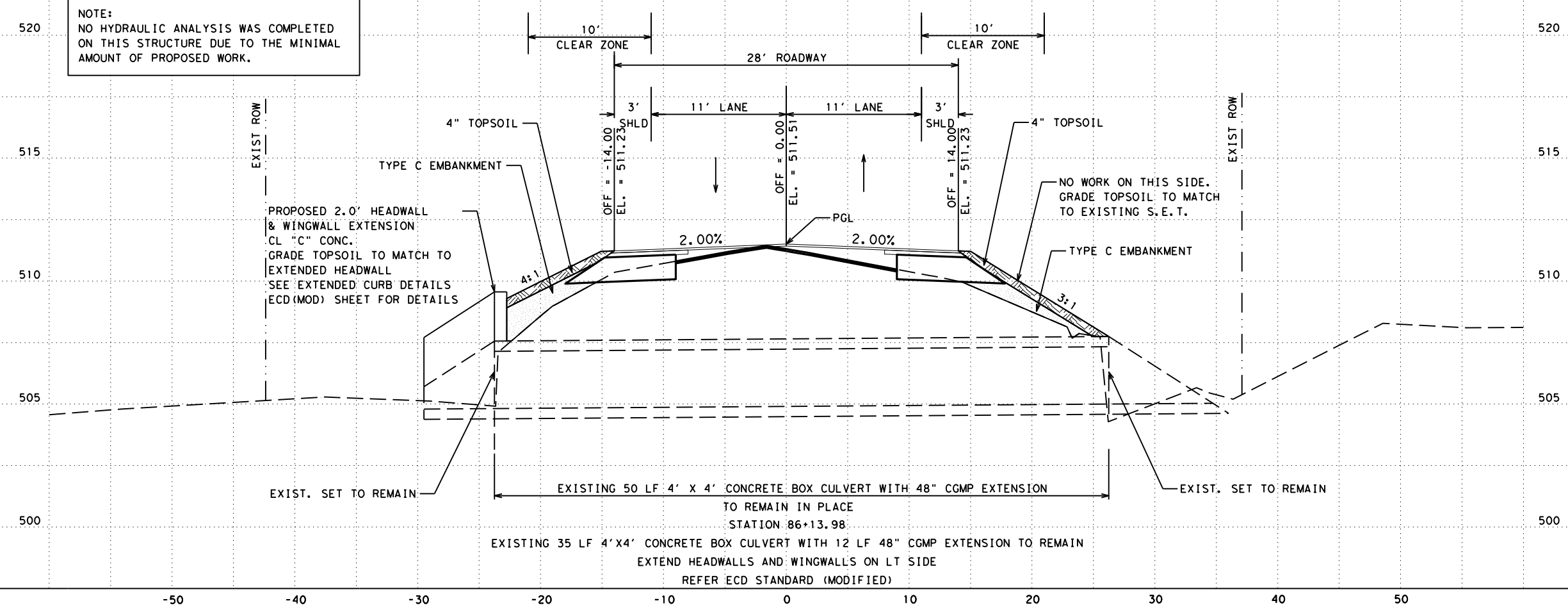
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EXTEND EXISTING HEADWALL AND WINGWALLS GRADE TOPSOIL TO MATCH TO EXTENDED HEADWALL SEE EXTENDED CURB DETAILS ECD(MOD) SHEET FOR DETAILS

DocuSigned by:  
  
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 3/17/2023

NOTE:  
 NO HYDRAULIC ANALYSIS WAS COMPLETED ON THIS STRUCTURE DUE TO THE MINIMAL AMOUNT OF PROPOSED WORK.



Austin District  
 North Travis Area Office

Texas Department of Transportation

CULVERT LAYOUT  
 STA 86+13.98

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1234	01	013, etc	FM 1100
DIST	COUNTY	SHEET NO.	
AUS	TRAVIS	81	



Bar	Size	No.	Spa
H	#4	6	1'-0"
V	#4	14	1'-0"
R	#4	4	~

Bar	Size	No.	Spa
H	#4	3	1'-0"
V	#4	5	1'-0"

Curb Height	Conc (CY/LF)	Reinf Steel (Lb/LF)
2'-0"	0.12	21.376

- Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear SET obstructions.
- Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length.
- Adjust as necessary to maintain 1 1/2" clear cover and 4" minimum between bars.
- Follow existing side slope.
- For vehicle safety construct curbs no more than 3" above 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.
- Adjust height to field conditions as necessary.

**CONSTRUCTION NOTES:**  
 Adjust reinforcing steel as necessary to provide 1 1/2" cover unless otherwise shown.  
 Remove any damaged or loose concrete. Avoid damage to sound concrete that is to remain in place. Use only hand tools or power-driven chipping hammers (15-lb. class maximum) to remove concrete.  
 Ensure substrates are clean and sound. Remove any contaminants, including laitance, oil, dust, debris, or other foreign particles. Roughen the substrate to ensure that there will be a mechanical bond between the new material and the parent concrete.

The new material should be applied over a saturated surface dry (SSD) substrate. Do not use a proprietary epoxy bonding layer in lieu of an SSD substrate unless approved by the Engineer. If use of a proprietary bonding agent is authorized, mix it in accordance with the manufacturer's requirements. Use only TxDOT approved Type V or Type VII material (refer to DMS 6100 - Epoxies and Adhesives).

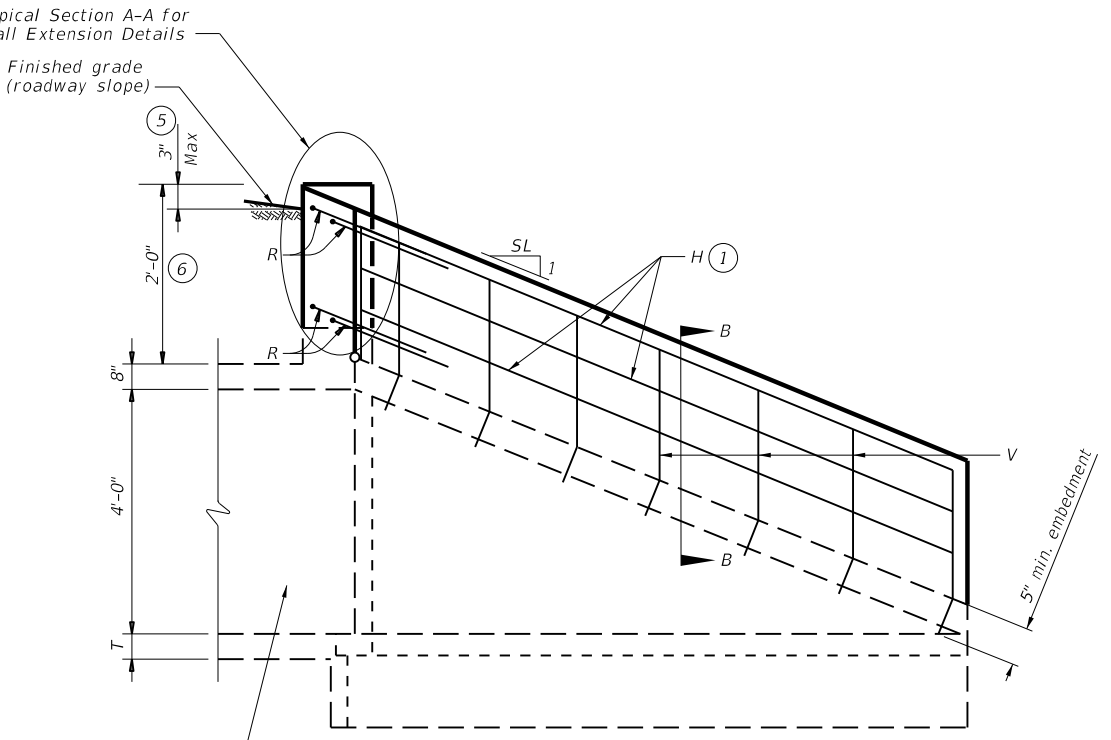
Concrete curing and installing adhesive anchors can be found in TxDOT Concrete Repair Manual, Chapter 3, Section 3.

Embed (#4) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 451, "Railing", or TxDOT Concrete Repair Manual.

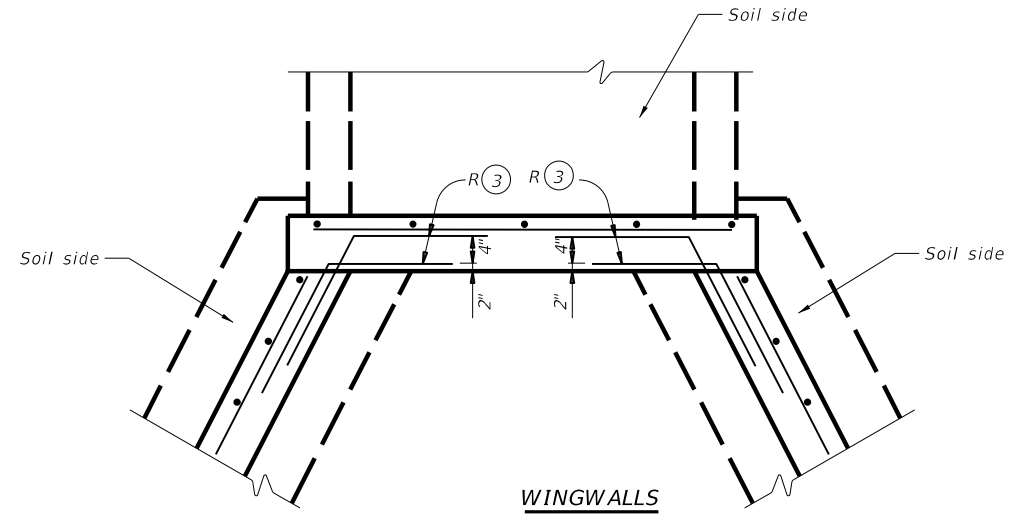
**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel.  
 Provide Class "C" concrete (f'c = 3,600 psi) minimum for curbs.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.

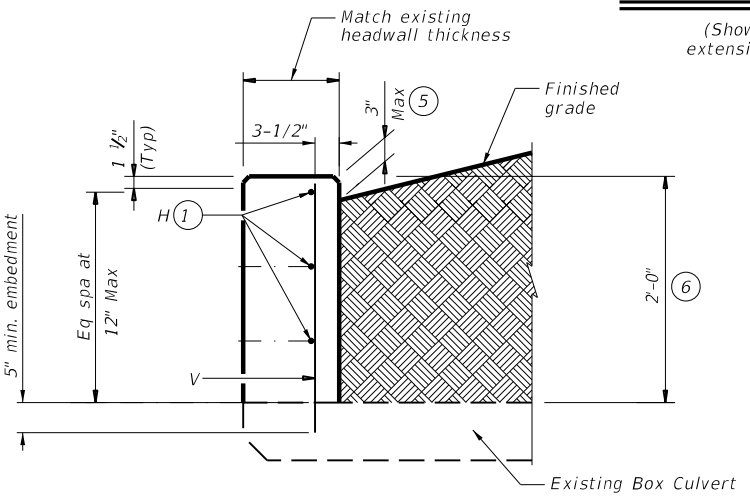
Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.



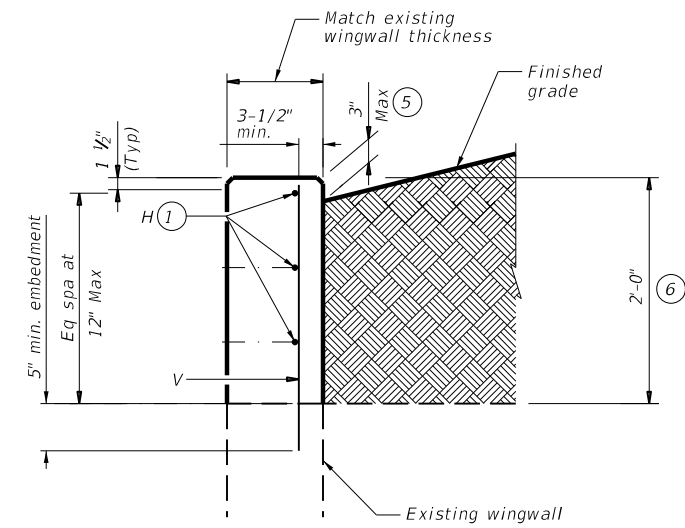
**INSIDE ELEVATION**  
 (Showing wingwall extension reinforcing)



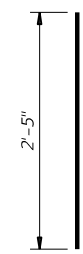
**WINGWALLS**  
**PLAN VIEW WITH CORNER DETAILS**



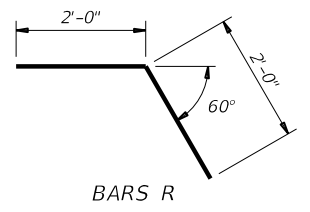
**TYPICAL SECTION A-A**  
**HEADWALL EXTENSION**



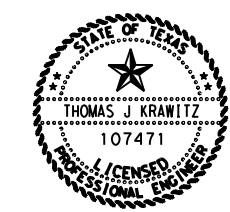
**TYPICAL SECTION B-B**  
**WINGWALL EXTENSION**



**BARS V (#4)**  
 Spaced at 12" Max  
 and not less than 3" nor more than 6"  
 from end of headwall and wingwall



**BARS R**



DocuSigned by:  
**Thomas Krawitz**  
 51C96827B85E406...

2/27/2023

		<b>Bridge Division Standard</b>	
<b>FM 1100</b> <b>EXTENDED CURB DETAILS</b> FOR BOX CULVERTS WITH CURBS 2'-0" EXTENDED <b>ECD(MOD)</b>			
FILE: ecdstdel.dgn	DN: GAF	CK: TxDOT	DW: TxDOT
CONTRACT: 1234	SECTION: 01	JOB: 013, etc	HIGHWAY: FM 1100
DIST: AUS	COUNTY: TRAVIS	SHEET NO. 83	

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DATE: 2/24/2023 9:30:20 AM  
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SECTION DIMENSIONS				⑤ FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																								QUANTITIES														
					Bars B					Bars C					Bars D					Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total					
					S	H	T	U	No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)
3' - 0"	2' - 0"	8"	7"	30'	108	#5	9"	3' - 11"	441	108	#4	9"	5' - 4"	385	2' - 6"	2' - 10"	108	#4	9"	5' - 1"	367	2' - 10"	2' - 3"	108	9"	2' - 0"	144	3	39' - 9"	80	19	39' - 9"	505	3' - 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' - 0"	3' - 0"	8"	7"	30'	108	#5	9"	3' - 11"	441	108	#4	9"	6' - 4"	457	3' - 6"	2' - 10"	108	#4	9"	5' - 1"	367	2' - 10"	2' - 3"	108	9"	3' - 0"	216	3	39' - 9"	80	23	39' - 9"	611	3' - 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' - 0"	2' - 0"	8"	7"	30'	108	#5	9"	4' - 11"	554	162	#4	6"	5' - 8"	613	2' - 6"	3' - 2"	162	#4	6"	5' - 5"	586	3' - 2"	2' - 3"	108	9"	2' - 0"	144	3	39' - 9"	80	21	39' - 9"	558	4' - 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' - 0"	3' - 0"	8"	7"	30'	108	#5	9"	4' - 11"	554	162	#4	6"	6' - 8"	721	3' - 6"	3' - 2"	162	#4	6"	5' - 5"	586	3' - 2"	2' - 3"	108	9"	3' - 0"	216	3	39' - 9"	80	25	39' - 9"	664	4' - 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' - 0"	4' - 0"	8"	7"	30'	108	#5	9"	4' - 11"	554	162	#4	6"	7' - 8"	830	4' - 6"	3' - 2"	162	#4	6"	5' - 5"	586	3' - 2"	2' - 3"	108	9"	4' - 0"	289	3	39' - 9"	80	25	39' - 9"	664	4' - 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

⑤ For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

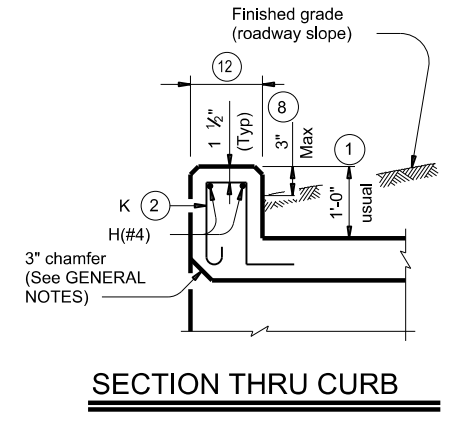
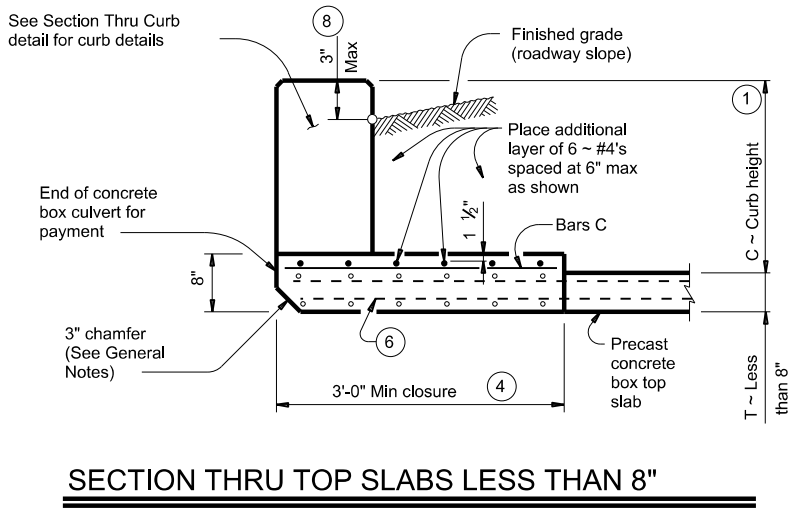
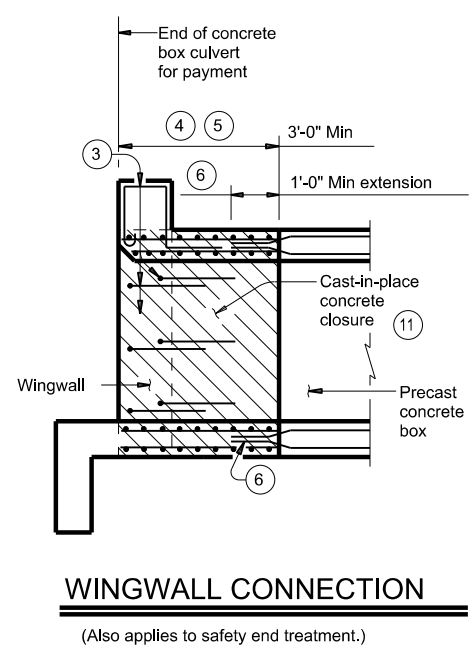
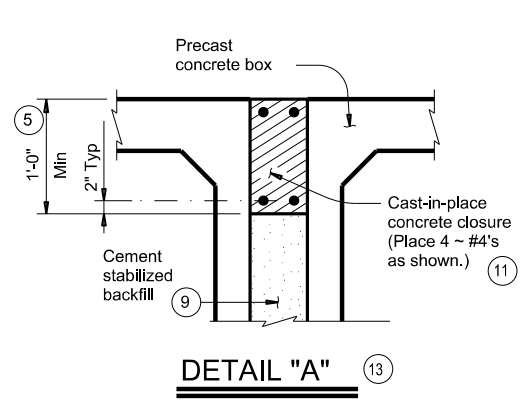
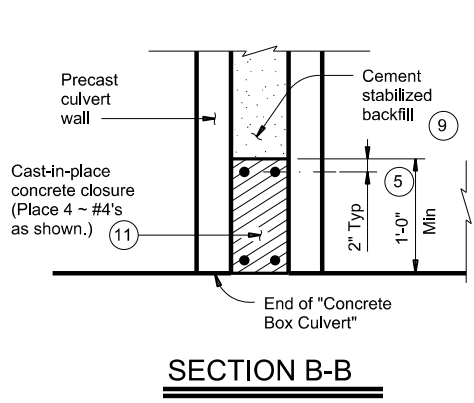
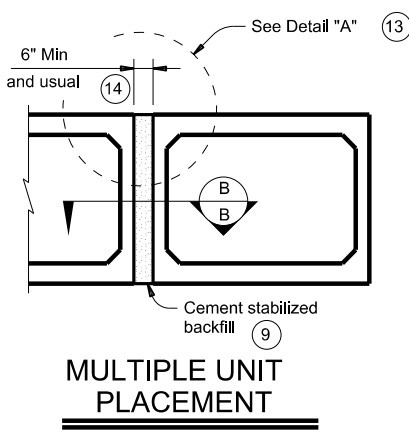


**SINGLE BOX CULVERTS  
 CAST-IN-PLACE  
 0' TO 30' FILL**

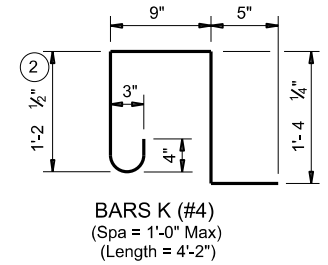
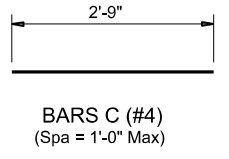
**SCC-3 & 4**

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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04/2021 Updated X values.	DIST	COUNTY	SHEET NO.	
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QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY

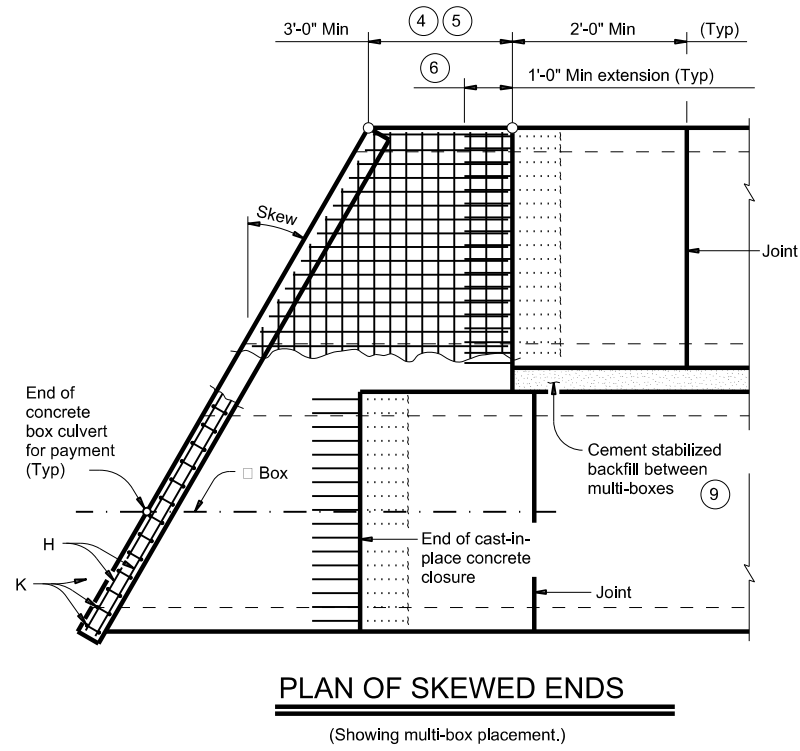
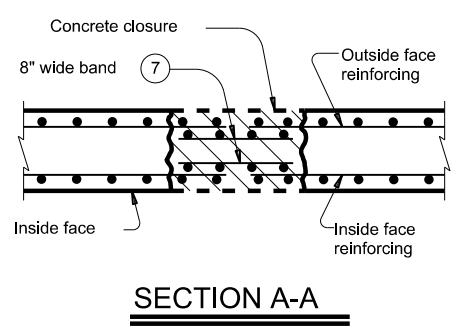
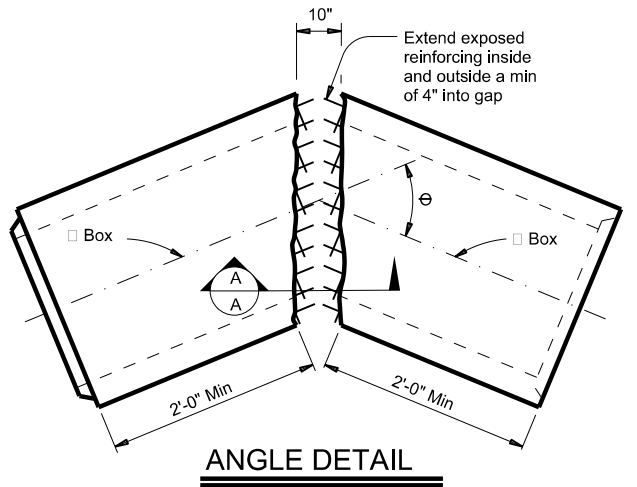


- 1 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
- 2 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.
- 3 Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
- 4 Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
- 5 For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
- 6 Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
- 7 Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
- 8 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.
- 9 Cement stabilized backfill between boxes is considered part of the box culvert for payment.
- 10 All curb concrete and reinforcing is considered part of the box culvert for payment.
- 11 Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
- 12 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
- 13 For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
- 14 This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel.  
 Provide ASTM A1064 welded wire reinforcement.  
 Provide Class C concrete (f<sub>c</sub> = 3,600 psi) for the closures.  
 Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."  
 Any additional concrete required for the closures will be considered subsidiary to the box culvert.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.  
 Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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



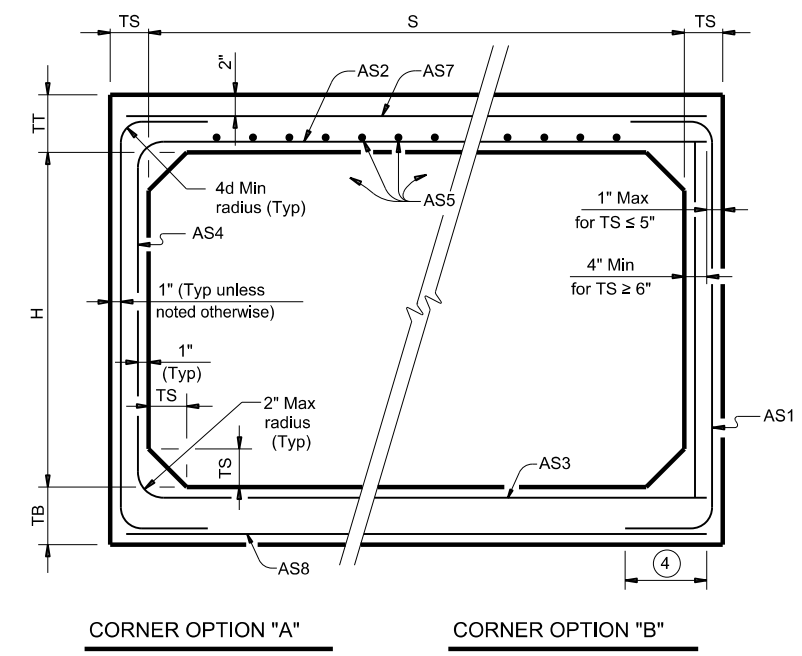
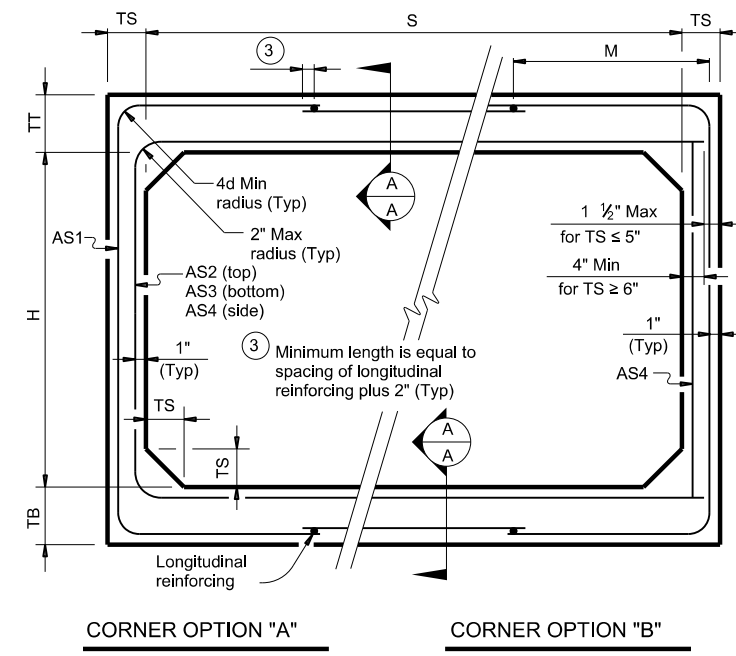
HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>BOX CULVERTS PRECAST MISCELLANEOUS DETAILS</b>			
<b>SCP-MD</b>			
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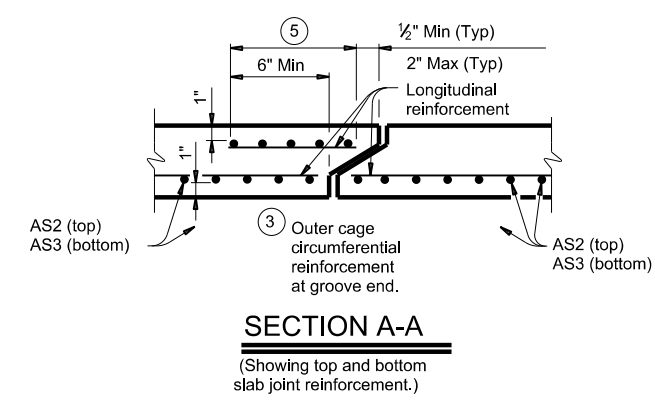
**BOX DATA**

SECTION DIMENSIONS					Fill Height (ft.)	M (Min) (in.)	REINFORCING (sq. in. / ft.) <sup>②</sup>							① Lift Weight (tons)
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)			AS1	AS2	AS3	AS4	AS5	AS7	AS8	
4	2	7.5	6	5	< 2	-	0.18	0.27	0.15	0.12	0.18	0.18	0.14	4.5
4	2	5	5	5	2 < 3	38	0.18	0.19	0.17	0.12	-	-	-	3.6
4	2	5	5	5	3 - 5	38	0.13	0.13	0.13	0.12	-	-	-	3.6
4	2	5	5	5	10	38	0.12	0.12	0.12	0.12	-	-	-	3.6
4	2	5	5	5	15	38	0.14	0.16	0.16	0.12	-	-	-	3.6
4	2	5	5	5	20	38	0.18	0.20	0.21	0.12	-	-	-	3.6
4	2	5	5	5	25	38	0.23	0.25	0.25	0.12	-	-	-	3.6
4	2	5	5	5	30	38	0.28	0.30	0.30	0.12	-	-	-	3.6
4	3	7.5	6	5	< 2	-	0.18	0.31	0.18	0.12	0.18	0.18	0.14	5.0
4	3	5	5	5	2 < 3	38	0.15	0.23	0.20	0.12	-	-	-	4.1
4	3	5	5	5	3 - 5	38	0.12	0.16	0.16	0.12	-	-	-	4.1
4	3	5	5	5	10	38	0.12	0.14	0.14	0.12	-	-	-	4.1
4	3	5	5	5	15	38	0.12	0.18	0.18	0.12	-	-	-	4.1
4	3	5	5	5	20	38	0.14	0.23	0.24	0.12	-	-	-	4.1
4	3	5	5	5	25	38	0.17	0.29	0.29	0.12	-	-	-	4.1
4	3	5	5	5	30	38	0.21	0.35	0.35	0.12	-	-	-	4.1
4	4	7.5	6	5	< 2	-	0.18	0.33	0.20	0.12	0.18	0.18	0.14	5.5
4	4	5	5	5	2 < 3	38	0.12	0.26	0.23	0.12	-	-	-	4.6
4	4	5	5	5	3 - 5	38	0.12	0.18	0.18	0.12	-	-	-	4.6
4	4	5	5	5	10	38	0.12	0.15	0.15	0.12	-	-	-	4.6
4	4	5	5	5	15	38	0.12	0.19	0.20	0.12	-	-	-	4.6
4	4	5	5	5	20	38	0.12	0.25	0.25	0.12	-	-	-	4.6
4	4	5	5	5	25	38	0.14	0.31	0.31	0.12	-	-	-	4.6
4	4	5	5	5	30	38	0.17	0.37	0.37	0.12	-	-	-	4.6



**FILL HEIGHT 2 FT AND GREATER**

**FILL HEIGHT LESS THAN 2 FT**



**MATERIAL NOTES:**  
 Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.  
 Provide Class H concrete (f'c = 5,000 psi).

**GENERAL NOTES:**  
 Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.  
 See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.  
 In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

① For box length = 8'-0"  
 ② AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.

HL93 LOADING

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

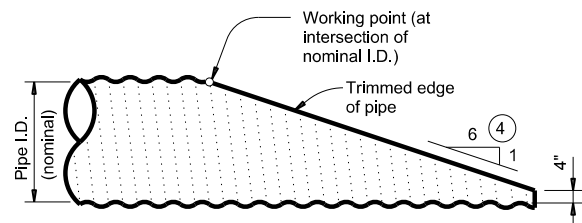
**SINGLE BOX CULVERTS  
 PRECAST  
 4'-0" SPAN**

**SCP-4**

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AUS	TRAVIS		88	



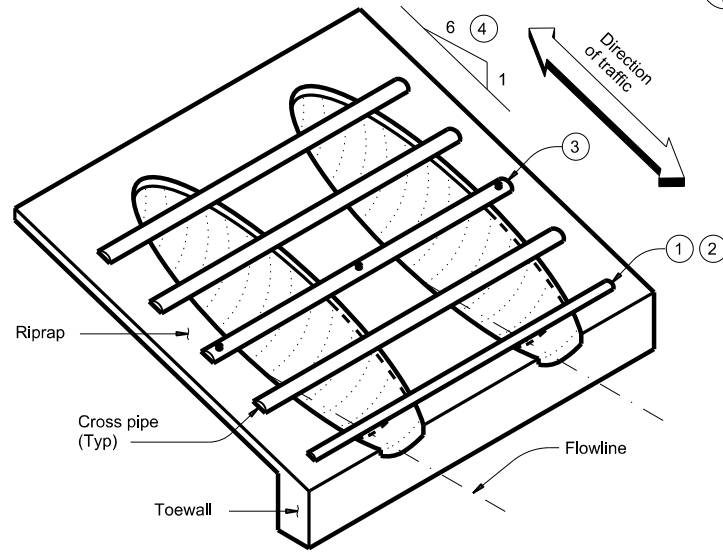
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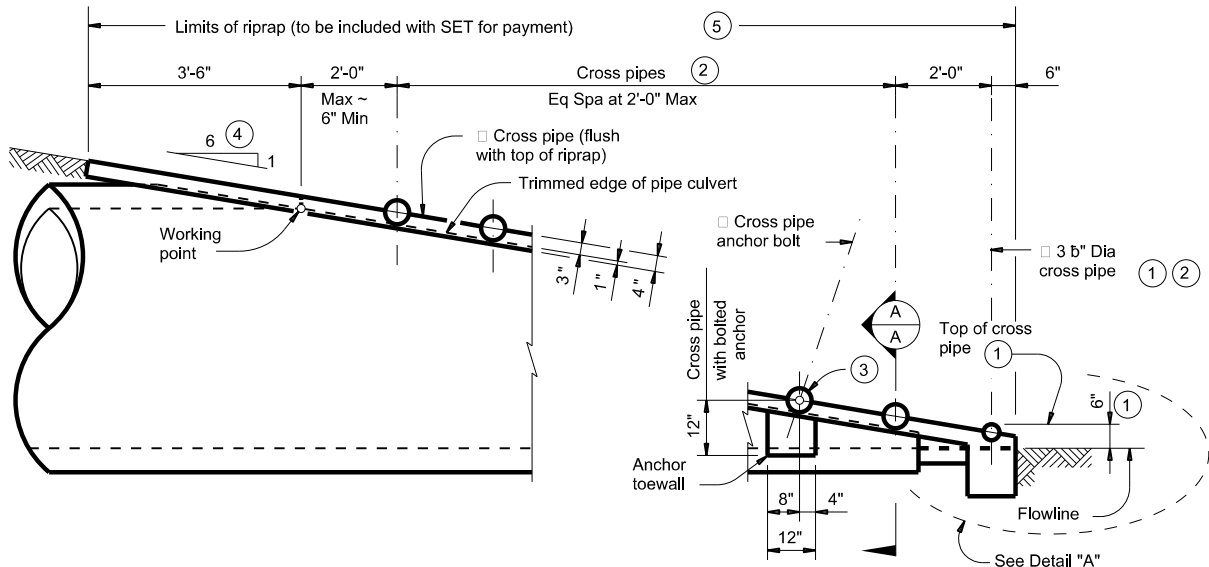
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

**SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER**

(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)

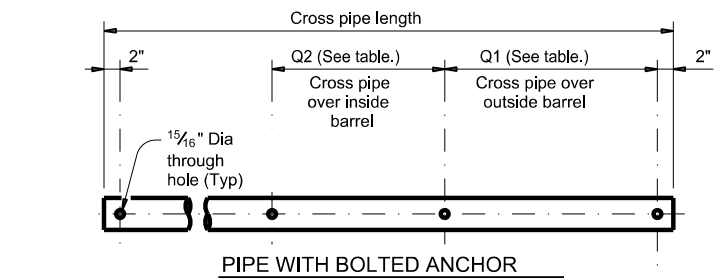


**ISOMETRIC VIEW OF TYPICAL INSTALLATION**

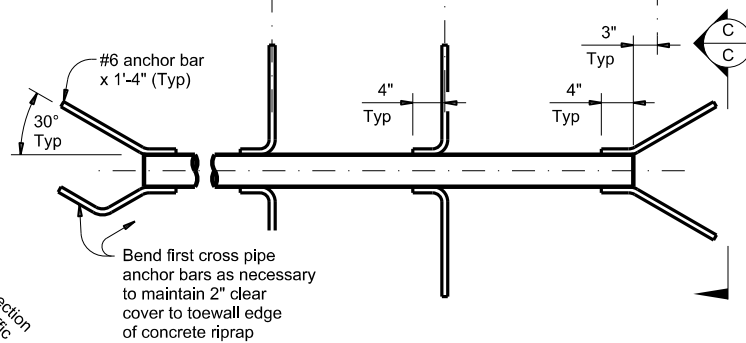


**SIDE ELEVATION OF CAST-IN-PLACE CONCRETE**

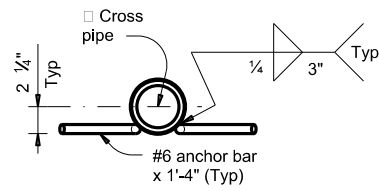
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



**PIPE WITH BOLTED ANCHOR**

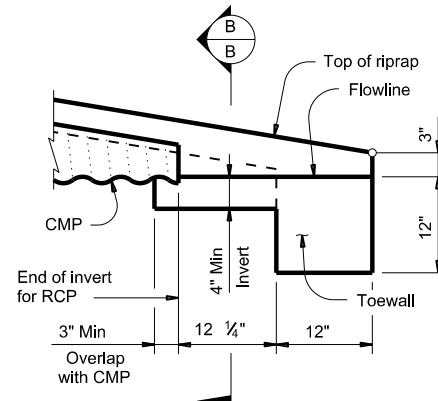


**PIPE WITH ANCHOR BARS**



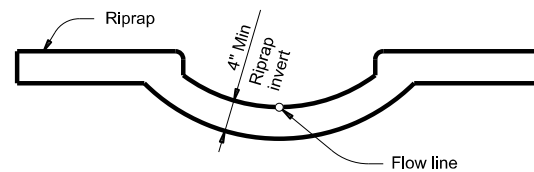
**SECTION C-C**

**CROSS PIPE DETAILS**



**DETAIL "A"**

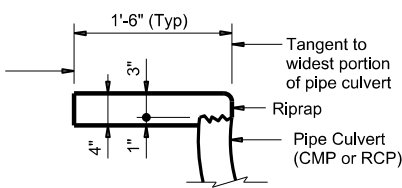
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



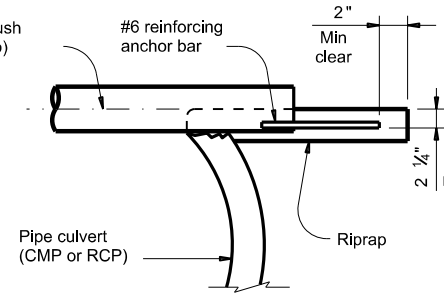
**SECTION B-B**

(Cross pipes not shown for clarity.)

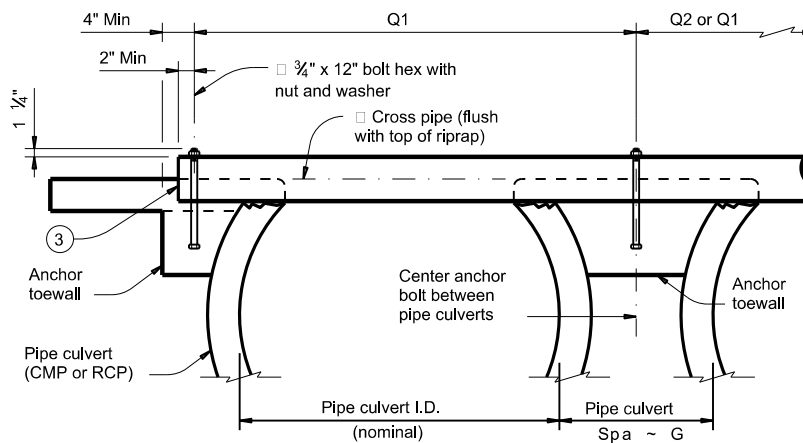
Limits of riprap (to be included with SET for payment)



**SHOWING TYPICAL PIPE CULVERT AND RIPRAP**



**SHOWING CROSS PIPE WITH ANCHOR BAR**



**SHOWING CROSS PIPE WITH BOLTED ANCHOR**

**SECTION A-A**

**CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES**

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"		
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"		
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"	3 or more pipe culverts	3 1/2" Std (4.000" O.D.)
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"		
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	2 or more pipe culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	All pipe culverts	
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts	4" Std (4.500" O.D.)
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"		
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"		
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"		
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"		
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"		
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"		

- The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".
- Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

**MATERIAL NOTES:**

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 cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52. Provide ASTM A307 bolts and nuts. Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

**GENERAL NOTES:**

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981. Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes. Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap". Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

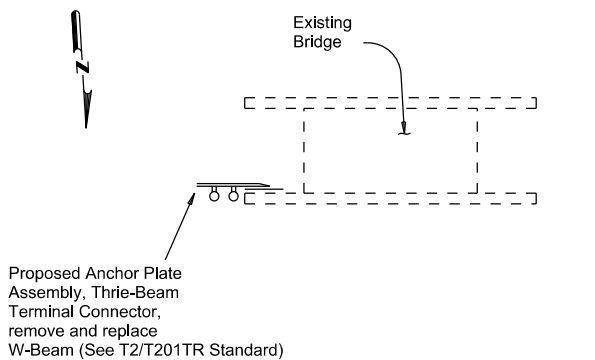
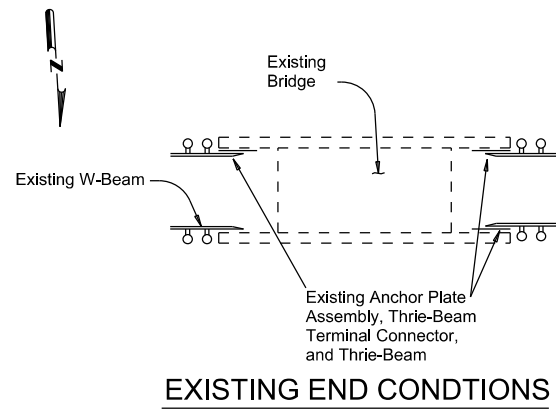
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SAFETY END TREATMENT

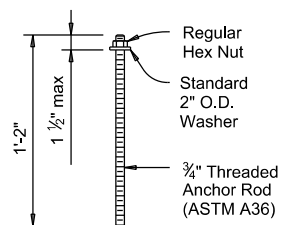
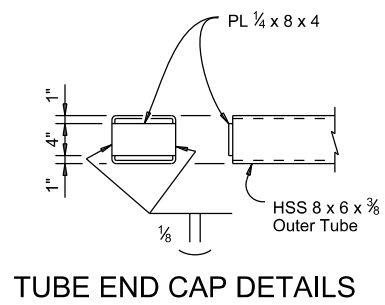
FOR 12" DIA TO 72" DIA  
PIPE CULVERTS  
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

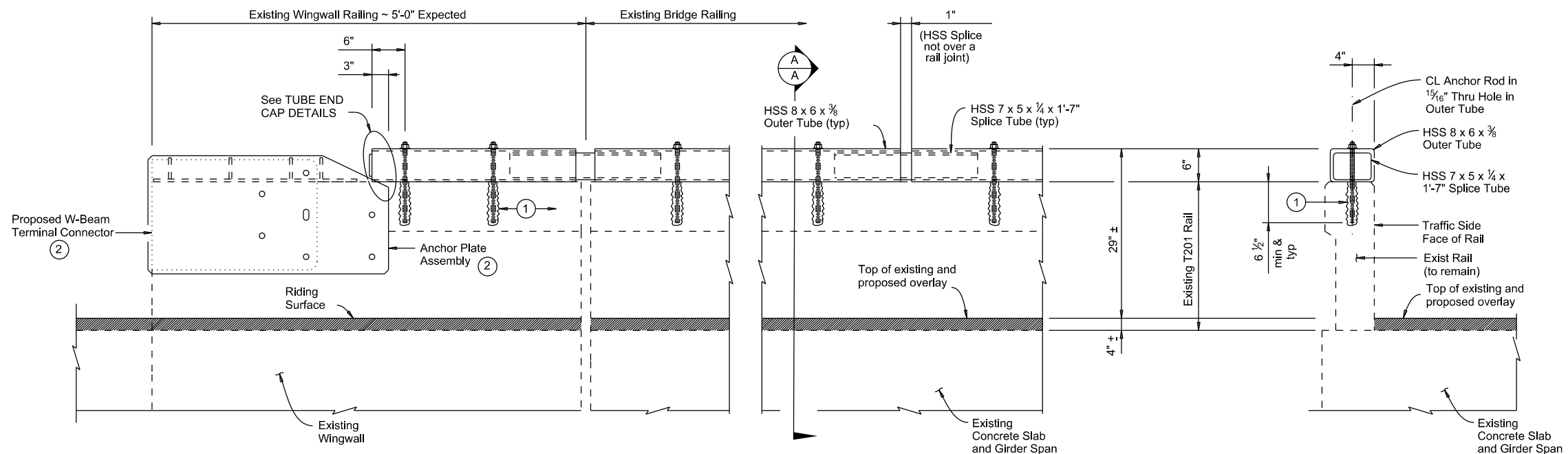
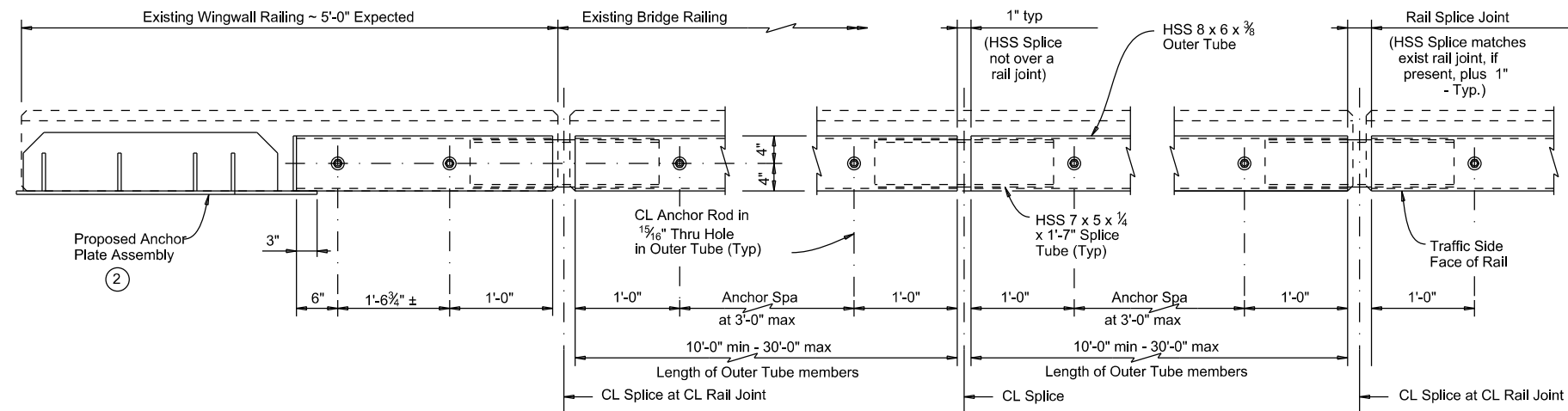
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REVISIONS	1234	01	013, etc	FM 1100
DIST	COUNTY		SHEET NO.	
AUS	TRAVIS		90	



See roadway plans for more details

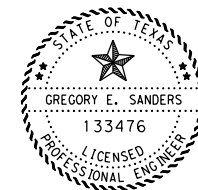


**ANCHOR RODS ①**



① Provide 3/4" Dia. ASTM A36 fully threaded rods with one regular hex nut and one standard 2" O.D. washer each. Embed fully threaded anchor rods 6 1/2" min. into concrete rail using Hilti HIT-RE 500 V3 epoxy adhesive. Other Type III, Class C, D, E or F epoxy adhesives meeting the requirements of DMS-6100, "Epoxyes and Adhesives" may be used if it can be demonstrated that they meet or exceed the strength of Hilti HIT-RE 500 V3 with the same embedment depth and threaded anchor rod size and spacing. Follow manufacturer's directions for installing the epoxied fully threaded anchor rods.

② Refer to "PROPOSED END CONDITIONS" detail for existing and proposed Anchor Plate Assembly and Thrie-Beam Terminal Connector locations



Gregory Sanders 3/15/2023



**BRIDGE T201 RAIL RETROFIT LAYOUT**

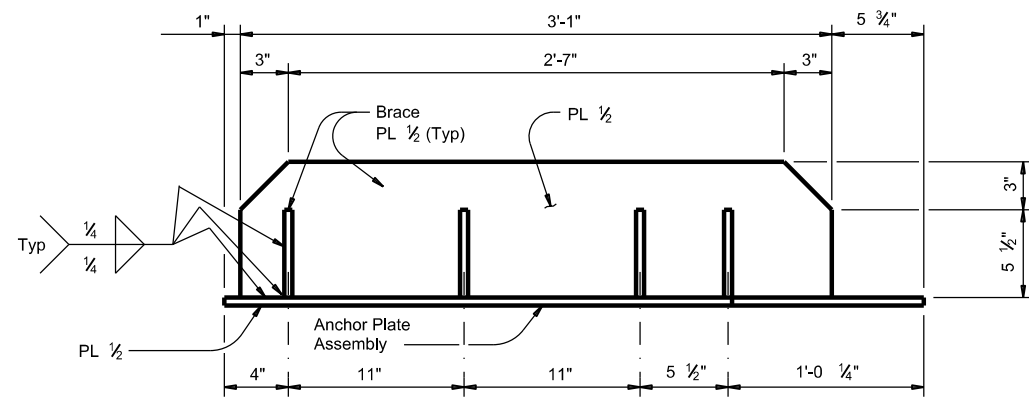
FM 1100 at Little Willow Creek

NBI: 142270123401005

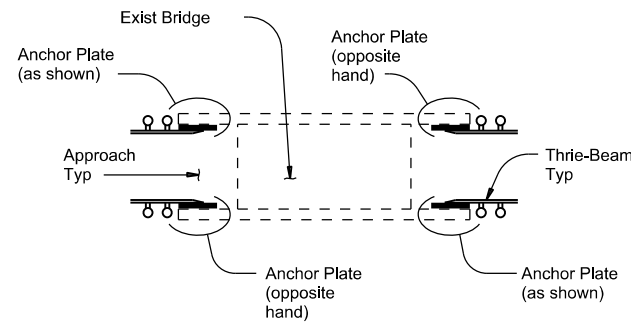
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©TxDOT AUGUST 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, ETC.	FM 1100
DIST	COUNTY		SHEET NO.	
AUS	TRAVIS		91	

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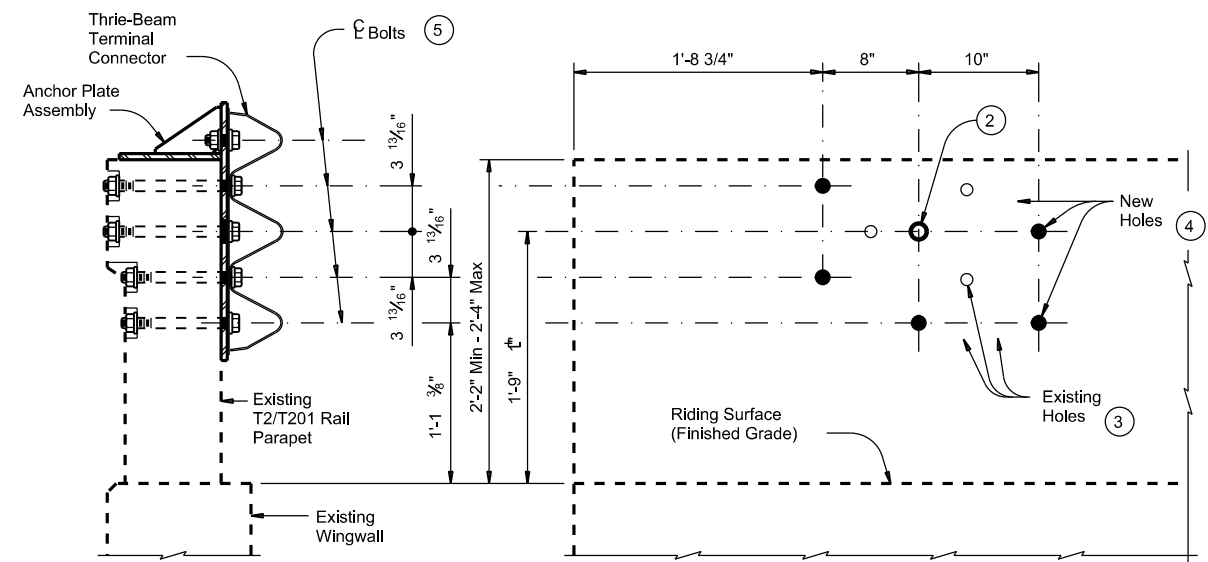
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PLAN



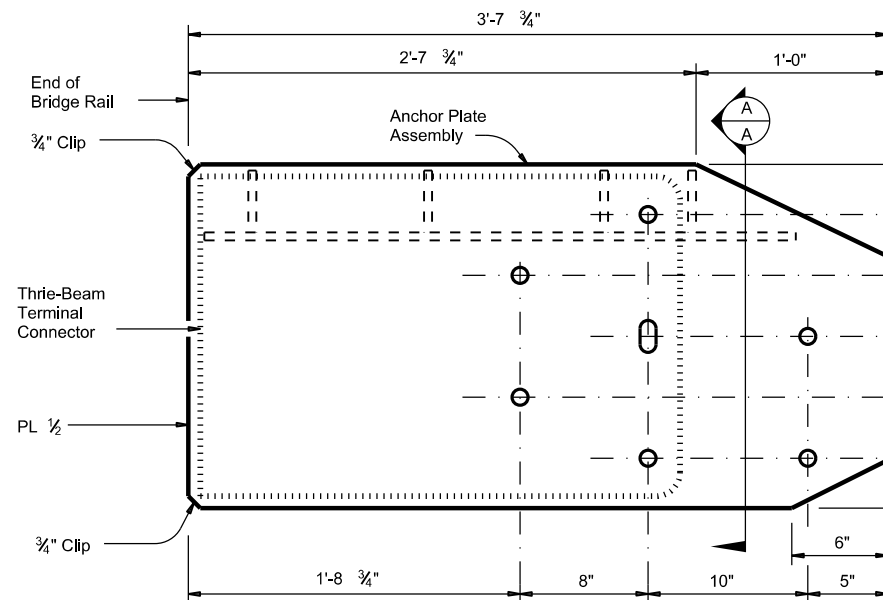
LOCATION DETAILS



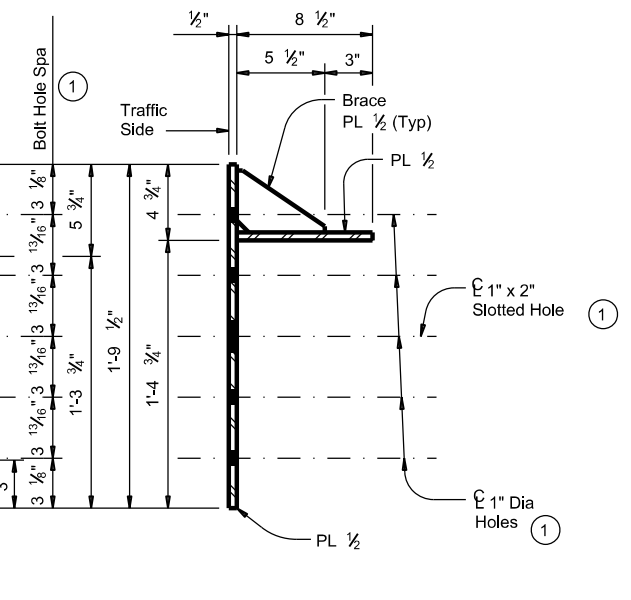
SECTION  
Showing completed installation

ROADSIDE ELEVATION  
Anchor Plate assembly and Thrie-Beam Terminal Connector not shown for clarity

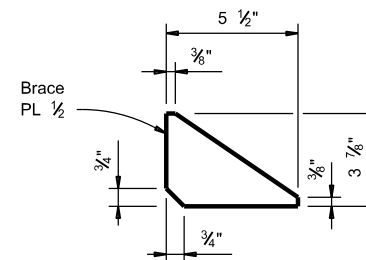
THRIE-BEAM TERMINAL CONNECTION DETAILS



ROADSIDE ELEVATION



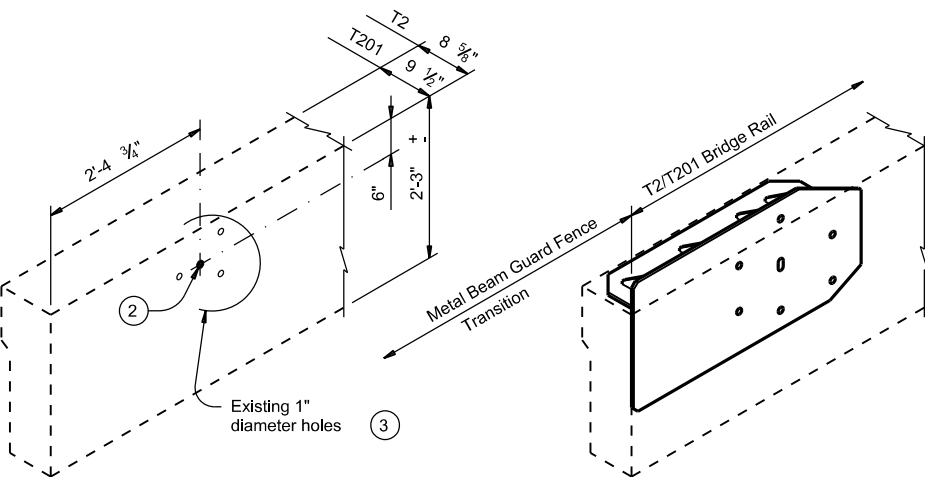
SECTION A-A



BRACE PLATE DETAIL

ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only. For other side, Anchor Plate must be built opposite hand.



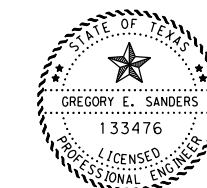
EXISTING PARAPET

Shown after removal of existing MBGF Transition connector and prior to coring new bolt holes

ANCHOR PLATE PLACEMENT

INSTALLATION DETAILS

- The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location, prior to fabrication of Anchor Plate assembly and prior to coring bolt holes in the existing T2/T201 parapet.
- If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.
- If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.
- Drill new 1" diameter holes, each with a 2 1/2" diameter x 1" deep recess, through existing railing parapet. Note that recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the Contractor's expense.
- 7 - 7/8" diameter ASTM F3125 Gr A325 Hex Head Anchor Bolts each with 2 - 1 3/4" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of 1/2" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.



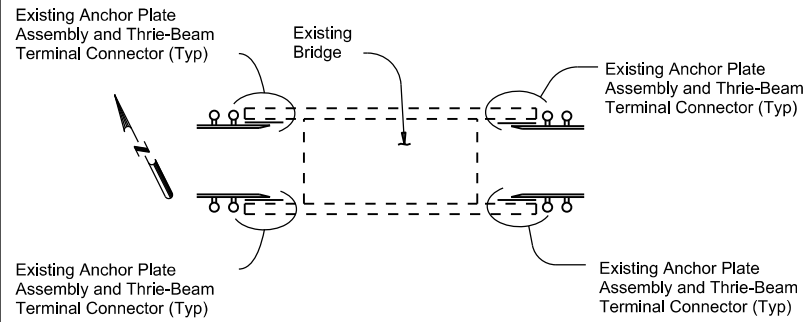
Gregory Sanders 3/15/2023

**CONSTRUCTION NOTES:**  
Field verify dimensions before commencing work and ordering materials.  
On T2 rail remove any MBGF (W-beam) and attachment hardware, from the face of rail if present, prior to installation of new MBGF Transition. Dispose of these materials as directed by the Engineer. Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.  
Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connection. Splice the Thrie-Beam Terminal Connection and Thrie-Beam with the normal 12 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

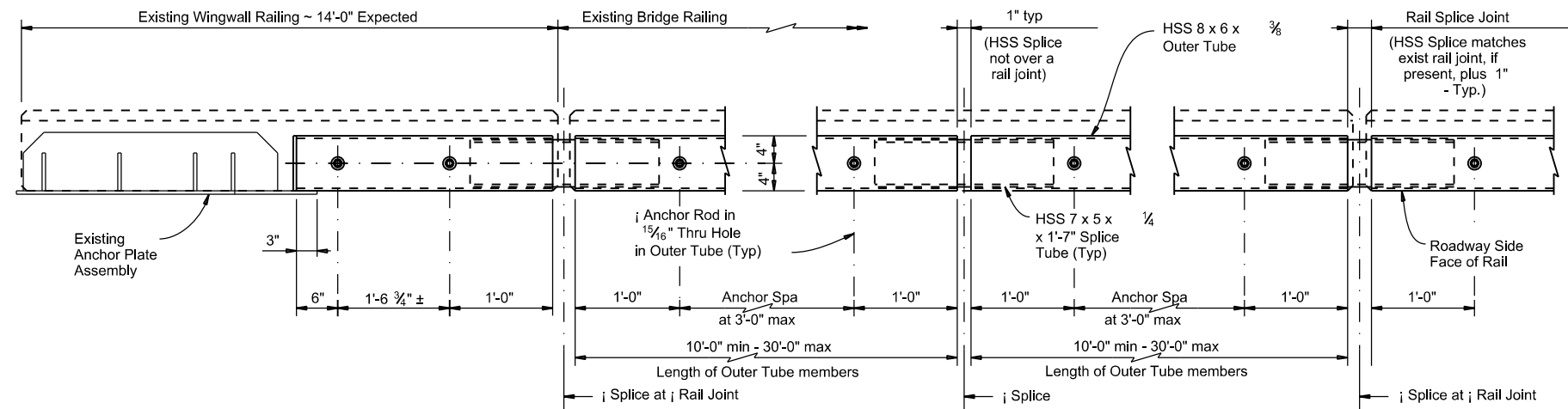
**MATERIAL NOTES:**  
Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld splatter. Grind edges and corners to a 1/16" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

**GENERAL NOTES:**  
These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection.  
Shop drawings are not required for this installation.  
Payment for materials, fabrication, and installation of this assembly are to be included in unit price bid in accordance with Item 540 "Mtl Bm Gd Fen Trans (Anchor Plate)".  
Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 Lbs.

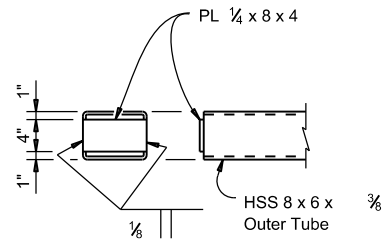
		<b>Bridge Division Standard</b>	
<b>BRIDGE T201 RAIL RETROFIT LAYOUT</b>			
<b>FM 1100 at Little Willow Creek</b>			
<b>NBI: 142270123401005</b>			
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©TxDOT September 2019	CONT: 1234	SECT: 01	JOB: 013, ETC.
REVISIONS	DET: 14	COUNTY: TRAVIS	SHEET NO.: 92



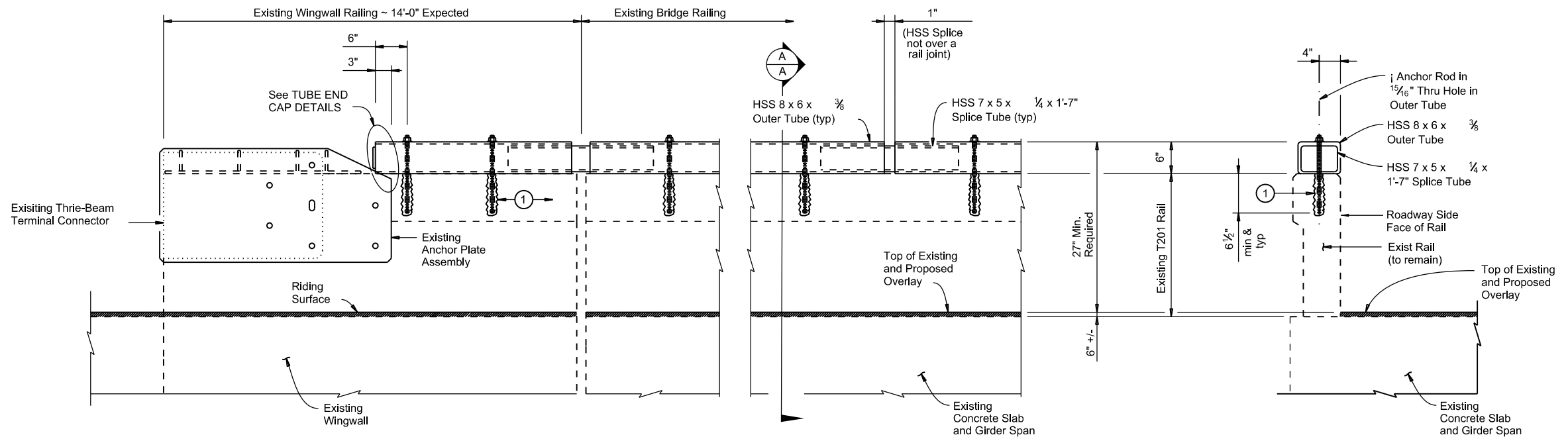
**EXISTING END CONDCTIONS**



**RAIL PLAN**

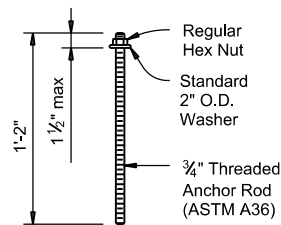


**TUBE END CAP DETAILS**



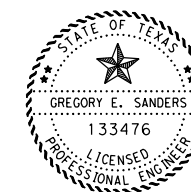
**RAIL TRAFFIC SIDE ELEVATION**

**SECTION A-A**



**ANCHOR RODS ①**

- ① Provide 3/4" Dia. ASTM A36 fully threaded rods with one regular hex nut and one standard 2" O.D. washer each. Embed fully threaded anchor rods 6 1/2" min. into concrete rail using Hilti HIT-RE 500 V3 epoxy adhesive. Other Type III, Class C, D, E or F epoxy adhesives meeting the requirements of DMS-6100, "Epoxyes and Adhesives" may be used if it can be demonstrated that they meet or exceed the strength of Hilti HIT-RE 500 V3 with the same embedment depth and threaded anchor rod size and spacing. Follow manufacturer's directions for installing the epoxied fully threaded anchor rods.



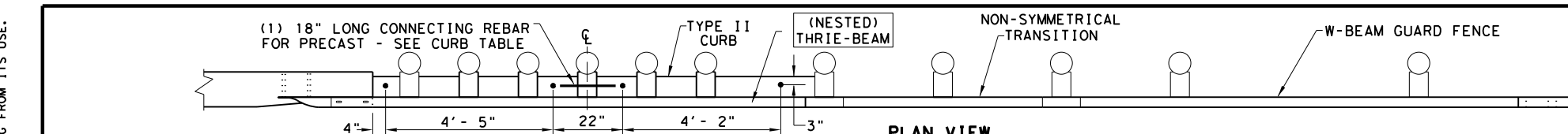
Gregory Sanders 3/15/2023

<b>BRIDGE T201 RAIL RETROFIT</b> FM 1100 at BIG DRY CREEK NBI: 142270123401006				
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©TxDOT AUGUST 2018	CONT: 1234	SECT: 01	JOB: 013, ETC.	HIGHWAY: FM 1100
REVISIONS	DIST: AUS	COUNTY: TRAVIS	SHEET NO. 93	

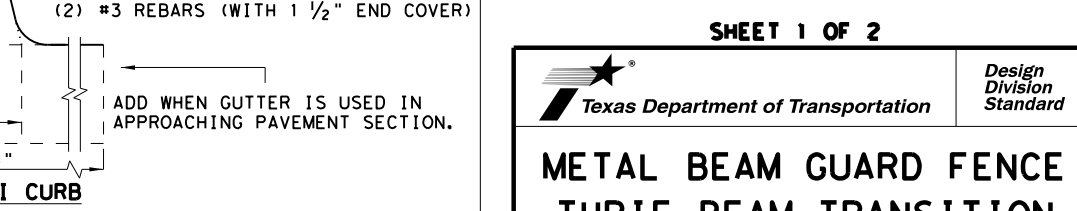
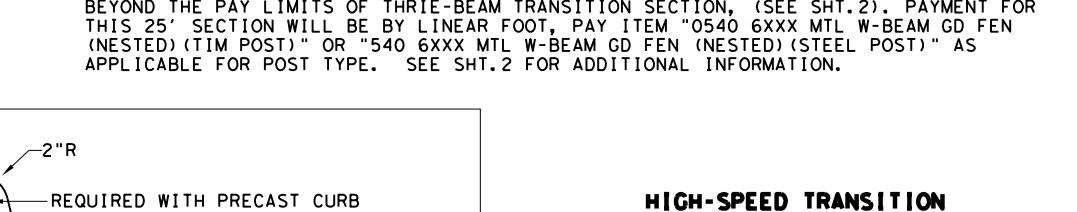
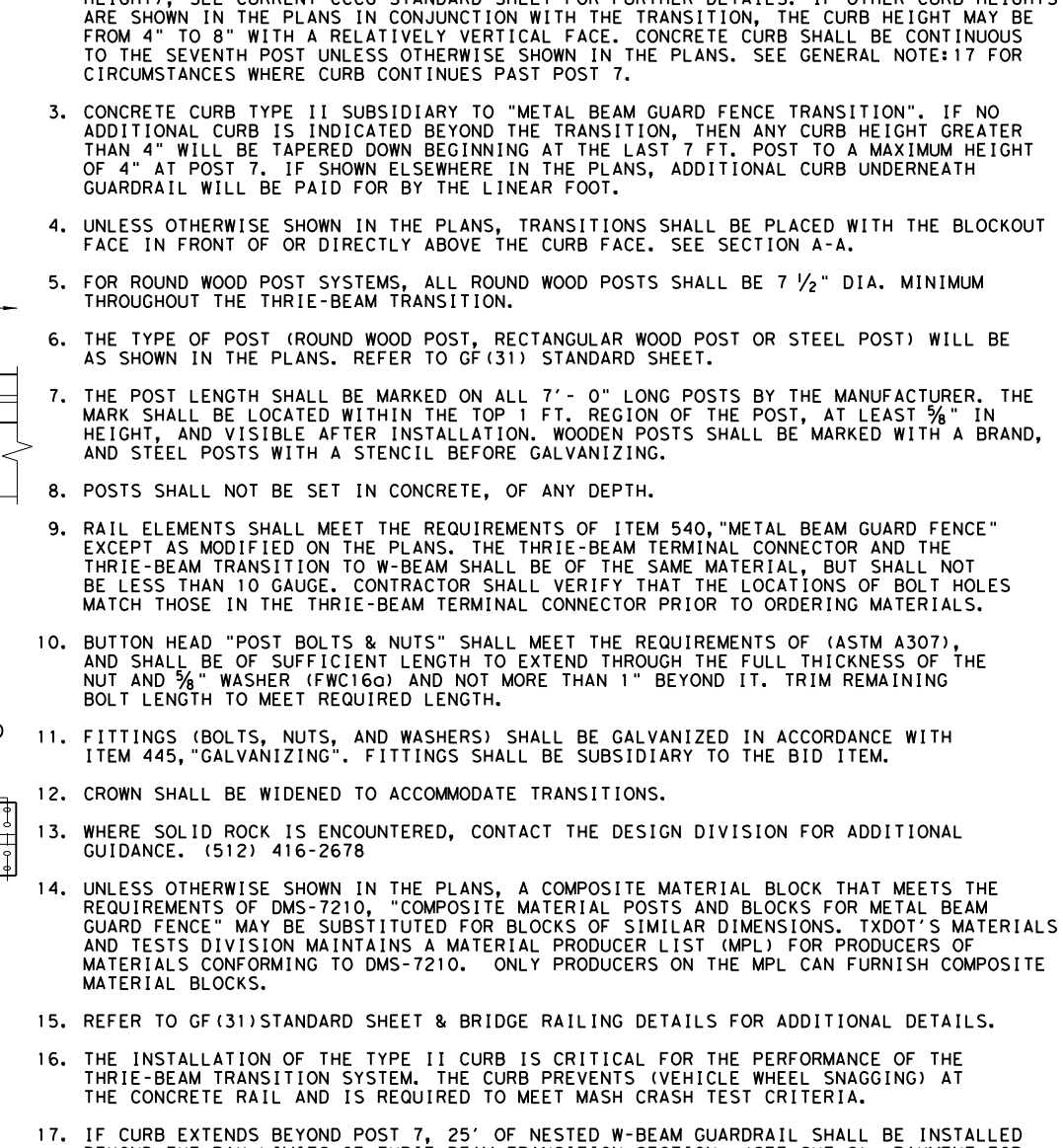
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- ### GENERAL NOTES
- CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
  - CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION 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.
  - 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.
  - 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.
  - FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
  - 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.
  - 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.
  - POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
  - 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.
  - 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 (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
  - FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
  - CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
  - WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
  - 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.
  - REFER TO GF (31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
  - 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.
  - 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.



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.			

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
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DIST	COUNTY	SHEET NO.	
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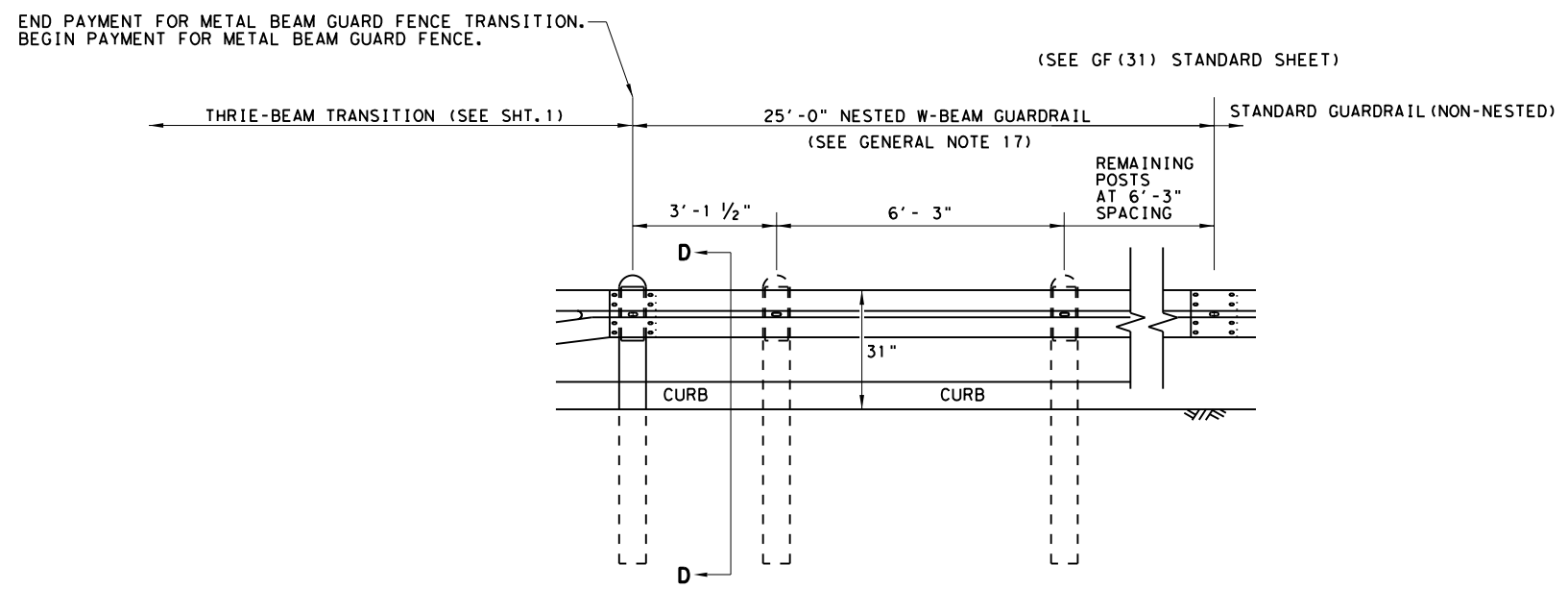
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NOTE: \*\* "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.

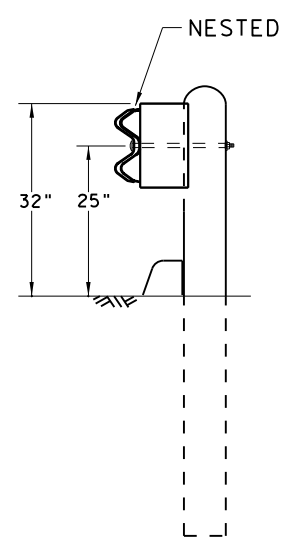
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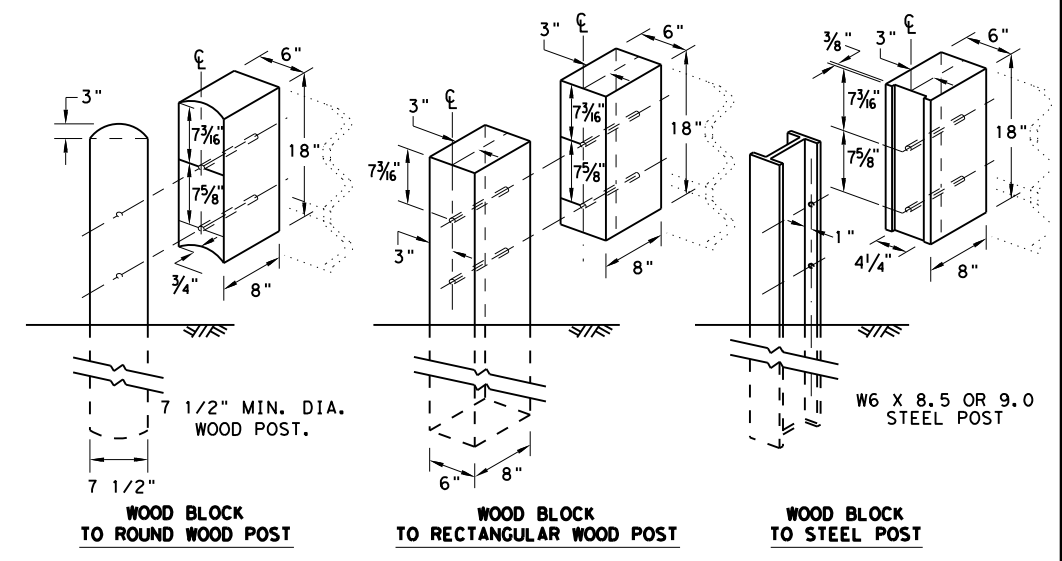
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



**ELEVATION VIEW**



**SECTION D-D**



**THREE BEAM TRANSITION BLOCKOUT DETAILS**

**HIGH-SPEED TRANSITION**

**SHEET 2 OF 2**

				Design Division Standard
--	--	--	--	--------------------------------

**METAL BEAM GUARD FENCE**  
**THREE-BEAM TRANSITION**  
**TL-3 MASH COMPLIANT**  
**GF (31) TR TL3-20**

FILE: gf31tr+1320.dgn	DN: TXDOT	CK: KM	DW: KM	CK: CGL/AG
©TXDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1234	01	013, ETC.	FM 1100
	DIST	COUNTY	SHEET NO.	
	AUS	TRAVIS	95	

# SUMMARY OF SMALL SIGNS CSJ 0113-02-062

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

BRIDGE MOUNT CLEARANCE SIGNS

(See Note 2)

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	Post Type		Anchor Type		Mounting Designation	
							FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SB = Slip-Bolt WS = Wedge Steel WP = Wedge Plastic	P = Prefab. "Plain" T = Prefab. "T" U = Prefab. "U"	1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	
	1	D2-1	KIMBRO	54 x 18	X		10BWG	1	SB	T		
	2	D1-1	↔ KIMBRO WEST RD	126 x 18	X		10BWG	1	SB	T		
	3	D1-1	GIESE LN ↔	78 x 18	X		10BWG	1	SB	T		
	4	D1-1	KIMBRO WEST RD ↔	126 x 18	X		10BWG	1	SB	T		
	5	R1-1	STOP	30 x 30	X		10BWG	1	SB	P		
		D3-1	FM 1100	12 x 6	X							
		D3-1	GIESE LN	12 x 6	X							

TY N = Type N  
TY S = Type S

Square Feet	Minimum Thickness
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater than 15	0.125"

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

**NOTE:**

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

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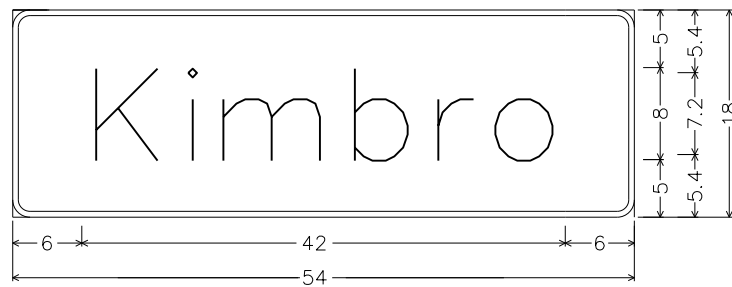


## SUMMARY OF SMALL SIGNS

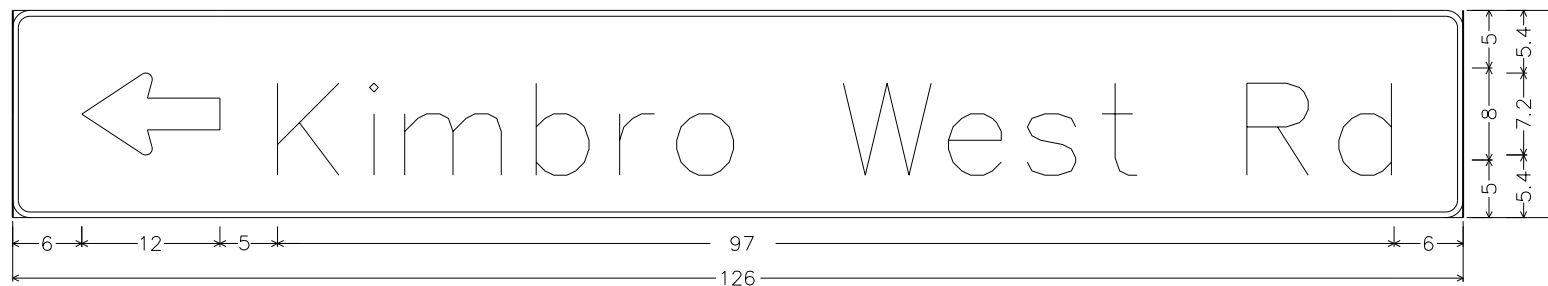
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8-16		AUS	TRAVIS	96					

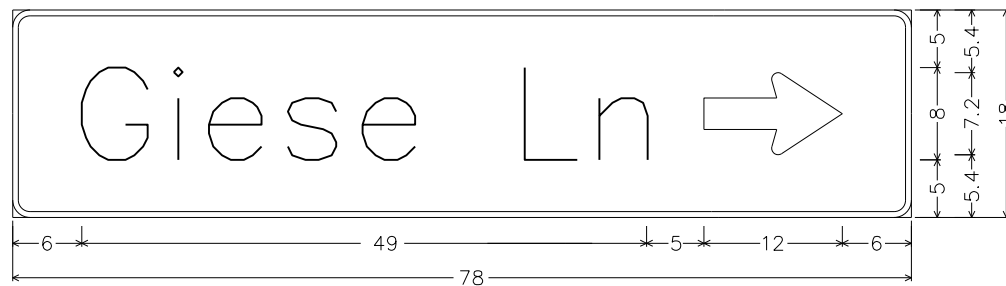
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Identifier: D2-1 8in;  
 1.5" Radius, 0.5" Border, White on Green;  
 "Kimbrow" ClearviewHwy-3-W



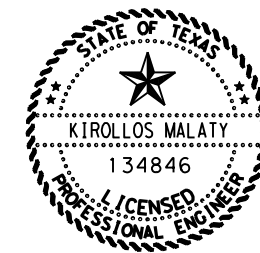
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 "Kimbrow West Rd" ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1"




Identifier : D1-1 8in RT;  
 1.5" Radius, 0.5" Border, White on Green;  
 [Giese Ln] ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0};




Identifier : D1-1 8in RT;  
 1.5" Radius, 0.5" Border, White on Green;  
 [Kimbrow West Rd] ClearviewHwy-3-W; Standard Arrow Custom 12.0" X 7.1" 0};



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 3/17/2023  
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**Austin District  
 North Travis Area Office**

 **Texas Department of Transportation**

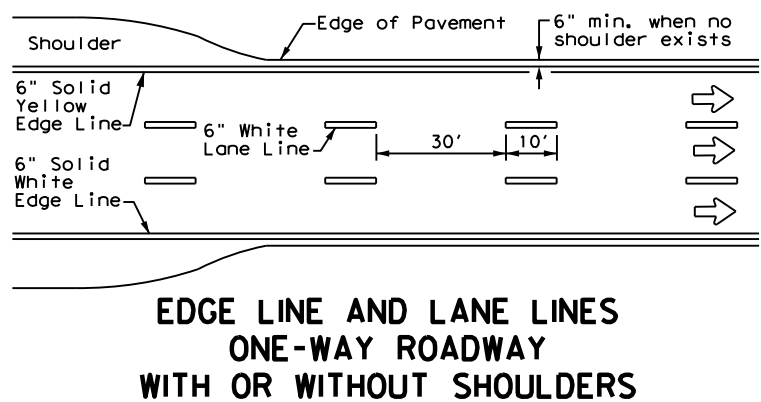
**FM 1100  
 SMALL SIGN  
 DETAILS**

NOT TO SCALE SHEET 1 OF 1

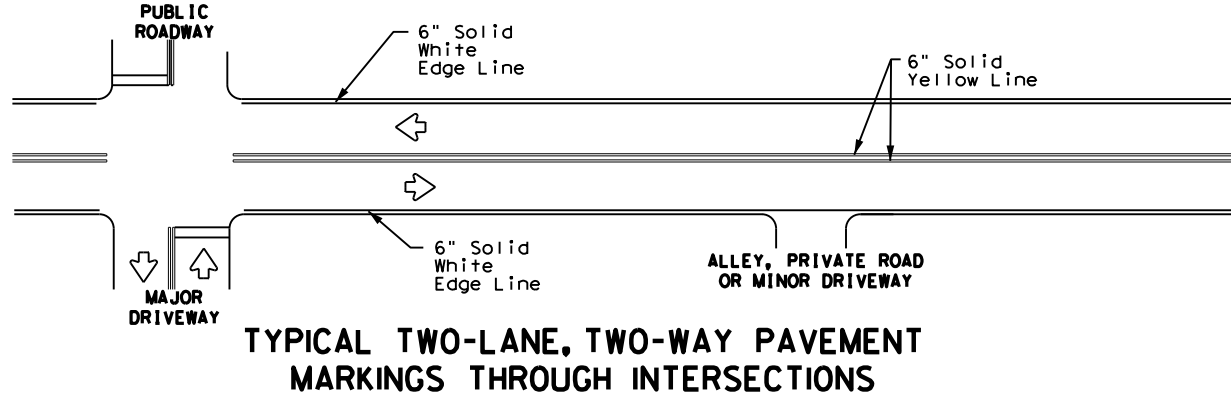
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BB		1234	01	013, etc	FM 1100
DW:	CK:	DIST		COUNTY	SHEET NO.
BB		AUS		TRAVIS	97

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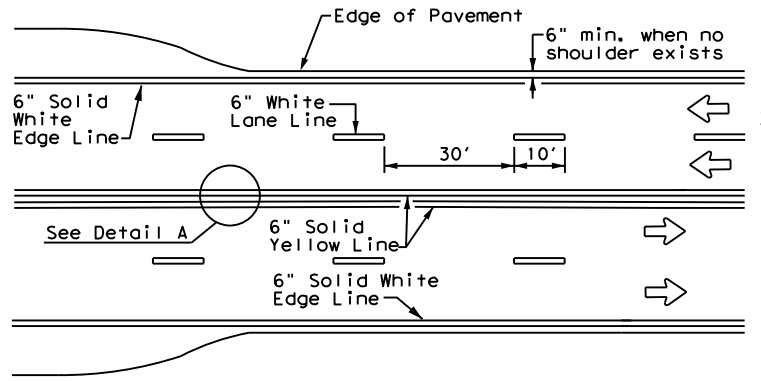
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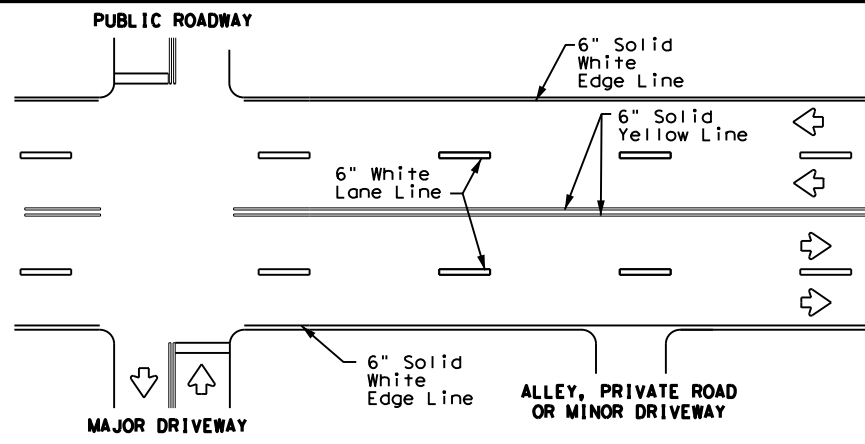
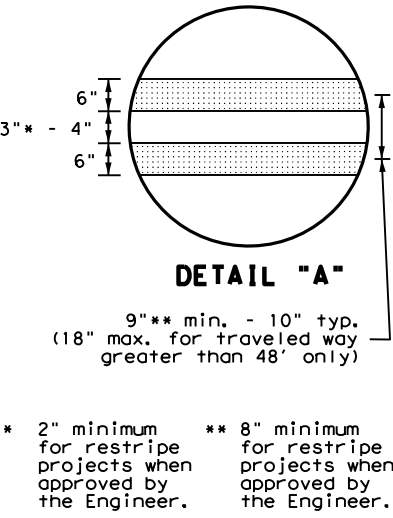
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



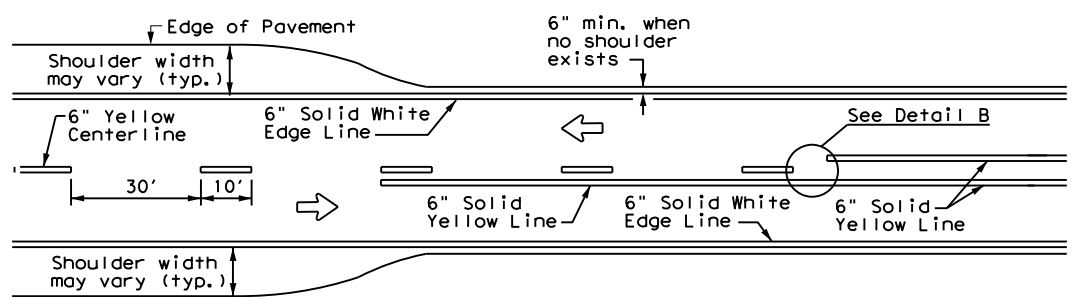
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



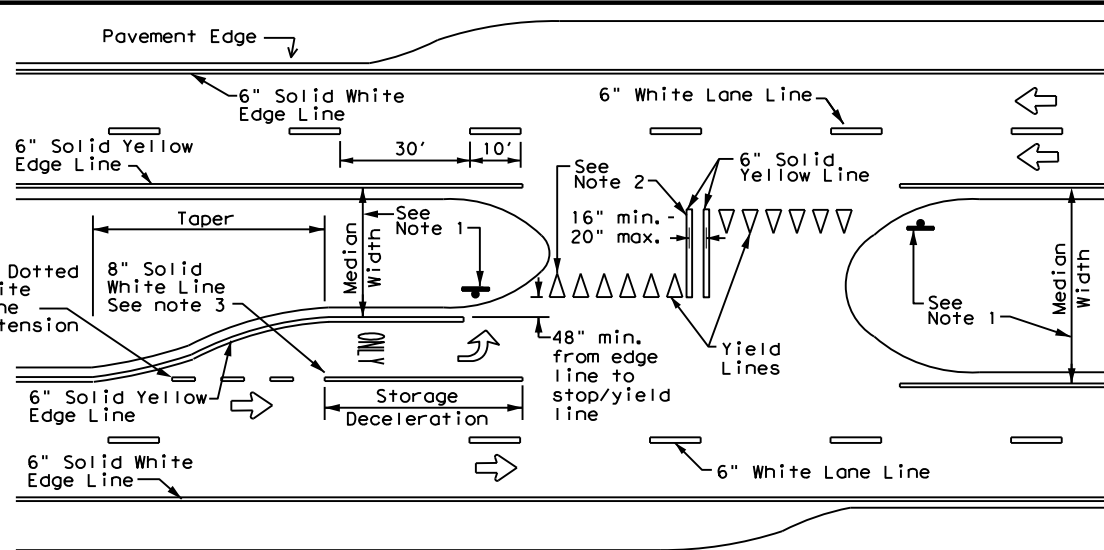
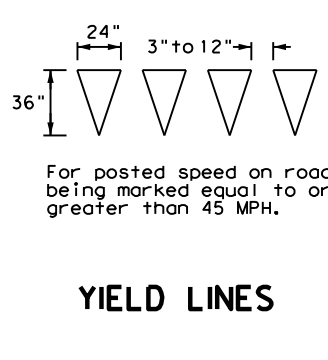
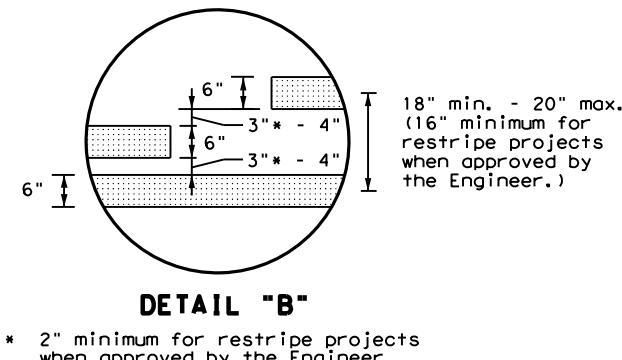
**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



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



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



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

**NOTES**

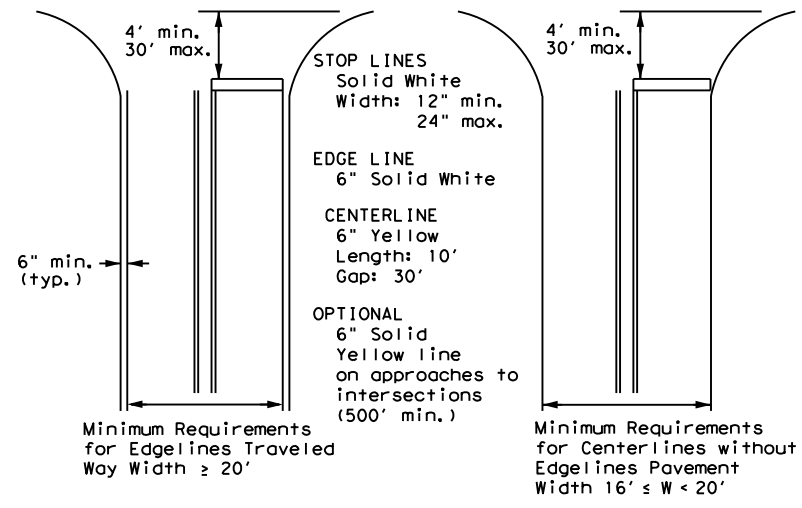
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

**GENERAL NOTES**

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

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

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



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

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

Texas Department of Transportation  
 Traffic Safety Division Standard

**TYPICAL STANDARD  
PAVEMENT MARKINGS**

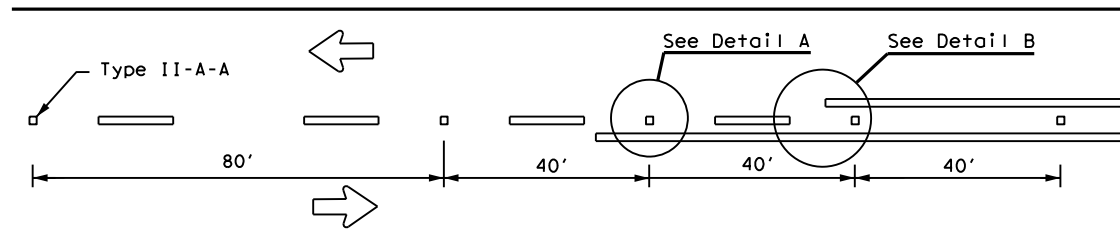
**PM(1) - 22**

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5-00 2-12				

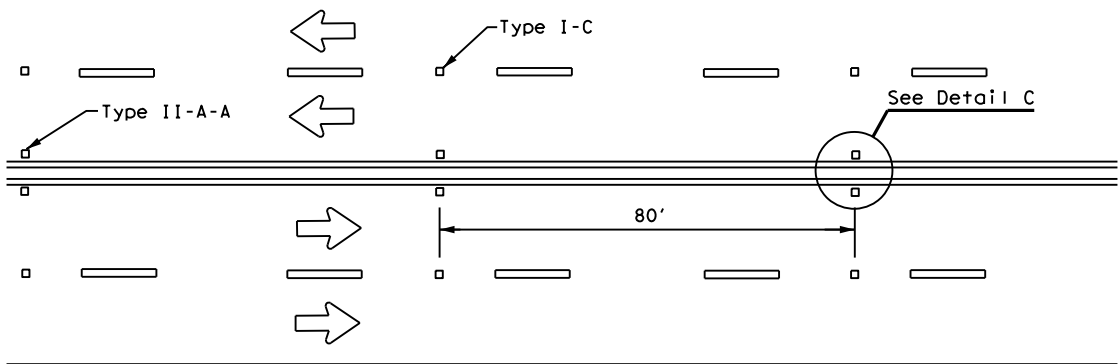
22A

# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

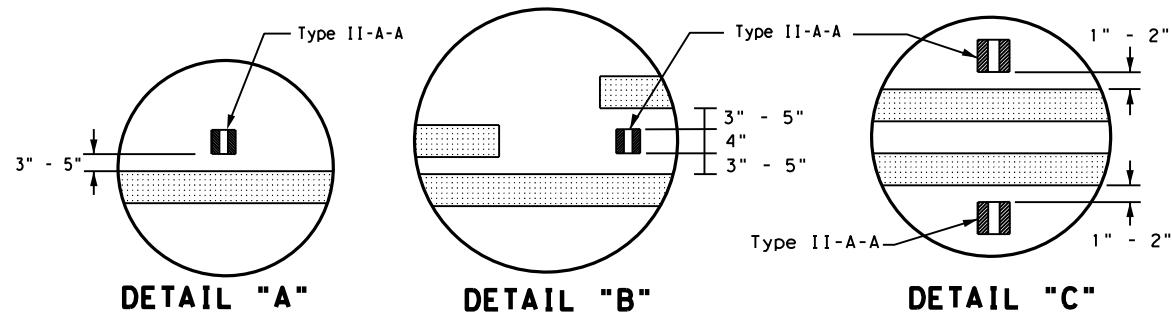
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**CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS**



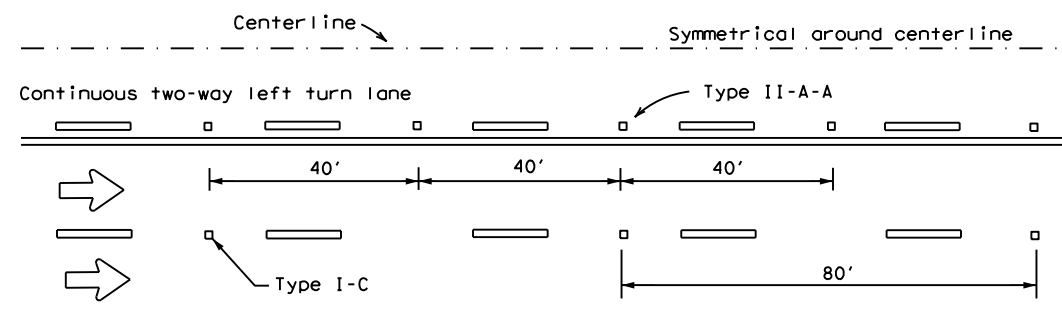
**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY ROADWAYS**



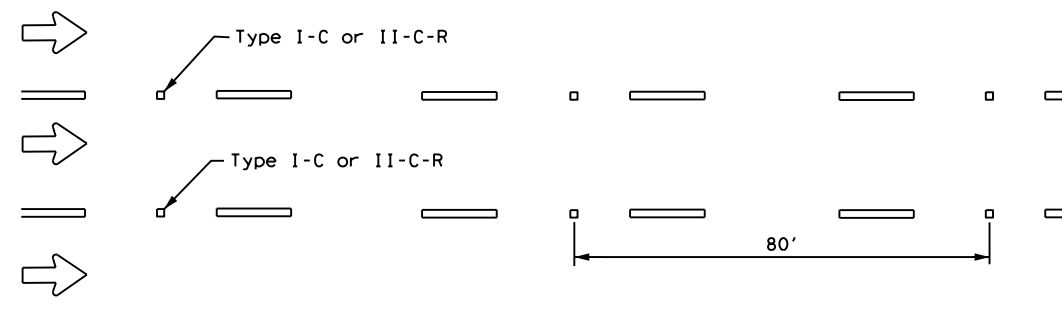
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**

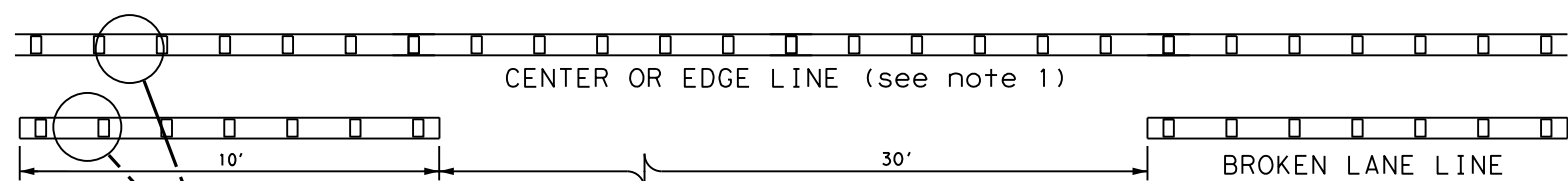


**CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE**



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

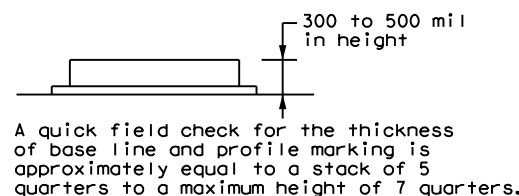
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.  
 See Note 3.



**REFLECTORIZED PROFILE  
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

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



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

**NOTES**

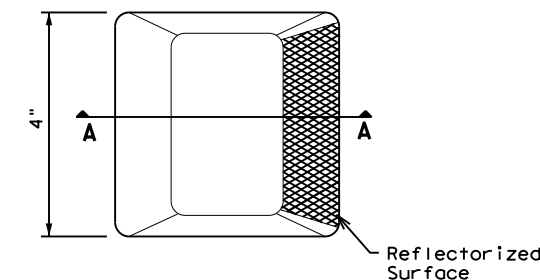
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

**GENERAL NOTES**

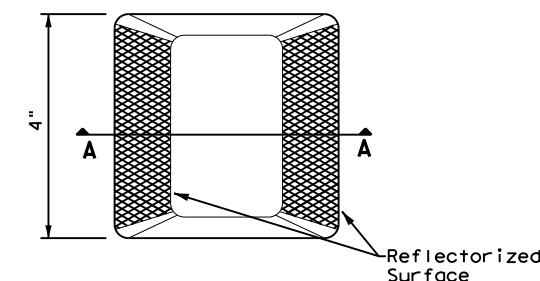
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians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

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

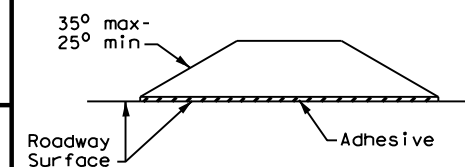
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



**SECTION A**

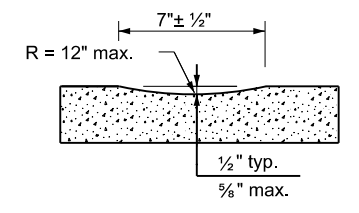
**RAISED PAVEMENT MARKERS**



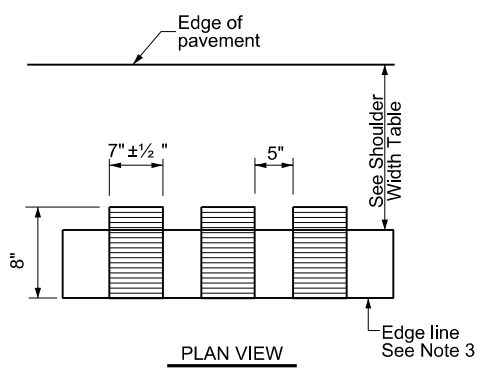
**POSITION GUIDANCE USING  
RAISED MARKERS  
REFLECTORIZED PROFILE  
MARKINGS  
PM(2) - 22**

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4-92 2-10 12-22	AUS	TRAVIS	99	
5-00 2-12				

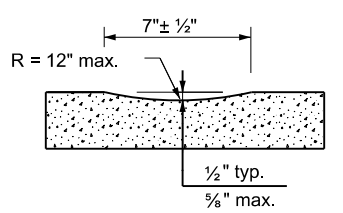
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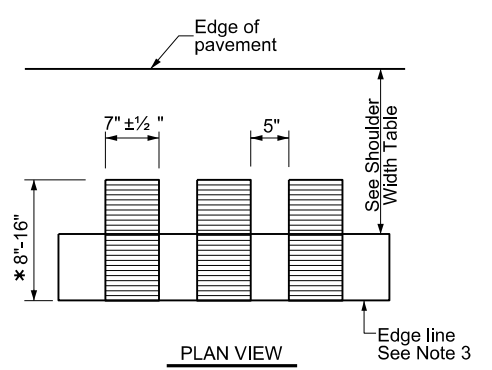
PROFILE VIEW  
OPTION 1



CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

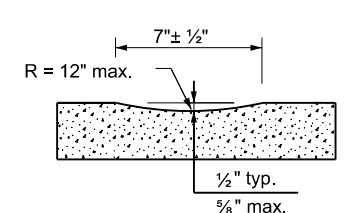


PROFILE VIEW  
OPTION 2

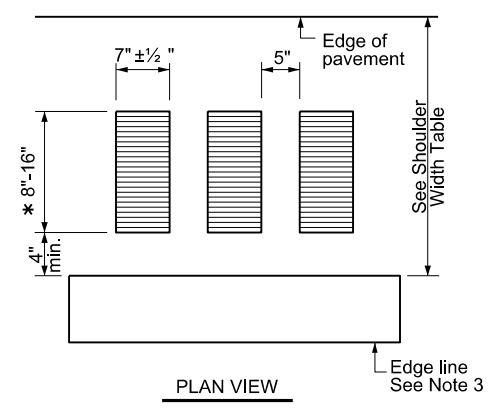


CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

\* This distance may vary based on width of shoulder

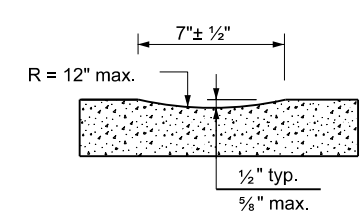


PROFILE VIEW  
OPTION 3

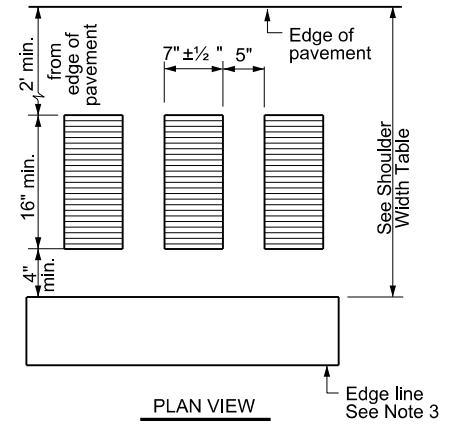


CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

\* This distance may vary based on width of shoulder



PROFILE VIEW  
OPTION 4



CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

GENERAL NOTES

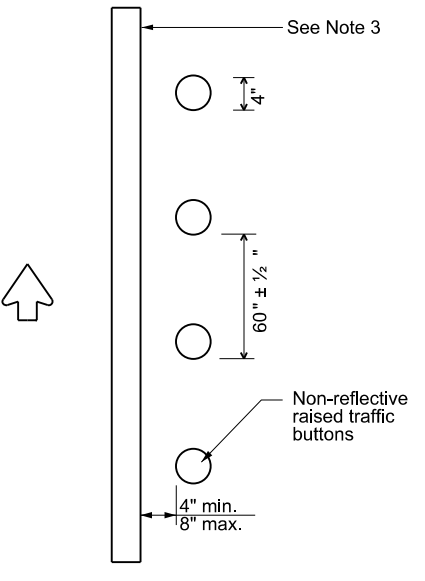
- Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
- Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not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

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

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

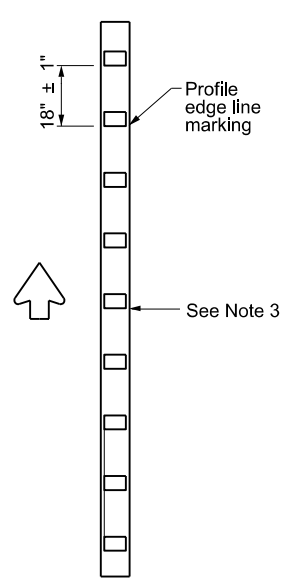
WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

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



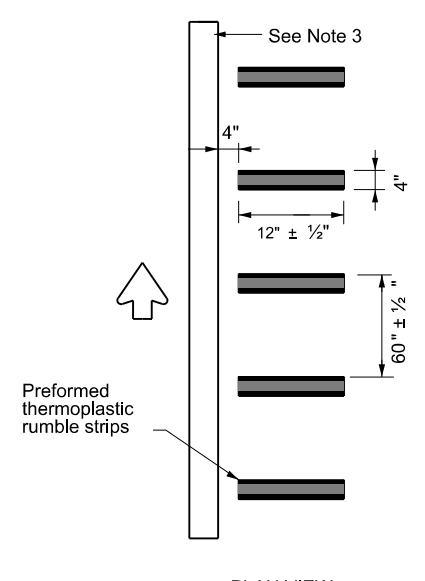
PLAN VIEW  
OPTION 5

RAISED EDGE LINE (Rumble Strips)



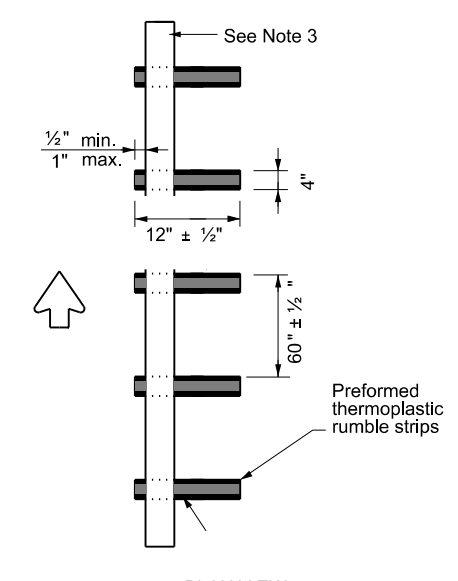
PLAN VIEW  
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW  
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



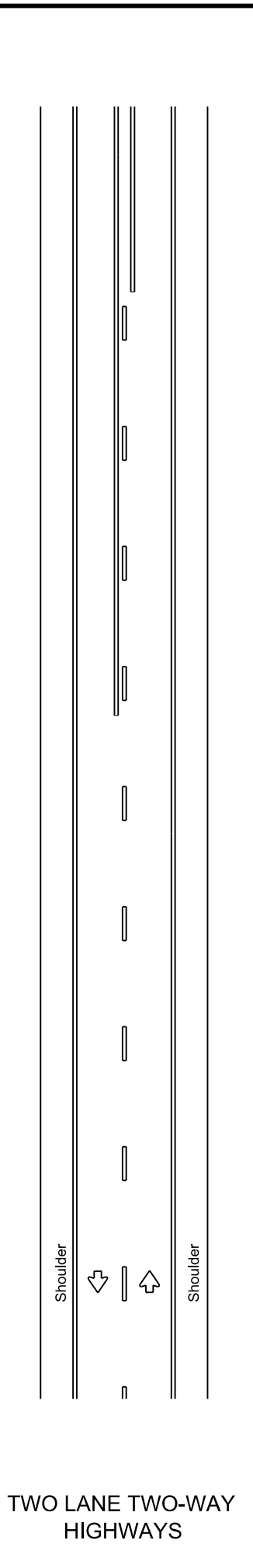
PLAN VIEW  
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

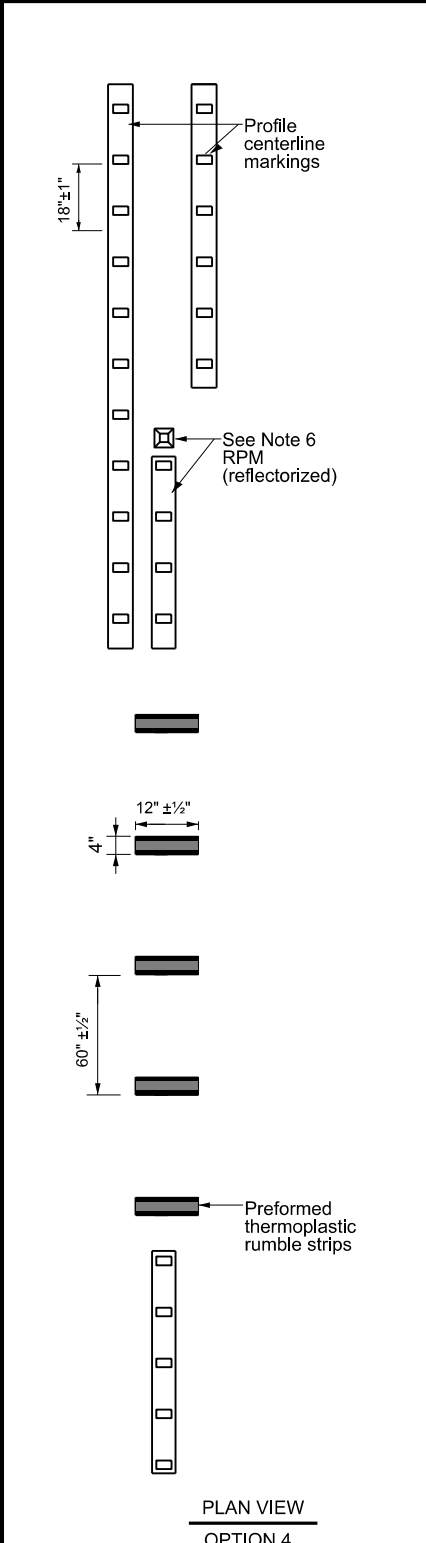
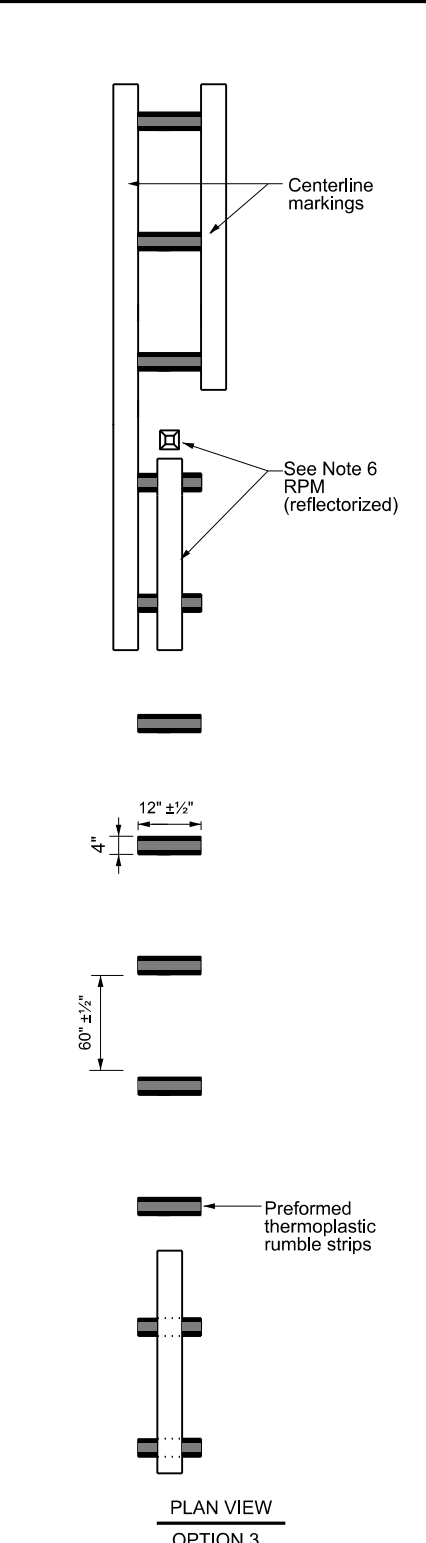
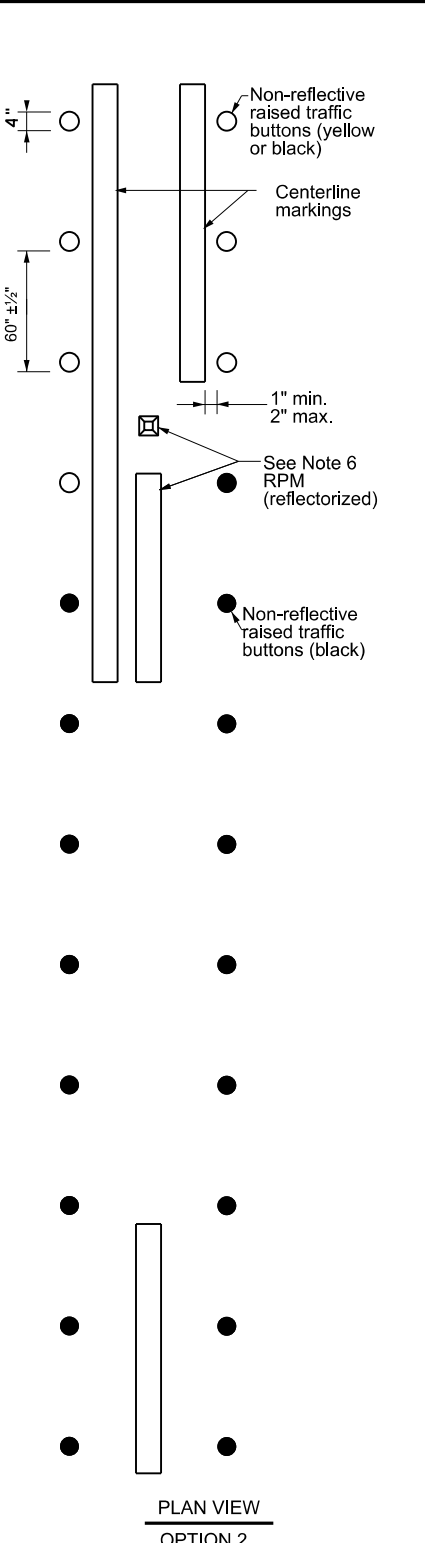
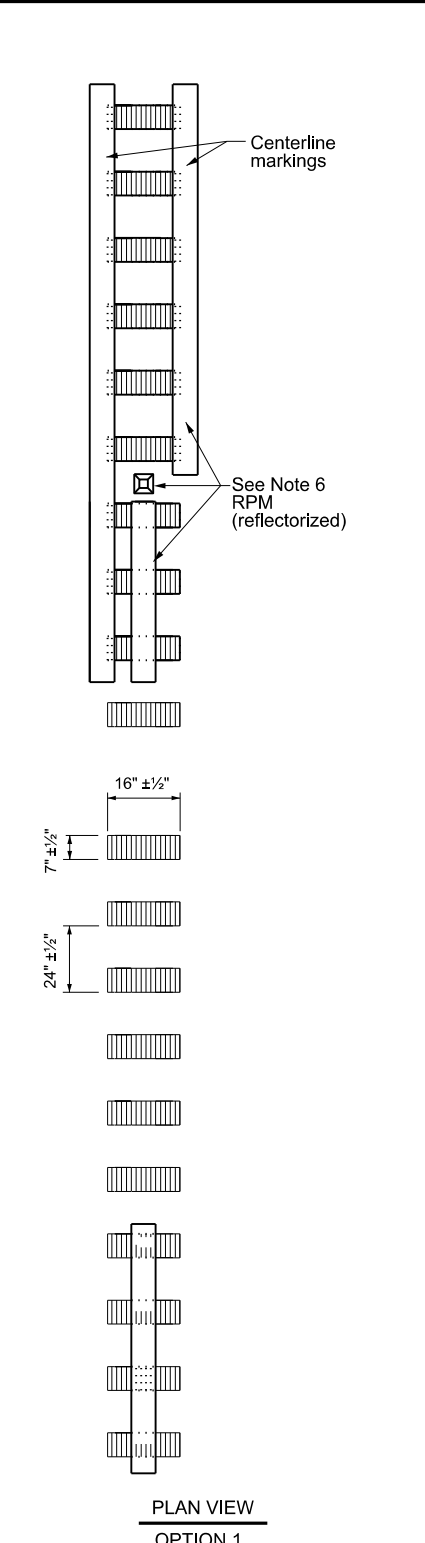
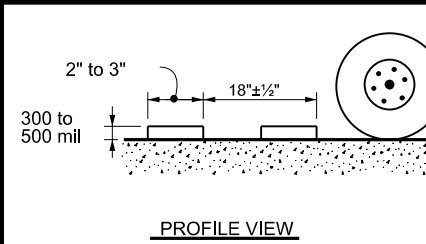
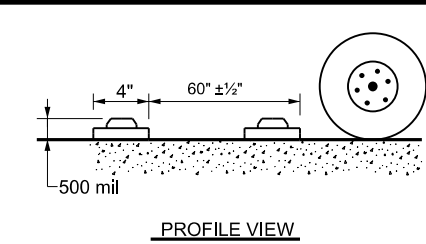
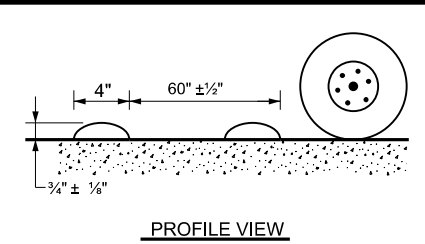
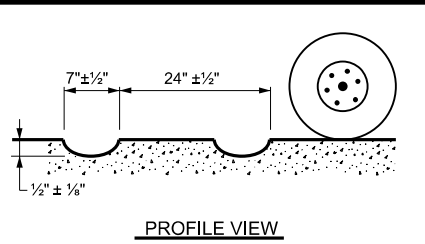
SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

		<b>Traffic Safety Division Standard</b>	
<b>EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS</b>			
<b>RS(2)-23</b>			
FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT	January 2023	CONT: 1234	SECT: 01
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## CENTERLINE RUMBLE STRIPS



MILLED CENTERLINE RUMBLE STRIPS

RAISED CENTERLINE RUMBLE STRIPS

PREFORMED THERMOPLASTIC RUMBLE STRIPS

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

### GENERAL NOTES

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

### WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

13. See standard sheet RS(2).

		<b>Texas Department of Transportation</b> <small>Traffic Safety Division Standard</small>	
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© TxDOT	January 2023	CONT:	1234
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10-13	AUS	JOB:	013,etc
1-23	DIST:	COUNTY:	TRAVIS
HIGHWAY:	FM 1100	SHEET NO.:	101



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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 units or the accuracy of the information contained herein.

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	SINGLE		DOUBLE		INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX) NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRFL = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount DIRECTION If Required BI = Bi-Directional BR = Bi-Directional with red on back
SHEETING	Yellow, White or Red Type B or C reflective sheeting				SHEETING				Yellow, White or Red Type B or C Reflective Sheeting
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (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.				SHEETING				
					POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

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

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

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	OW: TXDOT	CR: TXDOT
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10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	AUS	TRAVIS	102	

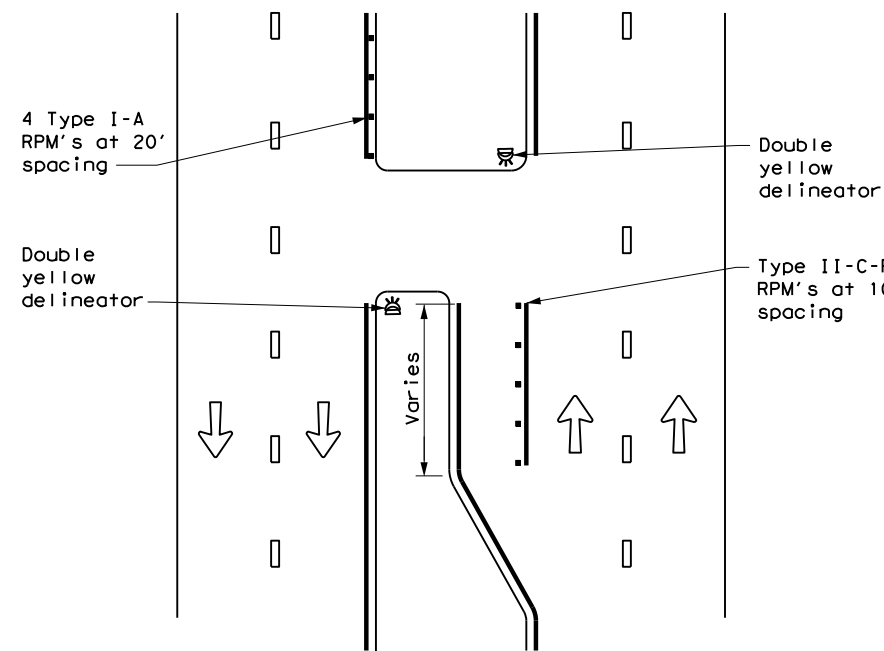
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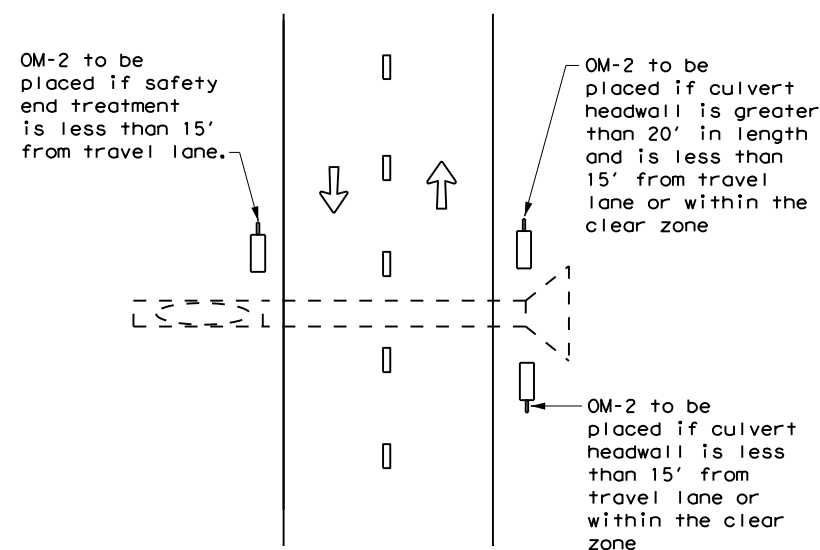
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**CROSSOVERS**



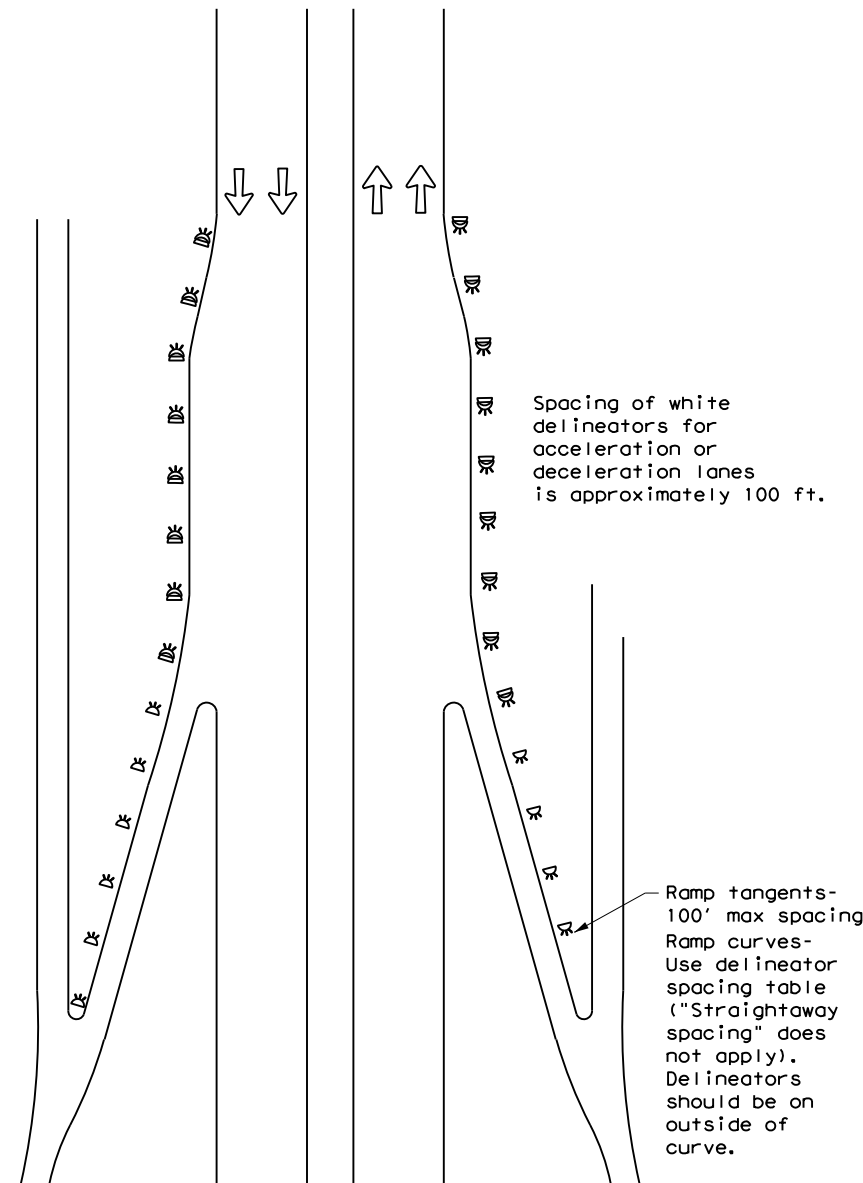
**DETAIL 1**

**FOR CULVERTS WITHOUT MBGF**



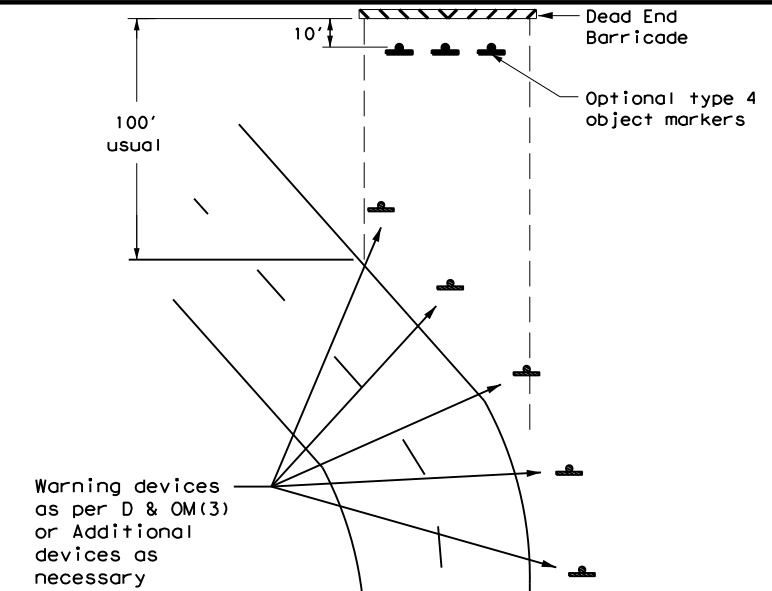
**DETAIL 2**

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



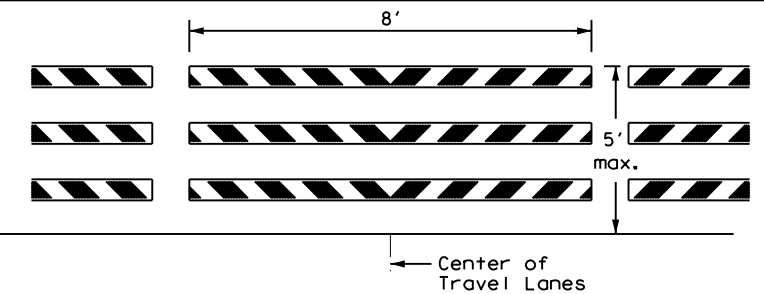
**DETAIL 3**

**TYPICAL APPLICATION OF DEAD END BARRICADE**



**DETAIL 4**

**TYPICAL DEAD END BARRICADE INSTALLATION**



**NOTES**

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

**DETAIL 5**

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



**DELINEATOR & OBJECT MARKER PLACEMENT DETAILS**

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

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	OW: TXDOT	CK: TXDOT
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7-20	AUS	TRAVIS	105	





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## SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

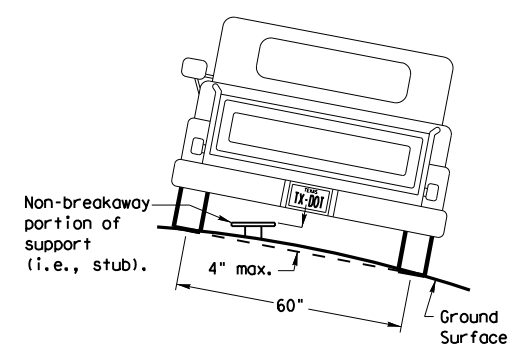
**Post Type**  
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))  
 TWT = Thin-Walled Tubing (see SMD(TWT))  
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))  
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

**Number of Posts (1 or 2)**

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

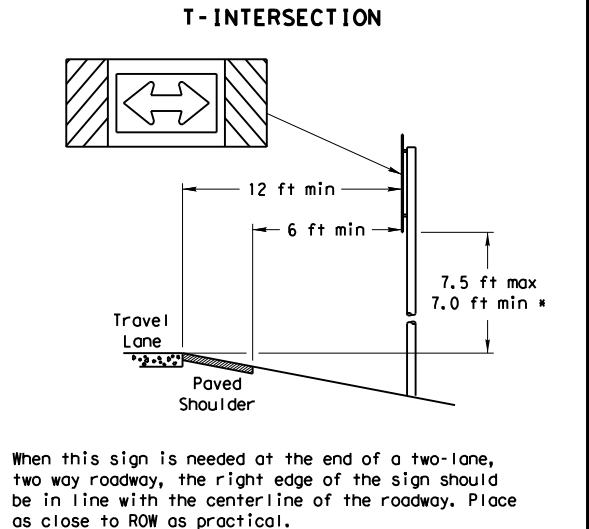
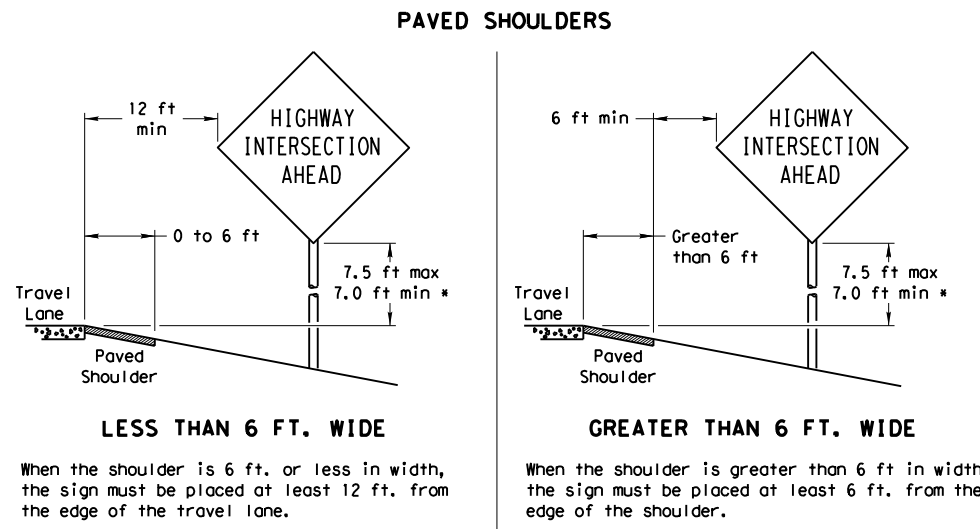
**Sign Mounting Designation**  
 P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))  
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))  
 IF REQUIRED  
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))  
 BM =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

## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

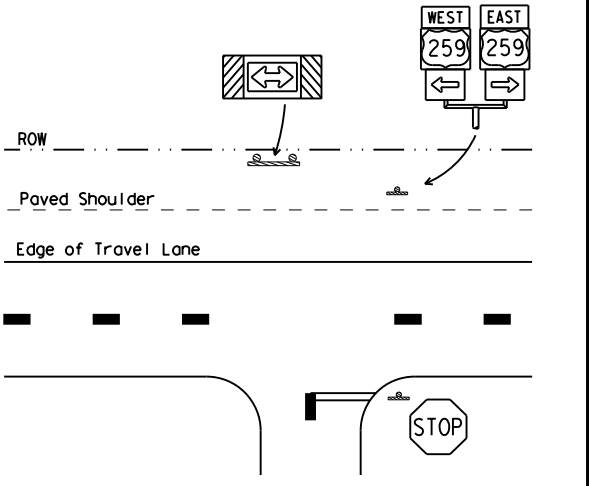
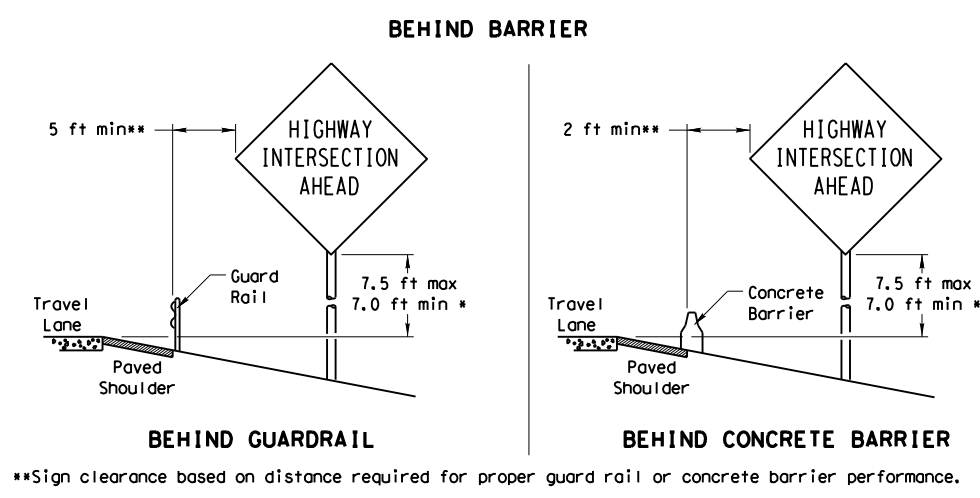
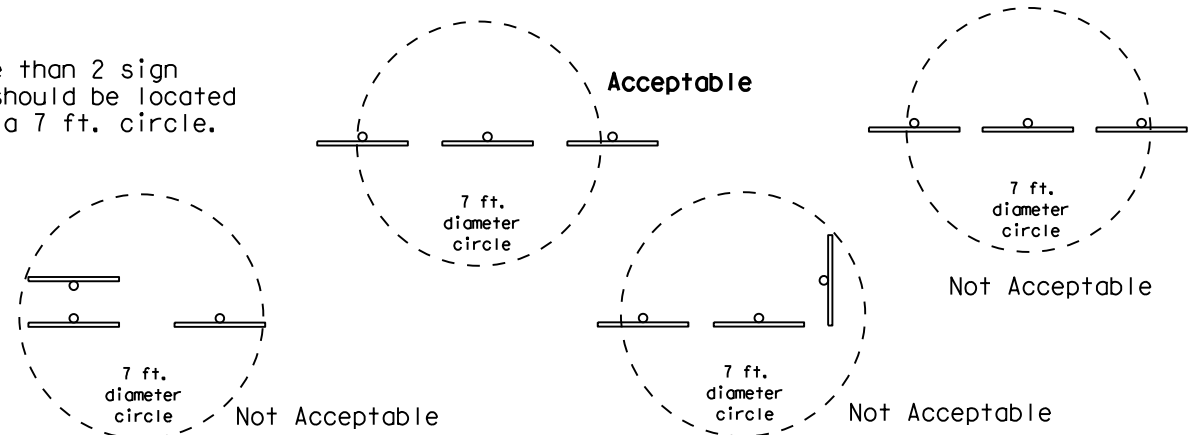


To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

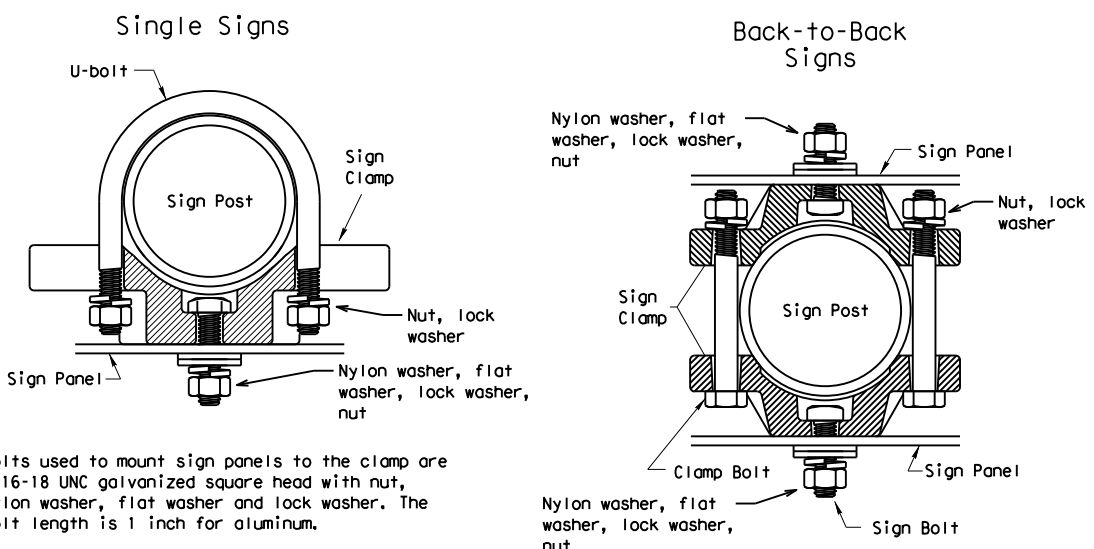
## SIGN LOCATION



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



## TYPICAL SIGN ATTACHMENT DETAIL



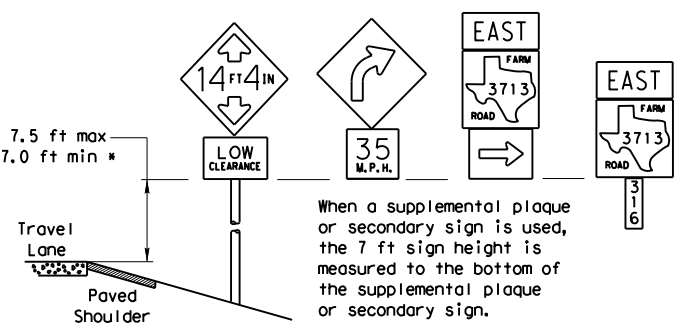
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

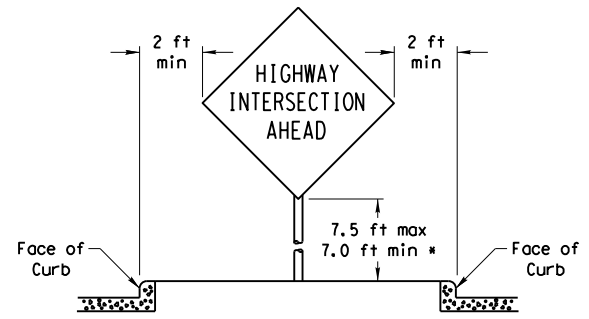
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

## SIGNS WITH PLAQUES

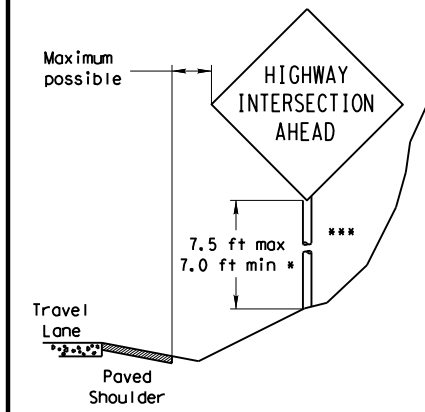


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

## CURB & GUTTER OR RAISED ISLAND



## RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



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

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

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

Signs shall be mounted using the following condition that results in the greatest sign elevation:

- a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

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

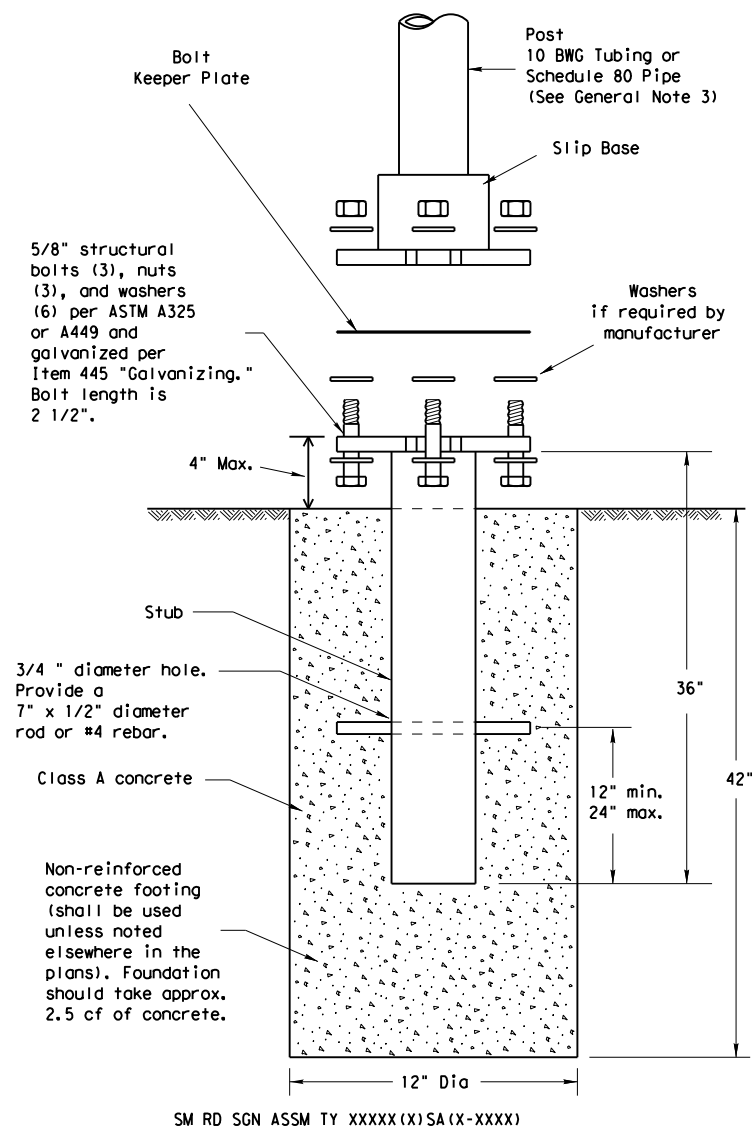


## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS SMD(GEN)-08

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## TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



### NOTE

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

### GENERAL NOTES:

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

### ASSEMBLY PROCEDURE

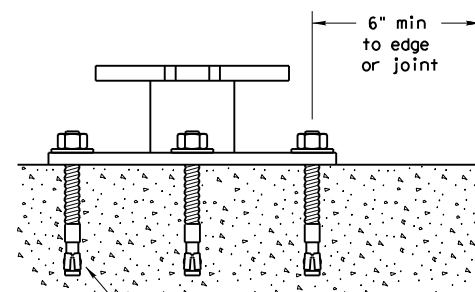
#### Foundation

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

#### Support

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

### CONCRETE ANCHOR



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

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

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



## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

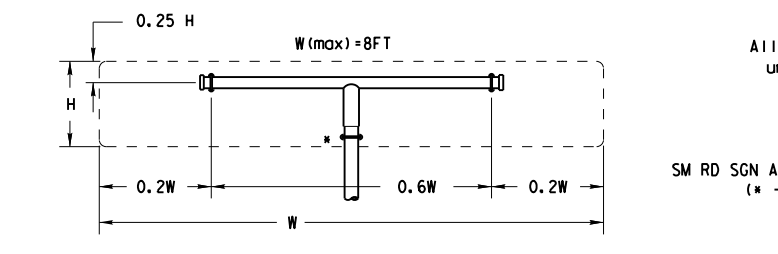
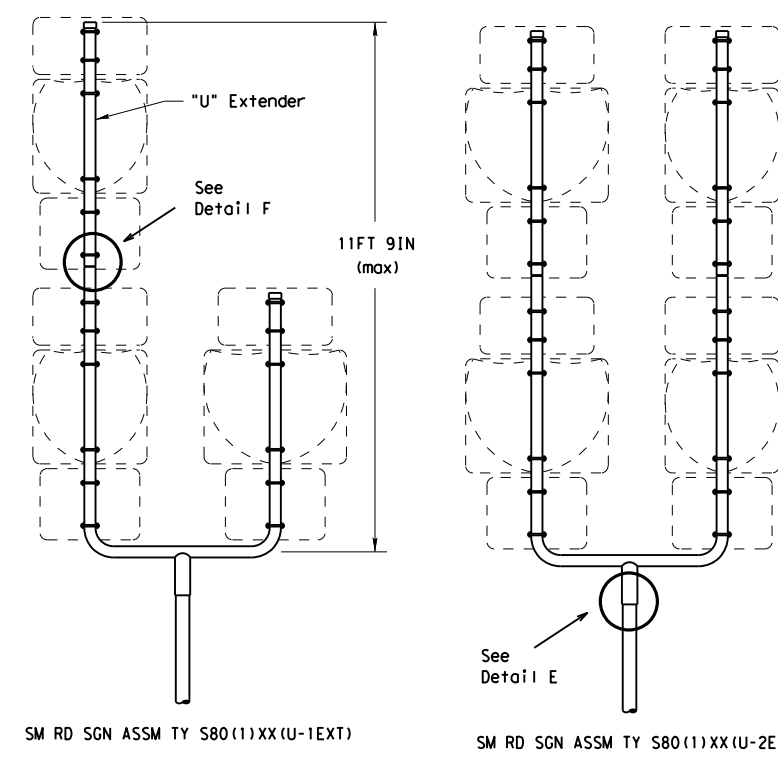
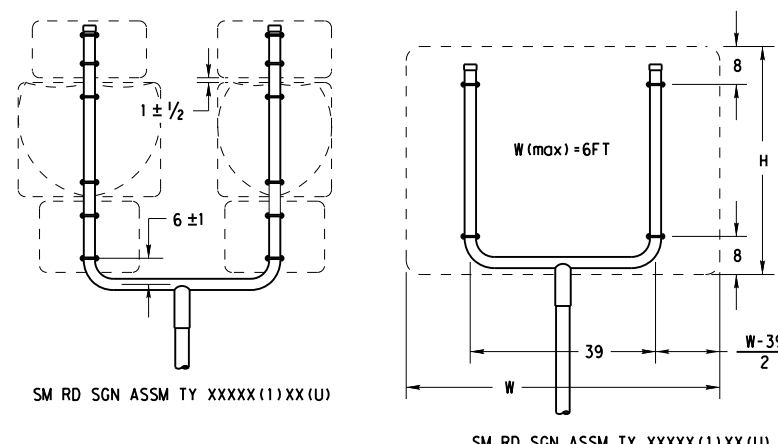
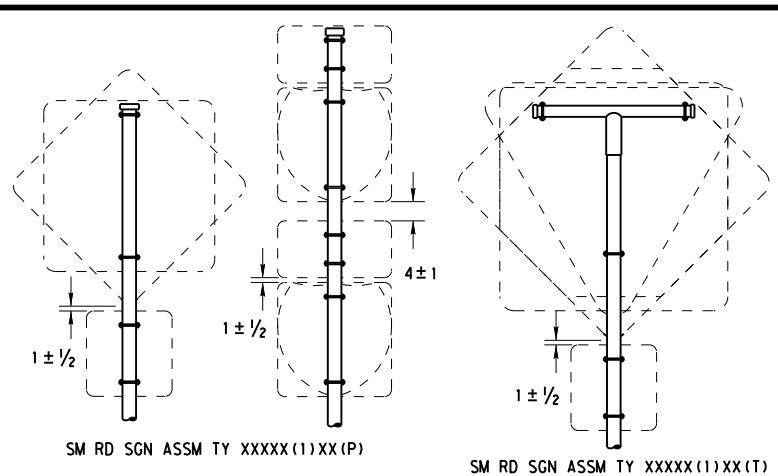
SMD(SLIP-1)-08

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		AUS	TRAVIS		109	



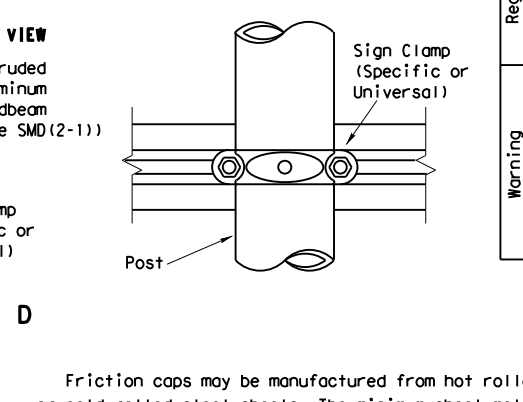
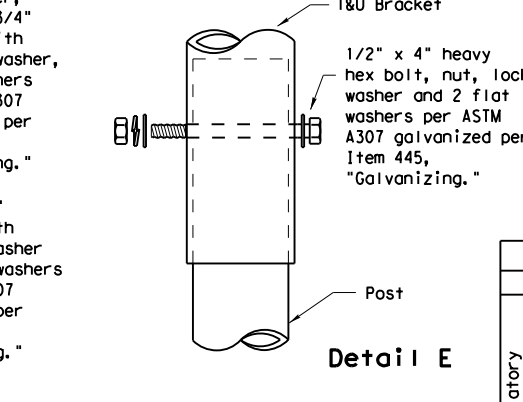
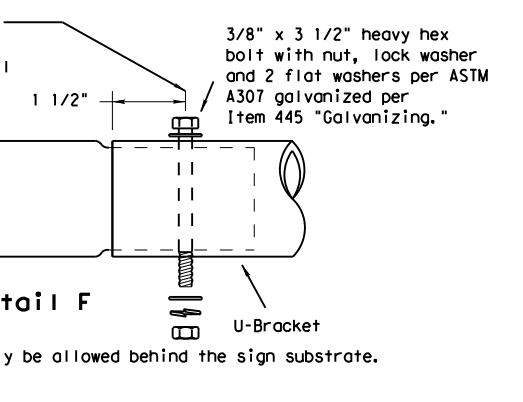
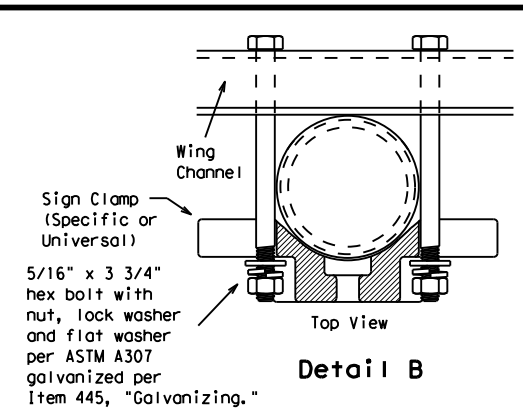
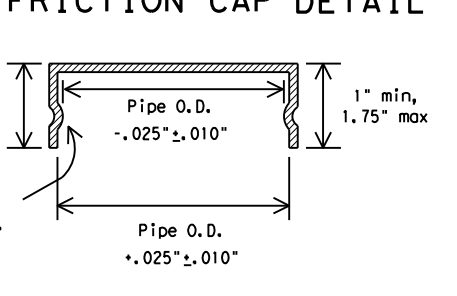
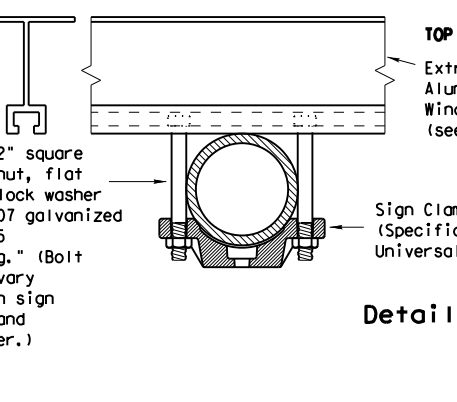
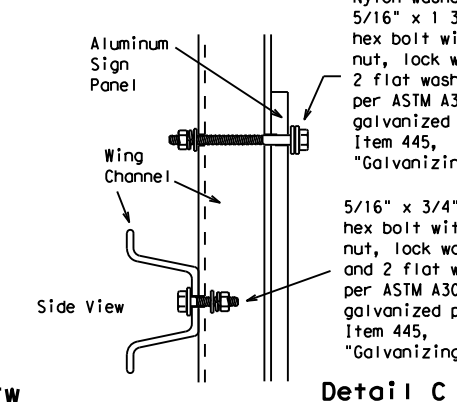
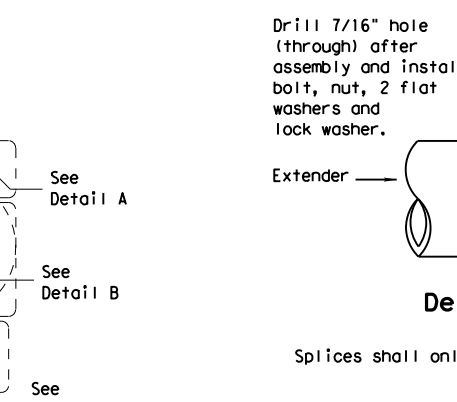
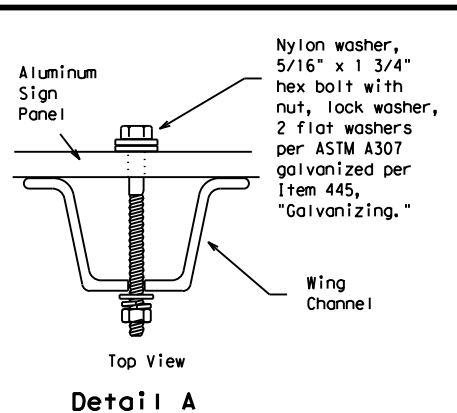
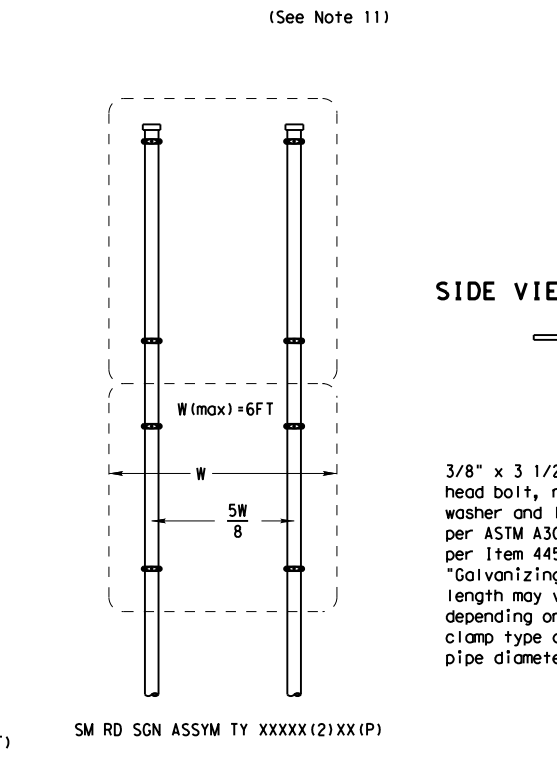
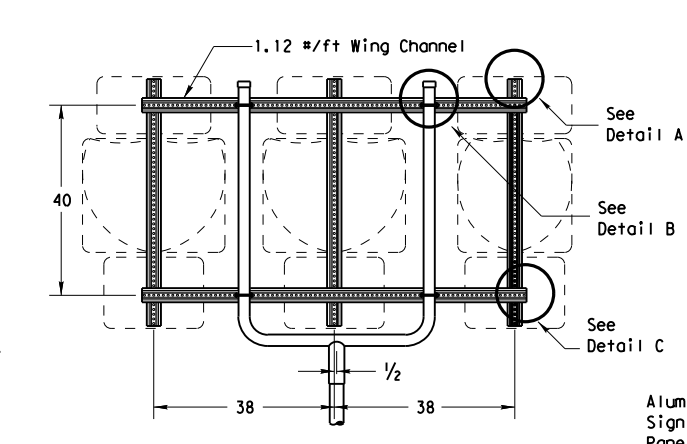
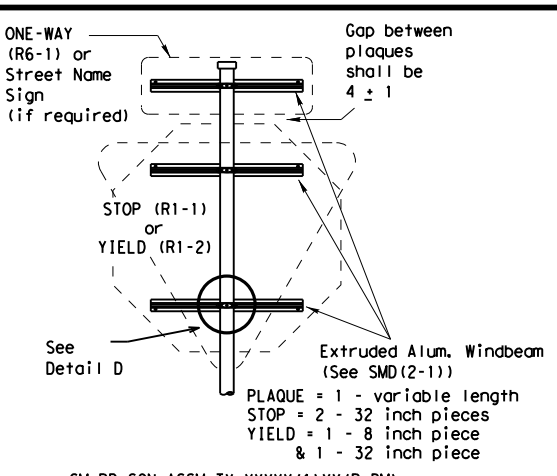
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All dimensions are in english unless detailed otherwise.

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



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes. The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture. Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

**GENERAL NOTES:**

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

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

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

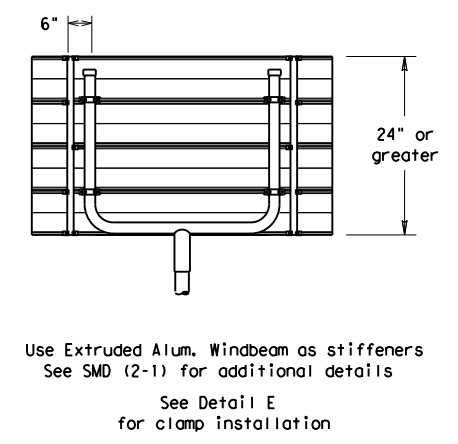
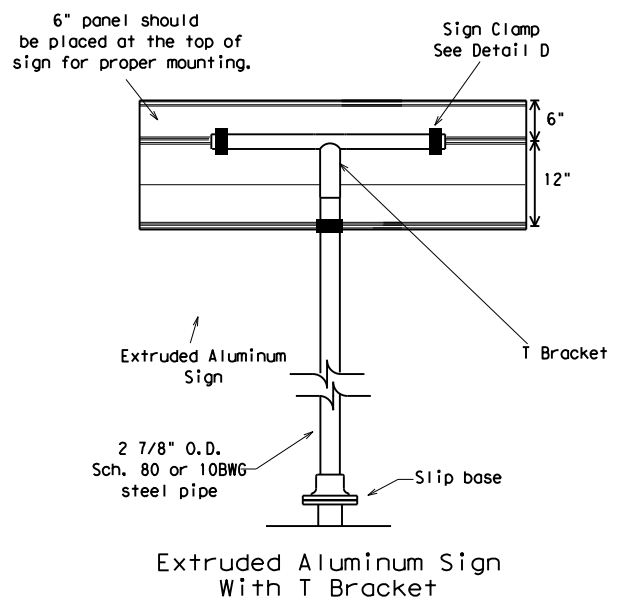
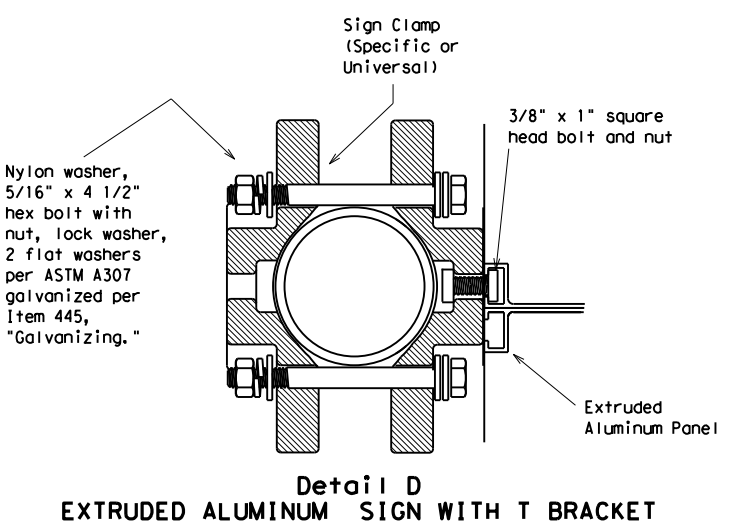
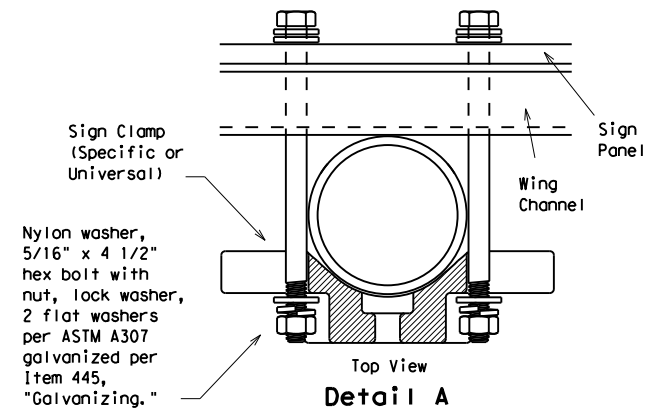
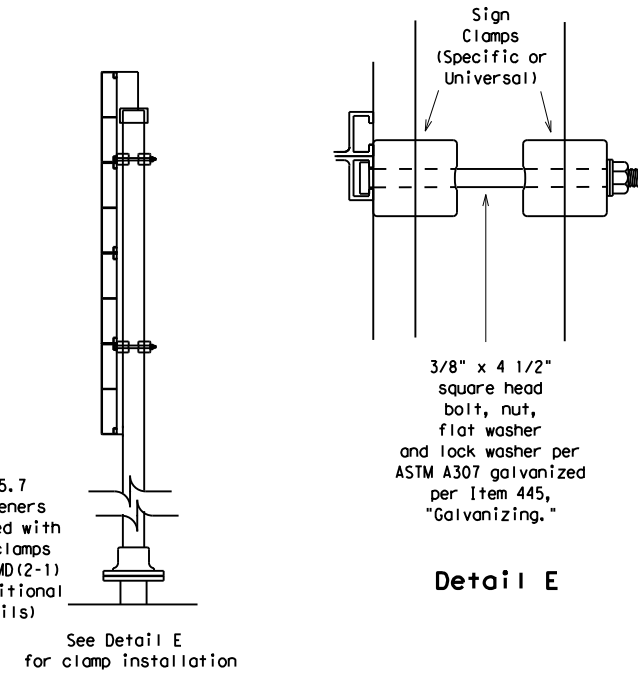
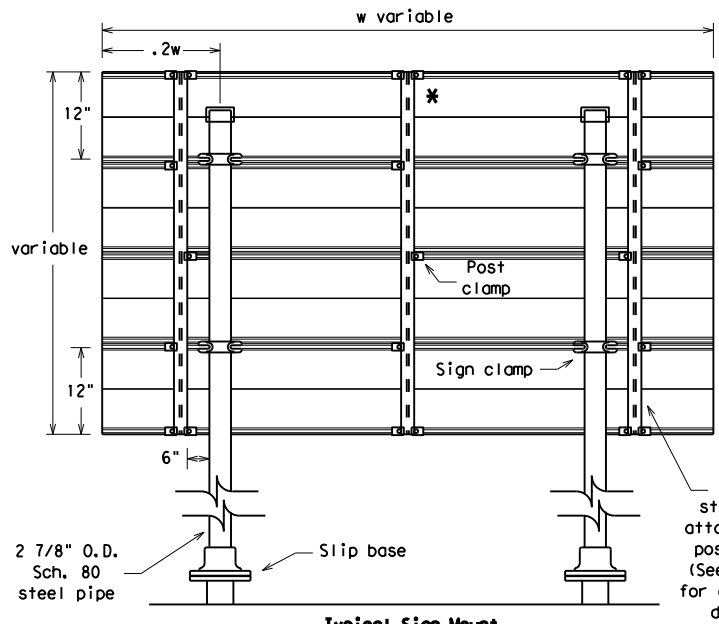
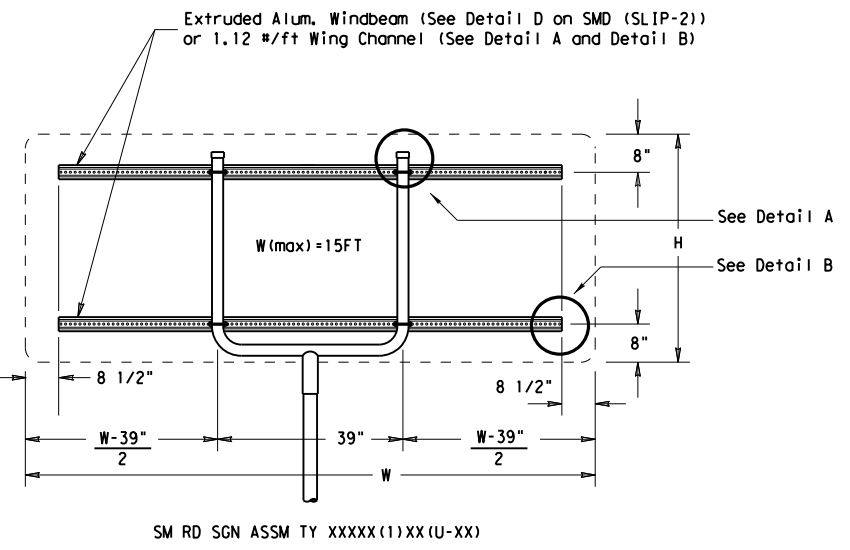
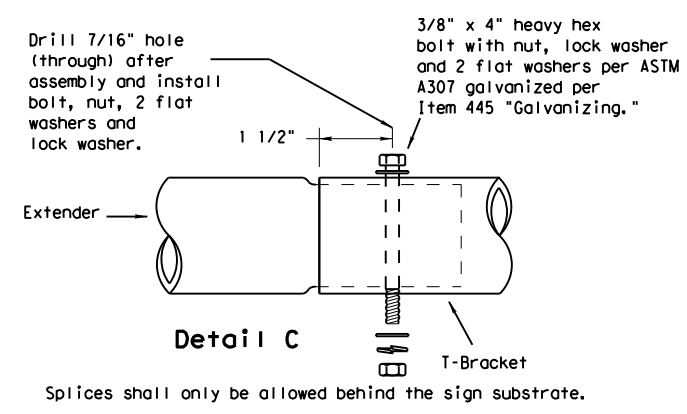
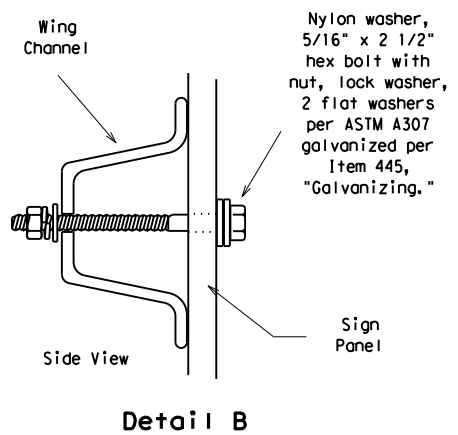
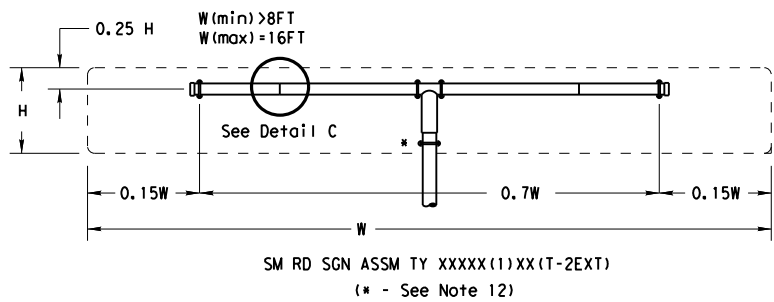
**Texas Department of Transportation**  
 Traffic Operations Division

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

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		1234	01	013, etc	FM 1100
		DIST	COUNTY	SHEET NO.	
		AUS	TRAVIS	110	

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GENERAL NOTES:

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

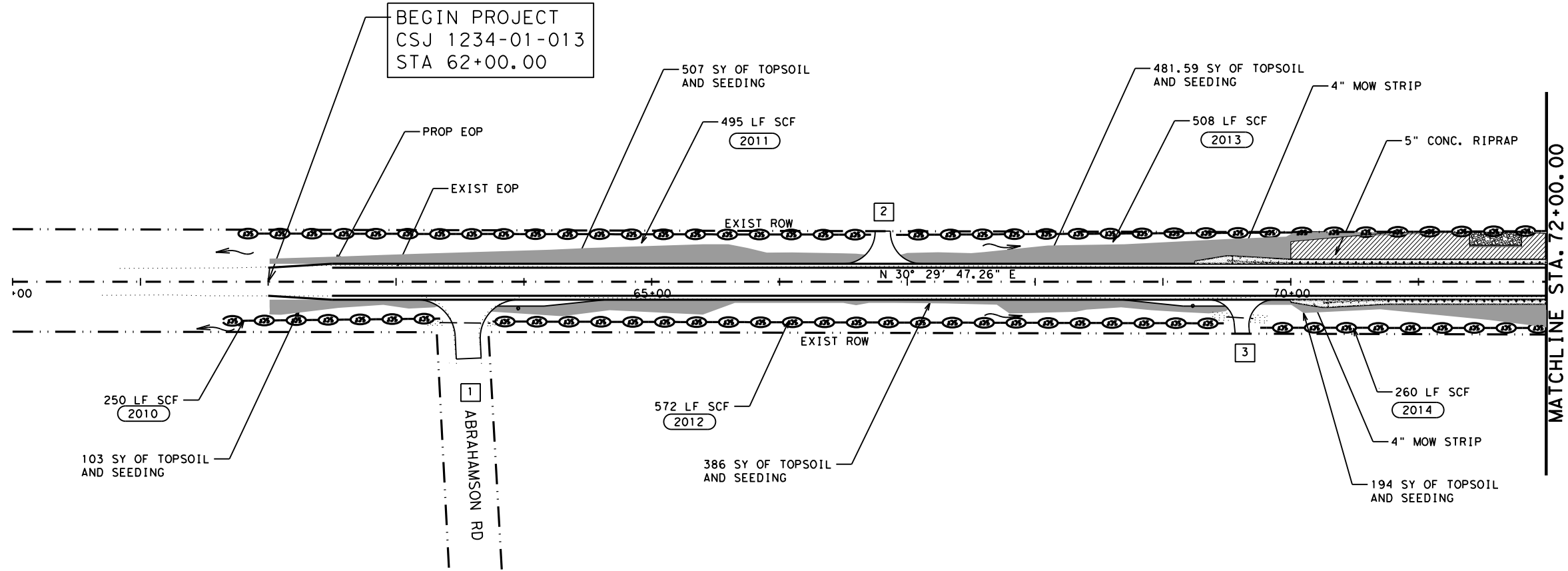
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
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	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
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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



**SIGN MOUNTING DETAILS  
 SMALL ROADSIDE SIGNS  
 TRIANGULAR SLIPBASE SYSTEM  
 SMD(SLIP-3)-08**

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		1234	01	013, etc	FM 1100
		DIST	COUNTY		SHEET NO.
		AUS	TRAVIS		111

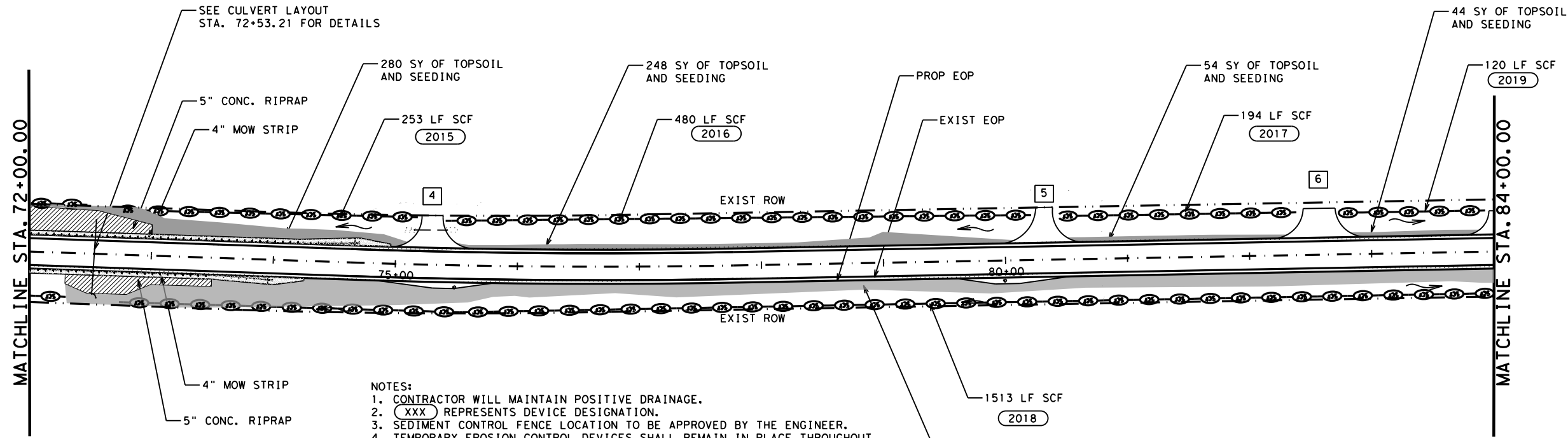
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LEGEND	
	SILT FENCE
	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



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- NOTES:
- CONTRACTOR WILL MAINTAIN POSITIVE DRAINAGE.
  - (XXX) REPRESENTS DEVICE DESIGNATION.
  - SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
  - TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
  - CONTRACTOR SHALL USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

**Austin District  
 North Travis Area Office**

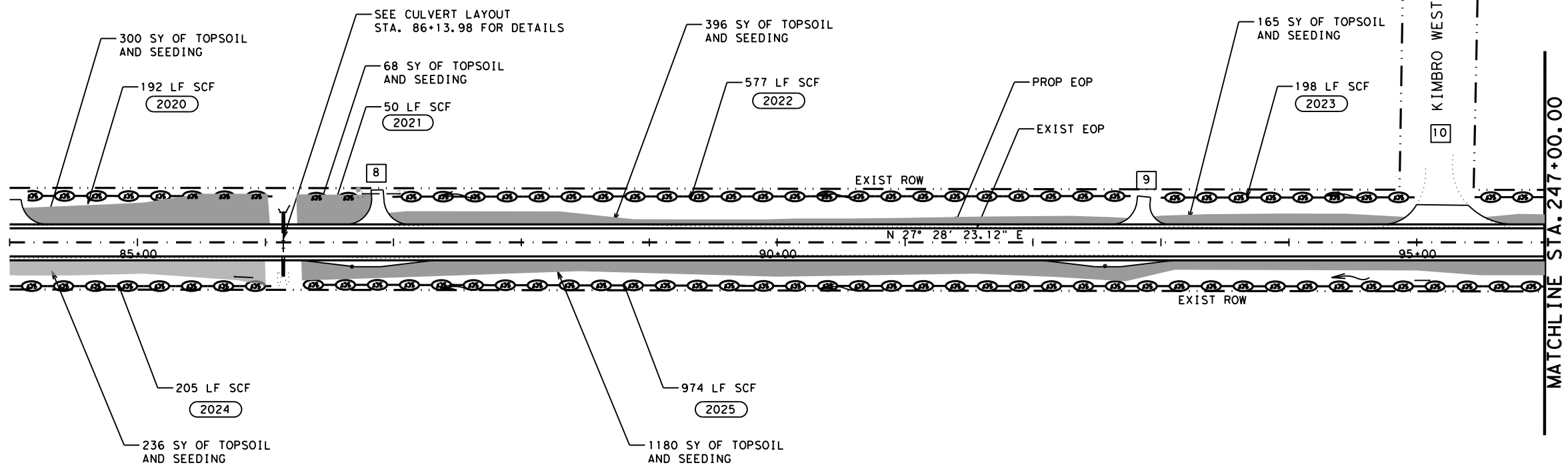
Texas Department of Transportation

**FM 1100  
 EROSION CONTROL  
 LAYOUT**

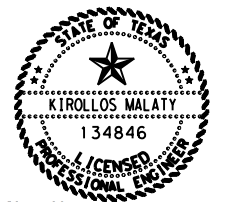
SHEET 1 OF 2

© 2023	CONT	SECT	JOB	HIGHWAY
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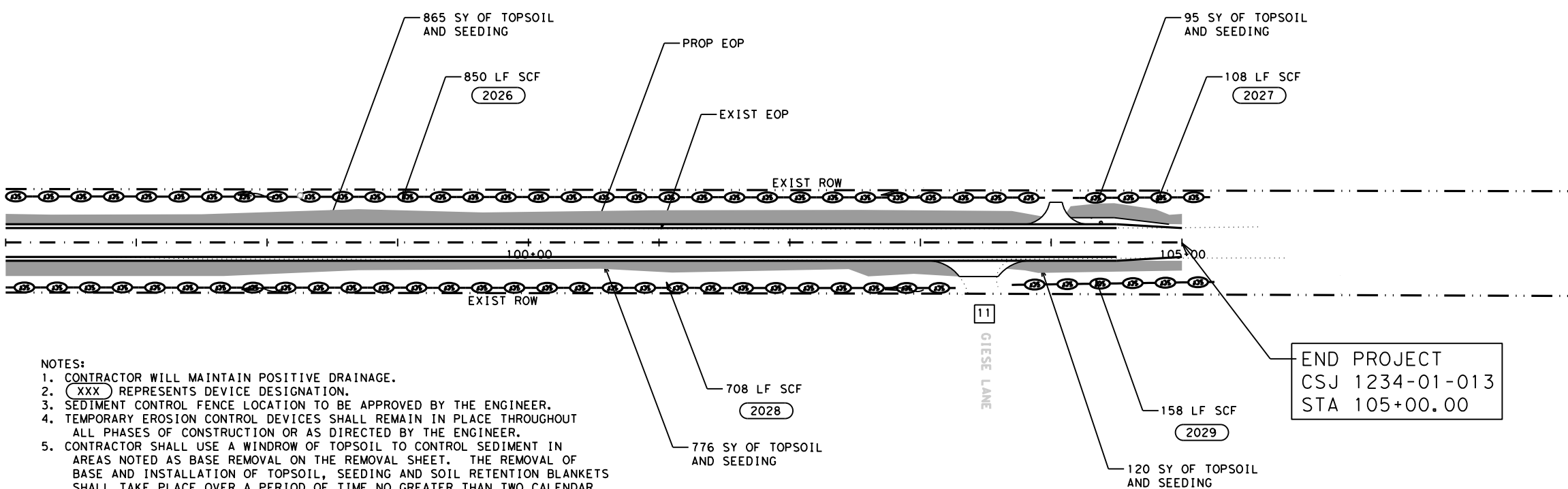
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LEGEND	
	SILT FENCE
	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



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- NOTES:
1. CONTRACTOR WILL MAINTAIN POSITIVE DRAINAGE.
  2. (XXX) REPRESENTS DEVICE DESIGNATION.
  3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
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END PROJECT  
 CSJ 1234-01-013  
 STA 105+00.00

Austin District  
 North Travis Area Office

FM 1100  
**EROSION CONTROL LAYOUT**

SHEET 2 OF 2

© 2023	CONT	SECT	JOB	HIGHWAY
DS: CK:	1234	01	013, etc	FM 1100
DW: CK:	DIST		COUNTY	SHEET NO.
	AUS		TRAVIS	113

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

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

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

- 
- No Action Required     Required Action

Action No.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- 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.

- PEDERNALES RIVER
- TRIBUTARIES TO THE PEDERNALES RIVER
- 
- 

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 checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input checked="" 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 checked="" 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

**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.

- During construction, the Contractor should avoid impacts to woody vegetation. Tree and brush trimming, cutting, and removal will be kept to a minimum and implemented only when necessary to complete project work.
- Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. Wherever practicable, impacted vegetation should be replaced with in-kind on-site replacement/restoration of native vegetation.
- The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- Avoid and minimize construction related vegetation and soil disturbance, including the removal of native vegetation, particularly mature native trees and shrubs, to the maximum extent practicable. This includes areas within the existing ROW and proposed ROW, but outside construction limits.
- To minimize adverse effects, activities should be planned to preserve mature trees, particularly acorn, nut, or berry producing varieties. These types of vegetation have high value to wildlife as food and cover.
- It is strongly recommended that trees greater than 12 inches in dbh that are removed be replaced. TPWD's experience indicates that for ecologically effective replacement, a ratio of three trees for every one lost should be provided to the extent practicable either on-site or off-site. Trees less than 12 inches dbh should be replaced at a one to one ratio.
- Replacement trees should be of equal or better wildlife quality than those removed and be regionally adapted native species.
- When trees are planted, a maintenance plan that ensures at least an 85 percent survival rate after three years should be developed for the replacement trees.
- The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- The use of seed mix that contains seeds from only locally adapted native species is recommended.

**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
MTA: 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

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

- No Action Required     Required Action

Action No.

- The contractor's attention is directed to the fact that there is the possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The contractor shall remove all old migratory bird nests from any woody vegetation or structures between September 16 and February 28 while the nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting between March 1 and September 15. All methods must be approved by Austin District Biologist well in advance of planned use.
- Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable.
- The use of any non-native vegetation in landscaping and revegetation is discouraged. Locally adapted native species should be used.
- Avoid and minimize construction related vegetation and soil disturbance, including the removal of native vegetation, particularly mature native trees and shrubs, to the maximum extent practicable. This includes areas within the existing ROW and proposed ROW, but outside construction limits.
- BMPs for Birds: mountain plover and western burrowing owl
  - Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed.
  - Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season;
  - Avoid the removal of unoccupied, inactive nests, as practicable;
  - Prevent the establishment of active nests during the nesting season on TxDOT-owned and operated facilities and structures proposed for replacement or repair.
  - Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.
- BMPs for Amphibian and Aquatic Reptiles: woodhouse's toad and Strecker's chorus frog
  - Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.
  - Minimize impacts to wetland, temporary and permanent open water features, including depressions and riverine habitats.
  - Maintain hydrologic regime and connections between wetlands and other aquatic features.
  - Use barrier fencing to direct animal movements away from construction activities and areas of potential wildlife-vehicle collisions in construction areas directly adjacent, or that may directly impact, potential habitat for the target species.
  - Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, using erosion control blankets or mats that contain no netting, or only contain loosely woven natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
  - Project specific locations (PSLs) proposed within state-owned ROW should be located in uplands away from aquatic features.
  - Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter, which may be refugia for terrestrial amphibians, where feasible.
  - When work is directly adjacent to the water, minimize impacts to shoreline basking sites (e.g. downed trees, sand bars, exposed bedrock) and over-winter sites (e.g. brush and debris piles, crayfish burrows) where feasible



**ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC**

SHEET 1 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS	1234	01	013, etc	FM 1100
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.	AUS	TRAVIS	114	

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

- 7. BMPs for Bats: cave myotis and Mexican free-tailed bat
  - The following survey and exclusion protocols should be followed prior to commencement of construction activities. For the purposes of this document, structures are defined as bridge, culverts (concrete or metal), wells, and buildings.
  - For activities that have the potential to impact structures, cliffs, caves, or trees; a qualified biologist will perform a habitat assessment and occupancy survey of the feature(s) with roost potential as early in the planning process as possible or within one year before project letting.
  - For roosts where occupancy is strongly suspected but unconfirmed during the initial survey, revisit feature(s) at most four weeks prior to scheduled disturbance to confirm absence of bats.
  - If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky odor, or staining and rub marks at potential entry points) are observed, take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.
  - Exclusion devices can be installed by a qualified individual between September 1 and March 31. Exclusion devices should be used for a minimum of seven days when minimum nighttime temperatures are above 50°F AND minimum daytime temperatures are above 70°F. Prior to exclusion, ensure that alternate roosting habitat is available in the immediate area. If no suitable roosting habitat is available, installation of alternate roosts is recommended to replace the loss of an occupied roost. If alternate roost sites are not provided, bats may seek shelter in other inappropriate sites, such as buildings, in the surrounding area. See Section 2: Standard Recommendations for recommended acceptable methods for excluding bats from structures.
  - If feature(s) used by bats are removed as a result of construction, replacement structures should incorporate bat friendly design or artificial roosts should be constructed to replace these features, as practicable.
  - Conversion of property containing cave or cliff features to transportation purposes should be avoided where feasible.
  - If removal of dead fronds is necessary at other times of the year, limit frond removal to extended warm periods (nighttime temperatures >55°F for at least two consecutive nights), so bats can move away from the disturbance and find new roosts.
  - Large hollow trees, snags (dead standing trees), and trees with shaggy bark should be surveyed for colonies and, if found, should not be disturbed until the bats are no longer occupying these features. Post-occupancy surveys should be conducted by a qualified biologist prior to tree removal from the landscape.
  - Retain mature, large diameter hardwood forest species and native/ornamental palm trees where feasible.
  - In all instances, avoid harm or death to bats. Bats should only be handled as a last resort and after communication with TPWD.
- 8. BMPs for the Eastern spotted skunk, mink, western spotted skunk, and long-tailed weasel:
  - Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered, and to avoid unnecessary impact to dens.
- 9. BMPs for Terrestrial Reptiles: Texas map turtle, Texas garter snake, slender grass lizard, plateau spot-tailed earless lizard, and western box turtle
  - Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable.
  - For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.
  - Inform contractors that if reptiles are found on project sites allow species to safely leave the project area.
  - Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.
  - Contractors will be advised of potential occurrence in the project area, and to avoid harming the species if encountered.

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.

**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. Construction crews will be required to store any potential hazardous materials and petroleum products properly away from the edges of water bodies to avoid accidental spills. In the event of a spill which may be hazardous, the spill coordinator must be contacted immediately.

**VII. OTHER ENVIRONMENTAL ISSUES**

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

No Action Required  Required Action

Action No.

- 1.
- 2.
- 3.

**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
NMP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

**Design Division Standard**

## ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

# EPIC

SHEET 2 OF 2

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
12-12-2011 (DS) REVISIONS	1234	01	013, etc	FM 1100
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.	AUS	TRAVIS	115	

**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**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**

1234-01-013

**1.2 PROJECT LIMITS:**

From: ABRAHAMSON ROAD

To: GIESE Ln.

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 30.3642574, (Long) -97.4772760

END: (Lat) 30.3737113, (Long) -97.4710020

**1.4 TOTAL PROJECT AREA (Acres):** 7.90

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 0.60

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

Pavement widening

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description

**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
N/A	N/A

\* 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.
			116
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	TRAVIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1234	01013	e+@FM	1100

**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
Vegetated Filter Strips		

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: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**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
N/A		

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.

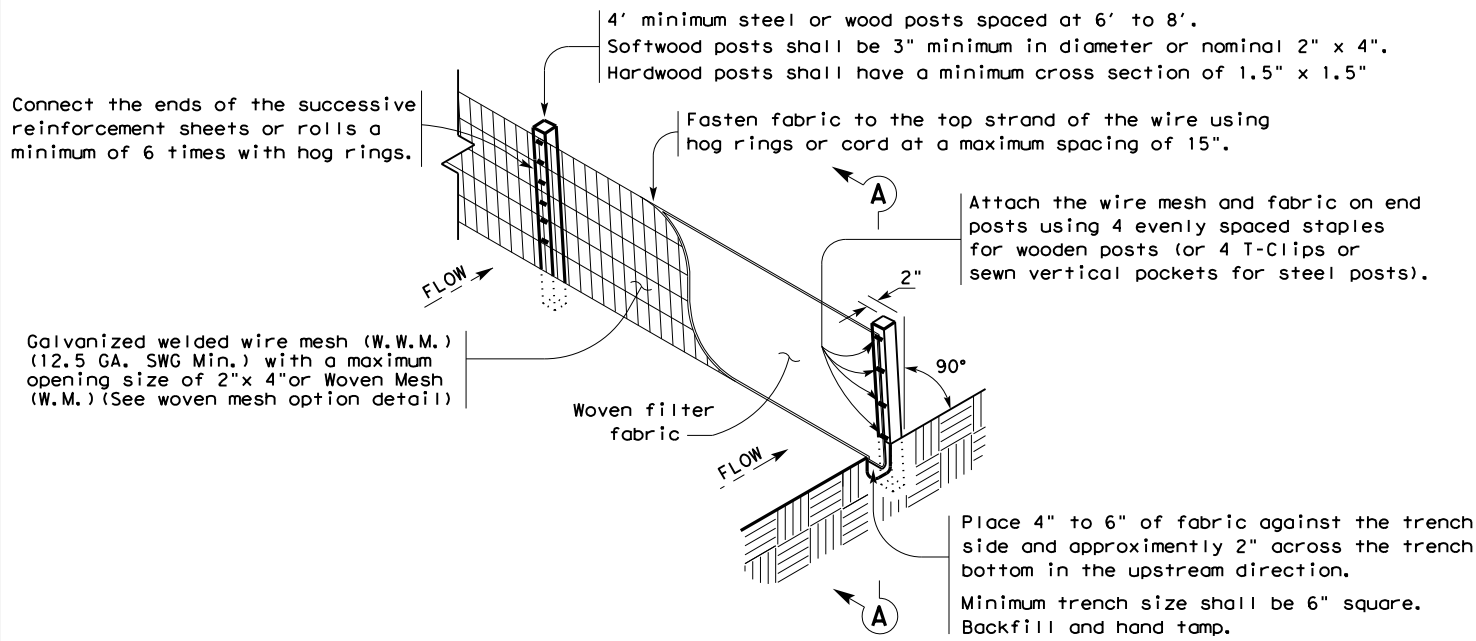
**STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)**



FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			117
STATE	STATE DIST.	COUNTY	
TEXAS	AUS	TRAVIS	
CONT.	SECT.	JOB	HIGHWAY NO.
1234	01013	e+c	FM 1100

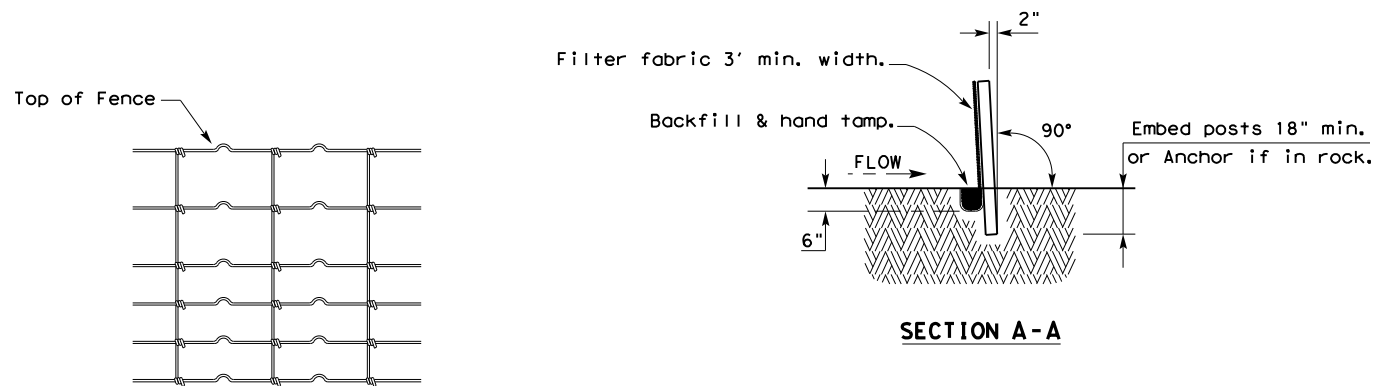


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**TEMPORARY SEDIMENT CONTROL FENCE**

SCF



**HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL**

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

**SEDIMENT CONTROL FENCE USAGE GUIDELINES**

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

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

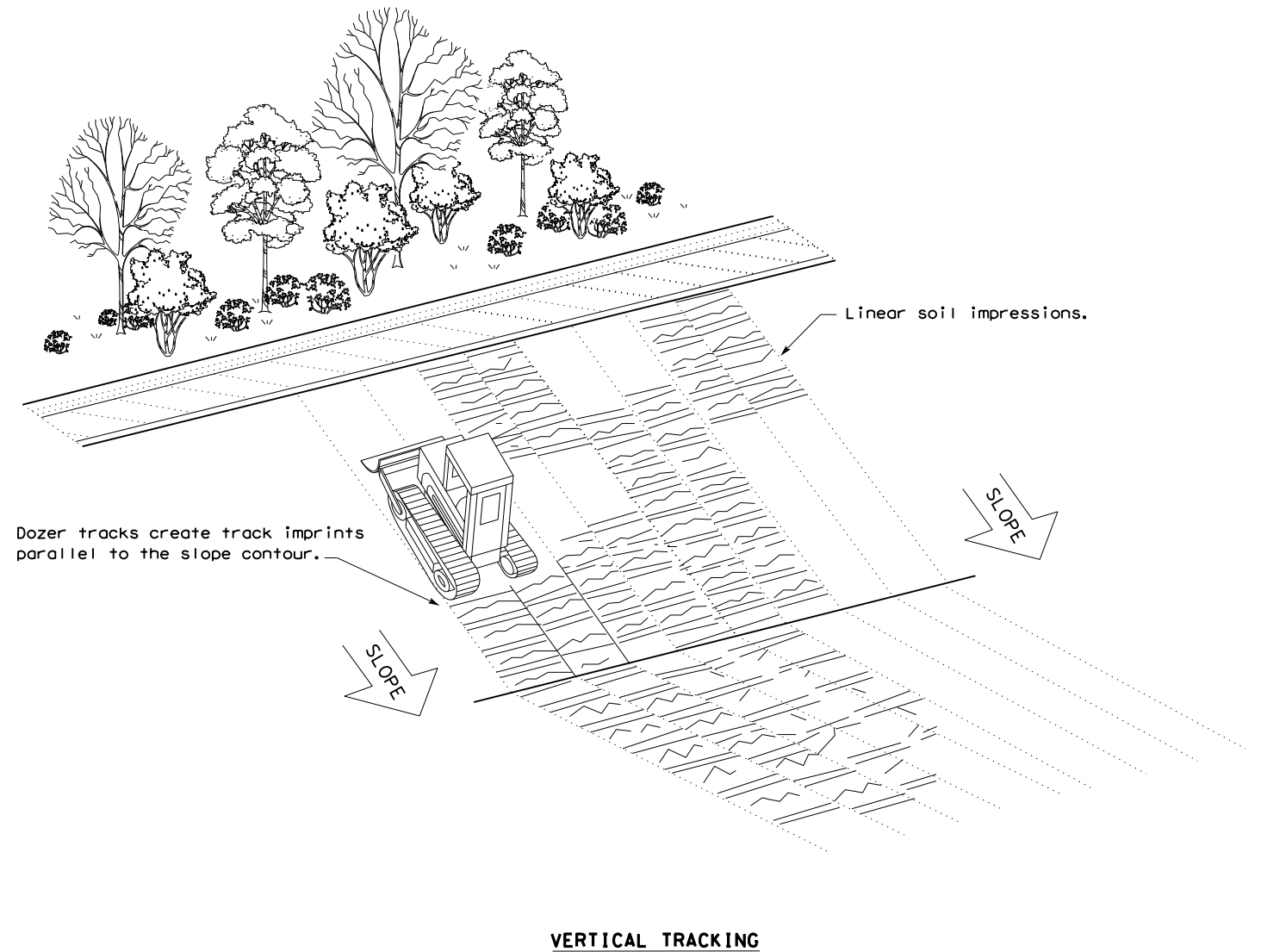
**LEGEND**

Sediment Control Fence

SCF

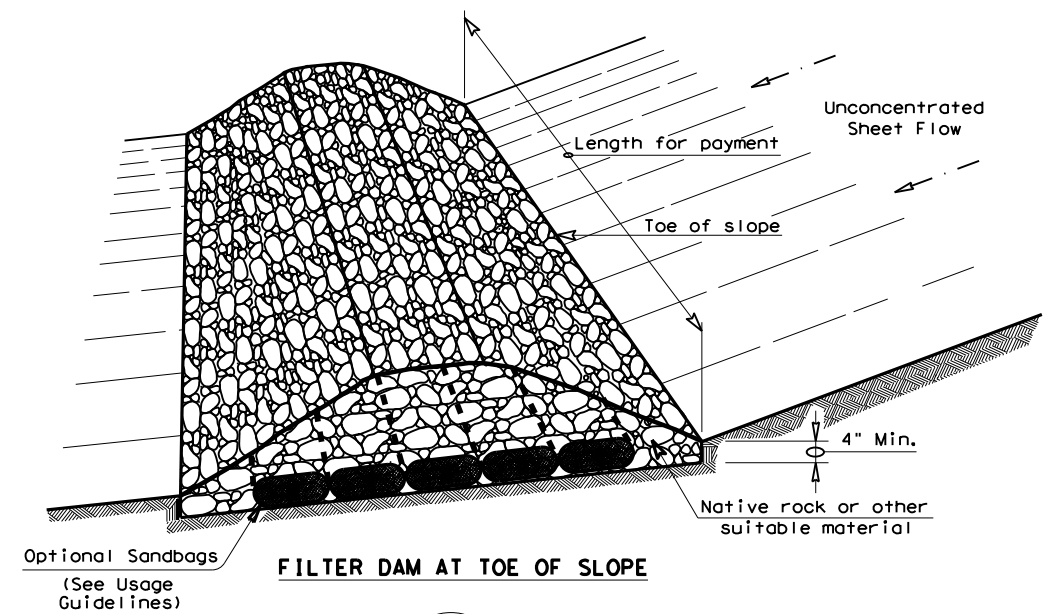
**GENERAL NOTES**

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



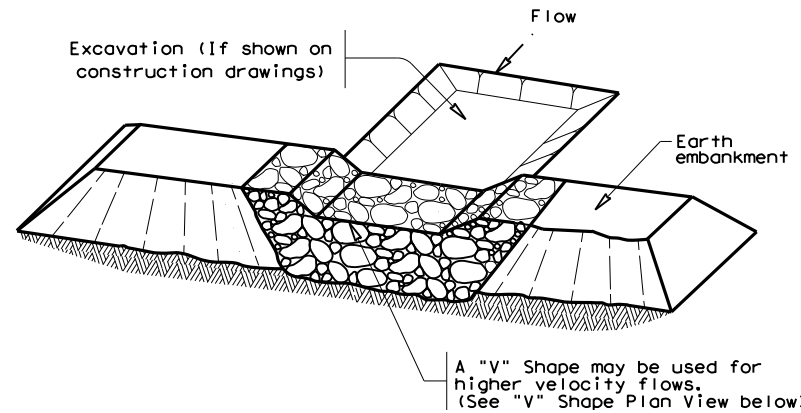
				Design Division Standard	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE &amp; VERTICAL TRACKING</b> <b>EC(1) - 16</b>					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1234	01	013, etc	FM 1100	
	DIST	COUNTY		SHEET NO.	
	AUS	TRAVIS		118	

DATE: 3/16/2023  
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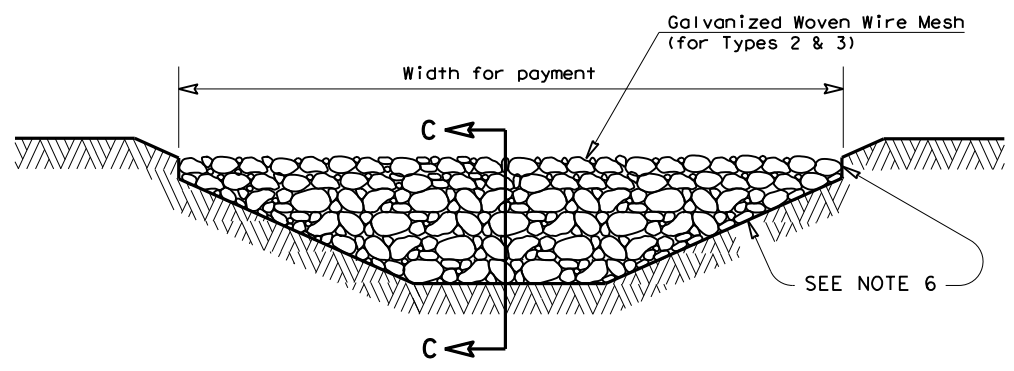
**FILTER DAM AT TOE OF SLOPE**

(RFD1)



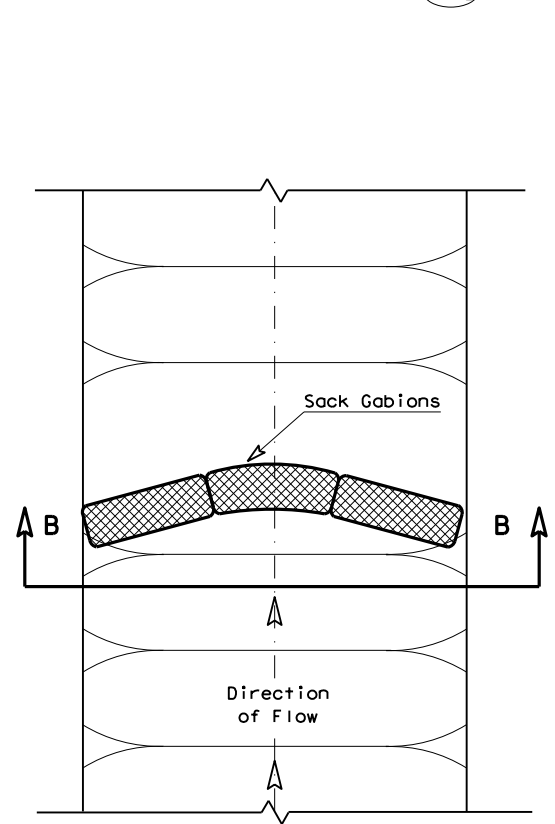
**FILTER DAM AT SEDIMENT TRAP**

(RFD1) OR (RFD2)

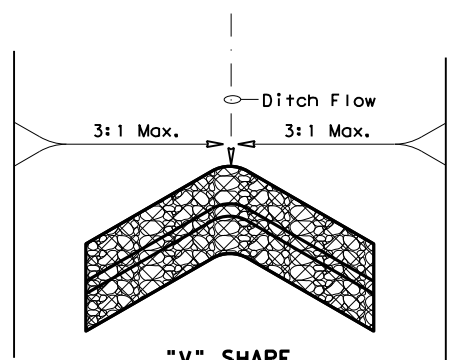


**FILTER DAM AT CHANNEL SECTIONS**

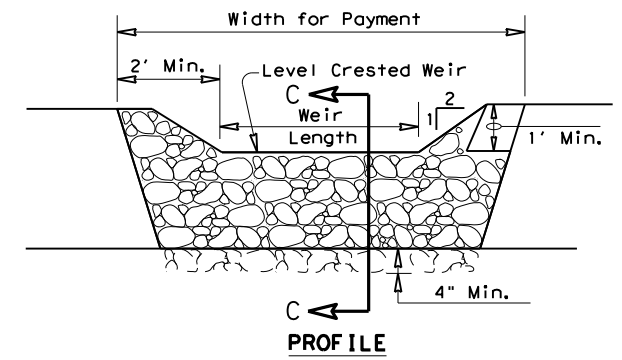
(RFD1) OR (RFD2) OR (RFD3)



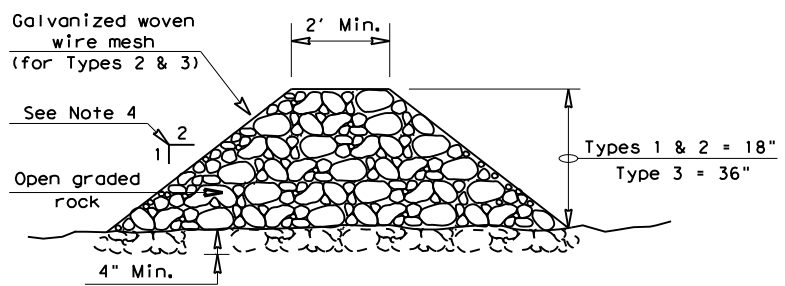
**PLAN VIEW**



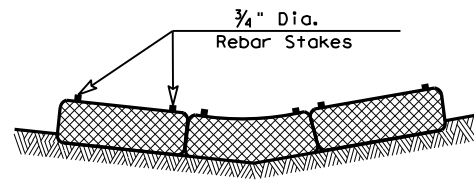
**"V" SHAPE PLAN VIEW**



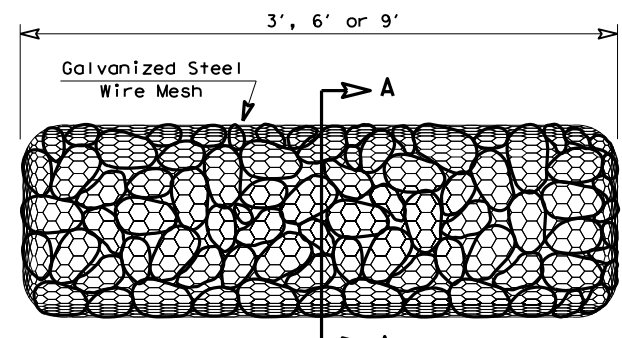
**PROFILE**



**SECTION C-C**

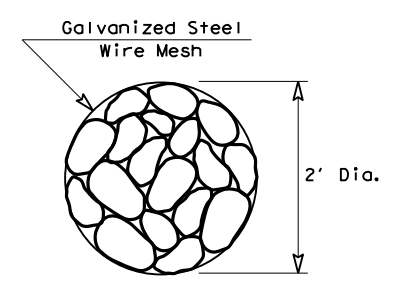


**SECTION B-B**



**TYPE 4 (SACK GABIONS)**

(RFD4)



**SECTION A-A**

**ROCK FILTER DAM USAGE GUIDELINES**

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT<sup>2</sup> of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

**GENERAL NOTES**

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4".
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

**PLAN SHEET LEGEND**

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)

		<b>Design Division Standard</b>	
<b>TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES</b> <b>ROCK FILTER DAMS</b> <b>EC(2) - 16</b>			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT: 1234	SECT: 01	JOB: 013, etc
REVISIONS	DIST: AUS		COUNTY: TRAVIS
			SHEET NO.: 119





