

SEE SHEET 2 FOR "INDEX OF SHEETS"

STATE OF TEXAS  
TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED  
STATE HIGHWAY IMPROVEMENT

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT  
CONSISTING OF REPLACE BRIDGE AND APPROACHES

**FM 956  
FAYETTE COUNTY**

CSJ: 1266-01-008  
PROJECT NO.: C 1266-1-8

LIMITS: AT WALKER BRANCH (STR# 1266-01-001)

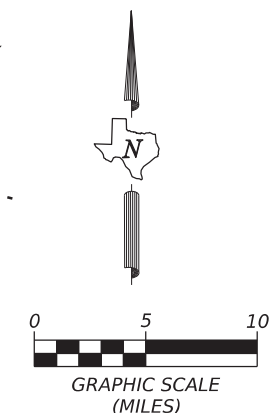
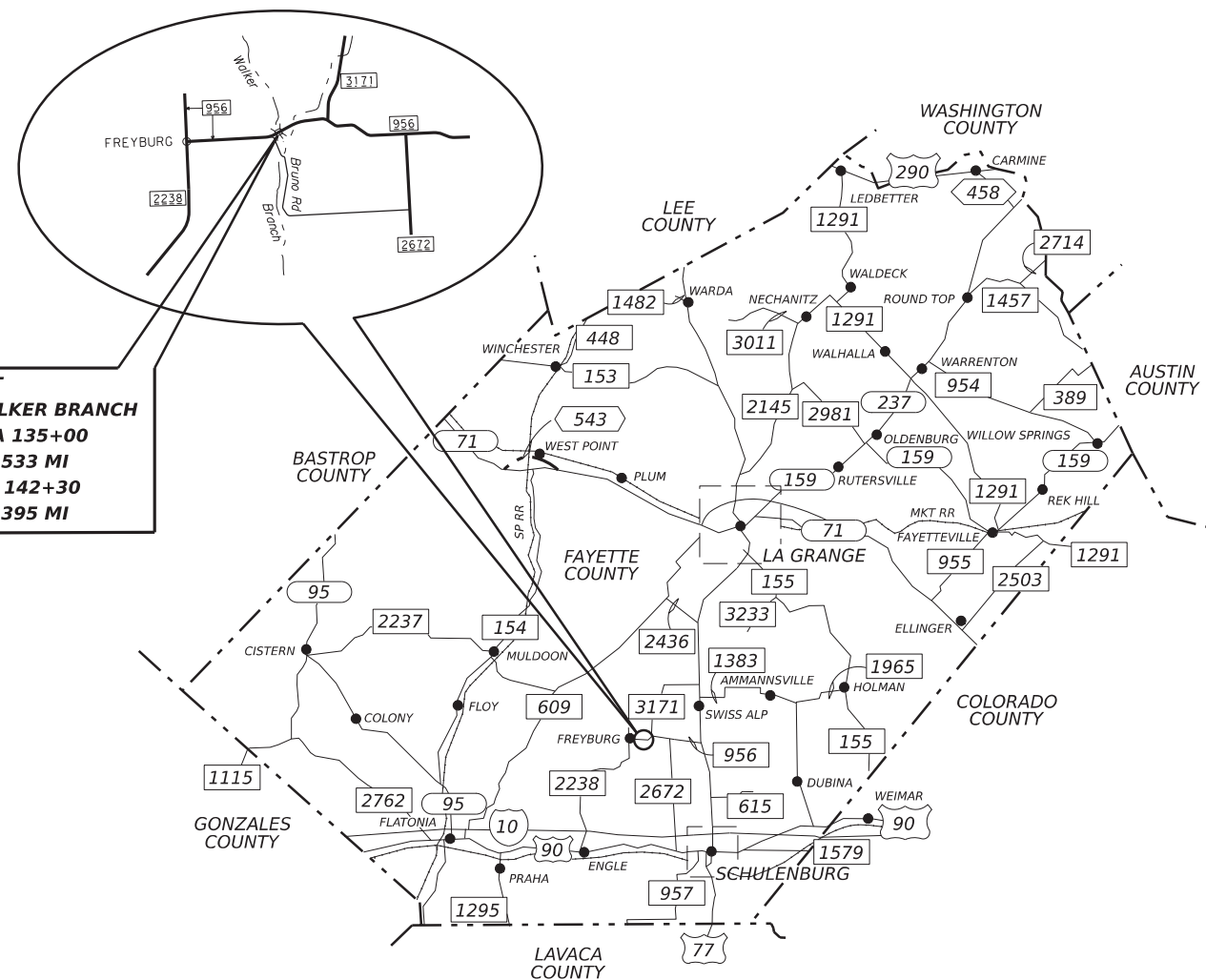
CONTRACTOR: \_\_\_\_\_  
DATE OF LETTING: \_\_\_\_\_  
DATE WORK BEGAN: \_\_\_\_\_  
DATE WORK COMPLETED: \_\_\_\_\_  
DATE WORK ACCEPTED: \_\_\_\_\_  
FINAL CONTRACT COST: \$ \_\_\_\_\_

LIST OF APPROVED FIELD CHANGES:

HWY FUNCTIONAL CLASS: RURAL MINOR COLLECTOR  
DESIGN SPEED: 50 MPH  
ADT: 184 VPD (2022)  
313 VPD (2042)

PROJECT LENGTH	
ROADWAY	= 692.73 FT = 0.131 MI
BRIDGES	= 37.27 FT = 0.007 MI
TOTAL	= 730.00 FT = 0.138 MI

**PROPOSED PROJECT**  
HWY FM 956 AT WALKER BRANCH  
BEGIN PROJECT: STA 135+00  
REF MRK = 474 + 1.533 MI  
END PROJECT: STA 142+30  
REF MRK = 474 + 1.395 MI



SUBMITTED FOR LETTING 07/03/2024

*Amanda Anderle Fling, P.E.*

DISTRICT DESIGN ENGINEER

RECOMMENDED FOR LETTING 7/3/2024

DocuSigned by:  
*Jeffery Vincklarck, P.E.*

C5D9721712F24F0... ON  
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING 7/3/2024

DocuSigned by:  
*Martin C. Horst, P.E.*

894AD332139E48D... ENGINEER

THIS IS TO CERTIFY THAT THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS, CONTRACT AND LISTED FIELD CHANGES.

\_\_\_\_\_, P.E. \_\_\_\_\_  
AREA ENGINEER DATE

**FAYETTE COUNTY  
YOAKUM DISTRICT**

EXCEPTIONS: NONE  
EQUATIONS: NONE  
RAILROAD CROSSINGS: NONE

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



**TEXAS DEPARTMENT OF TRANSPORTATION**

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ENVIRONMENTAL

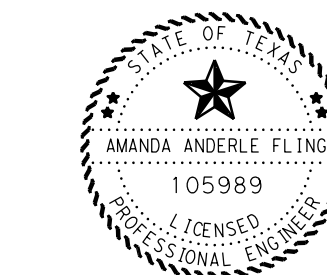
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 FILE: Index\_of\_Sheets.dgn  
 DATE: 7/3/2024

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



*Amanda Anderle Fling, P.E.*

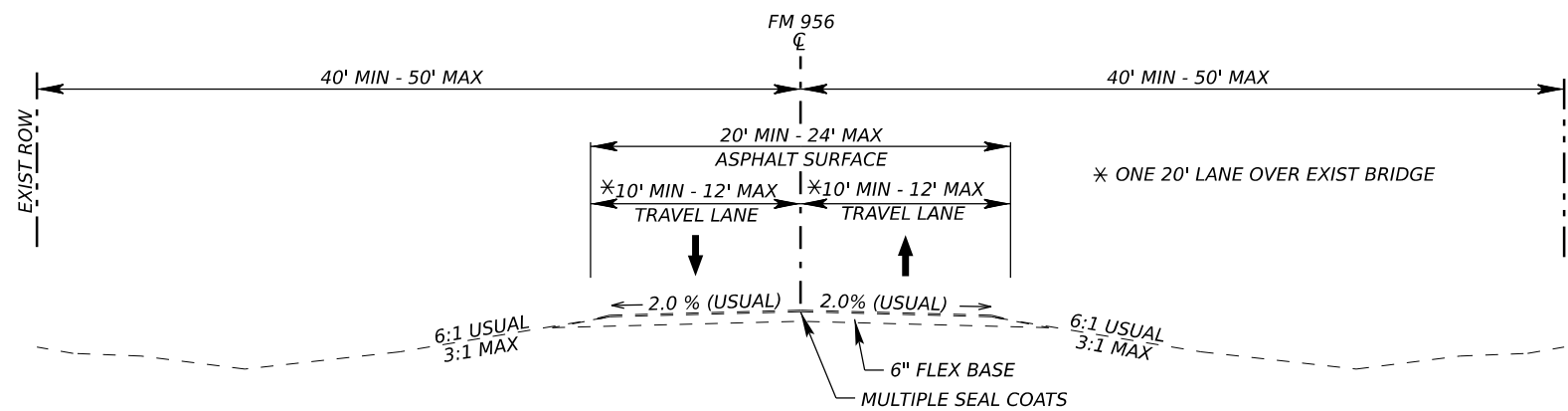
07/03/2024

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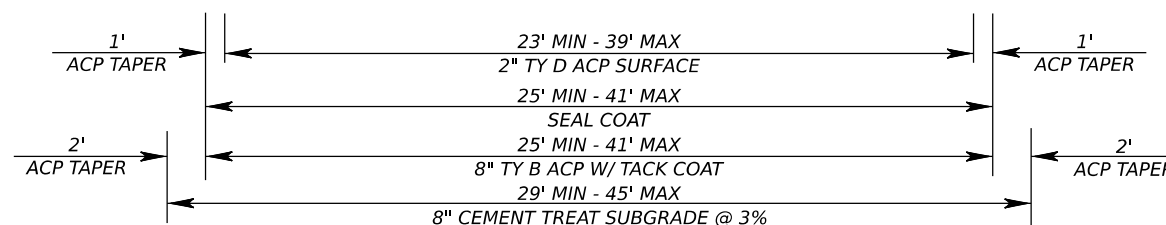
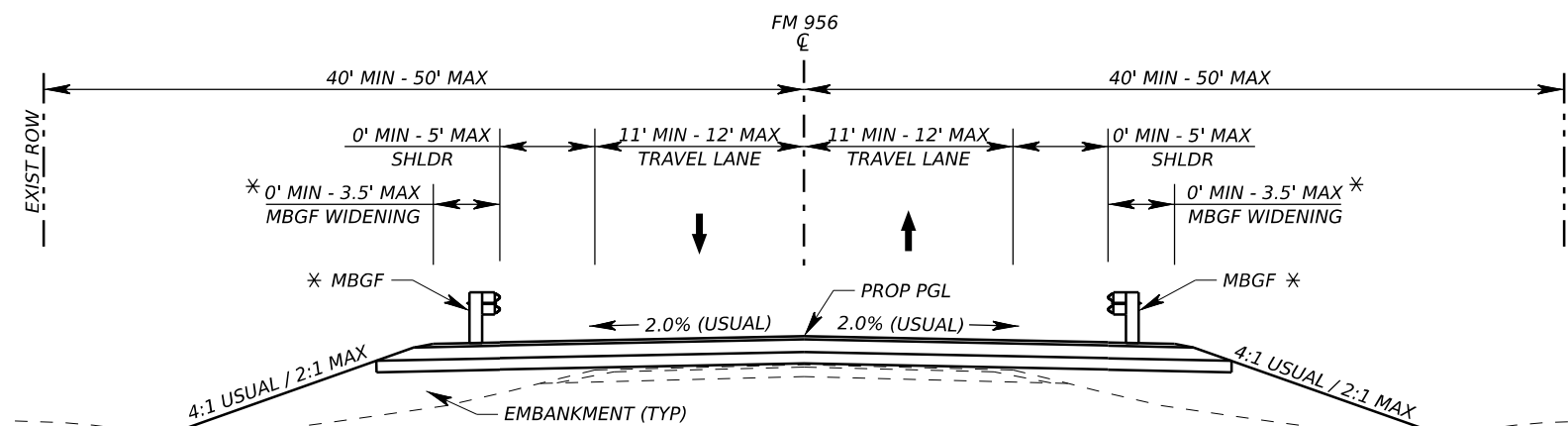
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6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	2



**FM 956  
EXISTING TYPICAL SECTION  
STA 135+00 TO STA 142+30**

NOTE: EXISTING BRIDGE FROM STA 138+52 TO STA 138+84.67

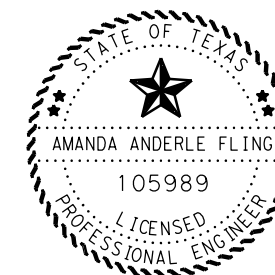


**FM 956  
PROPOSED TYPICAL SECTION  
STA 135+00 TO STA 138+52  
STA 138+52 TO STA 138+89.27 ①  
STA 138+89.27 TO STA 142+30**

NOTE: PROPOSED BRIDGE FROM STA 138+52 TO STA 138+89.27.

① NO CEMENT TREATED SUBGRADE OVER PROPOSED BRIDGE FROM STA 138+52 TO STA 138+89.27.

\* SEE "PLAN AND PROFILE" SHEET FOR MBGF LIMITS.



*Amanda Anderle Fling, P.E.*

07/03/2024

**TYPICAL SECTIONS**

SCALE: 1" = 10'

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FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
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TEXAS	YKM	FAYETTE	3

**Project Number:**

**Sheet: 4**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

**GENERAL:**

The Contractor is to take note that the working days will be charged as shown in the plans and not as a "Standard Workweek." See Item 8 below for details.

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

Covey Morrow IV [Covey.Morrow@txdot.gov](mailto:Covey.Morrow@txdot.gov)  
Chase Hermes [Chase.Hermes@txdot.gov](mailto:Chase.Hermes@txdot.gov)

Contractor questions will be accepted through email, phone, and in person by the above individuals.

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:  
<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

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

The Letting Pre-Bid Q&A 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.

Remove and dispose of existing raised pavement markers as directed. All work involved in the removal and disposal of these markers will not be paid for directly but shall be considered subsidiary to the various bid items involved.

Do not work on the roadway before sunrise or after sunset unless otherwise approved.

Leave all intersecting roadways, side streets, and entrances open during construction unless otherwise approved. Should there be a request to restrict access for such reasons as parallel culvert replacement, reconstruction, etc., approval will be required 48 hours in advance and the contractor will be required to coordinate satisfactorily with any affected property owners.

**Project Number:**

**Sheet: 4**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

Unless otherwise approved, maintain a minimum safety clearance from the edge of the travelway for material stockpiled in proximity of traffic lanes based on the current average traffic count of the particular highway as follows:

0 - 1500 = 16 feet

Over 1500 = 30 feet

In the event the above requirements cannot be met, make arrangements to stockpile material off the right of way.

Provide temporary pipe drains or culverts and take such other measures as directed to provide for continued drainage from all abutting property, the right of way and the roadway during construction operations. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

The Department will provide the cylinder testing machine for this project. Deliver the test specimens to the engineer's curing facilities as directed.

Do not clean out concrete trucks within the right of way.

**ITEM 2: INSTRUCTIONS TO BIDDERS**

The Contractor is to take note that this project is based off of A+B bid contracting (see Item 2 Article 11.5.3). Incentive/Disincentive provisions will apply to this project as per Special Provision to Item 8 (008---006) for both substantial completion of work and any milestone work. See notes under Item 8 below for the number of working days for the substantial completion of the project and any additional details.

**ITEM 6: CONTROL OF MATERIALS**

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

Project Number:

Sheet: 5

County: FAYETTE

Control: 1266-01-008

Highway: FM 956

#### ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

The Contractor's attention is directed to the fact that discharge of permanent or temporary fill material into the waters of the United States (U.S.) including jurisdictional wetlands, as necessary for construction, will require specific approval of the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act.

The Department will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and its potential to affect USACE jurisdictional areas. The Contractor may review the permitted plans at the office of the Area Engineer in charge of construction. The Department will hold the Contractor responsible for following all conditions of the approved permit. If the Contractor cannot work within the limits of this permit(s), then it becomes the Contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the existing permit(s) as originally obtained by the Department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the U.S., including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The Contractor shall maintain near normal flow of any jurisdictional waters of the U.S. at all times during construction. If the Contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the TXDOT Yoakum District Environmental Coordinator.

If the Contractor elects to work on a structure when the stream is flowing, near normal flow shall be maintained by a method approved by the Engineer. Labor and materials involved in this work will not be paid for directly, but will be considered subsidiary to the various bid items of the contract.

No significant traffic generator events identified.

If the contractor proposes work beyond the TxDOT obtained permit limitations, the contractor is responsible for additional costs, delays, and obtaining new or revised permits prior to construction.

Project Number:

Sheet: 5

County: FAYETTE

Control: 1266-01-008

Highway: FM 956

#### ITEM 8: PROSECUTION AND PROGRESS

Contract working days (including A+B substantial completion work) will be computed and charged as described in this paragraph per. 2024 spec 8.3.1.6 other. Working days will be charged Monday through Saturday, excluding national or state holidays, if weather or other conditions permit the performance of the principal unit of work underway, as determined by the Engineer, for a continuous period of at least 7 hr. between 7:00 A.M. and 6:00 P.M. The Contractor has the option of working on state holidays. Provide sufficient advance notice to the Engineer when scheduling work on state holidays. Work on Sundays and national holidays will not be permitted without written permission of the Engineer. If work requiring an Inspector to be present is performed on a Sunday or holiday, and weather or other conditions permit the performance of work for 7 hr. between 7:00 A.M. and 6:00 P.M., a working day will be charged.

##### A+B Bidding

The maximum number of days that will be accepted as a responsive bid for substantial completion shall be 50 working days.

Time charges for the purpose of credits/penalties related to A+B bidding will be computed and charged as specified in the plans. See Item 8 notes for details.

Substantial completion is defined as when FM 956 is open to traffic in the final lane configuration and final pavement markings have been placed.

The daily road user cost liquidated damages for substantial completion of the project is \$1775 per day, which will be assessed/penalized per day if the project is not completed within the number of days bid for substantial completion.

The Contractor will receive a credit in the amount of \$1775 per day for substantially completing the project in less than the number of days bid. The maximum number of days for computing the incentive credit is 10 days. The maximum amount of incentive is \$17,750

The number of working days for project completion and final cleanup will be an additional 5 working days after the substantial complete date of this project. The normal liquidated damage rate based on contract administration costs will be assessed if the project is not completed within this timeframe.

The Department will supply bidders, upon written request, one electronic copy of the time determination schedule. The time determination schedule provided is for informational use only and is not intended for bidding or construction purposes.

**Project Number:**

**Sheet: 6**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

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

Provide progress schedule as a Bar Chart.

The 90 day delayed convenience start special provision is for allowing the contractor additional time for mobilizing crews and equipment to start this project.

**ITEM 100: PREPARING RIGHT-OF-WAY**

Dispose of trees from the right-of-way within 24 hours of removal.

Treat cuts on trees designated for preservation in accordance with Item 100, "Preparing Right of Way".

**ITEM 110: EXCAVATION**

Remove existing vegetation, including roots and topsoil, within the grading limits to a depth of approximately two inches immediately before grading operations begin within any section. Place the material in a windrow on each side of the roadbed, and replace as directed on the completed slopes as soon as practicable. All topsoil excavation and the work involved in replacing the topsoil will not be paid for directly but will be subsidiary to the pertinent items.

**ITEMS 110 & 132: EXCAVATION AND EMBANKMENT**

Furnish Type C embankment consisting of suitable earth material such as loam, clay or other such material that will form a stable embankment and has a plasticity index of at least 15 but not more than 40. Requirements may vary for material excavated under Item 110, "Excavation", as directed.

Removal/Reworking of existing pavement is included in the excavation and embankment items.

**Project Number:**

**Sheet: 6**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

**ITEM 302: AGGREGATES FOR SURFACE TREATMENTS**

Furnish Type PE and Type E aggregate consisting of crushed slag, crushed stone or natural limestone rock asphalt.

Furnish precoated aggregate that has a residual bitumen coating target value of 1.0% by weight.

**ITEM 316: SEAL COAT**

As approved use an Emulsion instead of an Asphalt Cement when the surface treatment is placed between September 15 and May 1.

The asphalt application rate shown in the plans is an average between an Asphalt Cement and an Emulsion. The type of asphalt and application rate to be used will be as directed. The approximate application rate for Asphalt Cement with a Grade 3 aggregate is 0.32 Gal/SY and with a Grade 4 aggregate is 0.27 Gal/SY. The approximate application rate for an Emulsion with a Grade 3 aggregate is 0.48 Gal/SY and with a Grade 4 aggregate is 0.40 Gal/SY.

Use two paper widths covering a minimum of five feet at the beginning of each shot to construct a straight transverse joint and to prevent overlapping of the asphalt.

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

Provide a material transfer device capable of transferring mix from the haul trucks to the paver. Monitor its loading such that no damage is done to the existing pavement structures if a material transfer vehicle is used.

Securely attach a waterproof tarpaulin to the top of all trucks hauling ACP, to prevent air flow across the mix, for the duration of all ACP operations.

**ITEM 341: DENSE-GRADED HOT-MIX ASPHALT**

Tie HMA CP tapers to a vertical transition joint created by the milling operation at the beginning and ending transitions and at all exceptions, or as directed. Provide a temporary HMA CP taper at vertical joints until overlay operations begin. Milling and HMA CP work will not be paid for directly but will be considered subsidiary to this item.

Mixture designs, using the PG binder originally specified and without additives, failing to meet the requirements of Table 10 will require the addition of a minimum 1.0% of Type A hydrated lime based on dry weight of the total aggregate.

**Project Number:**

**Sheet: 7**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

Do not add additional quantity of RAP to stockpiles tested and approved. If additional RAP is added to a stockpile, a new design and trial batch will be required prior to placement on the roadway.

The extracted aggregate from contractor-owned RAP shall have a minimum of 85% two crushed faces when tested in accordance with TEX-460-A, Part I.

Limit uneven pavement to two days production with the requirement that all longitudinal joints adjacent to a travelway are constructed with a joint maker providing a maximum one inch vertical edge (1/2" desirable) with an adjacent 6:1 taper.

#### **ITEM 400: EXCAVATION AND BACKFILL FOR STRUCTURES**

Flexible base (Ty D) may be used for cement stabilized backfill aggregate, as approved.

#### **ITEM 432: RIPRAP**

Place 1/2 inch expansion joint material between the two concrete areas or structures where riprap is placed against other concrete such as concrete pavement and structures unless otherwise shown on the plans or as directed. This work will not be paid for directly but will be subsidiary to the pertinent items.

Unless otherwise shown on the plans or directed, riprap will be 5" deep and reinforced; reinforced toewalls 6" wide and 12" deep will be placed around the perimeter of each location.

The dimension as shown in the stone protection bid item description is the stone size as described in the specification. The required thickness will be as shown elsewhere in the plans.

#### **ITEM 462: CONCRETE BOX CULVERTS AND DRAINS**

Use precast concrete boxes on this project.

When using precast boxes, cast-in-place 1'-8" of the precast box at the connection to the existing structure, as directed.

For payment purposes, the culvert extension quantities are measured from the outside edge of the existing culvert headwall and do not include any necessary breakback into the existing culvert. Alternatives to the breakback including doweling may be allowed or directed dependent on related standard sheets (skew/fill depth) and other applicable general notes. All work related to breakback and alternative construction methods is subsidiary to pertinent items.

**Project Number:**

**Sheet: 7**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

Removing and disposing of portions of existing structures including wingwalls, headwalls, safety end treatments, etc. is subsidiary to the proposed culvert extension, proposed end treatment, or remove structure (small)(large)(box culvert)(pipe) items.

#### **ITEM 496: REMOVING STRUCTURES**

Material removed under this item will not be deemed salvageable.

The removal of the existing concrete riprap or stone riprap protecting the existing bridge, is subsidiary to Item 496 Removing Structures, except as shown in the plans.

The removal of multiple culvert barrels at one drainage location will be paid as a single structure by the each.

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

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

Use WZ(RS)-22 in conjunction with TCP(2-2).

Use TCP(2-2b) for one-lane, two-way traffic control.

When using TCP(2-2b), a pilot car is required to lead traffic through the work space with or without channelizing devices on the center line unless otherwise approved.

When using TCP(2-2b), channelizing devices may be omitted during base, subgrade and seal coat operations unless otherwise directed. Flaggers will be required at public intersections when channelizing devices are omitted.

When using TCP(2-2b), arrow boards, displaying the caution mode, may be used to enhance the flagger stations. If used, place the arrow board in advance of the flagger station a distance of 1/2X, the sign spacing distance shown on BC(2). Use arrow boards as shown on BC(7).

When using TCP(2-2b), the temporary 24" stop line and the CW16-2P plaques may be omitted.

**Project Number:**

**Sheet: 8**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

When using TCP(2-2b), an additional "Road Work Ahead" and "Be Prepared To Stop" signs will be required on each end of the lane closure unless otherwise approved.

Provide trail and lead vehicles when using TCP(3-1) or TCP(3-3).

Utilize TCP(3-3) for sweeping operations or for installing and removing tabs or raised pavement markers.

Provide suitable warning lights mounted high enough to be visible from all directions on all construction equipment, including pilot vehicles, and operate warning lights when the equipment is within the right of way. Equip other equipment such as trucks, trailers, autos, etc., with emergency flashers and use emergency flashers while within the work area.

No additional payment will be made for relocating existing sign assemblies to temporary mounts.

Signs warning of temporary conditions, such as "NO CENTER LINE," "LOOSE GRAVEL," etc., shall only be displayed when conditions are present. Remove or completely cover signs that do not apply to the roadway conditions. These signs may be installed prior to beginning work but shall remain completely covered until the signs are applicable.

**ITEM 503: PORTABLE CHANGEABLE MESSAGE SIGN**

Provide Portable Changeable Message Signs (PCMS) for the duration of the project. Locations and messages or other miscellaneous uses of PCMS, shall be as approved or directed by the Engineer.

**ITEM 504: FIELD OFFICE AND LABORATORY**

Provide a Type D structure for the asphalt mix control laboratory for the engineer's exclusive use. Equip the structure with a 240 volt electrical entrance service. The service will consist of a minimum of four 120 volt circuits with 20 amp breakers and at most two grounded convenience outlets per circuit and provisions for a minimum of two 220 volt ovens. Space heaters for heating the structure are unacceptable. Portable structures will be support blocked for stability and will be tied down.

**ITEM 505: TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA)**

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.

**Project Number:**

**Sheet: 8**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

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

1. See SWP3 plan sheet for total disturbed acreage.
2. The disturbed area in this project, all project locations in the contract, and contractor project specific locations (PSLs), within one (1) mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges.
3. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans.
4. Obtain any required authorization from the TCEQ for any contractor PSLs for construction activities on or off right-of-way (ROW).
5. When the total disturbed area for all projects in the contract and PSLs within one (1) mile of the project limits exceeds five (5) acres, provide a copy of the contractor NOI.
6. Provide a signed sketch detailing the location of any contractor's PSLs on ROW or within one (1) mile of the project.

**ITEM 540: METAL BEAM GUARD FENCE**

Furnish and install only one type of timber post at each location.

Furnish Type II rail elements at all locations.

**ITEMS 540 & 544: METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS**

No exposed bridge rail ends or guard fence ends will be allowed after normal working hours. Complete all work at each location during the normal working day.

**ITEM 644: SMALL ROADSIDE SIGN SUPPORTS AND ASSEMBLIES**

Use Class B concrete for all small roadside sign assembly concrete footings.

The exact location of the foundations to be placed will be determined in the field by the Engineer.



**Project Number:**

**Sheet: 9**

**County: FAYETTE**

**Control: 1266-01-008**

**Highway: FM 956**

Replace the signs with reference markers to the exact station from which they were removed.

Drill the holes in the signs carefully as to not damage the reflective sheeting of the signs.

Install the wedge anchor system in a concrete footing 42" in depth and 12" in diameter.  
Foundation should take approximately 2.7 cubic feet of concrete.

Slip bases with set screws/bolts will not be allowed.

**ITEM 666: REFLECTORIZED PAVEMENT MARKINGS**

Provide Type I pavement markings in accordance with this item. The requirements of this item are supplemented with the following provision: Place Type I pavement markings with a ribbon-gun application. All other provisions remain in effect.



CONTROLLING PROJECT ID 1266-01-008

DISTRICT Yoakum  
HIGHWAY FM 956

COUNTY Fayette

# Estimate & Quantity Sheet

CONTROL SECTION JOB				1266-01-008		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00130816			
COUNTY				Fayette			
HIGHWAY				FM 956			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	100-7002	PREPARING ROW	STA	1.000		1.000	
	110-7001	EXCAV (ROADWAY)	CY	856.000		856.000	
	132-7005	EMBANK (FNL)(OC)(TY C)	CY	425.000		425.000	
	150-7002	BLADING	HR	20.000		20.000	
	164-7001	BROADCAST SEED (PERM_RURAL_SAND)	SY	2,682.000		2,682.000	
	164-7005	BROADCAST SEED (TEMP_WARM)	SY	671.000		671.000	
	164-7006	BROADCAST SEED (TEMP_COOL)	SY	671.000		671.000	
	168-7001	VEGETATIVE WATERING	TGL	22.600		22.600	
	275-7001	CEMENT	TON	31.000		31.000	
	275-7017	CEMENT TREAT (SUBGRADE) (8")	SY	3,222.000		3,222.000	
	316-7232	AGGR (TY-PE, GR-4)(SAC-B)	CY	24.000		24.000	
	316-7264	ASPH (AC 20-5TR OR AC-20XP OR CRS-2P	GAL	1,036.000		1,036.000	
	341-7001	D-GR HMA TY-B PG64-22	TON	1,408.000		1,408.000	
	341-7050	D-GR HMA TY-D SAC-B PG70-22	TON	327.000		327.000	
	341-7082	TACK COAT	GAL	320.000		320.000	
	400-7010	CEM STABIL BKFL	CY	92.000		92.000	
	402-7001	TRENCH EXCAVATION PROTECTION	LF	54.000		54.000	
	403-7001	TEMPORARY SPL SHORING	SF	396.000		396.000	
	432-7002	RIPRAP (CONC)(5 IN)	CY	31.700		31.700	
	432-7043	RIPRAP (STONE PROTECTION)(18 IN)	CY	100.000		100.000	
	450-7020	RAIL (TY T631)	LF	74.540		74.540	
	462-7037	CONC BOX CULV (10 FT X 9 FT)	LF	105.600		105.600	
	466-7166	WINGWALL (FW - S) (HW=10 FT)	EA	2.000		2.000	
	496-7001	REMOV STR (BOX CULVERT)	EA	1.000		1.000	
	500-7001	MOBILIZATION	LS	1.000		1.000	
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3.000		3.000	
	503-7002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	505-7001	TMA (STATIONARY)	DAY	4.000		4.000	
	505-7003	TMA (MOBILE OPERATION)	DAY	4.000		4.000	
	506-7001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	40.000		40.000	
	506-7011	ROCK FILTER DAMS (REMOVE)	LF	40.000		40.000	
	506-7039	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,420.000		1,420.000	
	506-7041	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,420.000		1,420.000	
	540-7001	MTL W-BEAM GD FEN (TIM POST)	LF	575.460		575.460	
	544-7001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	644-7005	IN SM RD SN SUP&AM TY10BWG(1)SA(T-2EXT)	EA	1.000		1.000	
	644-7073	REMOVE SM RD SN SUP&AM	EA	3.000		3.000	



DISTRICT	COUNTY	CCSJ	SHEET
Yoakum	Fayette	1266-01-008	10



# Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1266-01-008

DISTRICT Yoakum

COUNTY Fayette

HIGHWAY FM 956

CONTROL SECTION JOB				1266-01-008		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00130816			
COUNTY				Fayette			
HIGHWAY				FM 956			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	658-7019	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	20.000		20.000	
	658-7078	REMOVE DELIN & OBJECT MARKER ASSMS	EA	16.000		16.000	
	666-7266	RE PROFILE PM TY I(W)6"(SLD)(100MIL)	LF	1,460.000		1,460.000	
	666-7270	RE PROFILE PM TY I(Y)6"(SLD)(100MIL)	LF	1,460.000		1,460.000	
	672-7004	REFL PAV MRKR TY II-A-A	EA	19.000		19.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

## ROADWAY SUMMARY

ROADWAY WIDTH		LOCATION		LENGTH	CEMENT TREAT WIDTH		ITEM 275		SEAL COAT WIDTH		ITEM 316		TY B ACP WIDTH		ITEM 341		TY D ACP WIDTH		ITEM 341
					BEGIN WIDTH	END WIDTH	CEMENT 106#/CF 3% TON	CEMENT TREAT SUBGRADE (8") SY	BEGIN WIDTH	END WIDTH	ASPH (AC 20-5TR OR AC-20XP OR CRS-2P) 0.34 GAL/SY GAL	AGGR (TY - PE GR - 4 SAC-B) 1 CY/130 SY CY	BEGIN WIDTH	END WIDTH	D-GR HMA TY - B PG64-22 (8") TON	TACK COAT 0.10 GAL/SY GAL	BEGIN WIDTH	END WIDTH	D-GR HMA TY - D SAC-B PG70-22 (2") TON
BEGIN WIDTH FT	END WIDTH FT	BEGIN STA	END STA	FT	BEGIN WIDTH FT	END WIDTH FT			BEGIN WIDTH FT	END WIDTH FT			BEGIN WIDTH FT	END WIDTH FT			BEGIN WIDTH FT	END WIDTH FT	
23.0	35.7	135+00	136+10	110.0	29.0	41.7	4.1	432.1	25.0	37.7	130.3	2.9	27.0	39.7	179.3	40.8	24.0	36.7	40.8
35.7	39.0	136+10	136+96	86.0	41.7	45.0	4.0	414.2	37.7	41.0	127.8	2.9	39.7	43.0	173.9	39.5	36.7	40.0	40.3
39.0	39.0	136+96	138+52	156.0	45.0	45.0	7.4	780.0	41.0	41.0	241.6	5.5	43.0	43.0	327.9	74.5	40.0	40.0	76.3
32.0	32.0	① 138+52	138+89.27 ①	37.27			0.0	0.0	32.0	32.0	45.1	1.0	32.0	32.0	58.3	13.3	32.0	32.0	14.6
39.0	39.0	138+89.27	140+45	155.73	45.0	45.0	7.4	778.7	41.0	41.0	241.2	5.5	43.0	43.0	327.4	74.4	40.0	40.0	76.1
39.0	36.6	140+45	141+30	85.0	45.0	42.6	3.9	413.7	41.0	38.6	127.8	2.9	43.0	40.6	173.7	39.5	40.0	37.6	40.3
36.6	24.0	141+30	142+30	100.0	42.6	30.0	3.8	403.3	38.6	26.0	122.0	2.8	40.6	28.0	167.7	38.1	37.6	25.0	38.3
<b>TOTALS</b>							<b>31</b>	<b>3222</b>			<b>1036</b>	<b>24</b>			<b>1408</b>	<b>320</b>			<b>327</b>

① NOTE: PROPOSED BRIDGE FROM STA 138+52 TO STA 138+89.27.

\*WIDTH INCLUDES 1/2 OF TAPER WERE APPLICABLE.

## MISCELLANEOUS SUMMARY

LOCATION	ITEM 150	ITEM 164			ITEM 166	ITEM 168	REMARKS
	BLADING (EST) HR	BROADCAST SEED (PERM) (RURAL) (SANDY) SY	BROADCAST SEED (TEMP) (WARM) SY	BROADCAST SEED (TEMP) (COOL) SY	* FERTILIZER 500 LBS/AC TON	VEGETATIVE WATERING (13.6 MG/AC x 3 CYCLES) TGL	
STA 135+00 TO STA 138+52 LT & RT		1582	396	396	0.08	13.33	
STA 138+89.27 TO STA 142+30 LT & RT		1100	275	275	0.06	9.27	
PROJECT LIMITS	20						AS APPROVED OR DIRECTED BY THE ENGINEER.
<b>TOTALS</b>	<b>20</b>	<b>2682</b>	<b>671</b>	<b>671</b>	0.14	<b>22.60</b>	

\* FOR CONTRACTOR'S INFORMATION ONLY.

## PAVEMENT MARKING SUMMARY

DESCRIPTION	LENGTH	ITEM 666		ITEM 672	REMARKS
		RE PROFILE PM TY I(W)6" (SLD) (090MIL) LF	RE PROFILE PM TY I(Y)6" (SLD) (090MIL) LF	REFL PAV MRKR TY II-A-A EA	
EDGELINES	730	1460			
DOUBLE NO PASS	730		1460	19	REFL PAV MRKR TY II-A-A = 1 EA/40 LF
<b>TOTALS</b>		<b>1460</b>	<b>1460</b>	<b>19</b>	

## EARTHWORK SUMMARY

End Area Volume Report						
BASELINE STATION	ITEM 110 EXCAVATION		CUMULATIVE VOLUME (CY)	ITEM 132 EMBANKMENT		CUMULATIVE VOLUME (CY)
	AREA (SF)	VOLUME (CY)		AREA (SF)	VOLUME (CY)	
13500.000 R1	29.1	0.0	0.0	0.0	0.0	0.0
13550.000 R1	29.1	53.8	53.8	1.3	1.2	1.2
13600.000 R1	30.3	54.9	108.8	6.8	7.5	8.7
13650.000 R1	31.1	56.8	165.6	9.5	15.1	23.8
13700.000 R1	43.1	68.7	234.3	5.0	13.4	37.3
13750.000 R1	64.8	99.9	334.2	4.5	8.8	46.0
13800.000 R1	64.4	119.7	453.9	12.6	15.8	61.8
13850.000 R1	15.3	73.8	527.7	108.4	112.0	173.9
13900.000 R1	14.3	27.3	555.0	25.7	124.2	298.0
13950.000 R1	34.6	45.3	600.3	9.8	32.8	330.9
14000.000 R1	34.1	63.6	663.9	6.7	15.3	346.1
14050.000 R1	12.0	42.7	706.6	17.4	22.3	368.4
14100.000 R1	16.7	26.6	733.2	12.7	27.9	396.3
14150.000 R1	22.0	35.9	769.1	8.7	19.8	416.1
14200.000 R1	35.9	53.7	822.8	0.4	8.4	424.5
14250.000 R1	0.0	33.3	856.1	0.0	0.4	424.8
<b>TOTALS</b>	<b>856</b>			<b>425</b>		

## RIPRAP SUMMARY

LOCATION	ITEM 432 RIPRAP (CONC) (5 IN) CY	REMARKS
STA 138+84 TO STA 139+20 RT	7.5	DITCH FLUME
<b>TOTALS</b>	<b>8</b>	

NOTE: SEE "PLAN AND PROFILE" AND "MISCELLANEOUS SUMMARIES AND DETAILS" SHEETS FOR MORE INFORMATION.

## TRAFFIC CONTROL SUMMARY

DESCRIPTION	ITEM 503	ITEM 505		REMARKS
	PORTABLE CHANGEABLE MESSAGE SIGN EA	TMA (STATIONARY) (EST) DAY	TMA (MOBILE OPERATION) (EST) DAY	
PROJECT DURATION	2	4	4	AS APPROVED OR DIRECTED BY THE ENGINEER.
<b>TOTALS</b>	<b>2</b>	<b>4</b>	<b>4</b>	

## PREP ROW SUMMARY

LOCATION	ITEM 100 PREPARING ROW STA
STA 138+20 TO STA 139+20	1
<b>TOTALS</b>	<b>1</b>

## QUANTITY SUMMARIES

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FED. RD. DIV. NO.		PROJECT NO.	
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CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	12

### STRUCTURE SUMMARY

LOCATION	DESCRIPTION	ITEM 400		ITEM 402	ITEM 403	ITEM 432		ITEM 462	ITEM 466	ITEM 496	REMARKS
		① CEM STABIL BKFL  CY	STRUCT EXCAV *  CY	TRENCH EXCAVATION PROTECTION  LF	TEMPORARY SPL SHORING  SF	② RIPRAP (CONC) (5 IN)  CY	RIPRAP (STONE PROTECTION) (18 IN) (EST) CY	CONC BOX CULVERT  10' X 9'  LF	WINGWALL (FW-S) (HW=10 FT)  EA	REMOVE STR (BOX CULVERT)  EA	
STA 138+52 TO STA 138+89.27	EXIST 3 - 10' x 9' x 21.30' CONCRETE BOX CULVERT W/ HEADWALLS & FLARED WINGWALLS LT & RT. REMOVE EXIST STRUCTURE. PROP 3 - 10' x 9' x 34.00' NORMAL (35.20' ALONG 15° SKEW) PRECAST CONCRETE BOX CULVERT W/ HEADWALLS & FLARED WINGWALLS (FW-S)(HW=10 FT) LT & RT USING BCS, SCP-10, SCP-MD & FW-S.	92	106	54	396	23.7	100	105.6	2	1	WALKER BRANCH BRIDGE CLASS BOX CULVERT STA 138+52.00 TO STA 138+89.27 NBI#: 13-076-0-1266-01-002
<b>TOTALS</b>		<b>92</b>	<b>106</b>	<b>54</b>	<b>396</b>	<b>23.7</b>	<b>100</b>	<b>105.6</b>	<b>2</b>	<b>1</b>	

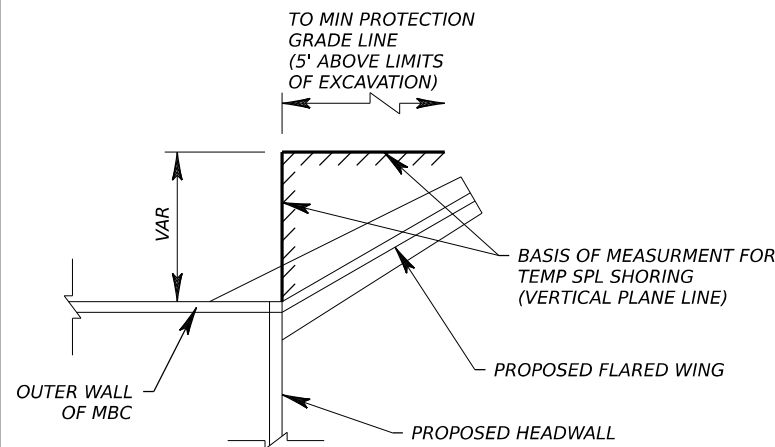
\* FOR CONTRACTOR'S INFORMATION ONLY.

NOTES:

- ① CEMENT STABILIZED BACKFILL FOR ENTIRE LENGTH OF STRUCTURE.
- ② INCLUDES 5" CONCRETE RIPRAP QUANTITY FOR CONCRETE APRON AS SHOWN ON FW-S.

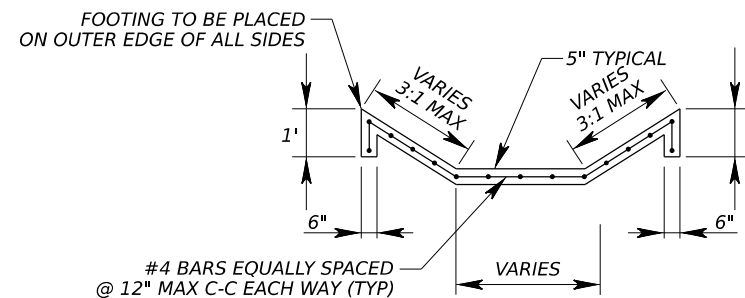
### BRIDGE RAIL, MBGF, END TREATMENT, & DELINEATOR SUMMARY

LOCATION	ITEM 450	ITEM 540	ITEM 544	ITEM 658		REMARKS
	RAIL (TY T631)  LF	MTL W-BEAM GD FEN (TIM POST)  LF	GUARDRAIL END TREATMENT (INSTALL)  EA	INSTL DEL ASSM(D-SW) SZ 1(BRF) GF2(BI)  EA	REMOVE DELIN & OBJECT MARKER ASSMS  EA	
STA 137+02 TO STA 138+52 LT		100	1	3	3	WALKER BRANCH BRIDGE CLASS BOX CULVERT STA 138+52.00 TO STA 138+89.27 NBI#: 13-076-0-1266-01-002
STA 136+14.27 TO STA 138+52 RT		187.73	1	5	3	
STA 138+52 TO STA 138+89.27 LT & RT WALKER BRANCH	74.54			4	4	
STA 138+89.27 TO STA 141+27 LT		187.73	1	5	3	
STA 138+89.27 TO STA 140+39.27		100	1	3	3	
<b>TOTALS</b>	<b>74.54</b>	<b>575.46</b>	<b>4</b>	<b>20</b>	<b>16</b>	



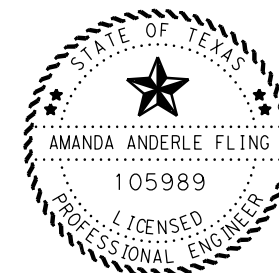
**TEMP SPL SHORING DETAIL**

PLAN VIEW  
(NOT TO SCALE)



**RIPRAP DETAIL**

(NOT TO SCALE)



Amanda Anderle Fling, P.E.

07/03/2024

### MISCELLANEOUS SUMMARIES AND DETAILS

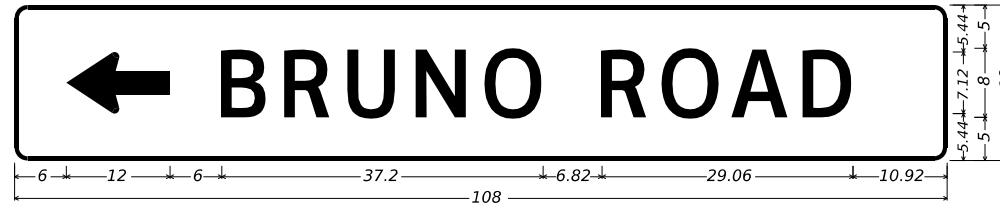
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SHEET 1 OF 1

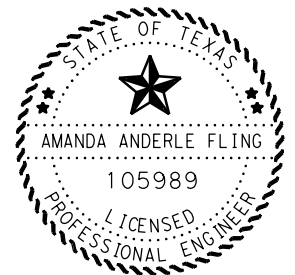
FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	13

SUMMARY OF SMALL SIGNS					SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)					ITEM 644		REMARKS
SIGN NO.	LOCATION STATION	SIGN NOMENCLATURE	SIGN TEXT	SIGN DIMENSION W x H	Post Type	Posts (1 or 2)	Anchor Type	Mounting Designation		IN SM RD SN SUP & AM 10BWG (1)SA (T-2EXT)	REMOVE SM RD SN SUP & AM EA	
					FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	UA = Univer-Conc UB = Univer-Bolt WS = Wedge-Steel SA = Slip-Conc SB = Slip-Bolt	P = Prefab. "Plain" T = Prefab. *T* U = Prefab. *U"	1EXT or 2EXT = # of Ext. BM = Extruded Wind Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. signs	EA	EA		
1	129+16 RT	W5-2	NARROW BRIDGE	30 X 30							1	INCIDENTAL WORK
2	139+42 RT	D1 - 1	← BRUNO ROAD	108 X 18	10BWG	1	SA	T	2EXT	1	1	
3	149+45 LT	W5-2	NARROW BRIDGE	30 X 30							1	INCIDENTAL WORK
<b>PROJECT TOTALS</b>										<b>1</b>	<b>3</b>	

SIGN #1



D1-1 8in LT;  
1.50" Radius, 0.50" Border, White on Green;  
Standard Arrow Custom 12.00" X 7.13" 180[]; "BRUNO ROAD", ClearviewHwy-3-W;



Amanda Anderle Fling, P.E.

07/03/2024

## SIGN SUMMARY AND DETAIL

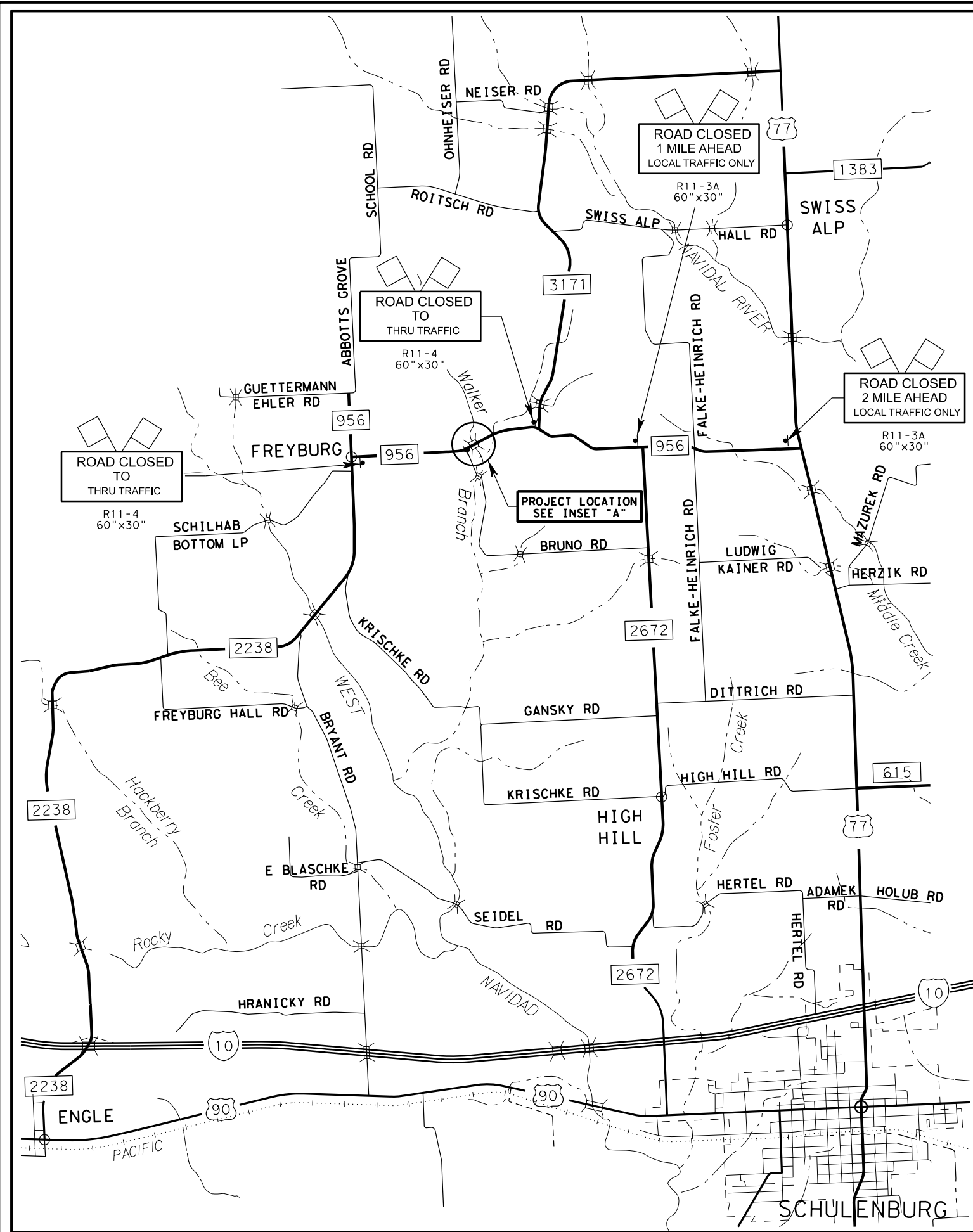
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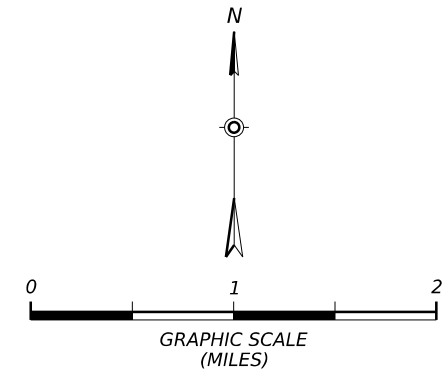
SHEET 1 OF 1

FED. RD. DIV. NO. 6		PROJECT NO.	
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	14

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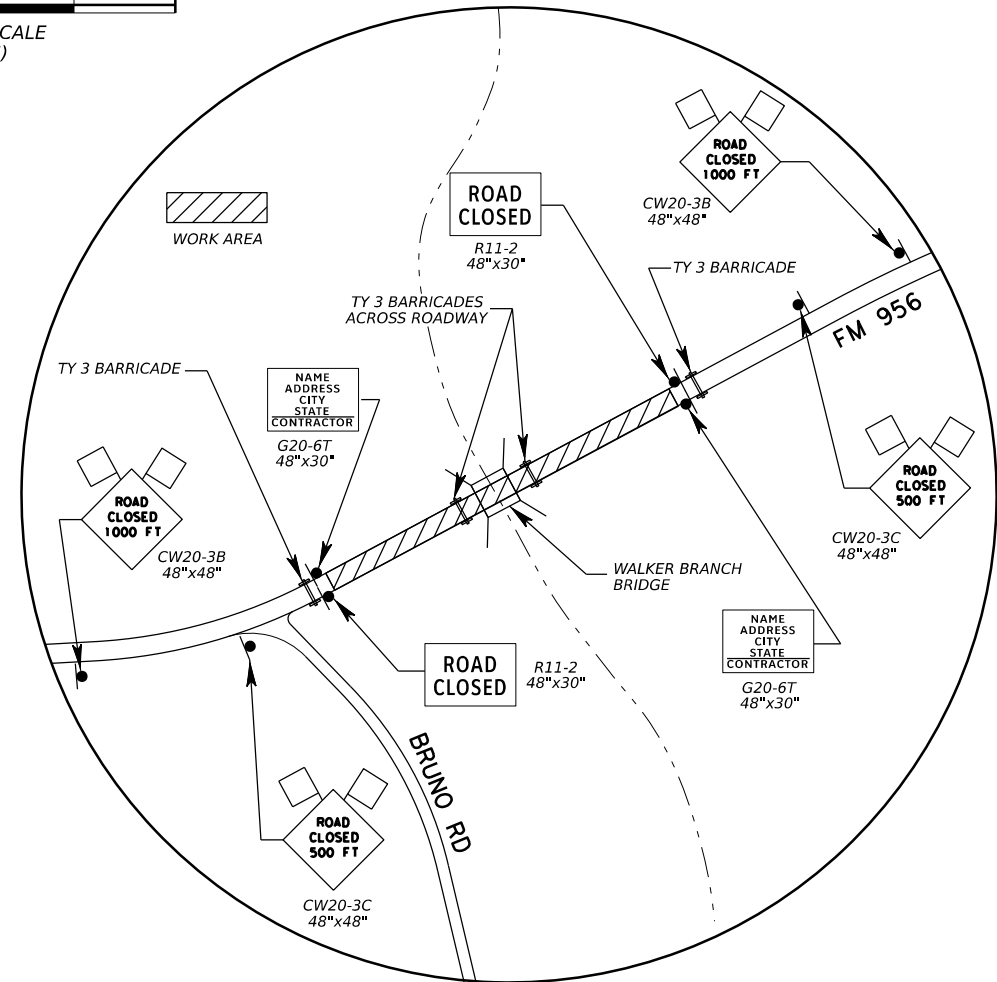


**LOCATION MAP**

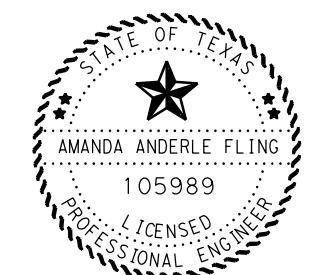


**NOTES:**

1. FM 956 WILL BE CLOSED TO THROUGH TRAFFIC UNTIL SUBSTANTIAL COMPLETION AS APPROVED BY THE ENGINEER.
2. TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER TO ALLOW EGRESS AND INGRESS FOR THE LOCAL PROPERTY OWNERS.
3. SEE BC SHEETS FOR MORE INFORMATION ON SIGN SPACING.
4. SEE ITEM 8 GENERAL NOTES REGARDING CLOSURE.



**CONSTRUCTION SIGNING AT PROJECT LOCATION  
INSET "A"  
(NOT TO SCALE)**



*Amanda Anderle Fling, P.E.*

**TRAFFIC CONTROL PLAN**

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SHEET 1 OF 1

FED. RD. DIV. NO.		PROJECT NO.		
6				
CONT.	SECT.	JOB	HIGHWAY NO.	
1266	01	008	FM 956	
STATE	DIST.	COUNTY	SHEET NO.	
TEXAS	YKM	FAYETTE	15	

07/03/2024

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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.

DATE: 7/3/2024 \$TIME\$  
 FILE: \$FILES\$

**WORKER SAFETY NOTES:**

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

**COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES**

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

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

SHEET 1 OF 12



**BARRICADE AND CONSTRUCTION  
GENERAL NOTES  
AND REQUIREMENTS**

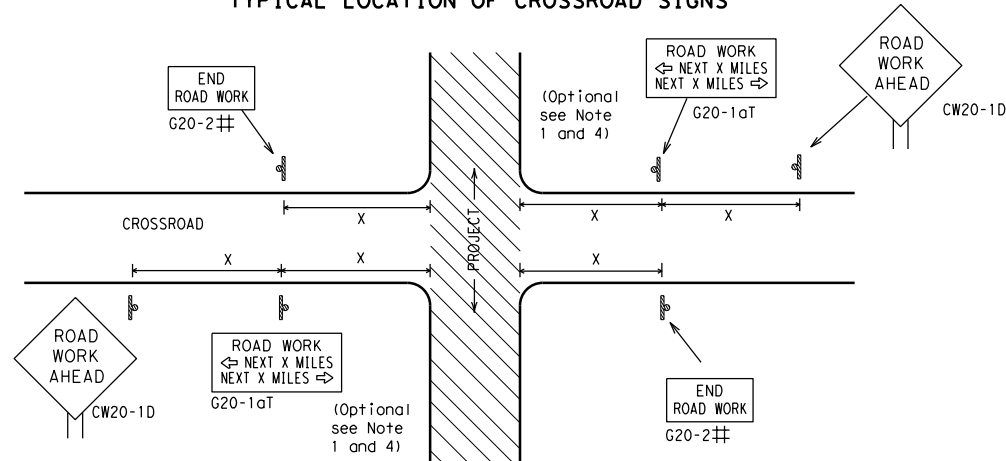
**BC (1) - 21**

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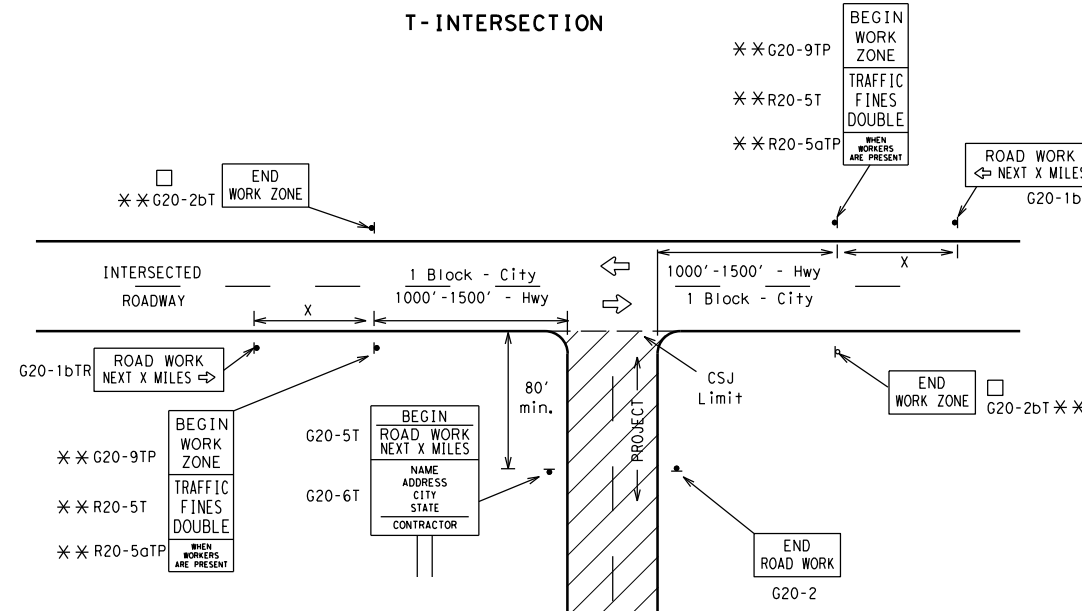
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**TYPICAL LOCATION OF CROSSROAD SIGNS**



- ## 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 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
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 <sup>2</sup>
			65	700 <sup>2</sup>
			70	800 <sup>2</sup>
			80	1000 <sup>2</sup>
*			*	* <sup>3</sup>

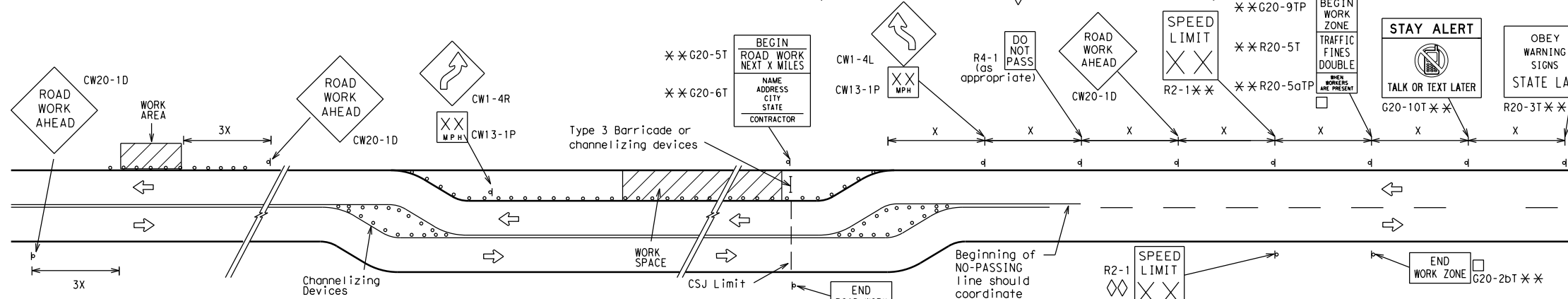
\* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

**GENERAL NOTES**

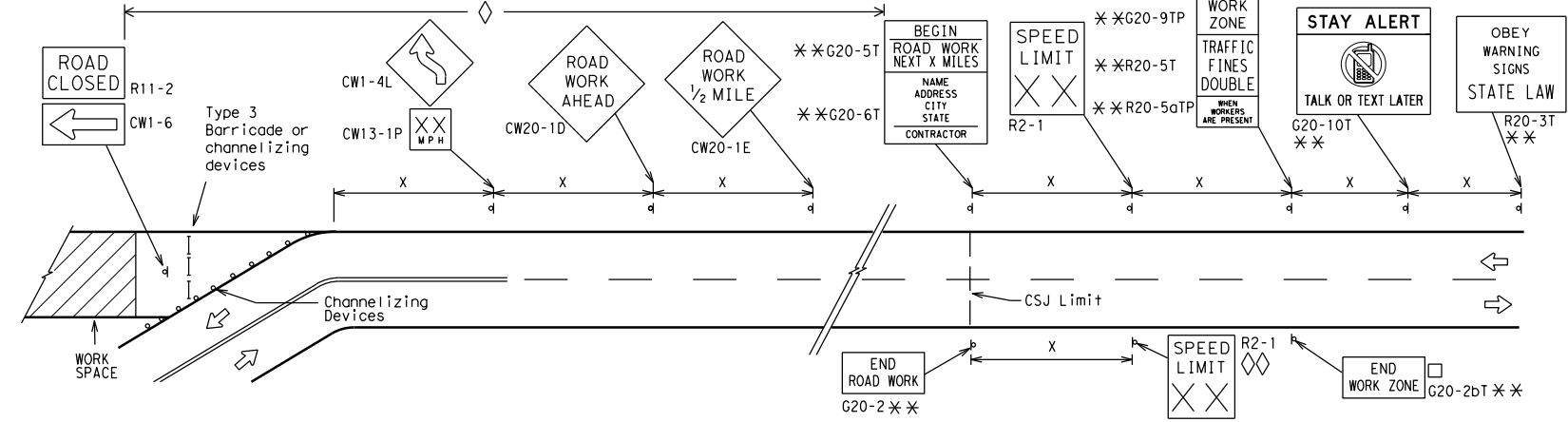
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

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

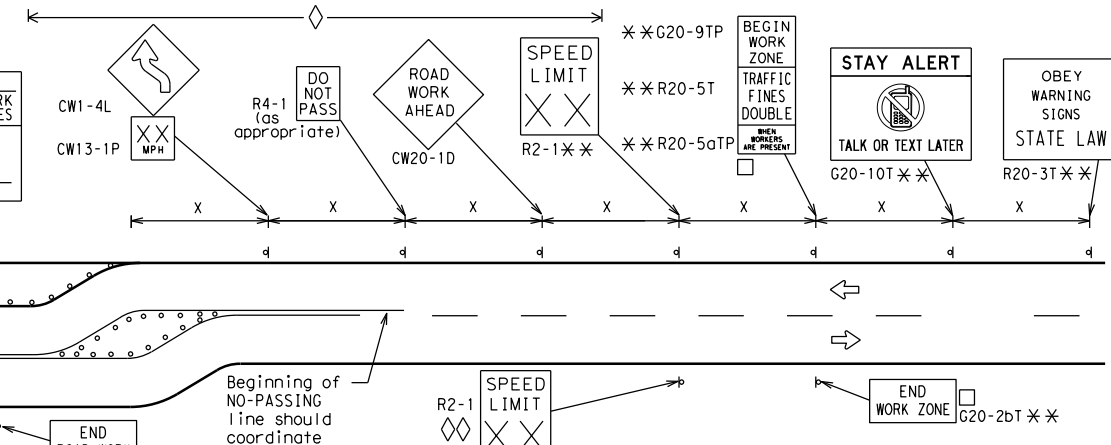


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



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



**NOTES**

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
  - \*\* CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
  - ◇ Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
  - ◇◇ Contractor will install a regulatory speed limit sign at the end of the work zone.

**LEGEND**

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

SHEET 2 OF 12



**BARRICADE AND CONSTRUCTION PROJECT LIMIT**

**BC(2)-21**

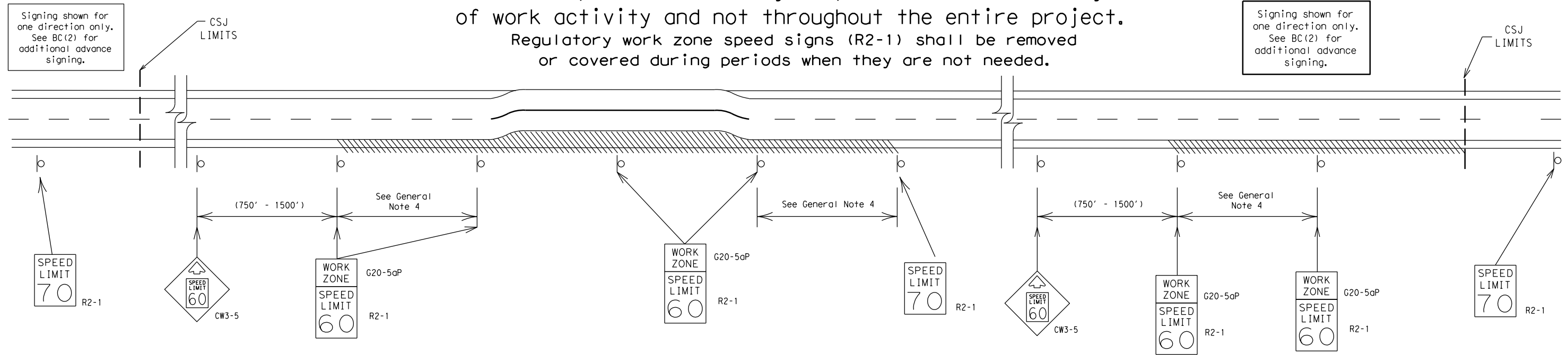
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# TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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



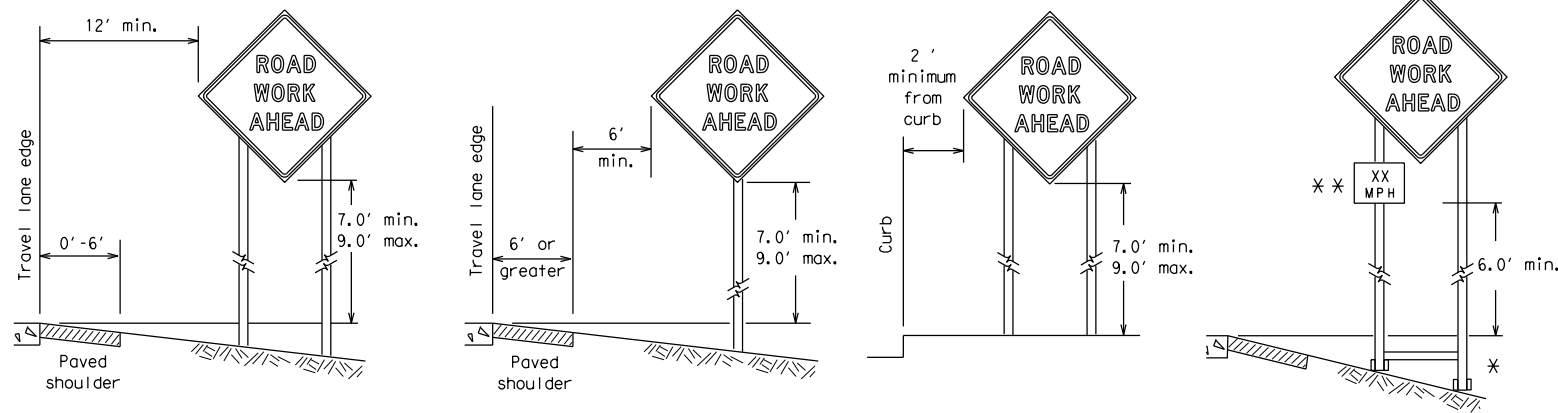
## BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 21

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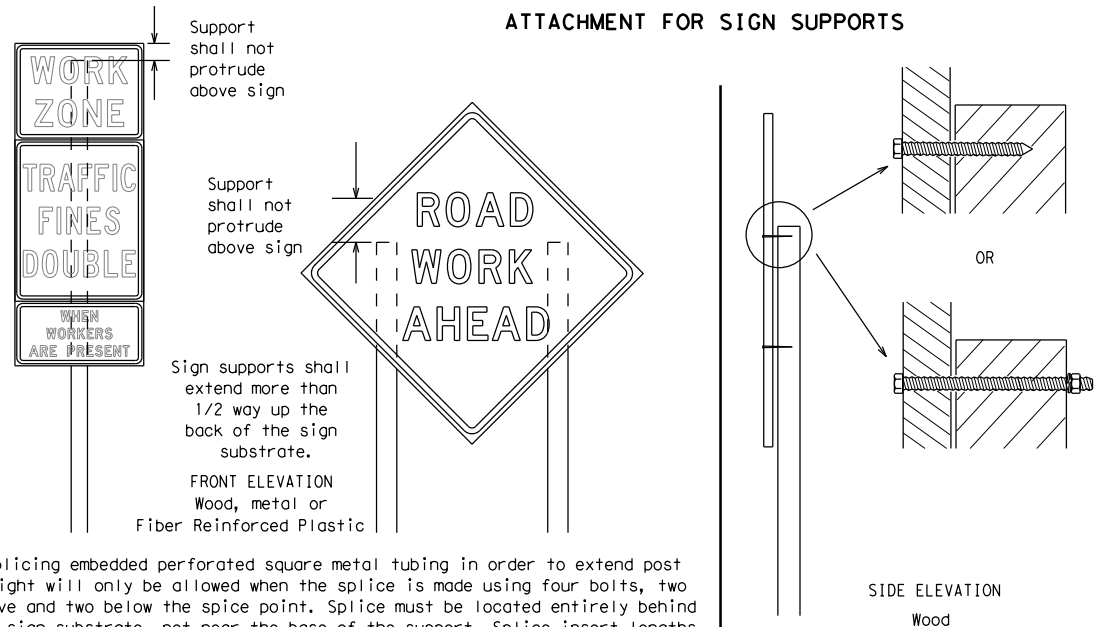
**TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS**



\* 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**



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

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**

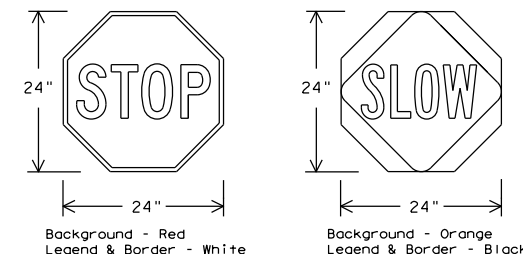
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

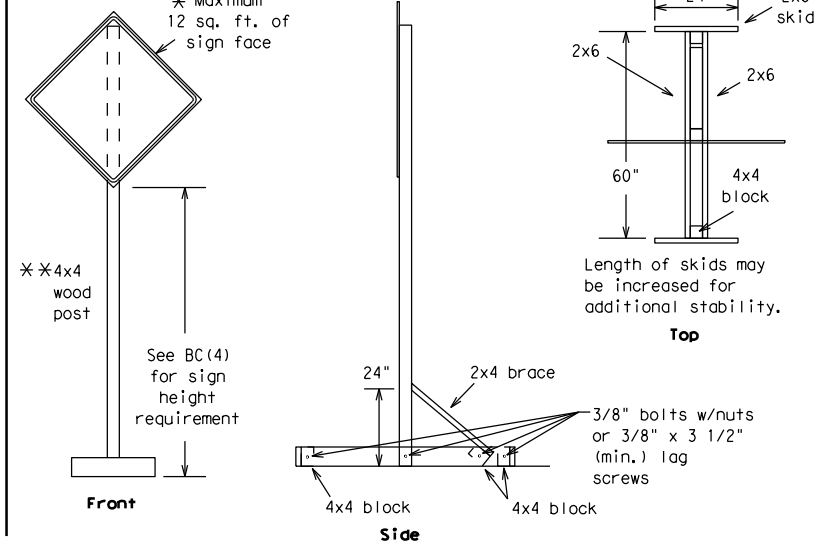
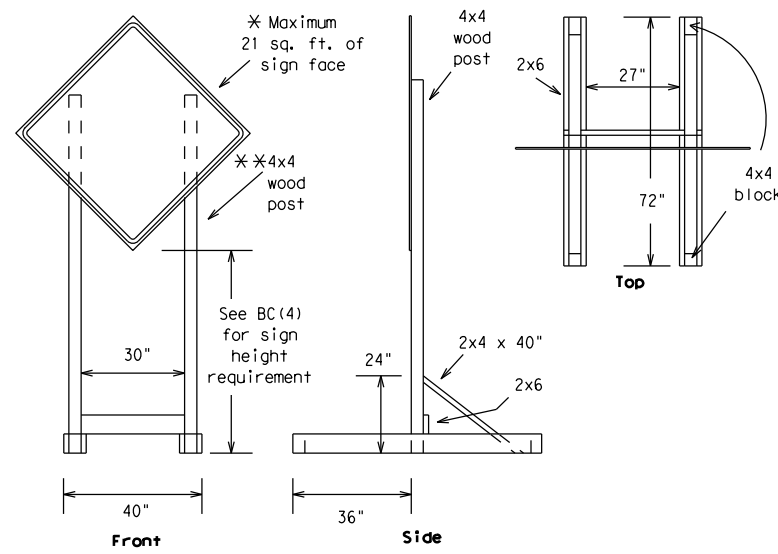


**BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES**

**BC (4) - 21**

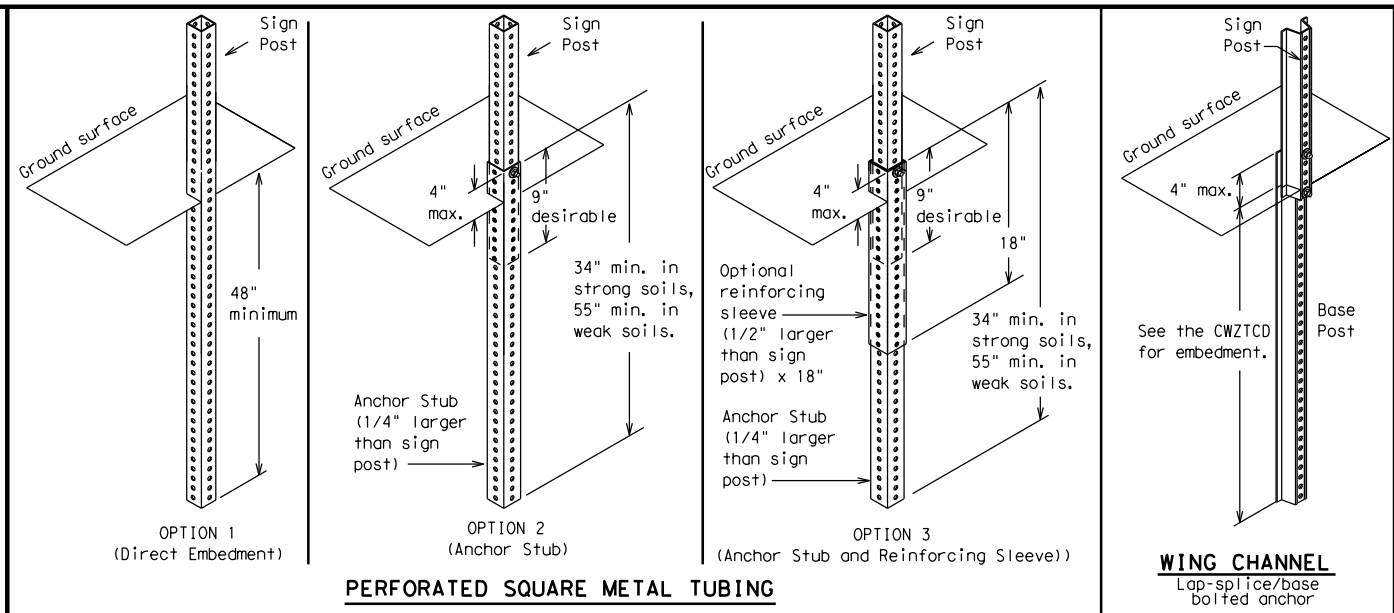
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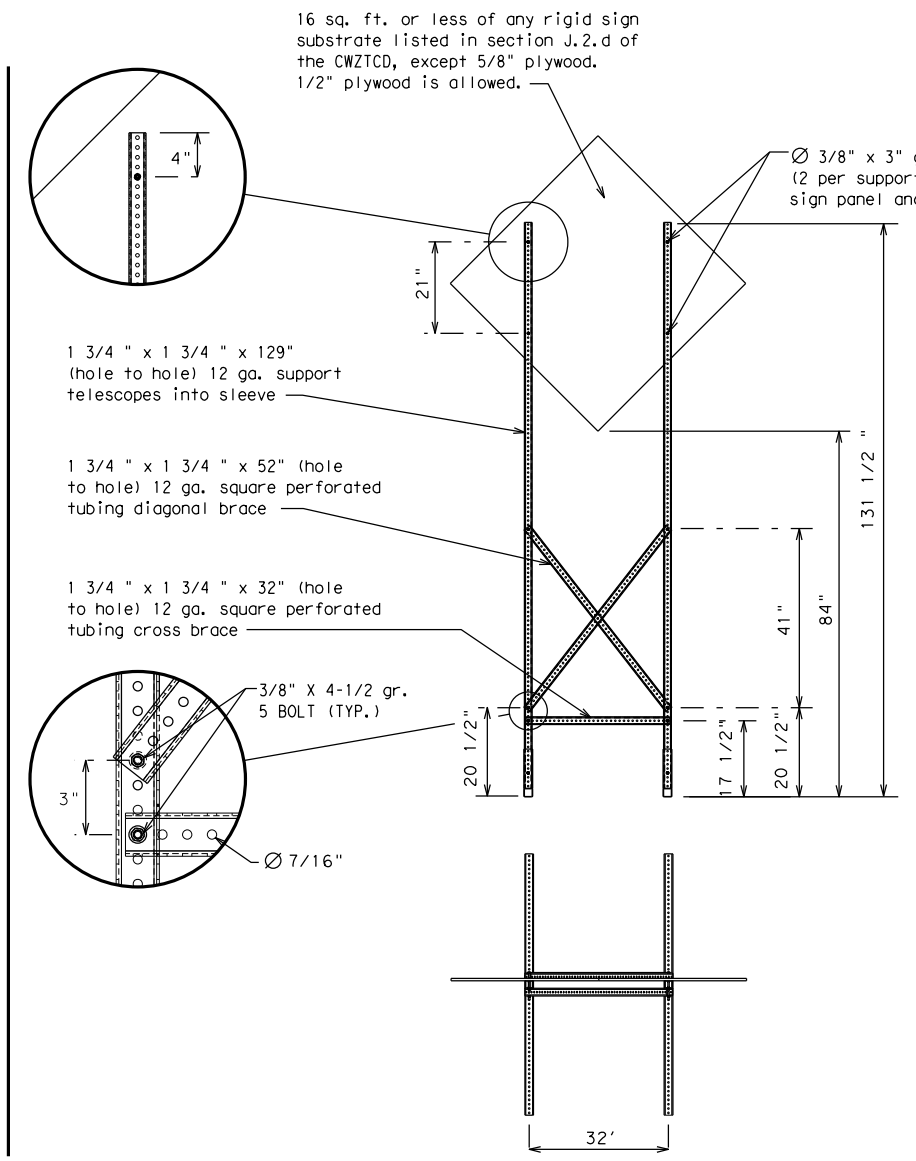
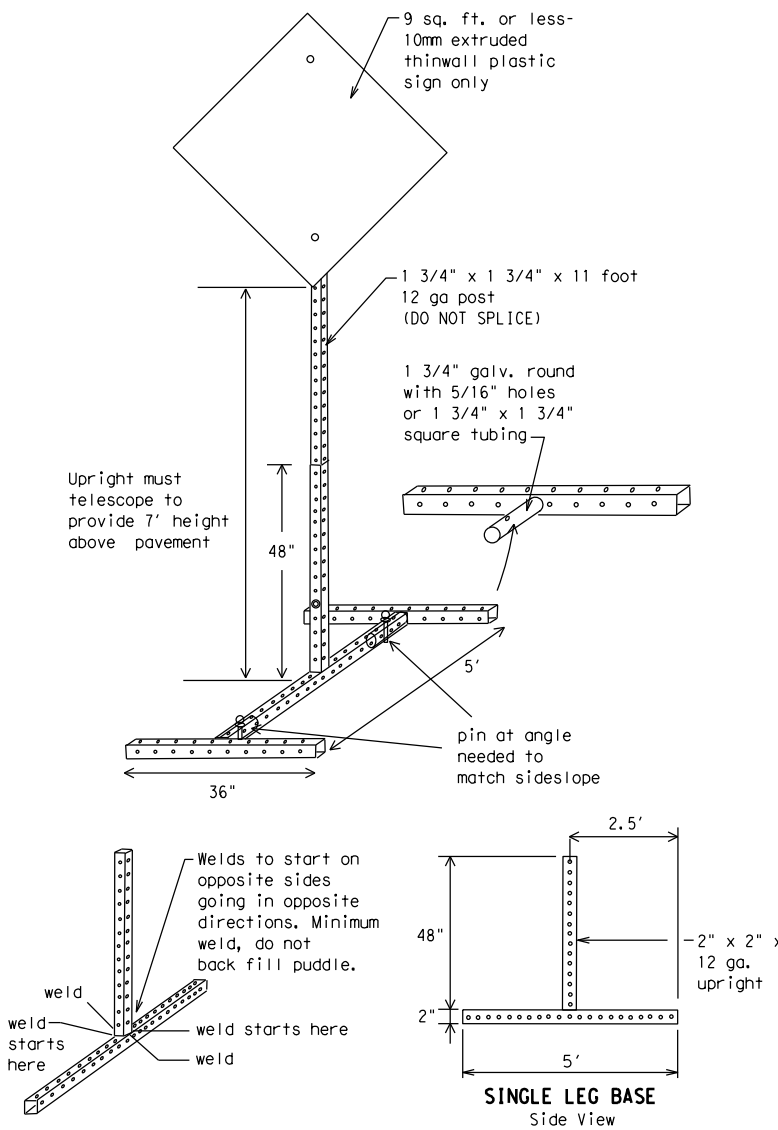
**SKID MOUNTED WOOD SIGN SUPPORTS**

\* 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.

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**BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT**

**BC(5) - 21**

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

# RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

## PORTABLE CHANGEABLE MESSAGE SIGNS

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

## Phase 1: Condition Lists

### Road/Lane/Ramp Closure List

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

### Other Condition List

FRONTAGE ROAD CLOSED
SHOULDER CLOSED XXX FT
RIGHT LN CLOSED XXX FT
RIGHT X LANES OPEN
DAYTIME LANE CLOSURES
I-XX SOUTH EXIT CLOSED
EXIT XXX CLOSED X MILE
RIGHT LN TO BE CLOSED
X LANES CLOSED TUE - FRI
ROADWORK XXX FT
FLAGGER XXXX FT
RIGHT LN NARROWS XXXX FT
MERGING TRAFFIC XXXX FT
LOOSE GRAVEL XXXX FT
DETOUR X MILE
ROADWORK PAST SH XXXX
BUMP XXXX FT
TRAFFIC SIGNAL XXXX FT
ROAD REPAIRS XXXX FT
LANE NARROWS XXXX FT
TWO-WAY TRAFFIC XX MILE
CONST TRAFFIC XXX FT
UNEVEN LANES XXXX FT
ROUGH ROAD XXXX FT
ROADWORK NEXT FRI-SUN
US XXX EXIT X MILES
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
DETOUR NEXT X EXITS
USE EXIT XXX
STAY ON US XXX SOUTH
TRUCKS USE US XXX N
WATCH FOR TRUCKS
EXPECT DELAYS
REDUCE SPEED XXX FT
USE OTHER ROUTES
STAY IN LANE *
FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
END SHOULDER USE
WATCH FOR WORKERS

### Location List

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

### Warning List

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

### \*\* Advance Notice List

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

\*\* See Application Guidelines Note 6.

## APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS 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
Canot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High-Occupancy Vehicle	HOV	Tuesday	TUES
Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

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



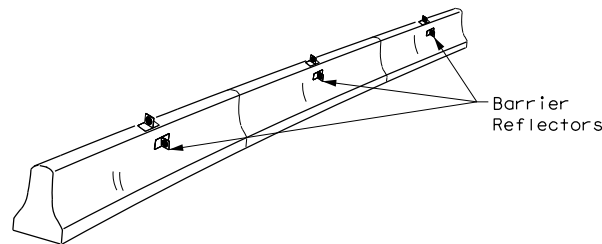
## BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC (6) - 21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	YKM	FAYETTE	21	

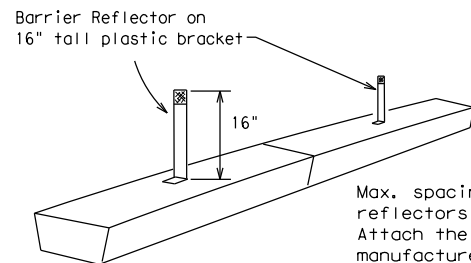
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



**CONCRETE TRAFFIC BARRIER (CTB)**

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

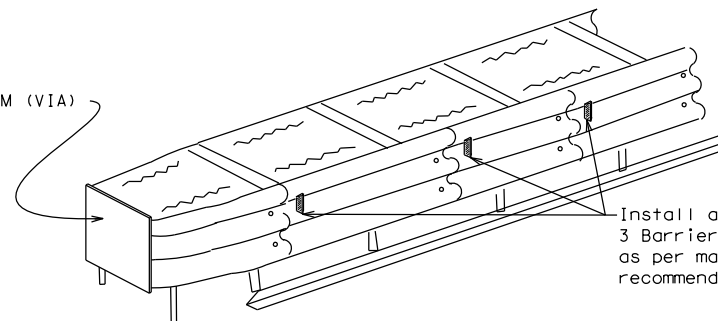


**LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES**

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

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

**LOW PROFILE CONCRETE BARRIER (LPCB)**



**DELINEATION OF END TREATMENTS**

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

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

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

**WARNING LIGHTS**

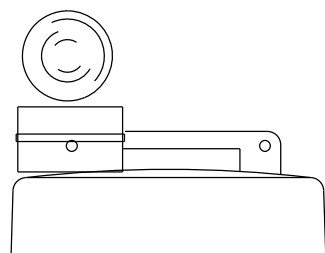
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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

**WARNING LIGHTS MOUNTED ON PLASTIC DRUMS**

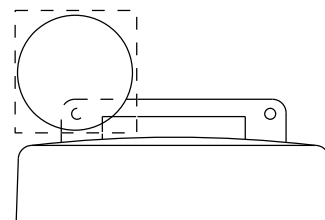
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing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

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

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



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

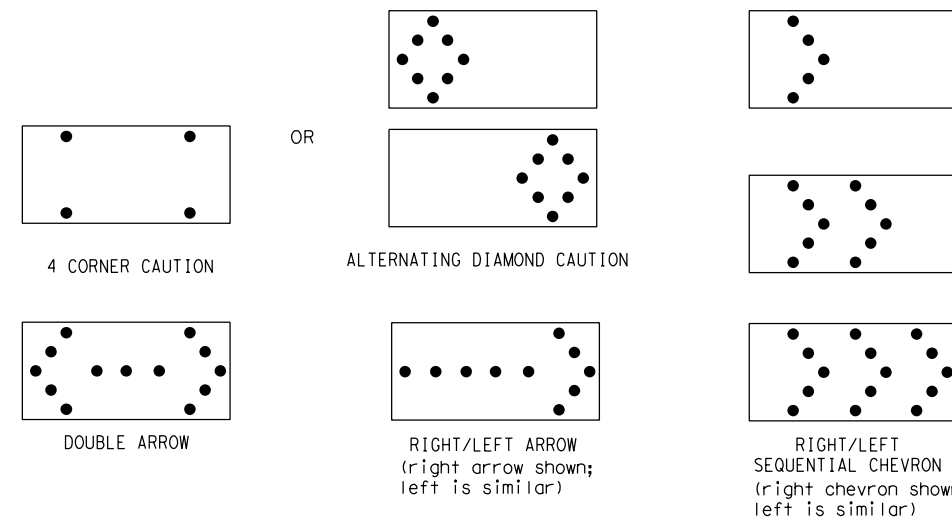


Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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



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

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

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

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

**FLASHING ARROW BOARDS**

SHEET 7 OF 12

**TRUCK-MOUNTED ATTENUATORS**

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



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

**BC (7) -21**

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		1266	01	008	FM 956				
9-07	8-14	DIST	COUNTY		SHEET NO.				
7-13	5-21	YKM	FAYETTE		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:

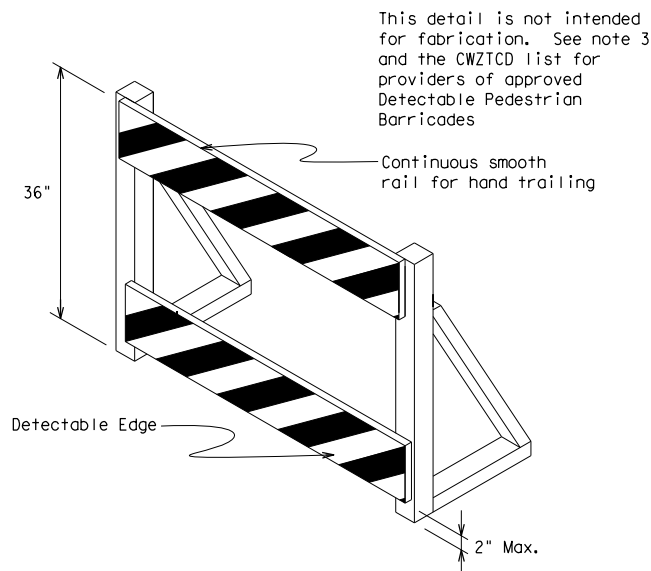
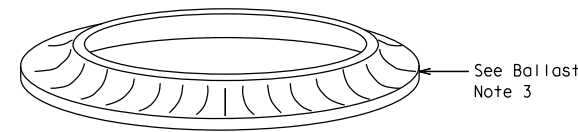
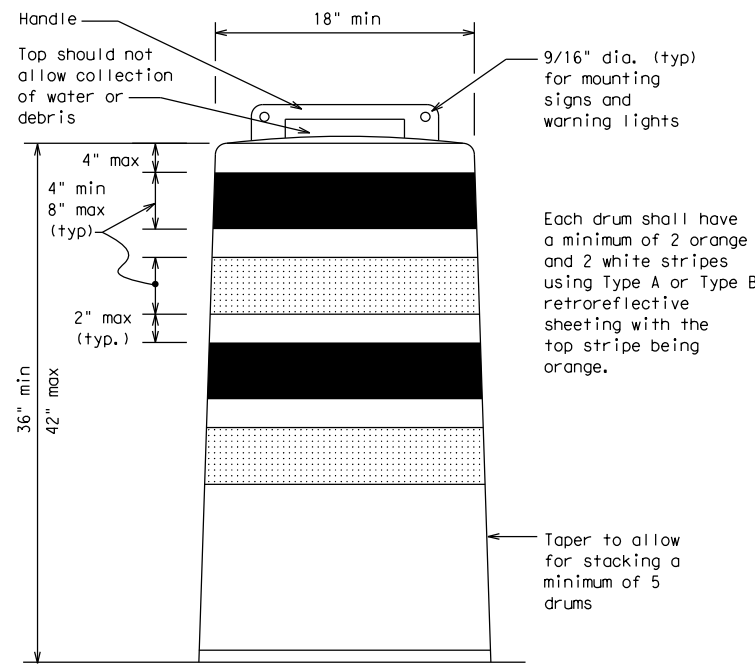
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

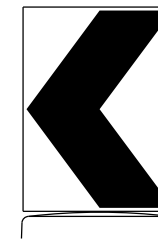
- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other 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.



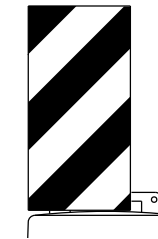
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

**DETECTABLE PEDESTRIAN BARRICADES**

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



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



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

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

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

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

SHEET 8 OF 12

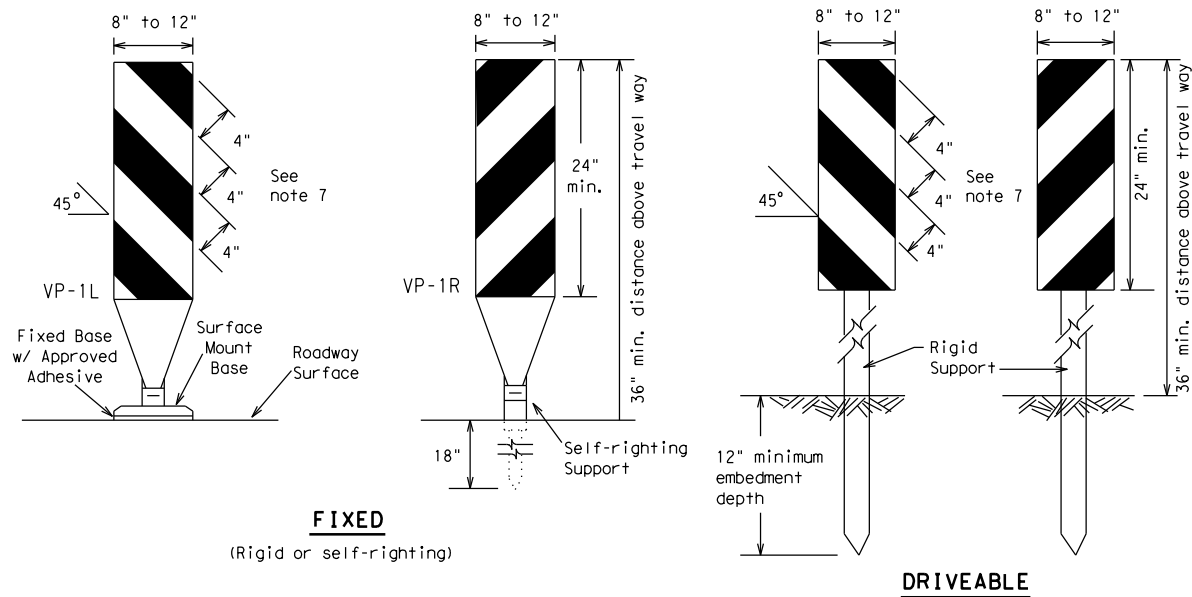


**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (8) - 21**

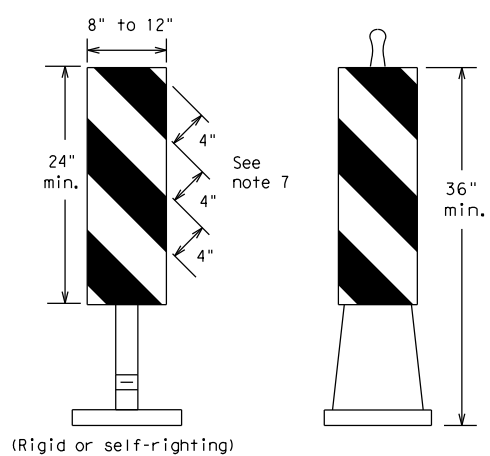
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© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		1266	01	008	FM 956
4-03	8-14	DIST	COUNTY	SHEET NO.	
9-07	5-21	YKM	FAYETTE	23	
7-13					

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

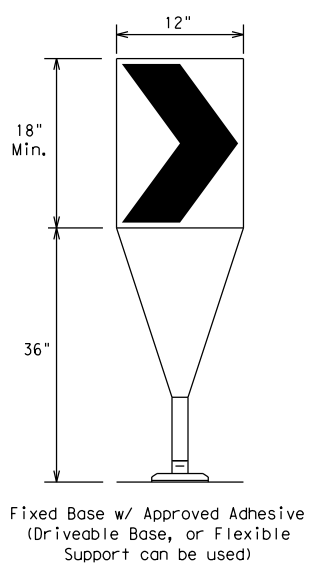
**DRIVEABLE**



**PORTABLE**

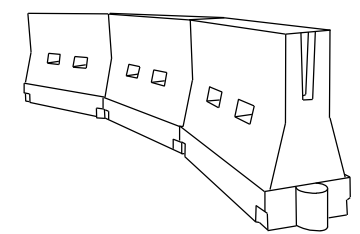
**VERTICAL PANELS (VPs)**

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



- 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 cones and the top of the unit shall not be less than 32 inches in height.

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

**GENERAL NOTES**

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

Posted Speed	Formula	Minimum Desirable Taper Lengths * *			Suggested Maximum Spacing of Channelizing Devices	
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent
30	L = WS <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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REVISIONS		1266	01	008	FM 956
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DATE: 7/3/2024 \$TIME\$  
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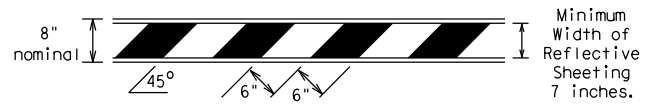


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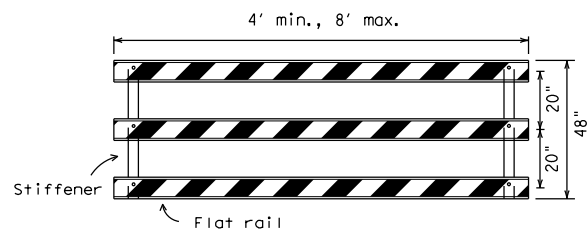
**TYPE 3 BARRICADES**

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

Barricades shall NOT be used as a sign support.

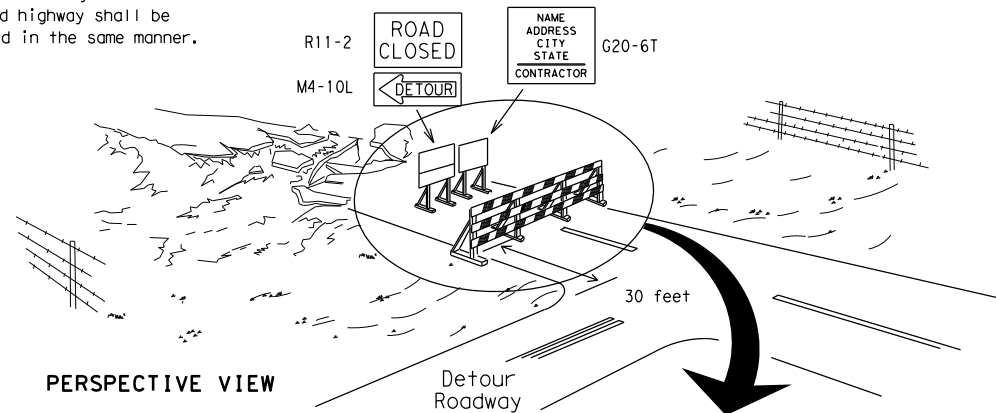


**TYPICAL STRIPING DETAIL FOR BARRICADE RAIL**



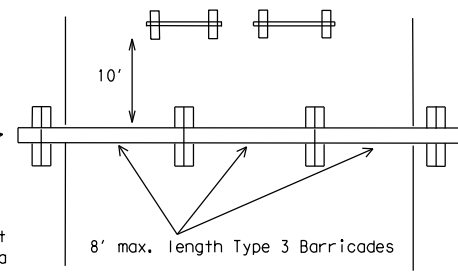
**TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES**

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



PERSPECTIVE VIEW

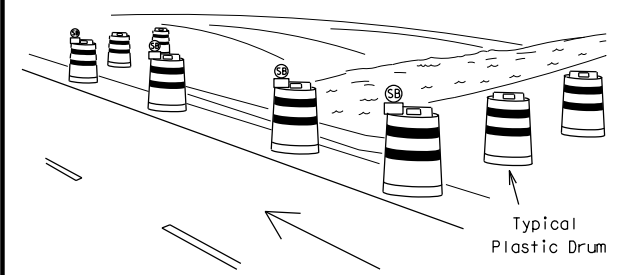
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



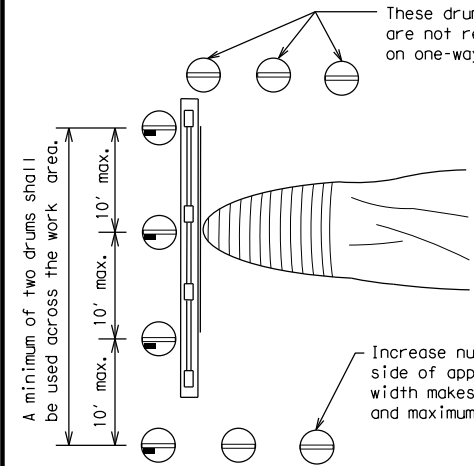
PLAN VIEW

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

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



PERSPECTIVE VIEW

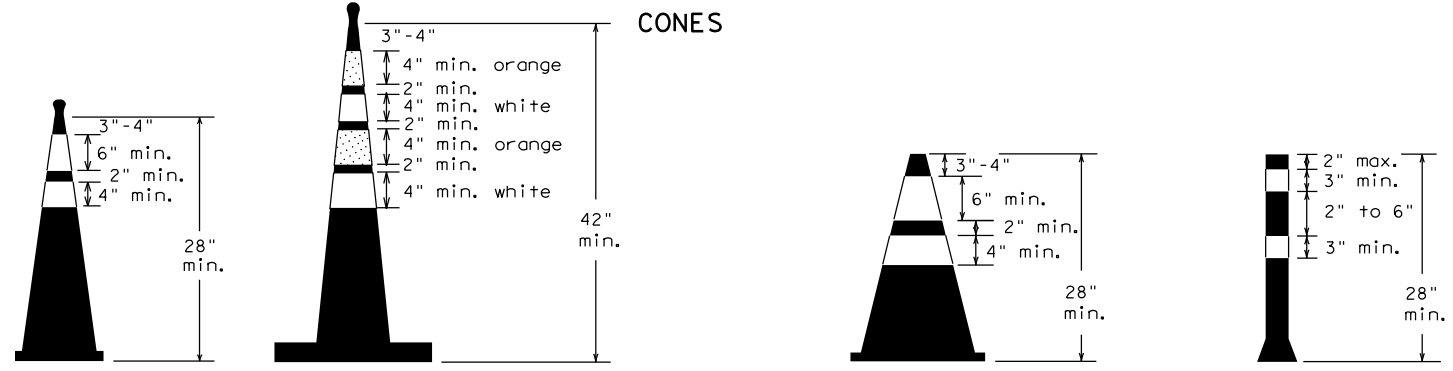


PLAN VIEW

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

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

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



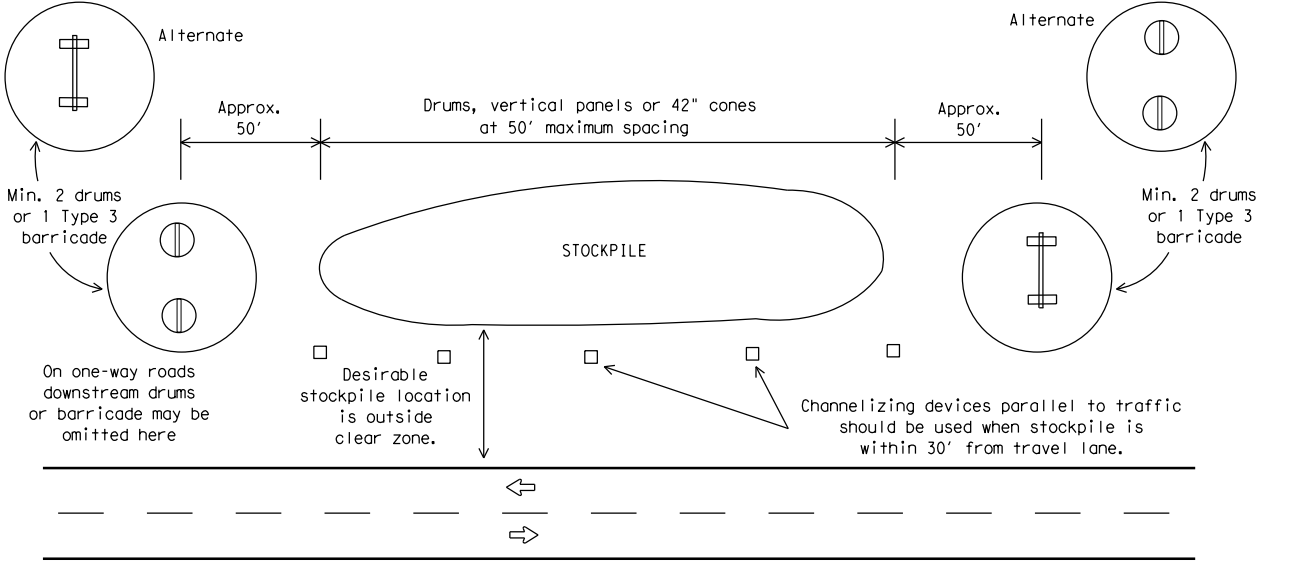
Two-Piece cones

One-Piece cones

Tubular Marker

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

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



**TRAFFIC CONTROL FOR MATERIAL STOCKPILES**



**BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES**

**BC (10) - 21**

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DATE: 7/3/2024 \$TIME\$  
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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.

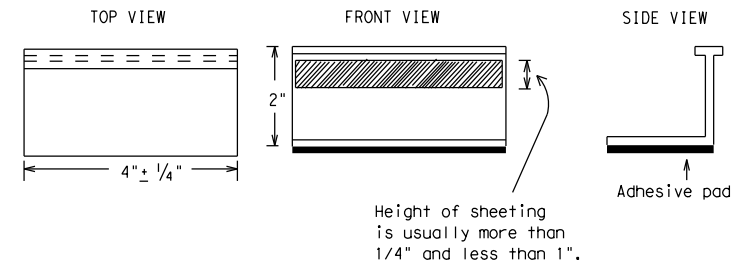
### MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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

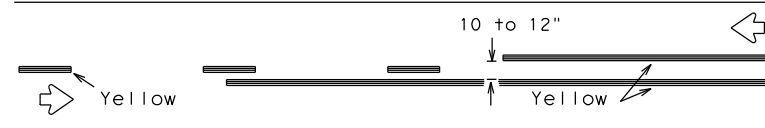
**BC(11) - 21**

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1-02	7-13			
11-02	8-14			
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	YKM	FAYETTE	<b>26</b>	

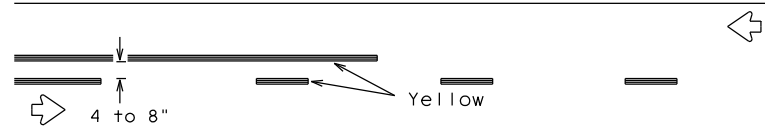
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## PAVEMENT MARKING PATTERNS

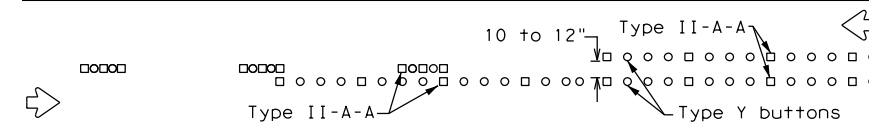


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

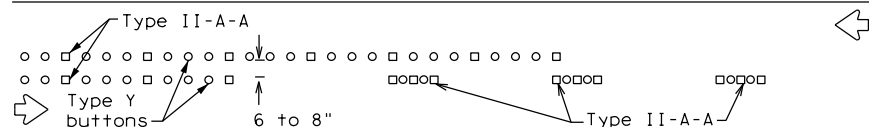


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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

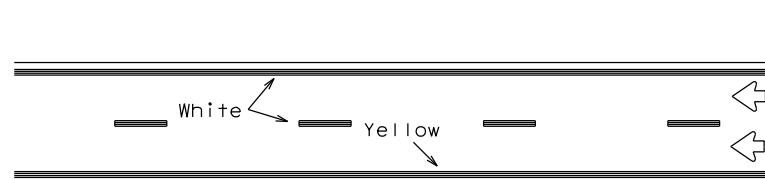


RAISED PAVEMENT MARKERS - PATTERN A



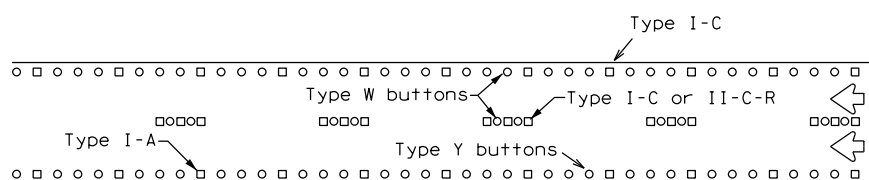
RAISED PAVEMENT MARKERS - PATTERN B

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



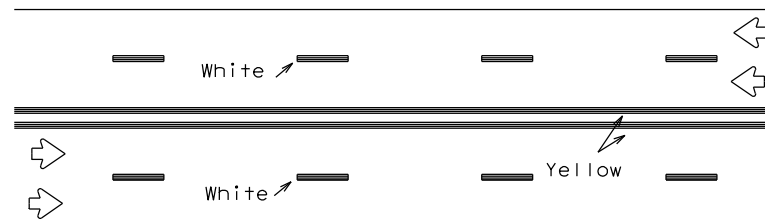
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



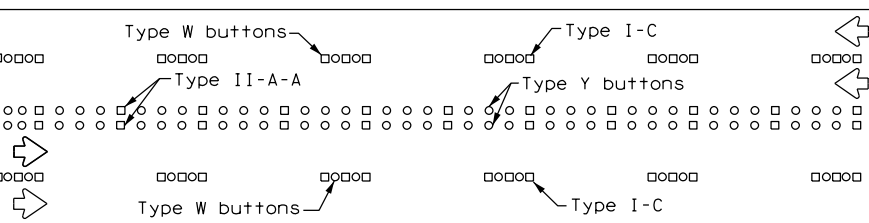
RAISED PAVEMENT MARKERS

## EDGE & LANE LINES FOR DIVIDED HIGHWAY



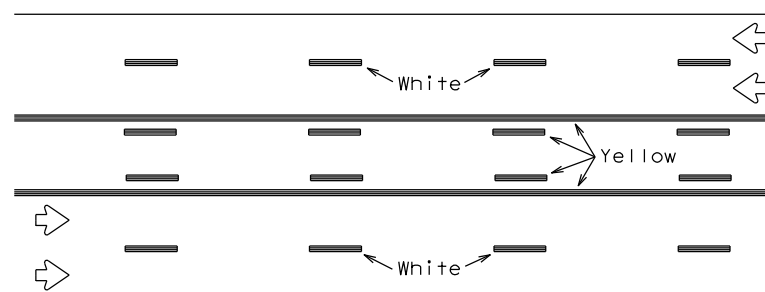
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



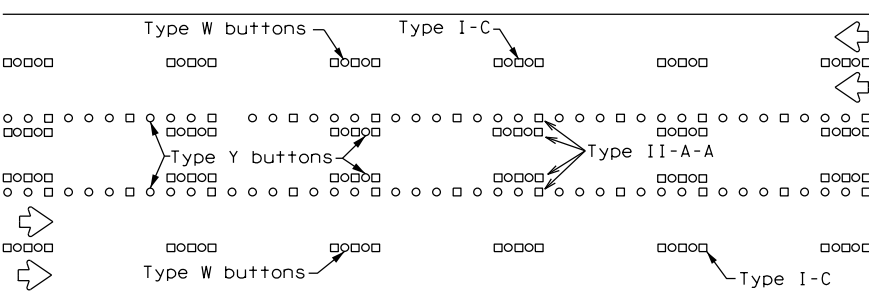
RAISED PAVEMENT MARKERS

## LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

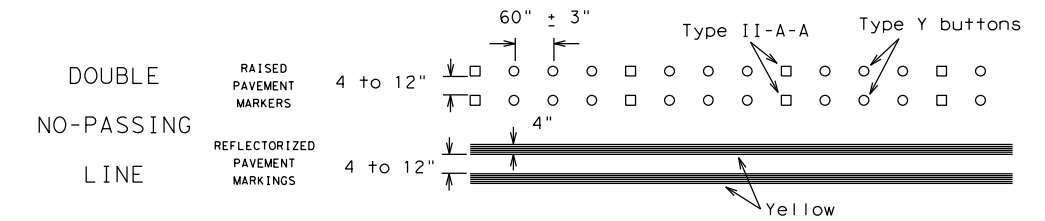
Prefabricated markings may be substituted for reflectorized pavement markings.



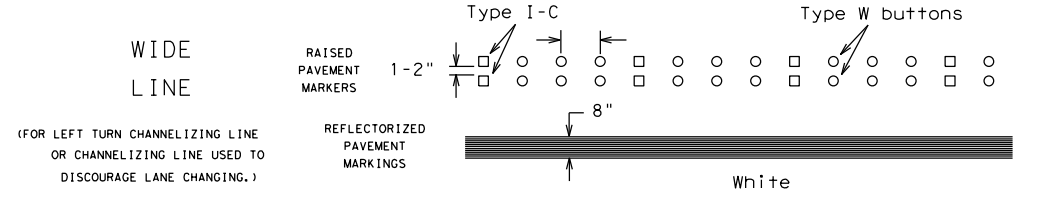
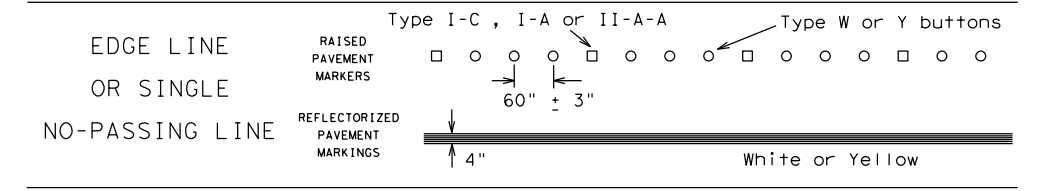
RAISED PAVEMENT MARKERS

## TWO-WAY LEFT TURN LANE

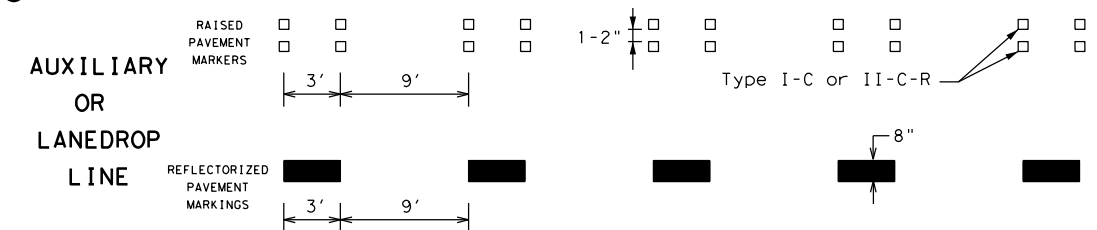
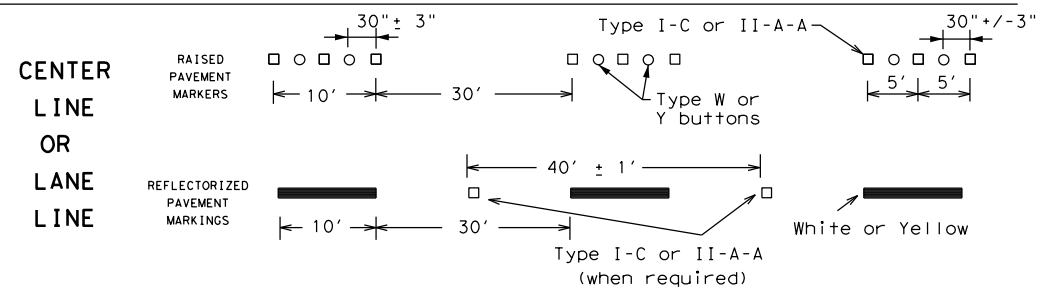
## STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



### SOLID LINES

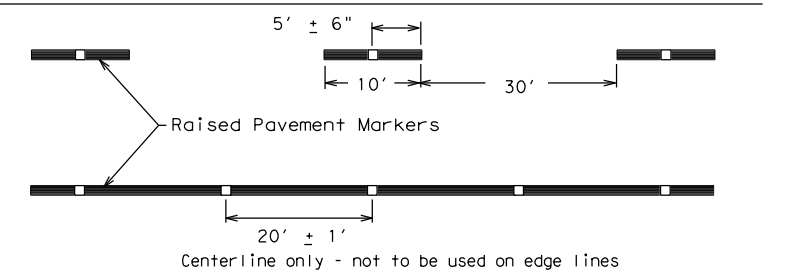


### BROKEN LINES



### 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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
1-97 9-07 5-21				
2-98 7-13	DIST	COUNTY	SHEET NO.	
11-02 8-14	YKM	FAYETTE	27	

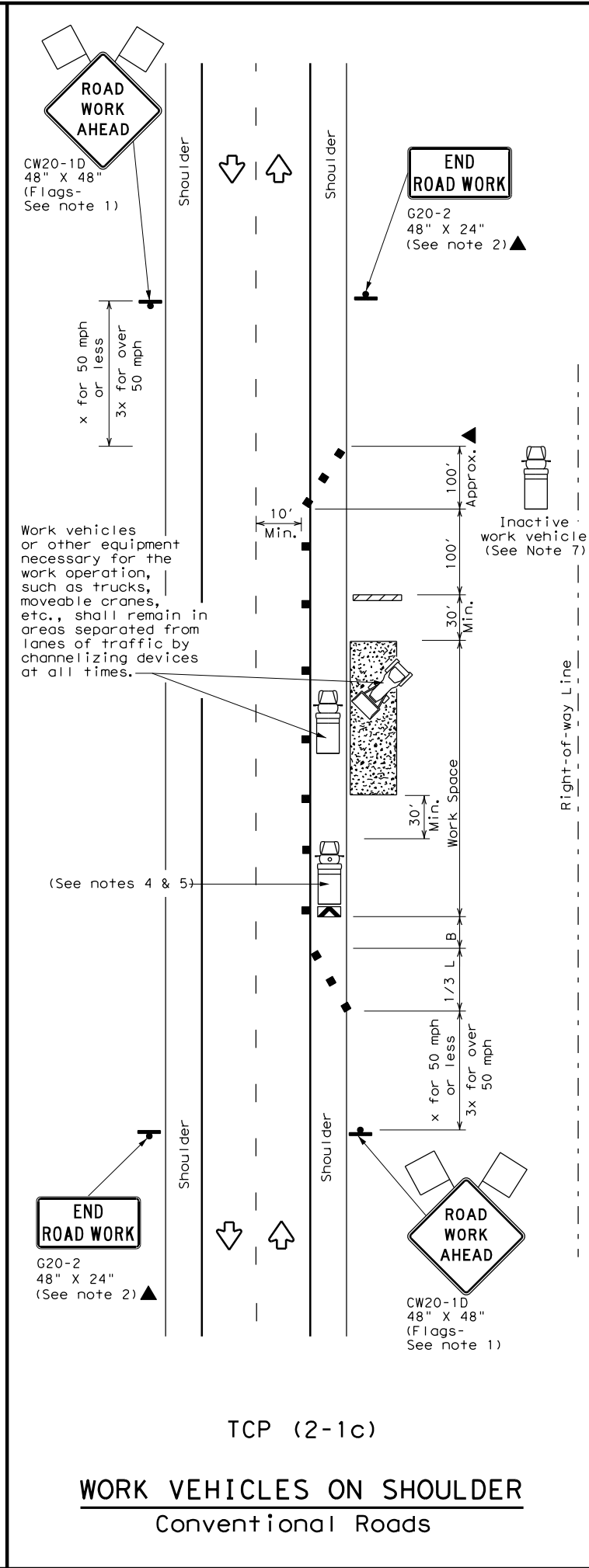
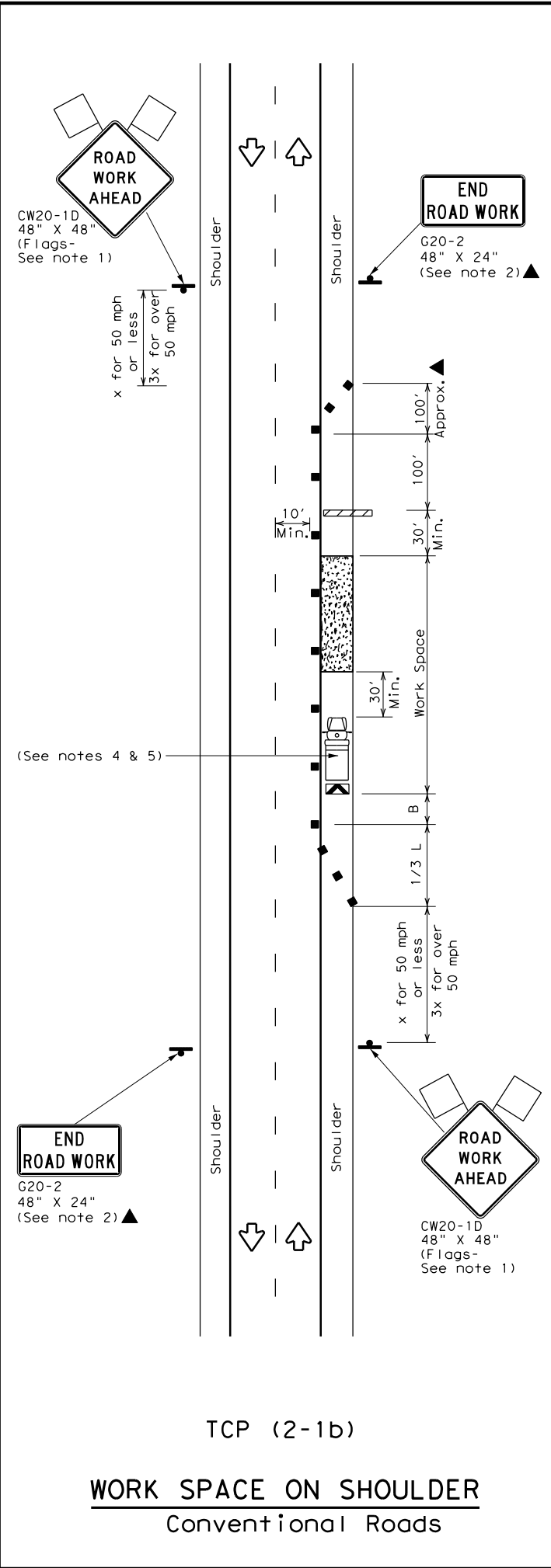
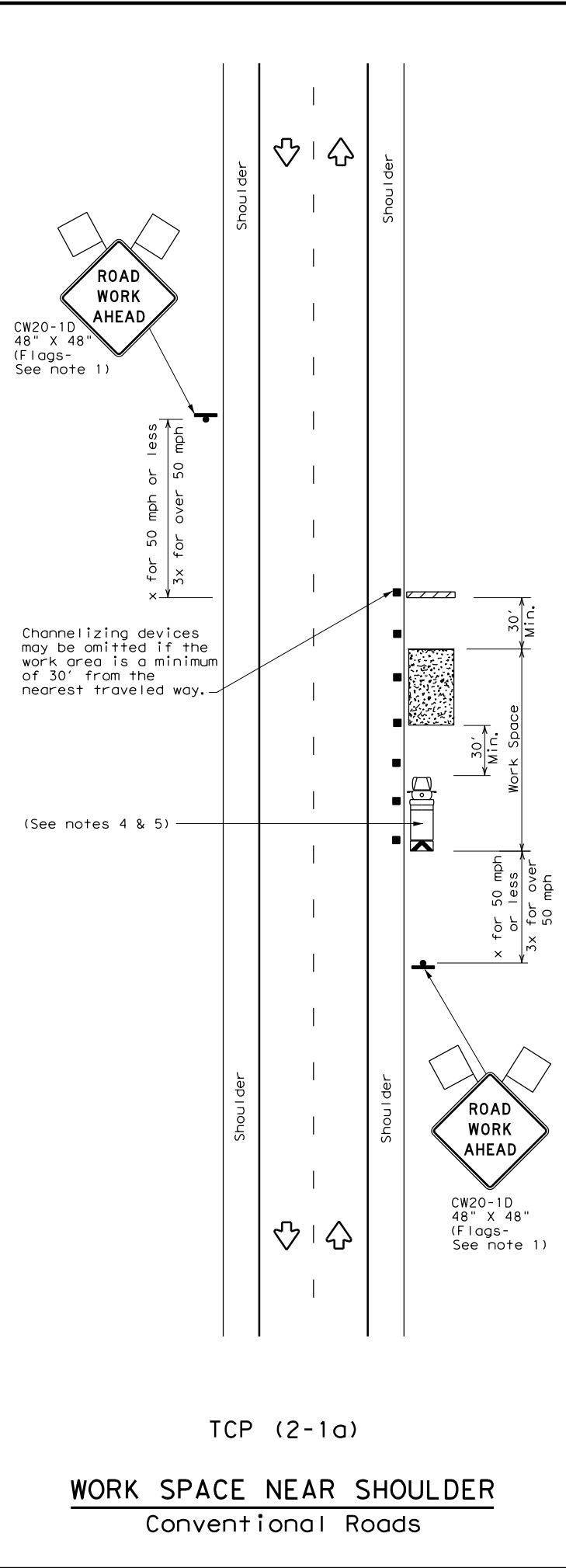
Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$



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
	✓	✓	✓	✓

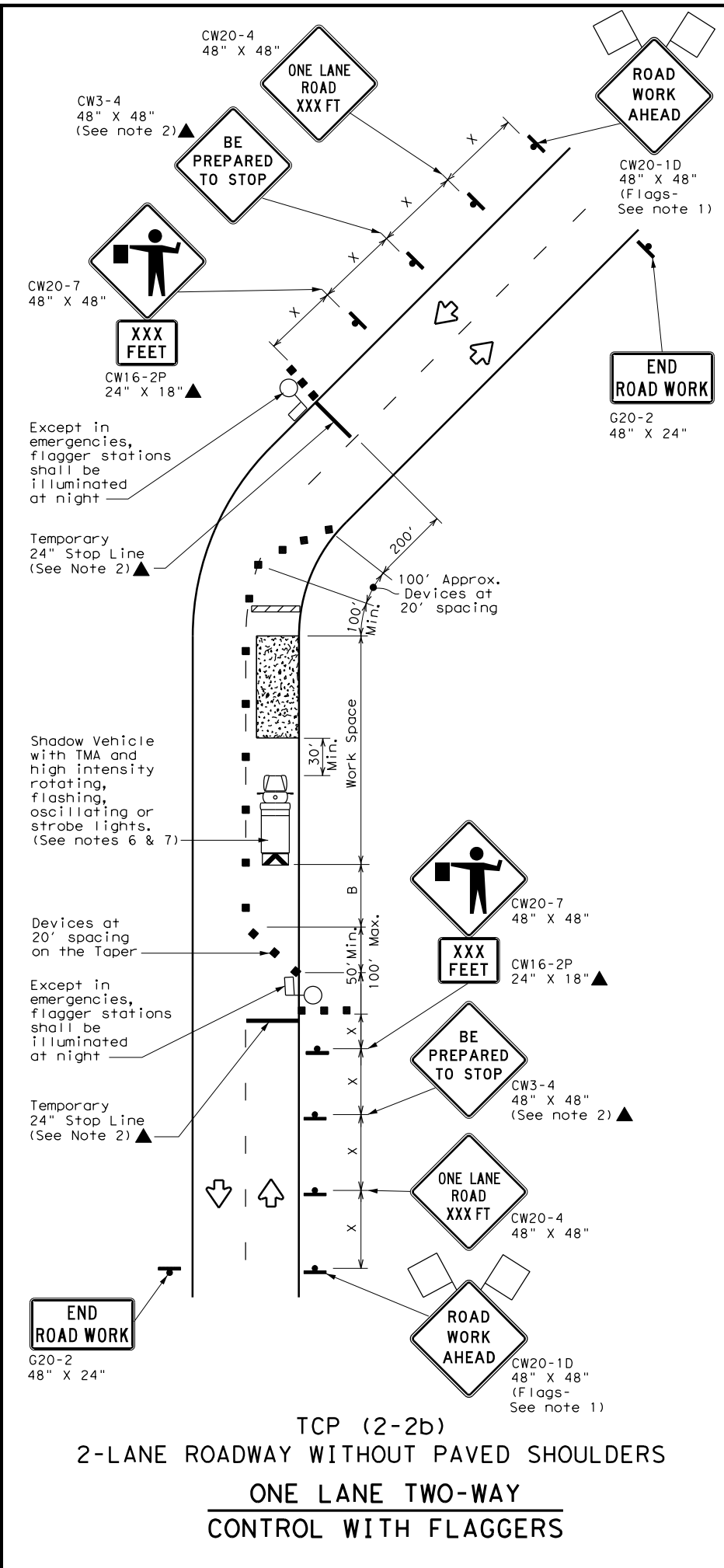
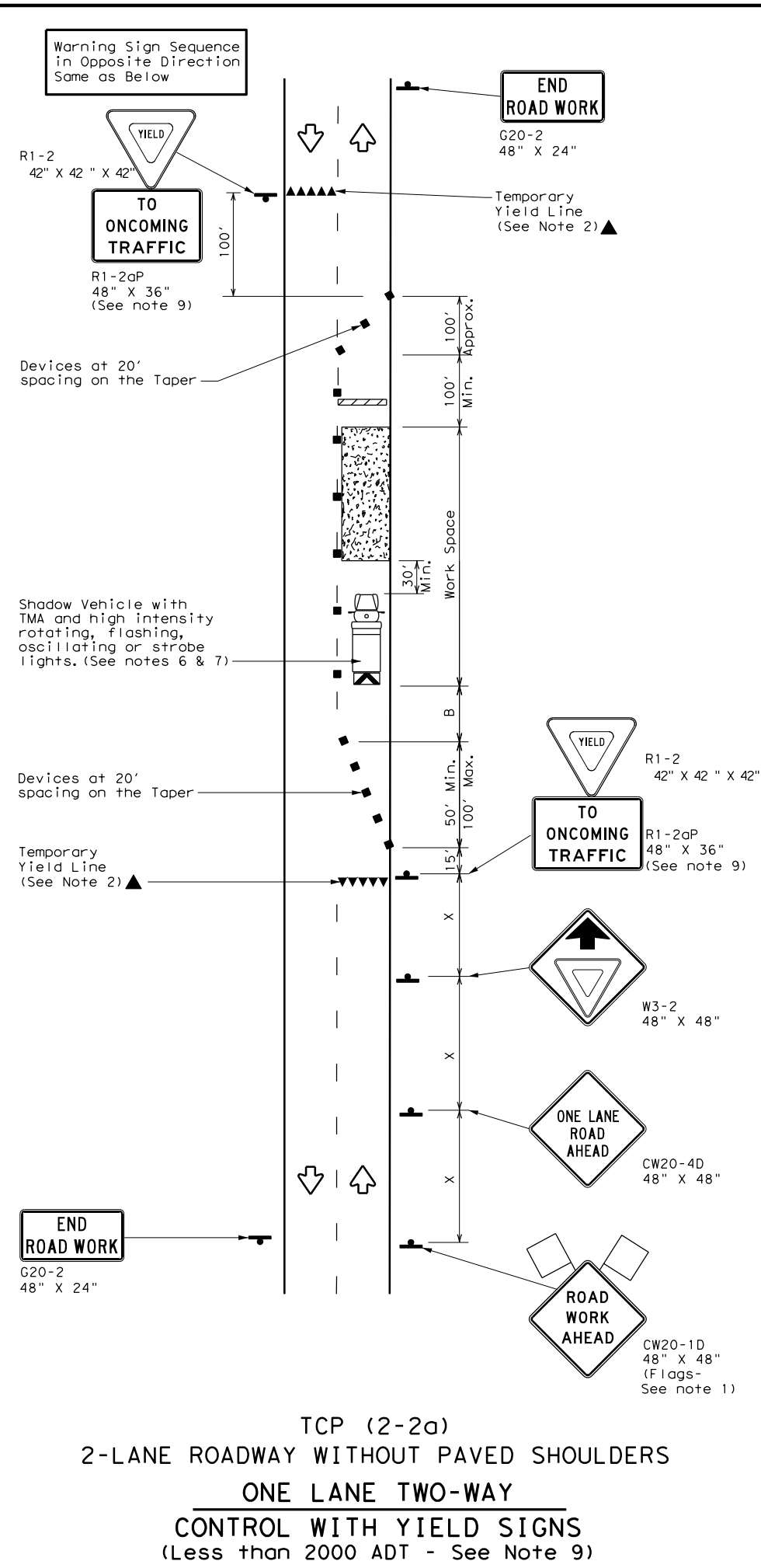
- GENERAL NOTES**
- Flags attached to signs where shown, are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
  - Stockpiled material 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.
  - Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
  - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.



<b>TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK</b>				
<b>TCP (2-1) - 18</b>				
FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CON:	SECT:	JOB:	HIGHWAY:
REVISIONS	1266	01	008	FM 956
2-94 4-98	DIST:	COUNTY:	SHEET NO.:	
8-95 2-12	YKM	FAYETTE	28	
1-97 2-18				

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$



**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'	575'
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

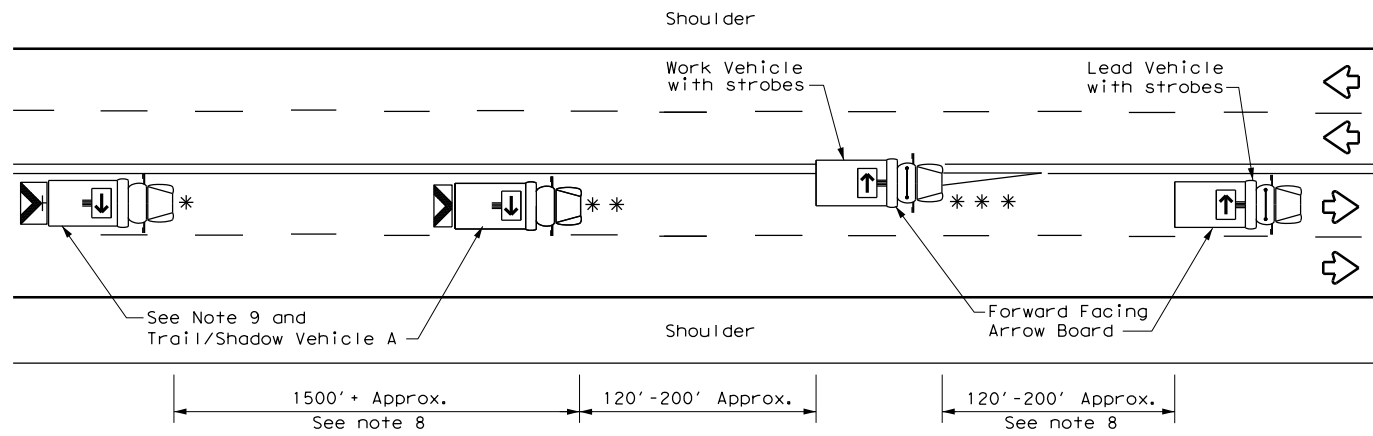
**Traffic Operations Division Standard**

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

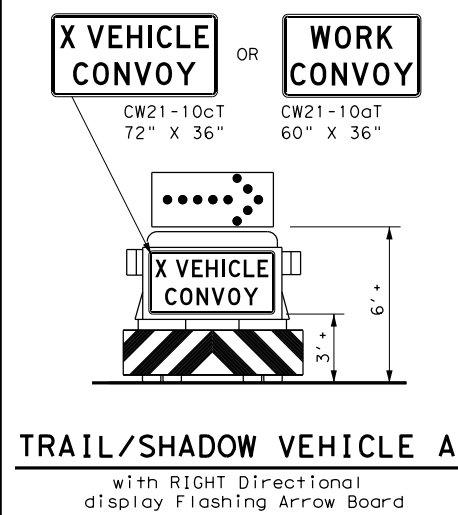
**TCP (2-2) - 18**

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© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS		1266	01	008	FM 956
8-95	3-03	DIST		COUNTY	SHEET NO.
1-97	2-12	YKM		FAYETTE	29
4-98	2-18				

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TCP (3-1a)  
UNDIVIDED MULTILANE ROADWAY



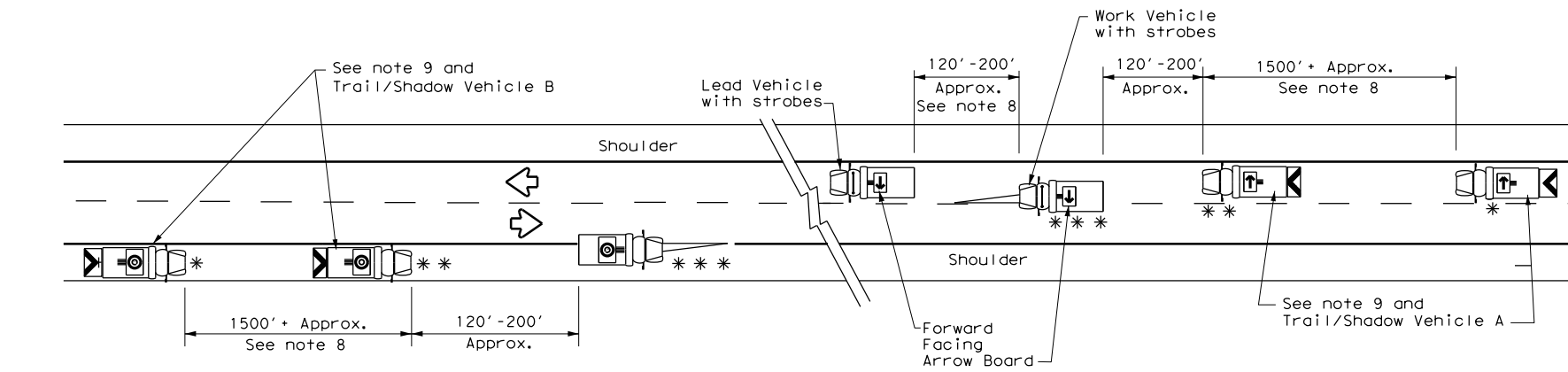
TRAIL/SHADOW VEHICLE A  
with RIGHT Directional display Flashing Arrow Board

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)

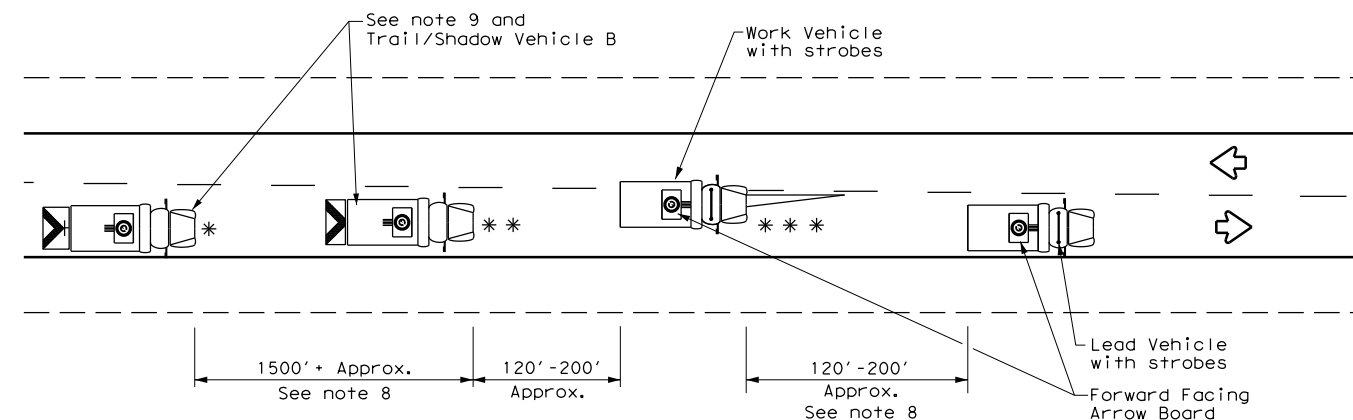
TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
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GENERAL NOTES

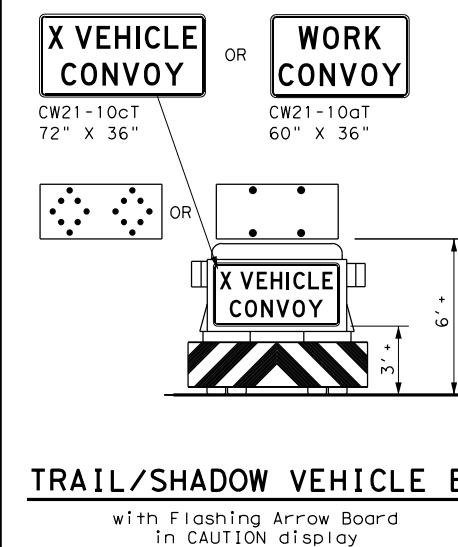
- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic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



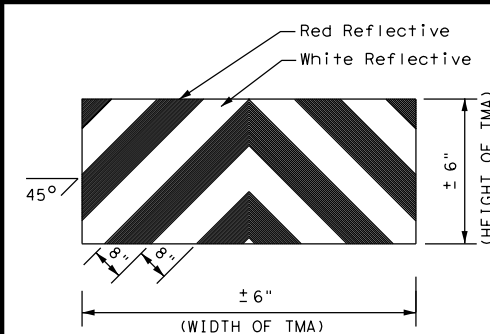
TCP (3-1b)  
TWO-WAY ROADWAY WITH PAVED SHOULDERS



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



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



STRIPING FOR TMA



TRAFFIC CONTROL PLAN  
MOBILE OPERATIONS  
UNDIVIDED HIGHWAYS

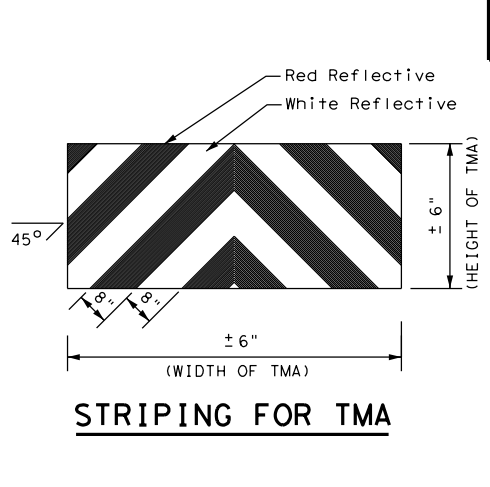
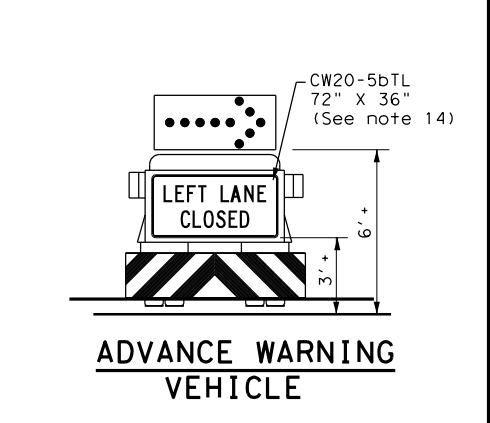
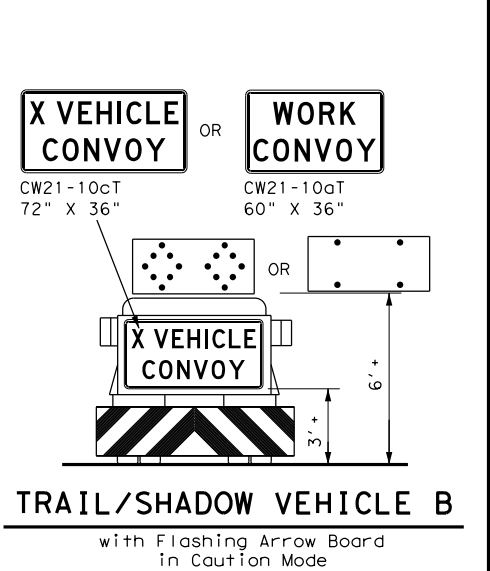
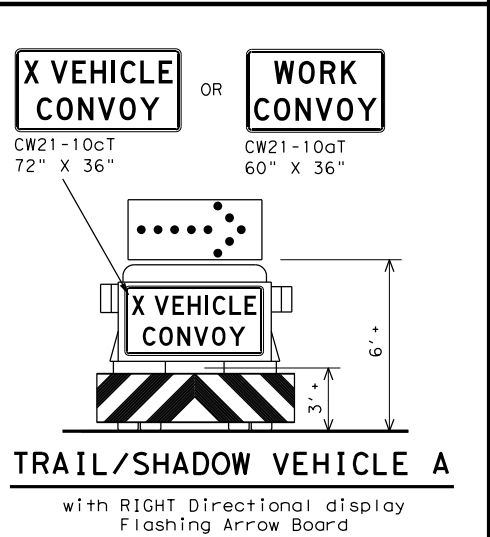
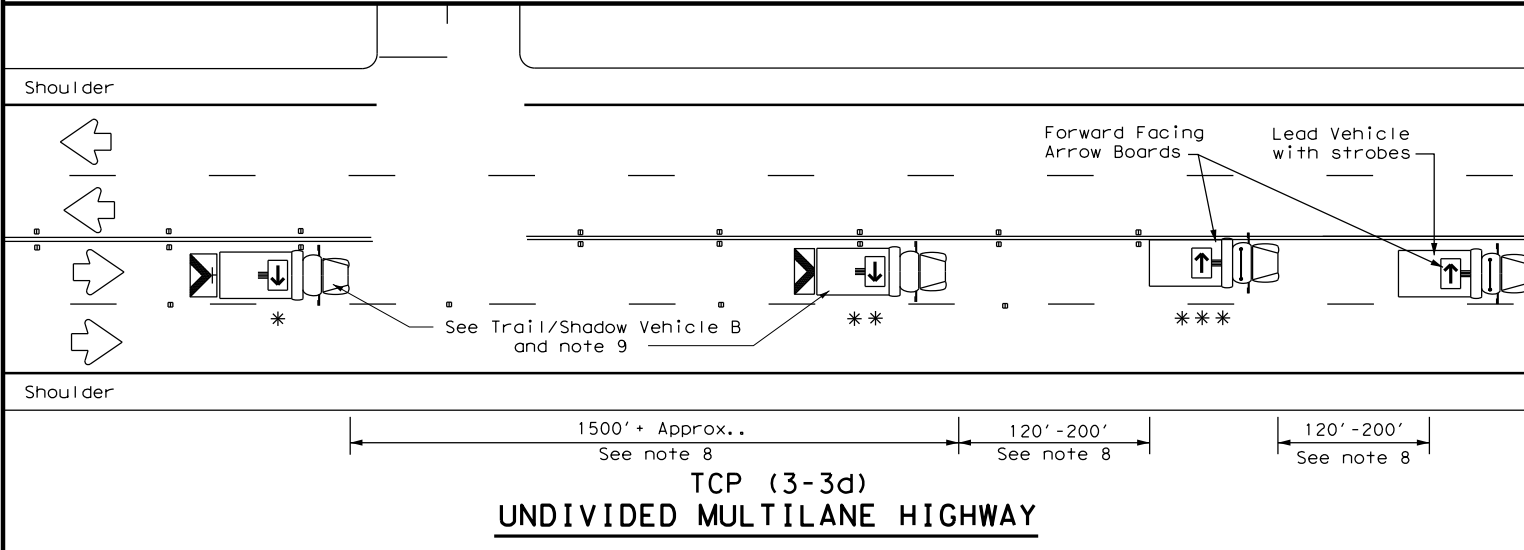
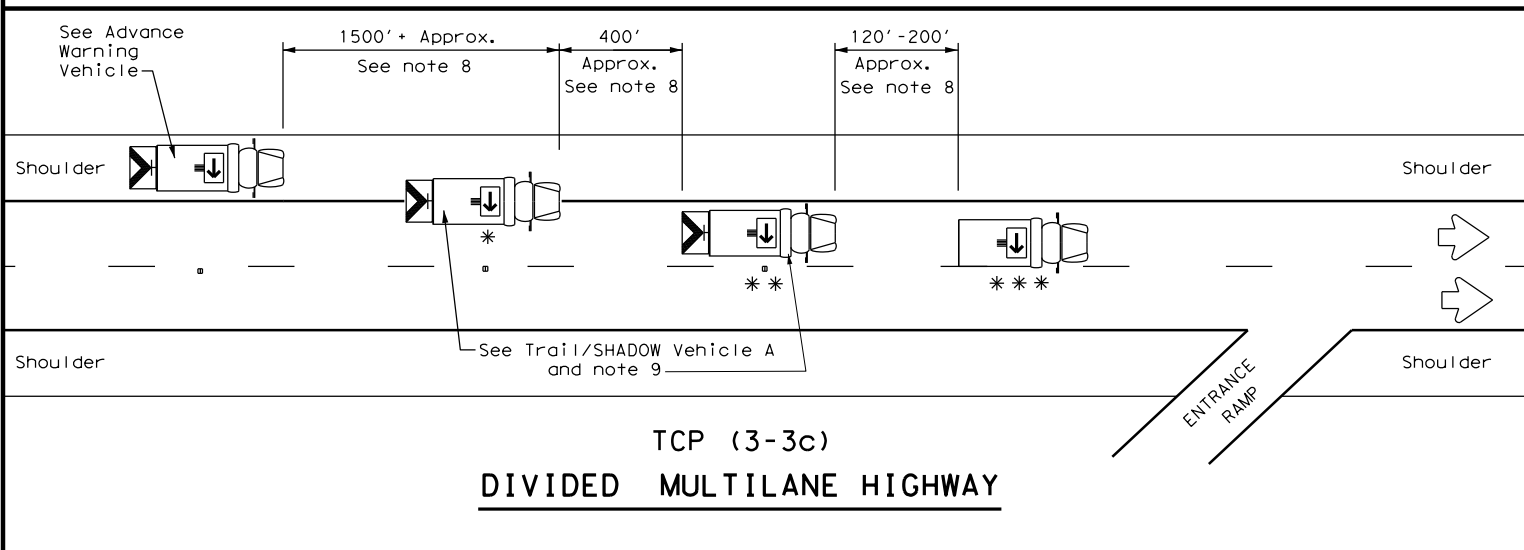
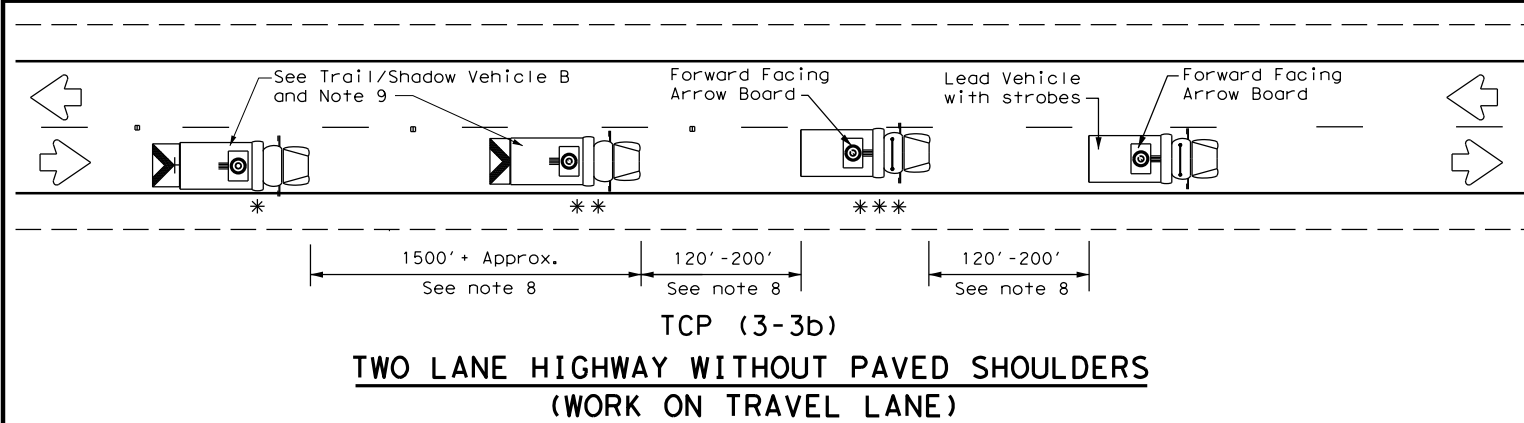
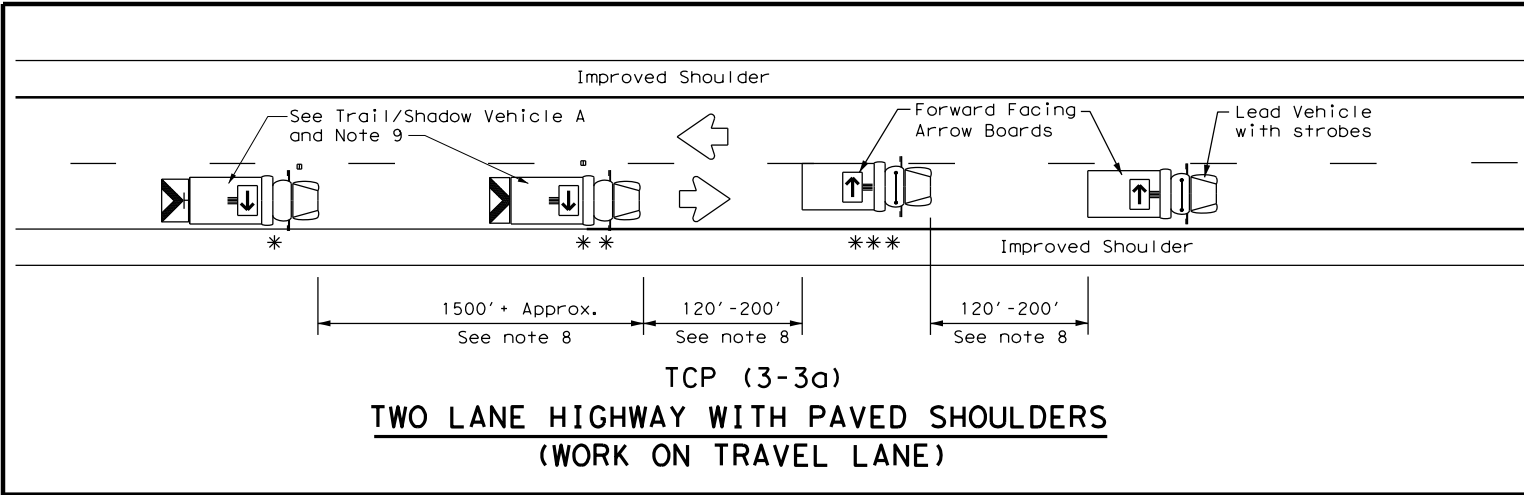
TCP (3-1) - 13

FILE:	tcp3-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	December 1985	CONT	SECT	JOB	HIGHWAY				
REVISIONS		1266	01	008	FM 956				
2-94	4-98	DIST	COUNTY	SHEET NO.					
8-95	7-13	YKM	FAYETTE	30					
1-97									

DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$



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

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

**GENERAL NOTES**

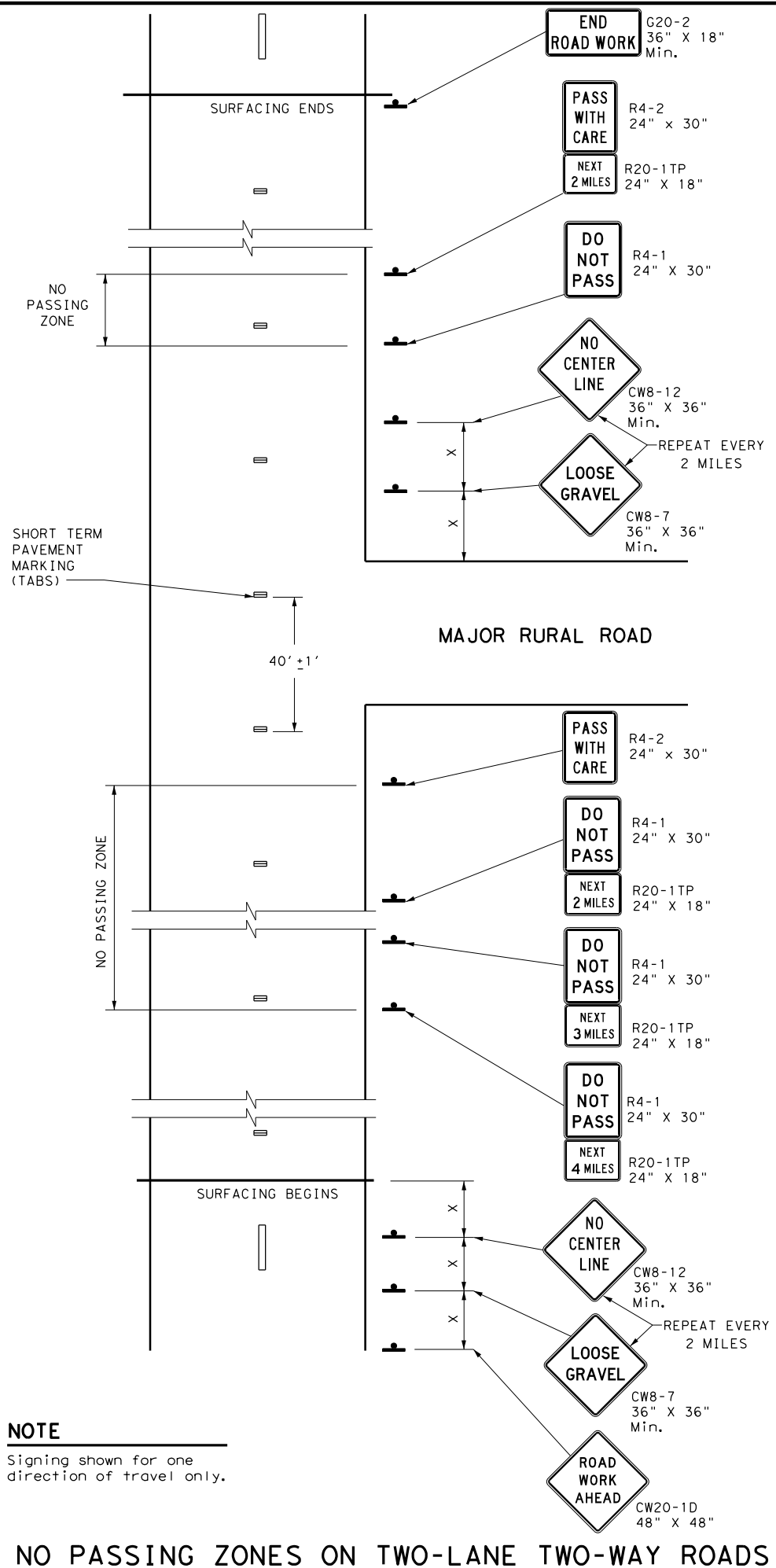
- TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer 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.



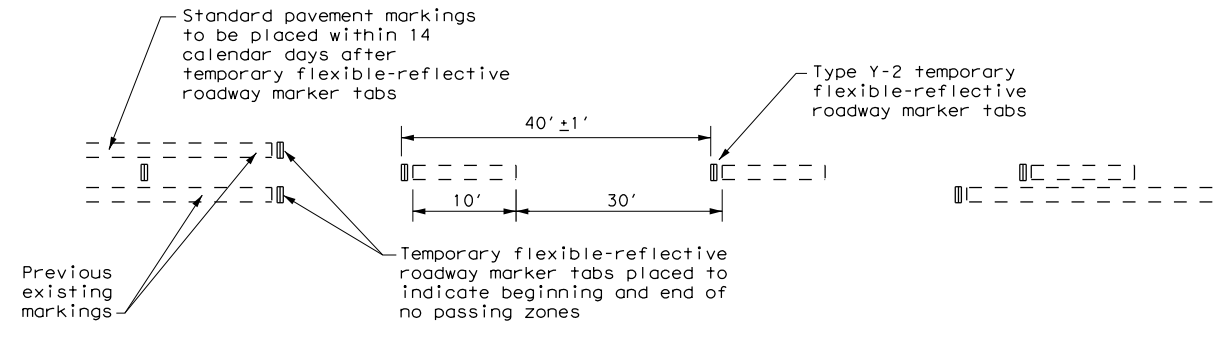
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP (3-3) - 14					
FILE:	tcp3-3.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		1266	01	008	FM 956
2-94	4-98	DIST	COUNTY	SHEET NO.	
8-95	7-13	YKM	FAYETTE	31	
1-97	7-14				

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$



**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

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

- 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.
- 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.
- 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.
- R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

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

- 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.
- 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.
- The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

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

- 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.
- The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

**PAVEMENT MARKINGS**

- 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.
- Tabs shall not be used to simulate edge lines.
- Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

**COORDINATION OF SIGN LOCATIONS**

- 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.
- Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

\* Conventional Roads Only

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

**GENERAL NOTES**

- 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.



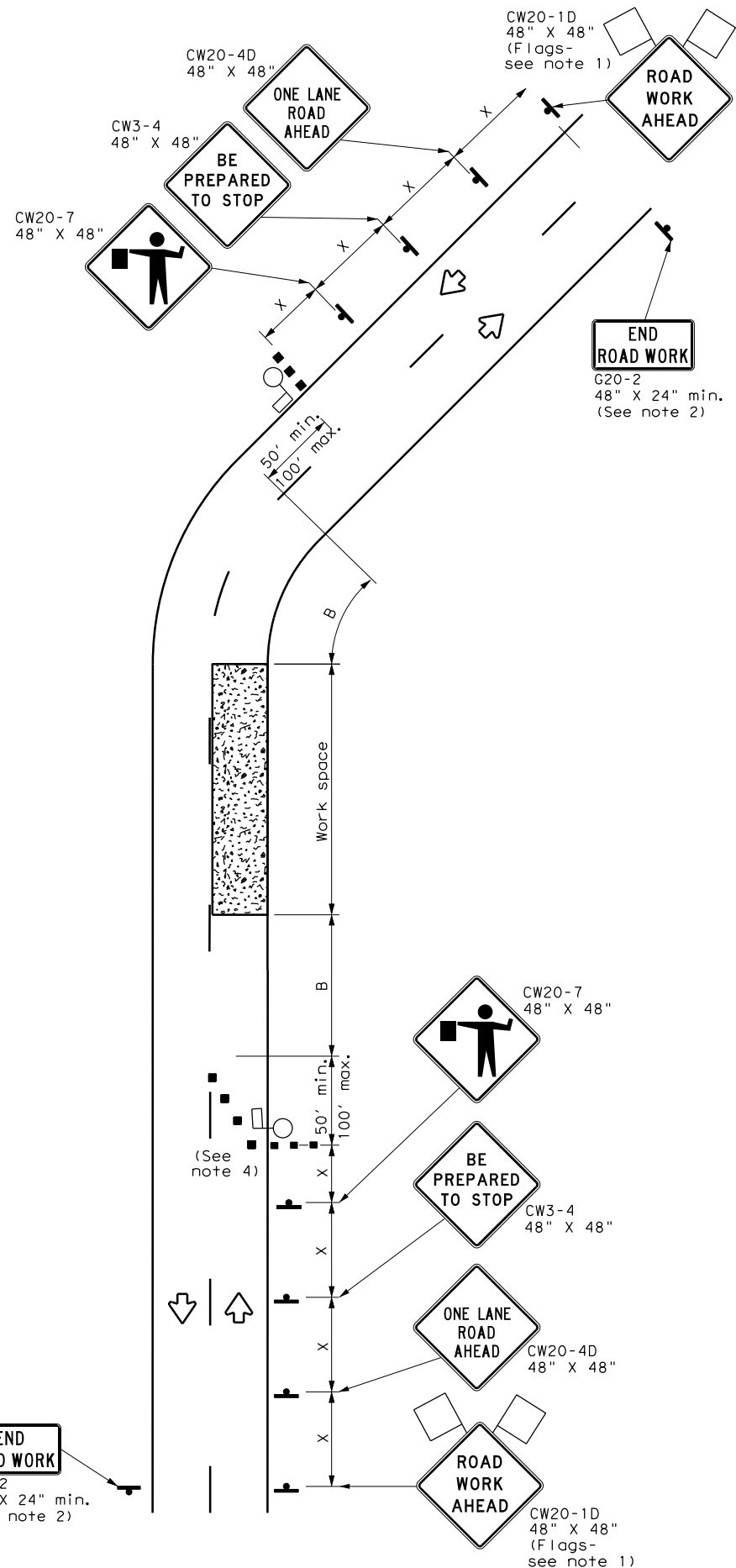
**TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS**  
**TCP (7-1) - 13**

FILE:	tcp7-1.dgn	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	March 1991	CONT	SECT	JOB	HIGHWAY				
REVISIONS		1266	01	008	FM 956				
4-92	4-98	DIST	COUNTY		SHEET NO.				
1-97	7-13	YKM	FAYETTE		32				

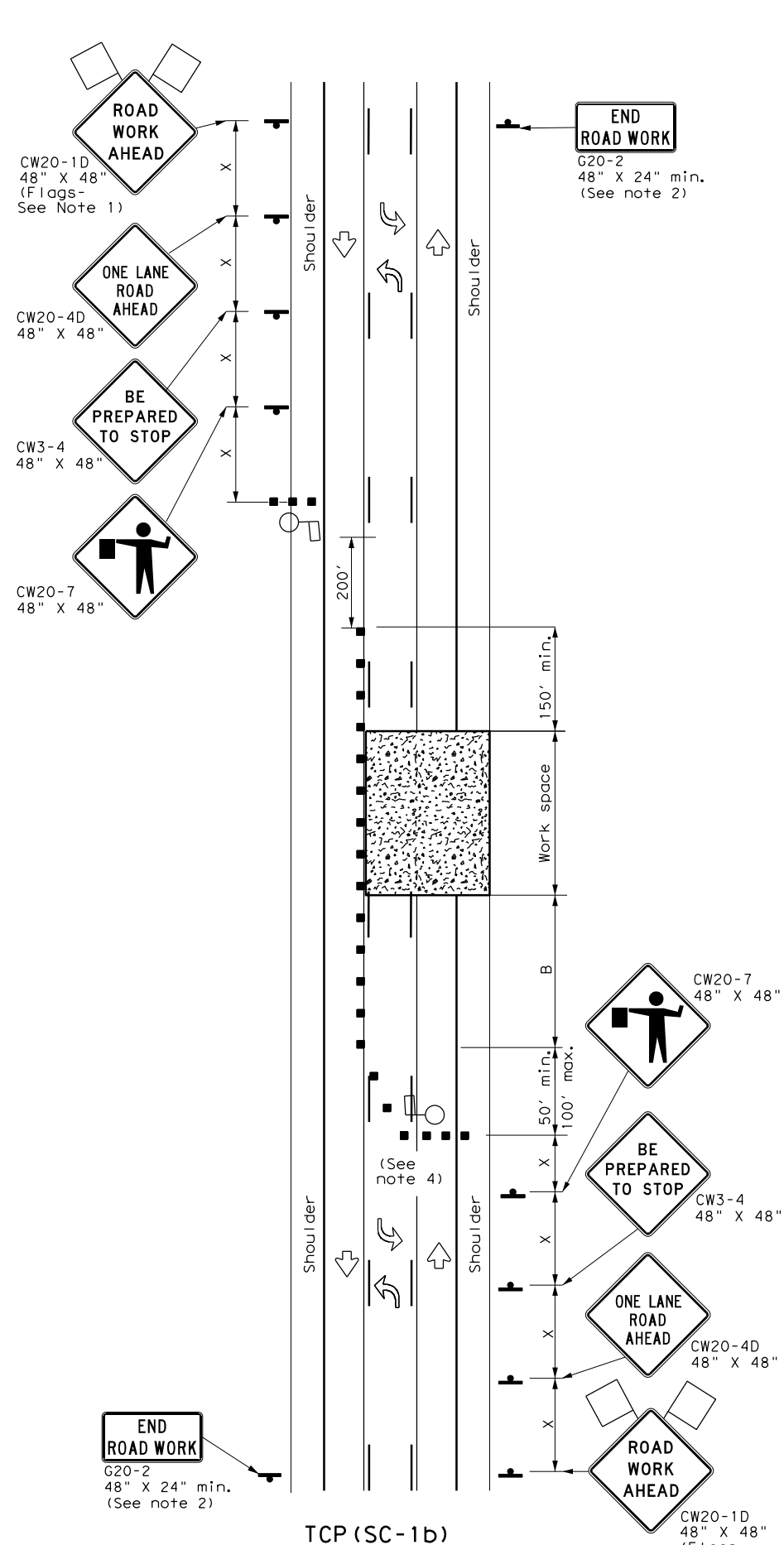


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 \$TIME\$  
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TCP (SC-1a)  
 ONE LANE TWO-WAY (TWO LANES)  
 CONTROL WITH PILOT VEHICLE



TCP (SC-1b)  
 ONE LANE TWO-WAY (THREE LANES)  
 CONTROL WITH PILOT VEHICLE  
 AND CHANNELIZING DEVICES

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing Distance "x"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
- Sign spacing may be increased or an additional ROAD WORK AHEAD (CW20-1D) sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
- Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
- Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
- If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
- Temporary rumble strips are not required on seal coat operations.
- The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

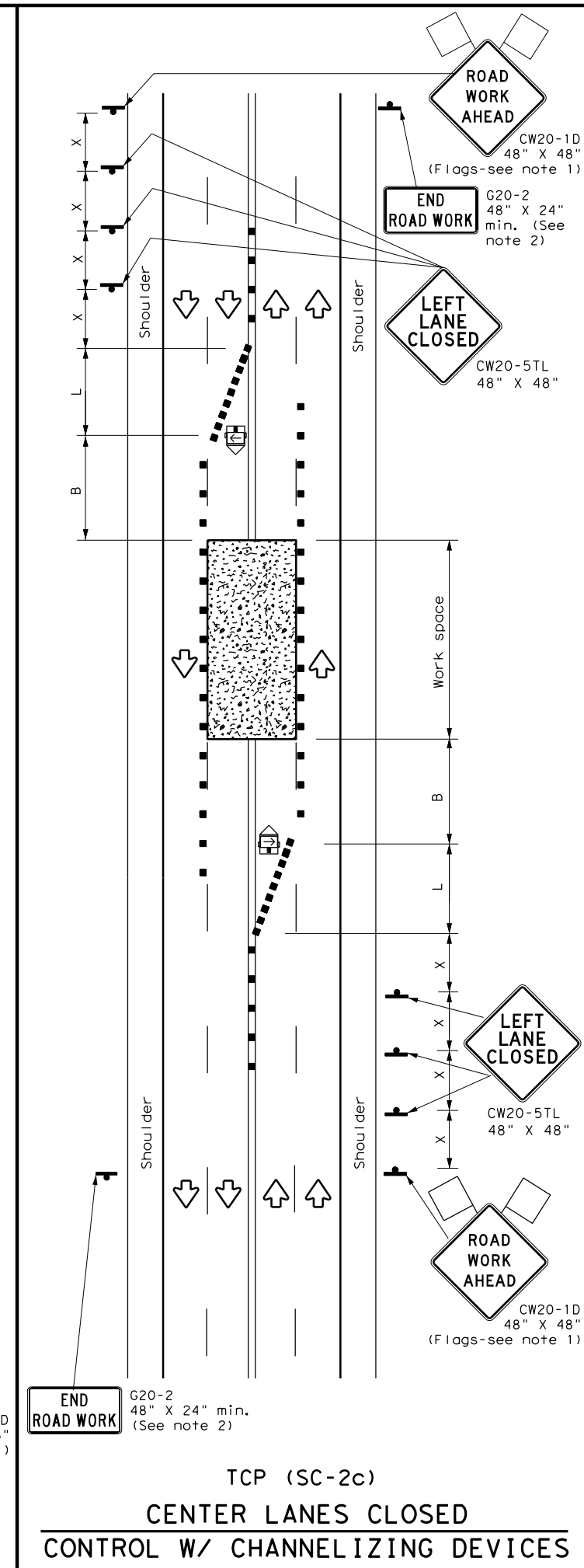
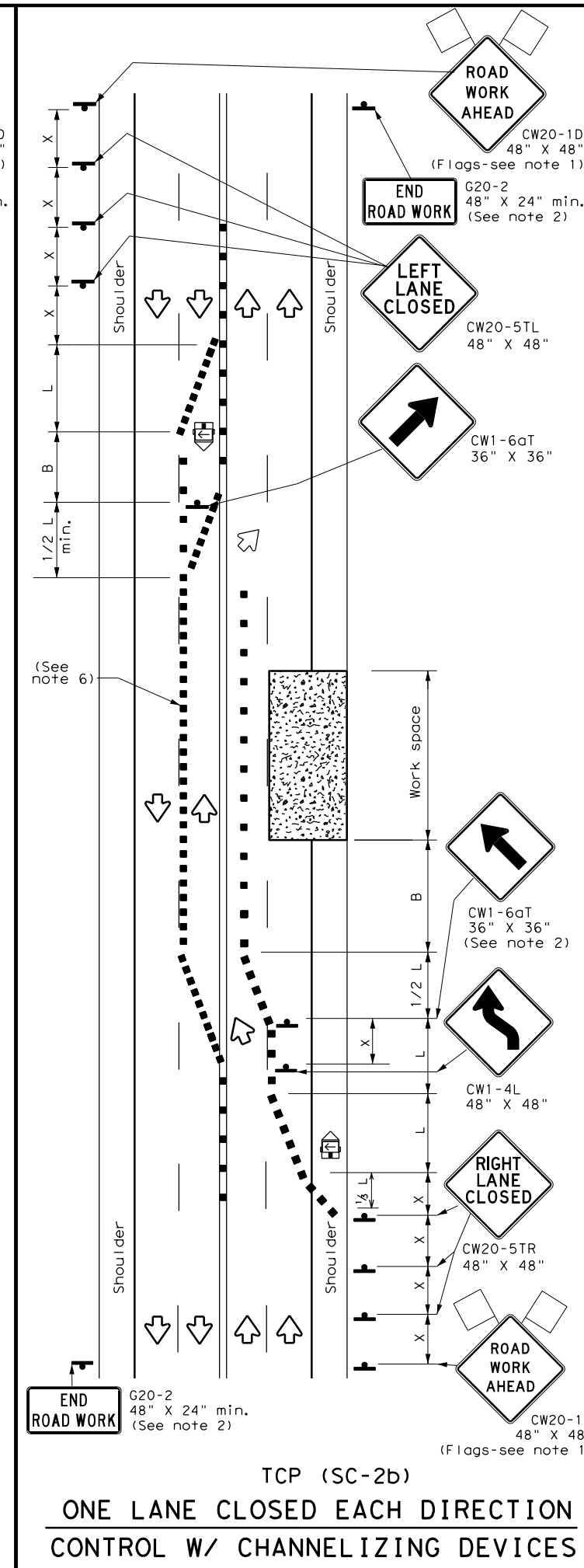
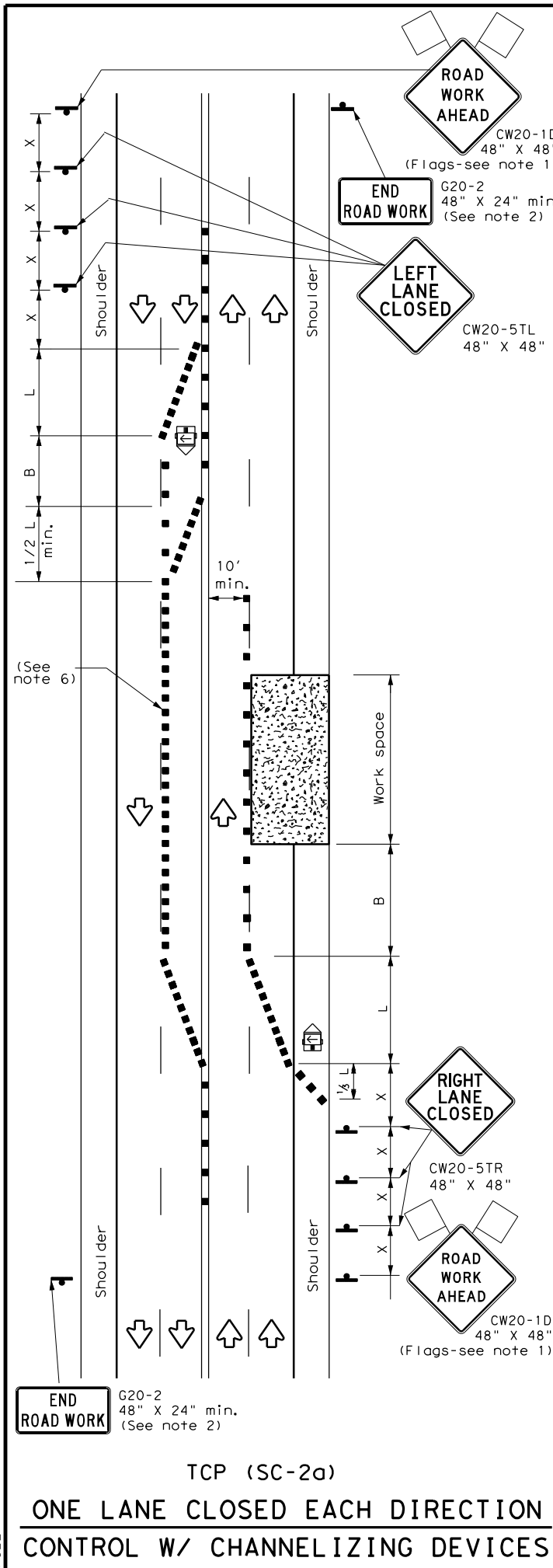
- Channelizing devices on the centerline are not required when a pilot car is leading traffic, unless directed by the Engineer.

SHEET 1 OF 8

		Traffic Safety Division Standard	
<b>TRAFFIC CONTROL PLAN          SEAL COAT OPERATIONS          ONE-LANE TWO-WAY</b>			
<b>TCP (SC-1) - 22</b>			
FILE: tcpsc-1-22.dgn	DN:	CK:	DW:
© TxDOT October 2022	CONT	SECT	JOB
REVISIONS	1266	01	008
4-21	DIST	COUNTY	SHEET NO.
10-22	YKM	FAYETTE	33

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DATE: 7/3/2024  
 \$TIME\$  
 FILE: \$FILE\$



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

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

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

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

- GENERAL NOTES**
- Flags attached to signs where shown are REQUIRED.
  - All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
  - The ROAD WORK AHEAD (CW20-1D) sign may be repeated if the visibility of the work zone is less than 1500 feet.
  - If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
  - Temporary rumble strips are not required on seal coat operations.

**TCP (SC-2a) and (SC-2b)**

- Channelizing devices which separate two-way traffic shall be spaced on tapers at:
  - 20 feet;
  - 15 feet when posted speeds are 35 mph or slower; or
  - at 1/2(S) for tangent sections.
 This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

SHEET 2 OF 8

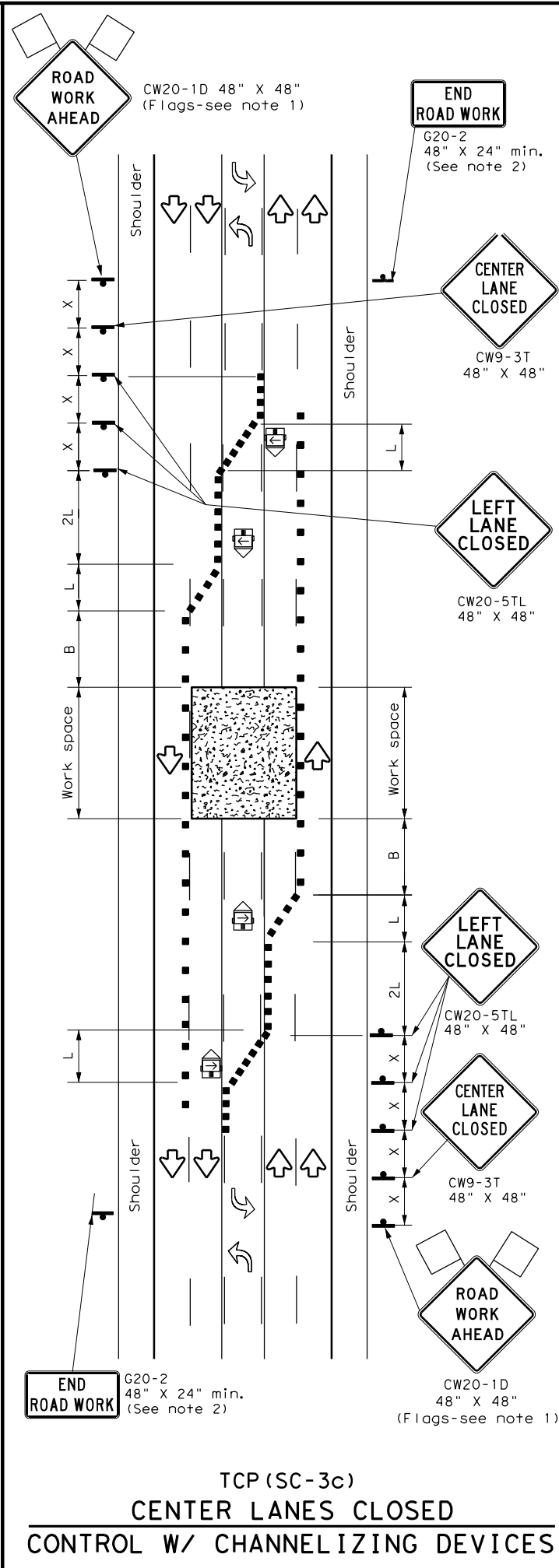
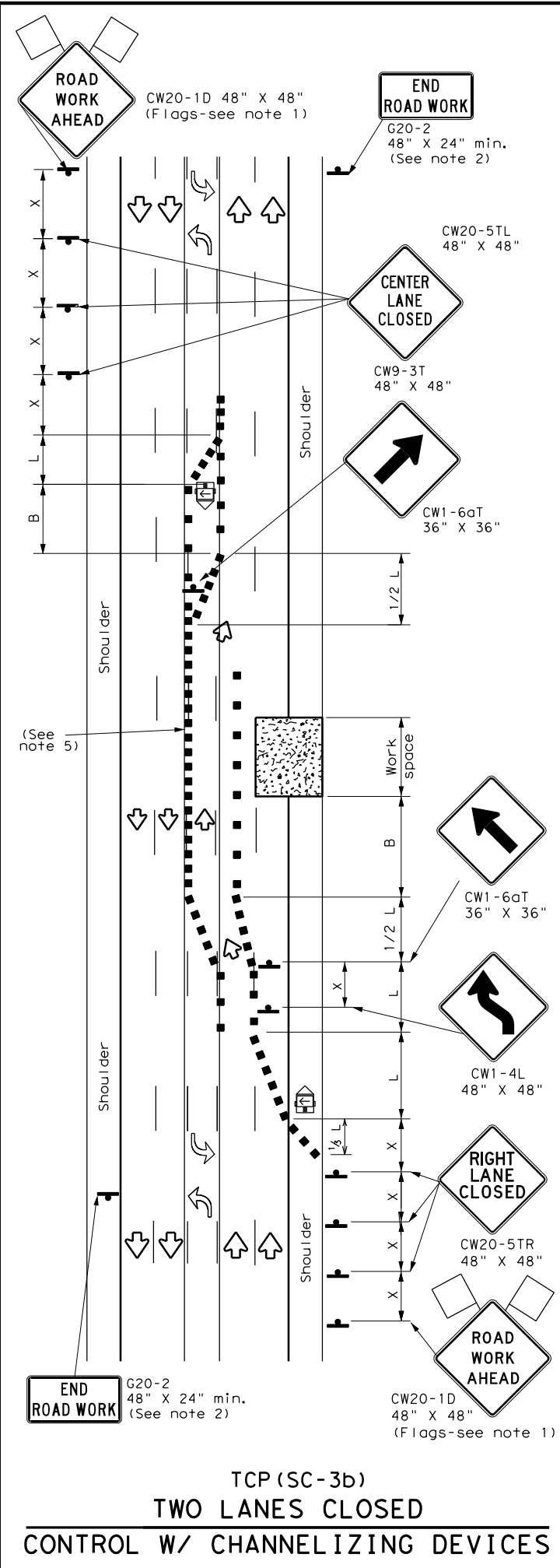
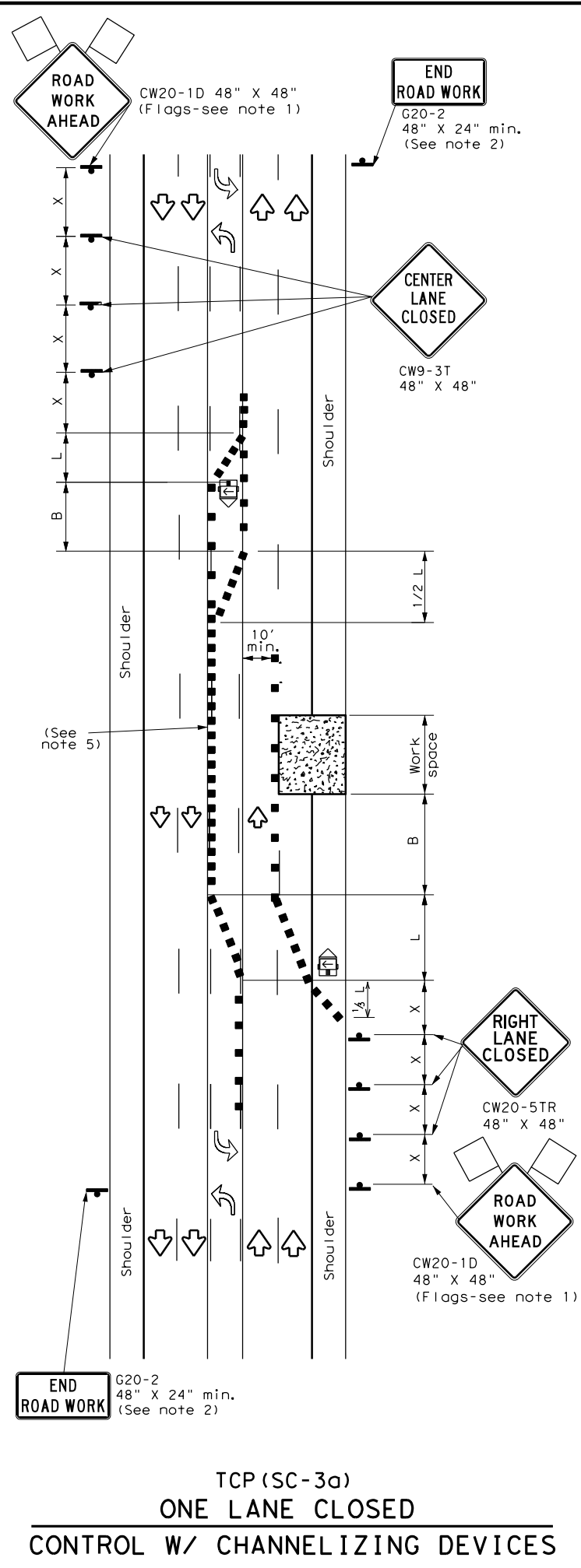
**Texas Department of Transportation**  
 Traffic Safety Division Standard

**TRAFFIC CONTROL PLAN**  
**SEALCOAT OPERATIONS**  
**MULTILANE ROADS**  
**(UNDIVIDED)**  
**TCP (SC-2) -22**

FILE: tcpsc-2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CON: 1266	SECT: 01	JOB: 008	HIGHWAY: FM 956
REVISIONS	DIST: YKM	COUNTY: FAYETTE	SHEET NO. 34	

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 FILE: \$FILES\$  
 \$TIME\$



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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing Distance "x"	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = 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**

- Flags attached to signs where shown are REQUIRED.
- All traffic control devices illustrated are REQUIRED, except: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
- If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personal (flaggers) at the intersection.
- Temporary rumble strips are not required on seal coat operations.

**TCP (SC-3a) and (SC-3b)**

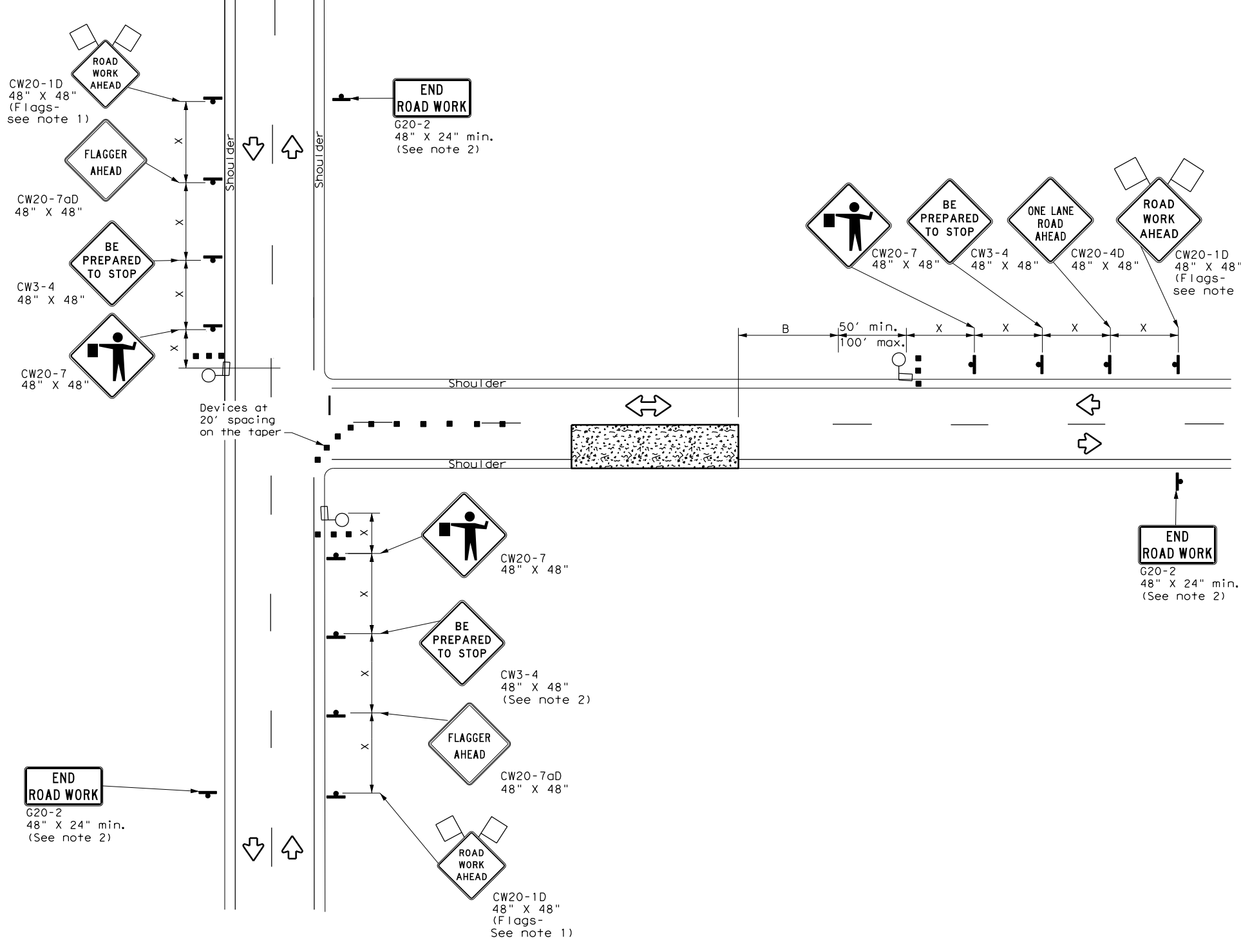
- Channelizing devices which separate two-way traffic shall be spaced on tapers at:
  - 20 feet;
  - 15 feet when posted speeds are 35 mph or slower; or
  - at 1/2(S) for tangent sections.
 This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

SHEET 3 OF 8

		Traffic Safety Division Standard	
<b>TRAFFIC CONTROL PLAN        SEAL COAT OPERATIONS        MULTILANE ROADS        (W/ CENTER LEFT TURN LANE)        TCP (SC-3) - 22</b>			
FILE: tcpsc-3-22.dgn	DN:	CK:	DW:
© TxDOT October 2022	CON: 1266	SECT: 01	JOB: 008
4-21	DIST: YKM	COUNTY: FAYETTE	SHEET NO.: 35
10-22			

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FILE: \$FILES\$



**ONE LANE TWO-WAY (T-INTERSECTION)  
CONTROL WITH PILOT VEHICLE**

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

Posted Speed X	Formula	Minimum Desirable Taper Lengths X X			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing Distance "X"	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = 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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
- Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
- Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
- Temporary rumble strips are not required on seal coat operations.
- The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

SHEET 4 OF 8



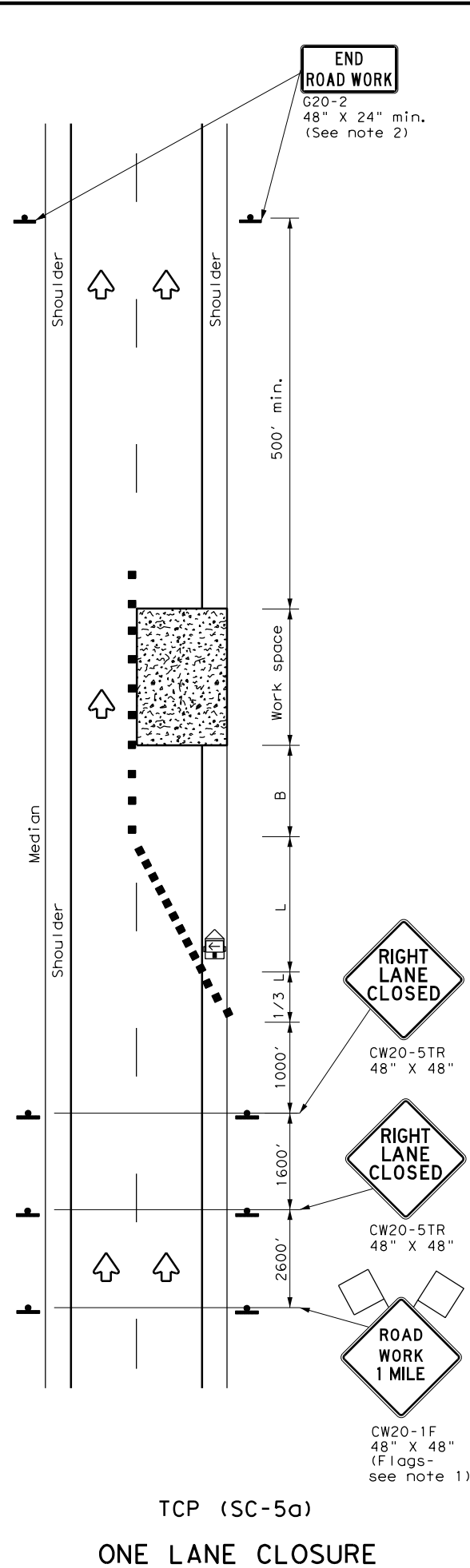
**TRAFFIC CONTROL PLAN  
SEAL COAT OPERATIONS  
NEAR INTERSECTION**

**TCP (SC-4) - 22**

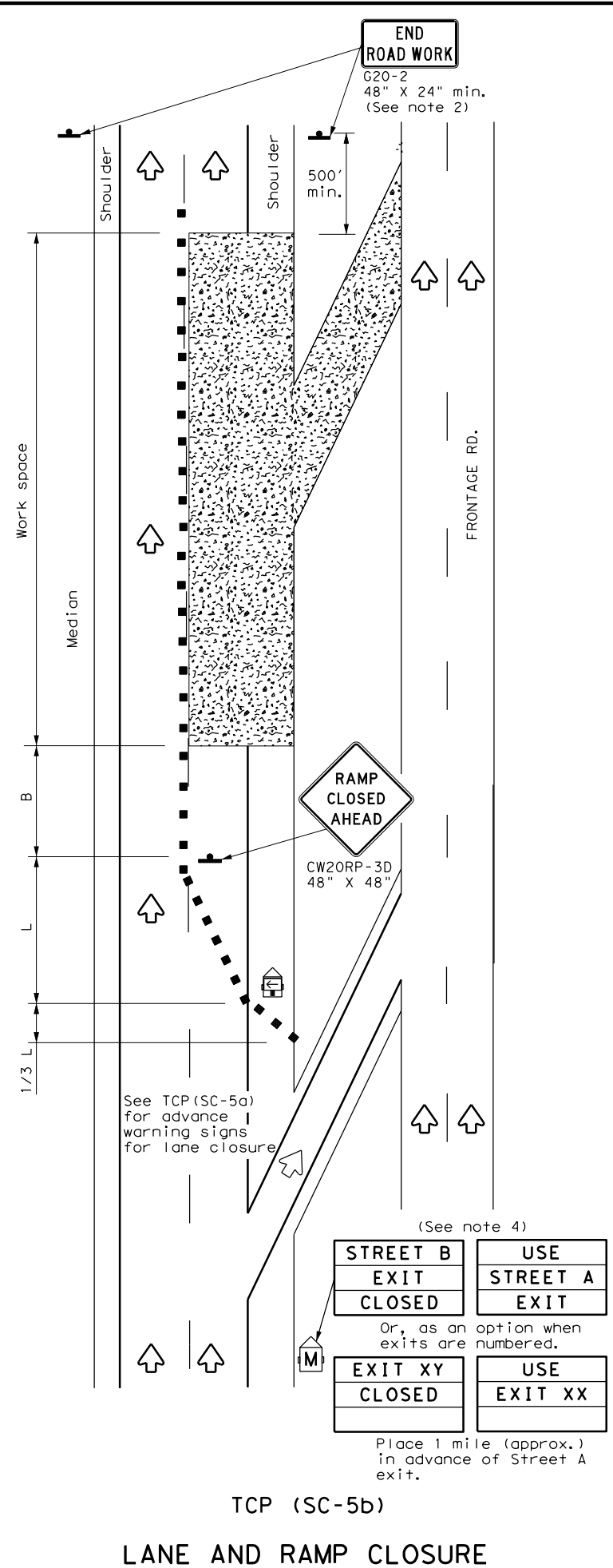
FILE: tcpsc-4-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
4-21	DIST	COUNTY	SHEET NO.	
10-22	YKM	FAYETTE	36	

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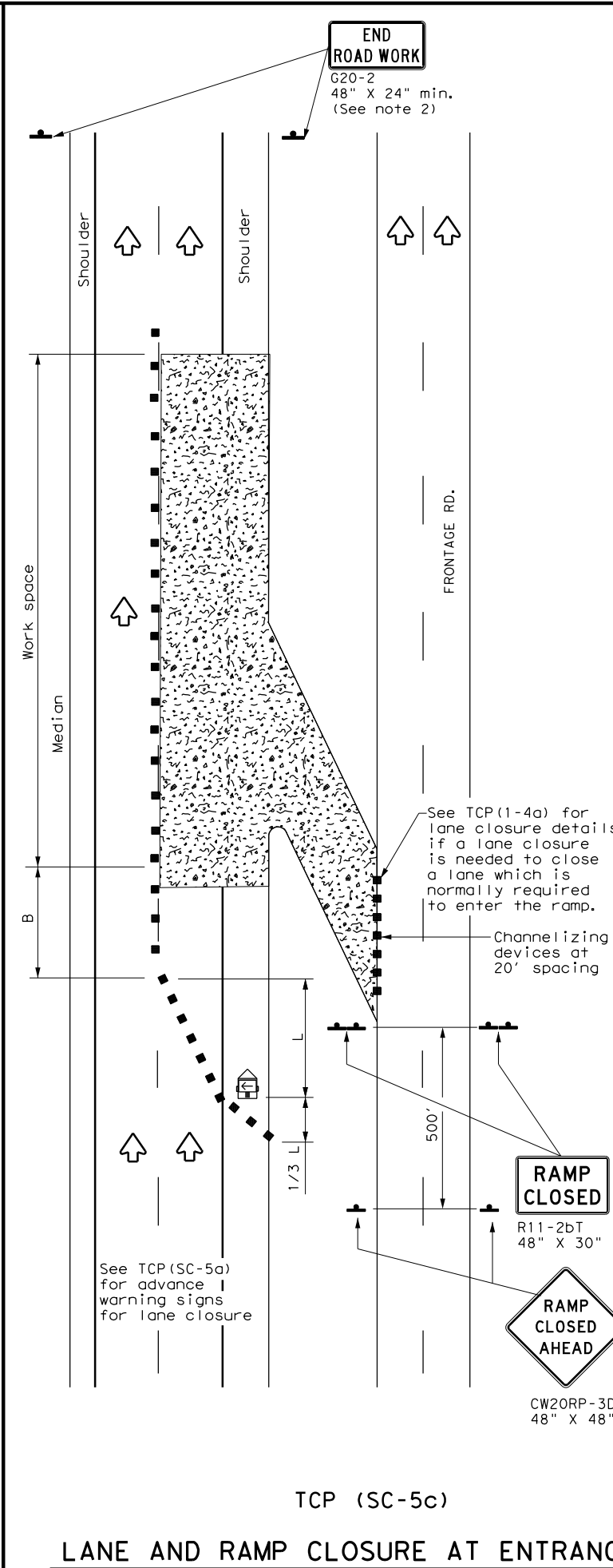
DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$



TCP (SC-5a)  
**ONE LANE CLOSURE**



TCP (SC-5b)  
**LANE AND RAMP CLOSURE AT EXIT RAMP**



TCP (SC-5c)  
**LANE AND RAMP CLOSURE AT ENTRANCE RAMP**

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

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

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

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

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

SHEET 5 OF 8



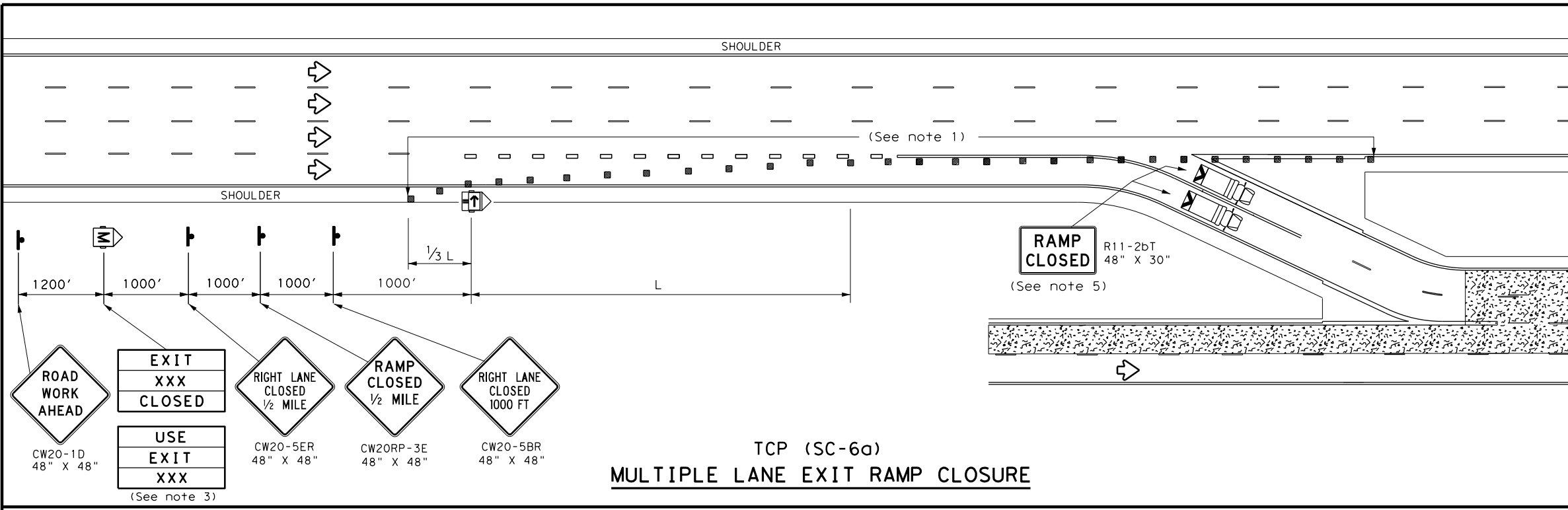
**TRAFFIC CONTROL PLAN  
SEAL COAT OPERATIONS  
DIVIDED HIGHWAYS**

**TCP (SC-5) - 22**

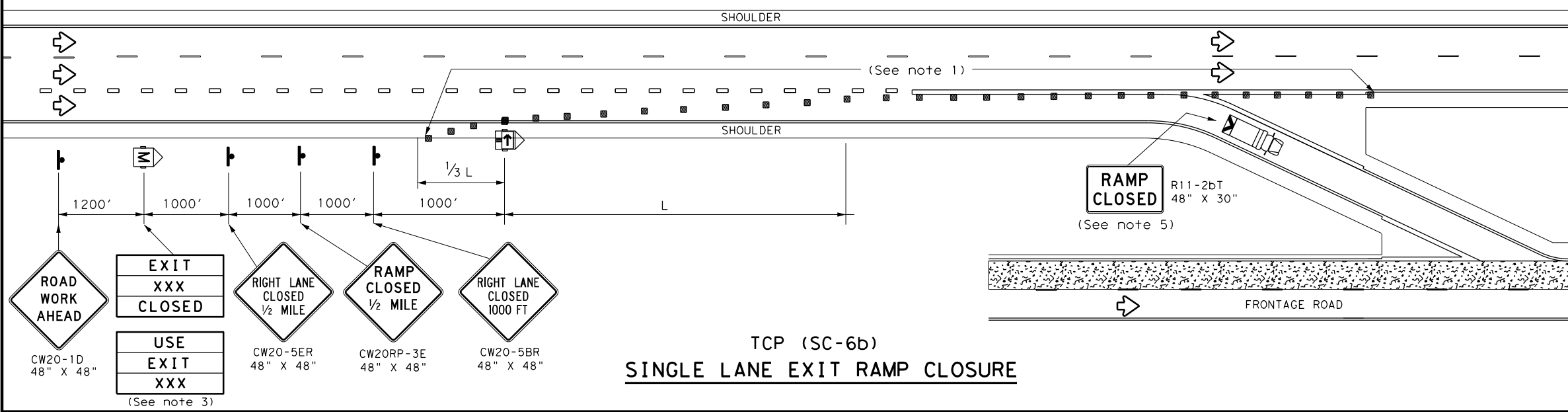
FILE: tcpsc-5-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CON: 1266	SECT: 01	JOB: 008	HIGHWAY: FM 956
4-21	DIST: YKM	COUNTY: FAYETTE	SHEET NO.:	37

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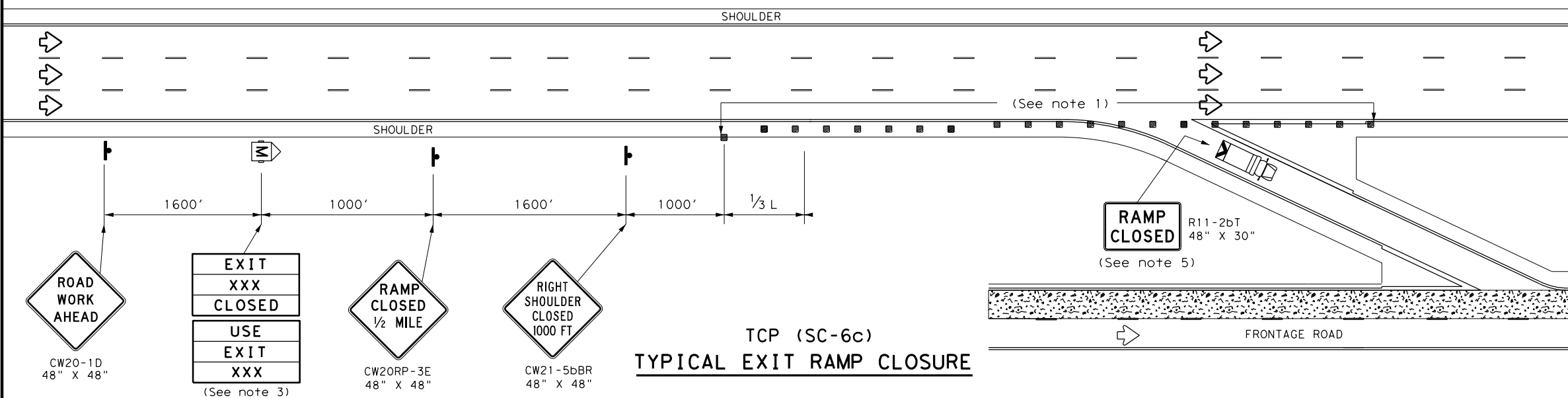
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TCP (SC-6a)  
**MULTIPLE LANE EXIT RAMP CLOSURE**



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



TCP (SC-6c)  
**TYPICAL EXIT RAMP CLOSURE**

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

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

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

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

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

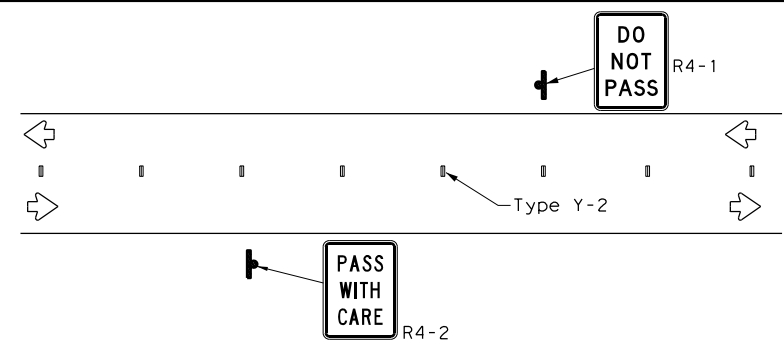
TRAFFIC CONTROL PLAN  
SEAL COAT OPERATIONS  
DIVIDED HIGHWAYS

TCP (SC-6) - 22

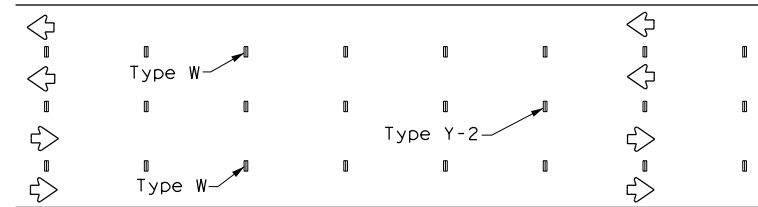
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© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
10-22	1266	01	008	FM 956
REVISIONS	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	38	

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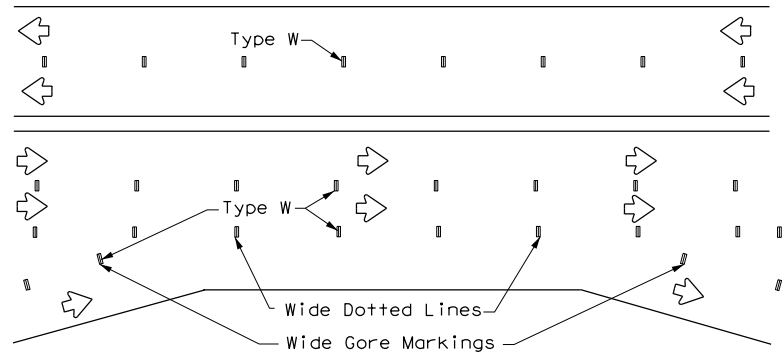
### WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



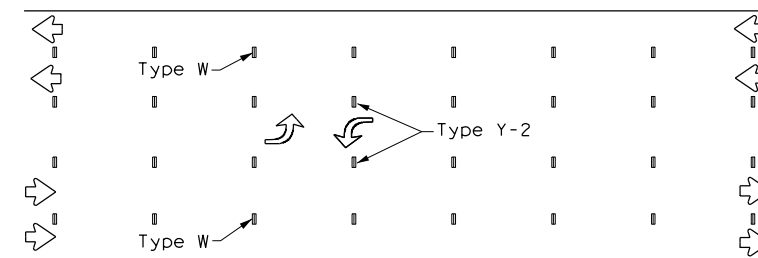
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



LANE LINES FOR DIVIDED HIGHWAY

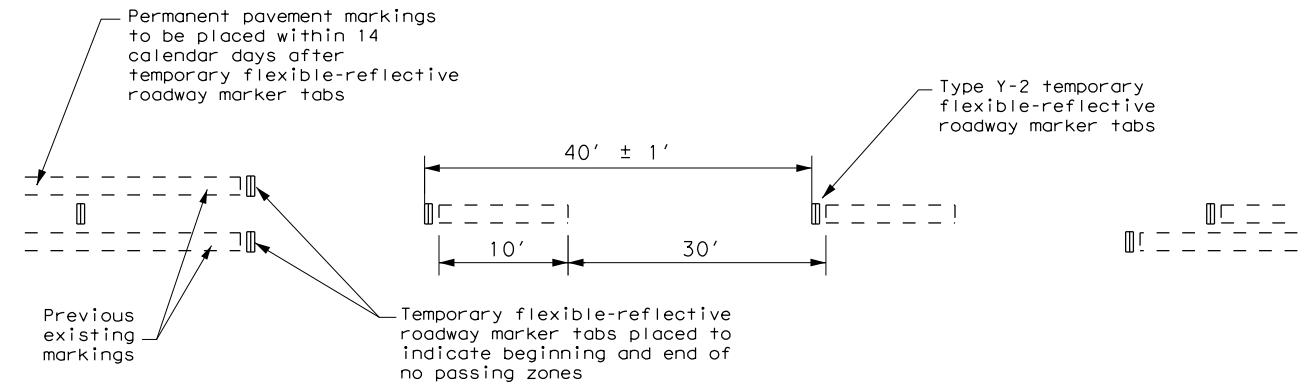


TWO-WAY LEFT TURN LANE

### WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)

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

### TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS



### TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

- Temporary markings for surfacing projects shall be Temporary Flexible-Reflective Roadway Marker Tabs with protective cover unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two days before the surfacing is applied. After the surfacing is rolled and swept, the protective cover over the reflective strip shall be removed.
- Temporary Flexible-Reflective Roadway Marker Tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with a yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
- Temporary Flexible-Reflective Roadway Marker Tabs will require normal maintenance replacement when used on roadways with an Average Daily Traffic (ADT) per lane of up to 7500 vehicles with no more than 10% truck mix. When roadway volumes exceed these values, additional maintenance replacement of these devices should be planned for.
- 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 4.
- Tabs shall meet requirements of Departmental Material Specification DMS-8242.
- Tabs shall NOT be used to simulate edge lines.

### NOTES:

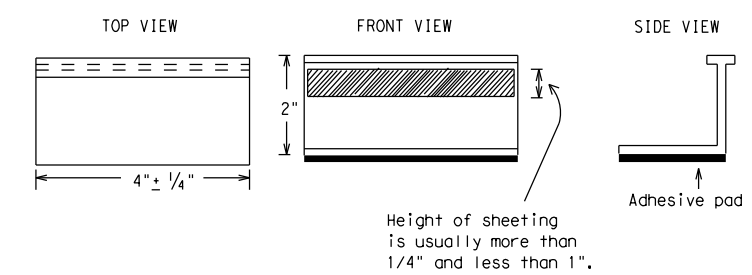
- The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
- For exit gores where a lane is being dropped, place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are NOT acceptable.
- Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.

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

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

SHEET 7 OF 8

### TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS



## TEMPORARY PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

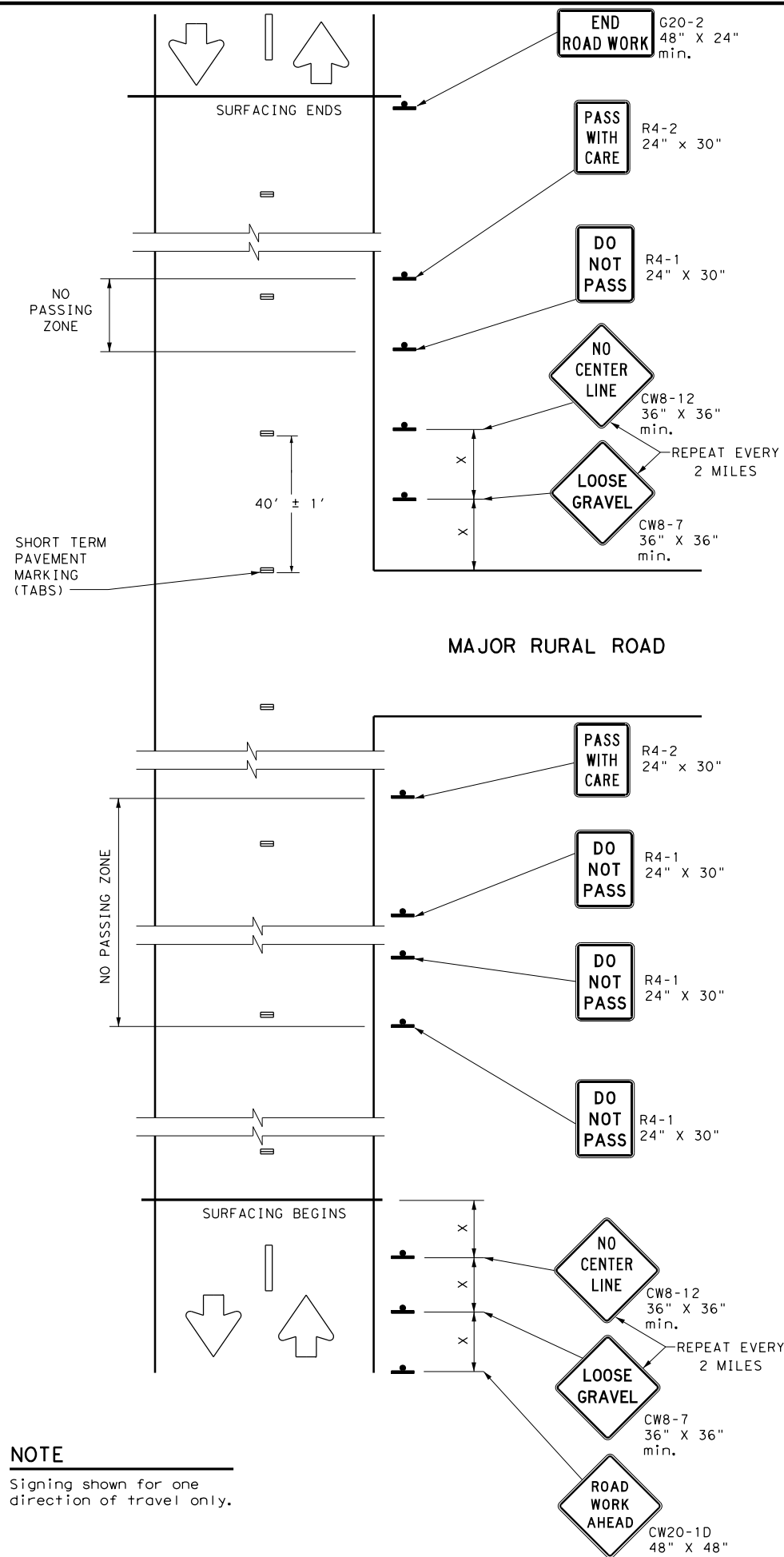
### TCP (SC-7) -22

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© TxDOT	October 2022	CONT	SECT	JOB	HIGHWAY				
REVISIONS		1266	01	008	FM 956				
4-21	10-22	DIST	COUNTY		SHEET NO.				
		YKM	FAYETTE		39				

DATE: 7/3/2024  
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**NOTE**  
Signing shown for one direction of travel only.

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

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

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

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

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

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

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

**COORDINATION OF SIGN LOCATIONS**

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

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

\* Conventional Roads Only

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

**GENERAL NOTES**

1. Surfacing operations that cover or obliterate existing pavement markings must first have the passing zones clearly marked with tabs as well as having any of the traffic control devices detailed on this sheet furnished and erected as directed by the Engineer.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Short Duration / Short Term Stationary Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways should be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

SHEET 8 OF 8



**TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS**

**TCP (SC-8) -22**

FILE: tcpsc-8-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	1266	01	008	FM 956
4-21	DIST	COUNTY		SHEET NO.
10-22	YKM	FAYETTE		40

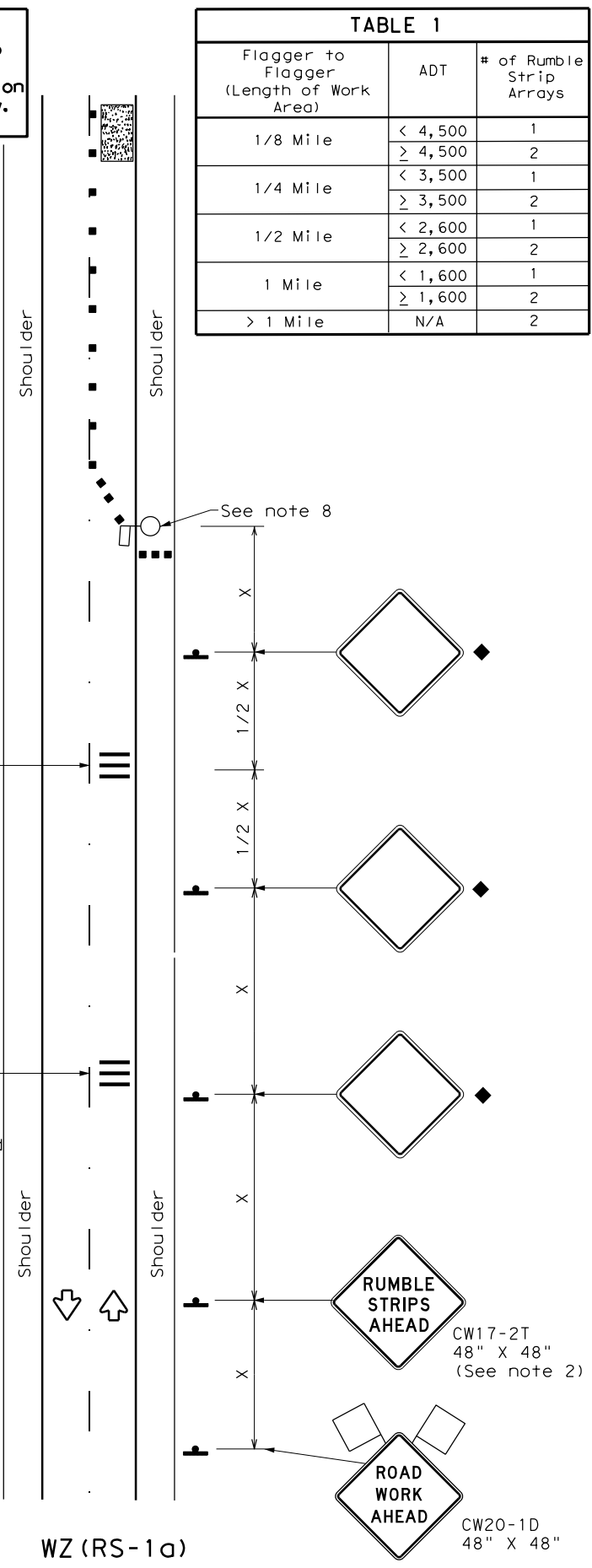


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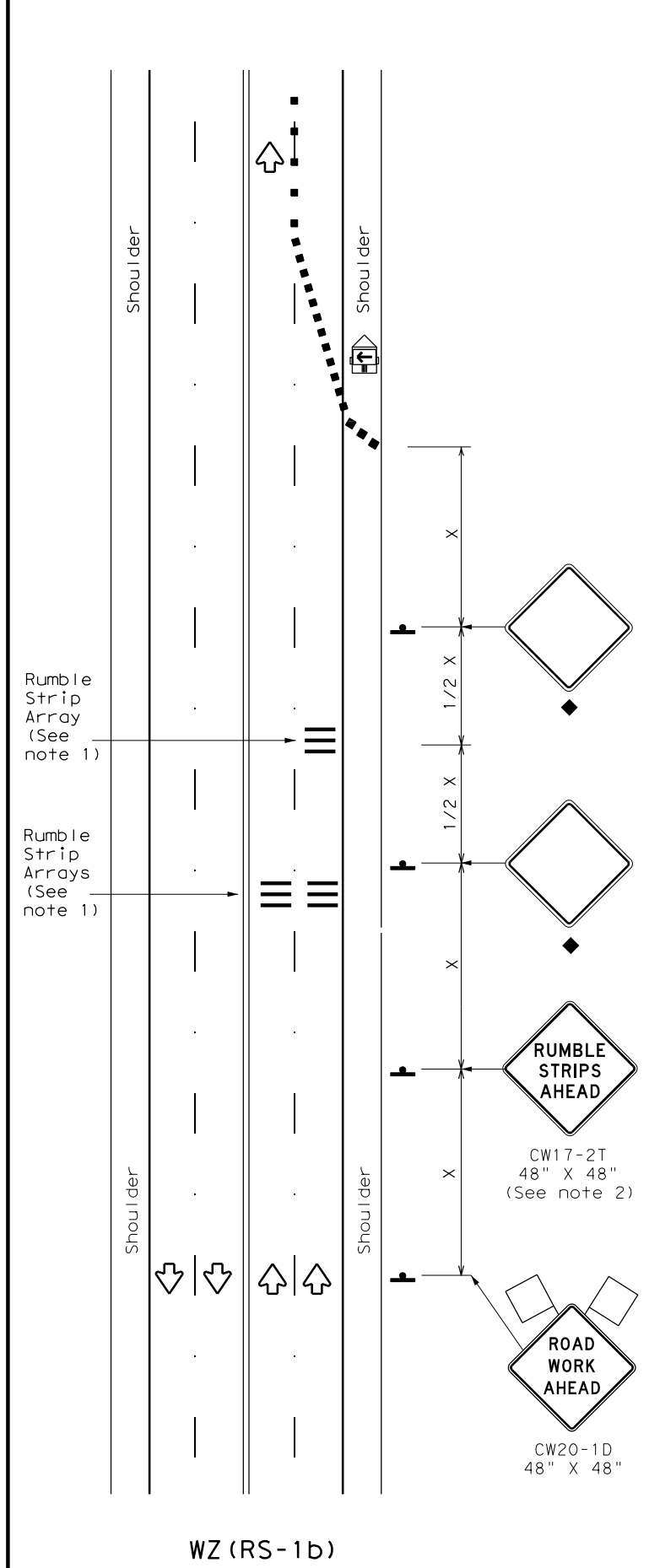
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Warning sign and rumble strip sequence in opposite direction is same as below.

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



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



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

**GENERAL NOTES**

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

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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS <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)

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

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

Texas Department of Transportation Traffic Safety Division Standard

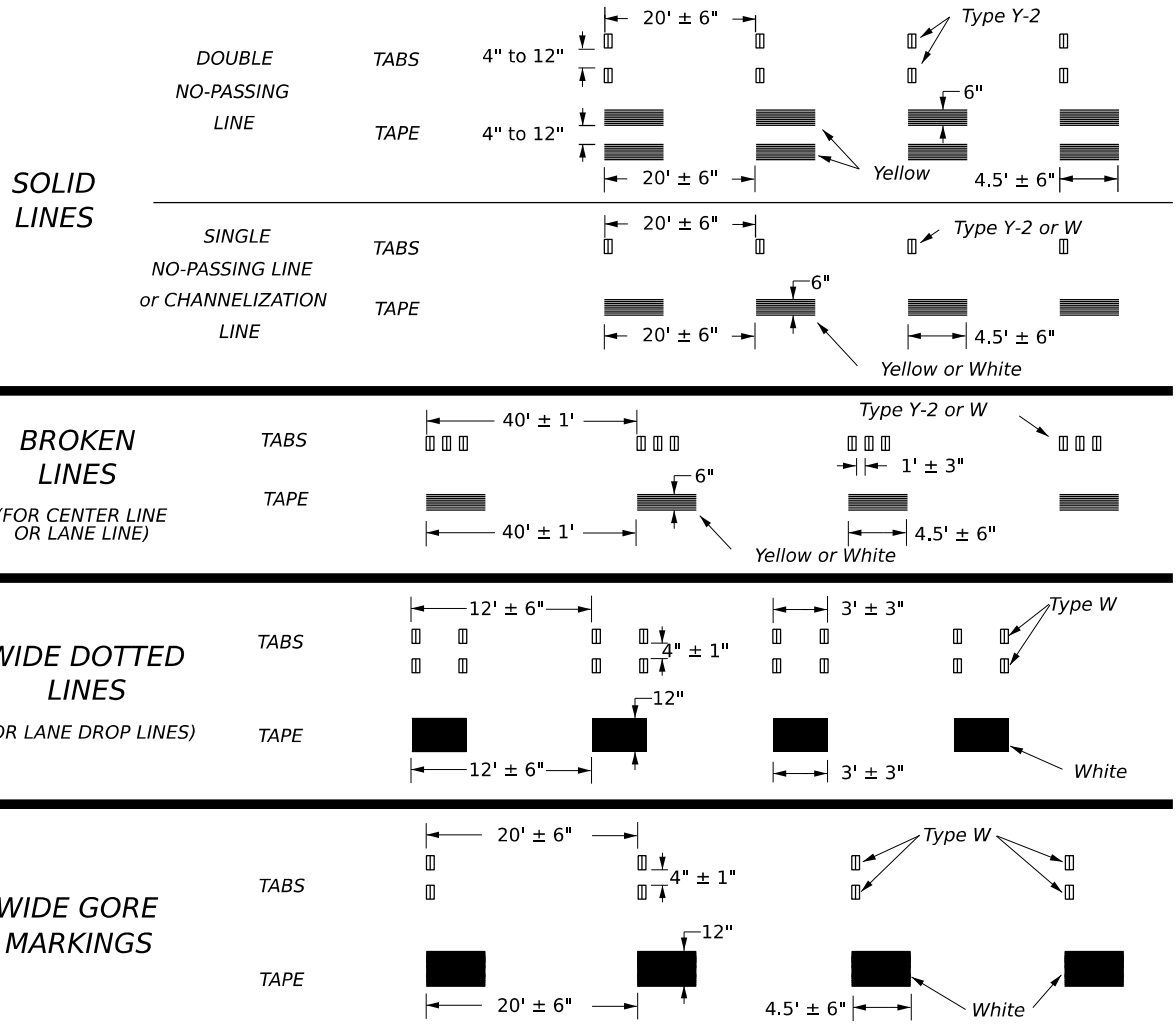
**TEMPORARY RUMBLE STRIPS**

**WZ (RS) - 22**

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2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	YKM	FAYETTE	41	

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## WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



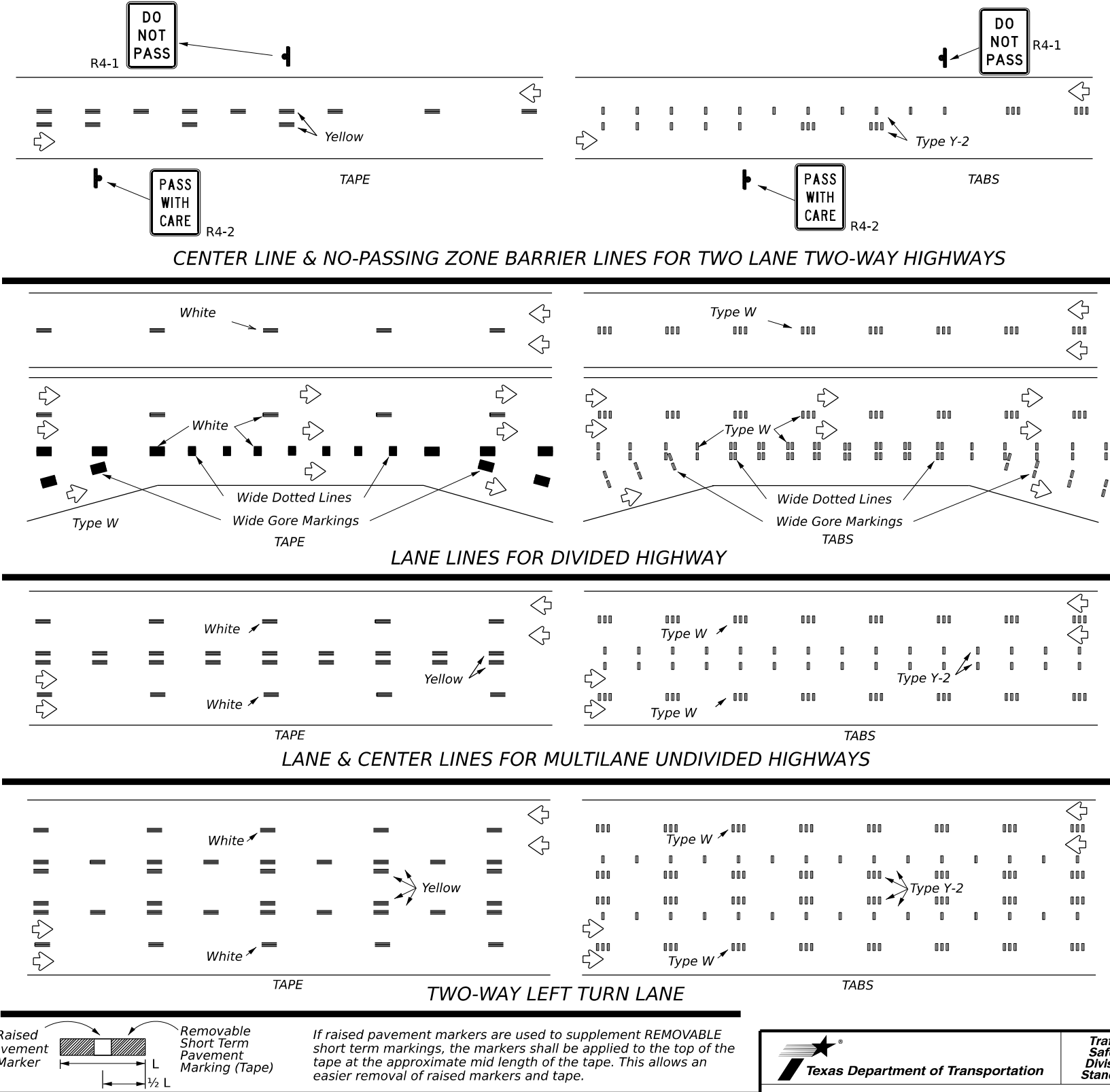
### NOTES:

- 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

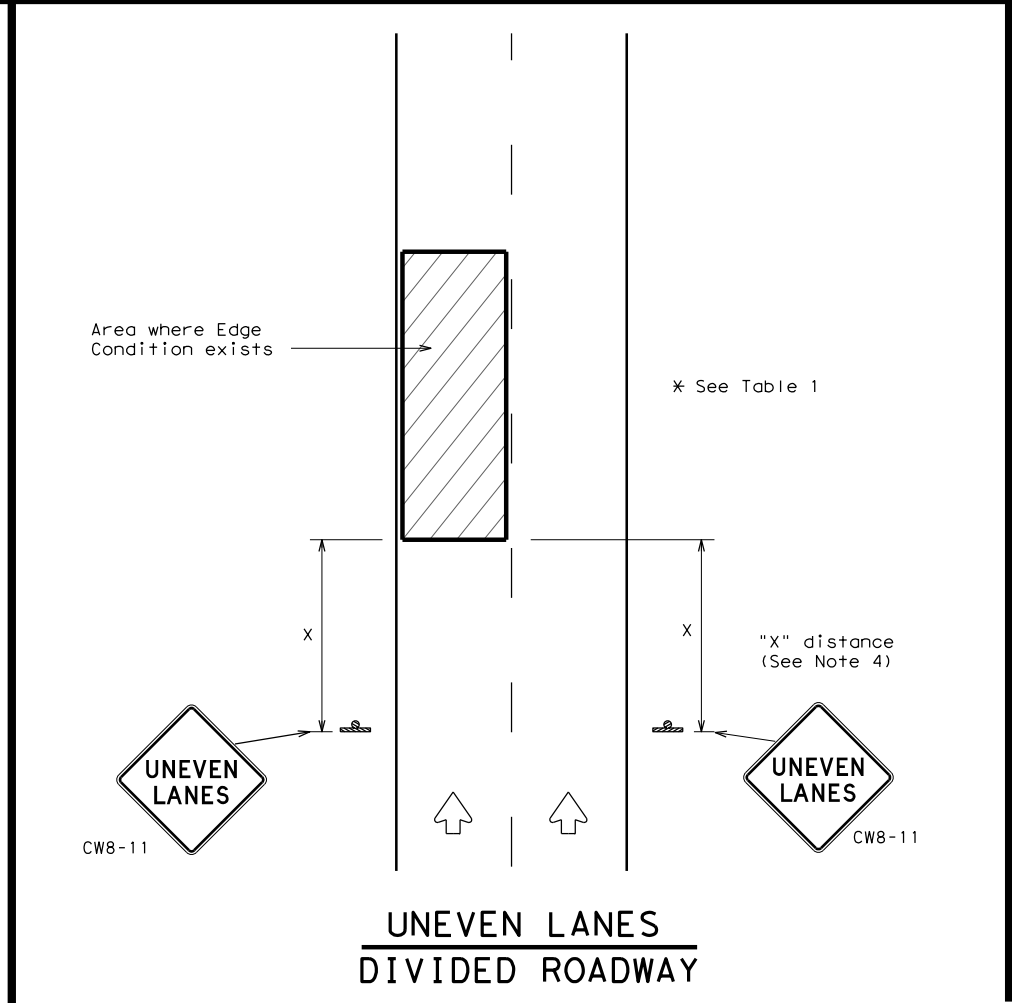
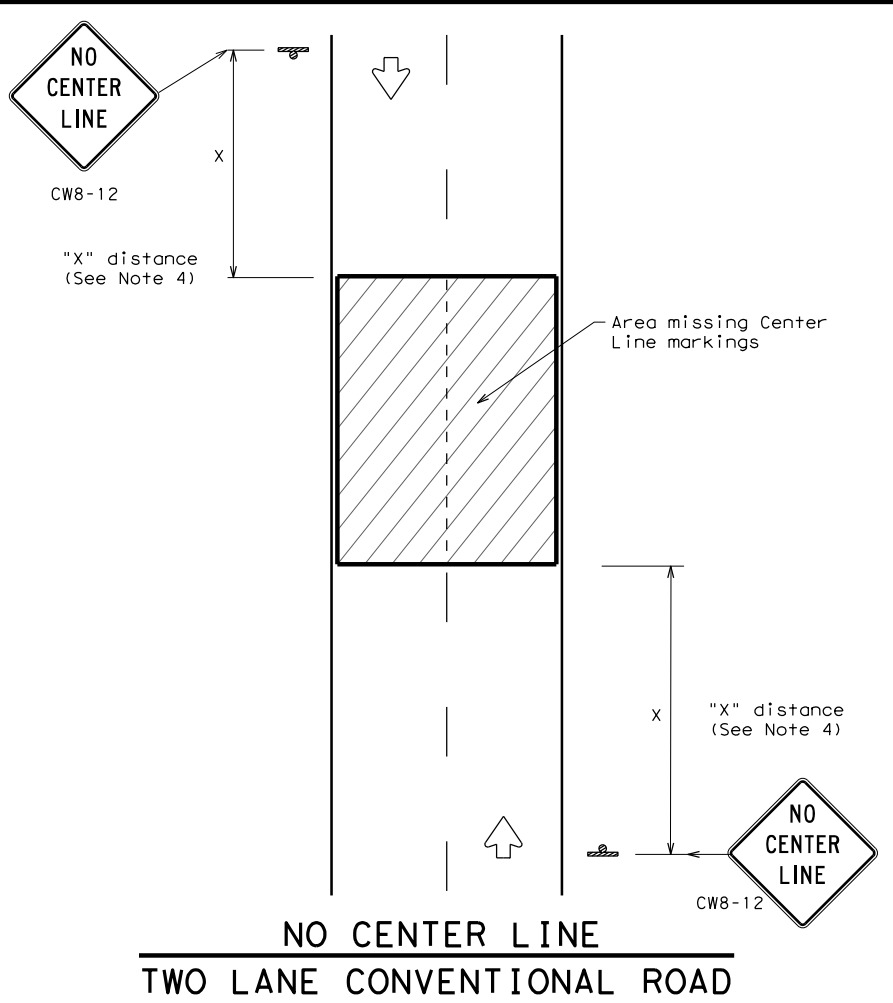
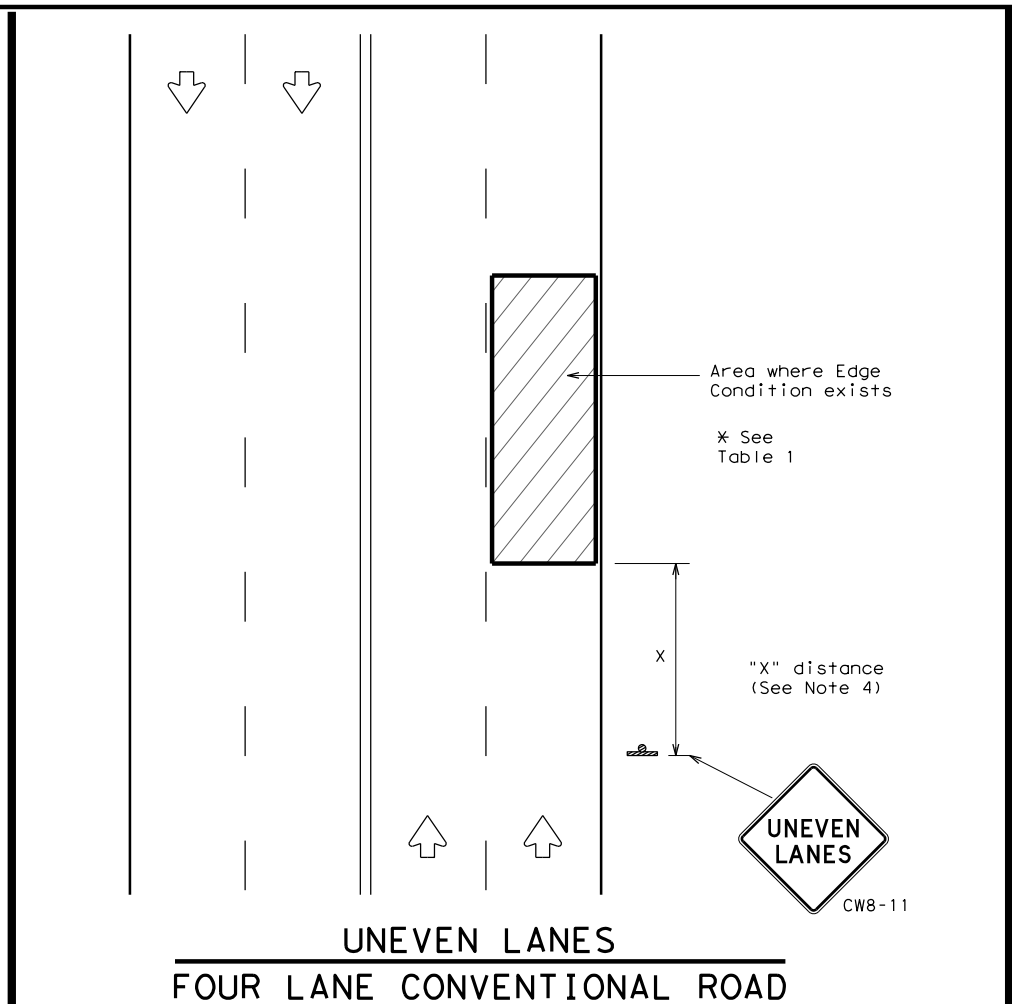
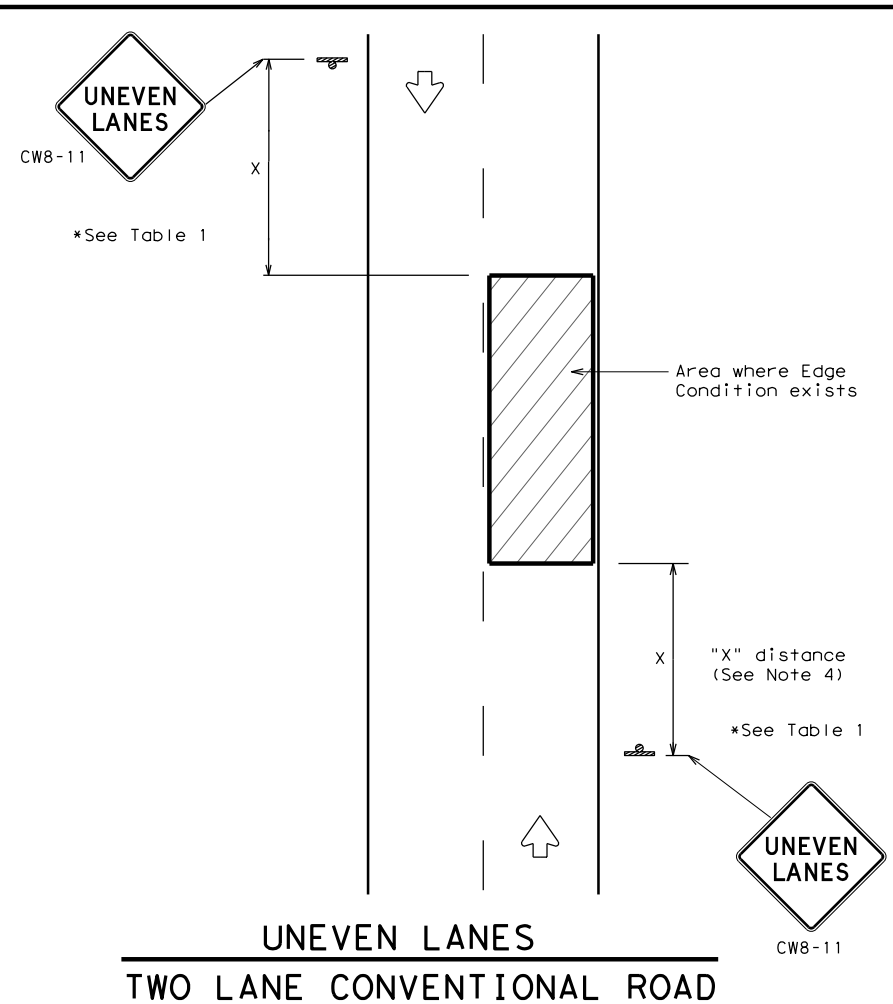
### WZ(STPM)-23

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© TxDOT February 2023	CONT 1266	SECT 01	JOB 008	HIGHWAY FM 956
REVISIONS	4-92 7-13	1-97 2-23	DIST YKM	COUNTY FAYETTE
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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**

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

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

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

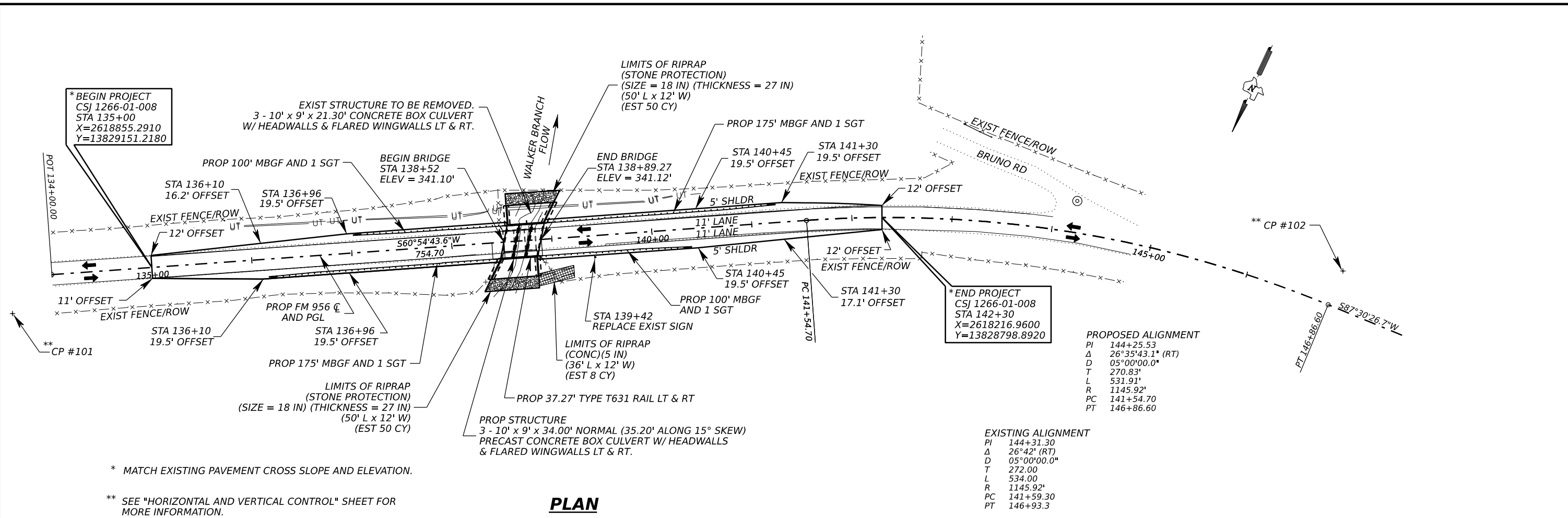
MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"



**SIGNING FOR UNEVEN LANES**

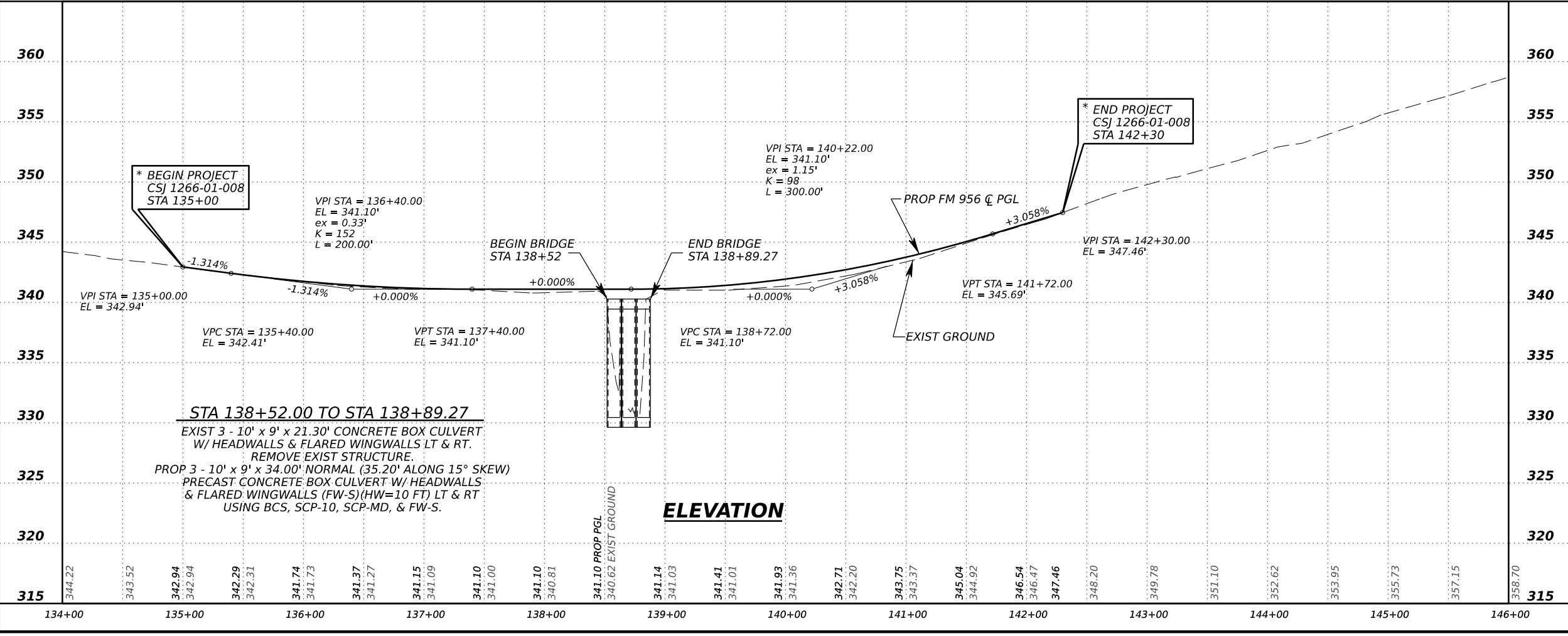
**WZ (UL) - 13**

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
8-95 2-98 7-13	DIST	COUNTY	SHEET NO.	
1-97 3-03	YKM	FAYETTE	43	



\* MATCH EXISTING PAVEMENT CROSS SLOPE AND ELEVATION.  
 \*\* SEE "HORIZONTAL AND VERTICAL CONTROL" SHEET FOR MORE INFORMATION.

**PLAN**



**ELEVATION**



Amanda Anderle Fling, P.E.

07/03/2024

**PLAN AND PROFILE**

SCALE: HOR 1" = 100'  
 VER 1" = 10'

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FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	44

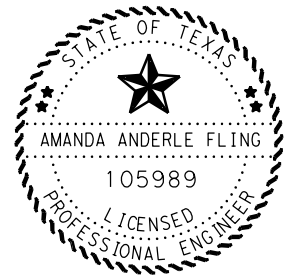
PATH: T:\YKMAN\EX\126601008\_FM956\_WalkerBranchPlan\_Sheets  
 FILE: FM956\_PSP.dgn  
 DATE: 7/11/2024



**PROPOSED FM 956 ALIGNMENT**

Alignment Name: FM 956  
 Alignment Description: Walker Branch  
 Alignment Style: Alignment\Baseline

	Station	Northing	Easting
Element: Linear			
POT	134+00.00 R1	13830996.75	2619283.77
PC	141+54.70 R1	13830629.85	2618624.26
Tangential Direction:	S60° 54'43.61"W		
Tangential Length:	754.70		
Element: Circular			
PC	141+54.70 R1	13830629.85	2618624.26
PI	144+25.53 R1	13830498.18	2618387.58
CC	13831631.24	2618067.17	
PT	146+86.60 R1	13830486.40	2618117.01
Radius:	1145.92		
Delta:	26° 35'43.11"	Right	
Degree of Curvature (Arc):	05° 00'00.00"		
Length:	531.91		
Tangent:	270.83		
Chord:	527.14		
Middle Ordinate:	30.72		
External:	31.57		
Back Tangent Direction:	S60° 54'43.61"W		
Back Radial Direction:	N29° 05'16.39"W		
Chord Direction:	S74° 12'35.16"W		
Ahead Radial Direction:	N02° 29'33.28"W		
Ahead Tangent Direction:	S87° 30'26.72"W		
Element: Linear			
PT	146+86.60 R1	13830486.40	2618117.01
POT	149+87.17 R1	13830473.33	2617816.72
Tangential Direction:	S87° 30'26.72"W		
Tangential Length:	300.57		



Amanda Anderle Fling, P.E.

07/03/2024

**HORIZONTAL ALIGNMENT DATA**

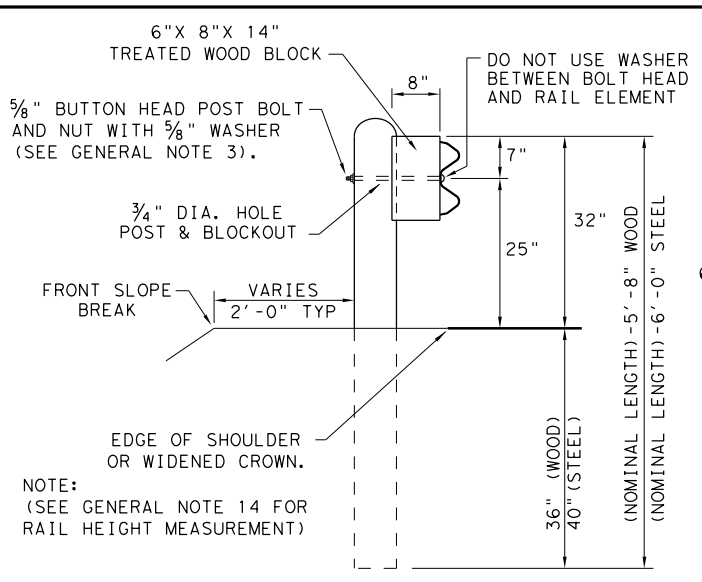
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SHEET 1 OF 1

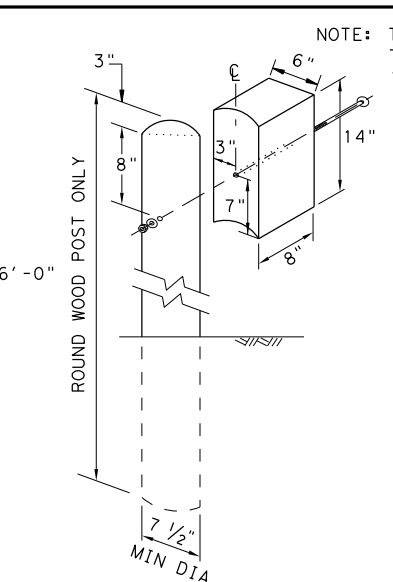
FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	46

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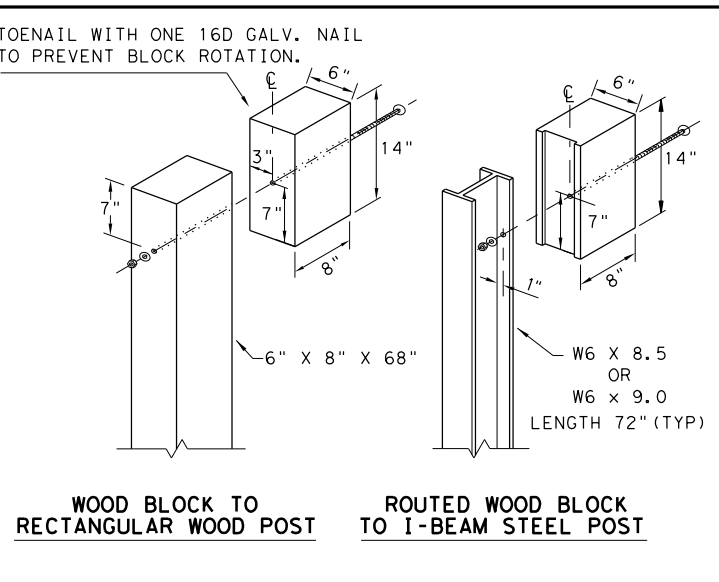
DATE: 7/3/2024  
FILE: \$FILES



**TYPICAL POST PLACEMENT**



**WOOD BLOCK TO ROUND WOOD POST**



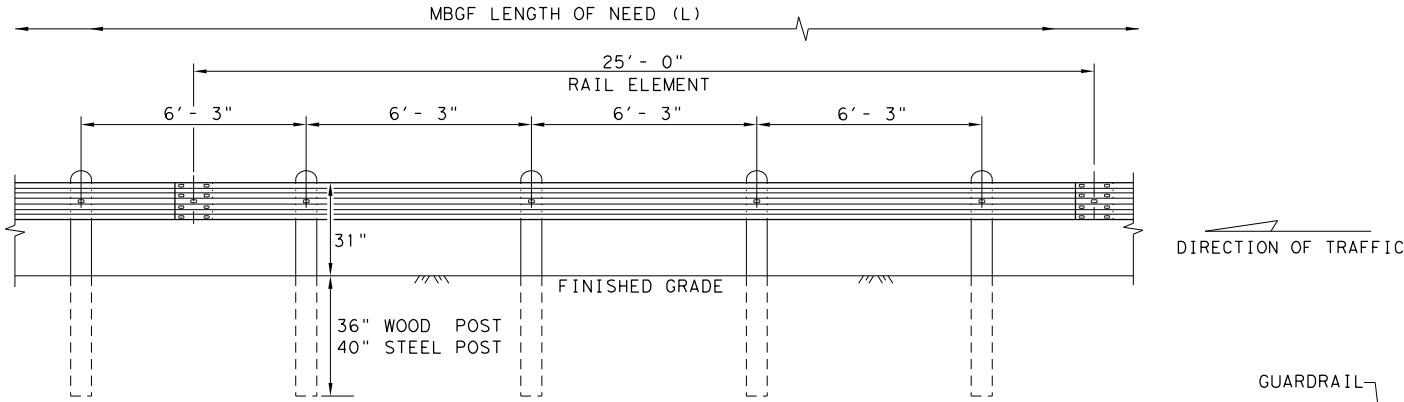
**WOOD BLOCK TO RECTANGULAR WOOD POST**

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

**GENERAL NOTES**

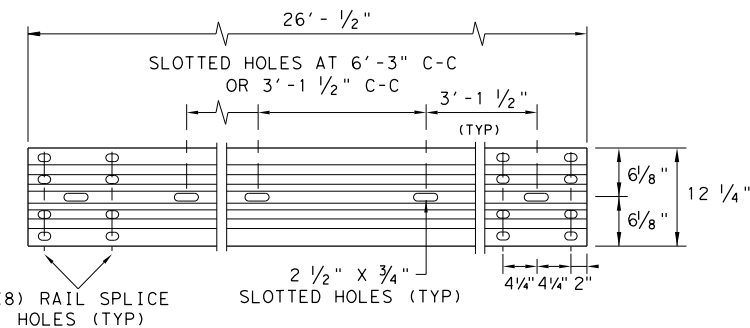
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS 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.

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



**ELEVATION MID-SPAN RAIL SPLICE**

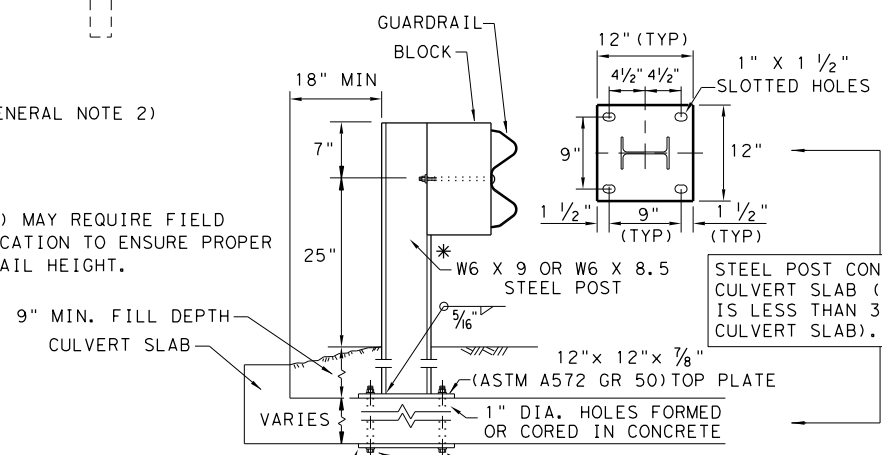
SHOWING A 25'-0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

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

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

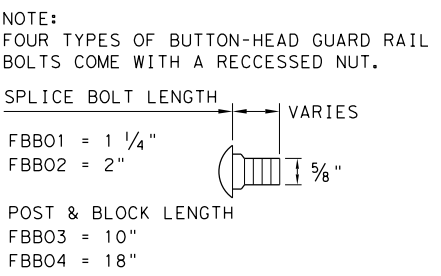


**LOW FILL CULVERT POST**

NOTE: TWO INSTALLATION OPTIONS.

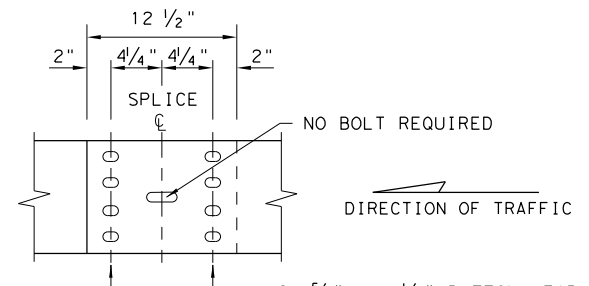
1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR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

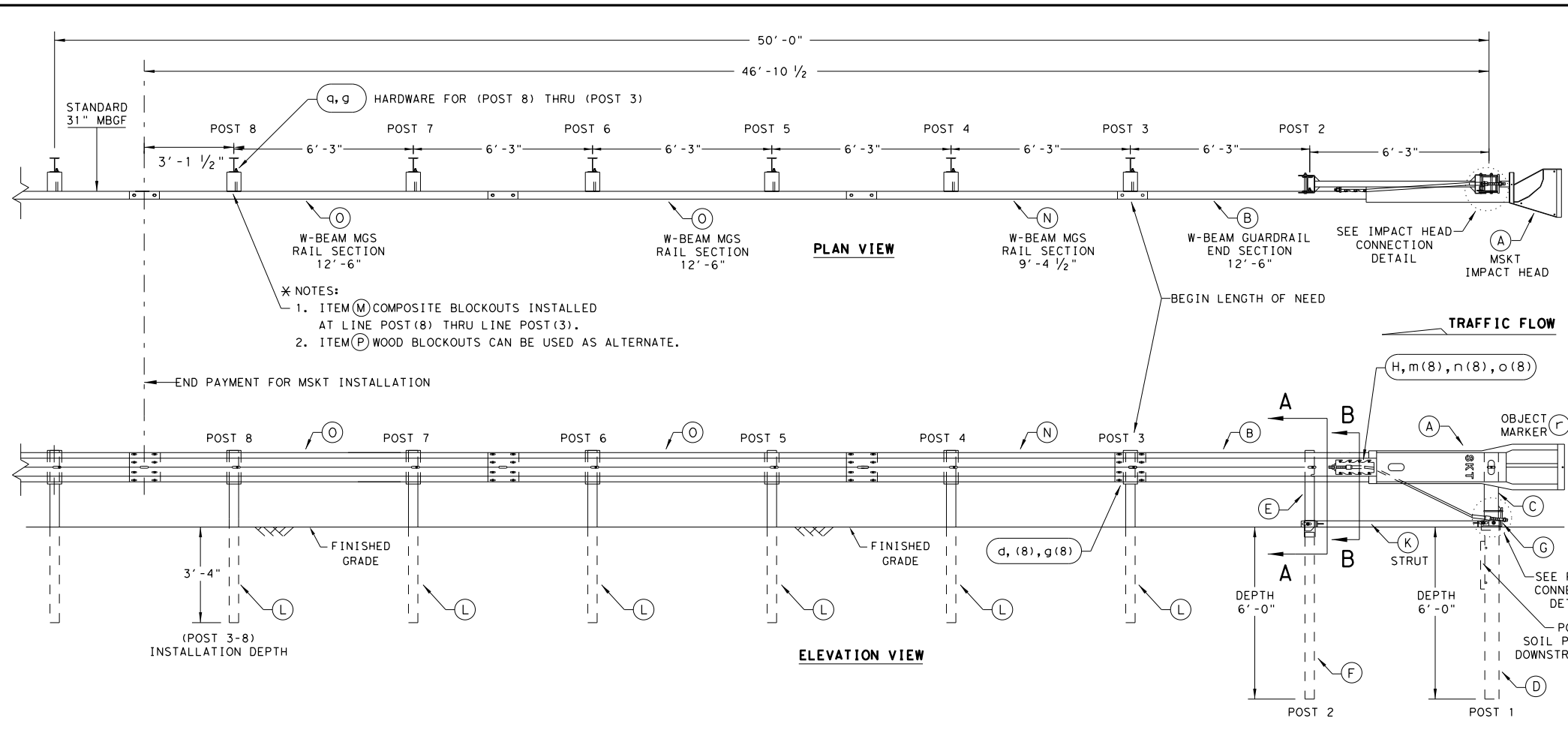


**MID-SPAN RAIL SPLICE DETAIL**

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

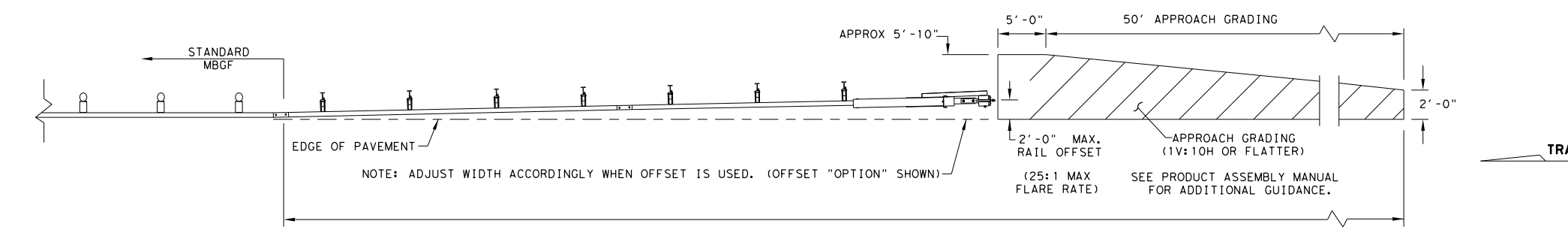
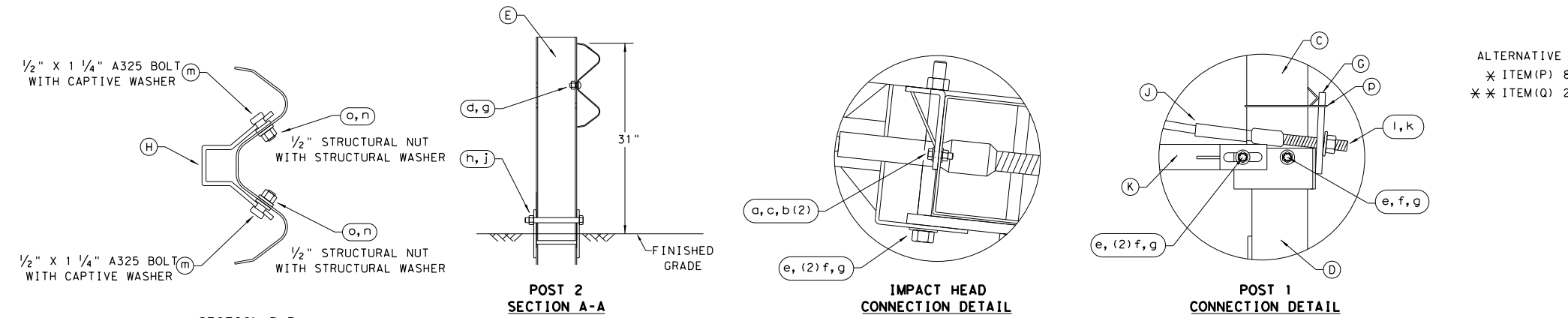
				<b>Design Division Standard</b>	
<b>METAL BEAM GUARD FENCE</b> <b>TL-3 MASH COMPLIANT</b> <b>GF(31)-19</b>					
FILE: gf3119.dgn	DN: TXDOT	CK: KM	OW: VP	CK: CGL/AG	
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	1266	01	008	FM 956	
	DIST	COUNTY	SHEET NO.		
	YKM	FAYETTE			47

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- 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 MBGF 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 Ga.	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	3/8" 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



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

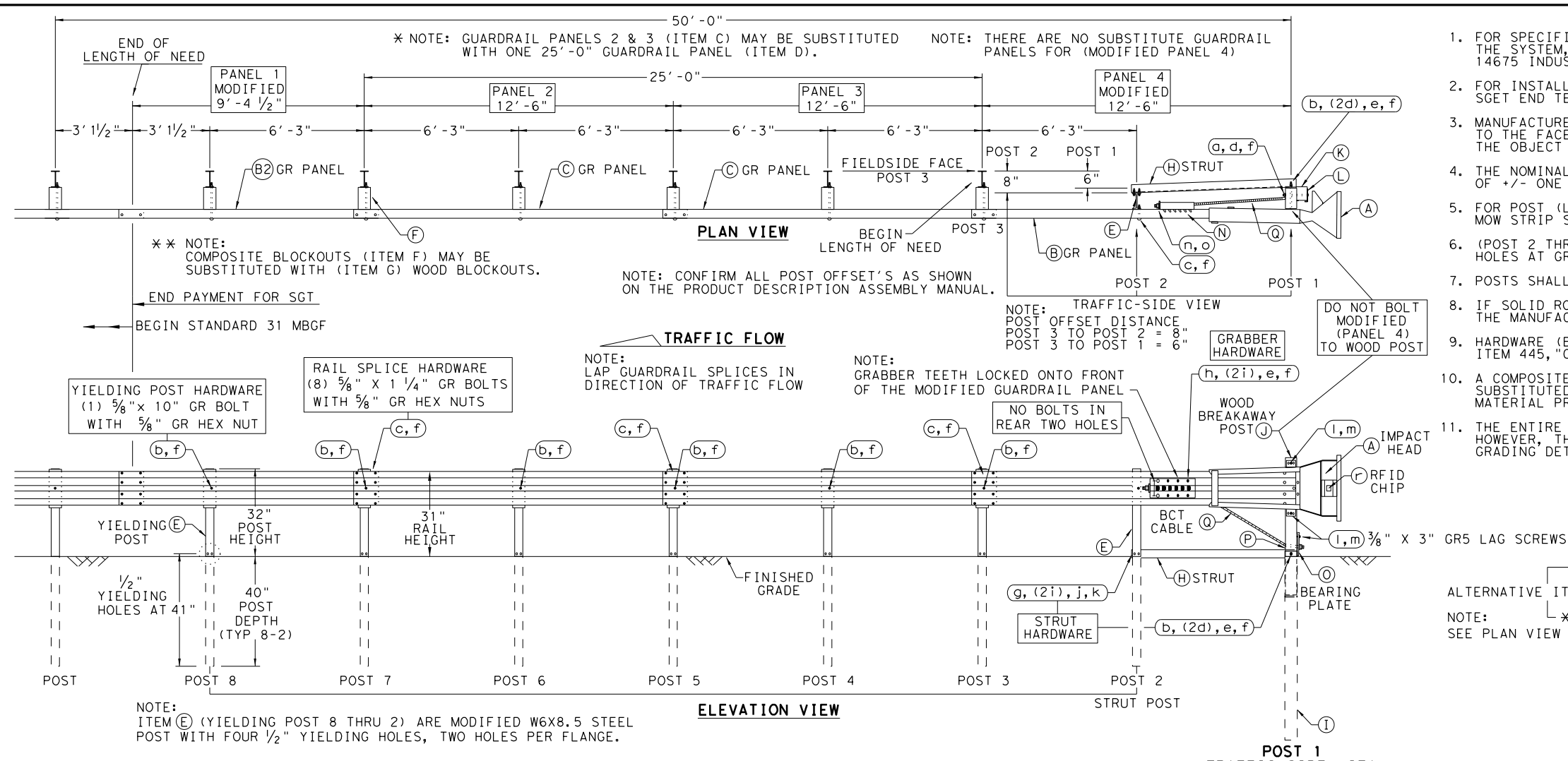
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© TXDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	48	

DATE: 7/3/2024  
 FILE: \$FILES\$



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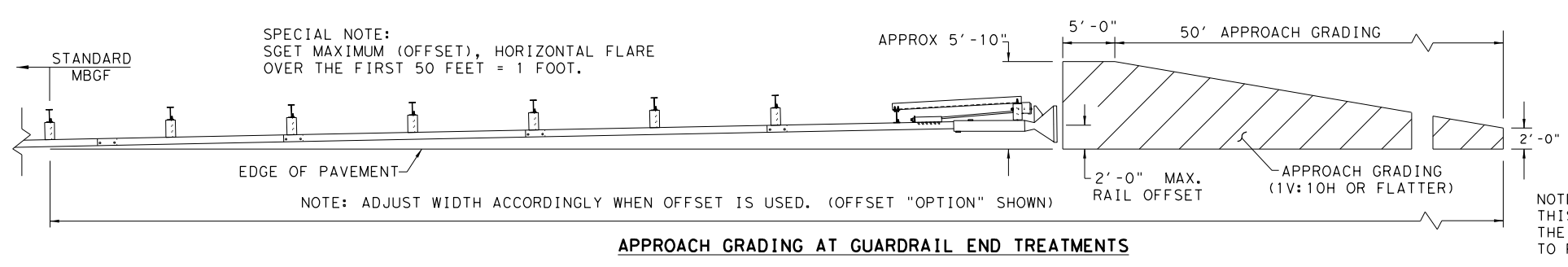
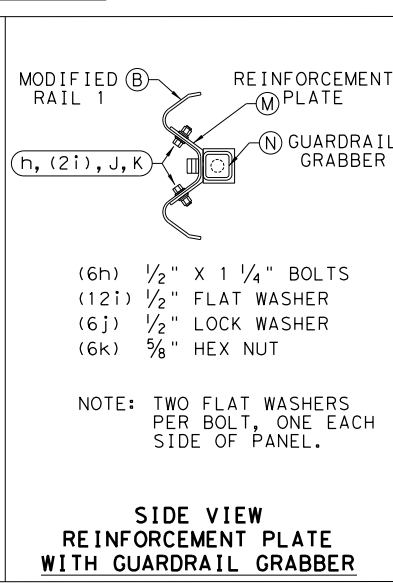
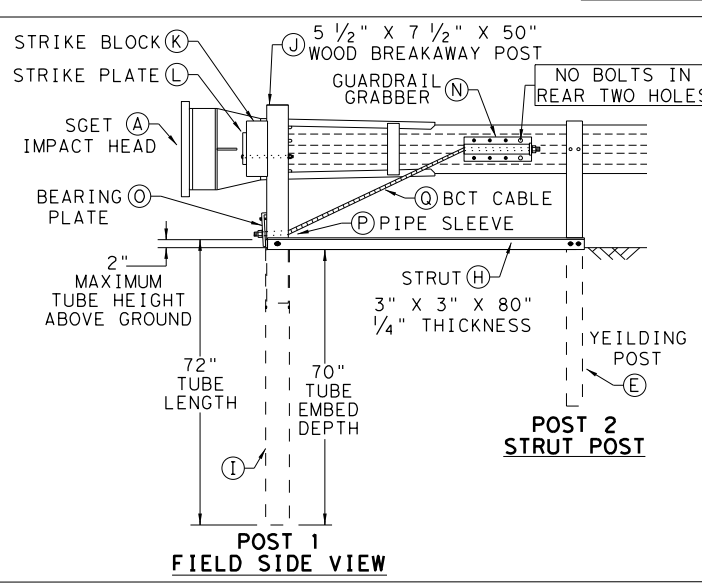
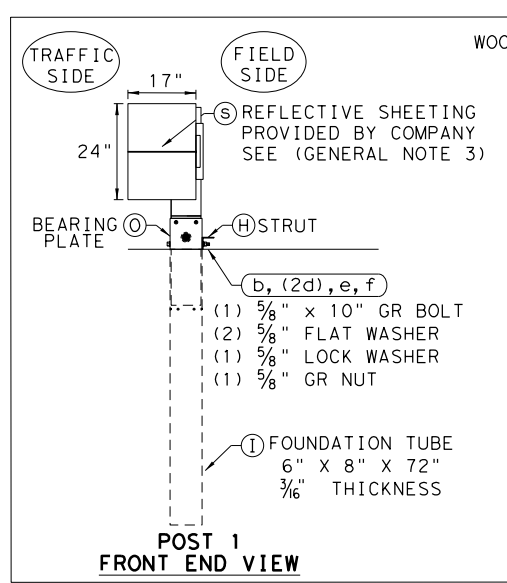
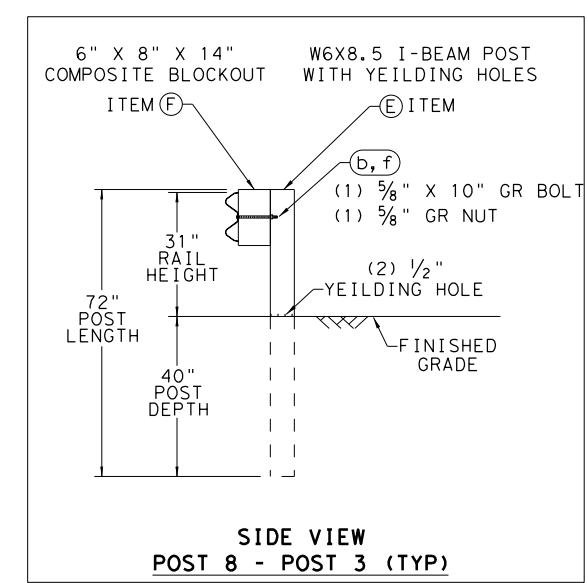


- GENERAL NOTES**
- FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
  - FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CB08
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WB08
H	1	STRUT 3" X 3" X 80" X 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" X 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" X 7 1/2" X 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81

ITEM	QTY	SMALL HARDWARE	ITEM #
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M



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

**Texas Department of Transportation**

**Design Division Standard**

**SPIG INDUSTRY, LLC**

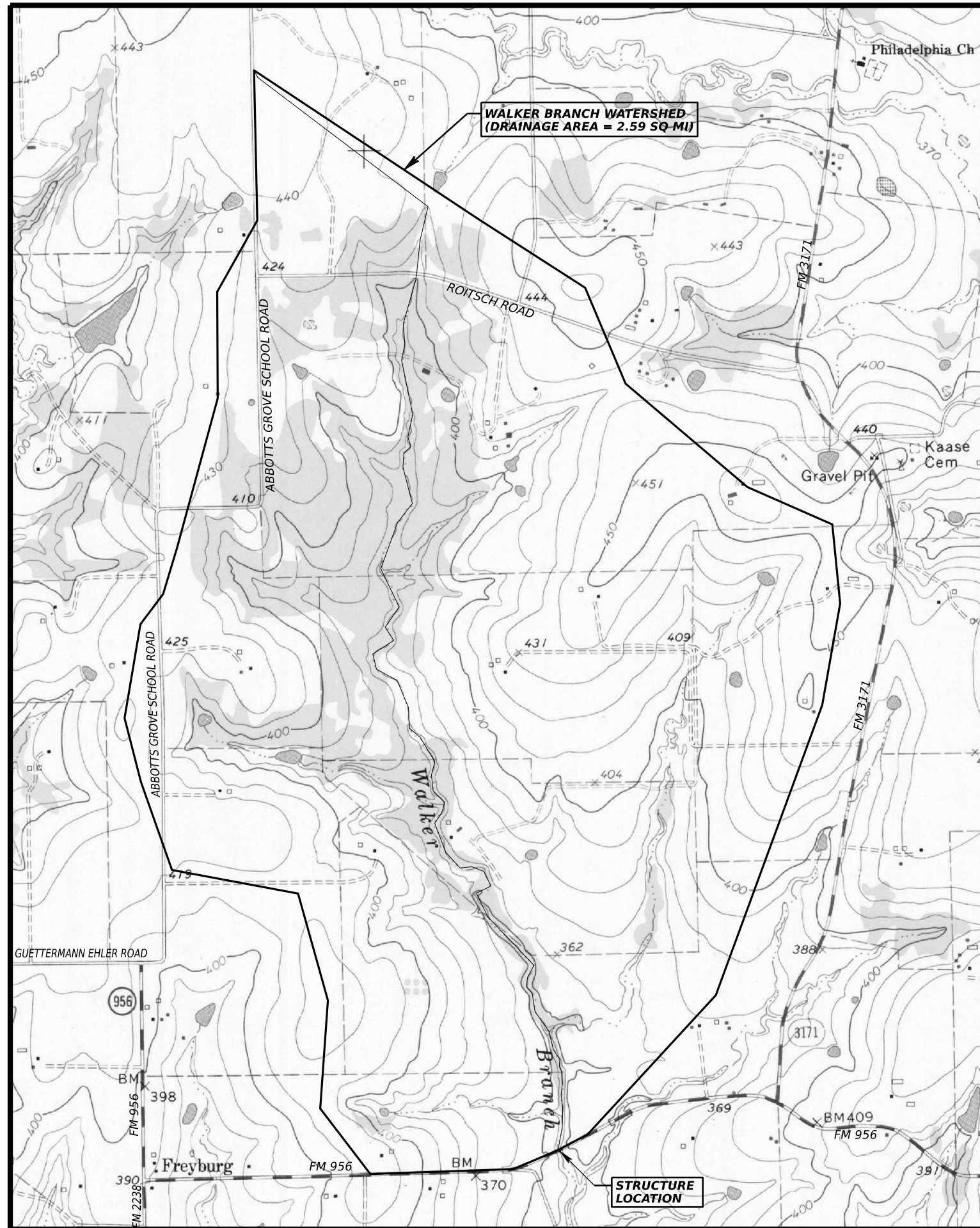
**SINGLE GUARDRAIL TERMINAL**

**SGET - TL-3 - MASH**

**SGT (15) 31-20**

FILE: sg153120.dgn	DN: TXDOT	CK: KM	DW: VP	CK: VP
© TXDOT: APRIL 2020	CONT: 01	SECT: 008	JOB: FM 956	REVISIONS
	DIST: YKM	COUNTY: FAYETTE	SHEET NO.: 49	

DATE: 7/3/2024  
FILE: \$FILES



**DRAINAGE AREA MAP**

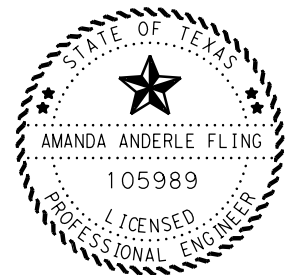
**DRAINAGE AREA MAP**

WALKER BRANCH

DRAINAGE AREA	=	1,655 ACRES (2.59 SQ MI)
CURVE NUMBER	=	77
TIME OF CONCENTRATION	=	2.627 HRS
INITIAL ABSTRACTION	=	0.60 IN
LAG TIME	=	94.57 MIN
Q <sub>10</sub>	=	1,980 CFS
Q <sub>100</sub>	=	3,744 CFS

UNITED STATES GEOLOGICAL SURVEY(USGS) QUADRANGLE MAPS WERE USED TO DETERMINE THE DRAINAGE AREA BOUNDARY AND THE WATER COURSE SLOPES.

PEAK DISCHARGE WAS DETERMINED USING THE U.S. ARMY CORPS OF ENGINEERS HYDROLOGIC MODELING SYSTEM (HEC-HMS) SOFTWARE VERSION 4.10 USING NOAA ATLAS 14 RAINFALL DATA. A COMPARISON WAS MADE USING OMEGA EM REGRESSION EQUATIONS.



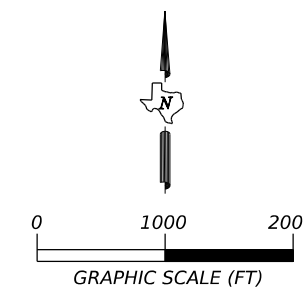
*Amanda Anderle Fling, P.E.*

07/03/2024

**DRAINAGE AREA MAP  
AND  
HYDROLOGIC DATA**

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SHEET 1 OF 1

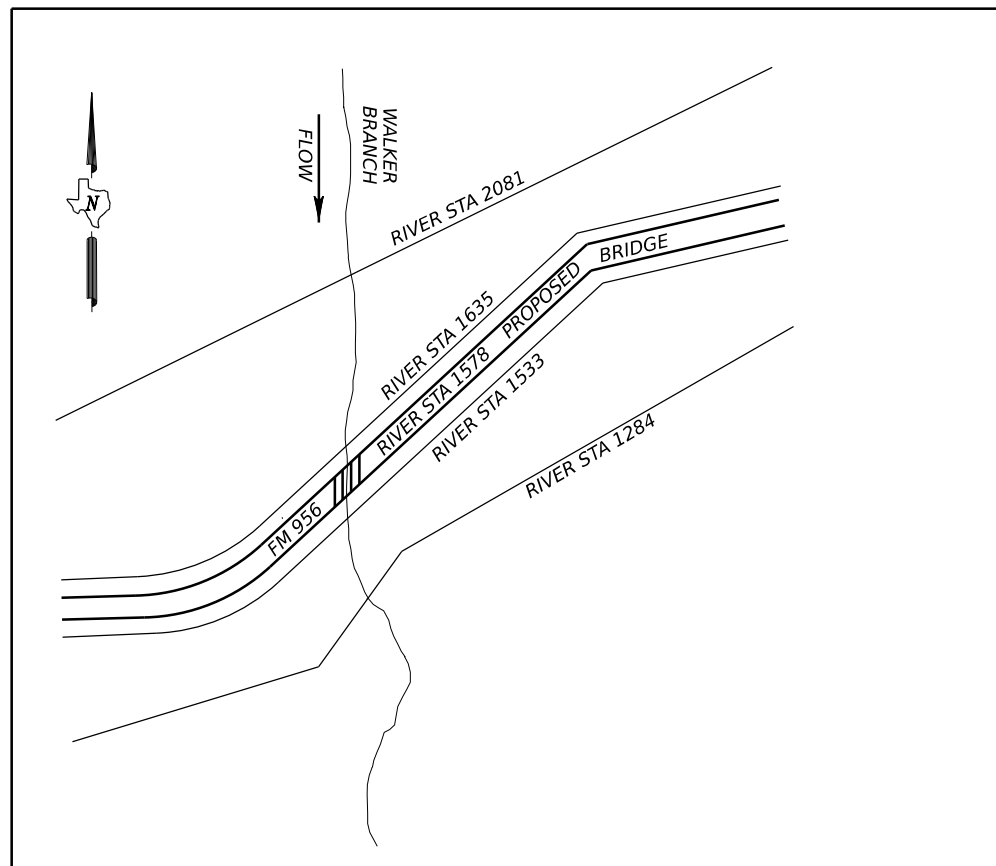


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FILE: DrainageAreaMap.dgn  
DATE: 7/3/2024

FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	50

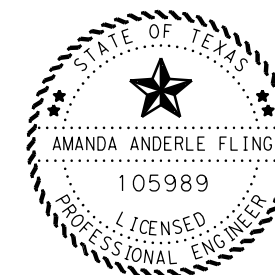
**WALKER BRANCH HYDRAULIC DATA**

Reach	River Sta	Profile	Plan	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)	Q Total (cfs)	Vel Chan (ft/s)
Reach1	2081	10Yr	Exist	342.82	342.10	342.10	2.17	0.03	238.03	1198.15	543.82	282.57	1980	8.47
Reach1	2081	10Yr	Prop	342.82	342.10	342.10	1.55	0.00	238.03	1198.15	543.82	282.57	1980	8.47
Reach1	2081	100Yr	Exist	343.89	343.22	342.91	1.58	0.04	624.85	1664.48	1454.67	356.44	3744	9.07
Reach1	2081	100Yr	Prop	343.84	342.91	342.91	1.24	0.09	575.97	1793.88	1374.15	343.72	3744	10.43
Reach1	1635	10Yr	Exist	340.49	339.86	338.89				1980.00		103.40	1980	6.36
Reach1	1635	10Yr	Prop	340.35	339.60	338.89				1980.00		97.23	1980	6.95
Reach1	1635	100Yr	Exist	342.26	341.74	340.51			211.58	3369.91	162.52	380.90	3744	6.07
Reach1	1635	100Yr	Prop	342.36	341.73	340.47			83.97	3595.65	64.38	379.70	3744	6.48
Reach1	1578 Br U	10Yr	Exist	340.50	339.86								1980	7.71
Reach1	1578 Br U	10Yr	Prop	340.36	339.60								1980	7.78
Reach1	1578 Br U	100Yr	Exist	342.27	341.74								3744	9.60
Reach1	1578 Br U	100Yr	Prop	342.37	341.73								3744	10.15
Reach1	1578 Br D	10Yr	Exist	340.06	339.22								1980	7.59
Reach1	1578 Br D	10Yr	Prop	340.06	339.22								1980	7.36
Reach1	1578 Br D	100Yr	Exist	341.40	340.23								3744	9.60
Reach1	1578 Br D	100Yr	Prop	341.40	340.23								3744	10.15
Reach1	1533	10Yr	Exist	340.06	339.22	339.06	0.94	0.04	149.85	1830.15		154.11	1980	7.61
Reach1	1533	10Yr	Prop	340.06	339.22	339.06	0.94	0.04	149.85	1830.15		154.11	1980	7.61
Reach1	1533	100Yr	Exist	341.40	340.23	340.23	1.02	0.09	549.46	3194.55		220.60	3744	9.23
Reach1	1533	100Yr	Prop	341.40	340.23	340.23	1.02	0.09	549.46	3194.55		220.60	3744	9.23
Reach1	1284	10Yr	Exist	339.08	338.37		1.71	0.03	560.25	1398.18	21.57	179.09	1980	7.73
Reach1	1284	10Yr	Prop	339.08	338.37		1.71	0.03	560.25	1398.18	21.57	179.09	1980	7.73
Reach1	1284	100Yr	Exist	340.26	339.39	339.39	1.48	0.00	1484.01	2123.74	136.25	453.42	3744	9.18
Reach1	1284	100Yr	Prop	340.26	339.39	339.39	1.48	0.00	1484.01	2123.74	136.25	453.42	3744	9.18



**CROSS SECTION LOCATIONS**

NOT TO SCALE



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**WALKER BRANCH HYDRAULIC DATA**

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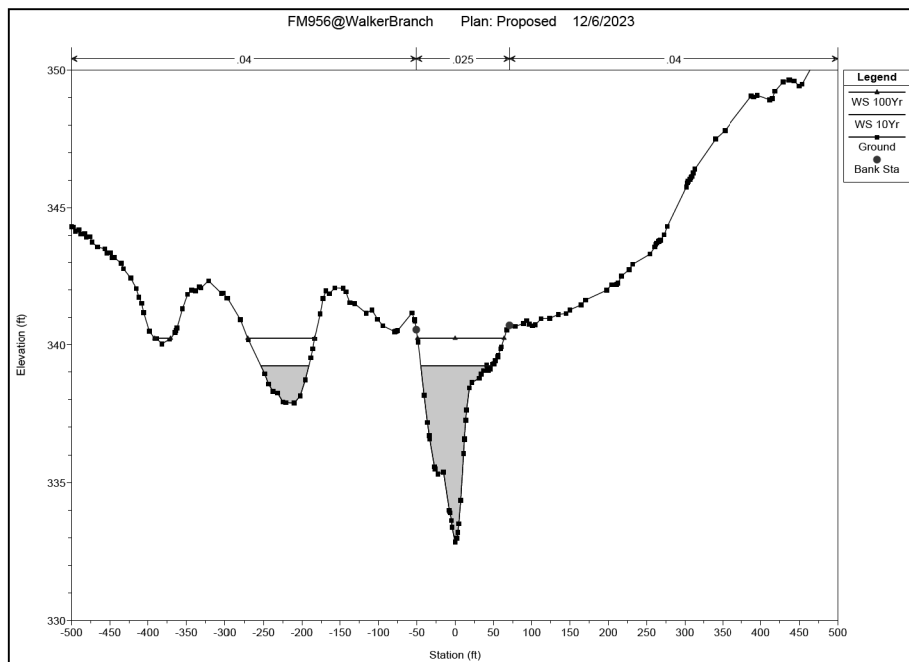
SHEET 1 OF 2

FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	51

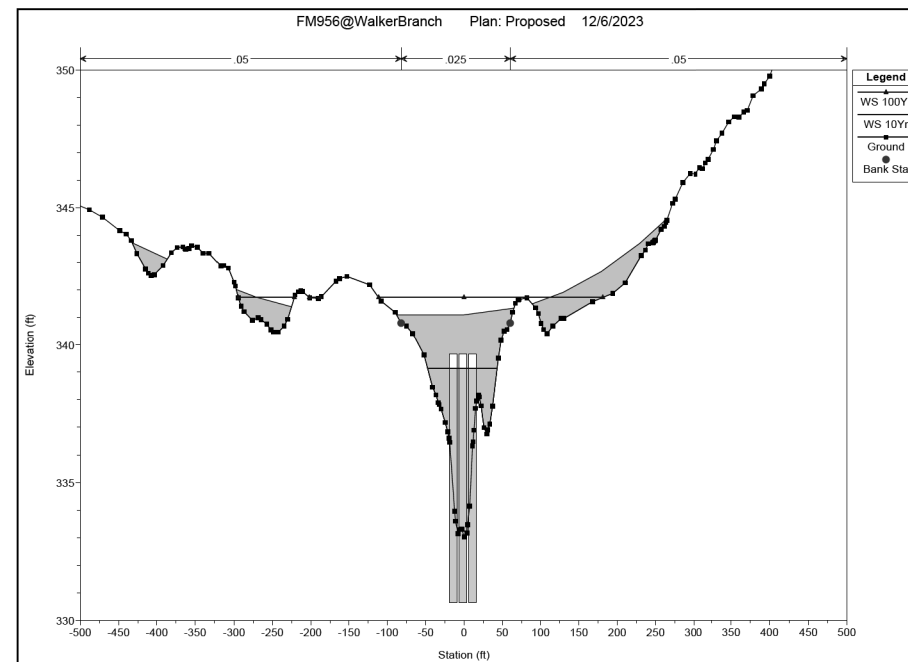
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FILE: HydraulicData.dgn  
DATE: 7/3/2024

NOTES:

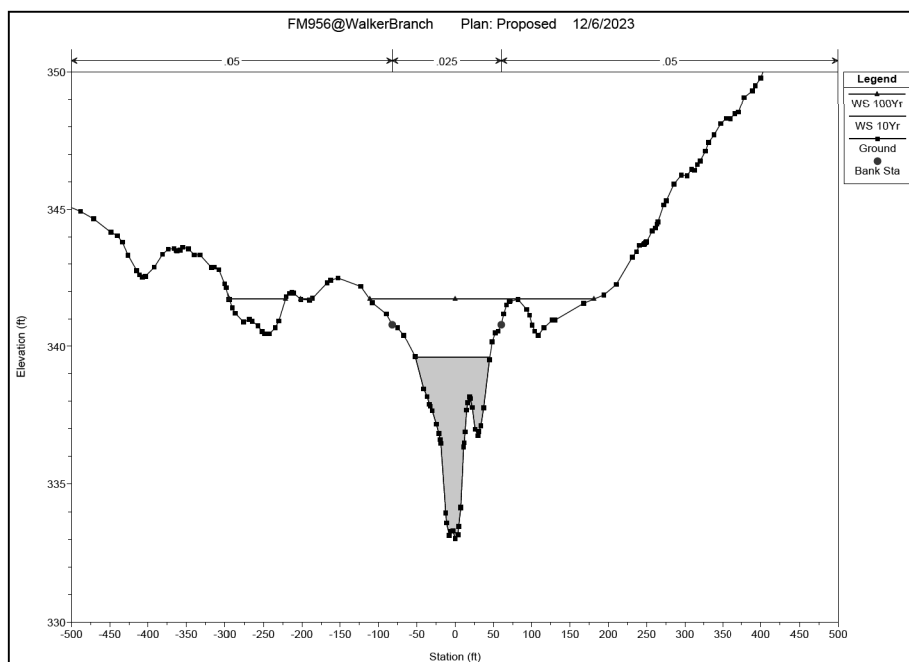
- HYDRAULIC ANALYSIS PERFORMED USING THE U.S. ARMY CORPS OF ENGINEERS HEC-RAS RIVER ANALYSIS SYSTEM VERSION 6.3.1 (SEPTEMBER 2022).
- RIVER STATIONS ARE IN FEET.
- TAILWATER ELEVATIONS WERE DETERMINED BY A NORMAL DEPTH COMPUTATION USING A DOWNSTREAM CHANNEL BED SLOPE OF 0.0040 FT/FT.
- THE PROJECT SITE IS LOCATED IN A ZONE A AREA ON THE FLOOD INSURANCE RATE MAP (PANEL NO. 48149C0425C DATED OCTOBER 17, 2006) OF FAYETTE COUNTY, TEXAS.
- NOTIFICATION OF THE FLOODPLAIN ADMINISTRATOR WAS DONE DECEMBER 10, 2023.



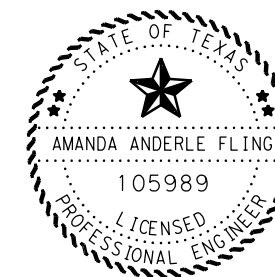
**RIVER STATION 1635  
(UPSTREAM)**  
NOT TO SCALE



**RIVER STATION 1578  
(UPSTREAM FACE OF PROPOSED BRIDGE)**  
NOT TO SCALE



**RIVER STATION 1533  
(DOWNSTREAM)**  
NOT TO SCALE



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07/03/2024

**WALKER BRANCH  
HYDRAULIC DATA**

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SHEET 2 OF 2

NOTE:  
HEC-RAS MODEL (VERSION 6.3.1, SEPTEMBER 2022)  
WAS USED FOR HYDRAULIC ANALYSIS OF EXISTING  
CONDITIONS AND DESIGN OF PROPOSED STRUCTURE.

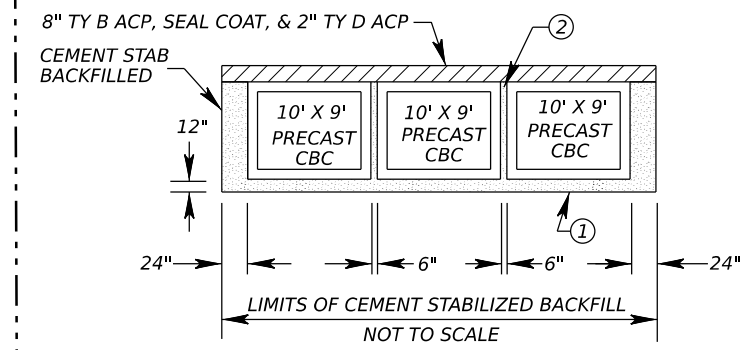
FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	52

**HYDRAULIC DATA:**  
 DRAINAGE AREA = 2.59 SQ MI  
 ALLOWABLE HW = 339.60 FEET  
 $Q_{10} = 1,980$  CFS  
 $HW_{10} = 339.60$  FEET  
 $TW_{10} = 339.22$  FEET  
 $V_{10} = 7.36$  FPS (OUTLET)  
 $Q_{100} = 3,744$  CFS  
 $HW_{100} = 341.73$  FEET  
 $TW_{100} = 340.23$  FEET  
 $V_{100} = 10.15$  FPS (OUTLET)

LAT: 29°45'30.03"N  
 LONG: 96°57'04.29"W

EXIST NBI #: 13-076-0-1266-01-001  
 PROP NBI #: 13-076-0-1266-01-002  
 ADT: 184 VPD (2022) 313 VPD (2042)  
 ROADWAY FUNCTIONAL CLASS: RURAL MINOR COLLECTOR  
 DESIGN SPEED: 50 MPH  
 TERRAIN: LEVEL  
 AASHTO DESIGN CRITERIA AND DESIGNED LOADING

EXIST STRUCTURE  
 STA 138+52.00 TO STA 138+84.67  
 3 - 10' X 9' X 21.30' CONCRETE BOX CULVERT  
 W/ HEADWALLS & FLARED WINGWALLS LT & RT  
 TO BE REMOVED.



- NOTES:
- LIMITS OF CEMENT STABILIZED BACKFILL TO EXTEND TO END OF BOX CULVERT.
  - CEMENT STABILIZED BACKFILL BETWEEN BOXES IS CONSIDERED PART OF THE BOX CULVERT FOR PAYMENT.



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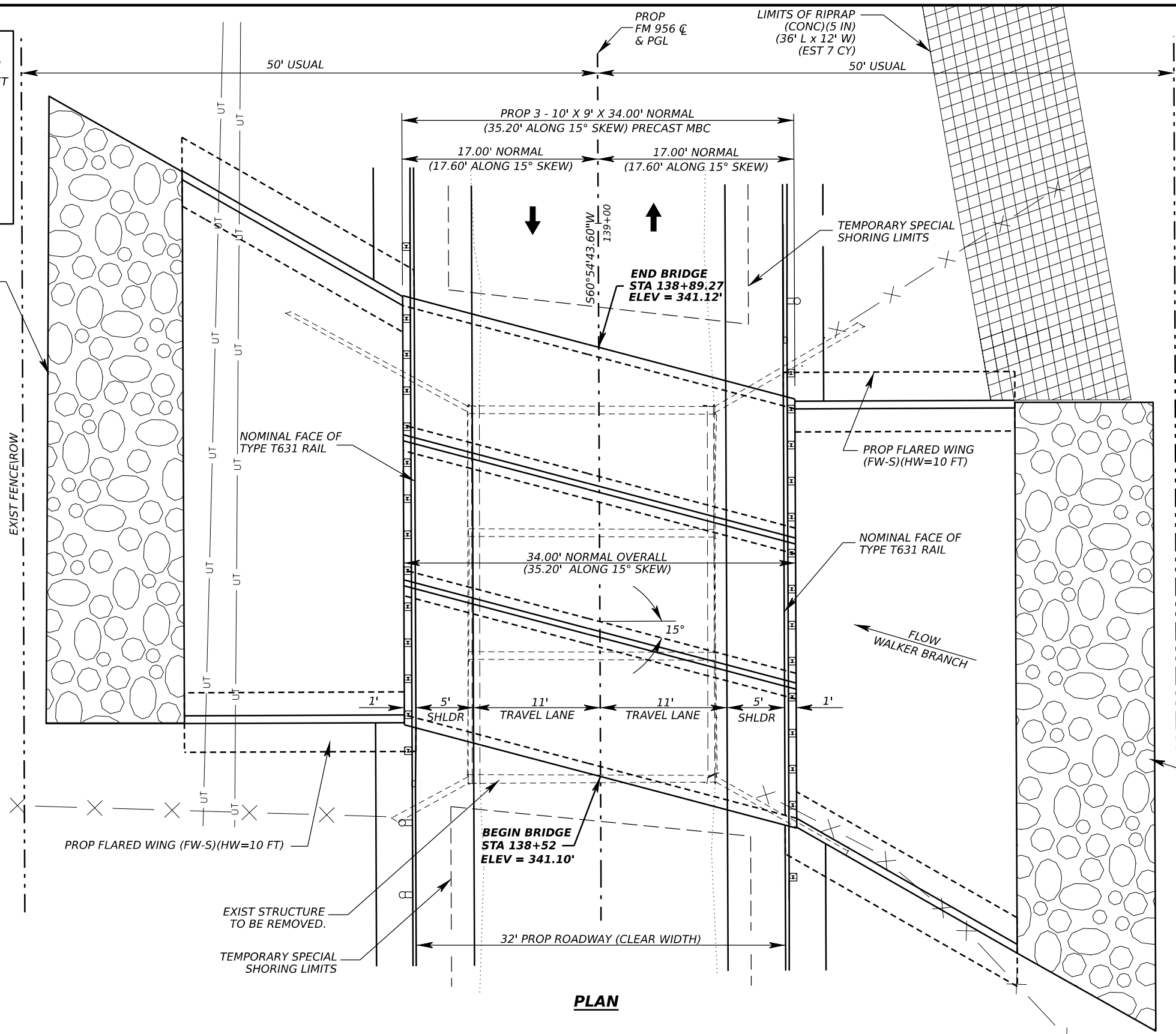
07/03/2024

# WALKER BRANCH CULVERT LAYOUT

SCALE: 1" = 10'

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FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	53



PLAN

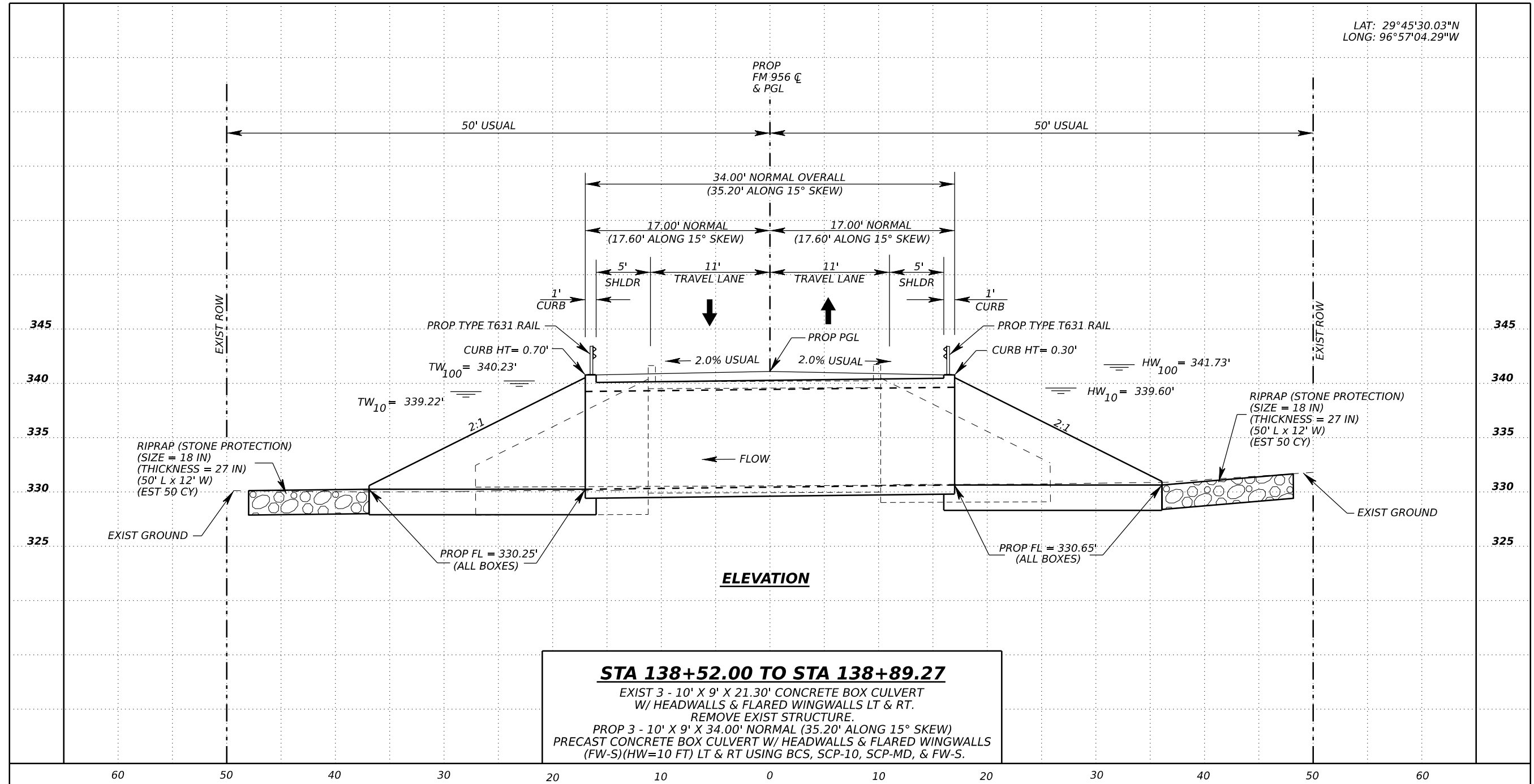
## STA 138+52.00 TO STA 138+89.27

EXIST 3 - 10' X 9' X 21.30' CONCRETE BOX CULVERT  
 W/ HEADWALLS & FLARED WINGWALLS LT & RT.  
 REMOVE EXIST STRUCTURE.  
 PROP 3 - 10' X 9' X 34.00' NORMAL (35.20' ALONG 15° SKEW)  
 PRECAST CONCRETE BOX CULVERT W/ HEADWALLS & FLARED WINGWALLS  
 (FW-S)(HW=10 FT) LT & RT USING BCS, SCP-10, SCP-MD, & FW-S.

- NOTES:
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD.
  - CONTRACTOR SHALL LOCATE ALL UTILITIES AND INFORM ENGINEER, IN WRITING, OF ANY CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.

PATH: T:\YKMAN\EX\PS&E\126601008\_FM956\_WalkerBranch\Plan\_Sheets1  
 FILE: FM956\_Culvert.dgn  
 DATE: 7/4/2024

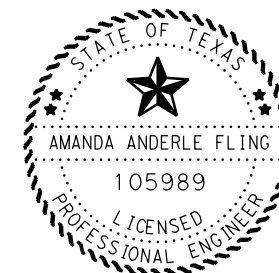
LAT: 29°45'30.03"N  
LONG: 96°57'04.29"W



**STA 138+52.00 TO STA 138+89.27**

EXIST 3 - 10' X 9' X 21.30' CONCRETE BOX CULVERT  
W/ HEADWALLS & FLARED WINGWALLS LT & RT.  
REMOVE EXIST STRUCTURE.  
PROP 3 - 10' X 9' X 34.00' NORMAL (35.20' ALONG 15° SKEW)  
PRECAST CONCRETE BOX CULVERT W/ HEADWALLS & FLARED WINGWALLS  
(FW-S)(HW=10 FT) LT & RT USING BCS, SCP-10, SCP-MD, & FW-S.

- NOTES:
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD.
  - CONTRACTOR SHALL LOCATE ALL UTILITIES AND INFORM ENGINEER, IN WRITING, OF ANY CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.



Amanda Anderle Fling, P.E.

07/03/2024

**WALKER BRANCH  
CULVERT LAYOUT**

SCALE: 1" = 10'

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SHEET 2 OF 2

FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	54

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

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans - Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°, 15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B O set of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (CY) (2)	Class "C" Conc (Wingwall) (CY) (3)	Total Wingwall Area (SF)
STA 138+52 TO STA 138+89.27 (Lt)	3 ~10'x 9'	1'	SCP-10	FW-S	15°	2:1	10"	10"	0.700'	10.292'	19.917'	11.499'	22.998'	N/A	N/A	12.0	1.0	13.6	228
STA 138+52 TO STA 138+89.27 (Rt)	3 ~10'x 9'	1'	SCP-10	FW-S	15°	2:1	10"	10"	0.300'	9.875'	19.083'	11.018'	22.036'	N/A	N/A	11.7	0.4	12.0	210

NOTES:  
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;  
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical  
• Side slope at culvert for arched or straight wingwalls.  
• Channel slope for parallel wingwalls.  
• Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = O set of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)

Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.

Area for four wingwalls (two structure ends) if Both.

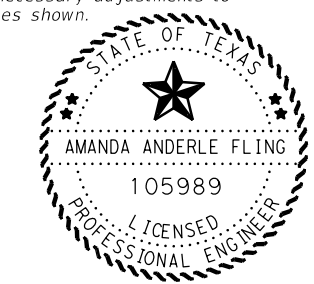
① Round the wall heights shown to the nearest foot for bidding purposes.

② Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

③ Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

④ Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

**SPECIAL NOTE:**  
  
This sheet is a supplement to the box culvert standards. It is to be filed out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.  
  
An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.



*Amanda Anderle Fling, P.E.*

07/03/2024



**BOX CULVERT SUPPLEMENT WINGS AND END TREATMENTS**

**BCS**

FILE: bcsstdel-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
CONT	SECT	JOB	HIGHWAY	
1266	01	008	FM 956	
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		55	

DATE: 7/3/2024  
FILE: \$TIME\$  
FILE: \$FILES\$

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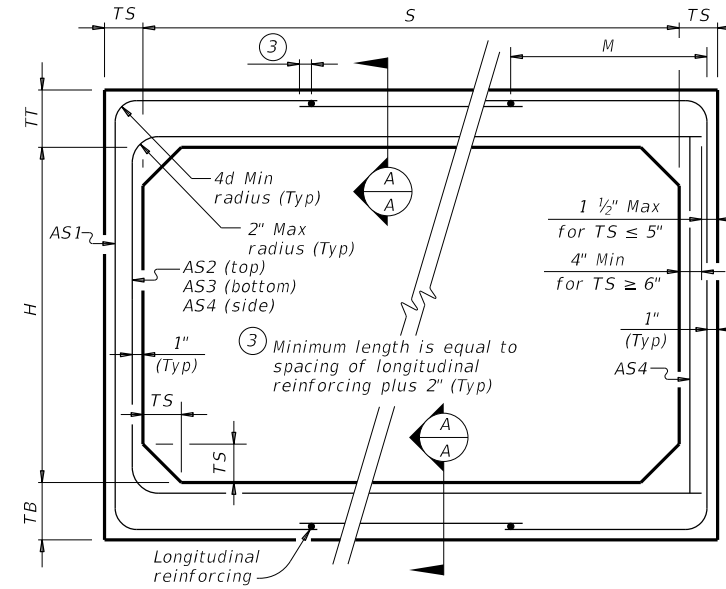
DATE: 7/3/2024  
 FILE: \$FILES\$  
 \$TIME\$

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	
10	4	10	10	10	< 2	-	0.33	0.34	0.27	0.24	0.24	0.24	16.5
10	4	10	10	10	2 < 3	58	0.38	0.35	0.30	0.24	-	-	16.5
10	4	10	10	10	3 - 5	53	0.31	0.28	0.27	0.24	-	-	16.5
10	4	10	10	10	10	52	0.36	0.32	0.33	0.24	-	-	16.5
10	4	10	10	10	15	52	0.47	0.42	0.43	0.24	-	-	16.5
10	4	10	10	10	20	52	0.61	0.54	0.55	0.24	-	-	16.5
10	4	10	10	10	25	52	0.75	0.67	0.68	0.24	-	-	16.5
10	5	10	10	10	< 2	-	0.30	0.36	0.30	0.24	0.24	0.24	17.5
10	5	10	10	10	2 < 3	58	0.35	0.39	0.34	0.24	-	-	17.5
10	5	10	10	10	3 - 5	52	0.28	0.31	0.30	0.24	-	-	17.5
10	5	10	10	10	10	52	0.33	0.35	0.36	0.24	-	-	17.5
10	5	10	10	10	15	47	0.42	0.46	0.47	0.24	-	-	17.5
10	5	10	10	10	20	47	0.55	0.59	0.61	0.24	-	-	17.5
10	5	10	10	10	25	47	0.68	0.73	0.75	0.24	-	-	17.5
10	6	10	10	10	< 2	-	0.28	0.38	0.33	0.24	0.24	0.24	18.5
10	6	10	10	10	2 < 3	58	0.32	0.42	0.37	0.24	-	-	18.5
10	6	10	10	10	3 - 5	53	0.26	0.34	0.33	0.24	-	-	18.5
10	6	10	10	10	10	52	0.30	0.38	0.39	0.24	-	-	18.5
10	6	10	10	10	15	47	0.39	0.49	0.51	0.24	-	-	18.5
10	6	10	10	10	20	47	0.50	0.63	0.65	0.24	-	-	18.5
10	6	10	10	10	25	47	0.61	0.78	0.80	0.24	-	-	18.5
10	7	10	10	10	< 2	-	0.25	0.40	0.36	0.24	0.24	0.24	19.5
10	7	10	10	10	2 < 3	58	0.30	0.45	0.40	0.24	-	-	19.5
10	7	10	10	10	3 - 5	58	0.24	0.36	0.35	0.24	-	-	19.5
10	7	10	10	10	10	52	0.28	0.40	0.42	0.24	-	-	19.5
10	7	10	10	10	15	47	0.36	0.52	0.54	0.24	-	-	19.5
10	7	10	10	10	20	47	0.46	0.67	0.69	0.24	-	-	19.5
10	7	10	10	10	25	47	0.56	0.82	0.85	0.24	-	-	19.5
10	8	10	10	10	< 2	-	0.24	0.41	0.38	0.24	0.24	0.24	20.5
10	8	10	10	10	2 < 3	64	0.27	0.47	0.43	0.24	-	-	20.5
10	8	10	10	10	3 - 5	58	0.24	0.38	0.38	0.24	-	-	20.5
10	8	10	10	10	10	52	0.26	0.42	0.44	0.24	-	-	20.5
10	8	10	10	10	15	47	0.34	0.54	0.57	0.24	-	-	20.5
10	8	10	10	10	20	47	0.43	0.69	0.72	0.24	-	-	20.5
10	9	10	10	10	< 2	-	0.24	0.42	0.41	0.24	0.24	0.24	21.5
10	9	10	10	10	2 < 3	70	0.26	0.50	0.46	0.24	-	-	21.5
10	9	10	10	10	3 - 5	64	0.24	0.40	0.40	0.24	-	-	21.5
10	9	10	10	10	10	58	0.25	0.43	0.46	0.24	-	-	21.5
10	9	10	10	10	15	52	0.32	0.56	0.59	0.24	-	-	21.5
10	9	10	10	10	20	47	0.40	0.71	0.75	0.24	-	-	21.5
10	10	10	10	10	< 2	-	0.24	0.44	0.44	0.24	0.24	0.24	22.5
10	10	10	10	10	2 < 3	79	0.25	0.52	0.48	0.24	-	-	22.5
10	10	10	10	10	3 - 5	70	0.24	0.42	0.43	0.24	-	-	22.5
10	10	10	10	10	10	64	0.24	0.44	0.48	0.24	-	-	22.5
10	10	10	10	10	15	52	0.30	0.57	0.61	0.24	-	-	22.5
10	10	10	10	10	20	52	0.38	0.73	0.77	0.24	-	-	22.5

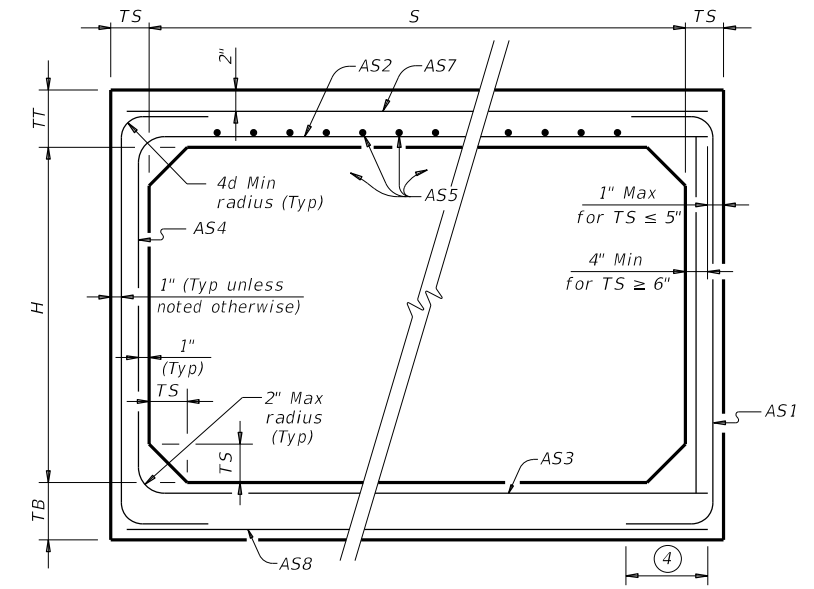
① For box length = 8'-0"

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.



CORNER OPTION "A" CORNER OPTION "B"

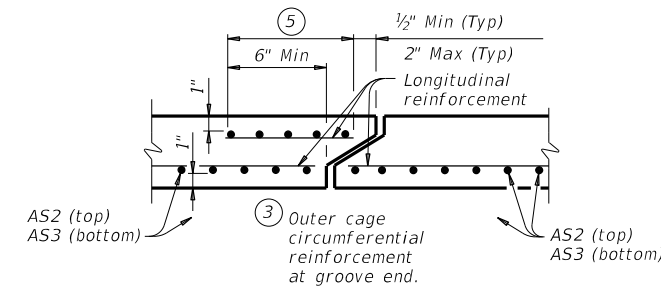
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

④ Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

**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 height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

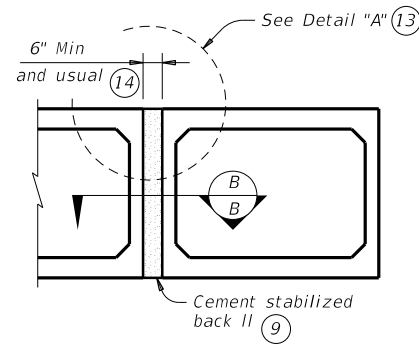
HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>SINGLE BOX CULVERTS          PRECAST          10'-0" SPAN</b>			
<b>SCP-10</b>			
FILE: scp10sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT February 2020	CONT SECT	JOB	HIGHWAY
REVISIONS	1266 01	008	FM 956
DIST	COUNTY	SHEET NO.	
YKM	FAYETTE	56	

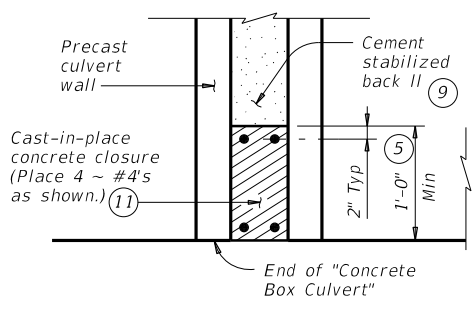


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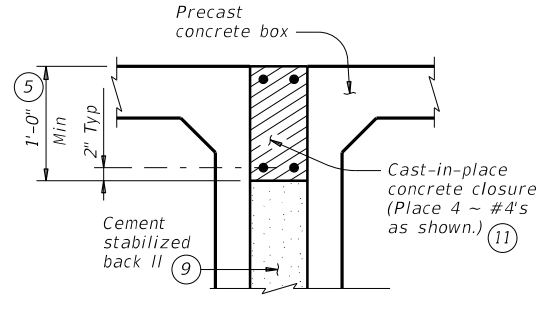
DATE: 7/3/2024  
 TIME: \$  
 FILE: \$



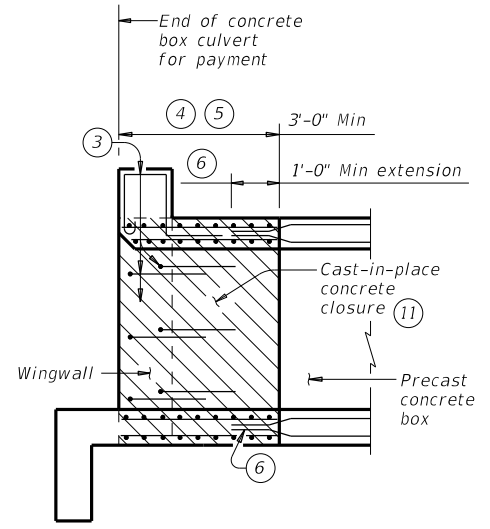
**MULTIPLE UNIT PLACEMENT**



**SECTION B-B**

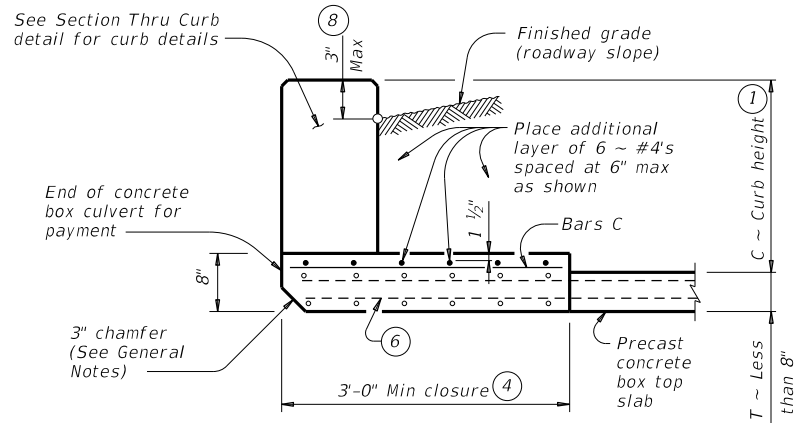


**DETAIL "A" (13)**

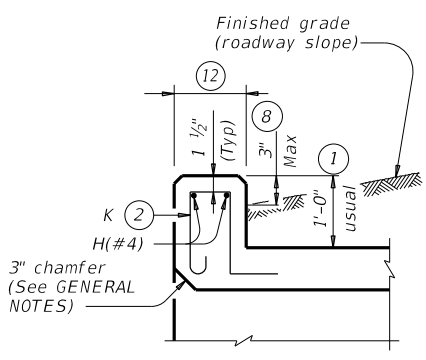


**WINGWALL CONNECTION**

(Also applies to safety end treatment.)

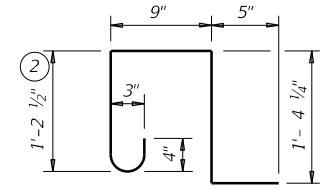
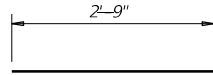


**SECTION THRU TOP SLABS LESS THAN 8"**



**SECTION THRU CURB**

QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY

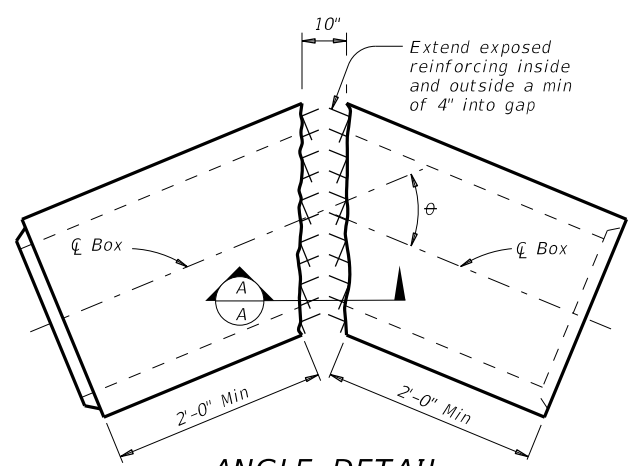


- 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & 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.
- 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.
- Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not t into closure area.
- Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the eld 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 ush with the inside and outside faces of the precast box section.
- 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.
- Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
- 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.
- For vehicle safety, the following requirements must be met:
  - For structures without bridge rail, construct curbs no more than 3" above nished grade.
  - For structures with bridge rail, construct curbs ush with nished 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.
- Cement stabilized back II between boxes is considered part of the box culvert for payment.
- All curb concrete and reinforcing is considered part of the box culvert for payment.
- Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
- 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
- For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the nial riding surface, provide wall closure as shown in Detail "A".
- 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.

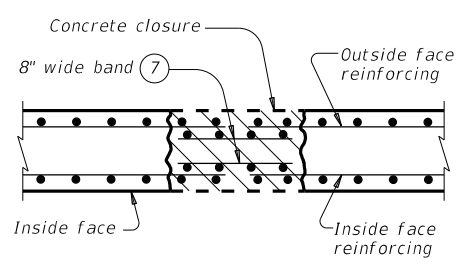
**MATERIAL NOTES:**  
 Provide Grade 60 reinforcing steel.  
 Provide ASTM A1064 welded wire reinforcement.  
 Provide Class C concrete (f'c = 3,600 psi) for the closures.  
 Provide cement stabilized back II meeting the requirements of Item 400, "Excavation and Back II for Structures."  
 Any additional 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.

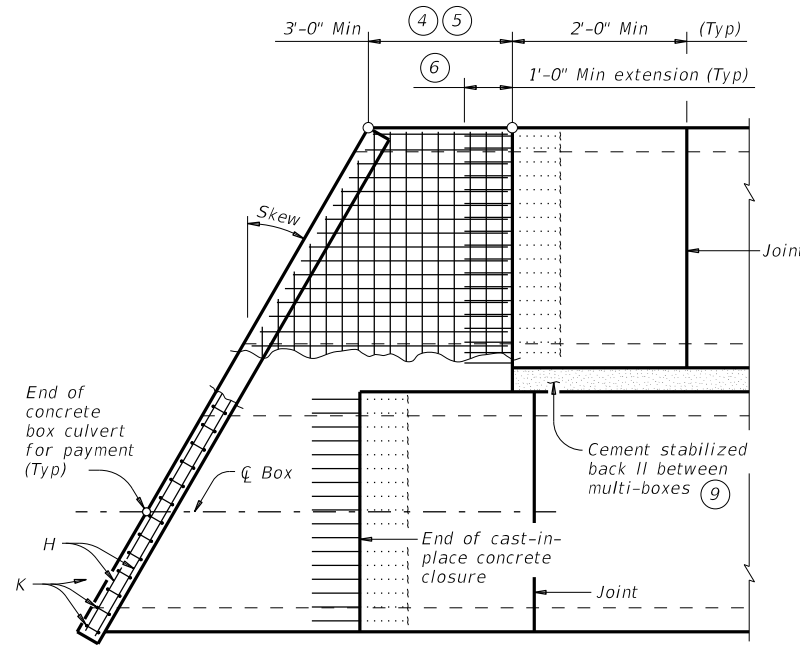
Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bars dimensions are out-to-out of bars.



**ANGLE DETAIL**



**SECTION A-A**



**PLAN OF SKEWED ENDS**

(Showing multi-box placement.)

HL93 LOADING

		<b>Bridge Division Standard</b>	
<b>BOX CULVERTS          PRECAST          MISCELLANEOUS DETAILS</b>			
<b>SCP-MD</b>			
FILE: SCPMDSTS-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT
REVISIONS	CONT	SECT	JOB
	1266	01	008
			FM 956
	DIST	COUNTY	SHEET NO.
	YKM	FAYETTE	57

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

**TABLE OF DIMENSIONS AND REINFORCING STEEL**  
(Wings for one structure end)

Maximum Wingwall Height Hw	Dimensions				Variable Reinforcing				Estimated Quantities per ft of wing length (2-wings)	
	W	X	Y	Z	Bars J1		Bars J2		Reinf (Lb/Ft)	Conc (CY/Ft)
					Size	Spa	Size	Spa		
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

**TABLE OF WINGWALL REINFORCING**  
(2-wings)

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

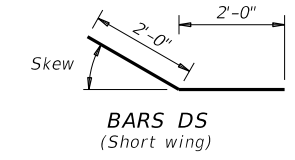
**TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES**

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

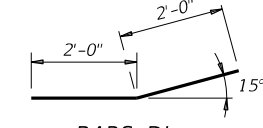
**WING DIMENSION FORMULAS:**  
(All values are in feet.)

$Hw = H + T + C - 0.250'$   
 $A = (Hw - 0.333')(SL)$   
 $B = (A) [\tan(\theta + 15^\circ)]$   
 $Lw = (A) \div [\cos(\theta + 15^\circ)]$   
 For cast-in-place culverts:  
 $Ltw = [(N)(S) + (N + 1)(U)] \div \cos(\theta)$   
 For precast culverts:  
 $Ltw = [(N)(2U + S) + (N - 1)(0.5')] \div \cos(\theta)$   
 Total wingwall area (two wings ~ SF) =  $0.5 (Hw + 0.333')(Lw + A)$

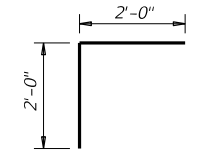
Hw = Height of wingwall  
 SL:1 = Side slope ratio (horizontal:1 vertical)  
 A = Length of short wingwalls  
 Lw = Length of long wingwall  
 Ltw = Culvert toewall length  
 N = Number of culvert spans  
 θ = Culvert skew  
 See applicable box culvert standard sheet for H, S, T, and U values.



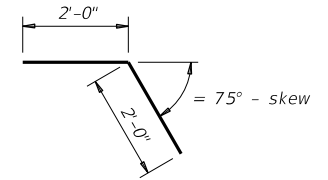
**BARS DS**  
(Short wing)



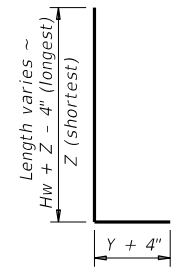
**BARS DL**  
(Long wing)



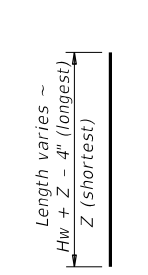
**BARS RS**  
(Short wing)



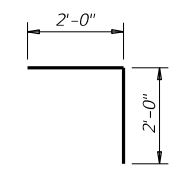
**BARS RL**  
(Long wing)



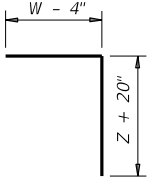
**BARS J1**



**BARS V**



**BARS L**



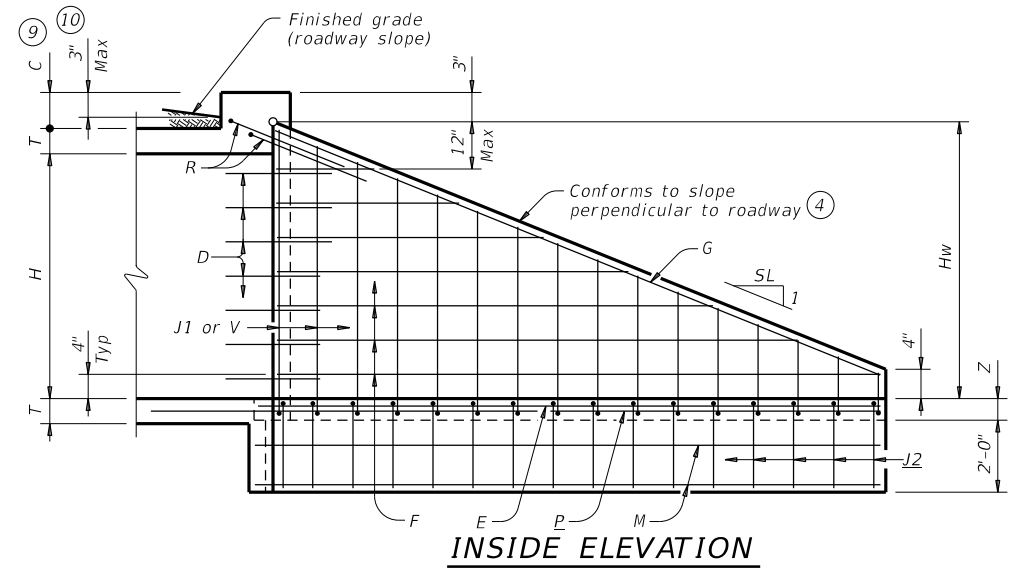
**BARS J2**

- Extend Bars P 3'-0" minimum into bottom slab of box culvert.
- Adjust as necessary to maintain 1 #2" clear cover and 4" minimum between bars.
- Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by 0.5 x (A + Lw).
- Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.
- When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.
- At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.
- Applicable values of skew are: 15°, 30°, and 45°.
- Typical wingwall angle for all skews.
- 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 or 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.
- 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.

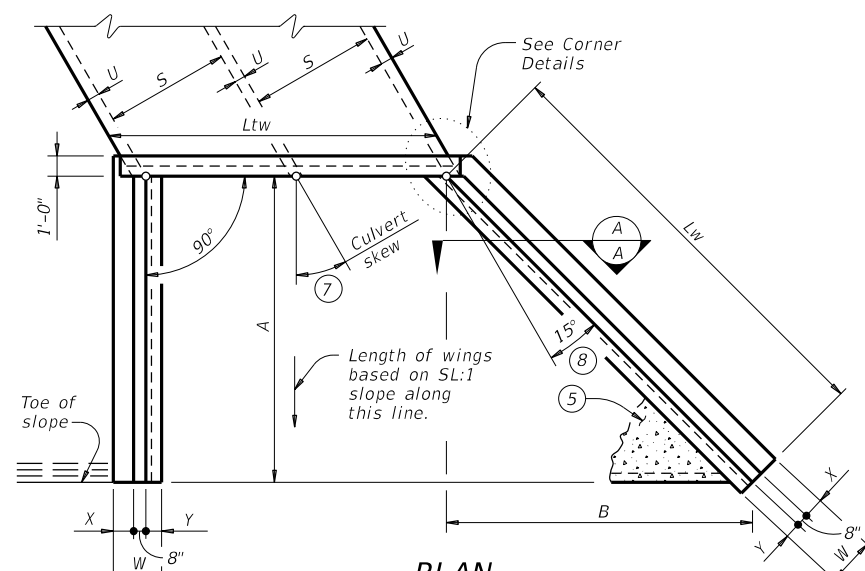
**MATERIAL NOTES:**  
 Provide Class C concrete (f'c=3,600 psi).  
 Provide Grade 60 reinforcing steel.  
 Provide galvanized reinforcing steel if required elsewhere in the plans.  
 In riprap concrete, synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.  
 See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.  
 The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

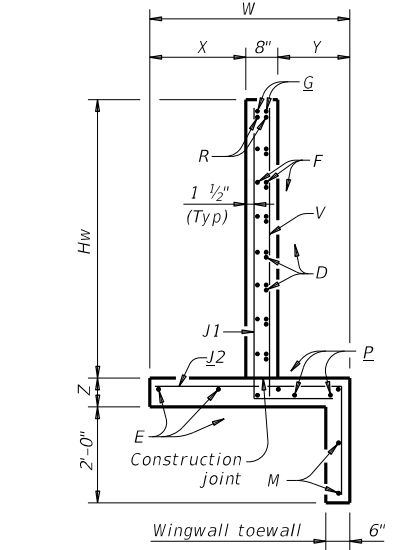
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.



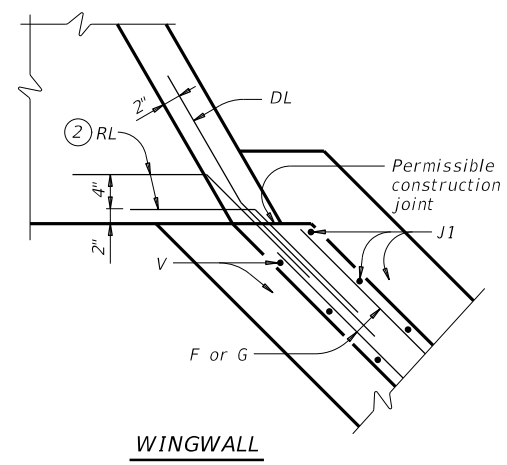
**INSIDE ELEVATION**  
(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)



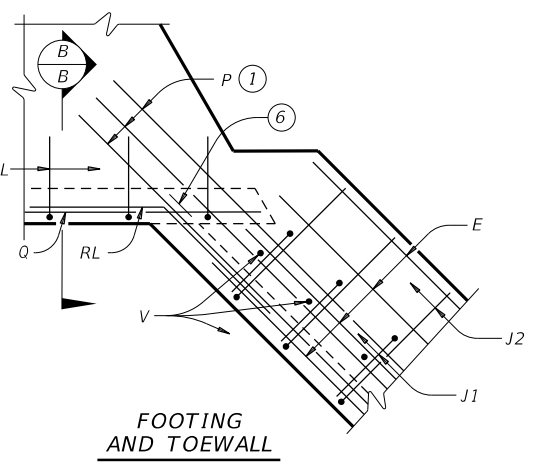
**PLAN**  
(Showing dimensions and 30° skew.)



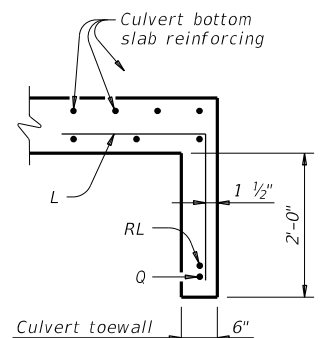
**SECTION A-A**



**WINGWALL**



**FOOTING AND TOEWALL**



**SECTION B-B**

**CORNER DETAILS**

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

Texas Department of Transportation  
 Bridge Division Standard

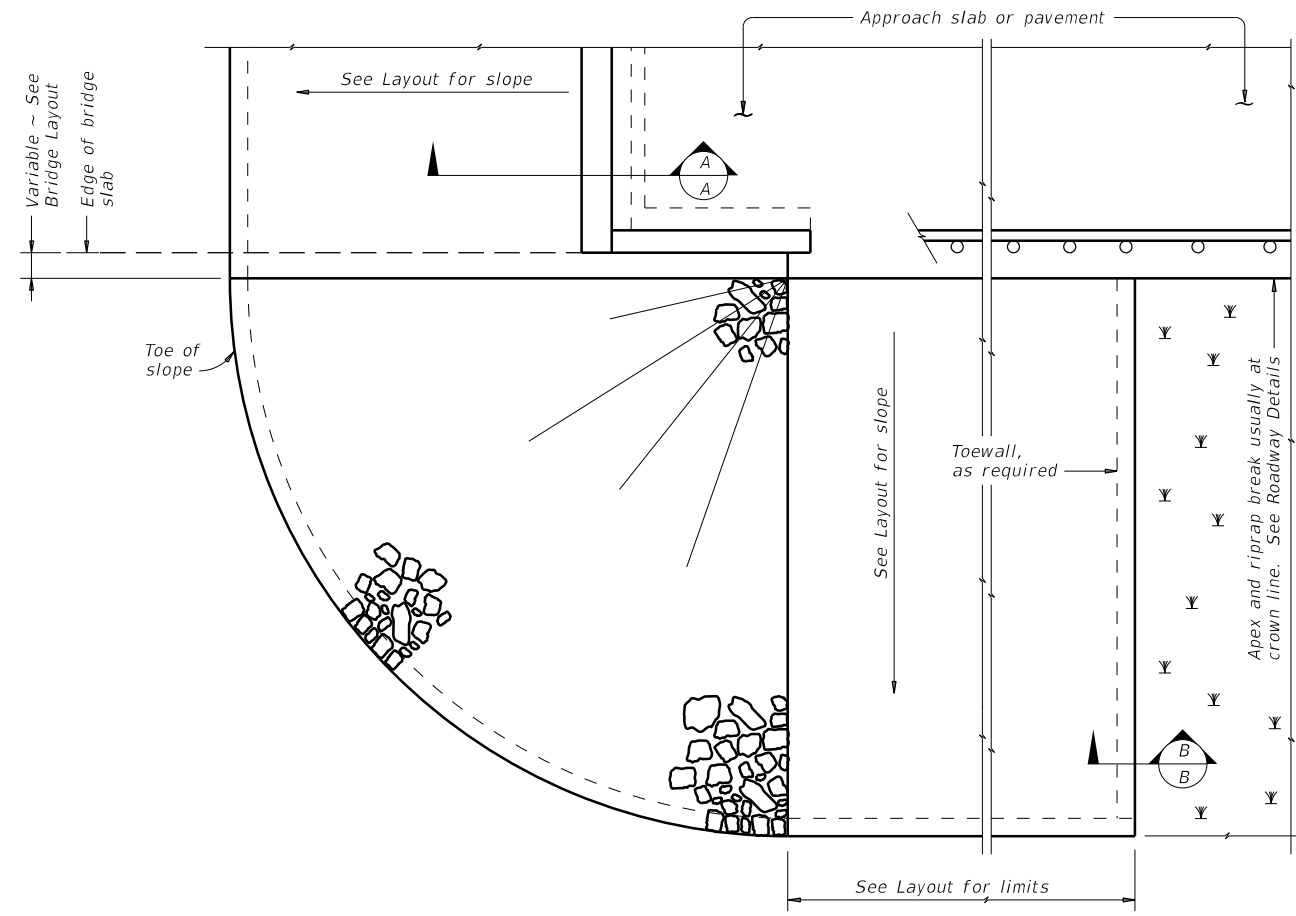
**CONCRETE WINGWALLS WITH FLARED WINGS FOR SKEWED BOX CULVERTS**

FW-S

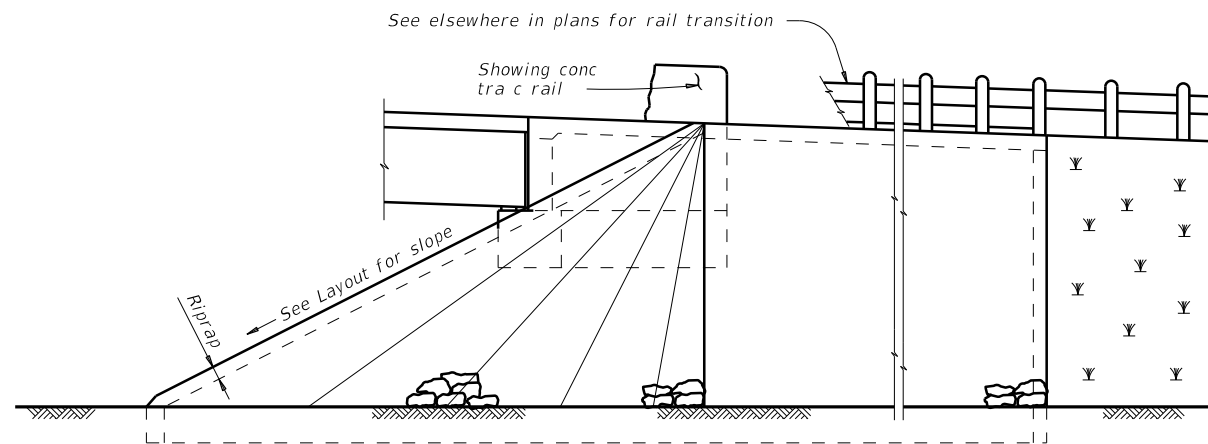
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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		58	

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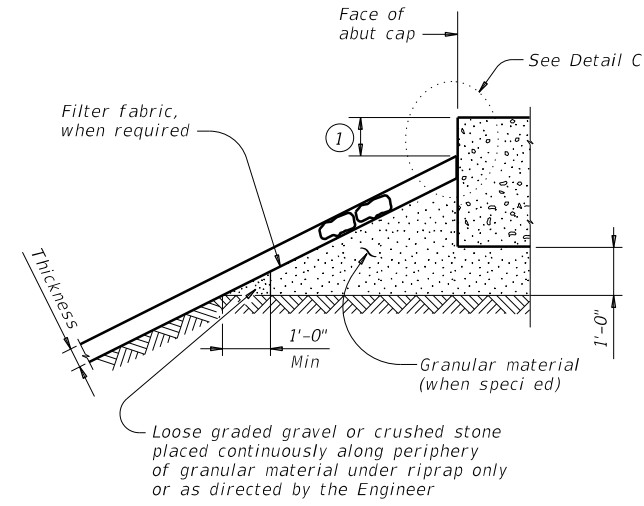
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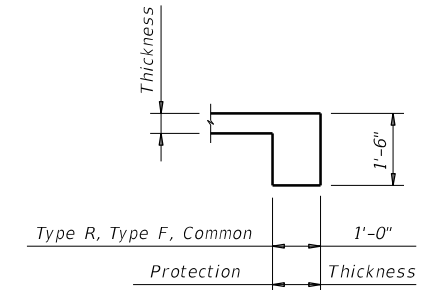
PLAN



ELEVATION

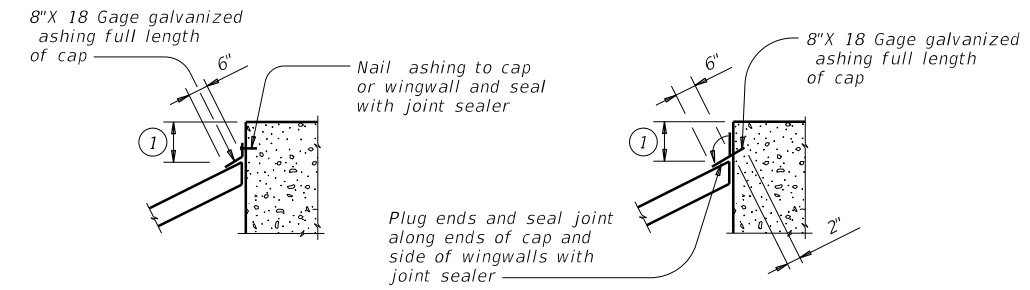


SECTION A-A AT CAP



SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C

① Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

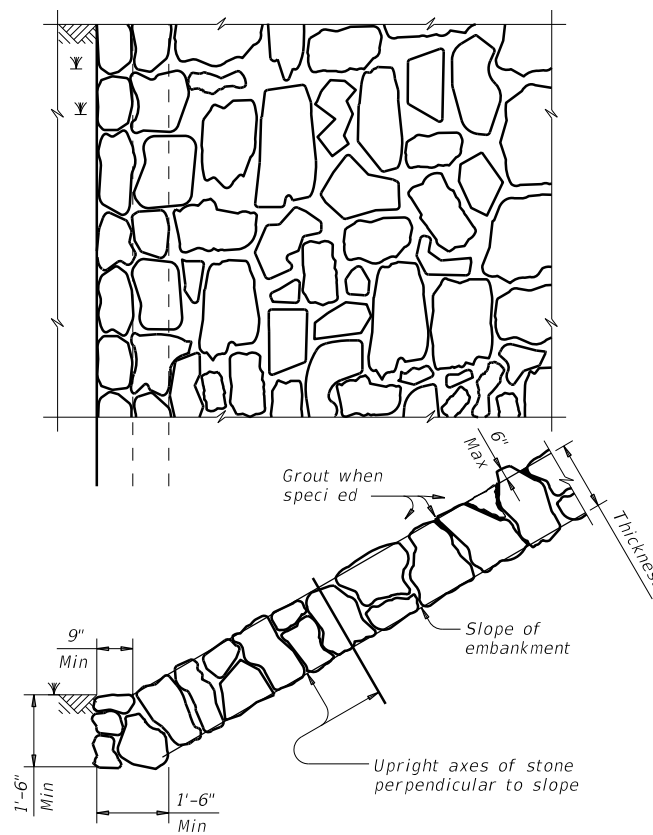
**GENERAL NOTES:**  
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.  
See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

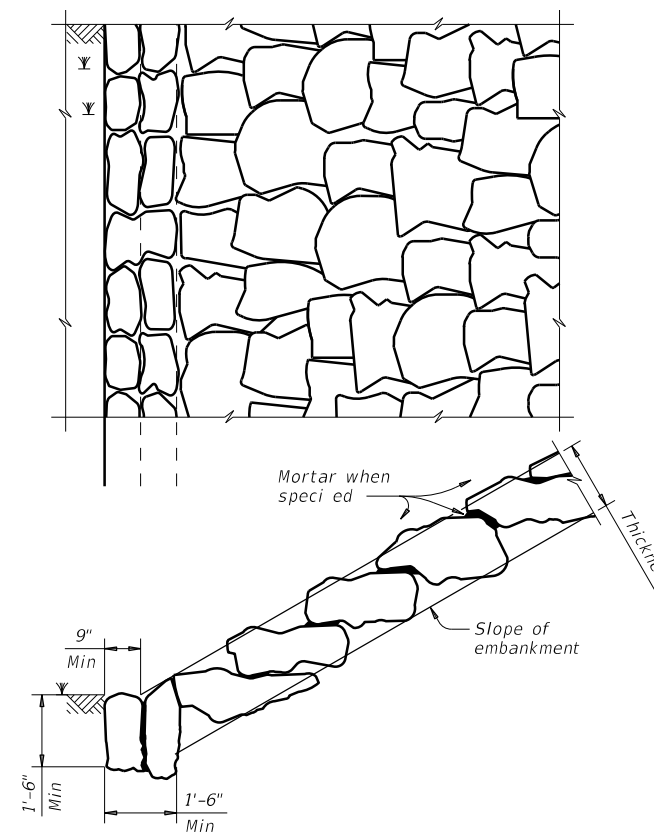
				<b>Bridge Division Standard</b>	
<h2>STONE RIPRAP</h2>					
<h3>SRR</h3>					
FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES	
©TxDOT	April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM	956
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	YKM	FAYETTE		59	

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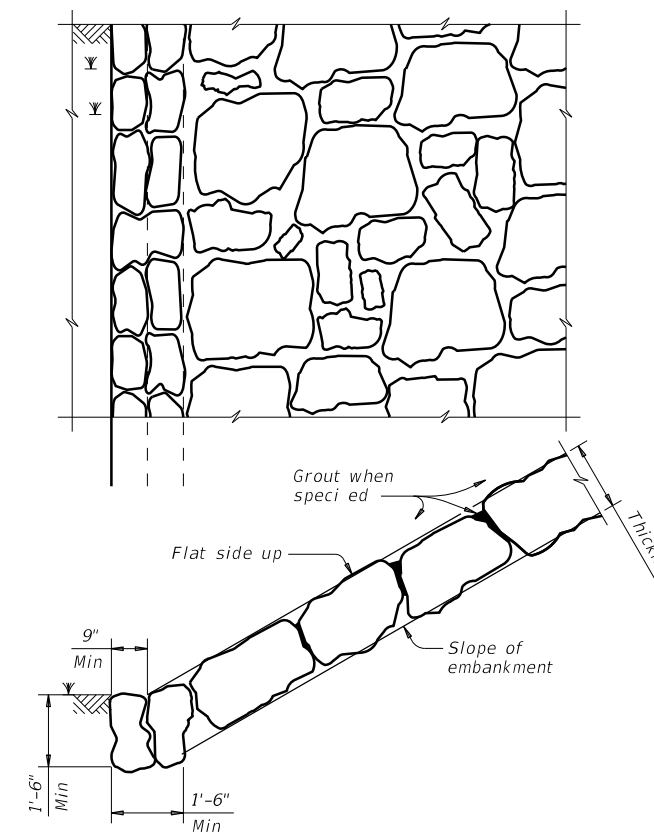
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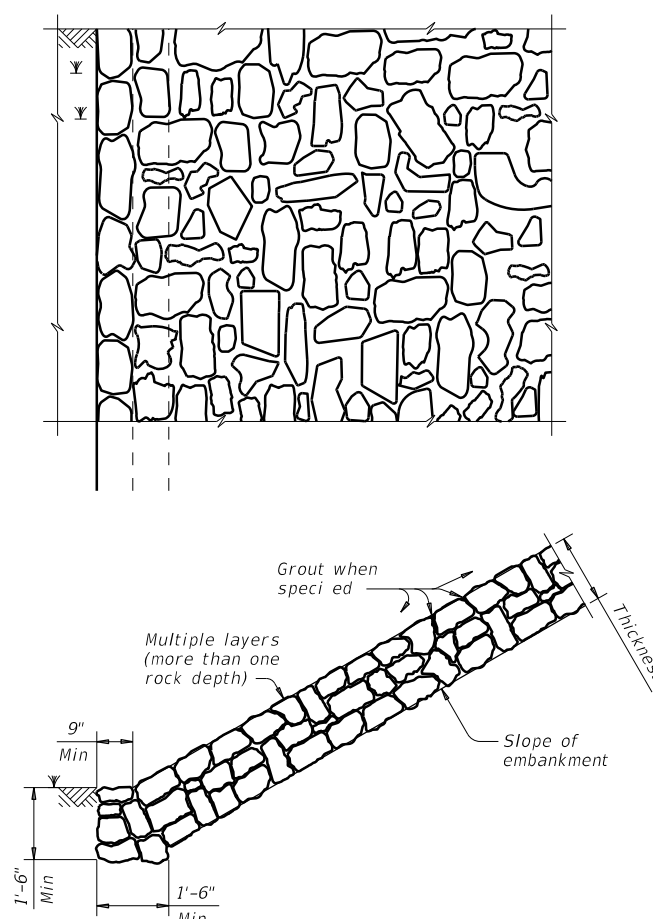
**FIGURE 1 ~ TYPE R STONE RIPRAP**  
dry or grouted



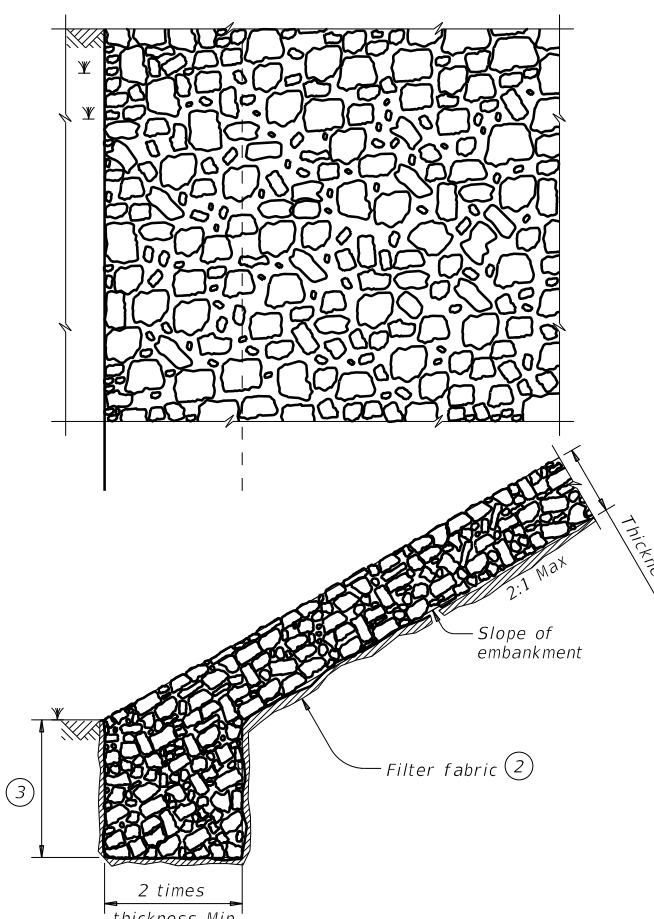
**FIGURE 2 ~ TYPE F STONE RIPRAP**  
dry or mortared



**FIGURE 3 ~ TYPE F STONE RIPRAP**  
grouted

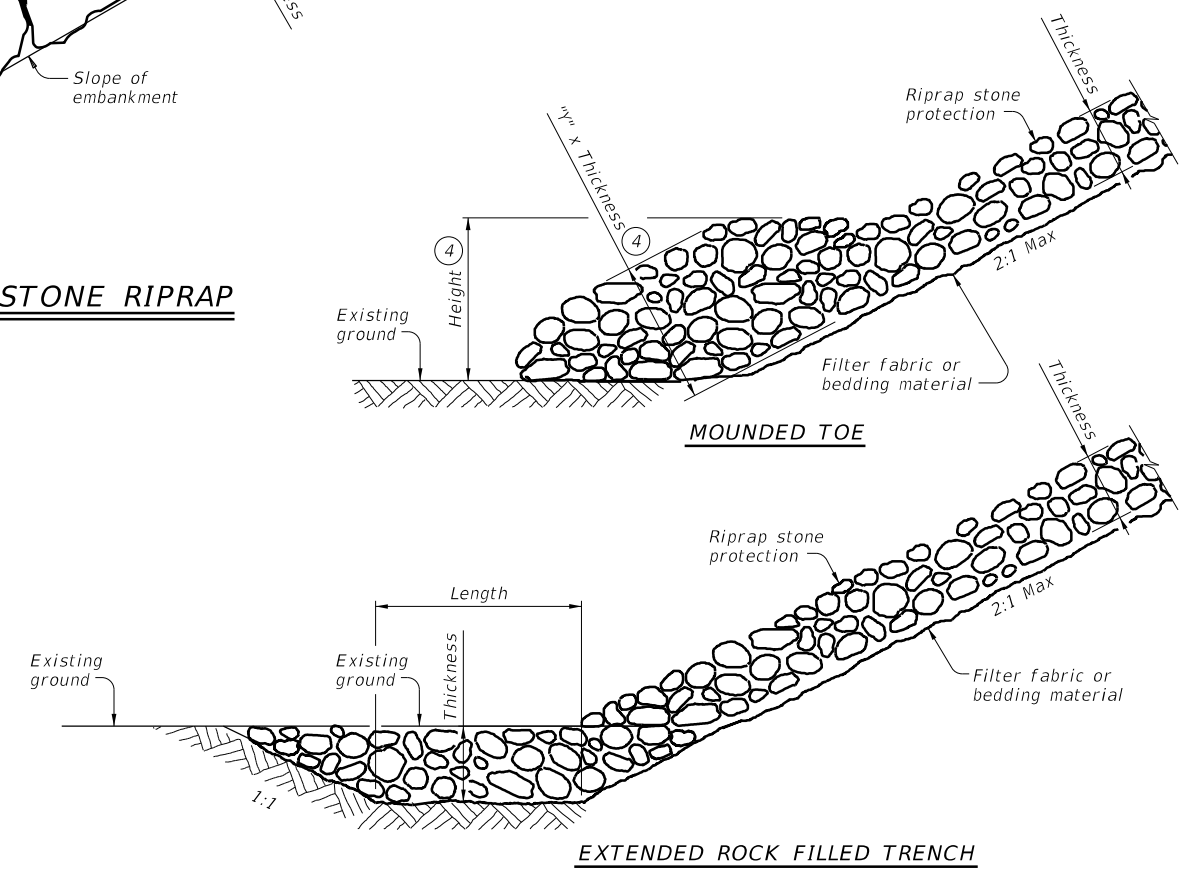


**FIGURE 4 ~ COMMON STONE RIPRAP**  
dry or grouted



**FIGURE 5 ~ PROTECTION STONE RIPRAP** ⑤

- ② Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.
- ③ Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.
- ④ "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.
- ⑤ List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.  
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



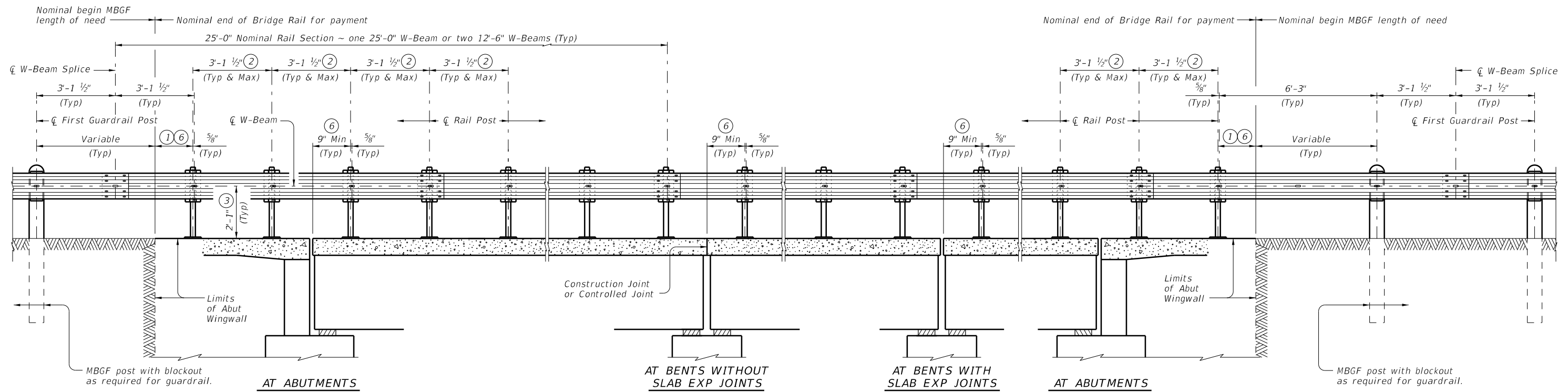
**PROTECTION STONE RIPRAP TOE OPTIONS** ⑤

**STONE RIPRAP**

**SRR**

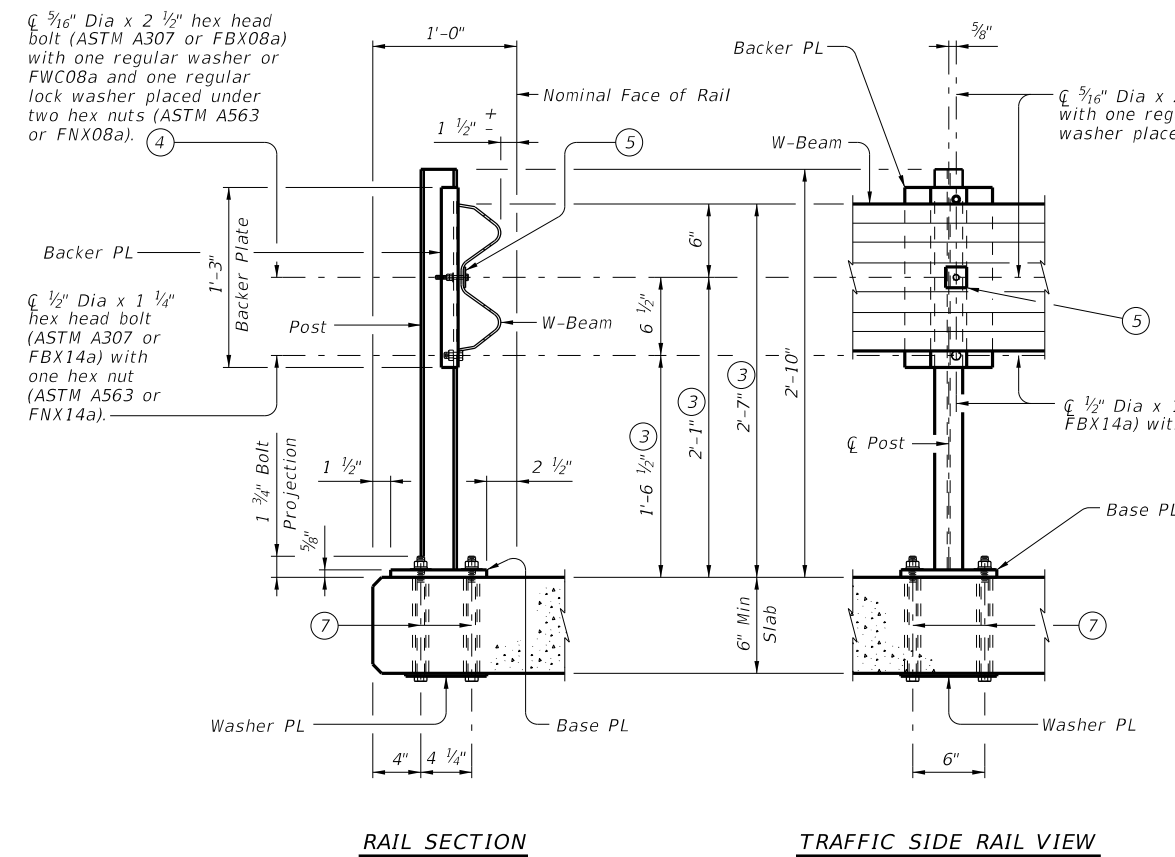
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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	60	

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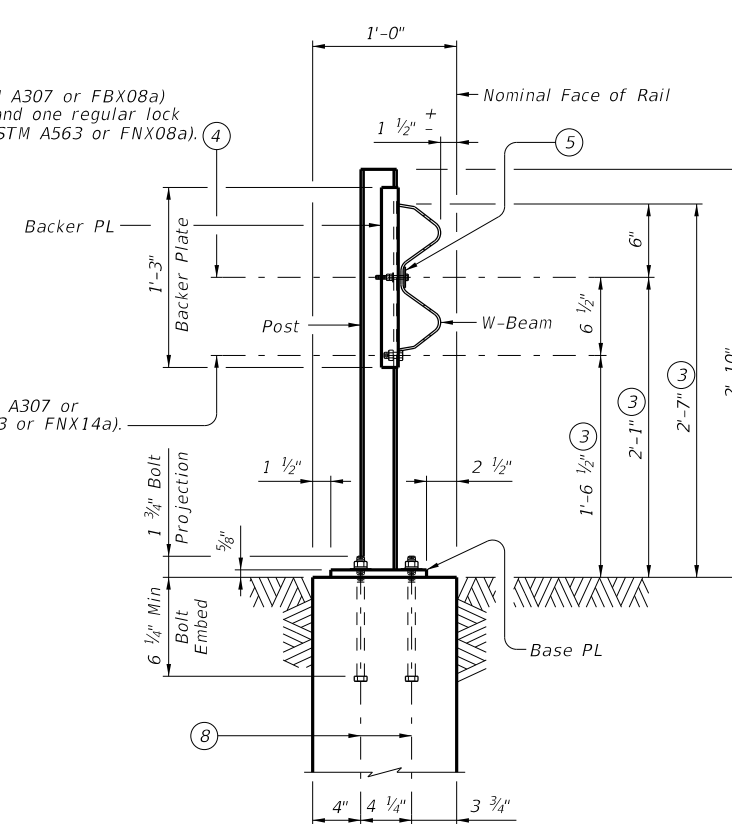


ROADWAY ELEVATION OF RAIL  
Showing without overlay.

- ① 9" Min, 5'-9" Max
- ② Maintain 3'-1 1/2" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.
- ③ Increase 2" for structures with overlay.
- ④ Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.
- ⑤ PL 1/8" x 1 3/4" x 1 3/4" with 3/8" Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).
- ⑥ The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new 3/4" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.
- ⑦ 7/8" Dia formed holes for 5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".
- ⑧ 3/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".



RAIL DETAILS ON BRIDGE SLAB  
Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL  
Showing without overlay.

SHEET 1 OF 2



TRAFFIC RAIL

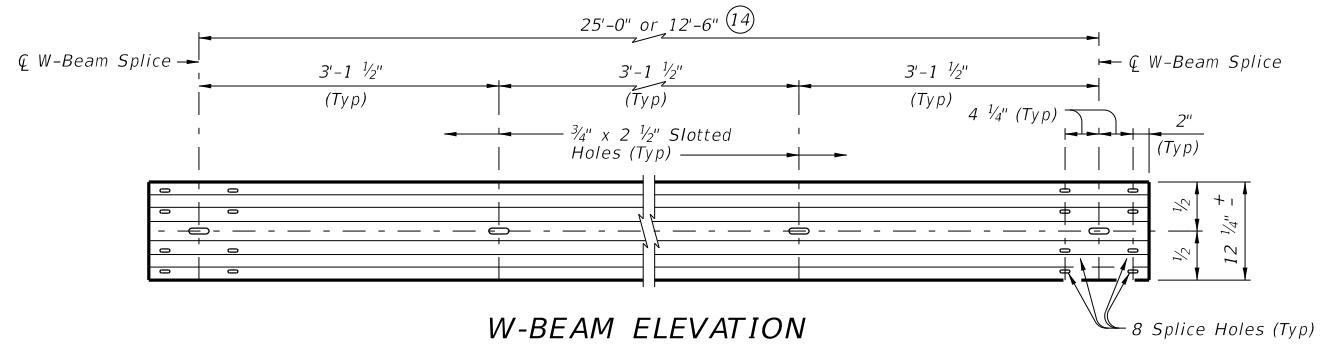
TYPE T631

FILE: RL-T631-23.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
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07/2020: Allowing 9'-4 1/2" or 6'-3" W-Beam sections	1266	01	008	FM 956
03/2023: MBGF Notes.	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	61	

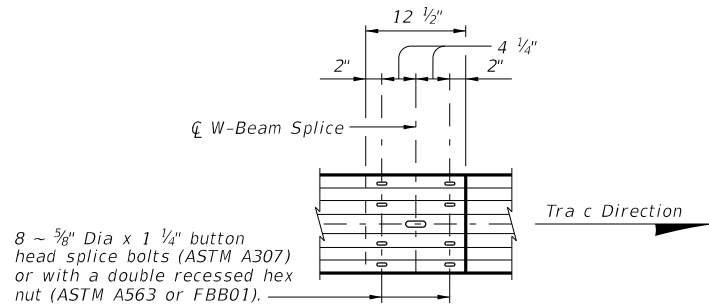
DATE: 7/3/2024  
FILE: \$FILES\$  
\$TIME\$

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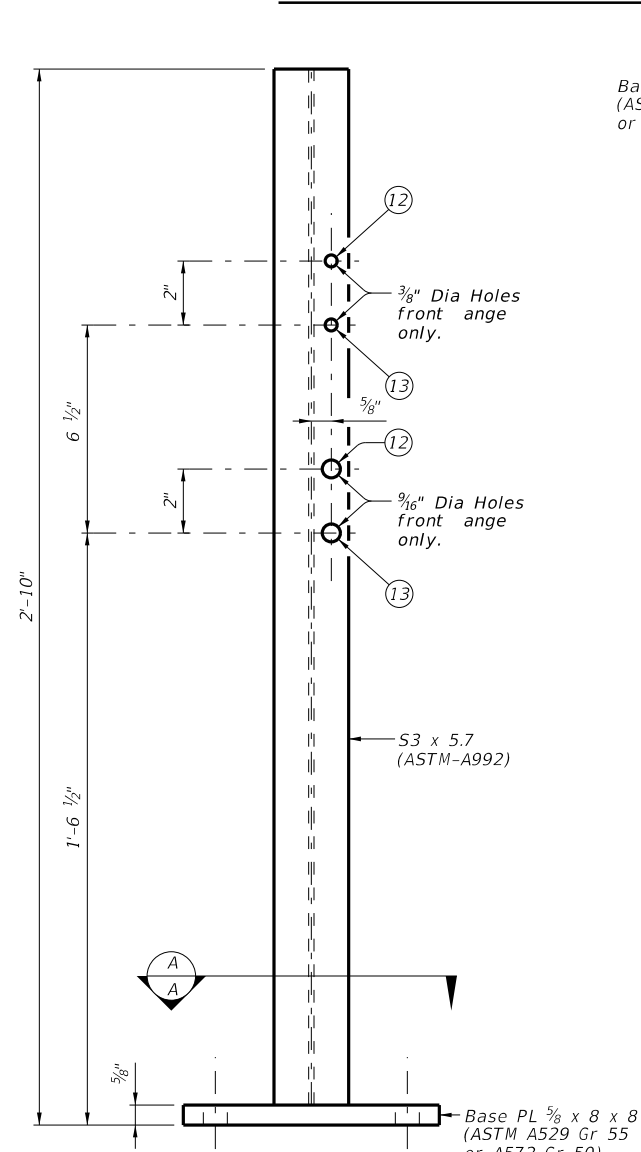
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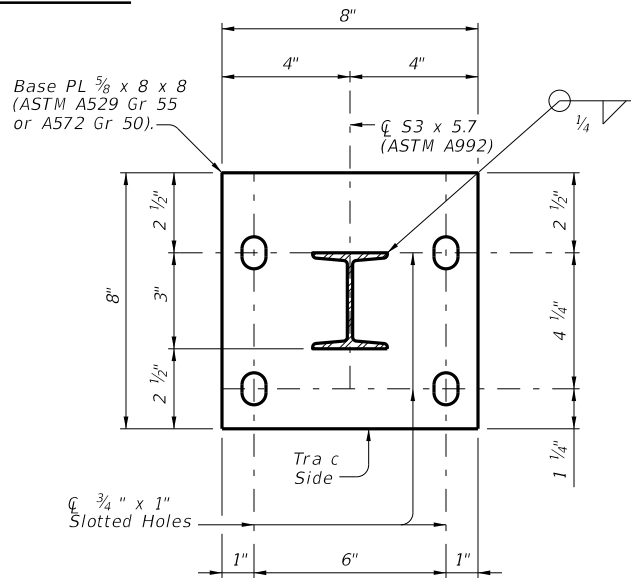
**W-BEAM ELEVATION**



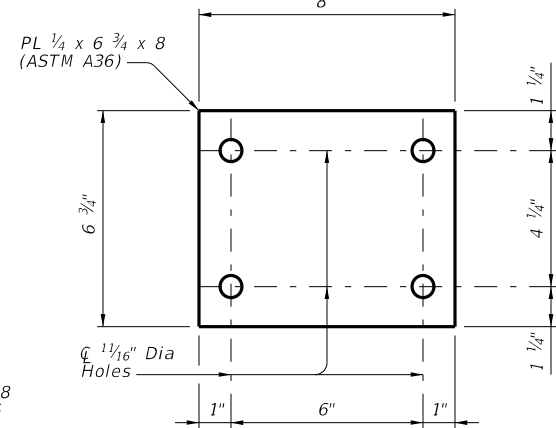
**W-BEAM SPLICE ELEVATION**



**POST ELEVATION**

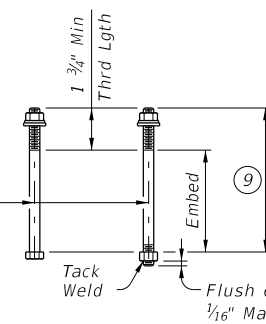


**SECTION A-A**



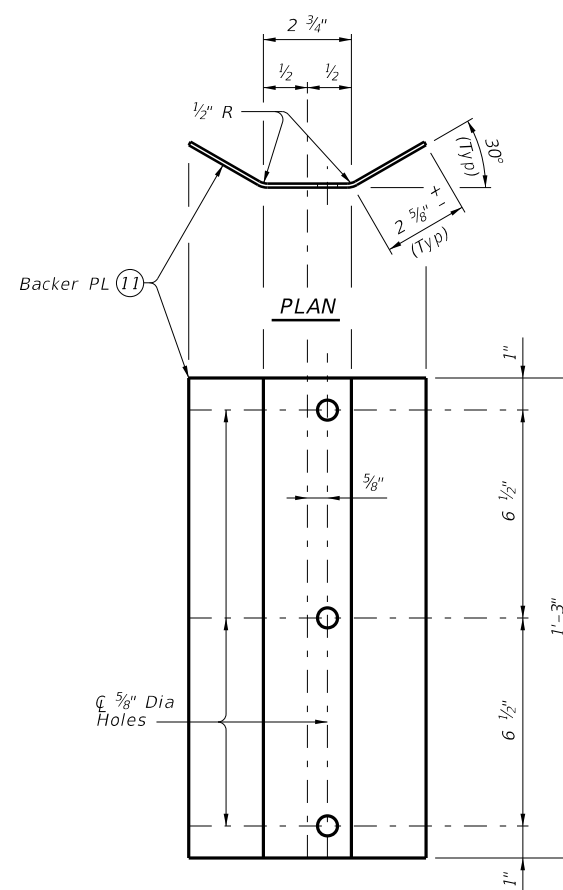
**WASHER PLATE DETAIL**

9 5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



**CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS (9)**

- (9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".
- (10) See "Material Notes" for anchor bolt information.
- (11) Backer PL 1/4" x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).
- (12) Used for structures with overlay.
- (13) Used for structures without overlay.
- (14) At the nominal end of the bridge rail for payment, one 9'-4 1/2" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



**BACKER PLATE**

**MBGF AND END TREATMENT NOTES:**  
 This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment installed tangent to the primary roadway.

**CONSTRUCTION NOTES:**  
 Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.  
 Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail. At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.  
 It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.  
 Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.  
 Shop drawings are not required for this rail.

**MATERIAL NOTES:**  
 Galvanize all steel components.  
 Anchor bolts for base plate must be 5/8" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

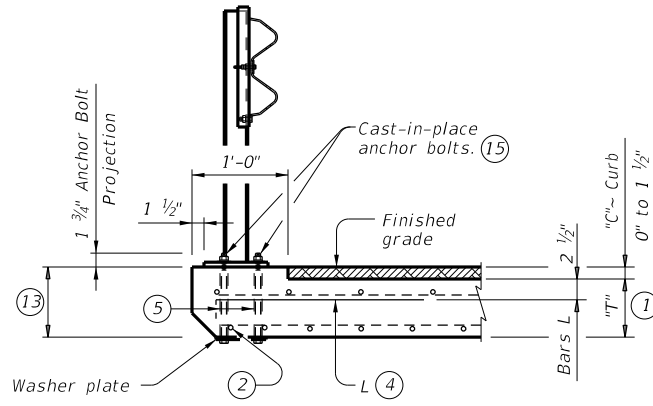
Optional adhesive anchorage system must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 3/4". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".  
 W-beam must 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" (Nominal) lengths and a single rail element of 9'-4 1/2" or 6'-3" (Nominal) length. W-Beam must have slotted holes at 3'-1 1/2".  
 Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

**GENERAL NOTES:**  
 This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.  
 This rail is designed to deflect approximately 4" to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.  
 Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.  
 Average weight of railing with no overlay: 20 pcf total.

SHEET 2 OF 2

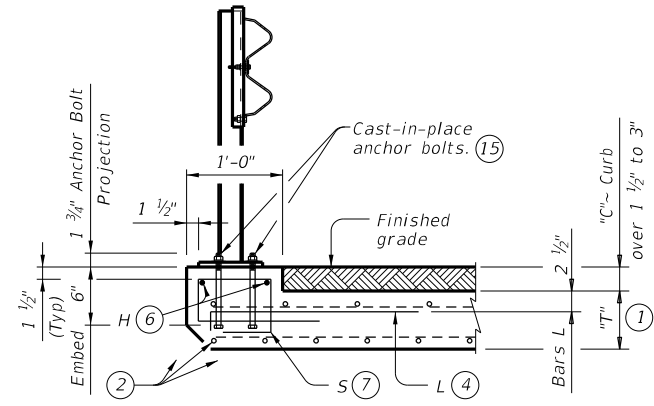
		<b>Bridge Division Standard</b>	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T631</h2>			
FILE: RL-T631-23.dgn	DN: TxDOT	CK: AES	DW: JTR
©TxDOT September 2019	CONT SECT	JOB	HIGHWAY
REVISIONS	1266 01	008	FM 956
07/2020: Allowing 9'-4 1/2" or 6'-3" W-Beam sections	DIST	COUNTY	SHEET NO.
03/2023: MBGF Notes.	YKM	FAYETTE	62

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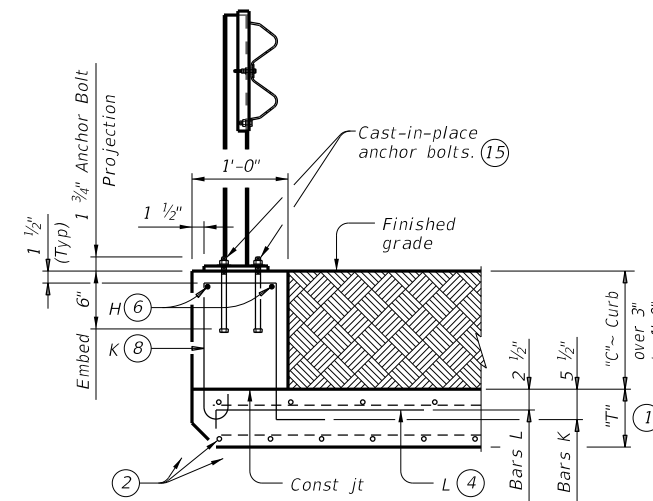
**SECTION - TYPE 1** (3)

Used for curbs 1 1/2" and Less  
(Showing "C" = 1 1/2")



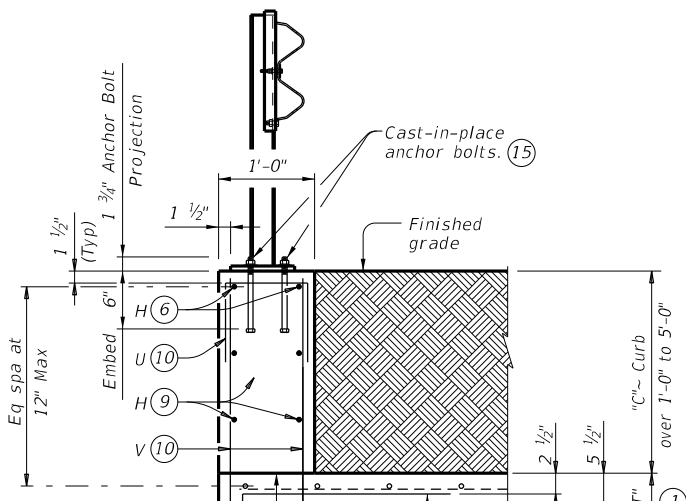
**SECTION - TYPE 2**

Used for curbs over 1 1/2" to 3"  
(Showing "C" = 3")



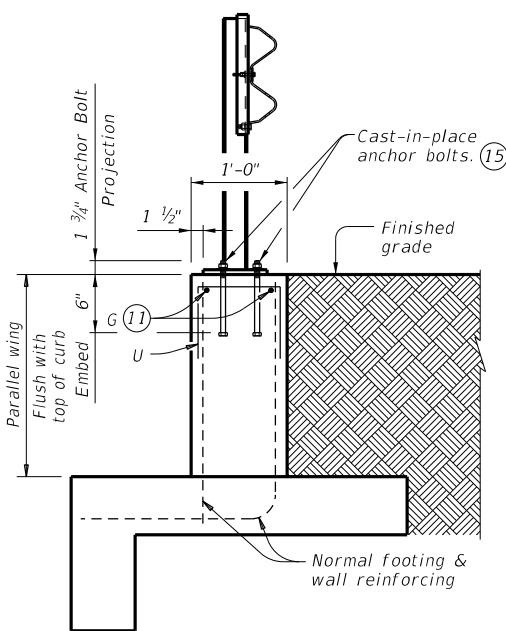
**SECTION - TYPE 3**

Used for curbs over 3" to 1'-0"  
(Showing "C" = 1'-0")



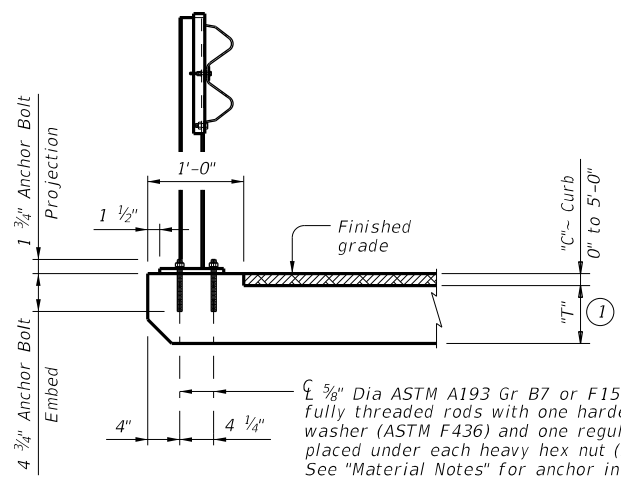
**SECTION - TYPE 4**

Used for curbs over 1'-0" to 5'-0"  
(Showing "C" = 2'-0")



**TYPICAL SECTION THRU PARALLEL WINGWALL** (15)

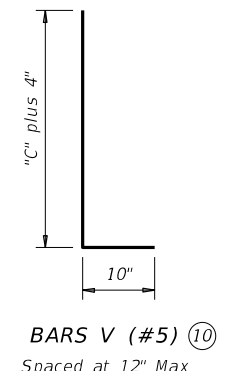
Use with all curb heights shown



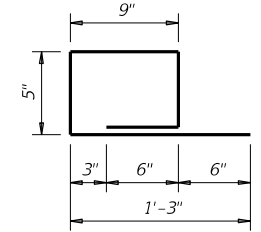
**OPTIONAL ADHESIVE ANCHORAGE**

Optional adhesive anchor may replace cast-in-place anchor bolts for Type 1 thru Type 4 and on Typical Section Thru Parallel Wingwalls. Reinforcement for optional adhesive anchorage matches details shown for Type 1 thru Type 4 and on Typical Section Thru Parallel Wingwalls.

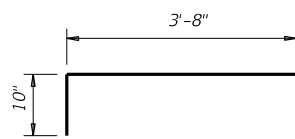
- 1 "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.
- 2 Adjust normal culvert slab bars as necessary to clear obstructions.
- 3 Omit normal culvert curb Bars K and H.
- 4 Place Bars L as shown. Tilt hook as necessary to maintain cover.
- 5 4 formed holes for anchor bolts at each rail post. See rail standard for information not shown.
- 6 Place normal culvert curb Bars H (#4) as shown. Adjust as necessary to clear obstructions.
- 7 Omit normal culvert curb Bars K. Place Bars S as shown. Tilt Bars S as necessary to maintain cover.
- 8 Place normal culvert curb Bars K spaced at 12" Max as shown. Tilt Bars K as necessary to maintain cover. Refer to box culvert details sheets for Bars K details.
- 9 Additional Bars H (#4) as required to maintain 12" Max spa.
- 10 At TYPE 4 mountings, replace normal culvert curb Bars K with one Bar U and two Bars V as shown spaced at 12" Max. Adjust length of Bars V as necessary to maintain clear cover.
- 11 Adjust parallel wing Bars G to positions shown.
- 12 Optional Bars L are to be used only for precast box culverts with 3'-0" closure pour.
- 13 If "T" plus "C" is greater than 8", provide reinforcement per TYPE 1 mounting and anchor bolts per TYPE 2 mounting.
- 14 Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The values for each section type in table can be interpolated for intermediate values of curb height, "C". Quantity includes Bars K (when applicable).
- 15 See "Cast-In-Place & Formed Hole Anchor Bolt Options."



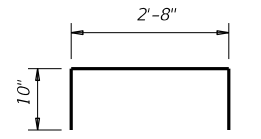
**BARS V (#5)** (10)  
Spaced at 12" Max



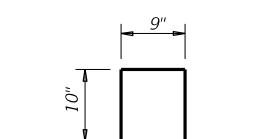
**BARS S (#4)** (7)  
Spaced at 12" Max



**BARS L (#5)** (4)(12)  
Spaced at 12" Max

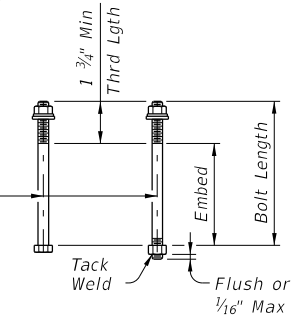


**OPTIONAL BARS L (#5)** (4)(12)  
Spaced at 12" Max



**BARS U (#4)** (10)  
Spaced at 12" Max

1/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ASTM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



**CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS**

Applies to T631LS and T631 tra c rails.

TABLE OF ESTIMATED CURB QUANTITIES (14)			
Curb Height "C"	Section Type	Conc (CY/LF)	Reinf Steel (Lb/LF)
1 1/2"	1	0.005	4.7
3"	2	0.009	8.4
6"	3	0.019	8.9
1'-0"	3	0.037	8.9
1'-6"	4	0.056	14.3
2'-0"	4	0.074	15.4
2'-6"	4	0.093	17.7
3'-0"	4	0.111	18.8
3'-6"	4	0.130	21.2
4'-0"	4	0.148	22.2
4'-6"	4	0.167	24.6
5'-0"	4	0.185	25.6

**CONSTRUCTION NOTES:**  
For vehicle safety, nished grade must be ush with top of curb. Adjust reinforcing as necessary to provide 1 1/4" cover. At the Contractor's option, anchor bolts may be an adhesive anchor system. Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

**MATERIAL NOTES:**  
Provide concrete for curb of the same Class and strength as the box culvert top slab. Galvanize all steel components of steel rail system. Provide Grade 60 reinforcing steel. Galvanize all reinforcing steel if required elsewhere. Anchor bolts for base plate must be 5/8" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Optional adhesive anchor system must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 3/4". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

**GENERAL NOTES:**  
Designed in accordance with AASHTO LRFD Bridge Design Specifications. See T631LS or T631 rail standard for approved speed restrictions, notes and details not shown. The curb is considered as part of the box culvert for payment. These details are for use with curbs that are 5'-0" tall and less only. Curb heights that are less than or greater than those shown will require special design.

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

The use of the T631LS rail is restricted to speeds of 45 mph or less.

**Bridge Division Standard**

**BOX CULVERT MOUNTING DETAILS FOR TYPE T631LS & T631 RAILS (CURBS 5' TALL AND LESS ONLY) T631-CM**

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REVISIONS	CONT	SECT	JOB	HIGHWAY
	1266	01	008	FM 956
DIST	COUNTY		SHEET NO.	
YKM	FAYETTE		63	

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DATE: 7/3/2024 \$TIME\$  
 FILE: \$FILES\$

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

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

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

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		<b>NOTE:</b> Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.		
DEVICE	GF1	GF2	CTB	 <b>W1-8</b>				 <b>W1-6</b>			
	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**

**DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION**

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

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DN: TXDOT	CK: TXDOT
© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	YKM	FAYETTE		<b>64</b>

20A



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**POST TYPE AND SUPPORT FOUNDATION DETAILS**

**TYPE OF BARRIER MOUNTS**

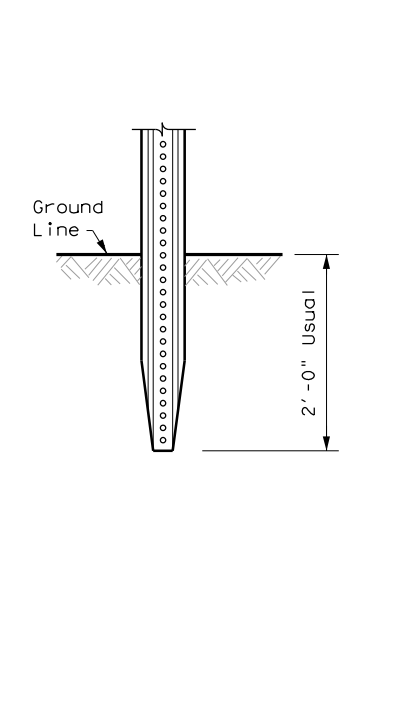
**WING CHANNEL (WC)**

**FLEXIBLE POSTS (YFLX, WFLX)**

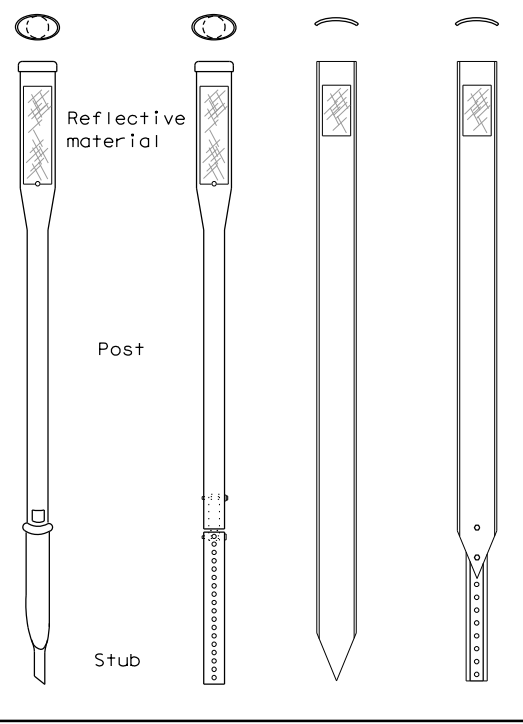
**WEDGE ANCHOR SYSTEMS**

**GUARD FENCE ATTACHMENT**

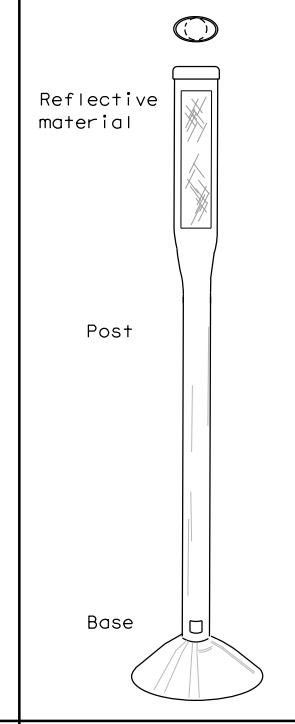
**GND**



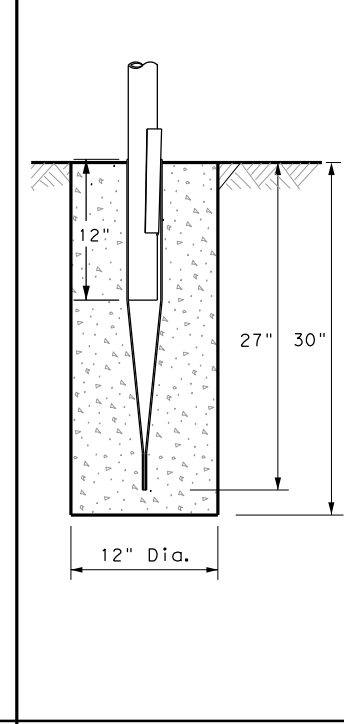
**GND**



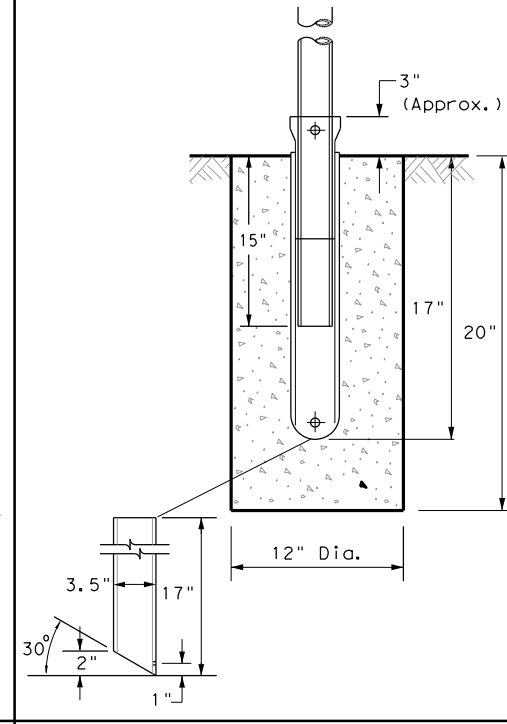
**SRF**



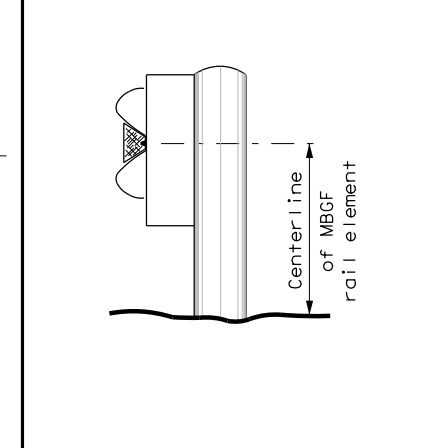
**WAS**



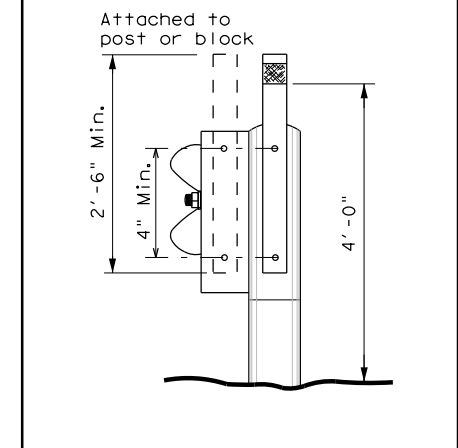
**WAP**



**GF 1**



**GF 2**



**NOTES**

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

**NOTES**

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

**NOTE**

1. Install per manufacturer's recommendations.

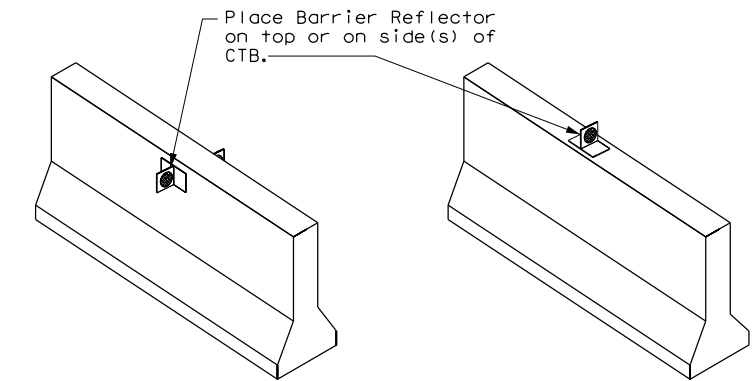
**EMBEDDED**

**SURFACE MOUNT**

**STEEL**

**PLASTIC**

**CONCRETE TRAFFIC BARRIER (CTB)**



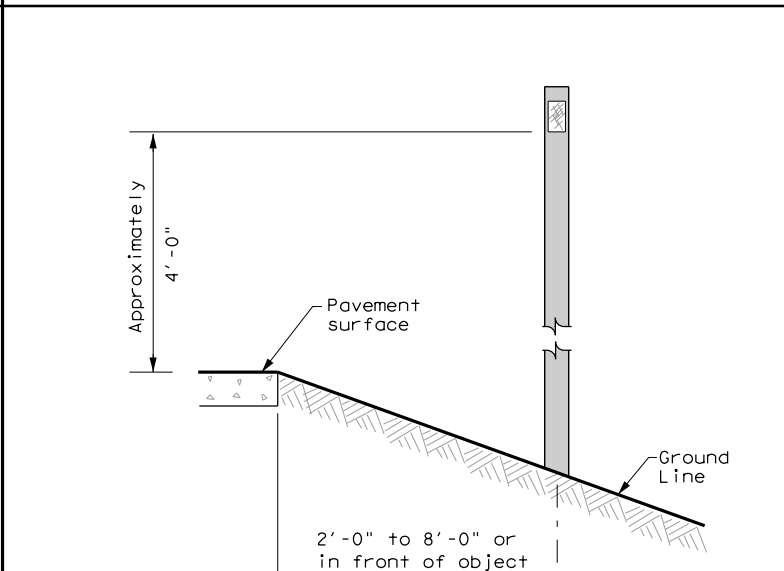
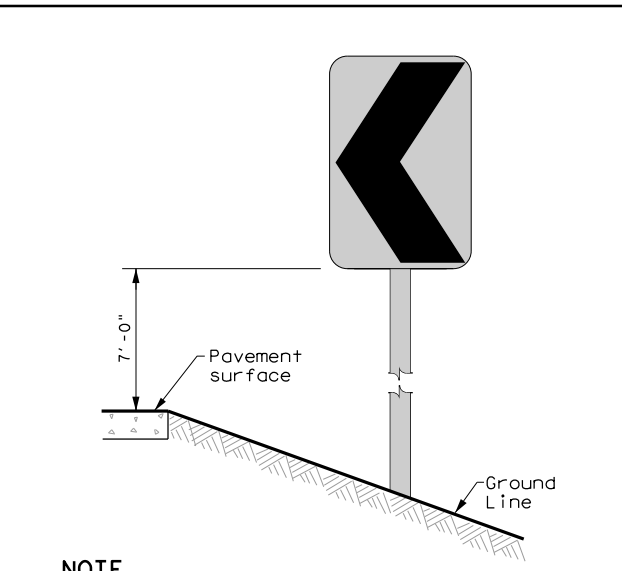
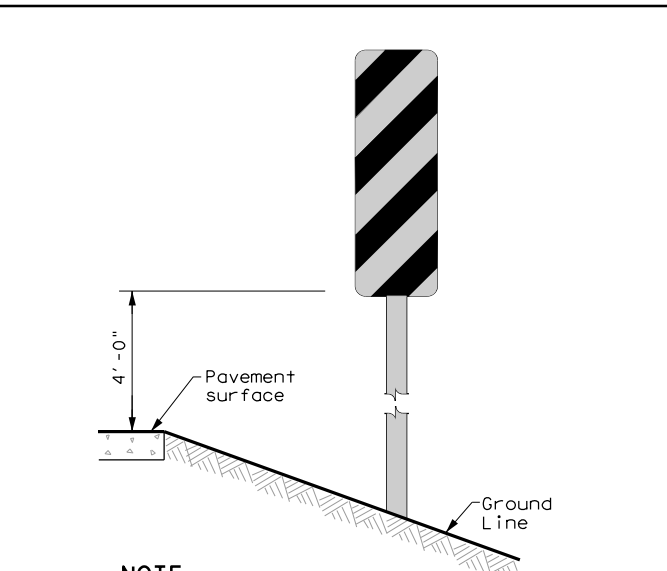
**GENERAL NOTES**

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

**TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS**

**CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN**

**DELINEATORS AND TYPE 2 OBJECT MARKERS**



**NOTE**

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

**NOTE**

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

**NOTE**

See general notes 1, 2 and 3.

DATE: 7/3/2024 \$TIME\$  
 FILE: \$FILES\$

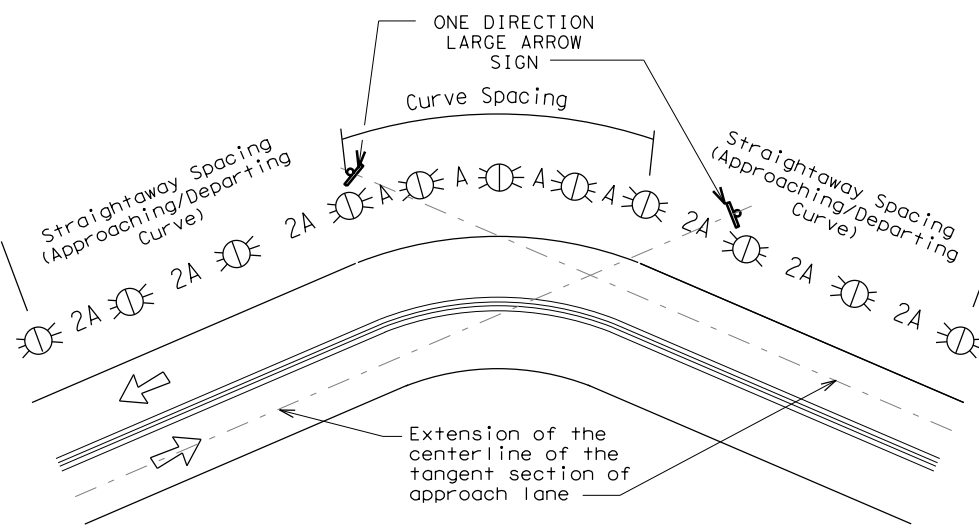
		<b>Traffic Safety Division Standard</b>	
<h2>DELINEATOR &amp; OBJECT MARKER INSTALLATION</h2> <h3>D &amp; OM(2)-20</h3>			
FILE: dom2-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT August 2004	CONT SECT	JOB	HIGHWAY
REVISIONS	1266 01	008	FM 956
10-09 3-15	DIST	COUNTY	SHEET NO.
4-10 7-20	YKM	FAYETTE	65

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### MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

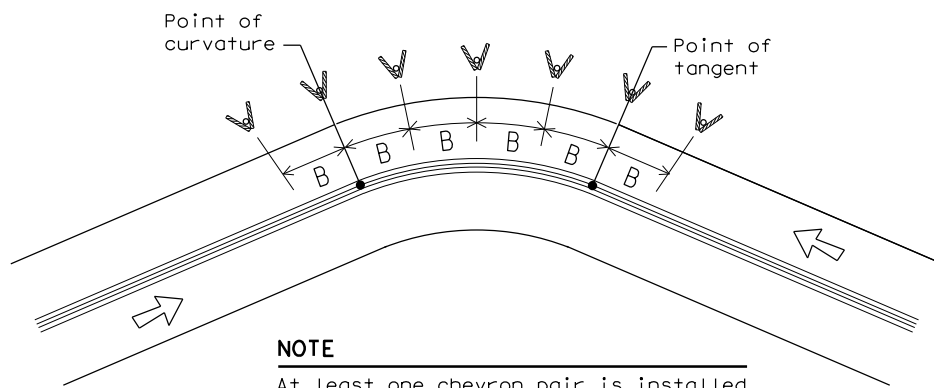
### SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



**NOTE**

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

### SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



**NOTE**

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

### DELINEATOR AND CHEVRON SPACING

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

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

### DELINEATOR AND CHEVRON SPACING

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

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

### DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

**NOTES**

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

**LEGEND**

	Bi-directional Delineator
	Delineator
	Sign



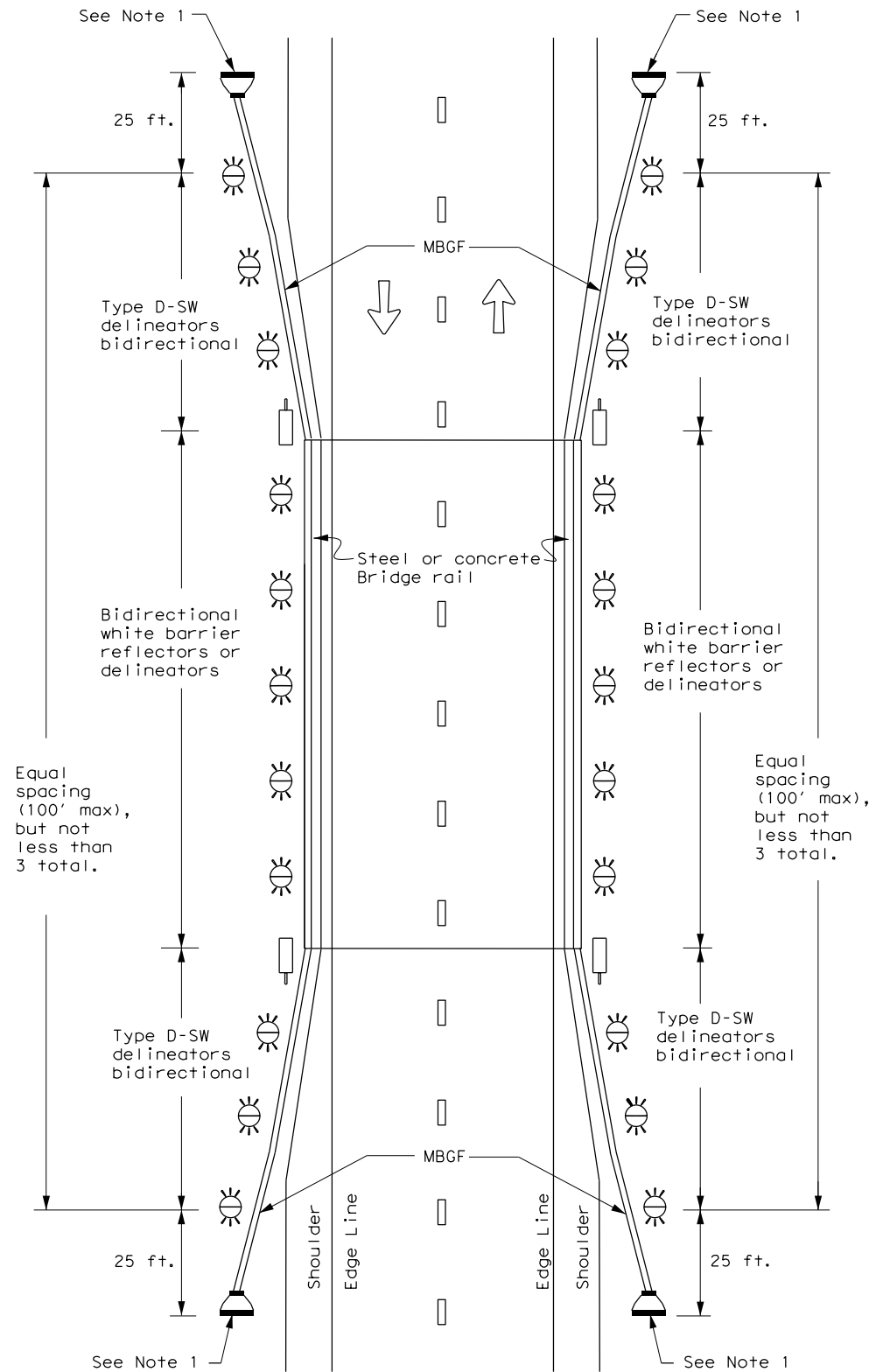
## DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

### D & OM(3) -20

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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
3-15 8-15	DIST	COUNTY	SHEET NO.	
8-15 7-20	YKM	FAYETTE	66	

DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

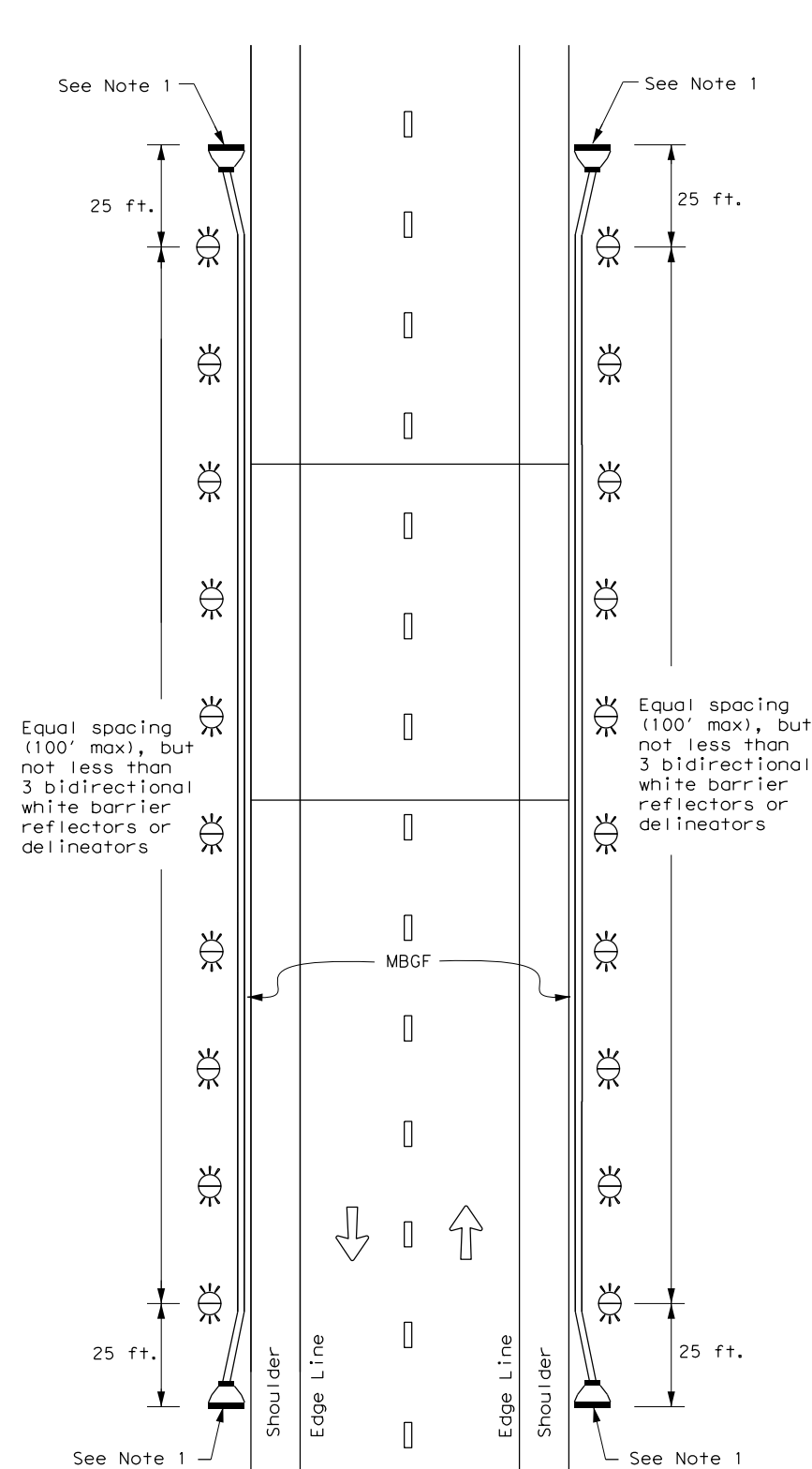
**TWO-WAY, TWO LANE ROADWAY  
WITH REDUCED WIDTH APPROACH RAIL**



**NOTE:**

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

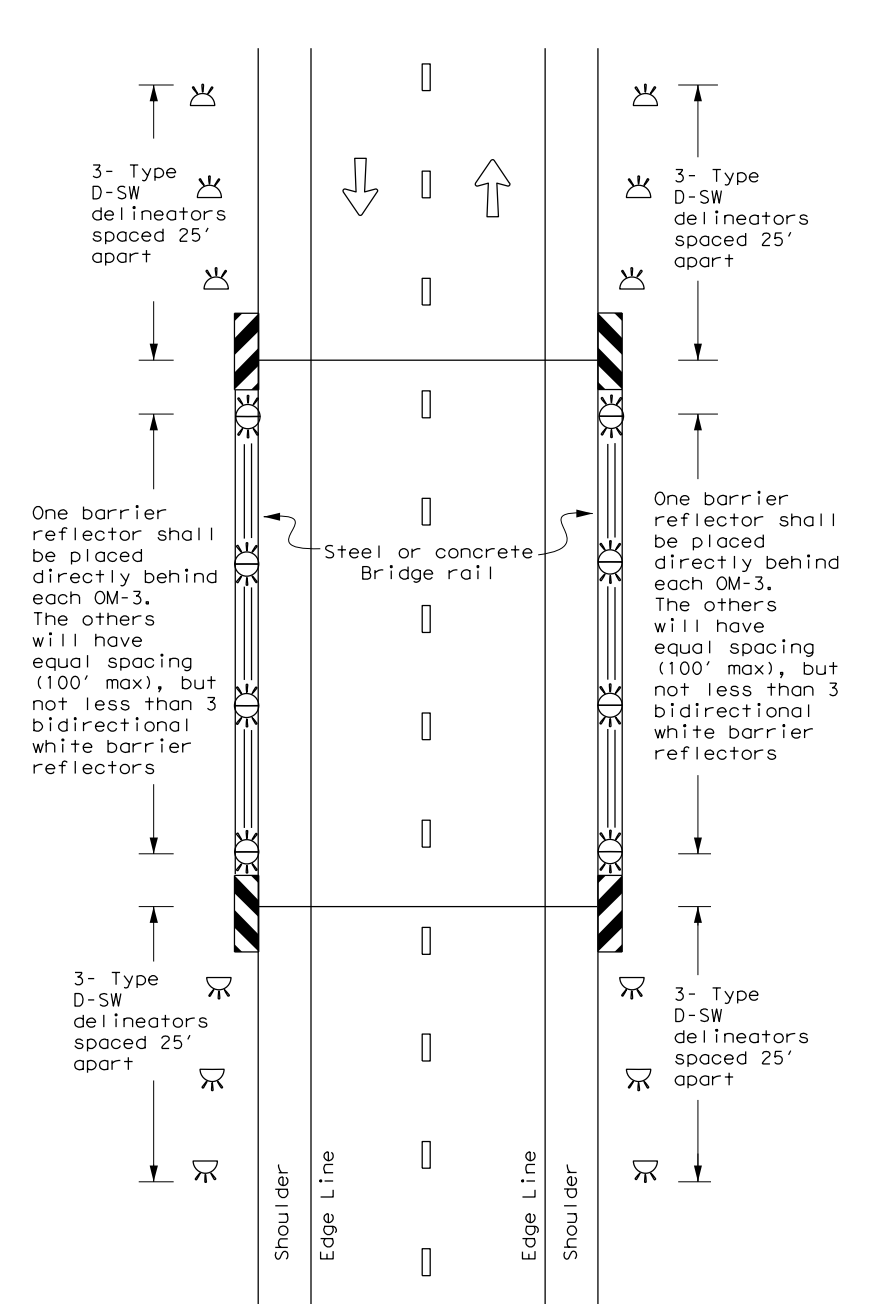
**TWO-WAY, TWO LANE ROADWAY  
WITH METAL BEAM GUARD FENCE (MBGF)**



**NOTE:**

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

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



**LEGEND**

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



Traffic Safety Division Standard

**DELINEATOR &  
OBJECT MARKER  
PLACEMENT DETAILS**

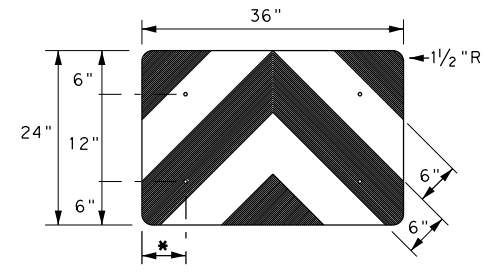
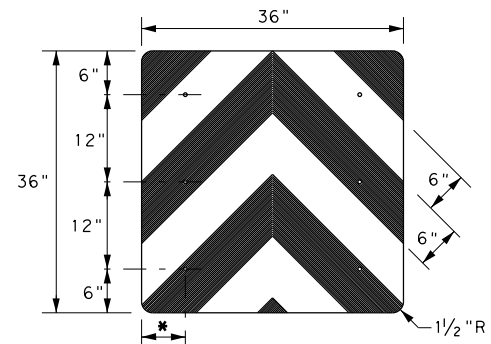
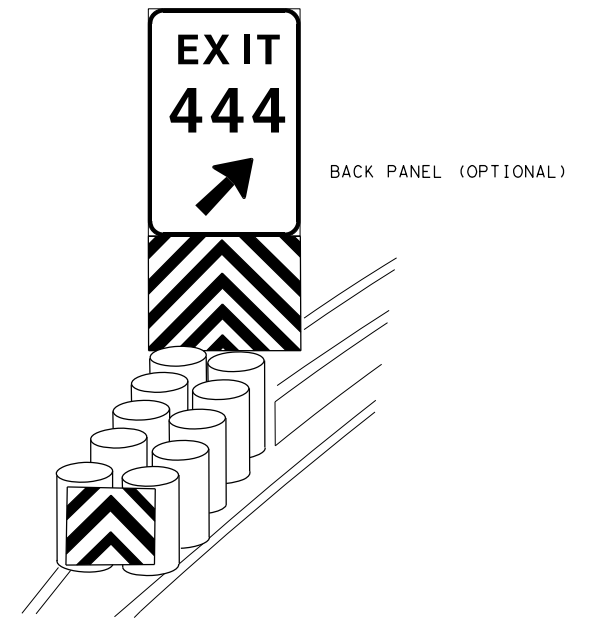
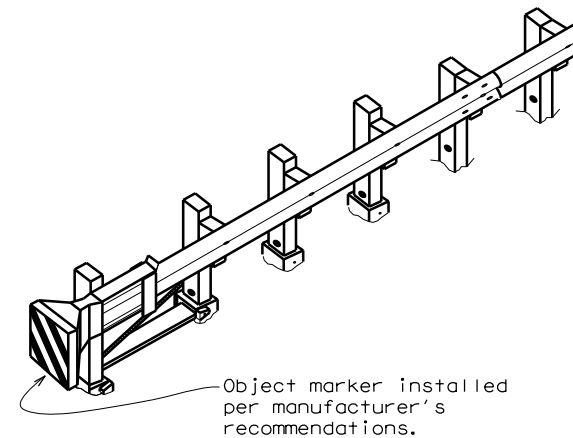
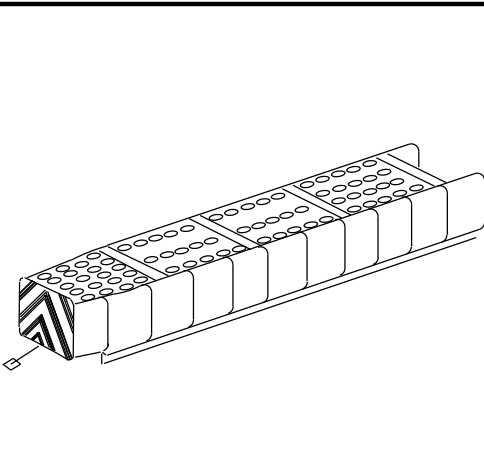
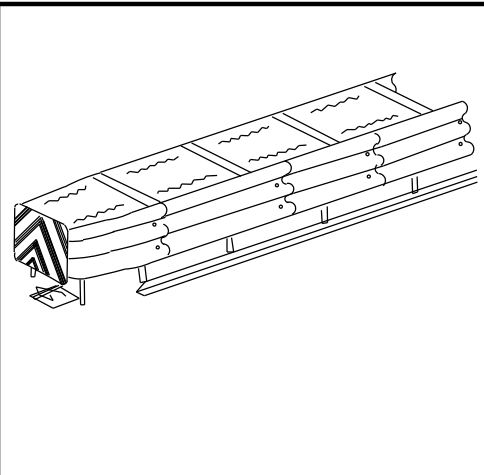
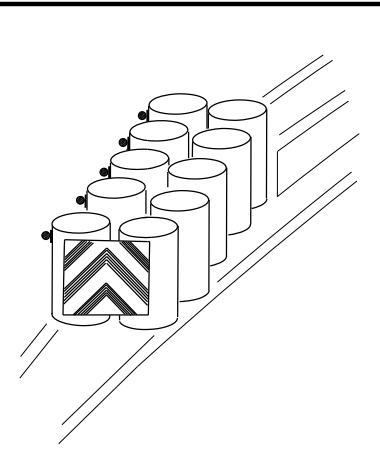
**D & OM(5) - 20**

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
7-20	DIST	COUNTY	SHEET NO.	
	YKM	FAYETTE	67	

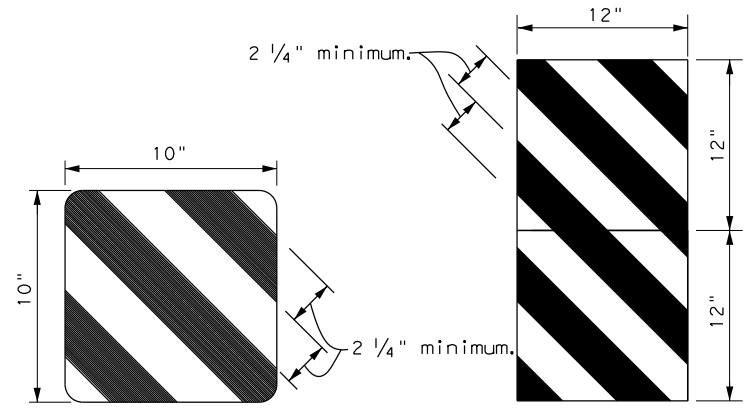
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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

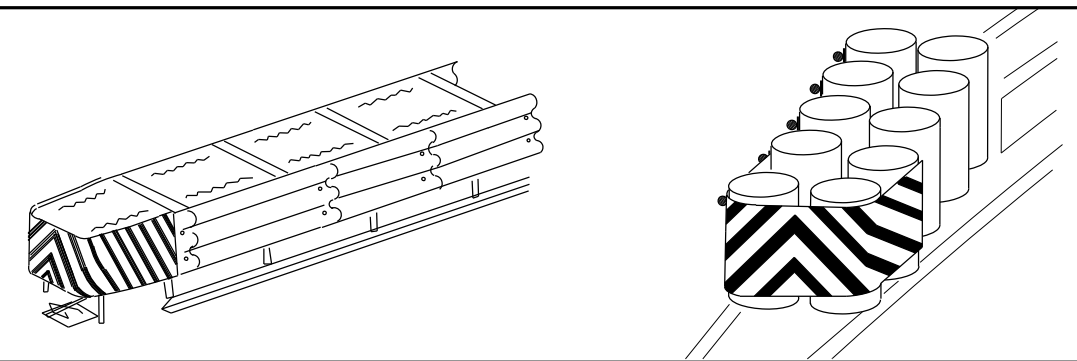
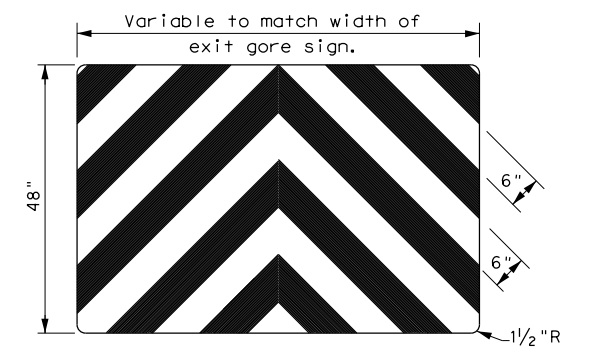
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\* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

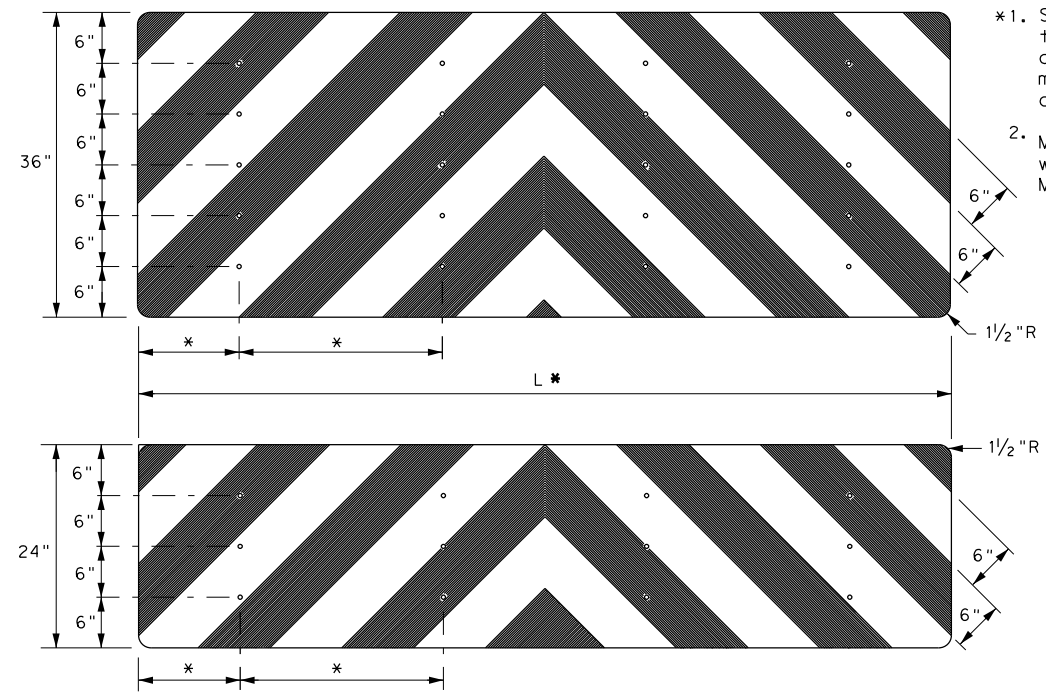


OBJECT MARKERS SMALLER THAN 3 FT<sup>2</sup>



**NOTES**

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



**NOTES**

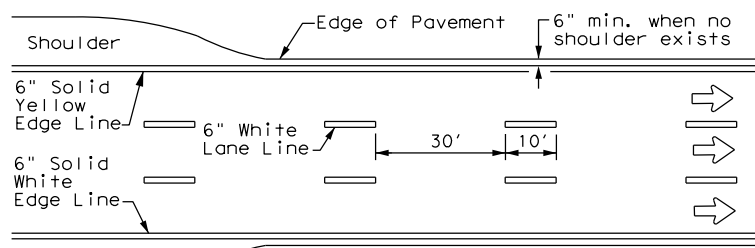
1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
2. Object Markers may be fabricated from adhesive backed reflective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

DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

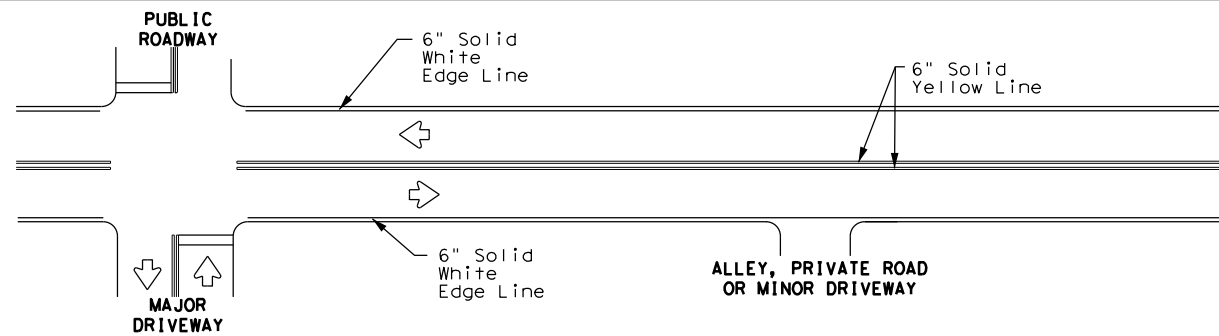
		<b>Texas Department of Transportation</b>		<b>Traffic Safety Division Standard</b>	
<b>DELINEATOR &amp; OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS</b> <b>D &amp; OM(VIA) -20</b>					
FILE: <u>dmv1a20.dgn</u>	DW: TXDOT	CK: TXDOT	DN: TXDOT	CK: TXDOT	
© TXDOT December 1989	CONT	SECT	JOB	HIGHWAY	
REVISIONS			1266 01	008	FM 956
4-92 8-04					
8-95 3-15					
4-98 7-20					
	DIST	COUNTY	SHEET NO.		
	YKM	FAYETTE	68		
20G					

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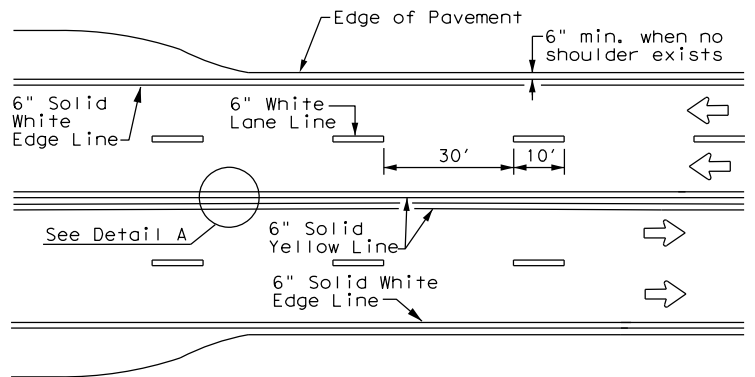
DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$



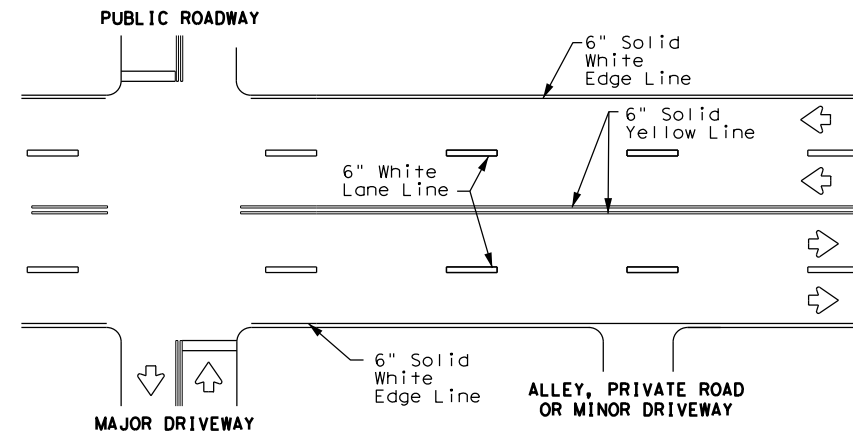
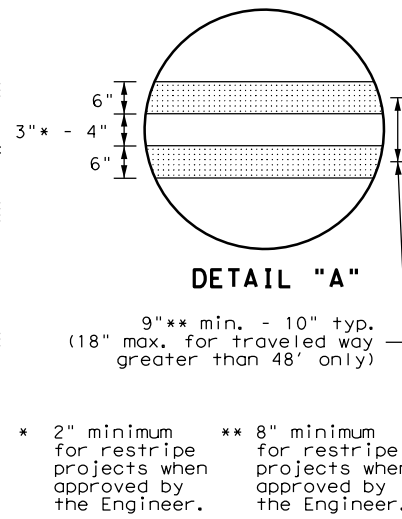
**EDGE LINE AND LANE LINES  
ONE-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



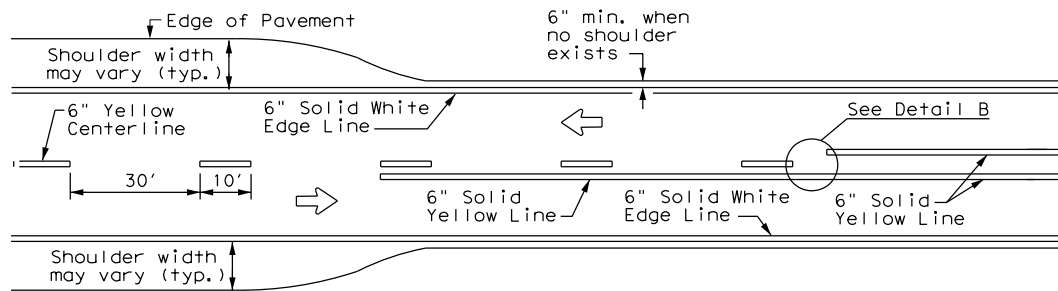
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT  
MARKINGS THROUGH INTERSECTIONS**



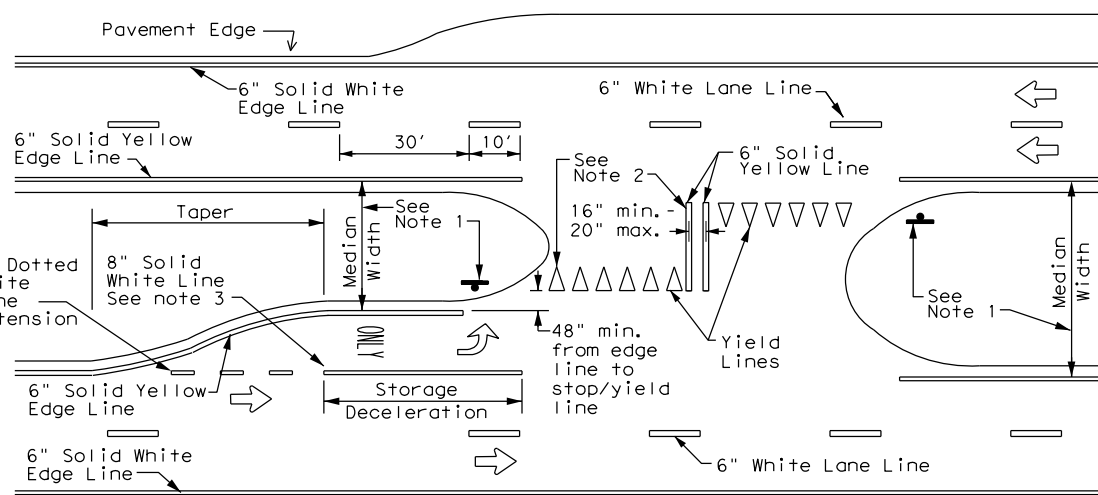
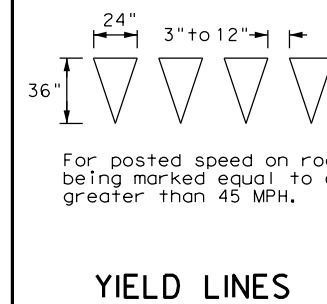
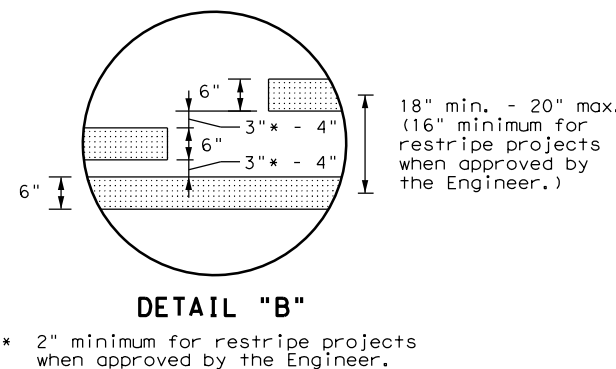
**CENTERLINE AND LANE LINES  
FOUR LANE TWO-WAY ROADWAY  
WITH OR WITHOUT SHOULDERS**



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



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



**FOUR LANE DIVIDED ROADWAY CROSSOVERS**

**NOTES**

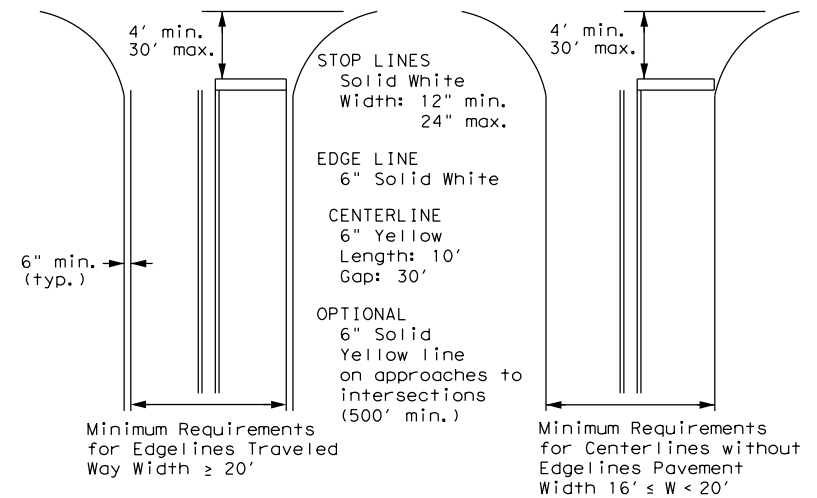
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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.



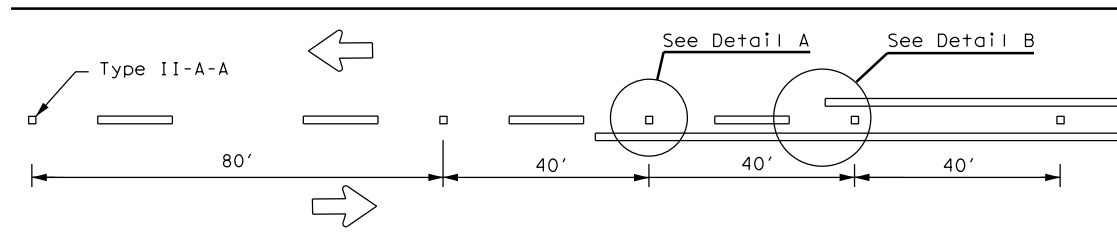
**TYPICAL STANDARD  
PAVEMENT MARKINGS**

**PM(1)-22**

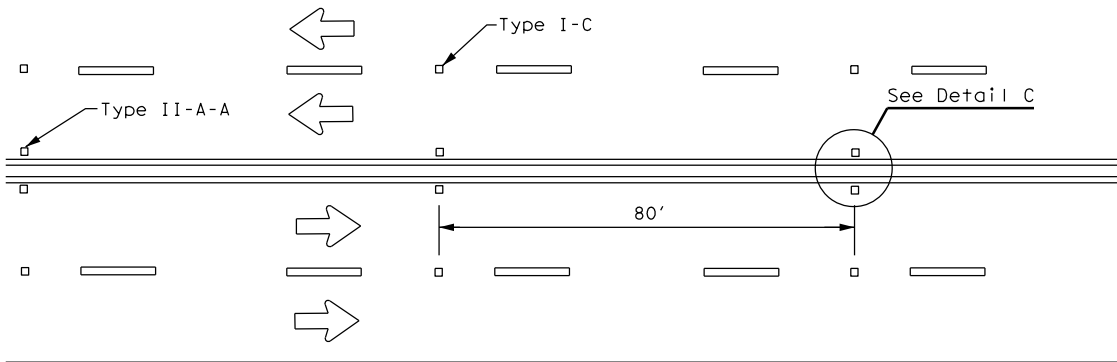
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	1266	01	008	FM 956
11-78 8-00 6-20	DIST	COUNTY	SHEET NO.	
8-95 3-03 12-22	YKM	FAYETTE	69	
5-00 2-12				

# REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

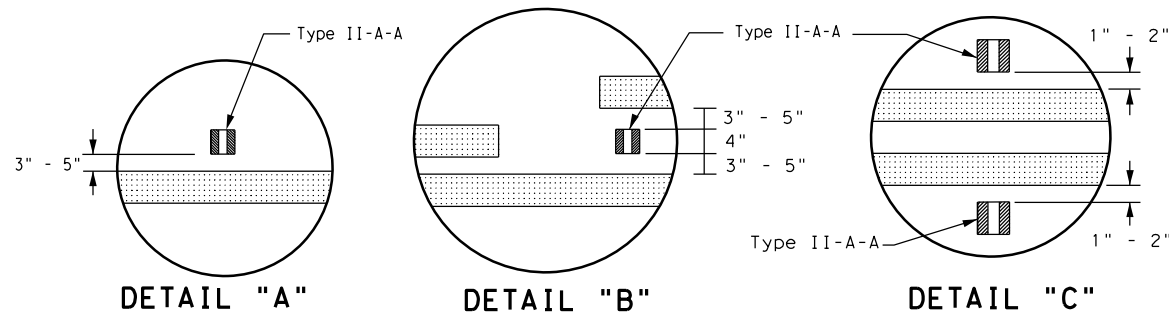
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**CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS**



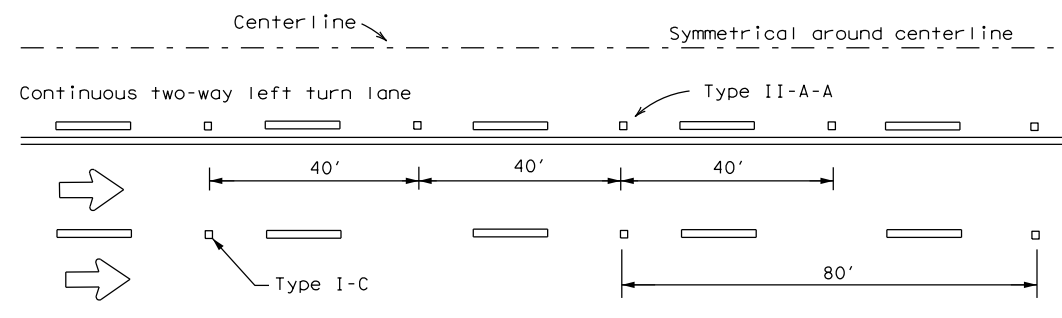
**CENTERLINE & LANE LINES  
FOR FOUR LANE TWO-WAY ROADWAYS**



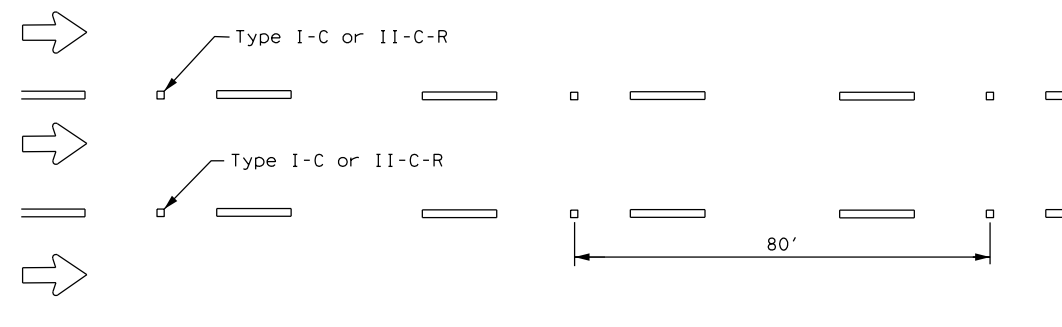
**DETAIL "A"**

**DETAIL "B"**

**DETAIL "C"**



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

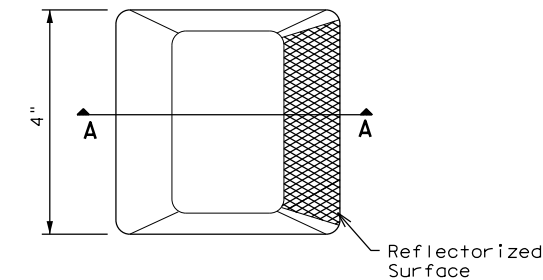


**LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)**

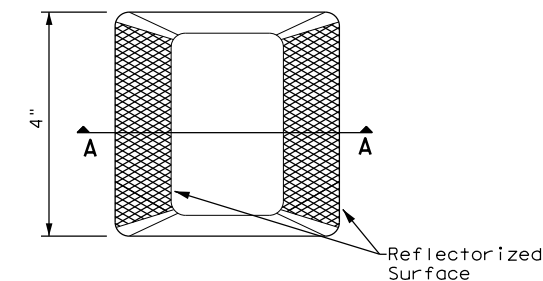
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.  
See Note 3.

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

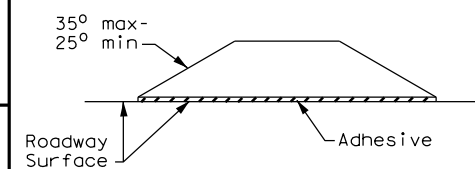
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



**Type I (Top View)**



**Type II (Top View)**



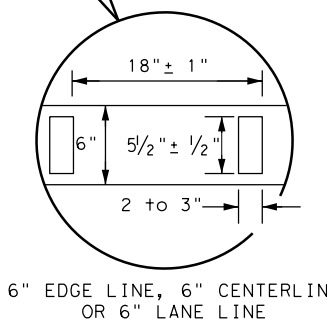
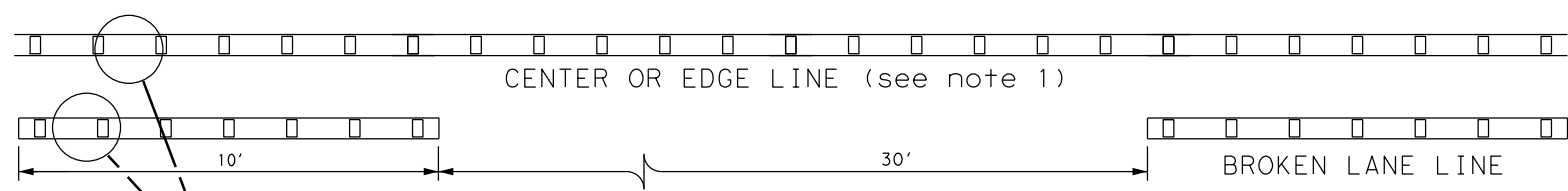
**SECTION A**

## RAISED PAVEMENT MARKERS



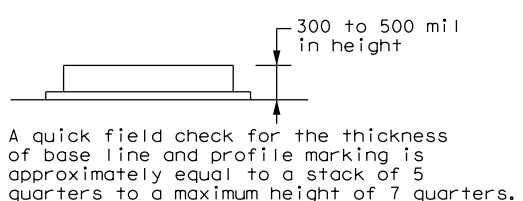
## POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2) - 22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
4-77 8-00 6-20	1266	01	008	FM 956
4-92 2-10 12-22	DIST	COUNTY	SHEET NO.	
5-00 2-12	YKM	FAYETTE	70	



**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

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

### GENERAL NOTES

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

DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

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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)

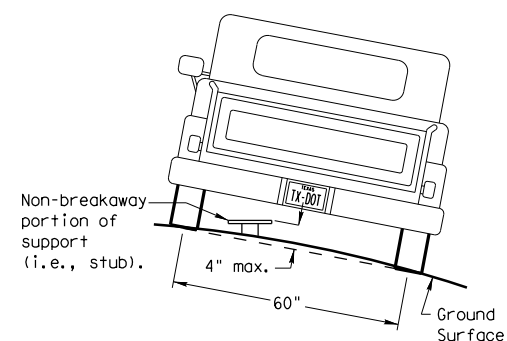
### Anchor Type

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))

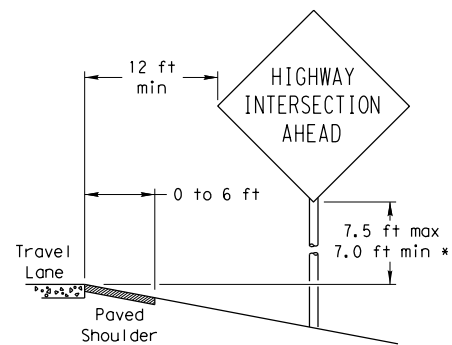
## REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

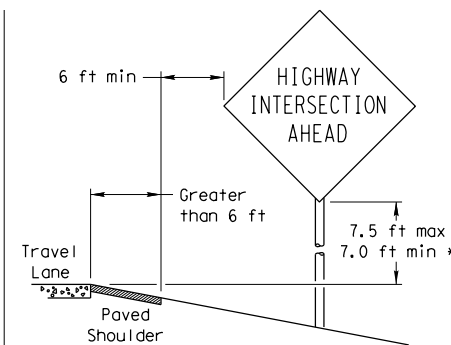
## SIGN LOCATION

### PAVED SHOULDERS



#### LESS THAN 6 FT. WIDE

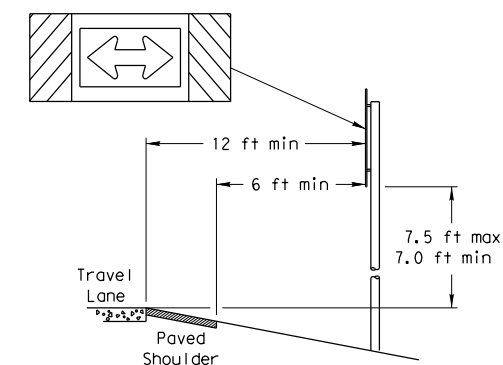
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



#### GREATER THAN 6 FT. WIDE

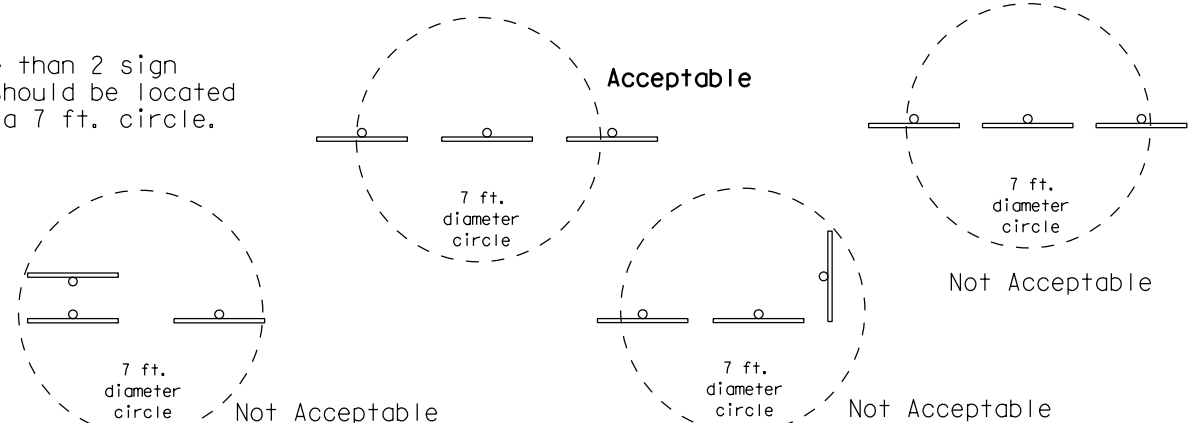
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

### T-INTERSECTION

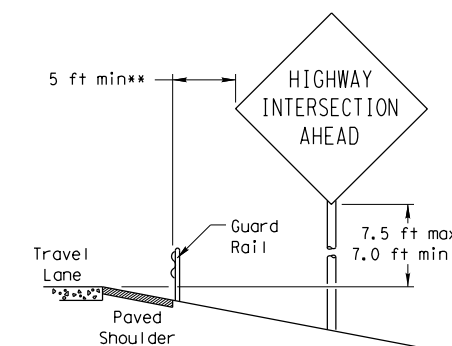


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

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

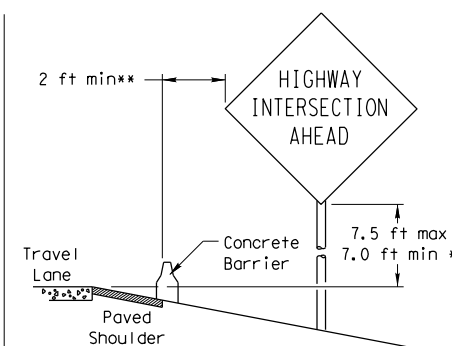


### BEHIND BARRIER

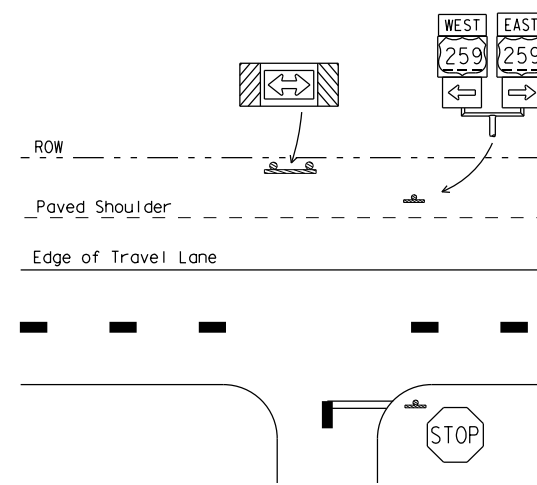


#### BEHIND GUARDRAIL

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



#### BEHIND CONCRETE BARRIER



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

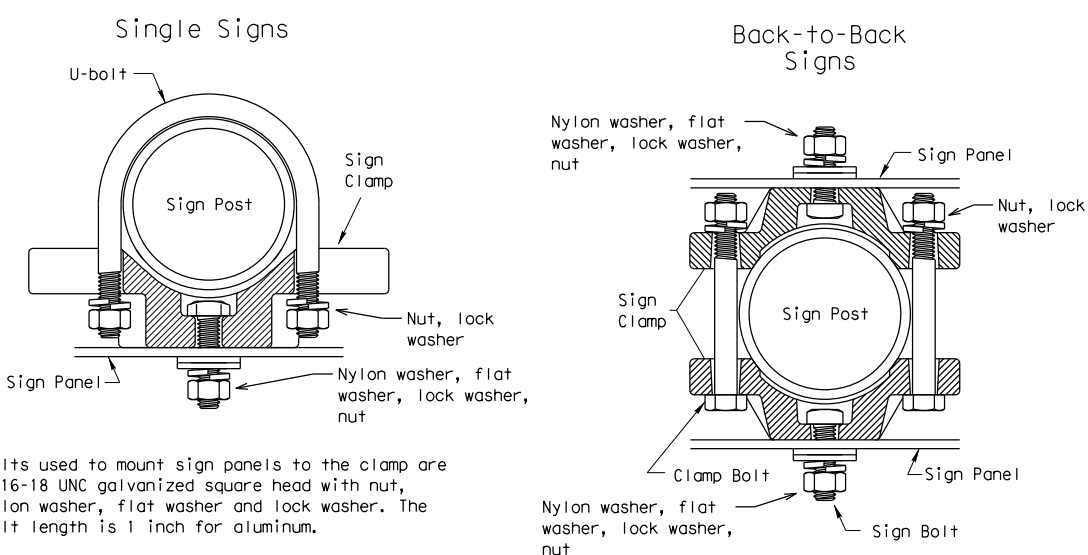
- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

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

## TYPICAL SIGN ATTACHMENT DETAIL



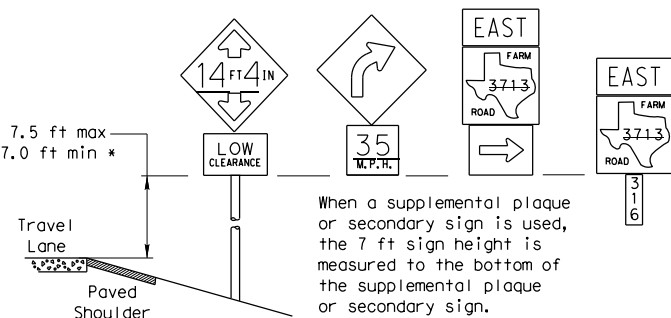
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

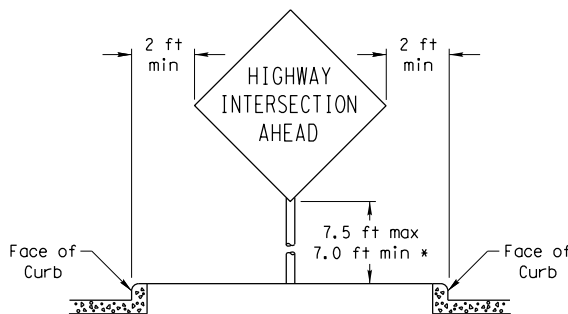
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

### SIGNS WITH PLAQUES

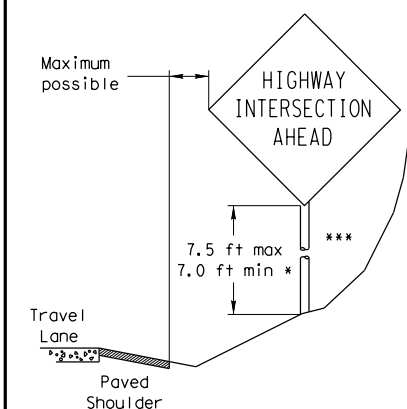


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

### 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.



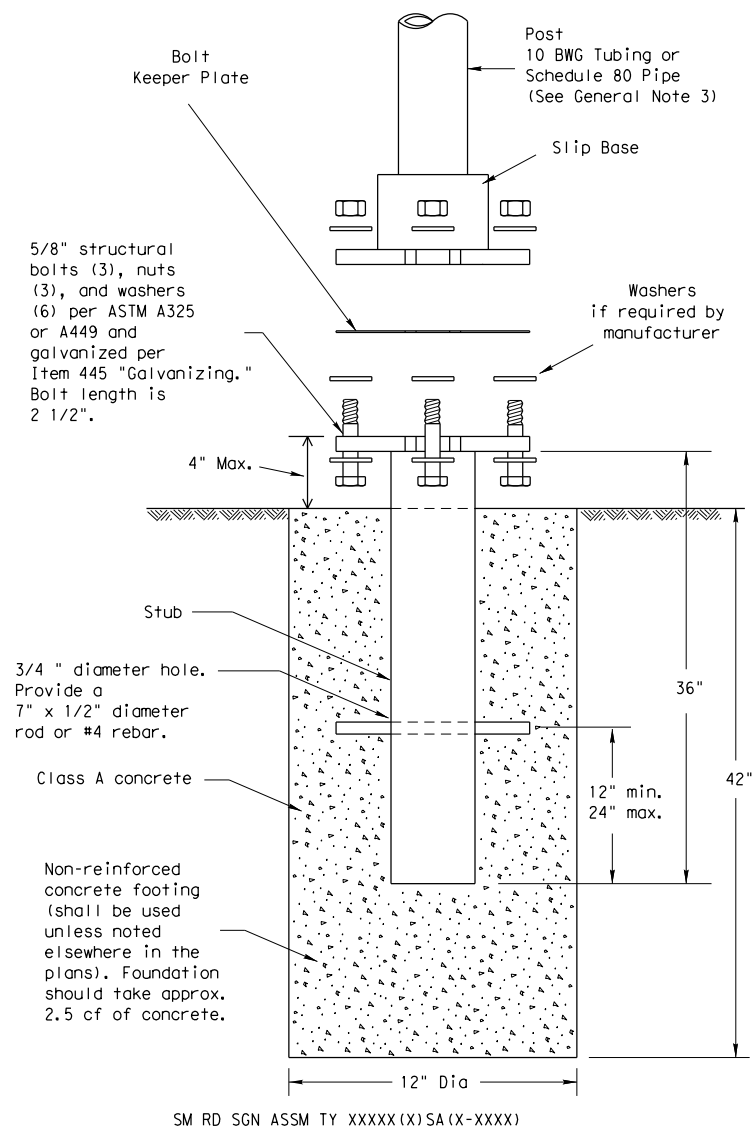
## SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD (GEN) - 08

© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		1266	01	008	FM 956
		DIST	COUNTY		SHEET NO.
		YKM	FAYETTE		71

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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

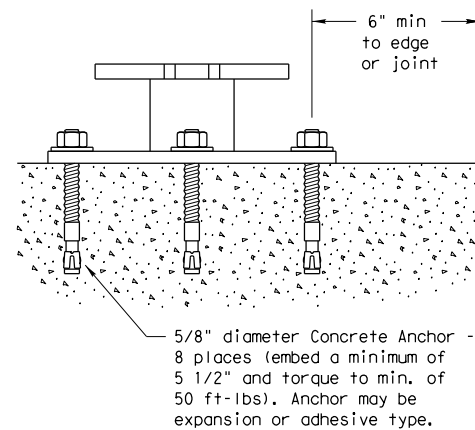
#### Foundation

- 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



SM RD SGN ASSM TY XXXX(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

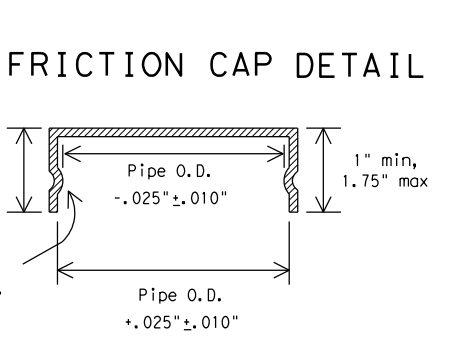
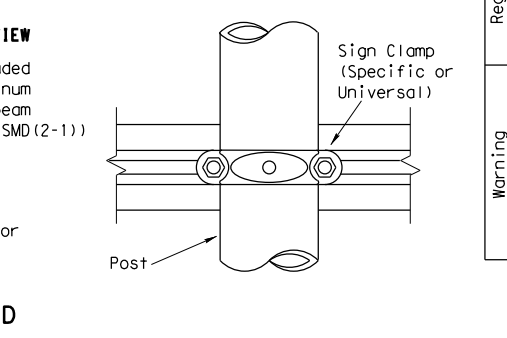
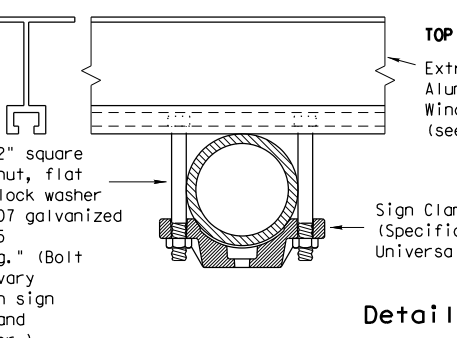
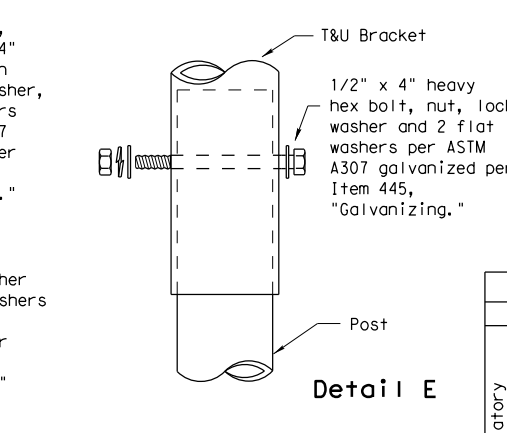
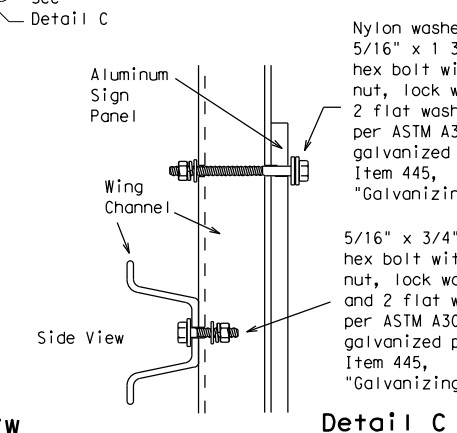
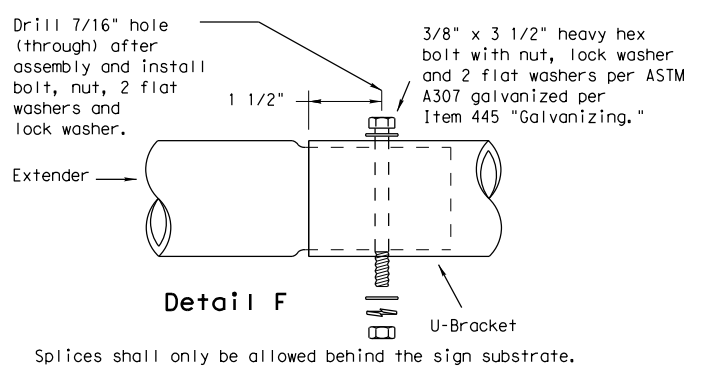
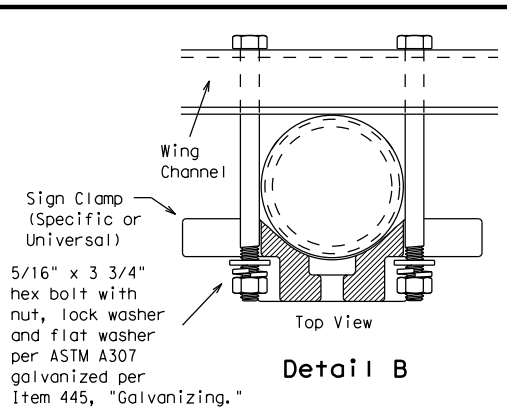
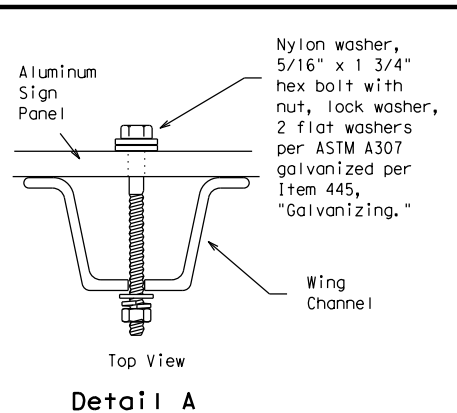
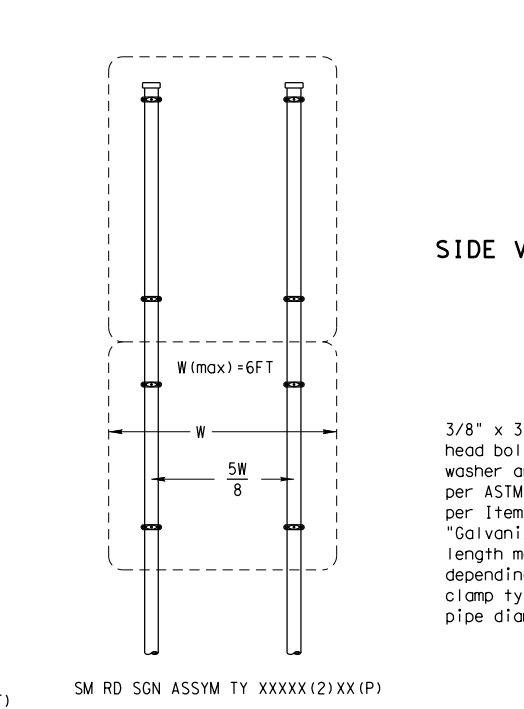
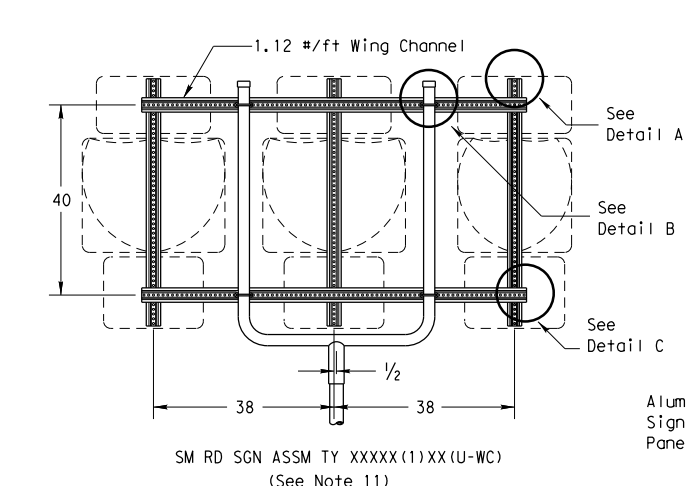
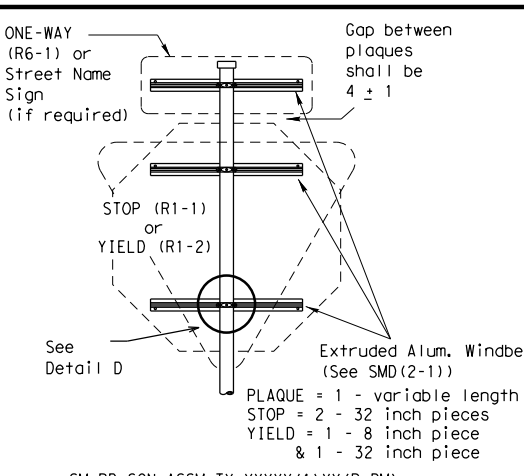
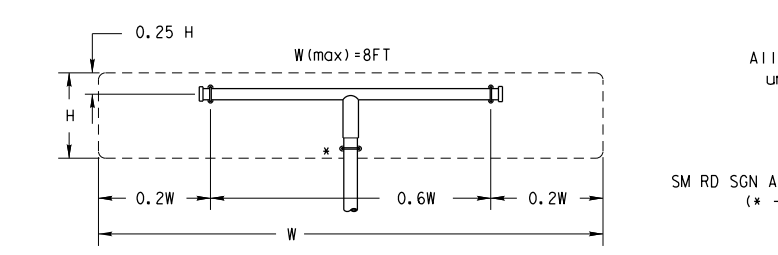
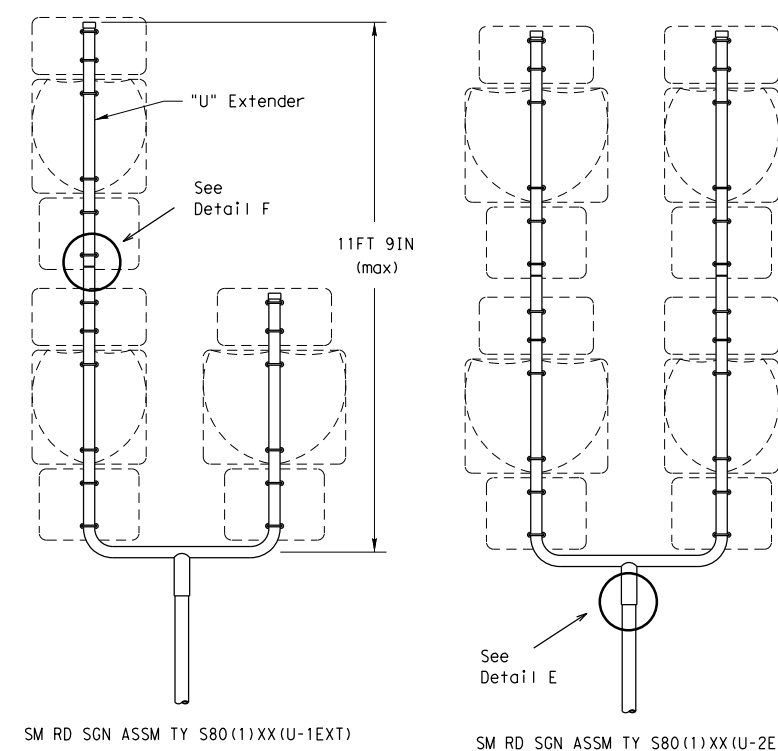
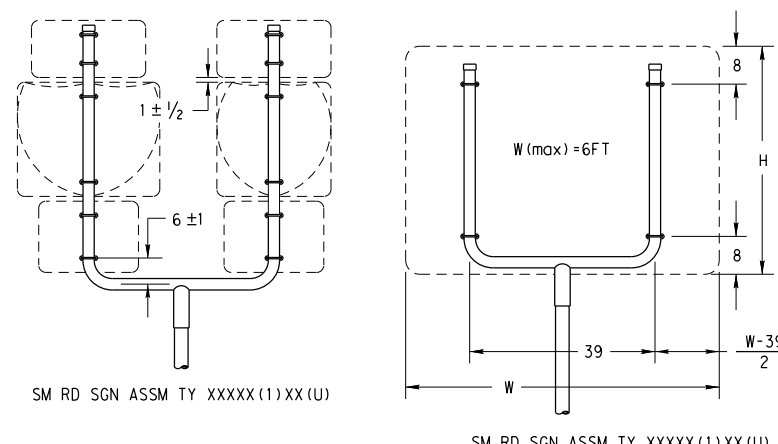
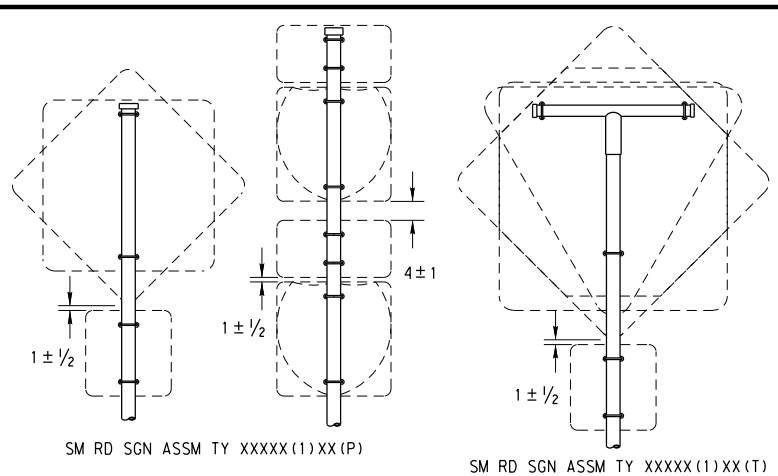
SMD(SLIP-1)-08

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9-08	REVISIONS		CONT	SECT	JOB	HIGHWAY
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			DIST	COUNTY		SHEET NO.
		YKM	FAYETTE		72	



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All dimensions are in english unless detailed otherwise.

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)	

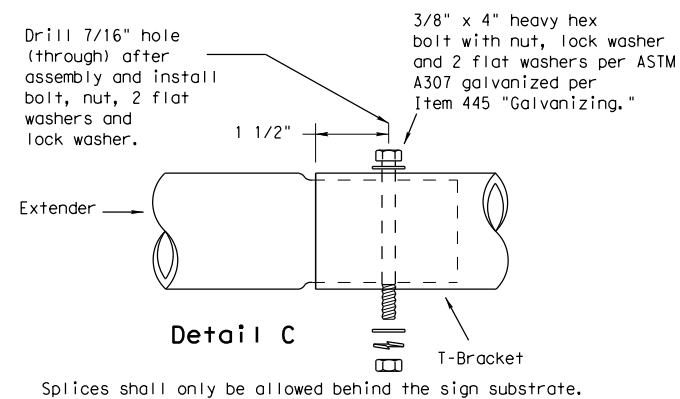
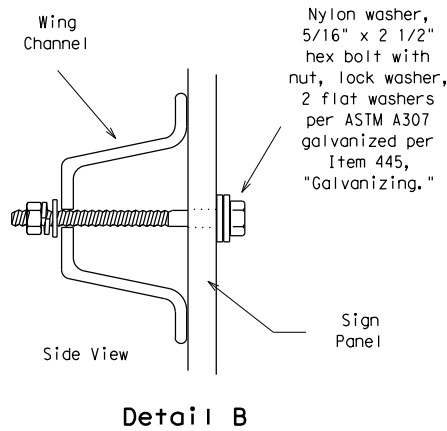
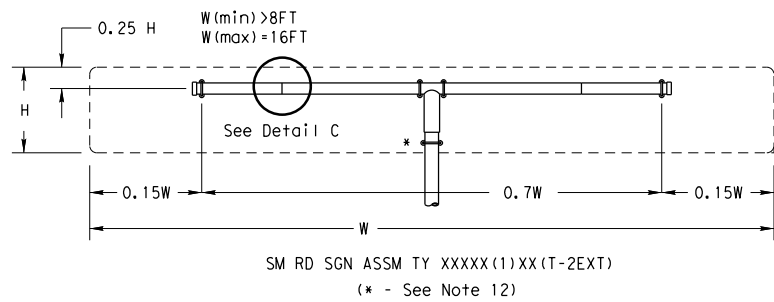


SIGN MOUNTING DETAILS  
SMALL ROADSIDE SIGNS  
TRIANGULAR SLIPBASE SYSTEM  
SMD(SLIP-2) -08

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		DIST	COUNTY		SHEET NO.
		YKM	FAYETTE		73

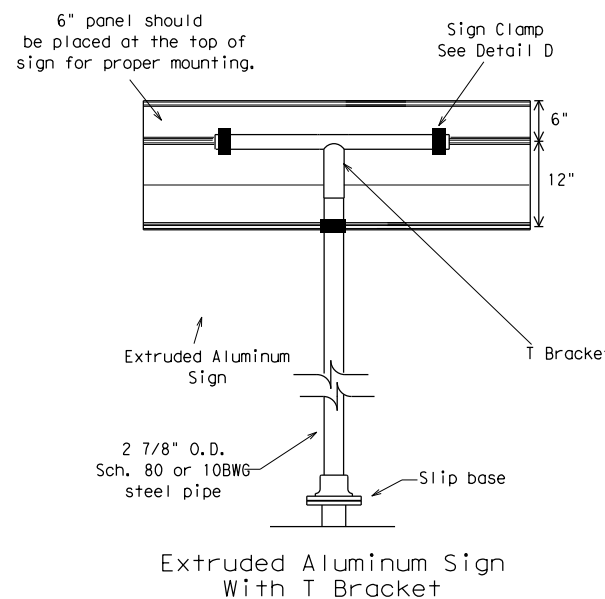
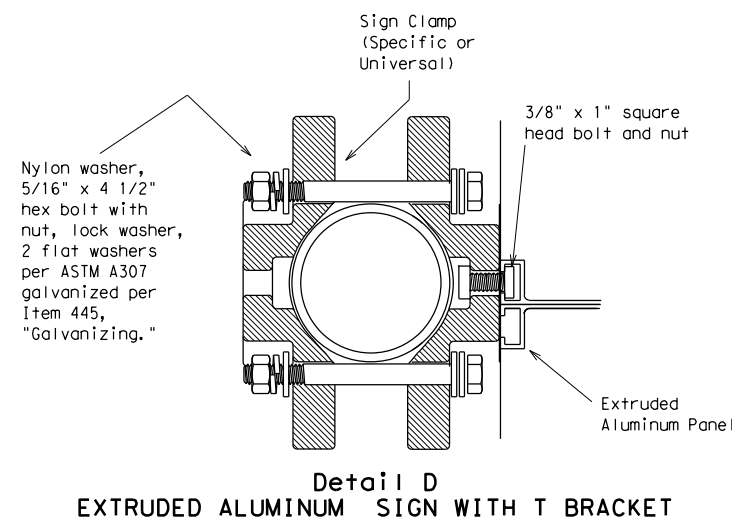
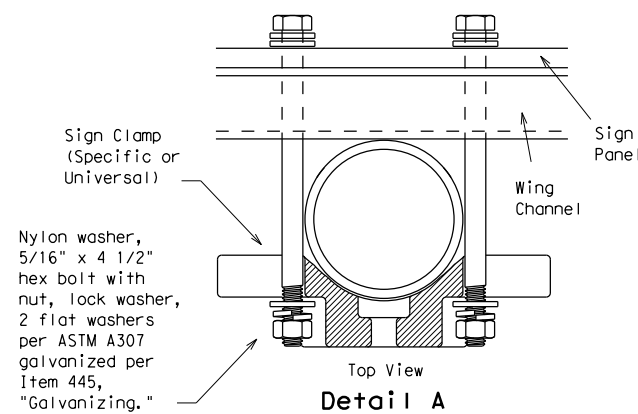
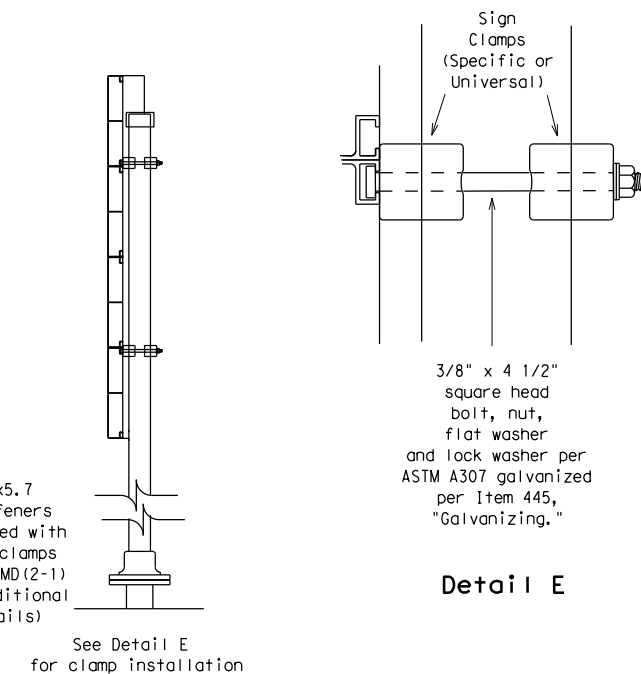
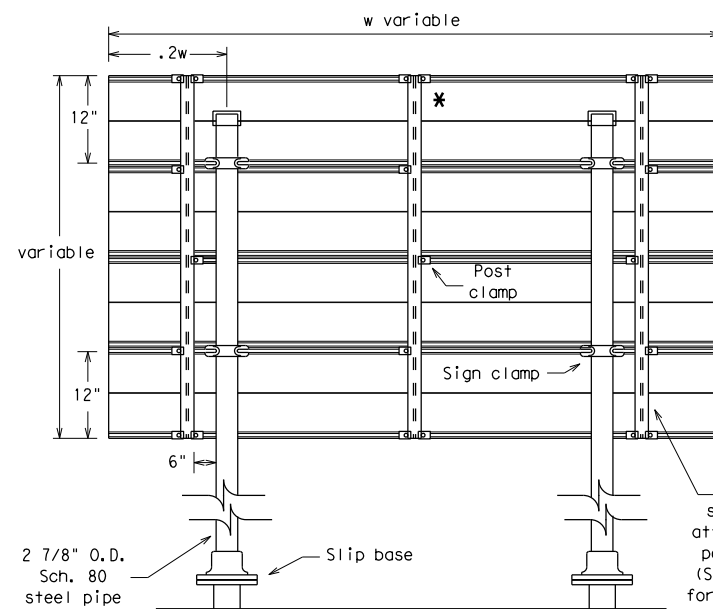
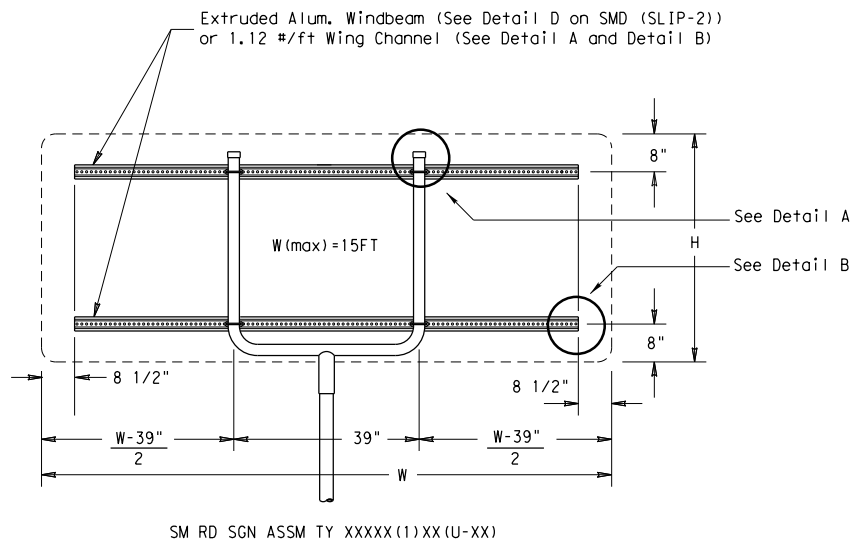
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**GENERAL NOTES:**

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



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

Use Extruded Alum. Windbeam as stiffeners See SMD (2-1) for additional details  
See Detail E for clamp installation

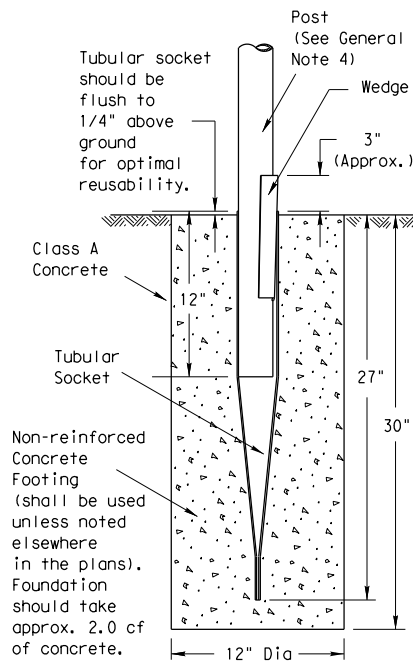


**SIGN MOUNTING DETAILS  
SMALL ROADSIDE SIGNS  
TRIANGULAR SLIPBASE SYSTEM  
SMD(SLIP-3) -08**

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		YKM	FAYETTE		74

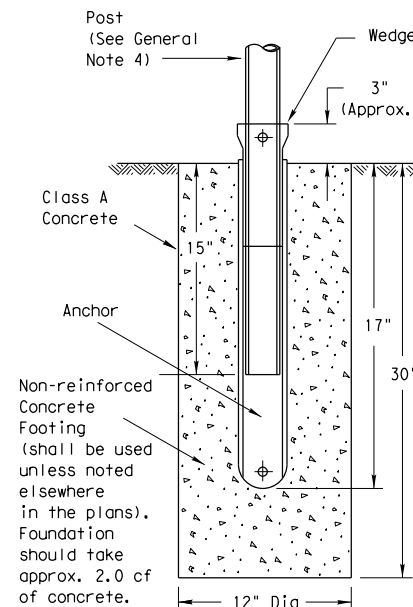
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### Wedge Anchor Steel System



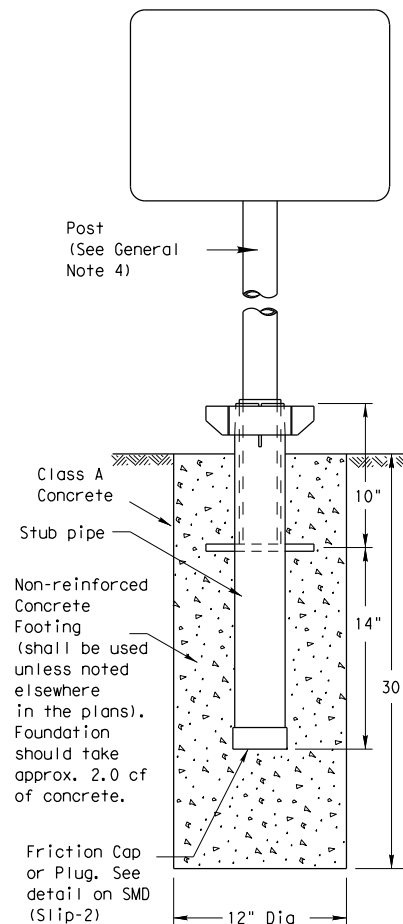
SM RD SGN ASSM TY TWT(X)WS(X)

### Wedge Anchor High Density Polyethylene (HDPE) System

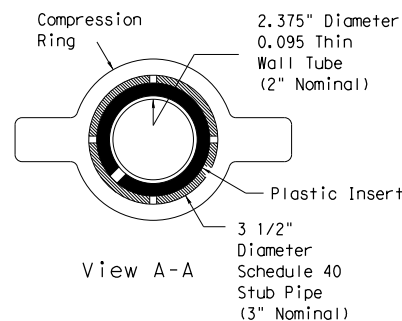
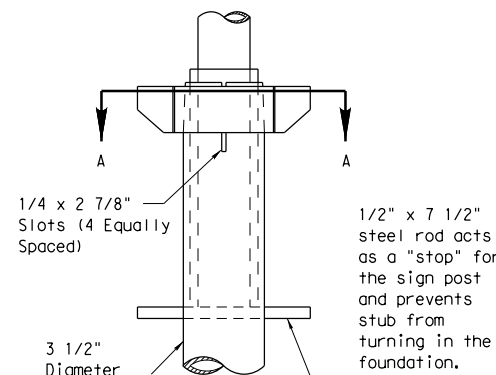


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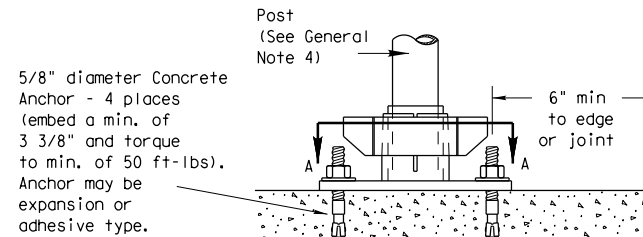
### Universal Anchor System with Thin-Walled Tubing Post



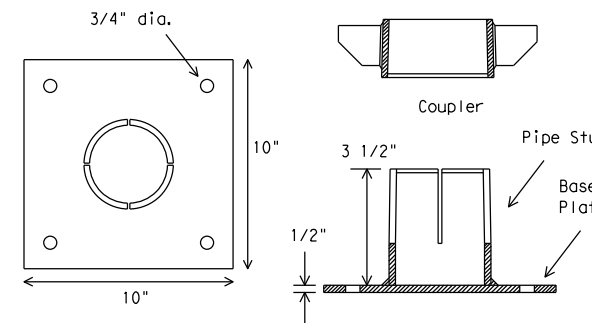
SM RD SGN ASSM TY TWT(X)UA(P)



Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

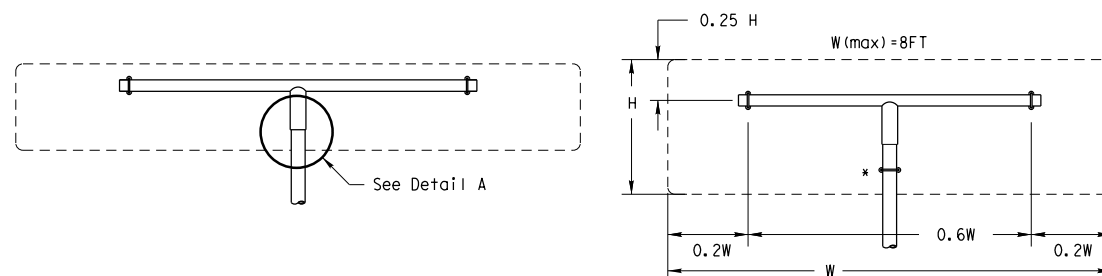


Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized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



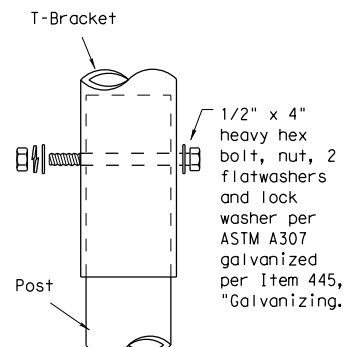
SM RD SGN ASSM TY TWT(X)UB(P)

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



SM RD SGN ASSM TY TWT(X)XX(T)

(\* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

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

### GENERAL NOTES:

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

### WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

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

### UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

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

Texas Department of Transportation  
Traffic Operations Division

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

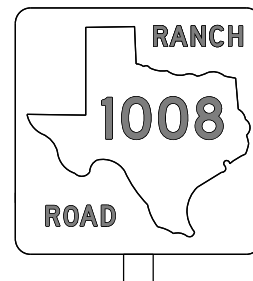
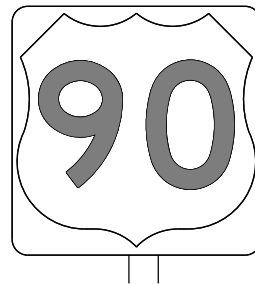
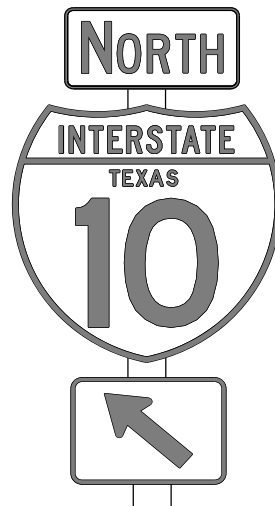
© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
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 FILE: \$FILES\$

## REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

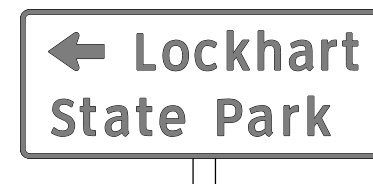
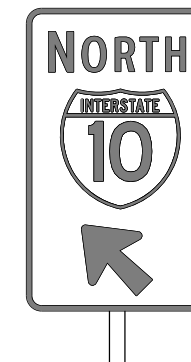
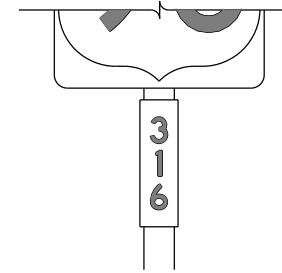
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

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

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



TYPICAL EXAMPLES

### GENERAL NOTES

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

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W
- Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
- Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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



## TYPICAL SIGN REQUIREMENTS

### TSR(3) - 13

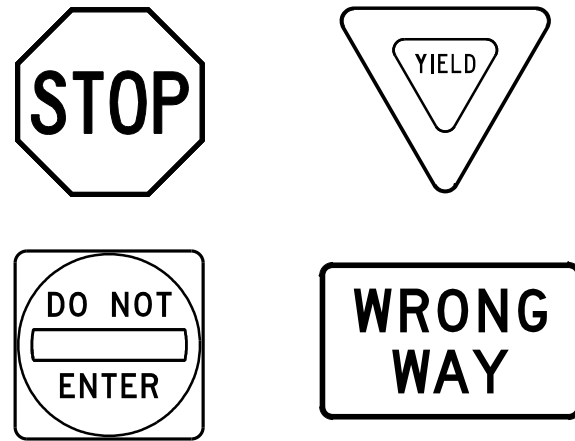
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DN: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		1266 01	008	FM 956
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	YKM	FAYETTE		76

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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILES\$

### REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

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



#### REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

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

### REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

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



#### TYPICAL EXAMPLES

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

### GENERAL NOTES

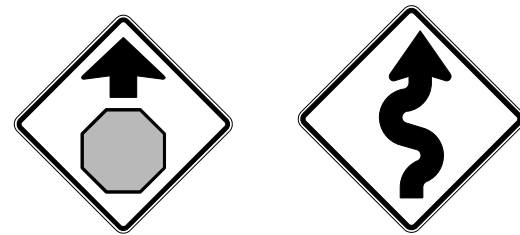
- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway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

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

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

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

### REQUIREMENTS FOR WARNING SIGNS



#### TYPICAL EXAMPLES

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

### REQUIREMENTS FOR SCHOOL SIGNS



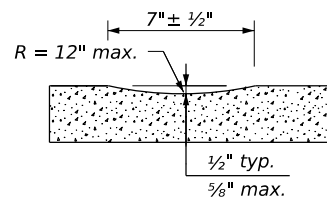
#### TYPICAL EXAMPLES

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

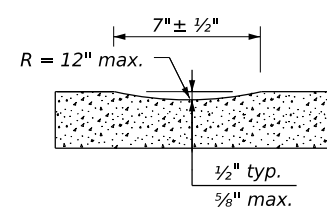
				<i>Traffic Operations Division Standard</i>	
<h2>TYPICAL SIGN REQUIREMENTS</h2> <h3>TSR(4) - 13</h3>					
FILE:	tsr4-13.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		1266	01	008	FM 956
12-03	7-13	DIST	COUNTY		SHEET NO.
9-08		YKM	FAYETTE		77

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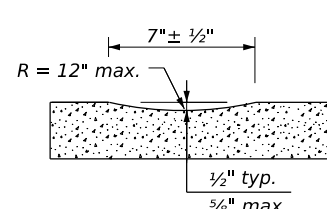
DATE: 7/3/2024  
FILE: \$FILE\$  
\$TIME\$



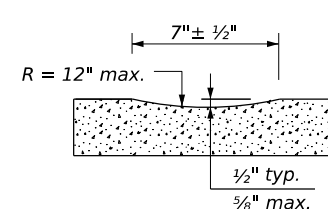
PROFILE VIEW  
OPTION 1



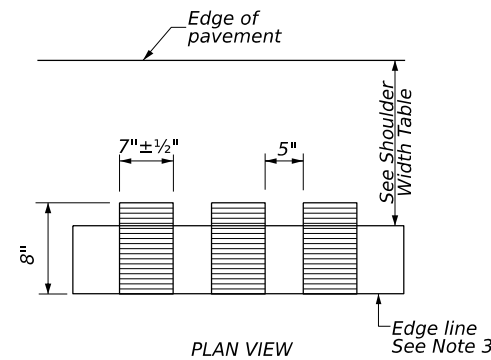
PROFILE VIEW  
OPTION 2



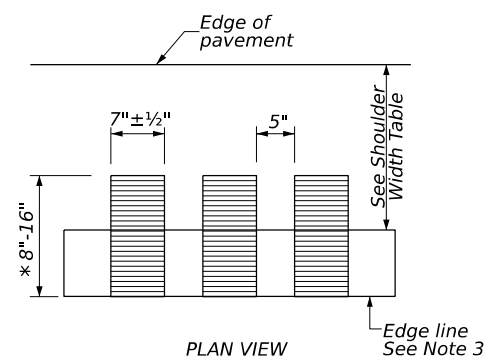
PROFILE VIEW  
OPTION 3



PROFILE VIEW  
OPTION 4

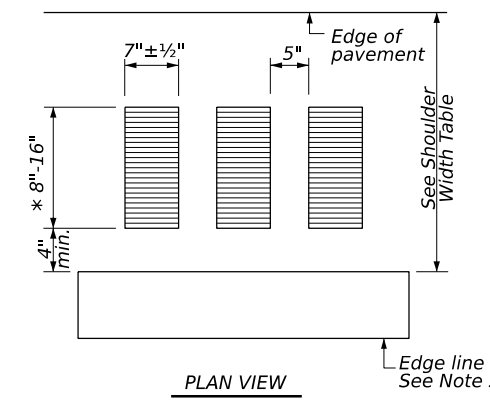


PLAN VIEW



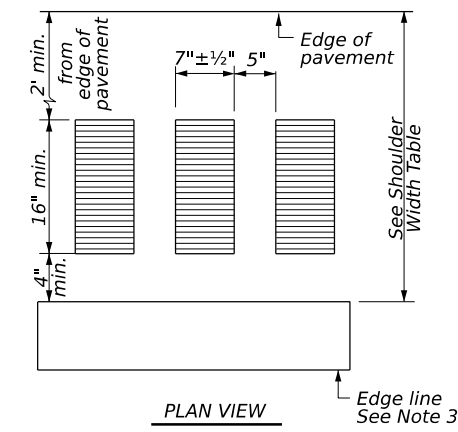
PLAN VIEW

\* This distance may vary based on width of shoulder



PLAN VIEW

\* This distance may vary based on width of shoulder



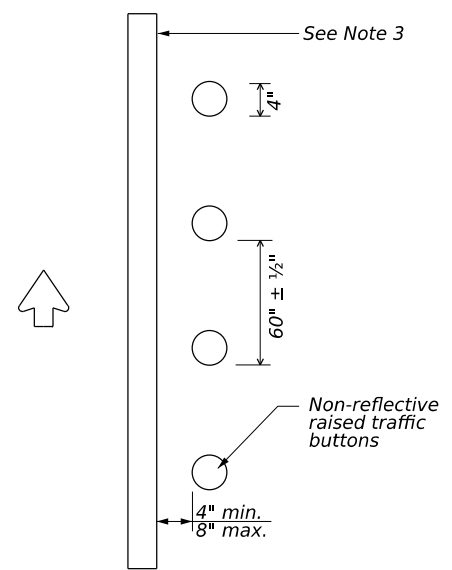
PLAN VIEW

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**

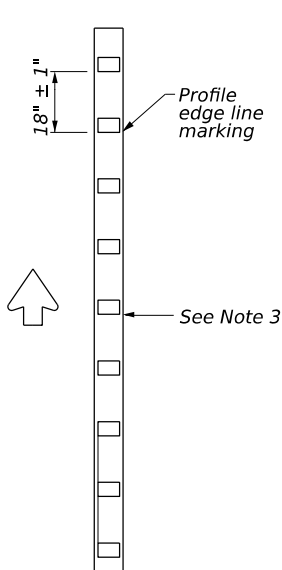
**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**

**CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)**



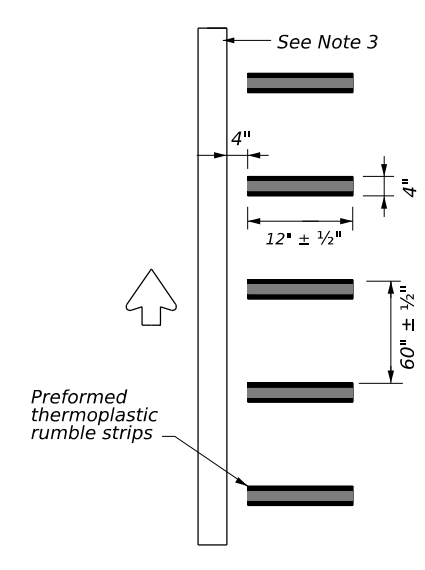
PLAN VIEW  
OPTION 5

**RAISED EDGE LINE (Rumble Strips)**



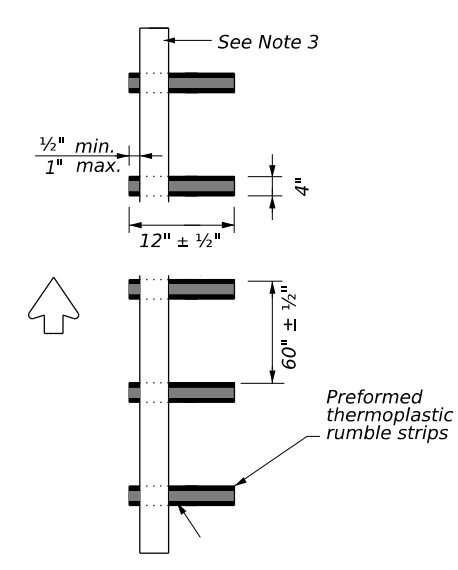
PLAN VIEW  
OPTION 6

**PROFILE EDGE LINE MARKINGS (Rumble Strips)**



PLAN VIEW  
OPTION 7

**PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)**



PLAN VIEW  
OPTION 8

**PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)**

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

**GENERAL NOTES**

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

**WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:**

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

**WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:**

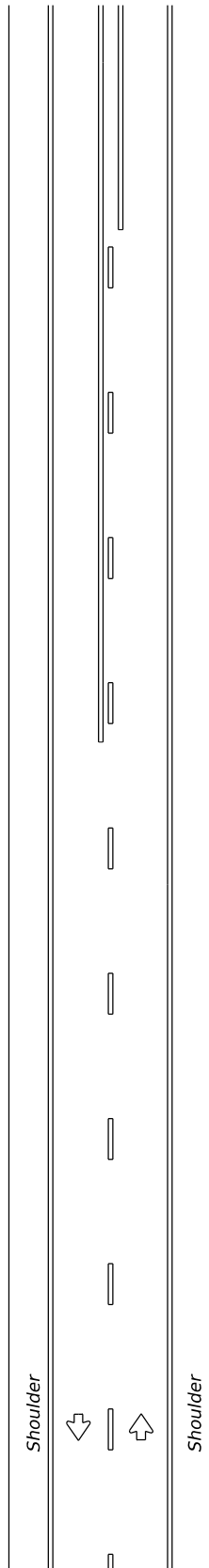
- Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
- Non-reflective traffic buttons shall be placed adjacent to the pavement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

		<b>Texas Department of Transportation</b>		<b>Traffic Safety Division Standard</b>	
<b>EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23</b>					
FILE:	rs(2)-23.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	January 2023	CONT:	1266	SECT:	01
		JOB:	008	HIGHWAY:	FM 956
10-13		DIST:	YKM	COUNTY:	FAYETTE
1-23				SHEET NO.:	78

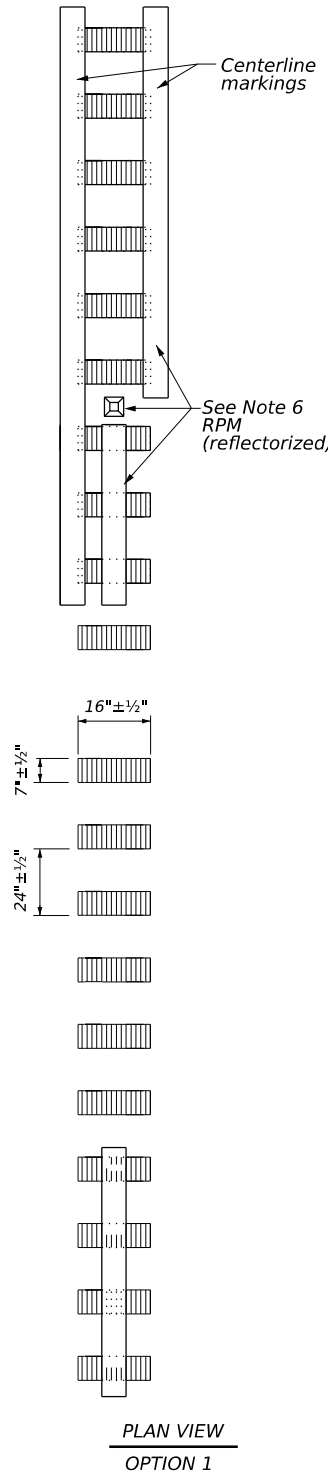
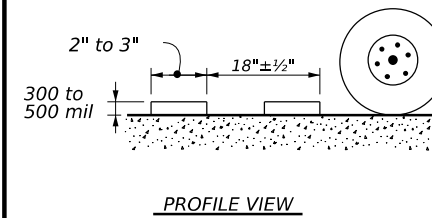
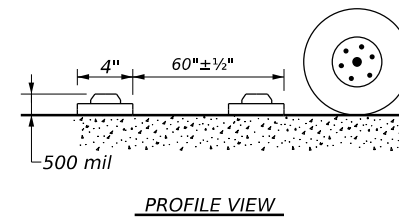
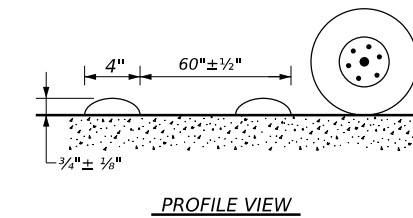
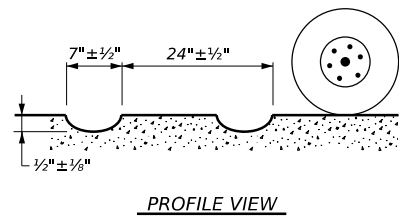
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DATE: 7/3/2024 \$TIME\$  
FILE: \$FILE\$

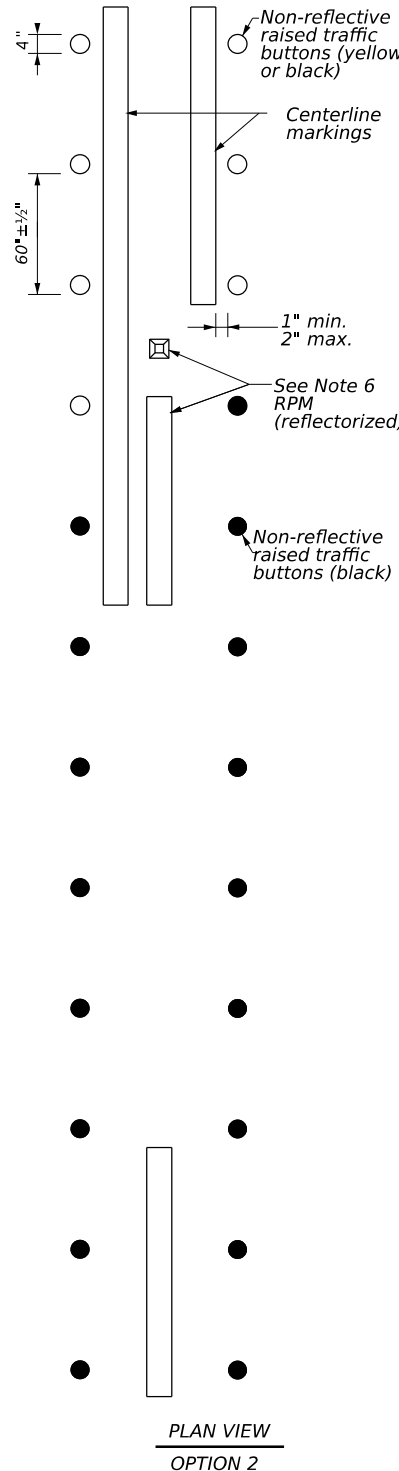
TWO LANE TWO-WAY HIGHWAYS



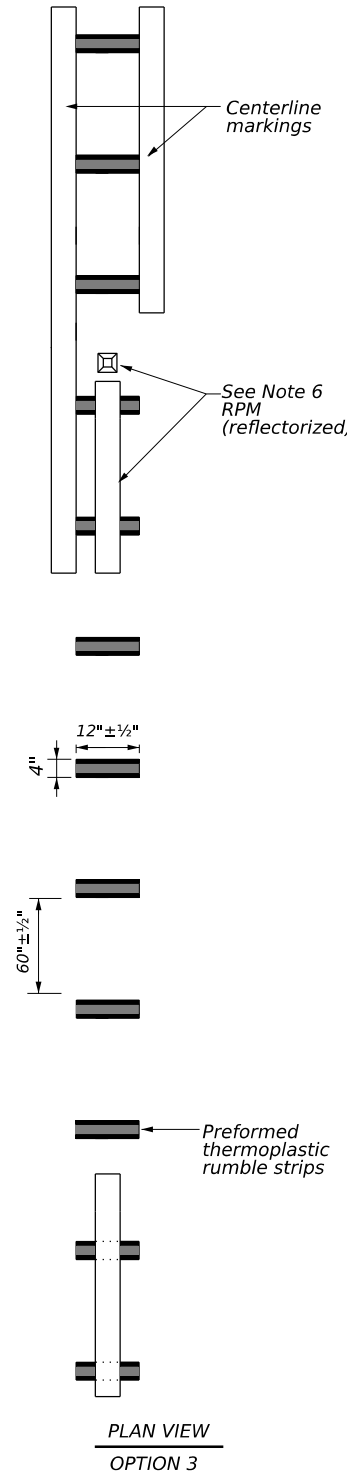
CENTERLINE RUMBLE STRIPS



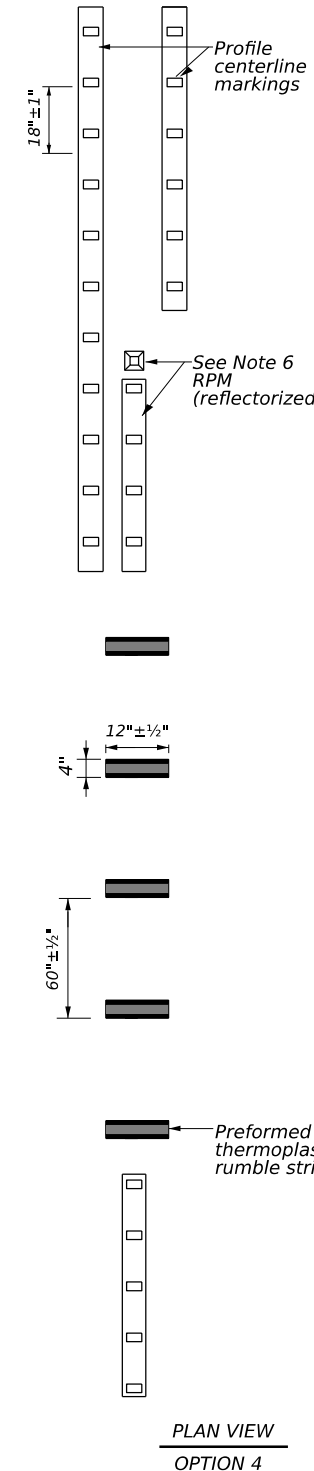
MILLED CENTERLINE RUMBLE STRIPS



RAISED CENTERLINE RUMBLE STRIPS



PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

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

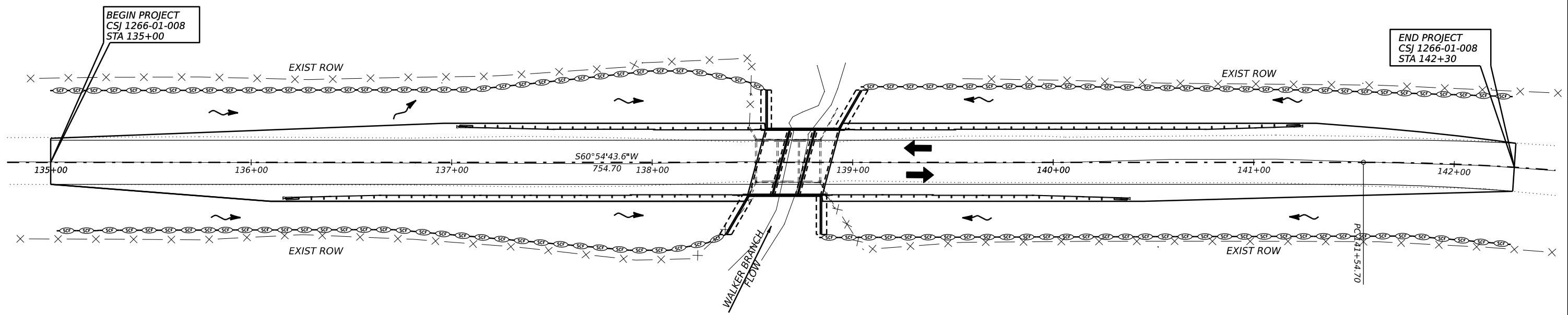
WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

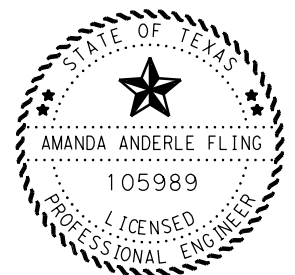
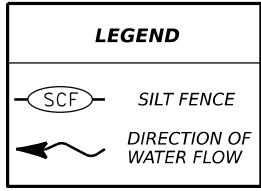
WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

<p><b>CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23</b></p>			
FILE: rs(4)-23.dgn	DW: TxDOT	CK: TxDOT	OW: TxDOT
© TxDOT	January 2023	CONT SECT	JOB HIGHWAY
REVISIONS	1266	01	008 FM 956
10-13	DIST	COUNTY	SHEET NO.
1-23	YKM	FAYETTE	79



LOCATION	ITEM 506			
	ROCK FILTER DAMS (INSTALL) (TY 1) LF	ROCK FILTER DAMS (REMOVE) LF	TEMP SEDMT CONT FENCE (INSTALL) LF	TEMP SEDMT CONT FENCE (REMOVE) LF
LEFT SIDE			690	690
RIGHT SIDE			680	680
AS APPROVED OR DIRECTED	40	40	50	50
<b>TOTALS</b>	<b>40</b>	<b>40</b>	<b>1420</b>	<b>1420</b>



Amanda Anderle Fling, P.E.

07/03/2024

### SWP3 LAYOUT AND SUMMARY

SCALE: 1" = 50'

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FED. RD. DIV. NO.		PROJECT NO.	
6			
CONT.	SECT.	JOB	HIGHWAY NO.
1266	01	008	FM 956
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	YKM	FAYETTE	80

PATH: T:\YKMAN\EX\PS&E\126601008\_FM956\_WalkerBranch\Plan\_Sheets\1  
 FILE: SW3P\_Layout.dgn  
 DATE: 7/4/2024



**STORMWATER POLLUTION PREVENTION PLAN (SWP3):**

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

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

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

**1.0 SITE/PROJECT DESCRIPTION**

**1.1 PROJECT CONTROL SECTION JOB (CSJ):**  
1266-01-008

**1.2 PROJECT LIMITS:**

From: AT WALKER BRANCH  
To: (STR# 1266-01-001)

**1.3 PROJECT COORDINATES:**

BEGIN: (Lat) 29°45'31.74"N ,(Long) 96°57'00.47"W  
END: (Lat) 29°45'28.37"N ,(Long) 96°57'07.78"W

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

**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 1.2

**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT  
CONSISTING OF REPLACE BRIDGE AND APPROACHES.

**1.7 MAJOR SOIL TYPES:**

Soil Type	Description
Bosque Sandy Clay Loam Occasionally Flooded	100% Sandy Clay Loam Moderately Well Drained Very High Rate of Run-off
Hallettsville Fine Sandy Loam 1 to 3 Percent Slope	Sandy Clay & Sandy Clay Loam Moderately Well Drained Medium Rate of Run-off
Pursley Clay Loam Frequently Flooded	Loam, Clay Loam & Silty Clay Loam Well Drained Low Rate of Run-off

**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 2.5.)  
 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  
 Discharges from concrete washout activities, runoff from concrete cutting activities, and other concrete related activities.  
 Other: \_\_\_\_\_  
 Other: \_\_\_\_\_  
 Other: \_\_\_\_\_

**1.11 RECEIVING WATERS:**

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

Tributaries	Classified Waterbody
Walker Branch, West Navidad River (1605A)	Navidad River (1605) No Impairment

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

**1.12 ROLES AND RESPONSIBILITIES: TxDOT**

Development of plans and specifications  
 Submit Notice of Intent (NOI) to TCEQ (≥5 acres)  
 Post Construction Site Notice  
 Submit NOI/CSN to local MS4  
 Perform SWP3 inspections  
 Maintain SWP3 records and update to reflect daily operations  
 Complete and submit Notice of Termination to TCEQ  
 Maintain SWP3 records for 3 years  
 Other: \_\_\_\_\_  
 Other: \_\_\_\_\_  
 Other: \_\_\_\_\_

**1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR**

Day To Day Operational Control  
 Submit Notice of Intent (NOI) to TCEQ (≥5 acres)  
 Post Construction Site Notice  
 Submit NOI/CSN to local MS4  
 Maintain schedule of major construction activities  
 Install, maintain and modify BMPs  
 Complete and submit Notice of Termination to TCEQ  
 Maintain SWP3 records for 3 years  
 Other: \_\_\_\_\_  
 Other: \_\_\_\_\_  
 Other: \_\_\_\_\_

**1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:**

MS4 Entity

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6				81
STATE	STATE DIST.	COUNTY		
TEXAS	YKM	FAYETTE		
CONT.	SECT.	JOB	HIGHWAY NO.	
1266	01	008	FM 956	

**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

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

**T / P**

- Sediment Trap
  - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
  - Not required (<10 acres disturbed)
  - Required (>10 acres) and implemented.
    - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - 3,600 cubic feet of storage per acre drained
  - Required (>10 acres), but not feasible due to:
    - Available area/Site geometry
    - Site slope/Drainage patterns
    - Site soils/Geotechnical factors
    - Public safety
    - Other: \_\_\_\_\_

**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
SEEDING	135+00	142+30

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

**2.4 OFFSITE VEHICLE TRACKING CONTROLS:**

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

**2.5 POLLUTION PREVENTION MEASURES:**

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

**2.6 VEGETATED BUFFER ZONES:**

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

Type	Stationing	
	From	To

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

**2.7 ALLOWABLE NON-STORMWATER DISCHARGES:**

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

**2.8 DEWATERING:**

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

**2.9 INSPECTIONS:**

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

**2.10 MAINTENANCE:**

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)**

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
6				82
STATE	STATE DIST.	COUNTY		
TEXAS	YKM	FAYETTE		
CONT.	SECT.	JOB	HIGHWAY NO.	
1266	01	008	FM 956	

**I. STORMWATER POLLUTION PREVENTION**

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit is required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506. If applicable list MS4 operator that may receive discharges from this project. MS4 operator should be notified prior to construction activities.

Prevent stormwater pollution erosion and sedimentation in accordance with TPDES Permit TXR 150000.

Comply with the SW3P and revise when necessary to control pollution or as 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) increase disturbed soil area to 5 acres or more, submit Notice of Intent (NOI) to TCEQ and Engineer.

MS4 Operator(s):

No Additional Comments

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

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

No USACE Permit Required

Work is authorized by the USACE under a Nationwide Permit 14 without a Pre-Construction Notification (PCN). Project specific permit was not issued by USACE, therefore is not in the plan set.

Work is authorized by the USACE under a Nationwide Permit \_\_\_\_\_ with a Pre-Construction Notification (PCN). The project specific permit issued by the USACE is included in the plan set.

Work is authorized by the USACE under a Individual Permit (IP). The project specific permit issued by the USACE is included in the plan set.

Work would be authorized by the USACE. The project specific permit issued by the USACE or Nationwide Permit will be provided to the contractor.

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

No United States Coast Guard (USCG) Coordination Required

United States Coast Guard (USCG) Permit

United States Coast Guard (USCG) Exemption

Best Management Practices

Erosion	Sedimentation	Post Construction TSS
<input checked="" type="checkbox"/> Temporary Vegetation	<input checked="" type="checkbox"/> Silt Fence	<input checked="" type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Vegetation Lined Ditches	<input type="checkbox"/> Rock Filter Dam	<input type="checkbox"/> Vegetation Lined Ditches
<input type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Grassy Swales

No Additional Comments

**III. CULTURAL RESOURCES**

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

No Additional Comments

**IV. VEGETATION RESOURCES**

Preserve native vegetation to the extent practical. Refer to TxDOT Standard Specifications 162, 164, 192, 193, 506, 730, 751, and 752 in order to comply with requirements for invasive species, beneficial landscaping and tree/brush removal.

No Additional Comments

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

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

The work may not remove active nests (from bridges, structures, or vegetation adjacent to the roadway, etc.) during nesting season (February 15 to October 1). If removal of structures or vegetation is necessary during the nesting season, the Contractor shall conduct a bird survey no more than 3 days in advance of the clearing/demolish start date. All bird surveys shall be conducted by a Field Biologist and adhere to the guidance document "Avoiding Migratory Birds and Handling Potential Violations" found in the TxDOT Environmental Compliance Toolkits at the time of the survey. (See below for Field Biologist and Ornithologist qualifications)

No Additional Comments

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

**VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES**

Refer to TxDOT Standard Specifications in the event potentially contaminated materials are observed, such as dead or distressed vegetation, trash disposal areas, drums, canisters, barrels, leaching or seepage of substances, unusual smells or odors, or stained soil, cease work in the area and contact the Engineer immediately.

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)? Yes  No

Are results of the asbestos inspection positive (is asbestos present)? Yes  No

TxDOT is still required to notify DSHS 14 working days prior to any scheduled demolition.

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.


No Additional Comments

**VII. GENERAL NOTES**

The contractor's attention is directed to the fact that discharges of permanent or temporary fill material into the waters of the United States, including jurisdictional wetlands, as necessary for construction, will require specific approval of the USACE under Section 404 of the Clean Water Act.

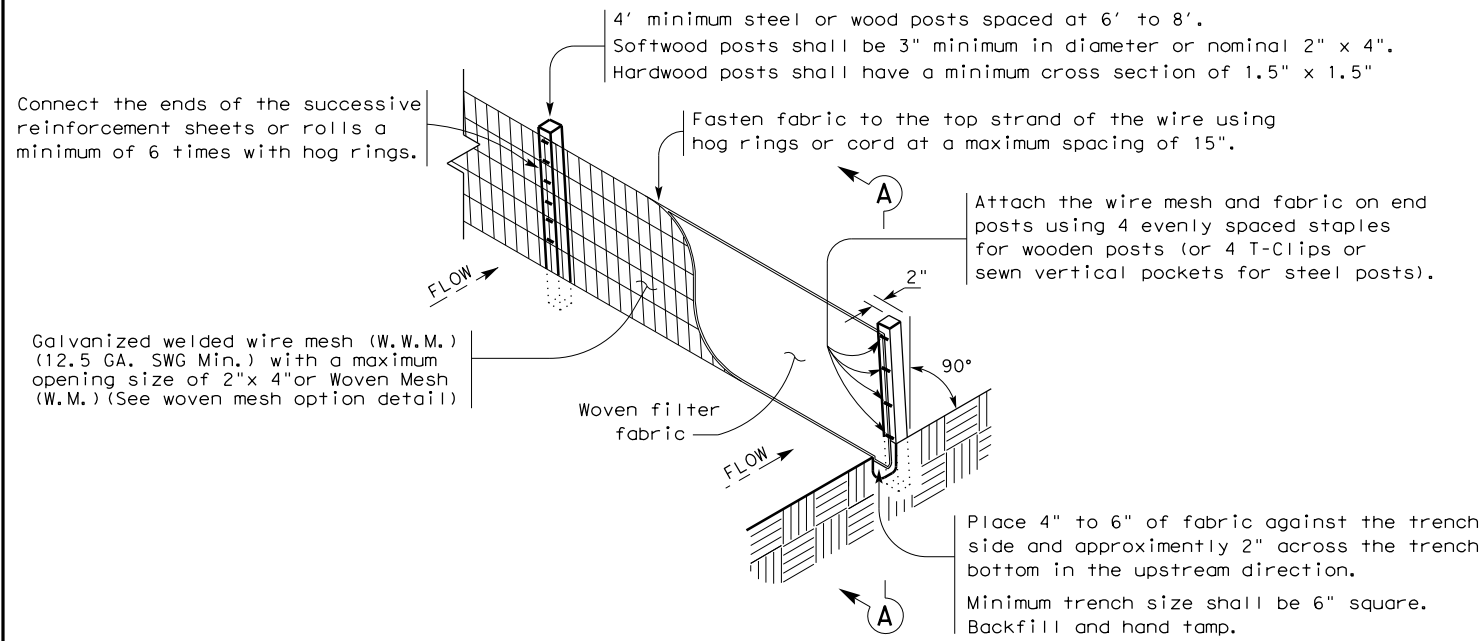
TxDOT will obtain the appropriate permit(s), Nationwide or Individual, when necessary as dictated by the proposed actions for the project and it's potential to affect USACE jurisdictional areas. The contractor may review the permitted plans at the office of the Area Engineer in charge of construction. TxDOT will hold the contractor responsible for following all conditions of the approved permit. If the contractor cannot work within the limits of the permit(s), then it becomes the contractor's entire responsibility to consult with the USACE pertaining to the need for changes or amendments to the conditions of the exiting permit(s) as originally obtained by the department.

Particular importance is stressed on the fact that any impacts to USACE jurisdictional waters of the United States, including jurisdictional wetlands, be the minimum necessary to complete the proposed work. The contractor shall maintain near normal flow of any jurisdictional waters of the United States at all times during construction. If the contractor needs further explanation of the conditions of the permit, including means of compliance, they may contact the Yoakum District Environmental Coordinator.

				TxDOT Yoakum District
<b>ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS</b>				
<b>EPIC</b>				
FM 956 AT WALKER BRANCH				
FILE: EPIC Sheet.dgn	DN:	CK:	DW:	CK:
© TxDOT: March 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS		1266	01	008
		COUNTY		SHEET NO.
		YKM		FAYETTE
				83

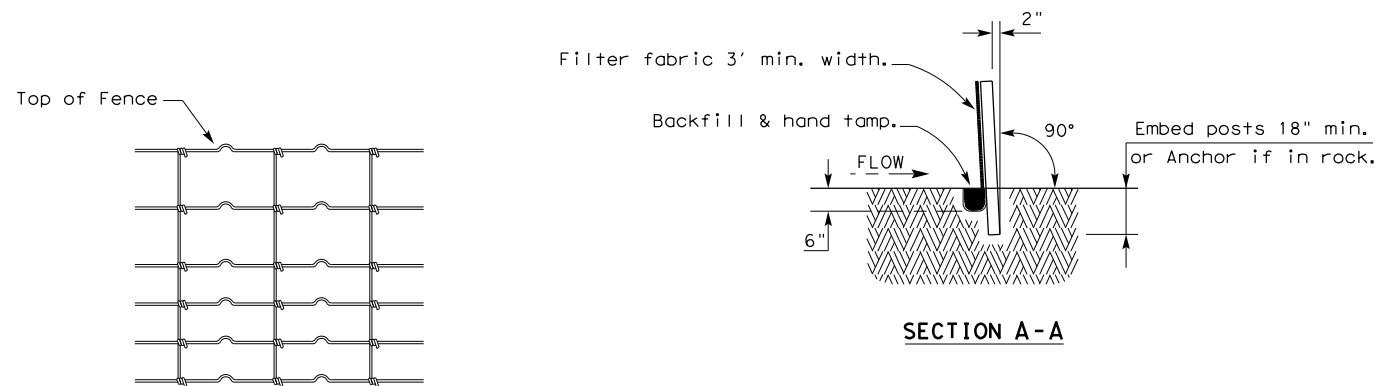
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**TEMPORARY SEDIMENT CONTROL FENCE**

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.

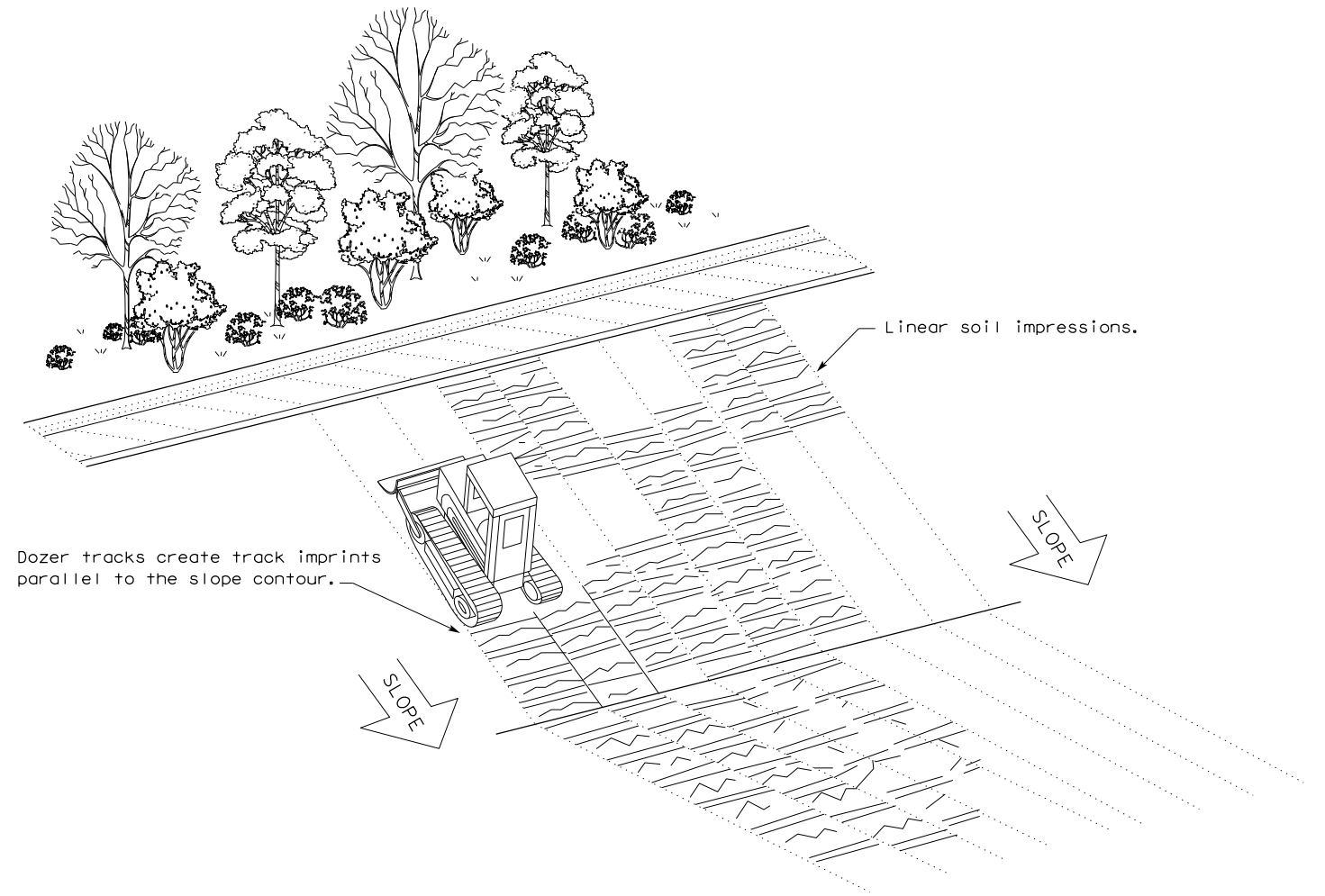
**LEGEND**

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.

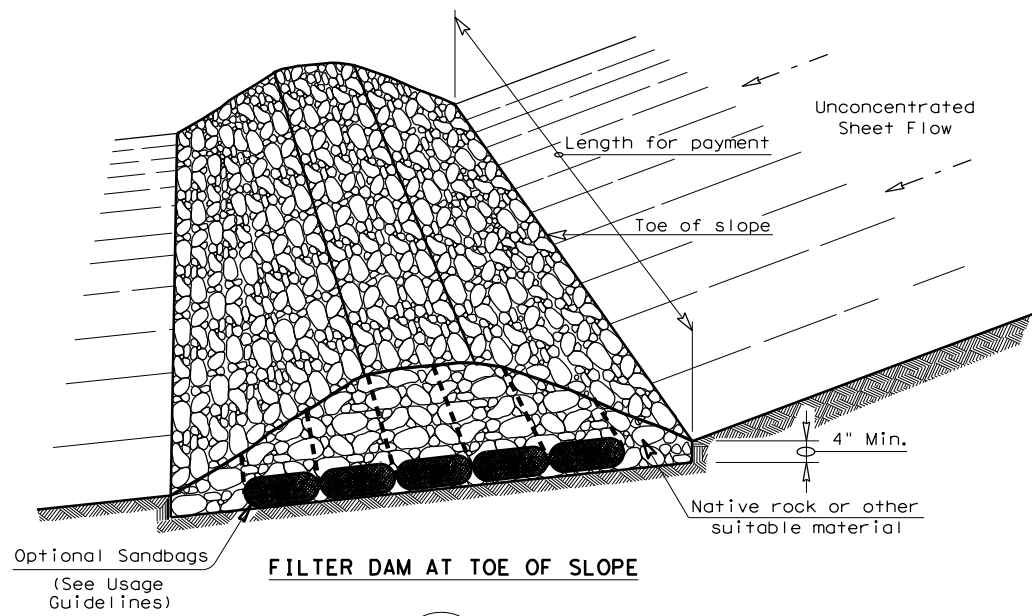


**VERTICAL TRACKING**

				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	1266	01	008	FM 956	
	DIST	COUNTY		SHEET NO.	
	YKM	FAYETTE		<b>84</b>	

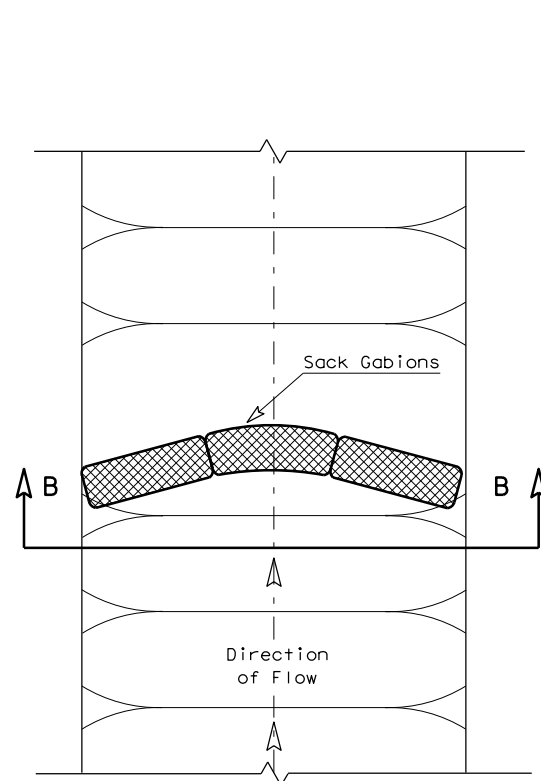
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DATE: 7/3/2024  
FILE: \$FILES

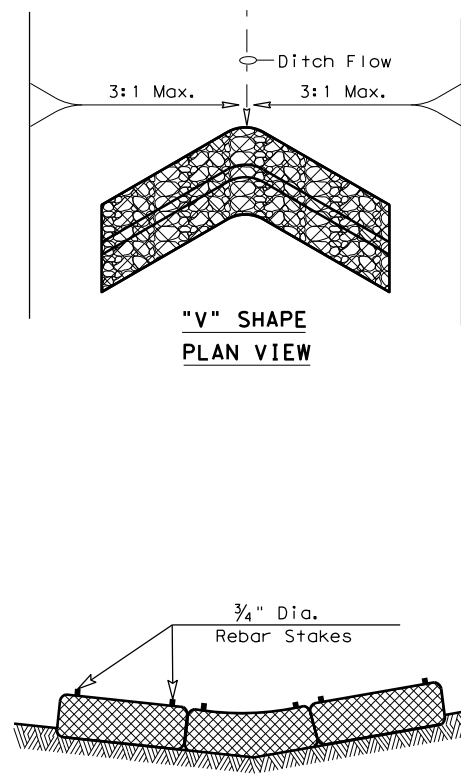


**FILTER DAM AT TOE OF SLOPE**

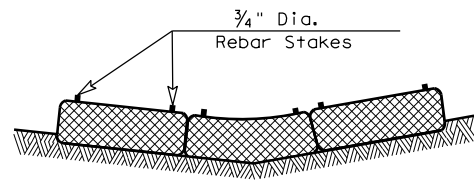
— (RFD1) —



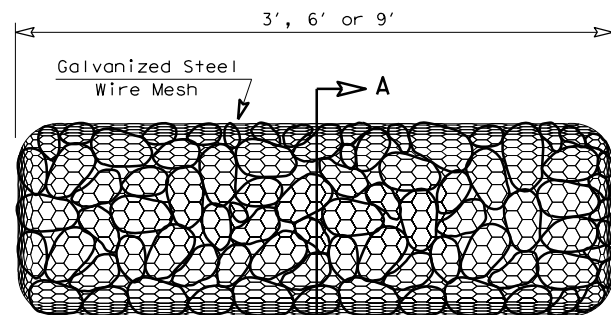
**PLAN VIEW**



**"V" SHAPE PLAN VIEW**

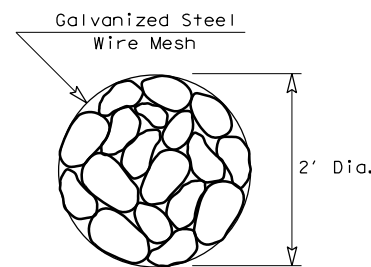


**SECTION B-B**

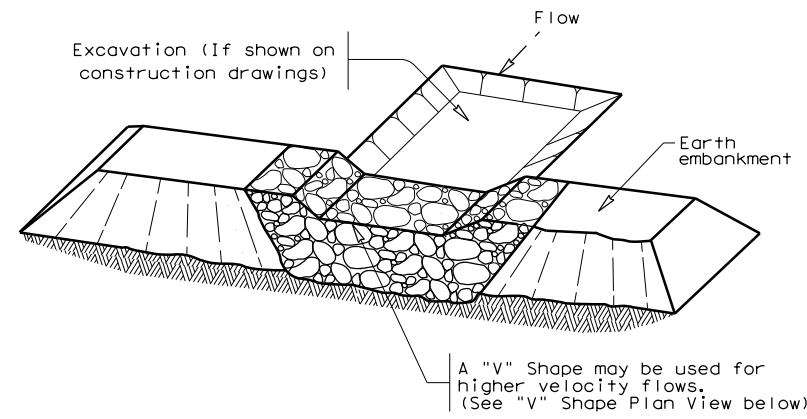


**TYPE 4 (SACK GABIONS)**

— (RFD4) —

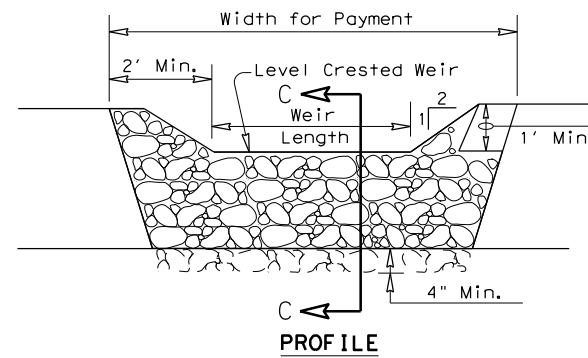


**SECTION A-A**

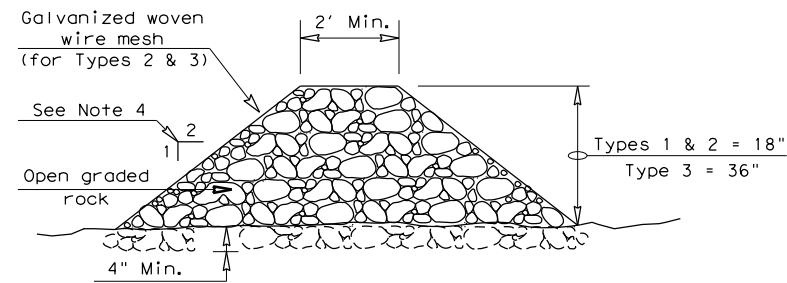


**FILTER DAM AT SEDIMENT TRAP**

— (RFD1) — OR — (RFD2) —



**PROFILE**



**SECTION C-C**

**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.

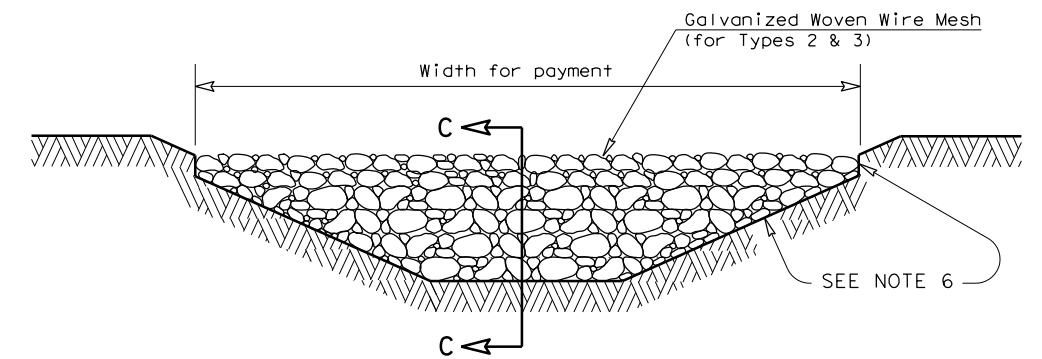
**Type 1 (18" high with no wire mesh) (3" to 6" aggregate):** Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high 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.



**FILTER DAM AT CHANNEL SECTIONS**

— (RFD1) — OR — (RFD2) — OR — (RFD3) —

**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 SECT	JOB	HIGHWAY
REVISIONS	1266 01	008	FM 956
	DIST	COUNTY	SHEET NO.
	YKM	FAYETTE	85