SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

MAIN LANE DESIGN SPEED = 60 MPH
ADT (2020) = 587
ADT (20 YR PROJECTED ADT) = 1150
FUNCTIONAL CLASSIFICATION: MINOR ARTERIAL

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	F 2023(922)		1
STATE	DIST.	COUNTY	
TEXAS	WFS.	THROCKMORTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0284	02	026	SH 79

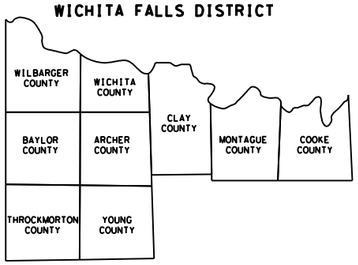
PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

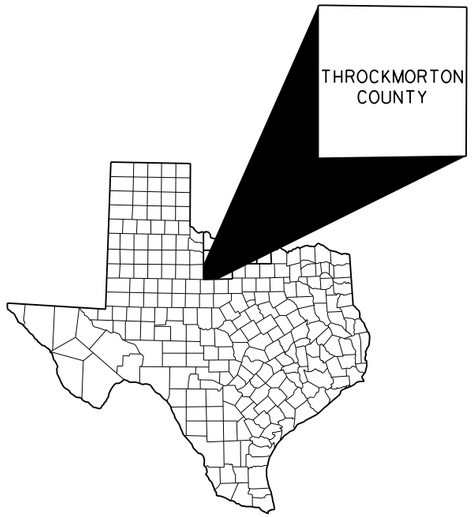
FEDERAL AID PROJECT NO. : F 2023(922)
CONTROL SECTION JOB : 0284-02-026

THROCKMORTON COUNTY
SH 79

CONTRACTOR NAME:_____
CONTRACTOR ADDRESS:_____
LETTING DATE:_____
DATE WORK BEGAN:_____
DATE WORK COMPLETED:_____
DATE OF ACCEPTANCE:_____

WICHITA FALLS DISTRICT

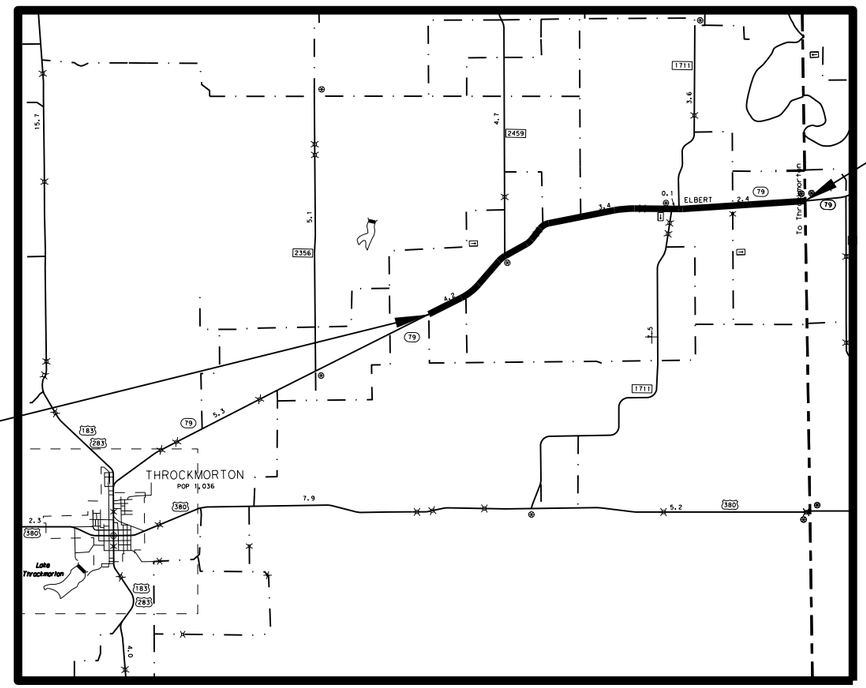




LIMITS: FROM: YOUNG COUNTY LINE
TO: MEXICAN SPRINGS RD.

LENGTH OF PROJECT =						
	BRIDGE	= 210.00	FT.	= 0.040	MI.
	ROADWAY	= 40,790.00	FT.	= 7.725	MI.
	TOTAL	= 41,000.00	FT.	= 7.765	MI.

TYPE OF WORK: FOR THE CONSTRUCTION OF REHABILITATION OF EXISTING ROAD
CONSISTING OF: PROVIDE ADDITIONAL PAVED SURFACE WIDTH



BEGIN PROJECT
CSJ: 0284-02-026
STA. 355+00.00
REF. MARKER 280+1.732

END PROJECT
CSJ: 0284-02-026
STA. 764+00.00
REF. MARKER 274+0.054

0 3.5 7
SCALE IN MILES

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

Texas Department of Transportation®
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SUBMITTED FOR LETTING 03/30/2023
Bryson Lawrence, P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING 03/30/2023
James S Reaves P.E.
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

RECOMMENDED FOR LETTING 03/30/2023
Richard D Brown P.E.
DISTRICT ENGINEER

COUNTY_____ PROJ. NO._____
HWY. NO._____ LETTING DATE_____
DATE ACCEPTED_____

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

FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/028402026/4 - Design/Plan Set/1. General/TITLESHEET.dgn
DATE: 3/29/2023

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STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A ## HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THE PROJECT.

Bryson Lawrence, P.E. 03/30/2023

NAME DATE

Texas Department of Transportation

SH 79

INDEX OF SHEETS

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
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WFS.	THROCKMORTON		2

CK:
DW:
CK:
DW:

DATE: 3/29/2023 3:43:56 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020264 - Design/Plan Set/1. General/SH 79 Index of Sheets

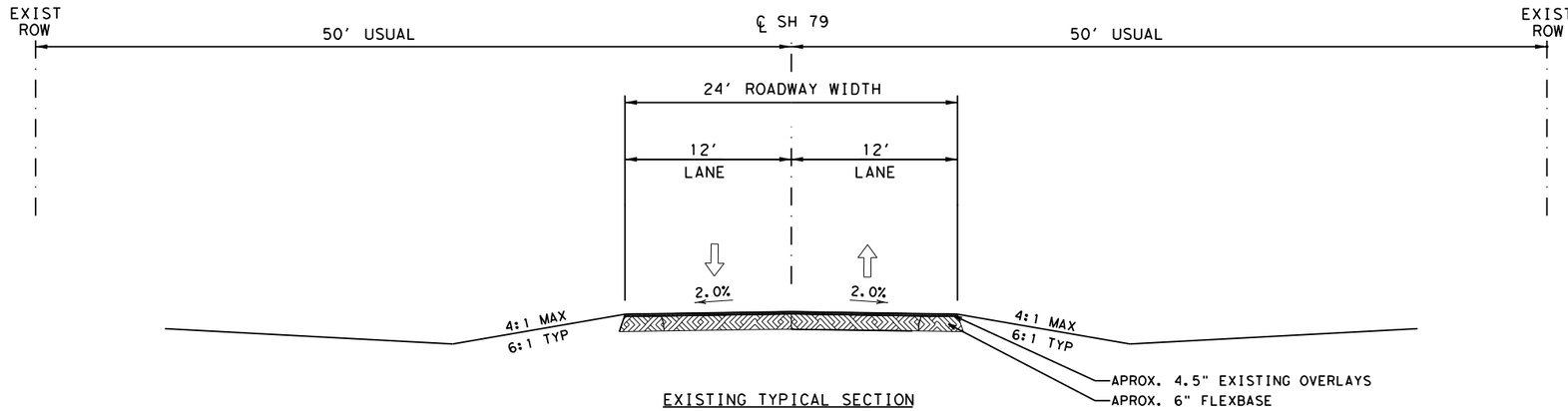
NOTES:

SEE VEGETATIVE ESTABLISHMENT DETAIL FOR SEEDING AND WATERING DETAILS.

① INSTALL CENTERLINE RUMBLE STRIPS.

② INSTALL EDGELINE RUMBLE STRIPS.

③ SEE MISCELLANEOUS DETAILS SHEET FOR LOCATIONS



EXISTING TYPICAL SECTION

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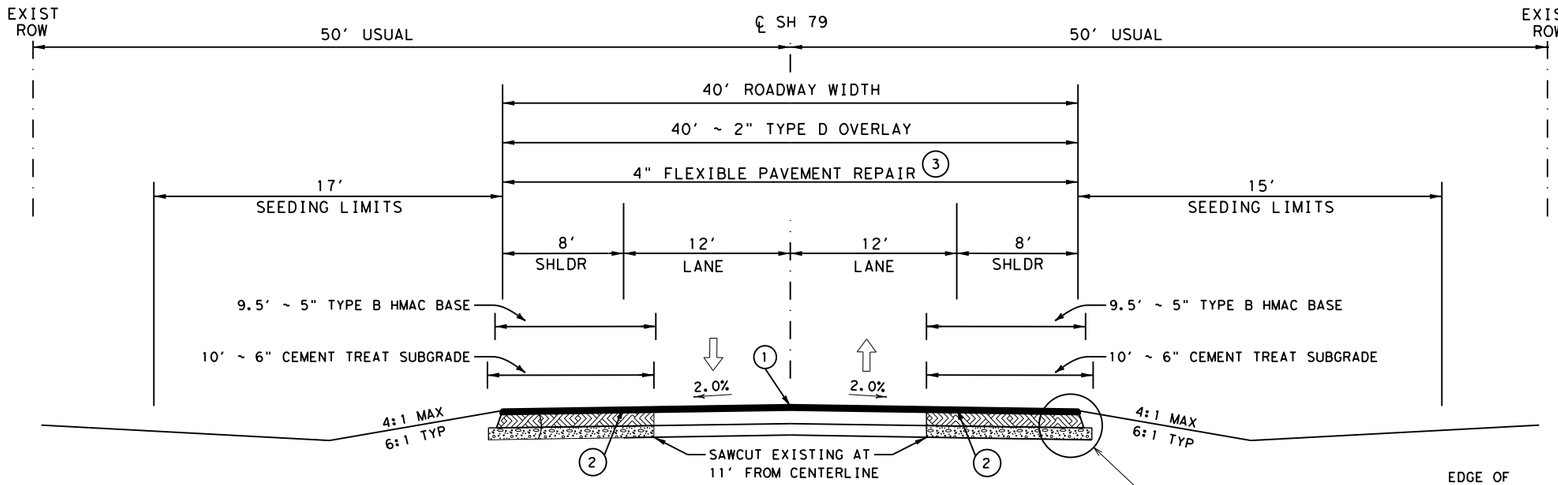
STA 499+80.72 TO STA 626+03.40
STA 636+00.00 TO STA 764+00.00



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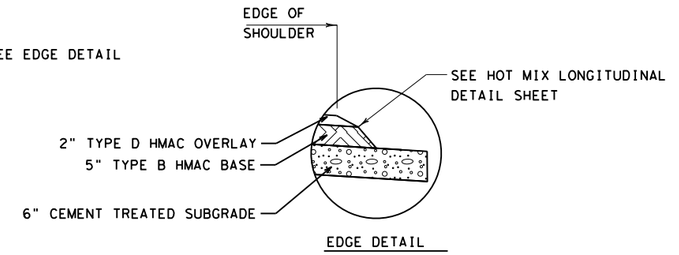


EDGE DETAIL

MATCH ALL EXISTING SUPERELEVATIONS UNLESS OTHERWISE NOTED.
SEE SUPERELEVATION DETAIL SHEET FOR MORE INFORMATION.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

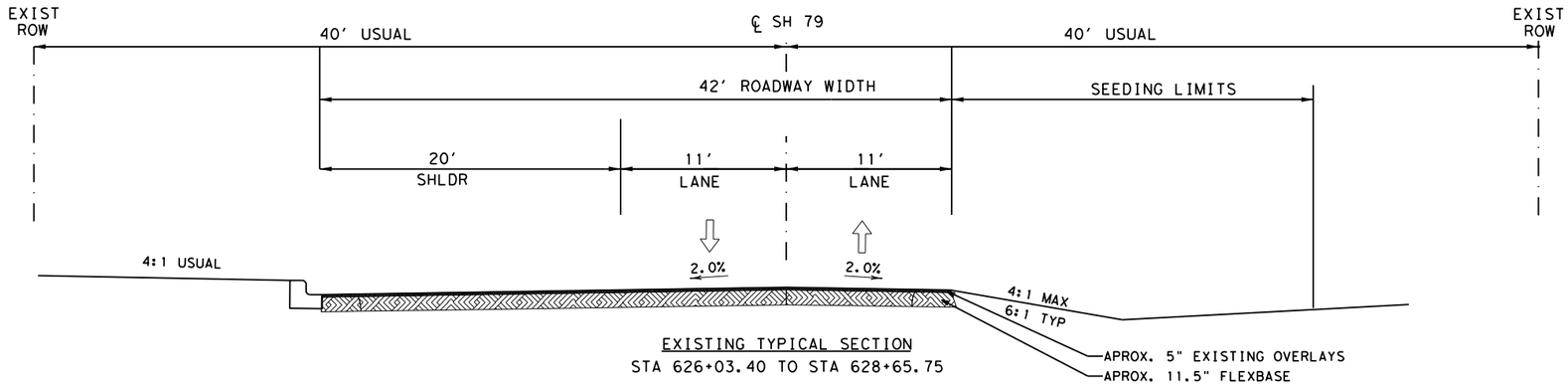
03/30/2023

SH 79 TYPICAL SECTION

SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		3

NOTES:
SEE VEGETATIVE ESTABLISHMENT DETAIL FOR SEEDING AND WATERING DETAILS.



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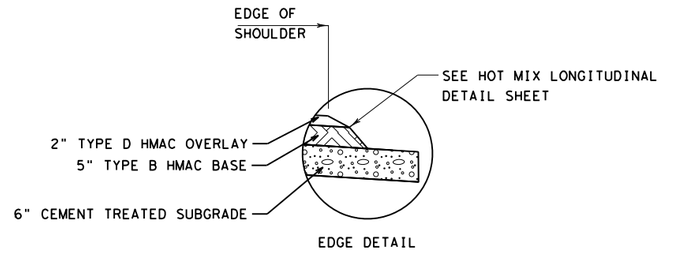
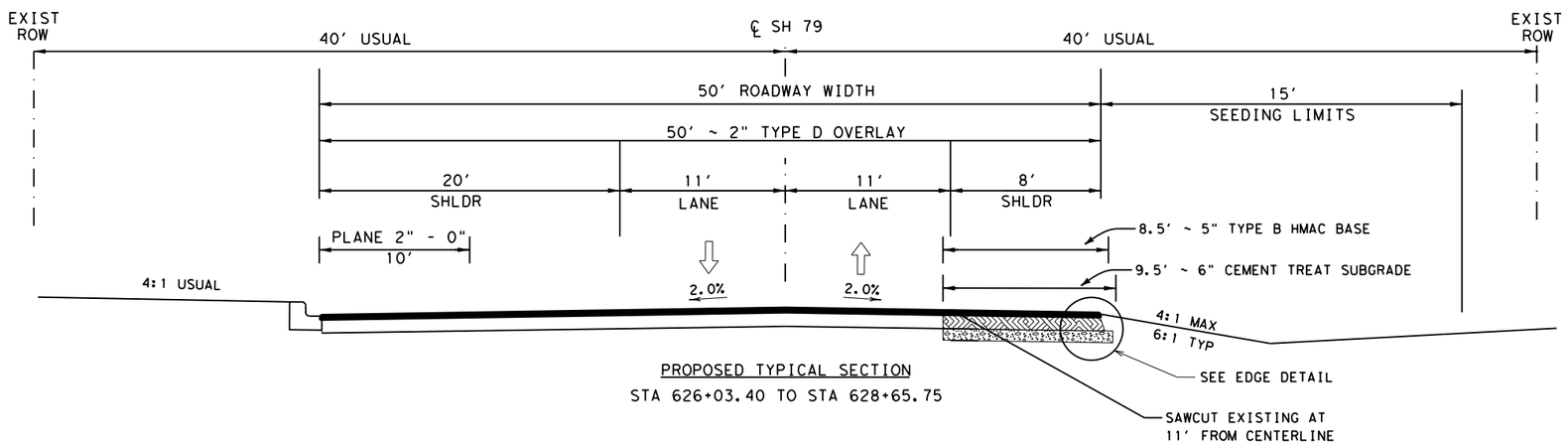


EDGE DETAIL



PROPOSED TYPICAL SECTION
STA 626+03.40 TO STA 628+65.75

MATCH ALL EXISTING SUPERELEVATIONS UNLESS OTHERWISE NOTED.
SEE SUPERELEVATION DETAIL SHEET FOR MORE INFORMATION.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

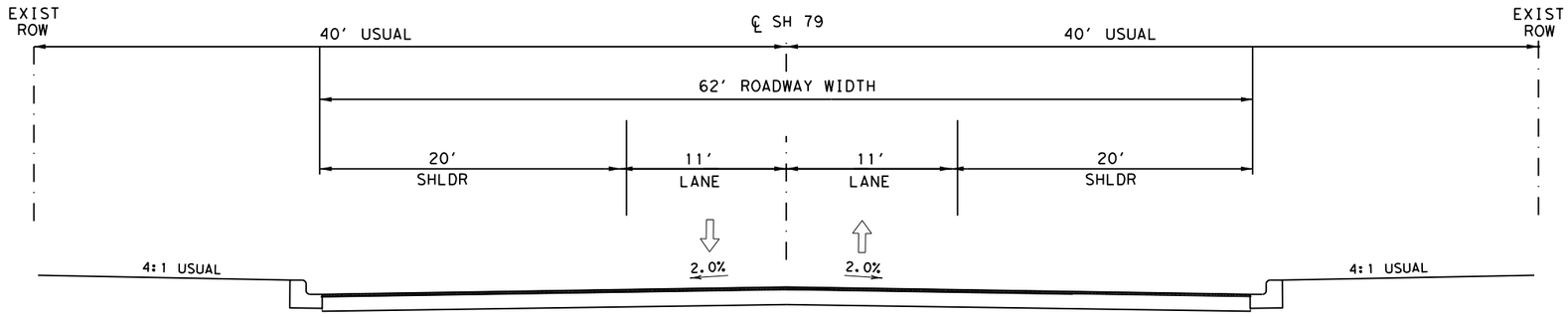
05/05/2023

SH 79 TYPICAL SECTION

SHEET 2 OF 4

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		4

NOTES:
SEE VEGETATIVE ESTABLISHMENT DETAIL FOR SEEDING AND WATERING DETAILS.



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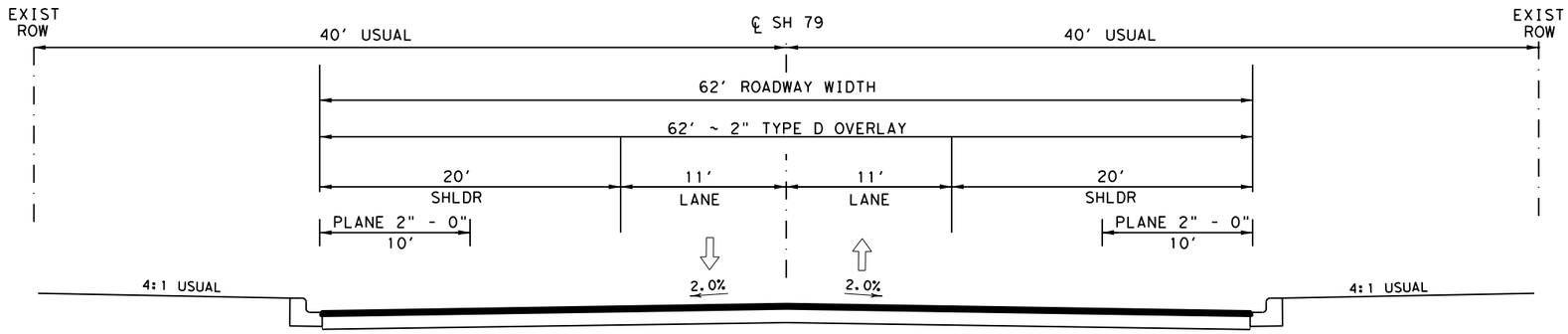

PROPOSED TYPICAL SECTION

STA 628+65.75 TO STA 636+00.00

MATCH ALL EXISTING SUPERELEVATIONS UNLESS OTHERWISE NOTED.
SEE SUPERELEVATION DETAIL SHEET FOR MORE INFORMATION.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

05/05/2023

SH 79 TYPICAL SECTION

SHEET 3 OF 4

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		5

NOTES:

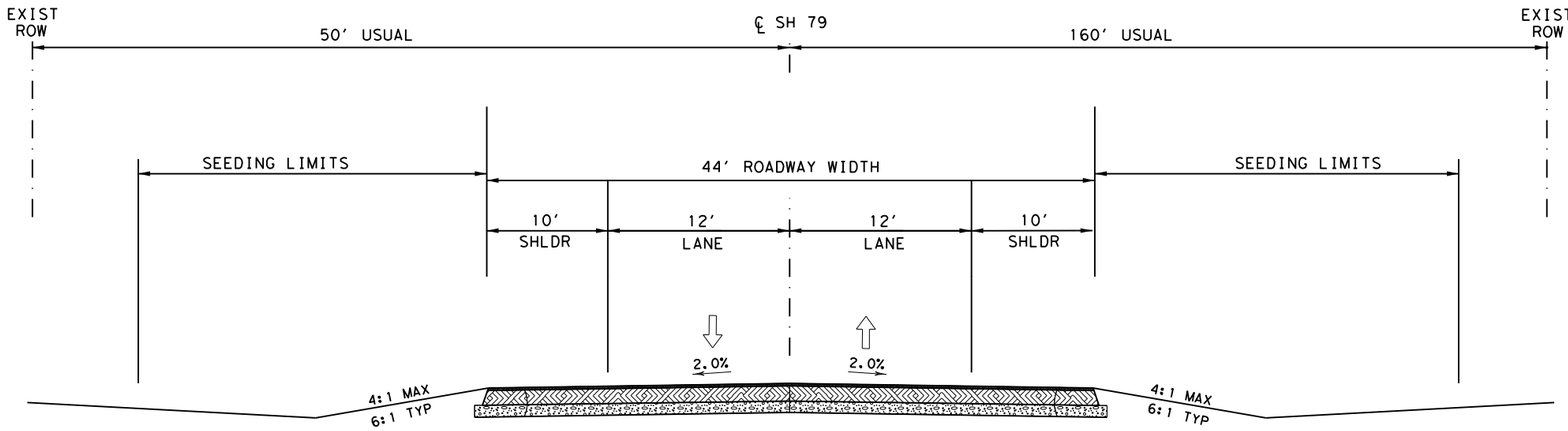
SEE VEGETATIVE ESTABLISHMENT DETAIL FOR BACKFILL OPERATIONS, SEEDING AND WATERING DETAILS.

(1) INSTALL CENTERLINE RUMBLE STRIPS.

(2) INSTALL EDGELINE RUMBLE STRIPS.

(3) NO WORK TO BE PERFORMED FROM STA. 490+55.00 TO STA 493+05.00.

(4) SEE MISCELLANEOUS DETAILS SHEET FOR LOCATIONS



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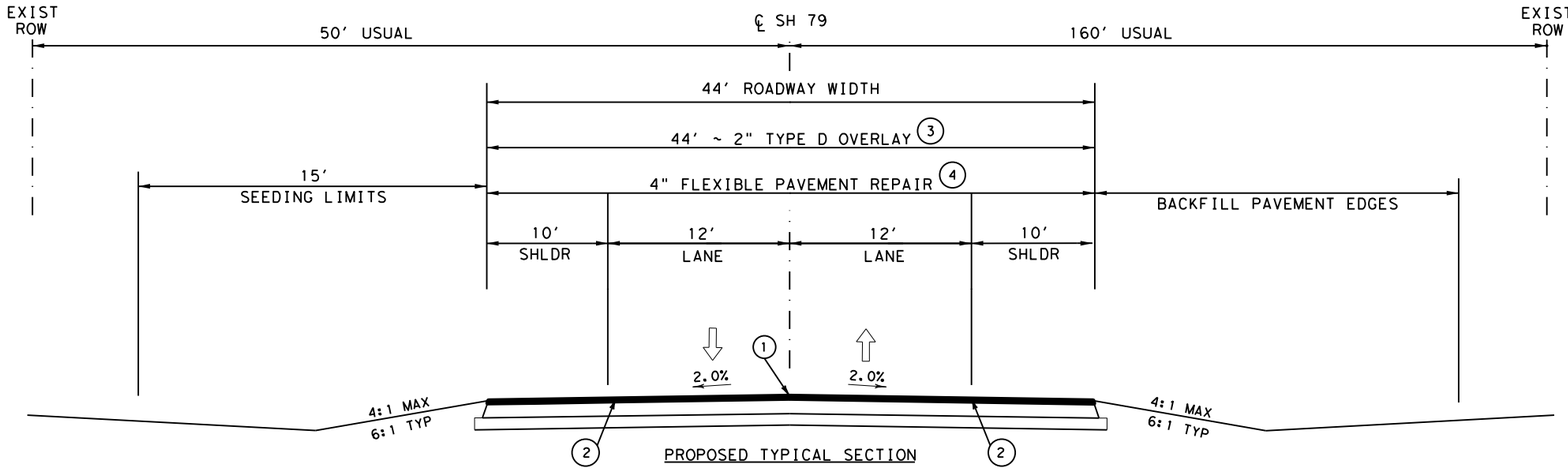
STA 493+05.00 TO STA 499+80.72



PROPOSED TYPICAL SECTION

STA 483+53.00 TO STA 490+55.00
STA 493+05.00 TO STA 499+80.72

MATCH ALL EXISTING SUPERELEVATIONS UNLESS OTHERWISE NOTED.
SEE SUPERELEVATION DETAIL SHEET FOR MORE INFORMATION.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

SH 79
TYPICAL SECTION

SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		6

GENERAL NOTES

Basis of Estimate:

Item - Description	Rate*	Unit
168 - Vegetative Watering	1.4 GAL/SY per Application every 2 weeks for 3 months	MG
275 - Cement (6”)	4% by weight Est @ 120 LB /CU FT	TON
310 – Prime Coat (MC-30)	0.25 GAL/SY	GAL
314 – Emulsified Asphalt Treatment (Erosion Control) (MS-2 or SS-1)	0.20 GAL/SY	GAL
3076 – Dense Graded Hot Mix Asphalt	110 LB / SY / Inch	TON
3084 – Bonding Course	0.06 GAL/SY (Residual)	GAL

For contractor’s information only, actual production rates may vary.

General Requirements

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

Zachary Husen, P.E.: Zachary.Husen@txdot.gov
Anthony Boucher, P.E.: Anthony.Boucher@txdot.gov

Questions may also be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

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

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

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

Bid Item Specific General Notes

Item 4 - Scope of Work

For the preconstruction conference submit a work schedule; temporary water pollution control plan; material sources; the person responsible for the SW3P; written utility coordination plan; certification statements; request for proposed subcontractors and letters designating the project superintendent, safety officer, and payroll officer.

Item 5 - Control of the Work
Provide the Engineer a minimum 24 hours’ notice for work requiring inspection or testing.

Item 6 - Control of Materials
To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

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

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

Item 7 - Legal Relations and Responsibilities

- No significant traffic generator events identified for this project.

Use an all-weather material in conjunction with item 7.2.4. This work will not be paid for directly, but will be subsidiary to item 132.

Item 8 - Prosecution and Progress
For this project, contract time will be computed as described in Item 8 based on a Standard Workweek (8.3.1.4.)

Item Specific

Item 132 - Embankment
All borrow/aggregate sites shall meet the requirements of the Texas Aggregate Quarry and Pit Safety Act which can be found at www.txdot.gov/inside-txdot/division/maintenance/quarry.html
This material shall consist of suitable earth material such as loam, clay or other materials that will form a stable embankment and be free from vegetation or other objectionable matter. Any embankment needed from a borrow pit must first be approved by the Engineer.

Windrow approximately 4” of existing grass and topsoil adjacent to the right of way line or vegetative buffer zone prior to beginning earthwork operations. Upon completion of earthwork operations scarify the slopes and ditches longitudinally to a depth of approximately 4 inches and return the windrowed material to the slopes and the ditches as a permanent erosion control measure. This work will not be paid for directly but is considered subsidiary to item 132.

Item 134 – Backfilling Pavement Edges
For Type A Backfill, Use easily cultivated fertile backfill that is free from objectionable material and resists erosion. Ensure that the soil obtained from sites outside the right of way has a pH of 5.5 to 8.5, per Tex-128-E and a PI <=15, per Tex-106-E. Soil is subject to testing by the Engineer.

Backfill pavement edges in accordance with “Hot Mix Longitudinal Joint Detail” sheet.

RAP generated from this project may be used as backfill material.

Thickness of backfill material varies and contractor shall bid accordingly.

Complete backfilling operations within 14 days after the surface course is completed. Failure to complete backfilling during this time will result in the withholding of payment for all hot mix placed until all backfilling has been completed.

Item 164 - Seeding for Erosion Control
Temporary seeding will be required in several small areas as work progresses to comply with the storm water pollution prevention plan and may require multiple mobilizations of seeding crew. The Engineer may blend temporary and permanent seeding according to the temperatures and time of year in order to achieve maximum coverage in the least amount of time.

The contractor is responsible for the protection and maintenance of all seeded areas until final acceptance of the project. Maintenance includes:

1. Protection of seeded and mulched areas against traffic.

2. Fully mowing the project twice (2) for a rehab/widening job or once (1) for an overlay. This work will not be paid for directly.

Item 168 - Vegetative Watering
Water as directed by the Engineer all areas that receive seed to sustain grass growth to obtain a minimum 70% vegetative cover within the right of way. This may require the contractor to water the newly established grass for a period of up to three months after all other work on the contract is completed and before the project is accepted. Watering shall be done at times determined by the Engineer in order to minimize any loss due to evaporation.

Item 275 – Cement Treatment (Road Mixed)
Cement percentage in the Basis of Estimate are for estimating purposes only.

Item 354 – Planing and Texturing Pavement
Refer to the Hot Mix Longitudinal Joint Detail for all edge treatments. This work will be considered subsidiary to item 354.

Construct butt joints at all locations where planning, inlay, and overlay operations begin and end.

Contractor to verify manhole locations, if applicable, before milling operations begin.
Material is to be used as backfill pavement edges any remaining material will become property of TXDOT and be stockpiled at the following location:

On the South Side of SH 79 1.6 mi. NE of US 283; .1 mi. East of North Elm Creek Bridge (33°12'17.58"N, 99° 9'15.39"W)

Item 467 - Safety End Treatment
For all Type II SETs, provide riprap aprons as shown on the plans.

Item 502 - Barricades, Signs, and Traffic Handling
The Traffic Control Plan (TCP) for this project includes the plans, the Texas Manual on Traffic Control Devices, Barricade and Construction Standard Sheets, Standard TCP Sheets, and as otherwise required by the Engineer.

The Contractor's person responsible for TCP compliance is available by local telephone 24 hours a day and must respond to traffic control needs within 45 minutes of being notified.

Work will not be permitted without adequate traffic control devices in place. Work will only be permitted on one side of the roadway at any time.

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.

Work vehicles within 30 feet of the traveled way shall have strobe lights or rotating beacons in use.

Wear appropriate personal protective equipment at all times while outside of vehicles and equipment on the project.

Provide adequate flagging on side roads to ensure that traffic flow is not compromised during one way traffic control operations.

Repair barricades within 48 hours after barricade report has been delivered to the Contractor. Failure to comply will cease all work until barricades are repaired to the satisfaction of the Department. Replace all damaged traffic control devices immediately. Remove any damaged traffic control devices from the project within 24 hours.

Failure to make necessary corrections to Traffic Control items based on barricade inspections will be cause for withholding the monthly estimate until such corrections are made.

Remove from the roadway and store in a central location approved by the Engineer all temporary traffic control devices, such as cones, barrels, portable signs, vertical panels, etc., which will not be used within 24 hours. This includes removal of temporary traffic control devices from the roadway over the weekend.

Refer to the “Treatment for Various Edge Conditions” for the proper traffic control devices to be used for the various edge conditions.

The use of Portable Traffic Signals are not required, but may be used as an option to the contractor.

Place portable CW 21-2 "FRESH OIL" signs prior to the placing of asphalt onto roadway and remove signs when they are no longer needed.

Cover or remove portable CW 8-12 "NO CENTER STRIPE" signs immediately upon completion of striping of the roadway.

A pilot car is required for this project. Provide a “Queue time” of no longer than 10 (ten) minutes during roadway work operations. When traffic backs up behind the placement of striping and/or raised pavement markers, cease operations and pull over to alleviate vehicle queues every 1 mile or every 10 minutes whichever comes first.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls
Anticipate multiple mobilizations for SWP3 work.

Verify locations and dimensions of BMP’s and obtain the Engineer’s approval prior to placement. BMP locations indicated on the plans are approximate and may be adjusted as necessary by the Engineer.

The disturbed area for this project, as shown on the plans, is 16.66 acres. The total disturbed area (TDA) will establish the required authorization for storm water discharges. The TDA of the project will be determined as described by the Environmental Permits Issues and Commitments (EPIC) sheet.

Contractor shall meet the requirements for the Project SW3P binder as described on the SW3P sheet.

The Contractor shall collect and dispose of all waste material as required by the Storm Water Pollution Prevention Plan (SW3P).

If sediment escapes the construction site, immediately stop all work on the project, remove the sediment, and modify the SW3P site plan to prevent future non-compliance issues.

The Contractor shall install concrete truck washouts as shown on the WFS-TA-BMP plan sheet. This work including materials and labor will not be measured or paid for directly but will be subsidiary to Item 506.

Item 530 - Intersections, Driveways, and Turnouts
Removal of existing asphalt or concrete driveways will not be paid for directly but will be considered subsidiary to this pay item.

Coordinate the replacement of driveways with the property owners prior to performing work. Driveway locations and widths will be verified by the Engineer before placement.

Saw cut existing concrete and asphaltic concrete drives to create a smooth joint with the proposed driveway or street.

When intersections of roadways are encountered extend final 2” overlay to the ROW line regardless of existing pavement structure.

Item 542 – Removing Metal Beam Guard Fence
Salvage and stockpile the existing metal rail in a neat and orderly manner at the Throckmorton maintenance facility. Dispose of all posts deemed not salvageable.

Item 644 – Small Roadside Sign Assemblies
The Throckmorton Maintenance office will provide the SA bases for the new signs on this project. Contact the Throckmorton Maintenance Office prior to placing signs to allow ample time to order required bases.

Contractor is responsible for verifying sign locations prior to final placement. Stake sign support locations for verification by the engineer and obtain approval from the engineer prior to placement of sign supports.

Item 666 - Reflectorized Pavement Markings
Contractor is responsible for verifying passing/no-passing zones for final stripe. Poly-dot the locations of the proposed reflectorized pavement markings and obtain approval from the Engineer prior to placement.

Use Type II beads on all striping.

Remove temporary tabs from all roads prior to striping. Removal of tabs will be subsidiary to pertinent items.

The lead vehicle and trail vehicle will be required for all striping operations as shown on TCP (3-1)-13.

Item 672 - Raised Pavement Markers
Raised pavement marker adhesive will meet the requirements of Departmental Materials Specifications DMS-6130, “Bituminous Adhesive for Pavement Markers”.

The lead vehicle and trail vehicle(s) will be required for all marker installation operations as shown on TCP(3-3)-14.

Item 3076 – Dense-Graded Hot-Mix Asphalt
Provide mixture Type B using PG binder 64-22 for widening and provide mixture Type D using PG binder 70-28 for overlay work. No Substitute PG Binder will be allowed on this project.

Type B widening base shall be installed in two lifts.

Design the surface mixture using the Superpave gyratory compactor with a minimum asphalt content of 5.4% and with a target lab mold density of 96.0%.

Hamburg Wheel Test requirements for this project will be a minimum of 5K passes @ 12.5 mm rut depth for PG 64-22 and 10K passes @ 12.5 mm rut depth for PG 70-28

The use of Recycled Asphalt Shingles (RAS) or Recycled Asphalt Pavement (RAP) will not be permitted in the surface mix for this project.

Level up and Pavement Repair is to be performed prior to widening.

Item 3084 – Bonding Course
Spray paver will not be used unless otherwise authorized by the Engineer. Additional quantity has been added for treatment of vertical surface of saw cuts.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0284-02-026 **DISTRICT** Wichita Falls **COUNTY** Throckmorton
HIGHWAY SH 79

			CONTROL SECTION JOB		**0284-02-026**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00124535**		
			COUNTY		**Throckmorton**		
			HIGHWAY		**SH 79**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	629.000		629.000	
	110-6001	EXCAVATION (ROADWAY)	CY	4,866.000		4,866.000	
	110-6002	EXCAVATION (CHANNEL)	CY	10.000		10.000	
	132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	10,596.000		10,596.000	
	134-6001	BACKFILL (TY A)	STA	17.000		17.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)	SY	64,013.000		64,013.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)	SY	64,013.000		64,013.000	
	164-6033	DRILL SEEDING (PERM) (RURAL) (SANDY)	SY	128,025.000		128,025.000	
	168-6001	VEGETATIVE WATERING	MG	1,088.000		1,088.000	
	275-6001	CEMENT	TON	929.000		929.000	
	275-6019	CEMENT TREAT (SUBGRADE)(6")	SY	85,344.000		85,344.000	
	310-6009	PRIME COAT (MC-30)	GAL	21,344.000		21,344.000	
	314-6010	EMULS ASPH (EROSN CONT)(SS-1)	GAL	9,100.000		9,100.000	
	351-6013	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	SY	1,925.000		1,925.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	4,881.000		4,881.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	3.100		3.100	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	56.000		56.000	
	460-6002	CMP (GAL STL 18 IN)	LF	55.000		55.000	
	460-6003	CMP (GAL STL 24 IN)	LF	167.000		167.000	
	460-6004	CMP (GAL STL 30 IN)	LF	34.000		34.000	
	460-6005	CMP (GAL STL 36 IN)	LF	52.000		52.000	
	467-6270	SET (TY I)(S= 8 FT)(HW= 4 FT)(4:1) (C)	EA	1.000		1.000	
	467-6348	SET (TY II) (18 IN) (CMP) (6: 1) (P)	EA	2.000		2.000	
	467-6379	SET (TY II) (24 IN) (CMP) (6: 1) (C)	EA	1.000		1.000	
	467-6380	SET (TY II) (24 IN) (CMP) (6: 1) (P)	EA	12.000		12.000	
	467-6410	SET (TY II) (30 IN) (CMP) (6: 1) (P)	EA	2.000		2.000	
	467-6444	SET (TY II) (36 IN) (CMP) (6: 1) (P)	EA	2.000		2.000	
	480-6001	CLEAN EXIST CULVERTS	EA	12.000		12.000	
	496-6004	REMOV STR (SET)	EA	2.000		2.000	
	496-6005	REMOV STR (WINGWALL)	EA	1.000		1.000	
	496-6007	REMOV STR (PIPE)	LF	308.000		308.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	14.000		14.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	170.000		170.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	170.000		170.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	2,220.000		2,220.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	2,220.000		2,220.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0284-02-026 **DISTRICT** Wichita Falls **COUNTY** Throckmorton
HIGHWAY SH 79

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0284-02-026**			
		PROJECT ID		**A00124535**			
		COUNTY		**Throckmorton**			
		HIGHWAY		**SH 79**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	7,410.000		7,410.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	7,410.000		7,410.000	
	530-6002	INTERSECTIONS (ACP)	SY	783.000		783.000	
	530-6005	DRIVEWAYS (ACP)	SY	585.000		585.000	
	530-6016	DRIVEWAYS (BASE)	SY	4,582.000		4,582.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	74,828.000		74,828.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	37,414.000		37,414.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	550.000		550.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	540-6033	MTL BM GD FEN (LONG SPAN SYSTEM)	EA	2.000		2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	350.000		350.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	4.000		4.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	8.000		8.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	560-6004	MAILBOX INSTALL-S (TWG-POST) TY 2	EA	5.000		5.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	2.000		2.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	5.000		5.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	8.000		8.000	
	644-6030	IN SM RD SN SUP&AM TYS80(1)SA(T)	EA	11.000		11.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA	2.000		2.000	
	644-6042	IN SM RD SN SUP&AM TYS80(1)SB(T)	EA	3.000		3.000	
	644-6044	IN SM RD SN SUP&AM TYS80(1)SB(U)	EA	2.000		2.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	38.000		38.000	
	644-6061	IN SM RD SN SUP&AM TYTWT(1)WS(T)	EA	5.000		5.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	71.000		71.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	15.000		15.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)	EA	19.000		19.000	
	662-6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	3,117.000		3,117.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	82,000.000		82,000.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	8,335.000		8,335.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	22,528.000		22,528.000	
	668-6074	PREFAB PAV MRK TY C (W) (12") (SLD)	LF	60.000		60.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	712.000		712.000	
	752-6004	TREE TRIMMING / BRUSH REMOVAL(CHANNELS)	AC	0.250		0.250	
	3076-6001	D-GR HMA TY-B PG64-22	TON	22,377.000		22,377.000	
	3076-6046	D-GR HMA TY-D SAC-B PG70-28	TON	20,210.000		20,210.000	
	3076-6047	D-GR HMA TY-D PG70-28 (LEVEL-UP)	TON	2,124.000		2,124.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0284-02-026 **DISTRICT** Wichita Falls **COUNTY** Throckmorton
HIGHWAY SH 79

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0284-02-026**			
		PROJECT ID		**A00124535**			
		COUNTY		**Throckmorton**			
		HIGHWAY		**SH 79**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	3084-6001	BONDING COURSE	GAL	22,457.000		22,457.000	
	6185-6002	TMA (STATIONARY)	DAY	400.000		400.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	20.000		20.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

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SUMMARY OF ROADWAY ITEMS

LOCATION		104 6054	110 6001	132 6004	134 6001	275 6001	275 6019	310 6009	351 6013	354 6021	432 6045	533 6001	533 6002	540 6001	540 6006	540 6033	542 6001	542 6004	544 6001	544 6003	560 6004	658 6062	658 6081	752 6004	3076 6001
	PLAN LAYOUT SHEET NUMBER	REMOVING CONCRETE (MOW STRIP)	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY B)	BACKFILL (TY A)	CEMENT	CEMENT TREAT (SUBGRADE) (6")	PRIME COAT (MC-30)	FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")	PLANE ASPH CONC PAV(0" TO 2")	RIPRAP (MOW STRIP)(4 IN)	RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	MTL BM GD FEN (LONG SPAN SYSTEM)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	MAILBOX INSTALL-S (TWG-POST) TY 2	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND (BI)	TREE TRIMMING / BRUSH REMOVAL(CHANNELS)	D-GR HMA TY-B PG64-22
		LF	CY	CY	STA	TON	SY	GAL	SY	SY	CY	LF	LF	LF	EA	EA	LF	EA	EA	EA	EA	EA	EA	AC	TON
355+00 to 377+00	1		143	658		53	4889	1223		444		4600	2300												1278
377+00 to 401+00	2		289	484		58	5334	1334				4800	2400											0.04	1394
401+00 to 425+00	3		305	1158		58	5334	1334				4800	2400												1394
425+00 to 449+00	4		214	1413		58	5334	1334				4800	2400											0.02	1394
449+00 to 473+00	5		197	1186		58	5334	1334	244			4800	2400											0.02	1394
473+00 to 497+00	6	629	212	1158	14	26	2340	585	1045	1956	32	4800	2400	350	4		350	4	4	4		9	8	0.02	624
497+00 to 521+00	7		318	718	3	51	4710	1178	636			4800	2400										8		1245
521+00 to 545+00	8		303	348		58	5334	1334				4800	2400										3		1394
545+00 to 569+00	9		246	316		58	5334	1334				4800	2400												1394
569+00 to 593+00	10		510	180		58	5334	1334				4800	2400												1394
593+00 to 617+00	11		268	340		58	5334	1334			24	4616	2308	200		2			4		3	6		0.12	1394
617+00 to 641+00	12		449	325		37	3396	849		2037															933
641+00 to 665+00	13		308	412		58	5334	1334				2612	1306								1				1394
665+00 to 689+00	14		259	473		58	5334	1334				4800	2400												1394
689+00 to 713+00	15		343	386		58	5334	1334				4800	2400												1394
713+00 to 737+00	16		268	548		58	5334	1334				4800	2400								1			0.03	1394
737+00 to 761+00	17		208	461		58	5334	1334				4800	2400												1394
761+00 to 764+00	18		26	32		8	667	167		444		600	300												175
PROJECT TOTALS		629	4866	10596	17	929	85344	21344	1925	4881	56	74828	37414	550	4	2	350	4	8	4	5	15	19	0.25	22377

SUMMARY OF ROADWAY ITEMS

LOCATION		3076 6046	3076 6047	3084 6001	6185 6002
	PLAN LAYOUT SHEET NUMBER	D-GR HMA TY-D SAC-B PG70-28	D-GR HMA TY-D PG70-28 (LEVEL-UP)	BONDING COURSE	TMA (STATIONARY)
		TON	TON	GAL	DAY
355+00 to 377+00	1	1076		1145	22
377+00 to 401+00	2	1174	19	1301	22
401+00 to 425+00	3	1174	479	1597	22
425+00 to 449+00	4	1174	348	1523	22
449+00 to 473+00	5	1174	173	1414	23
473+00 to 497+00	6	1111	616	1333	26
497+00 to 521+00	7	1192	489	1604	22
521+00 to 545+00	8	1174		1248	22
545+00 to 569+00	9	1174		1248	22
569+00 to 593+00	10	1174		1248	22
593+00 to 617+00	11	1174		1248	23
617+00 to 641+00	12	1422		1152	24
641+00 to 665+00	13	1174		1248	24
665+00 to 689+00	14	1174		1248	20
689+00 to 713+00	15	1174		1248	22
713+00 to 737+00	16	1174		1248	20
737+00 to 761+00	17	1174		1248	20
761+00 to 764+00	18	147		156	22
PROJECT TOTALS		20210	2124	22457	400

SUMMARY OF DRAINAGE ITEMS

LOCATION	110 6002	432 6002	467 6270	467 6379	480 6001	496 6005
	EXCAVATION (CHANNEL)	RIPRAP (CONC)(5 IN)	SET (TY I)(S=8 FT)(HW=4 FT)(4:1) (C)	SET (TY II) (24 IN) (CMP) (6: 1) (C)	CLEAN EXIST CULVERTS	REMOV STR (WINGWALL)
	CY	CY	EA	EA	EA	EA
STRUCTURE # 1					1	
STRUCTURE # 2					1	
STRUCTURE # 3						
STRUCTURE # 4					1	
STRUCTURE # 5					1	
STRUCTURE # 6					1	
STRUCTURE # 7					1	
STRUCTURE # 8					1	
STRUCTURE # 9					1	
STRUCTURE # 10					1	
STRUCTURE # 11					1	
STRUCTURE # 12						
STRUCTURE # 13						
STRUCTURE # 14				1		
STRUCTURE # 15	10	3.1	1		1	1
STRUCTURE # 16						
STRUCTURE # 17					1	
PROJECT TOTALS	10	3.1	1	1	12	1

* INSTALL 12" SLD "W" STOP BARS AT ALL INTERSECTING COUNTY ROADS

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	164 6009	164 6011	164 6033	168 6001	314 6010	506 6001	506 6011	506 6038	506 6039	506 6041	506 6043
	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	DRILL SEEDING (PERM) (RURAL) (SANDY)	VEGETATIVE WATERING	EMULS ASPH (EROSN CONT)(SS-1)	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	MG	GAL	LF	LF	LF	LF	LF	LF
355+00 to 377+00	3667	3667	7334	62	489					300	300
377+00 to 401+00	4000	4000	8000	68	534	20	20	280	280	480	480
401+00 to 425+00	4000	4000	8000	68	534					300	300
425+00 to 449+00	4000	4000	8000	68	534	20	20	180	180	480	480
449+00 to 473+00	4000	4000	8000	68	534	20	20	180	180	420	420
473+00 to 497+00	1755	1755	3510	30	534	10	10	680	680	750	750
497+00 to 521+00	3533	3533	7065	60	534	20	20	180	180	480	480
521+00 to 545+00	4000	4000	8000	68	534	20	20	180	180	1020	1020
545+00 to 569+00	4000	4000	8000	68	534	0	0	0	0	300	300
569+00 to 593+00	4000	4000	8000	68	534	10	10	90	90	390	390
593+00 to 617+00	4000	4000	8000	68	534	10	10	90	90	390	390
617+00 to 641+00	2558	2558	5116	43	534	10	10	90	90	300	300
641+00 to 665+00	4000	4000	8000	68	534	10	10	90	90	300	300
665+00 to 689+00	4000	4000	8000	68	534	10	10	90	90	390	390
689+00 to 713+00	4000	4000	8000	68	534					360	360
713+00 to 737+00	4000	4000	8000	68	534	10	10	90	90	390	390
737+00 to 761+00	4000	4000	8000	68	534					300	300
761+00 to 764+00	500	500	1000	9	67					60	60
PROJECT TOTALS	64013	64013	128025	1088	9100	170	170	2220	2220	7410	7410

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	662 6110	666 6309	666 6318	666 6321	668 6074	672 6009	6185 6005
	WK ZN PAV MRK SHT TERM (TAB)TY Y	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W) (12") (SLD)	REFL PAV MRKR TY II-A-A	TMA (MOBILE OPERATION)
	EA	LF	LF	LF	LF	EA	DAY
							20
355+00 to 377+00	174	4600	97	4213		57	
377+00 to 401+00	174	4800	600	1767		51	
401+00 to 425+00	174	4800	543	1843		48	
425+00 to 449+00	173	4800	387	2898		55	
449+00 to 473+00	173	4800	508	2623	15	42	
473+00 to 497+00	173	4800		4800		42	
497+00 to 521+00	173	4800	428	2496		42	
521+00 to 545+00	173	4800	600			42	
545+00 to 569+00	173	4800	600			42	
569+00 to 593+00	173	4800	600			42	
593+00 to 617+00	173	4800	600			42	
617+00 to 641+00	173	4800	297	1835	30	42	
641+00 to 665+00	173	4800	600	53	15	42	
665+00 to 689+00	173	4800	600			30	
689+00 to 713+00	173	4800	600			30	
713+00 to 737+00	173	4800	600			30	
737+00 to 761+00	173	4800	600			30	
761+00 to 764+00	173	600	75			3	
PROJECT TOTALS	3117	82000	8335	22528	60	712	20

Texas Department of Transportation

SH 79

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		14

SUMMARY OF SIGNING ITEMS										
LOCATION	644 6001	644 6004	644 6007	644 6030	644 6033	644 6042	644 6044	644 6060	644 6061	644 6076
	IN SM RD SN SUP&AM TY10BWG(1) SA(P)	IN SM RD SN SUP&AM TY10BWG(1) SA(T)	IN SM RD SN SUP&AM TY10BWG(1) SA(U)	IN SM RD SN SUP&AM TYS80(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(U)	IN SM RD SN SUP&AM TYS80(1)SB(T)	IN SM RD SN SUP&AM TYS80(1)SB(U)	IN SM RD SN SUP&AM TYTWT(1)WS (P)	IN SM RD SN SUP&AM TYTWT(1)WS (T)	REMOVE SM RD SN SUP&AM
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
CSJ: 0284-02-026	2	5	8	11	2	3	2	38	5	71
PROJECT TOTALS	2	5	8	11	2	3	2	38	5	71

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Texas Department of Transportation

SH 79

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		15

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DN:

DATE: 3/29/2023 2:54:17 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020264 - Design/Plan Set/3. Roadway/SIDEROAD SUMMARY

SUMMARY OF SIDEROAD QUANTITIES

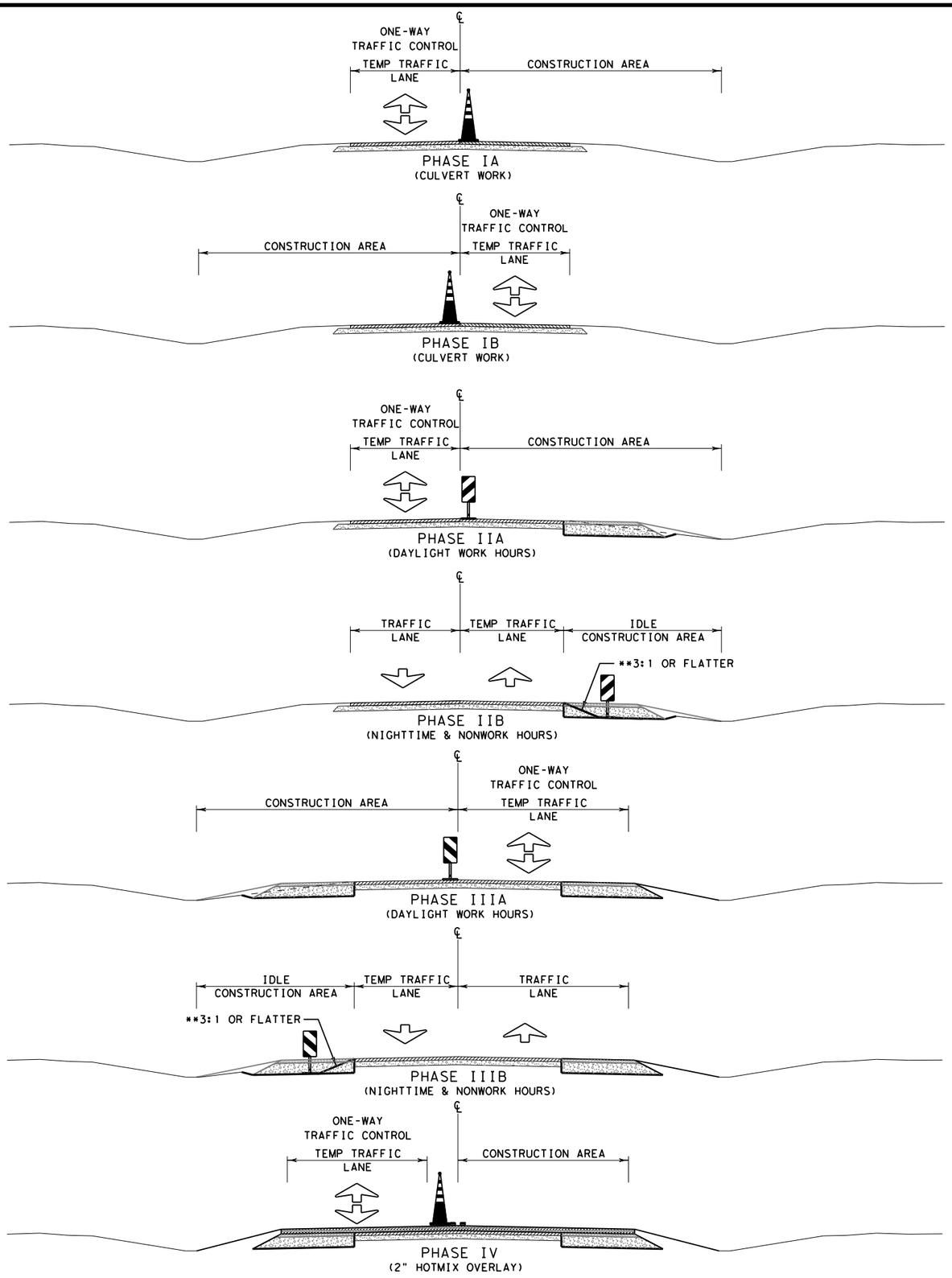
PLAN LAYOUT SHEET NUMBER	LOCATION		SIDE ROAD NUMBER	"W"	"L"	RADII		AREA	460 6002	460 6003	460 6004	460 6005	467 6348	467 6380	467 6410	467 6444	496 6004	496 6007	530 6005	530 6016	560 6002	COMMENTS
	STA	TURN	##	FT	FT	R1	R2	SY	LF	LF	LF	LF	EA	EA	EA	EA	EA	LF	SY	SY	SY	
1	359+37	LT	1	16	50	15	15	99.7												100		MATCH EXISTING GRADE
1	370+85	RT	2	16	30	15	15	64.1												64		MATCH EXISTING GRADE
2	397+56	RT	3	40	30	25	40	178												178		MATCH EXISTING GRADE
3	403+98	RT	4	16	30	30	30	97												97		MATCH EXISTING GRADE
3	414+37	LT	5	16	30	15	15	53												53		MATCH EXISTING GRADE
4	431+51	RT	6	16	30	15	15	64.1												64		MATCH EXISTING GRADE
5	451+00	LT	7	44	35	70	35	527													527	MATCH EXISTING GRADE
5	470+43	LT	8	16	30	15	15	63.9												64		MATCH EXISTING GRADE
5	470+47	RT	9	16	30	15	15	73.7												74		MATCH EXISTING GRADE
6	484+06	RT	10	16	28	15	15	60.5												61		MATCH EXISTING GRADE
6	489+17	LT	11	16	28	15	15	60.5	25				2					25		61		REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
6	496+09	LT	12	16	12	15	15	33												33		MATCH EXISTING GRADE
7	500+40	LT	13	22	30	40	30	150		45				2				45	150			REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
7	508+00	RT	14	16	30	15	15	65												65		MATCH EXISTING GRADE
7	508+15	LT	15	16	30	15	15	65												65		MATCH EXISTING GRADE
7	519+20	LT	16	16	30	15	15	65												65		MATCH EXISTING GRADE
8	527+38	RT	17	16	30	15	15	65												65		MATCH EXISTING GRADE
8	537+75	LT	18	16	41	15	15	84												84		MATCH EXISTING GRADE
8	538+70	RT	19	16	41	15	15	84												84		MATCH EXISTING GRADE
8	538+70	LT	20	16	41	20	30	92				52				2		52	92			REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
8	539+20	RT	21	16	30	15	15	65												65		MATCH EXISTING GRADE
9	557+27	RT	22	16	30	15	15	65												65		MATCH EXISTING GRADE
9	557+79	LT	23	16	30	15	15	65												65		MATCH EXISTING GRADE
10	575+59	LT	24	16	30	15	15	65												65		MATCH EXISTING GRADE
10	576+73	RT	25	16	30	15	15	65												65		MATCH EXISTING GRADE
11	595+44	LT	26	16	30	15	15	65			34				2		2	34		65		REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
11	597+00	RT	27	16	30	15	15	65												65		MATCH EXISTING GRADE
11	602+80	LT	28	16	40	15	15	82		24				2				24		82		REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
11	607+95	RT	29	16	40	15	15	82												82		MATCH EXISTING GRADE
11	609+32	LT	30	24	20	20	20	73												73		MATCH EXISTING GRADE
11	609+46	RT	31	16	20	20	20	55												55		MATCH EXISTING GRADE
11	610+23	LT	32	11	20	15	15	35												35		MATCH EXISTING GRADE
11	612+56	LT	33	16	20	15	15	47												47		MATCH EXISTING GRADE
11	613+53	RT	34	16	20	15	15	47												47		MATCH EXISTING GRADE
11	616+71	RT	35	16	28	5	5	51												51		MATCH EXISTING GRADE
12	617+55	RT	36	16	20	15	15	47												47		MATCH EXISTING GRADE
12	620+00	RT	37	16	20	15	15	47												47		MATCH EXISTING GRADE
12	622+50	RT	38	16	24	15	15	54												54		MATCH EXISTING GRADE
12	624+44	RT	39	16	24	2	5	43												43		MATCH EXISTING GRADE
12	628+10	LT	40	16	8	5	5	16												16		MATCH EXISTING GRADE
12	628+71	LT	41	16	8	5	5	16												16		MATCH EXISTING GRADE
12	629+20	RT	42	26	9	30	30	69													69	MATCH EXISTING GRADE
12	629+58	LT	43	16	8	5	5	16												16		MATCH EXISTING GRADE
12	630+91	LT	44	16	7.5	5	5	15											15			MATCH EXISTING GRADE
12	632+07	RT	45	16	8	5	5	16												16		MATCH EXISTING GRADE
12	633+00	RT	46	16	8	5	5	16												16		MATCH EXISTING GRADE
12	633+95	RT	47	16	8	5	5	16												16		MATCH EXISTING GRADE
12	634+07	LT	48	16	8	15	15	25												25		MATCH EXISTING GRADE
12	634+84	RT	49	16	8	15	15	25												25		MATCH EXISTING GRADE
12	636+00?	LT	50	34	38	30	10	187													187	MATCH EXISTING GRADE
13	642+16	RT	51	16	34	15	5	72											72			MATCH EXISTING GRADE
13	642+88	RT	52	16	30	15	15	65												65		MATCH EXISTING GRADE
13	645+12	RT	53	16	30	40	40	130												130		MATCH EXISTING GRADE
13	647+80	RT	54	260	30	30	15	910												910		MATCH EXISTING GRADE
13	649+50	RT	55	22	30	30	30	117												117		MATCH EXISTING GRADE
13	650+22	RT	56	16	34	15	15	72												72		MATCH EXISTING GRADE
13	651+34	RT	57	16	30	15	15	65												65		MATCH EXISTING GRADE
13	660+85	RT	58	16	30	15	15	65												65		MATCH EXISTING GRADE
13	663+00	RT	59	16	30	15	15	65											65			MATCH EXISTING GRADE
14	669+18	LT	60	16	30	15	15	65												65		MATCH EXISTING GRADE
14	679+72	LT	61	16	30	15	15	65												65		MATCH EXISTING GRADE
14	686+57	LT	62	16	30	15	15	65												65		MATCH EXISTING GRADE
15	689+22	RT	63	16	30	20	15	73	30					2				30	73			REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
15	689+27	LT	64	16	30	15	15	65		36				2				36		65		REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
16	726+81	RT	65	16	30	15	15	65												65		MATCH EXISTING GRADE
16	726+92	LT	66	16	30	15	15	65												65		MATCH EXISTING GRADE
16	736+77	LT	67	16	30	30	30	97												97		MATCH EXISTING GRADE
16	736+81	RT	68	32	30	15	15	118											118			MATCH EXISTING GRADE
17	748+97	LT	69	16	30	15	15	65		39				2				39		65		REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
17	757+44	LT	70	16	30	15	15	65		23				2				23		65		REMOVE AND REPLACE CMP, ADD SET'S, AND MATCH EXISTING GRADE
PROJECT TOTALS									55	167	34	52	2	12	2	2	2	308	585	4582	783	

Texas Department of Transportation

SH 79

SIDEROAD SUMMARY

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		16



SEQUENCE OF WORK:

PHASE I: COMPLETE CULVERT WORK AND LEVEL UP.

PHASE II: COMPLETE PHASE II CONSTRUCTION ACCORDING TO TYPICAL.

PHASE III: COMPLETE PHASE III CONSTRUCTION ACCORDING TO TYPICAL.

PHASE IV: PLACE 2" HMAC OVERLAY. COMPLETE RUMBLE STRIPS & FINAL STRIPING OPERATIONS.

NOTES:

ALL PAVEMENT REPAIR SHALL BE DONE PRIOR TO WIDENING AND LEVEL-UP.

LIMIT LANE CLOSURES ALONG HIGHWAY INTERSECTIONS, AND AT CROSS STREETS, TO THE HOURS DIRECTED BY THE ENGINEER.

WORK ON BOTH SIDES OF THE ROAD AT THE SAME TIME WILL NOT BE ALLOWED. PHASE II WORK SHALL BE COMPLETED PRIOR TO BEGINNING PHASE III.

MAXIMUM LANE CLOSURE WITH ONE-WAY TRAFFIC CONTROL SHALL BE TWO MILES. ONE-WAY TRAFFIC CONTROL MAY BE EXTENDED BY THE ENGINEER WHEN THE CONTRACTOR PROVES TO HAVE ADEQUATE FORCES & EQUIPMENT TO PERFORM MORE WORK.

ALL ONE-WAY TRAFFIC CONTROL WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT BID ITEMS.

PILOT CAR SHALL BE REQUIRED FOR ALL ONE-WAY TRAFFIC CONTROL OPERATIONS.

CW 8-9a "Shoulder Drop-Off" OR CW 8-11 "Uneven Lanes" SIGNS PLUS VERTICAL PANELS SHALL BE PLACED DURING PHASES IIB & IIIB AT A MAXIMUM SPACING OF 1,800 FT.

PHASES II & III CHANNELIZING DEVICES SHOWN ARE BACK TO BACK MOUNTED PORTABLE VERTICAL PANELS ON SELF-RIGHTING SUPPORTS AS DESCRIBED ON BC(9)-21. OTHER APPROVED BASES AND SUPPORTS MAY BE USED AT THE CONTRACTOR'S OPTION AND ENGINEER'S APPROVAL.

COMPLETE ALL MOW STRIP AND MBGF INSTALLATION BEFORE PHASE IV BEGINS.

PHASE IV CHANNELIZING DEVICES SHOWN ARE 42 INCH, TWO-PIECE CONE AS DESCRIBED ON BC(10)-21. OTHER APPROVED DEVICES MAY BE USED AT THE CONTRACTOR'S OPTION AND ENGINEER'S APPROVAL.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

* - BARRICADE & CONSTRUCTION STDS BC(1-12)-21 REQUIRED FOR ALL PHASES. REFER TO WORK ZONE STANDARD (WZ) SHEETS FOR ADDITIONAL DETAILS. STANDARDS SHOWN ARE CONSIDERED TO BE THE MINIMUM REQUIREMENTS FOR WORK ZONE SIGNING AND TRAFFIC CONTROL. ADDITIONAL OR OTHER DEVICES MAY BE REQUIRED AS DIRECTED BY THE ENGINEER.

** - THE 3:1 SLOPE BACKFILL FOR END OF DAY OPERATIONS SHALL CONSIST OF CLEAN STONE, SCREENED MATERIALS NOT CONTAINING ANY FINES, OR OTHER MATERIALS APPROVED BY THE ENGINEER. INSTALLATION OF THIS MATERIAL WILL BE CONDUCTED FROM THE ROADWAY SIDE OF THE PROJECT TO PROTECT THE SURFACE OF THE PRIME SUBRADE. WHEN WORK IS RESUMED ON THIS EXCAVETED AREA, THIS BACKFILL MATERIAL SHALL BE INCORPORATED INTO THE ROAD WORK OR DISPOSED OF AS APPROVED BY THE ENGINEER. MATERIALS AND LABOR FOR THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 110 EXCAVATION (ROADWAY).

SH 79
SEQUENCE OF WORK

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		17

DATE: 3/29/2023 2:54:27 PM
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DATE: 3/29/2023 2:54:36 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/028402026/4 - Design/Plan Set/8. Traffic/BC(1)-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

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

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
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

Texas Department of Transportation

Traffic Safety Division Standard

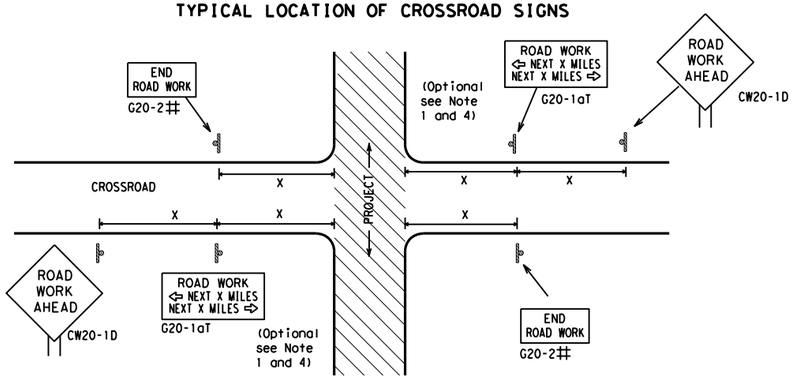
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	WFS.	THROCKMORTON		18
5-10 5-21				

DATE: 3/29/2023 2:54:40 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/02840202674 - Design/Plan Set/8. Traffic/BC(1)-21.dgn

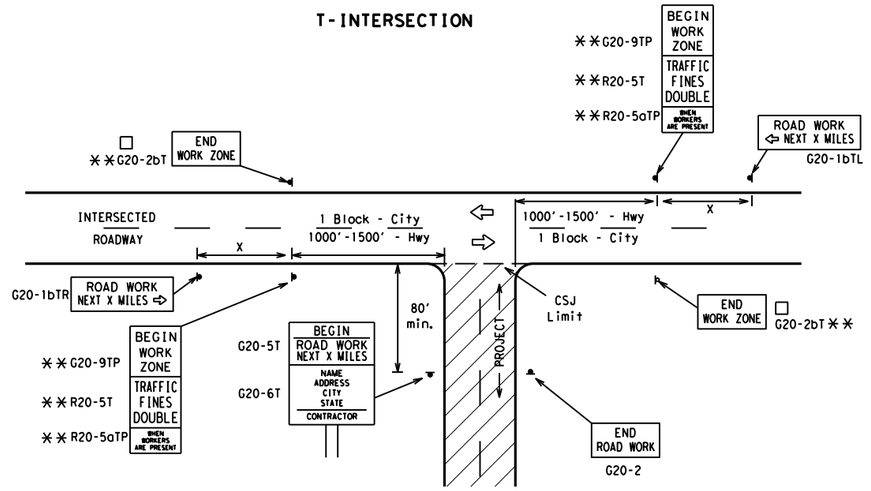
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. 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.
2. 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.
3. 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.
4. 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.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. 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

1. 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.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
*	*[3]

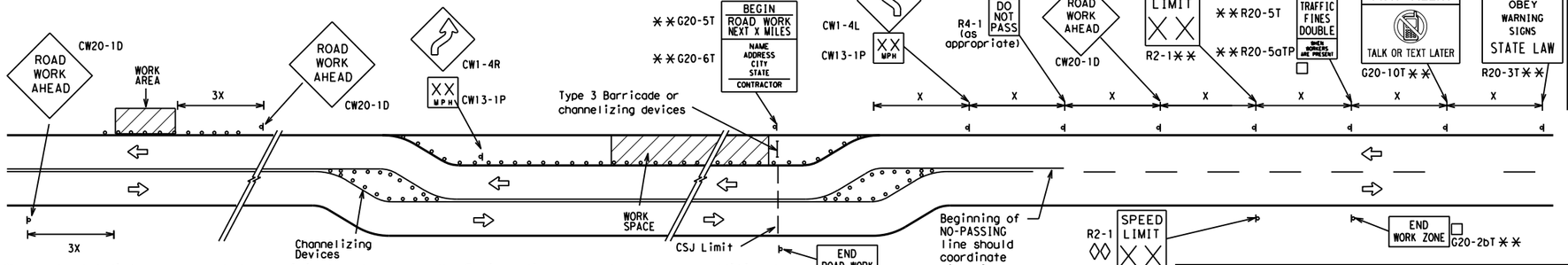
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

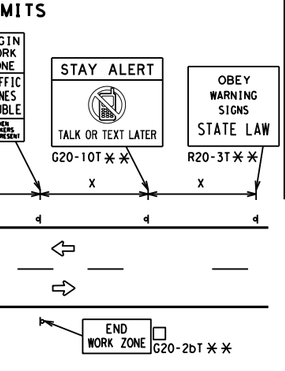
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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".
5. Only diamond shaped warning sign sizes are indicated.
6. 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

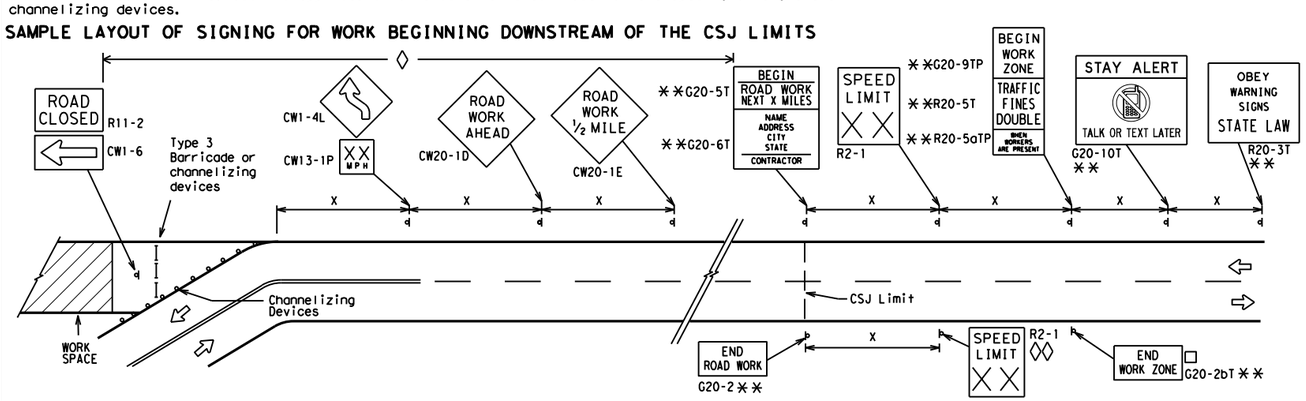


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

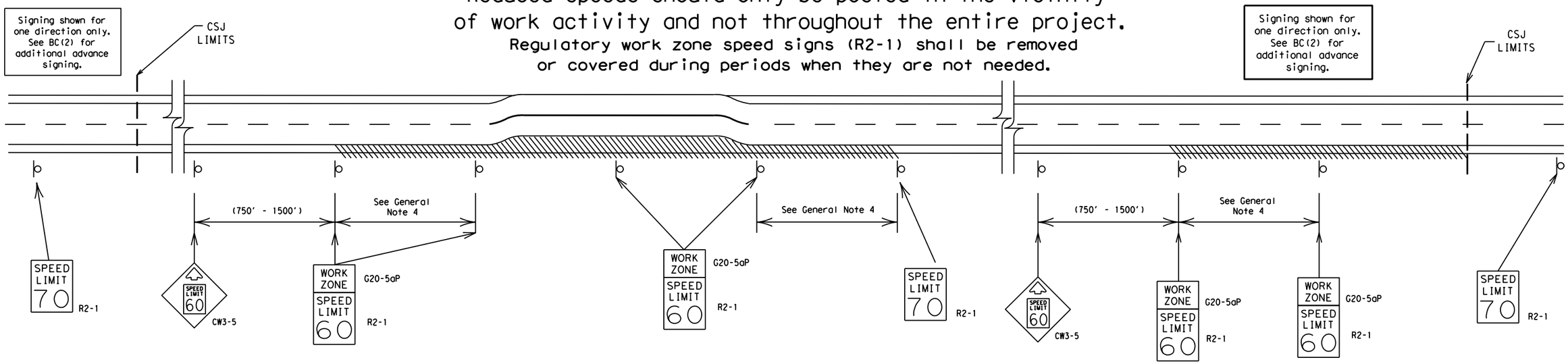
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	THROCKMORTON		19

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:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) 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

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. 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
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. 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.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. 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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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0284	02	026	SH 79
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS.	THROCKMORTON		20

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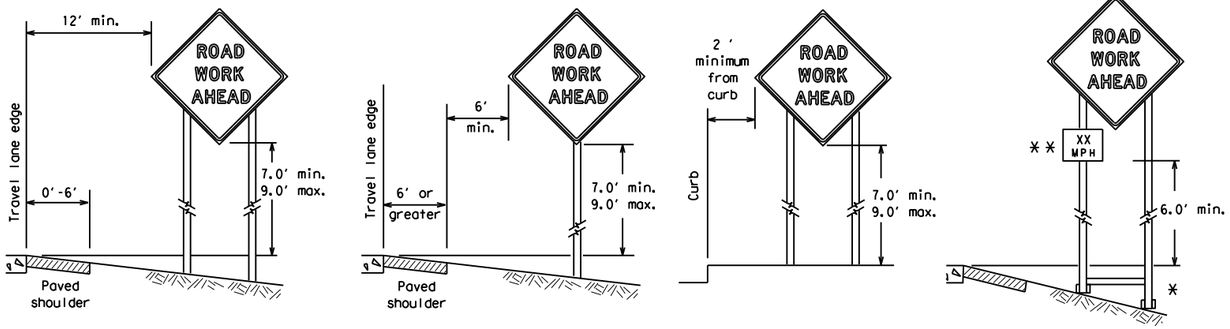
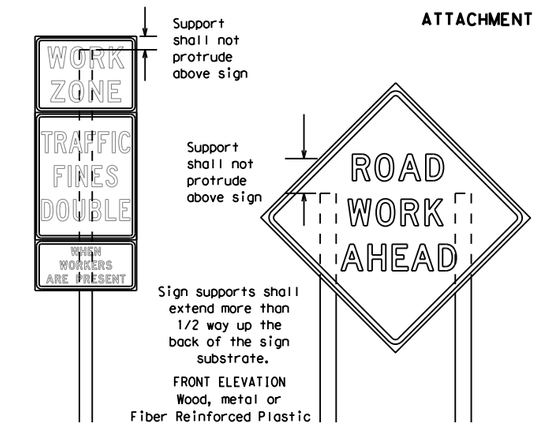
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

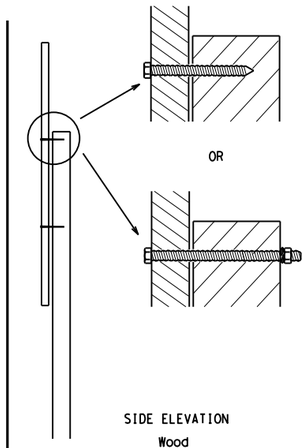


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





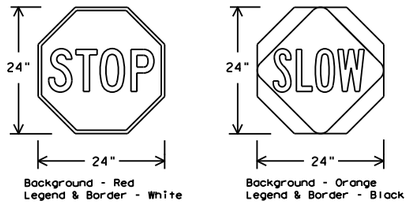
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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 spice 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.

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. 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.
2. 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.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. 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.
5. 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.
6. 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.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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)

1. 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.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. 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.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. 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.
2. 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.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. 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.
5. 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

1. 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

1. 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.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. 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

1. 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).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. 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

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. 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.
3. 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.
4. 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.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. 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.
7. 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.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. 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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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9-07 8-14	DIST	COUNTY		SHEET NO.
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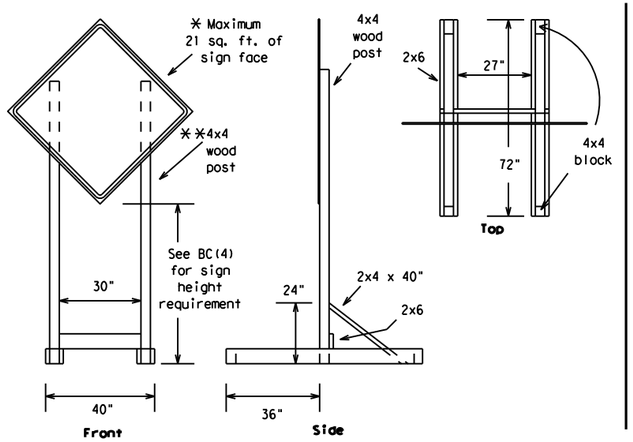
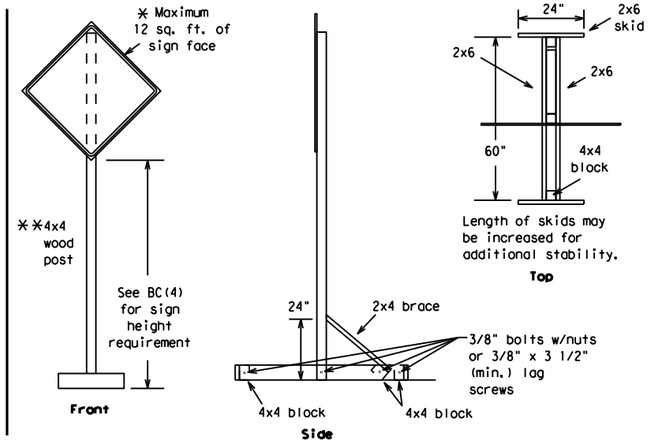
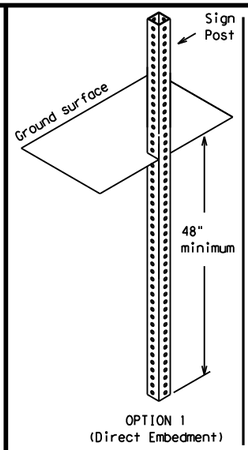
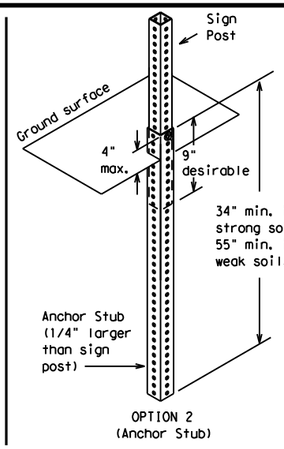


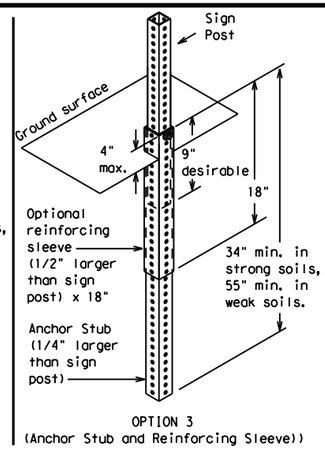


SKID MOUNTED WOOD SIGN SUPPORTS

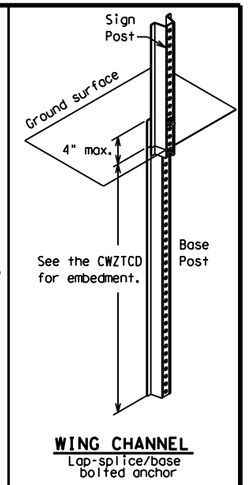
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







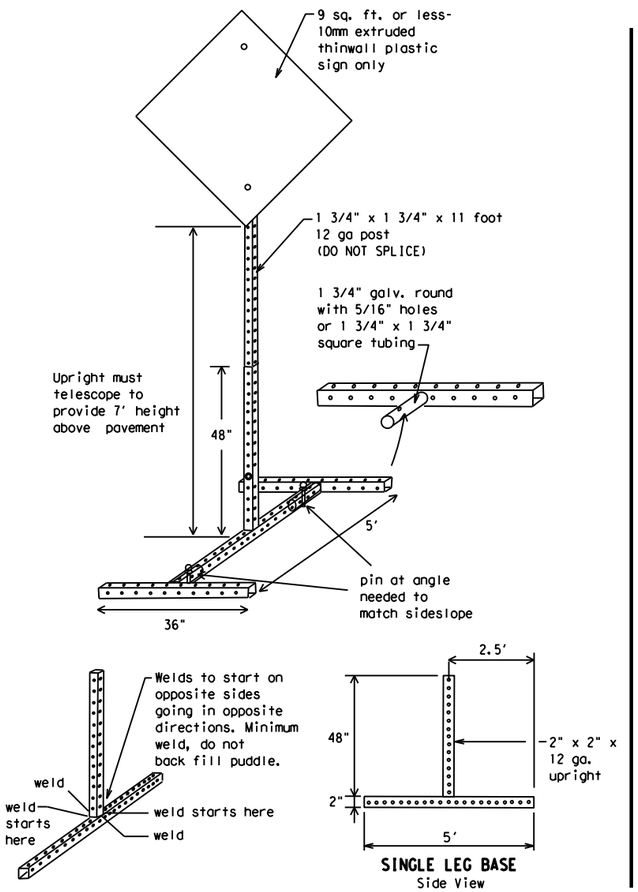
PERFORATED SQUARE METAL TUBING

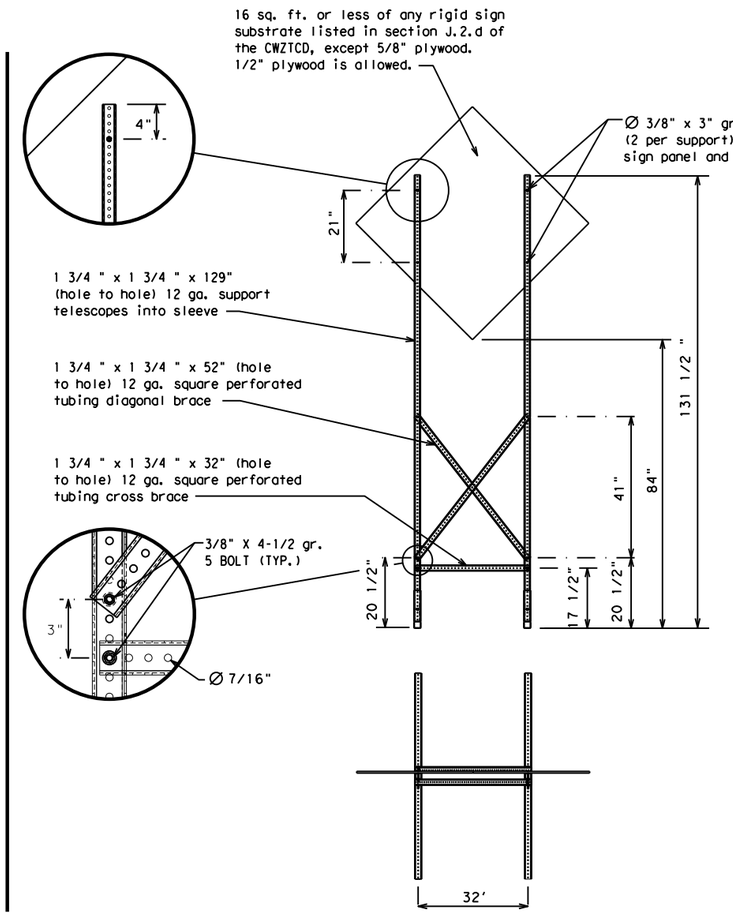


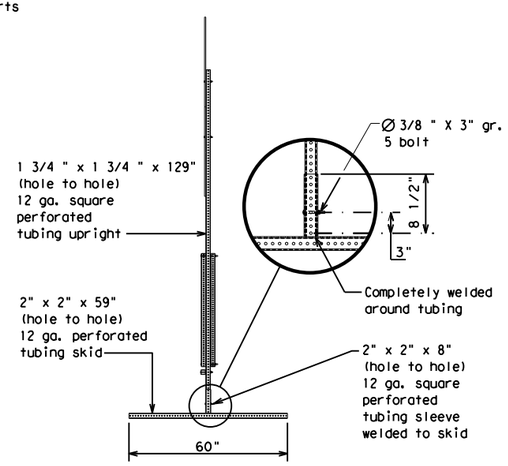
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

☐ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

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Texas Department of Transportation | Traffic Safety Division Standard

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

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. 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.
3. 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.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. 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.
8. 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.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. 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.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. 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.
15. 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.
16. Each line of text should be centered on the message board rather than left or right justified.
17. 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.

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. 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.
6. 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

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. 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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	THROCKMORTON		23

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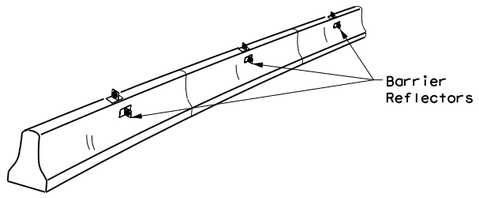
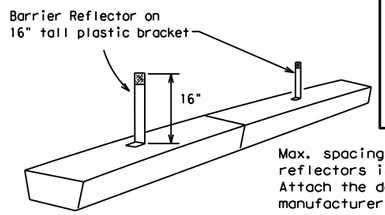
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/028402026/4 - Design/Plan Set/8. Traffic/BC(1)-21.dgn

1. 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).
2. 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)

3. 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.
4. 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.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

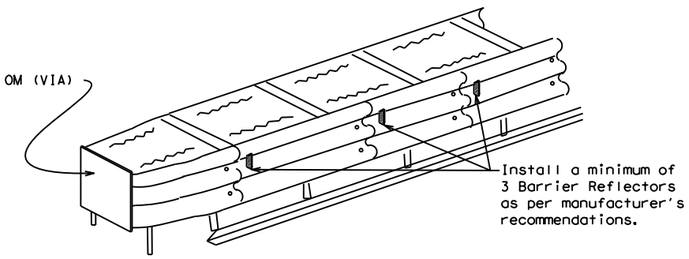


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

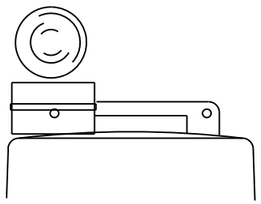


DELINEATION OF END TREATMENTS

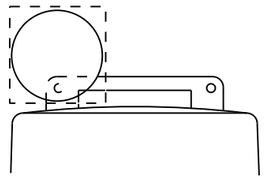
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate 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



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



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

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. 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".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. 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.
7. 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.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

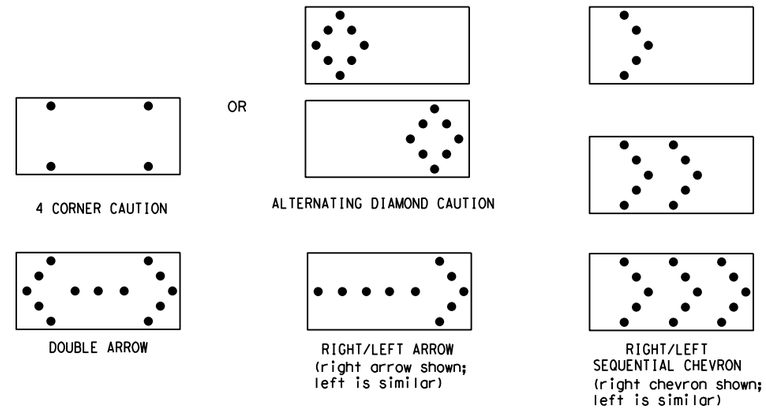
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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.
4. 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.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. 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

1. 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.
2. 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.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. 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.
6. 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.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

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

1. 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.
2. 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.
3. 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.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. 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.
8. 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.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. 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.
14. 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

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. 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.
6. 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.

Texas Department of Transportation

Traffic Safety Division Standard

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	0284	02	026	SH 79
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS.	THROCKMORTON		24

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. 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.
3. 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.
4. 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).
5. 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.
6. 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:

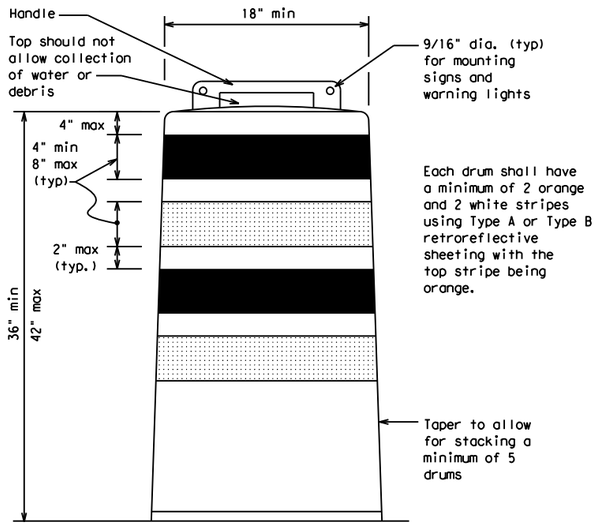
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

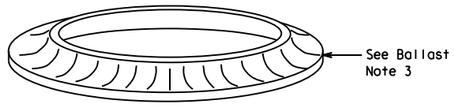
RETROREFLECTIVE SHEETING

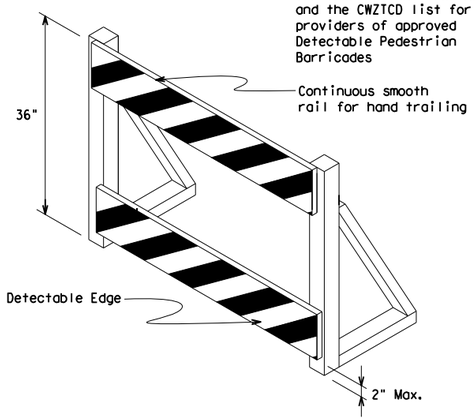
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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

1. 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.
2. 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.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. 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.
5. 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.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

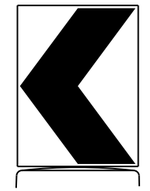




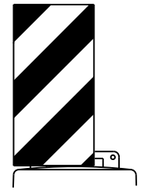


DETECTABLE PEDESTRIAN BARRICADES

1. 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.
2. 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.
3. 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.
4. 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.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. 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

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. 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.
4. 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.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. 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.
8. 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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	WFS.	THROCKMORTON		25
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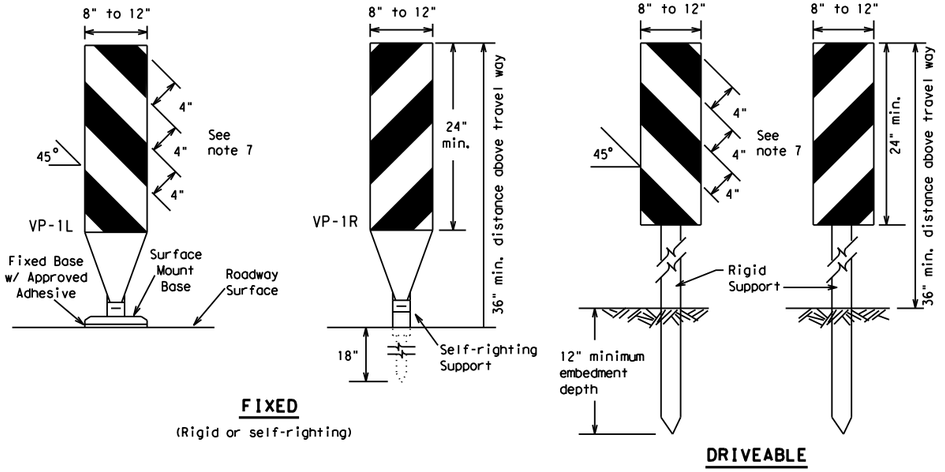
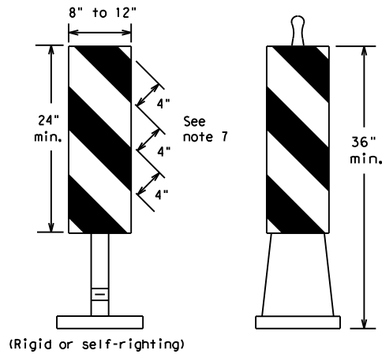


FIXED
(Rigid or self-righting)

DRIVEABLE

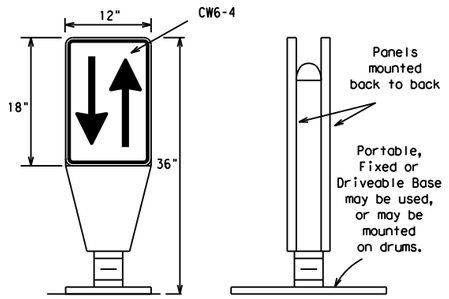


(Rigid or self-righting)

PORTABLE

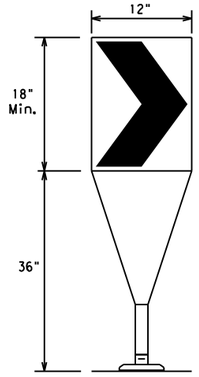
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



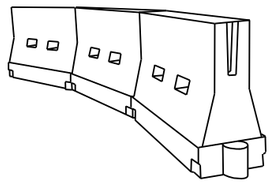
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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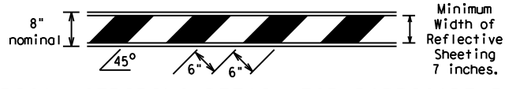
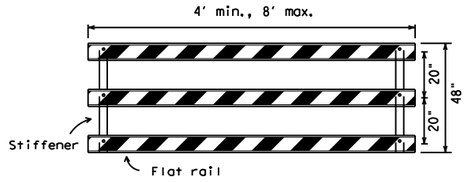
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



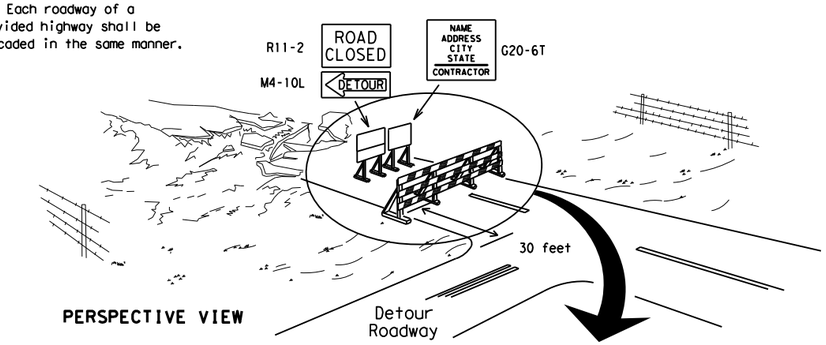
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

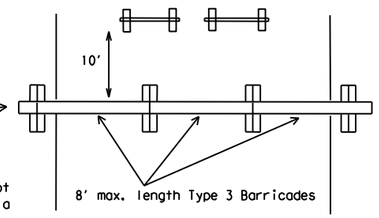
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

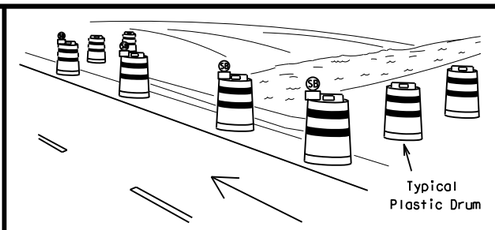
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

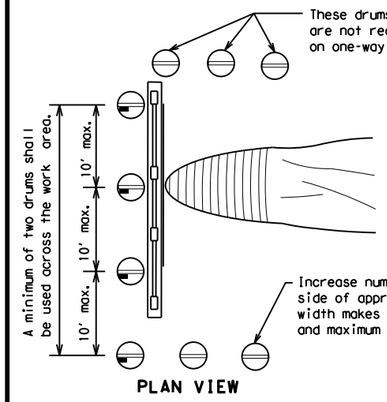
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

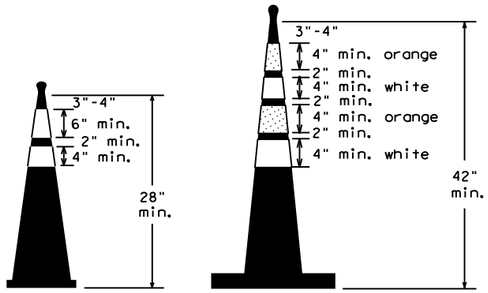
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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
SB	Steady burn warning light or yellow warning reflector

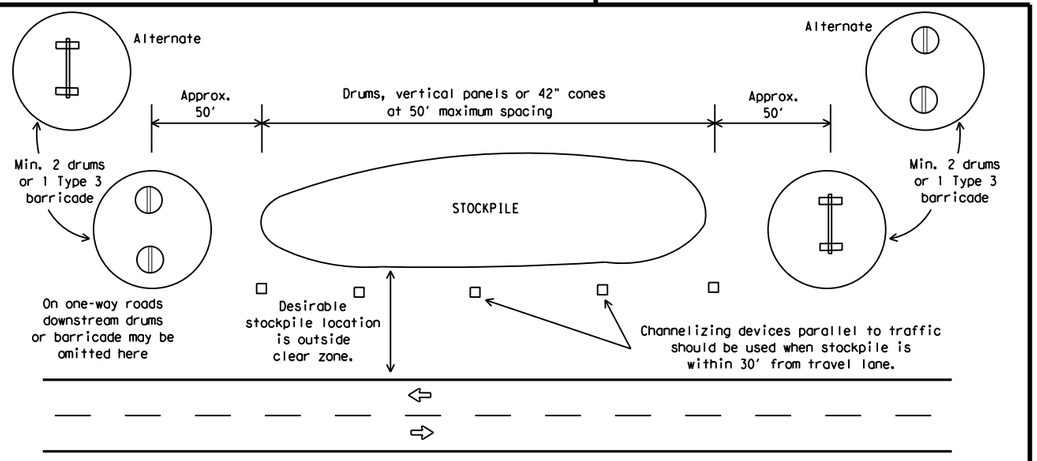
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13 5-21	WFS.	THROCKMORTON		27

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

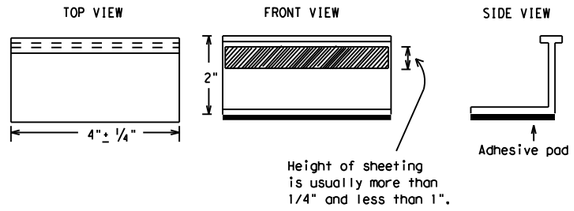
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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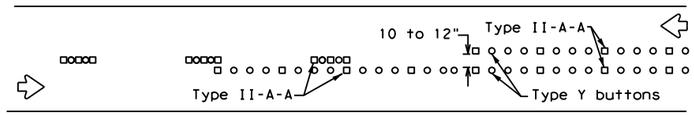
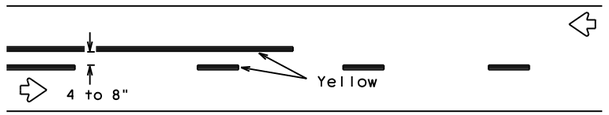
PAVEMENT MARKING PATTERNS

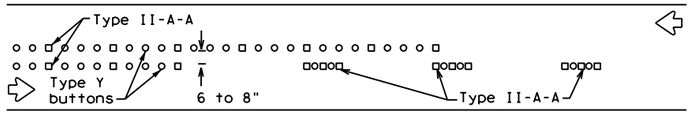
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



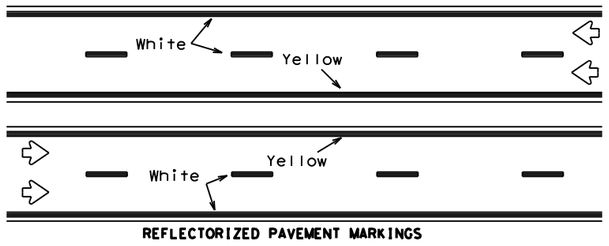
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



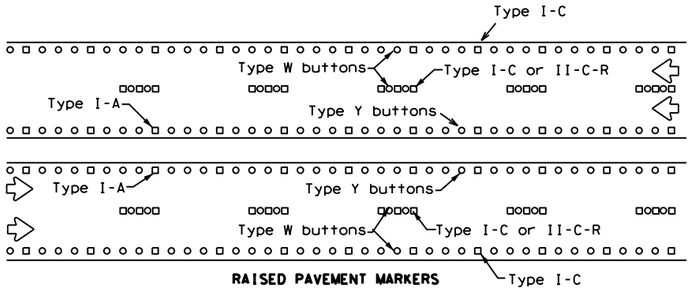
RAISED PAVEMENT MARKERS - PATTERN B

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.

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



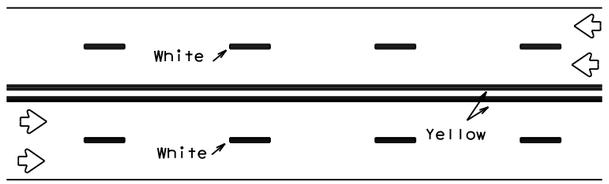
REFLECTORIZED PAVEMENT MARKINGS



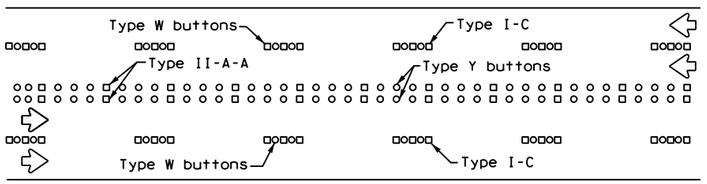
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



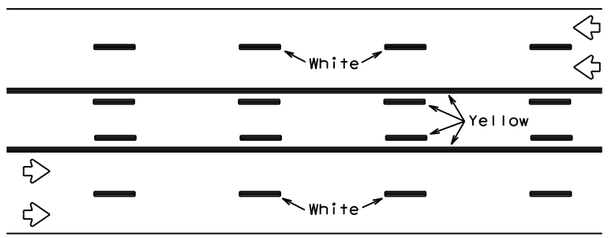
REFLECTORIZED PAVEMENT MARKINGS



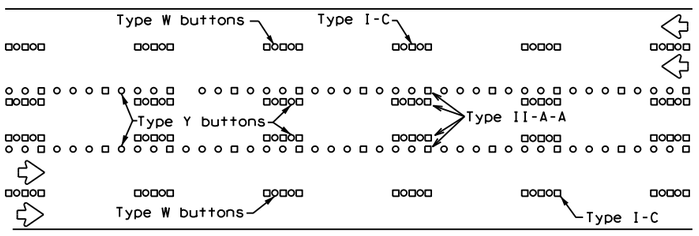
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

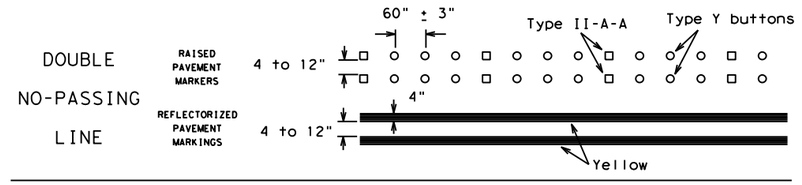
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

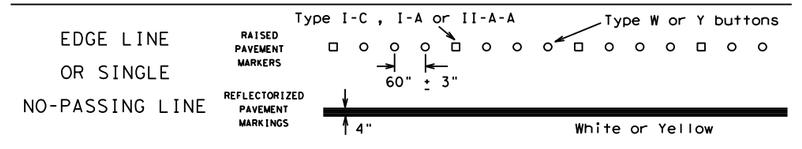
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

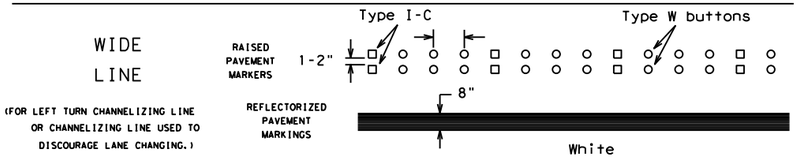


EDGE LINE OR SINGLE NO-PASSING LINE



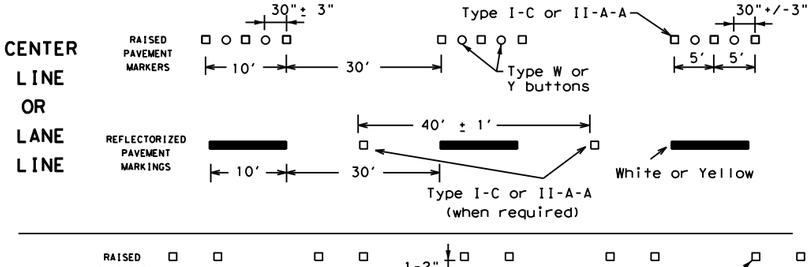
WIDE LINE

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

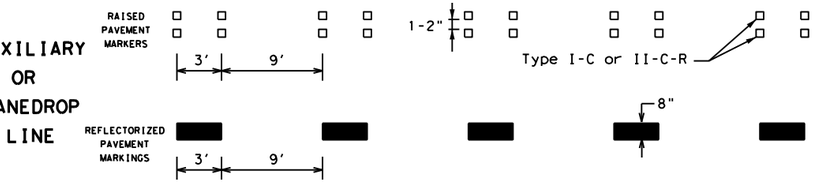


BROKEN LINES

CENTER LINE OR LANE LINE

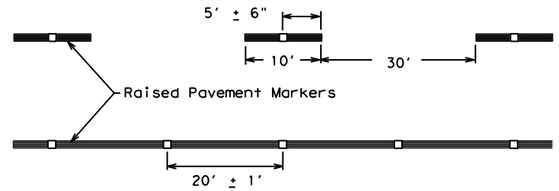


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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."

Texas Department of Transportation

Traffic Safety Division Standard

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 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		29

106

DATE: 3/29/2023 2:55:26 PM
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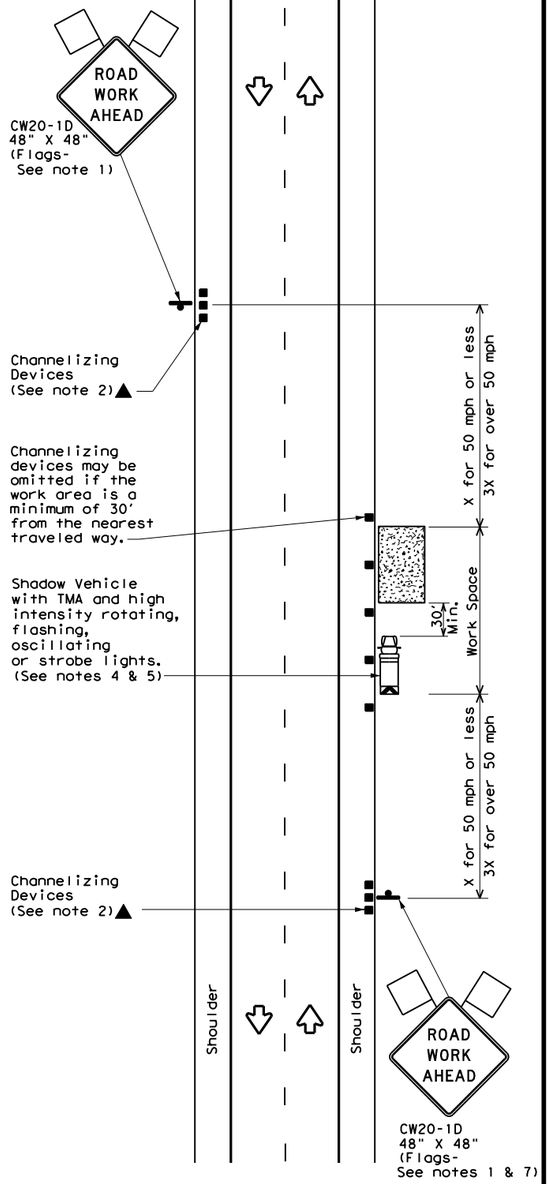
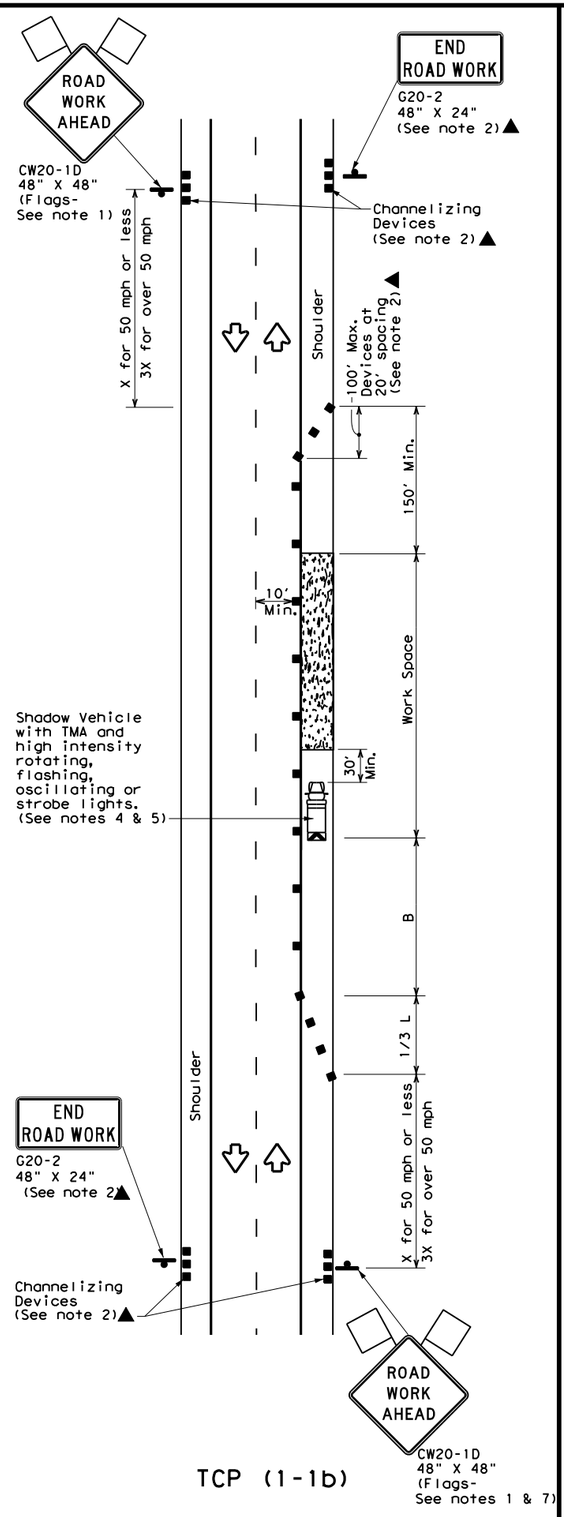


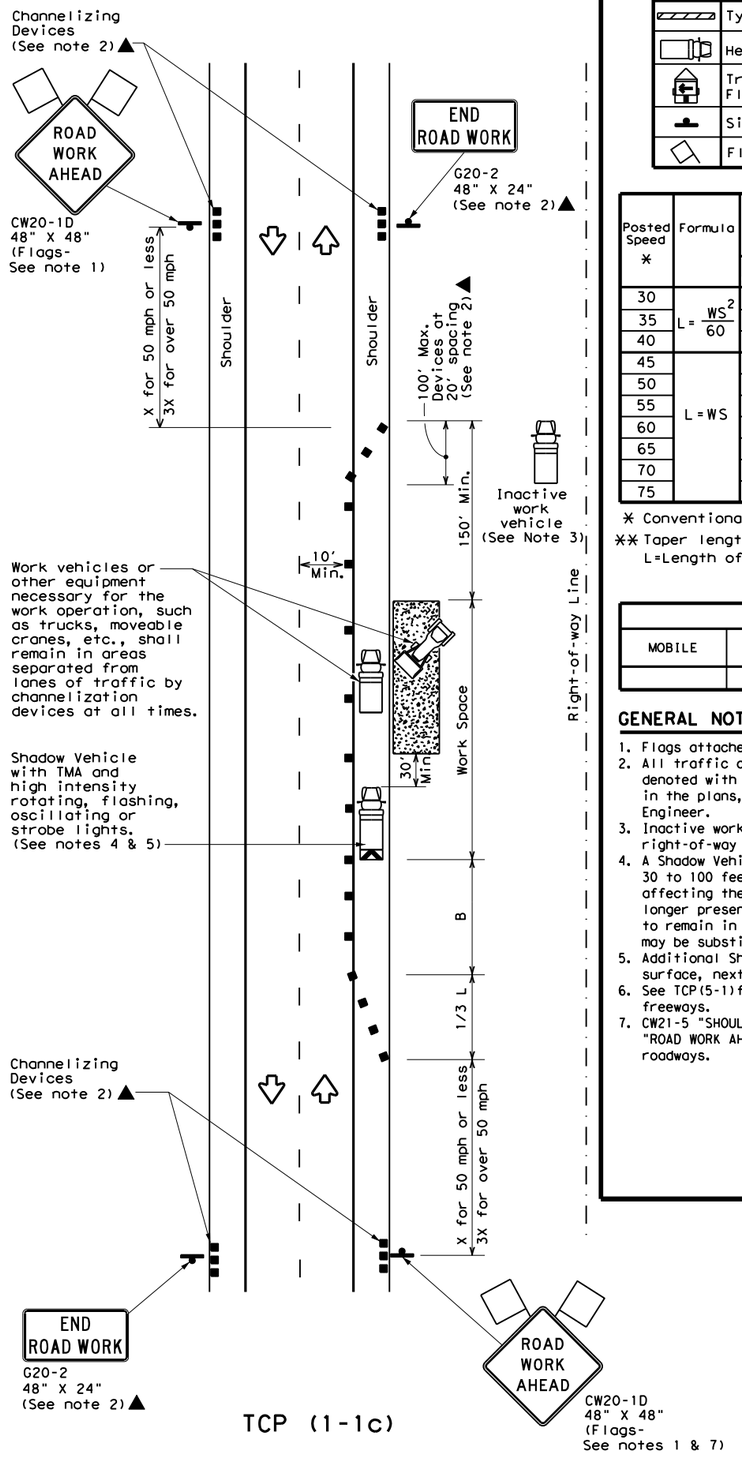
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

1. Flags attached to signs where shown are REQUIRED.
2. 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.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. 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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

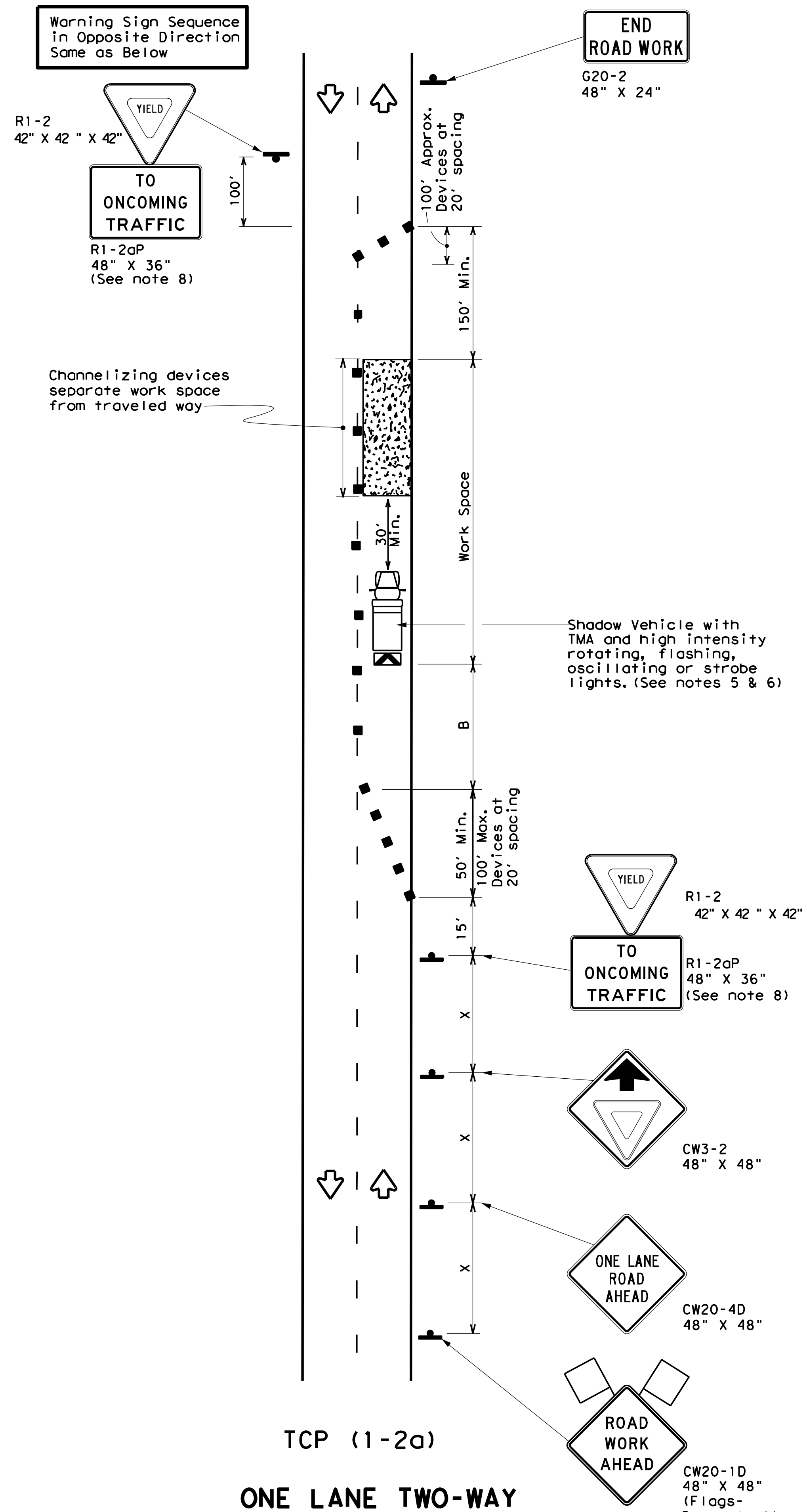
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

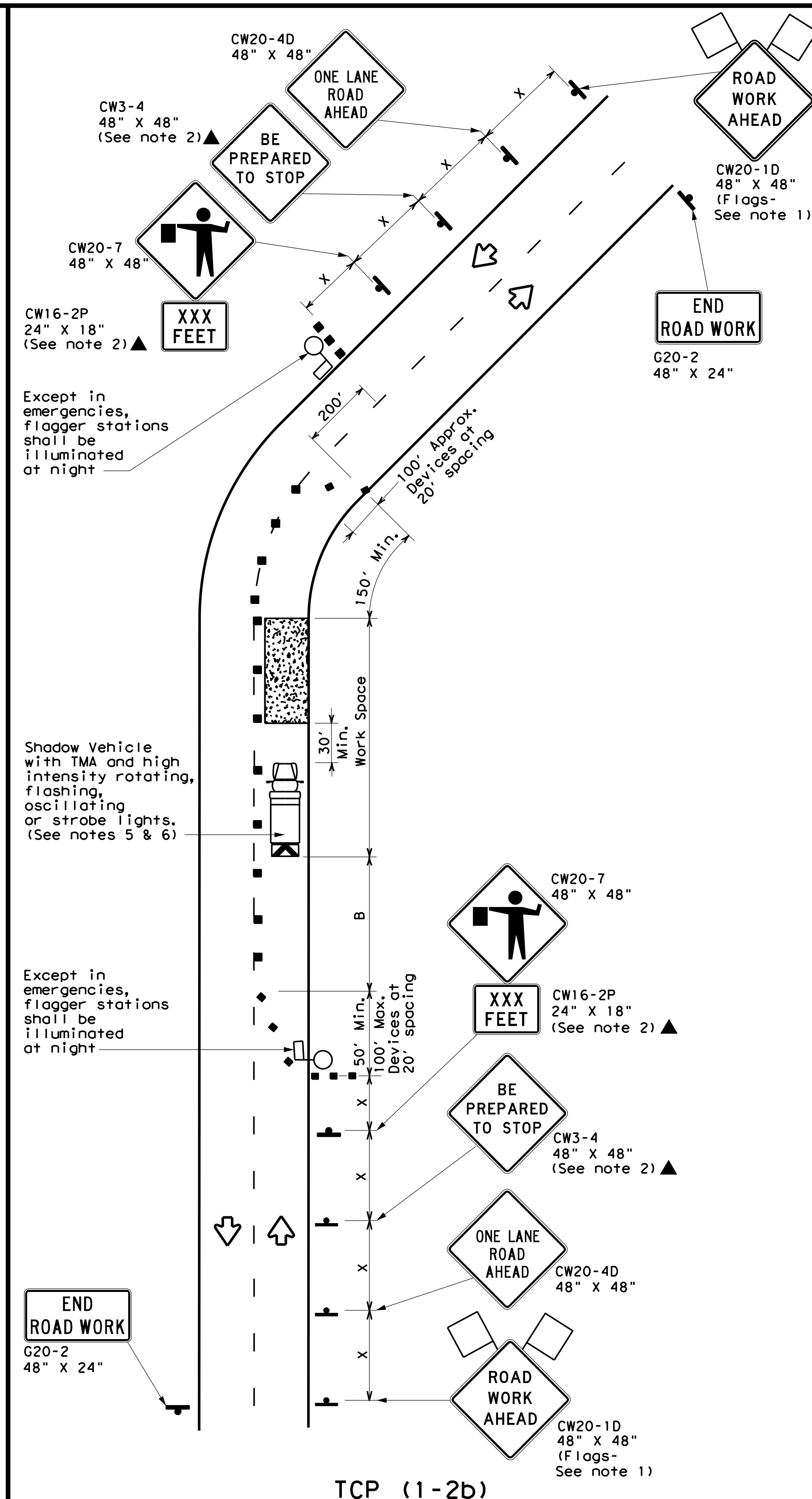
FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98	0284	02	026	SH 79
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	WFS.	THROCKMORTON		30



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=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

1. Flags attached to signs where shown are REQUIRED.
2. 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.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. 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.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. 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).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. 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(1-2)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		31

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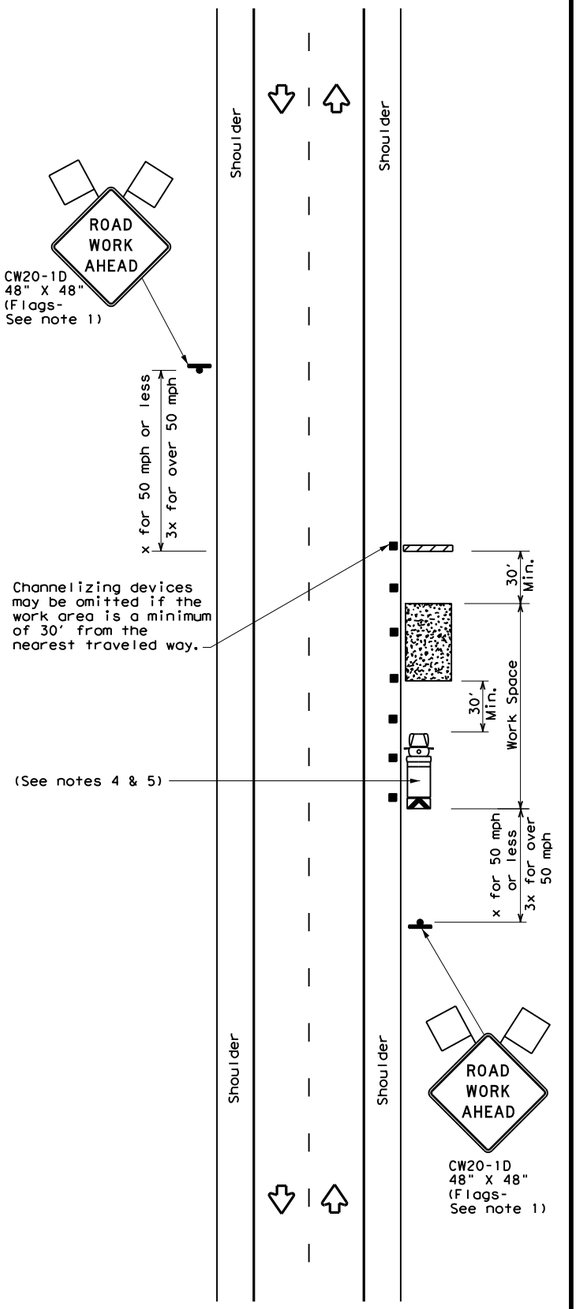
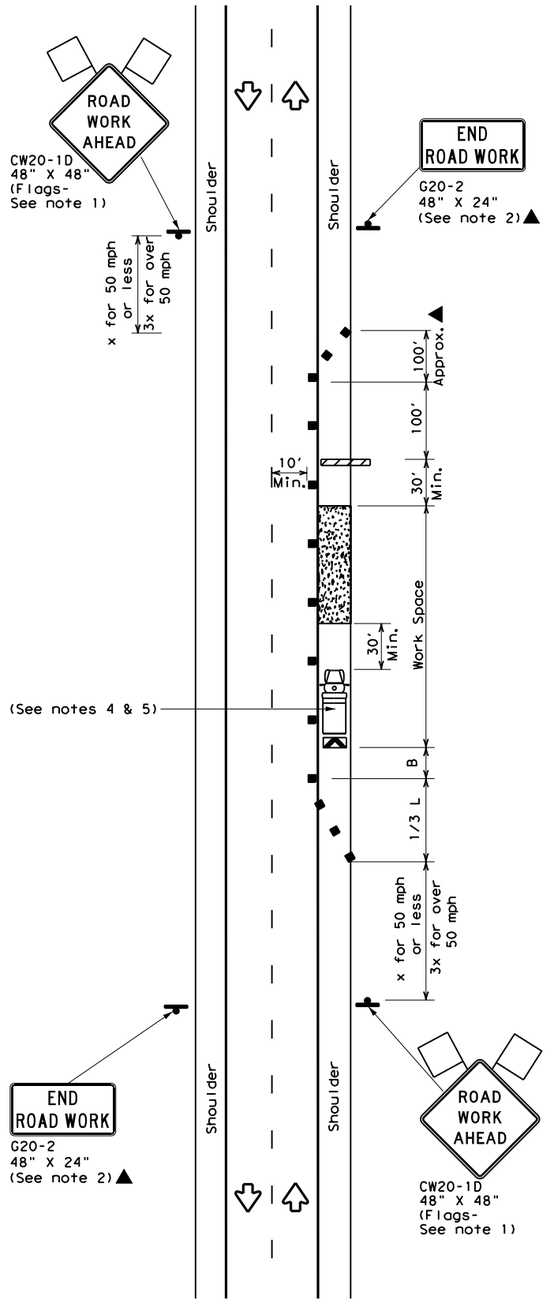


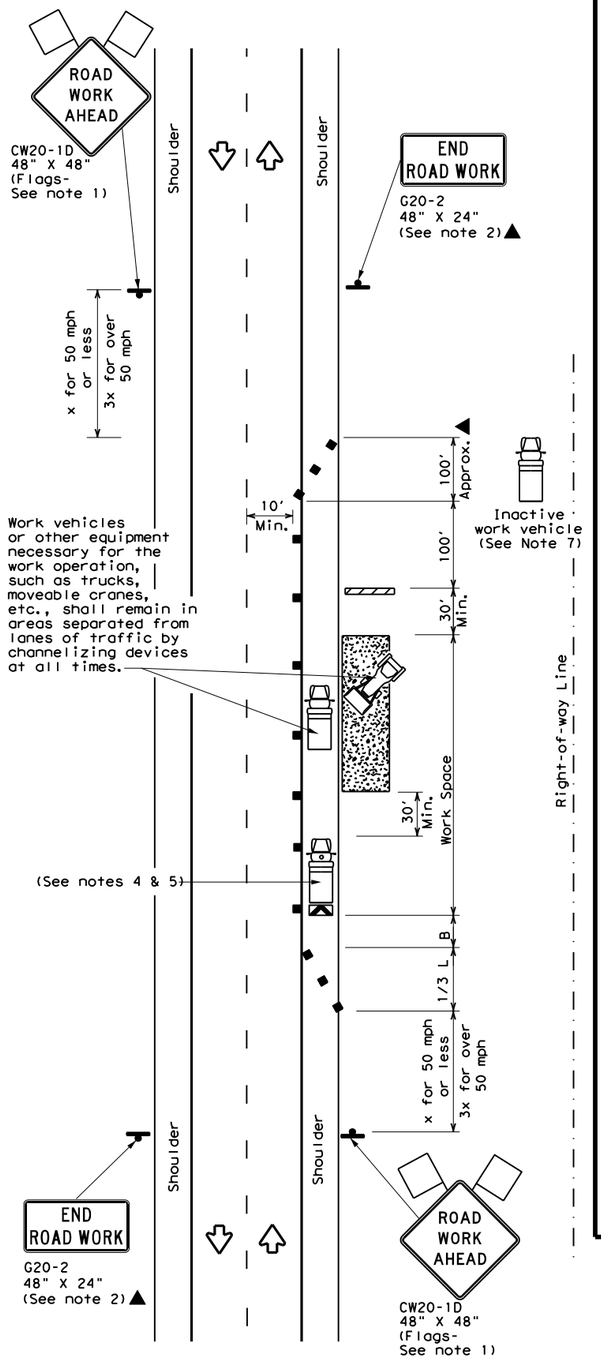
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

1. Flags attached to signs where shown, are REQUIRED.
2. 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.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. 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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	WFS.	THROCKMORTON		32
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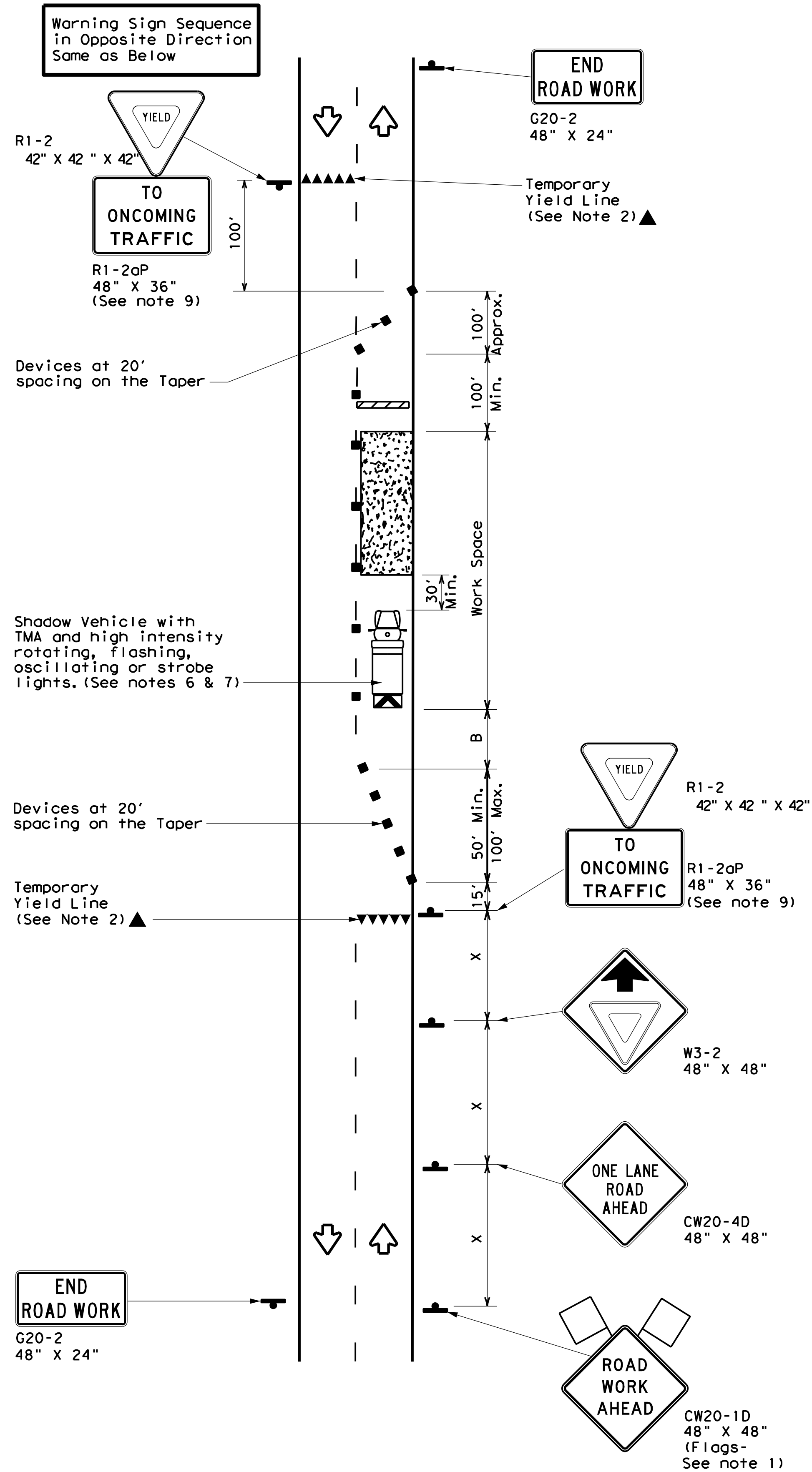
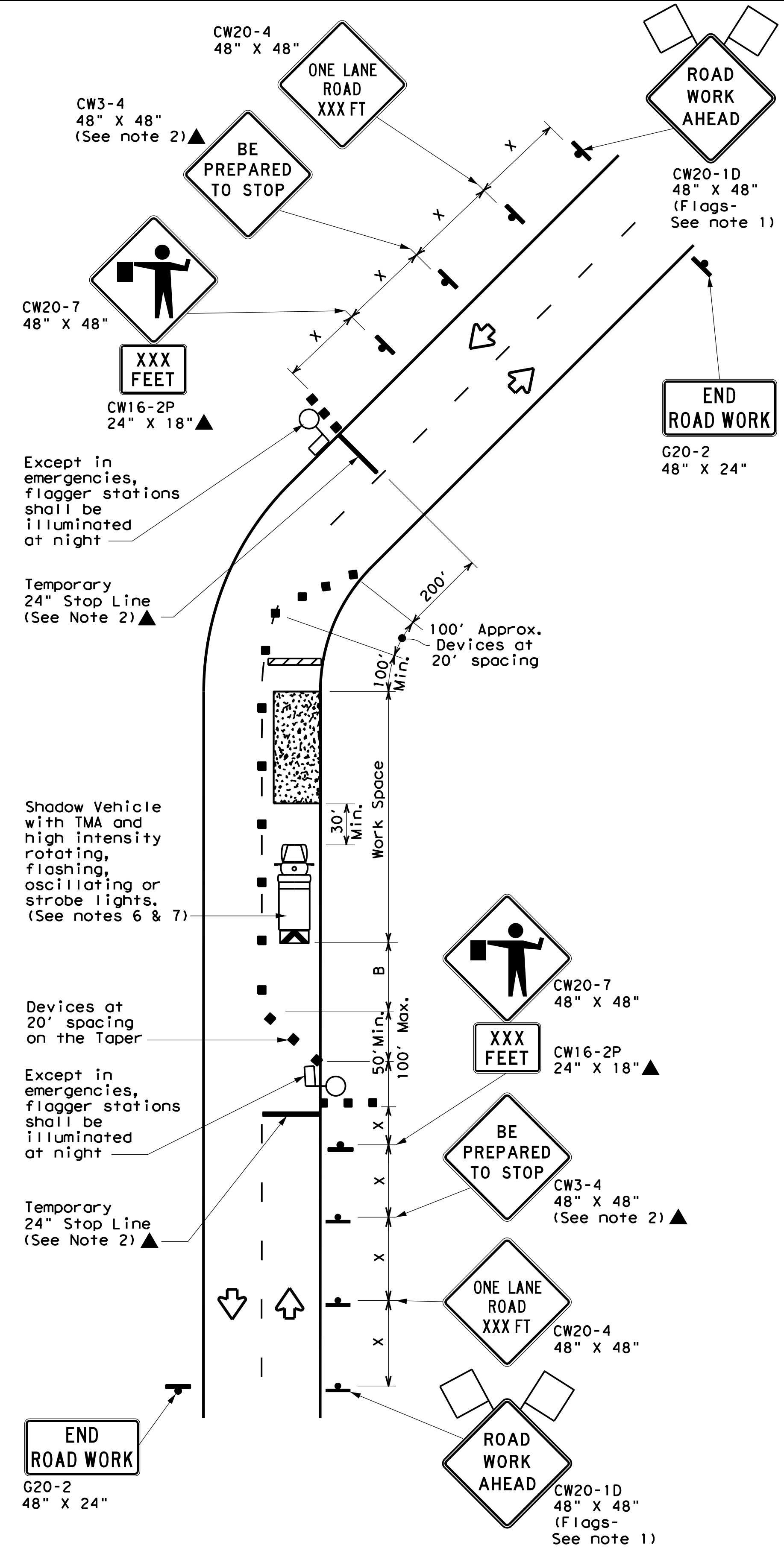


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	$L = \frac{WS^2}{60}$	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

1. Flags attached to signs where shown, are REQUIRED.
2. 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.
3. 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.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. 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.
7. 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)

8. The R1-2 "YIELD" sign traffic control may be used on projects 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.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. 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).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0284	02	026	SH 79
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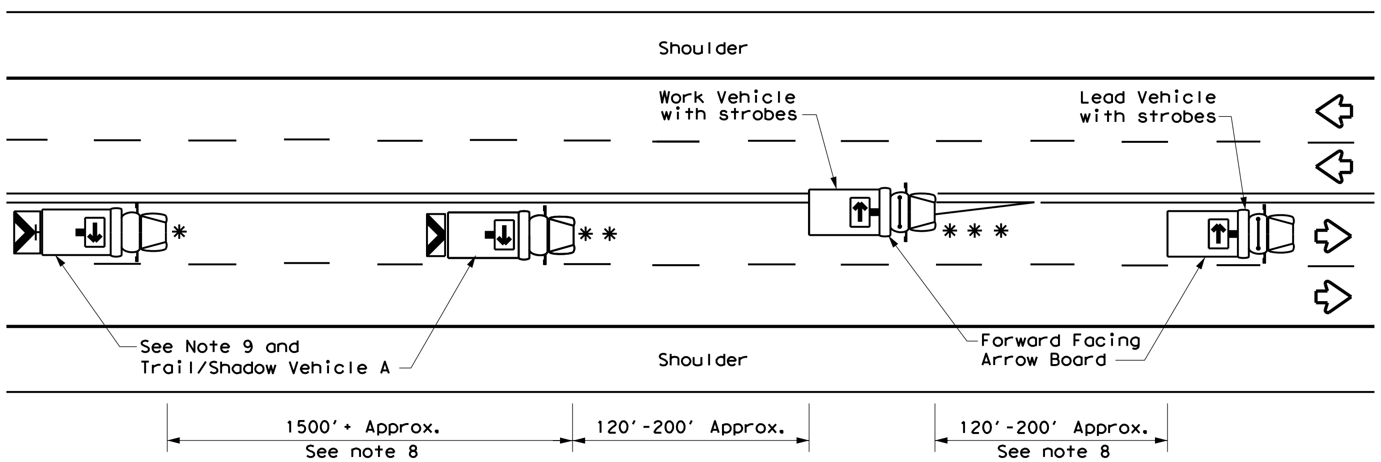
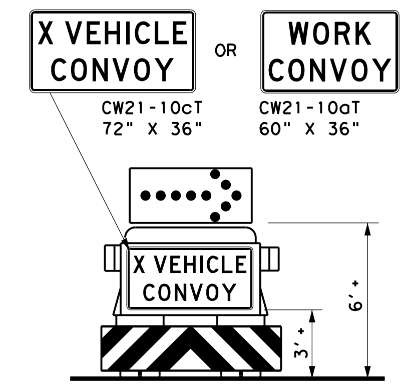
	WFS.		THROCKMORTON	33



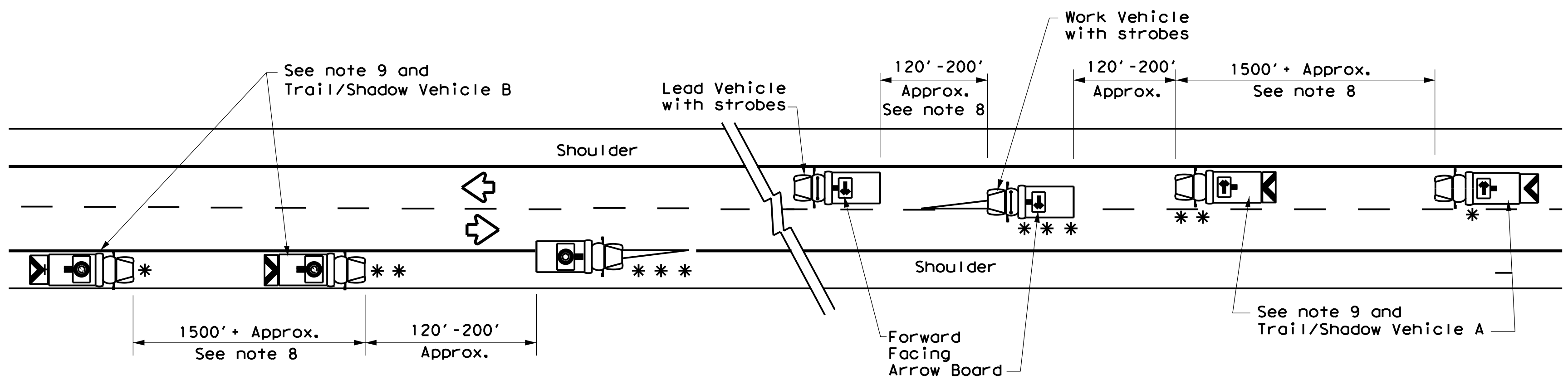
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

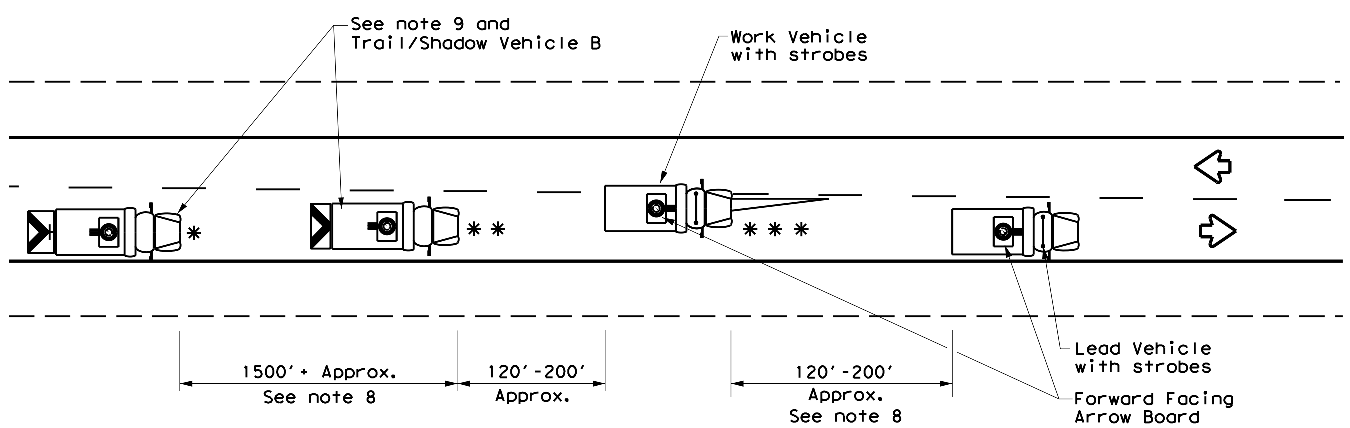


WORK ON SHOULDER

WORK ON TRAVEL LANE

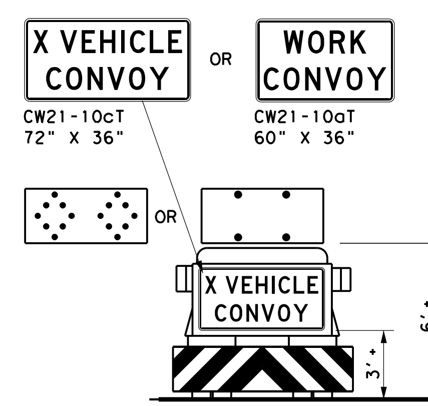
TCP (3-1b)

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

LEGEND

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

TYPICAL USAGE

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.

2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.

4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.

5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.

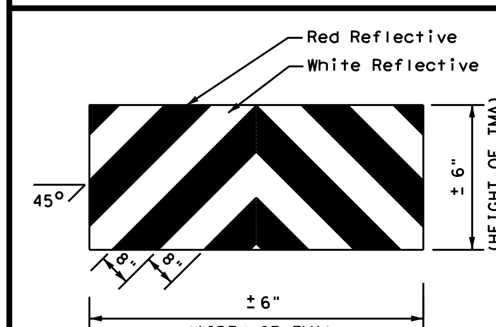
6. Each vehicle shall have two-way radio communication capability.

7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.

8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.

9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.

10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		34

175

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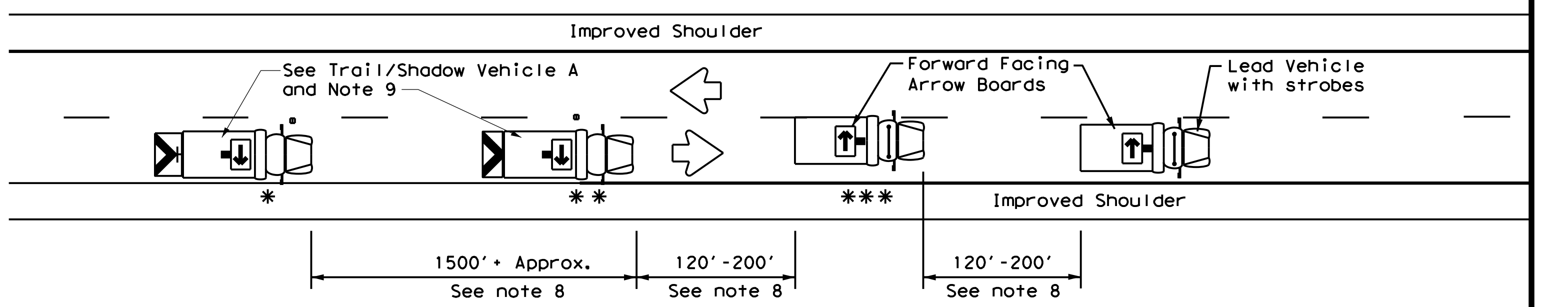
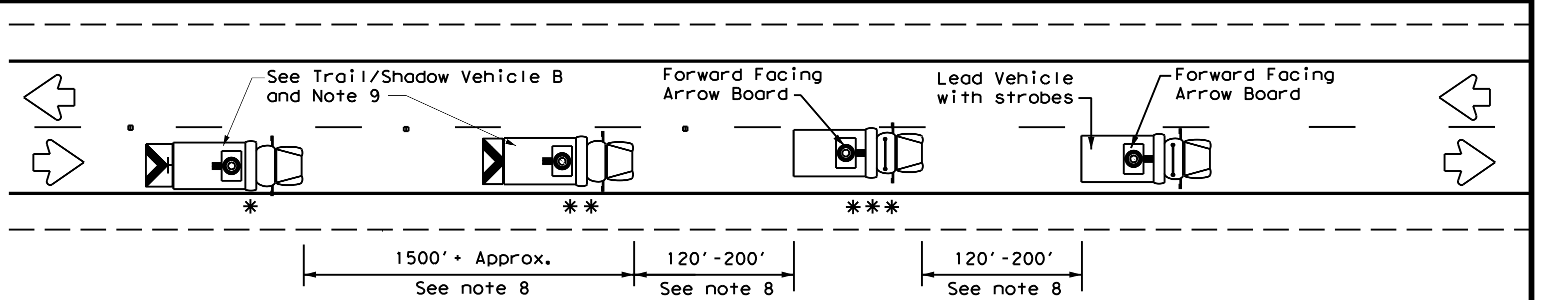


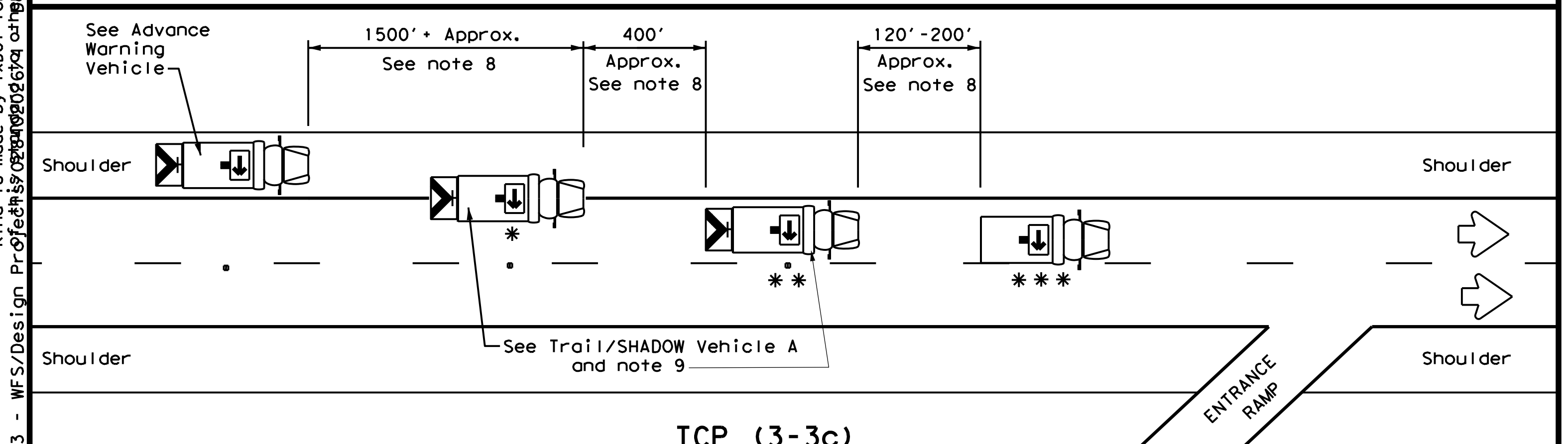
TCP (3-3a)

TWO LANE HIGHWAY WITH PAVED SHOULDERS (WORK ON TRAVEL LANE)



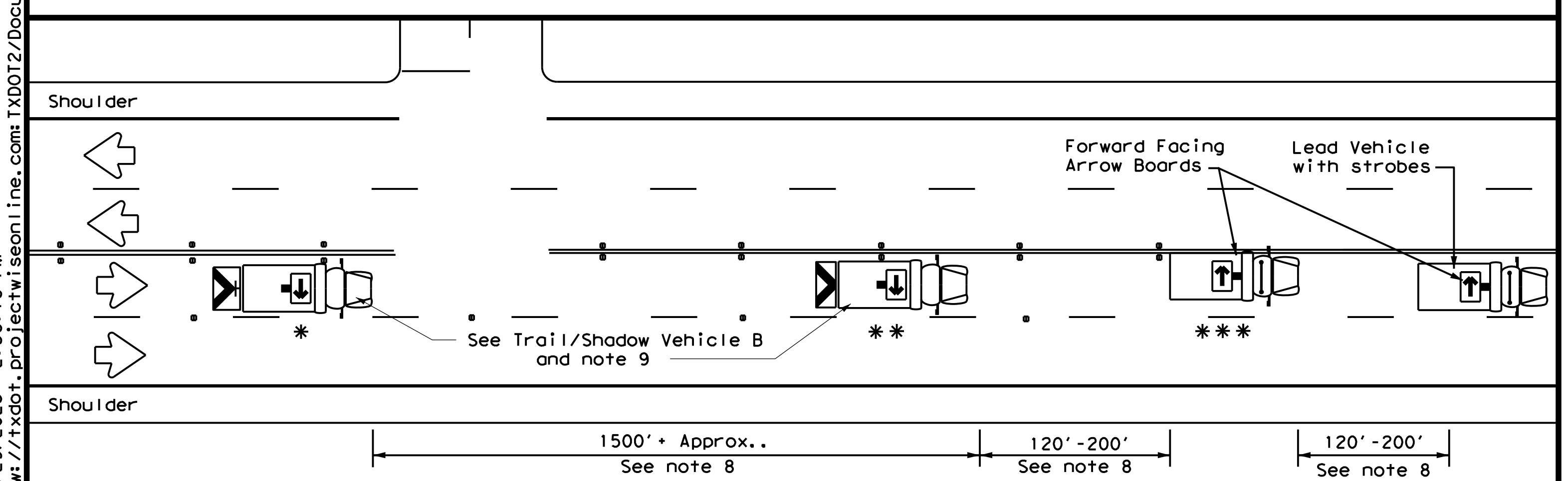
TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)



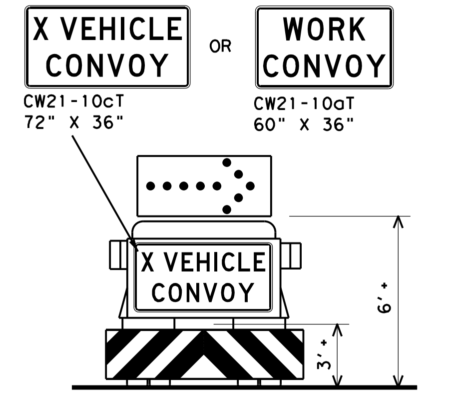
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



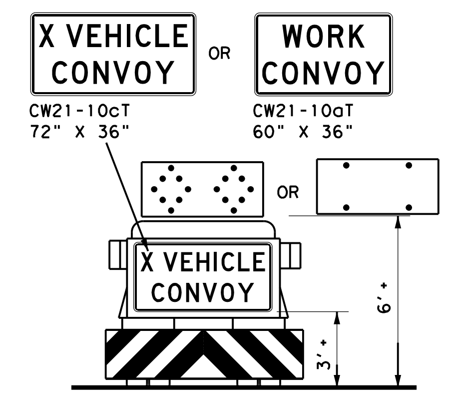
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



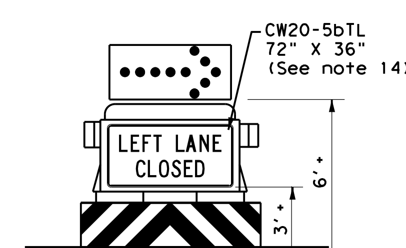
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

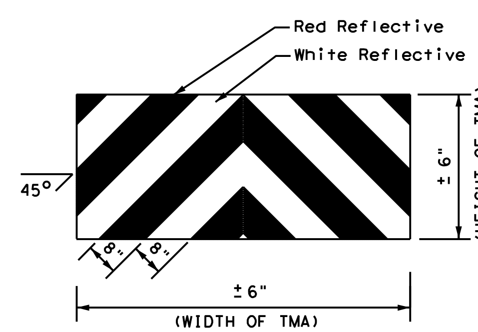


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

Symbol	Meaning	Arrow Board Display	
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

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

GENERAL NOTES

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

Texas Department of Transportation — Traffic Operations Division Standard

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

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REVISIONS 2-94 4-98 8-95 7-13 1-97 7-14	DIST WFS.	COUNTY THROCKMORTON		SHEET NO. 35

177

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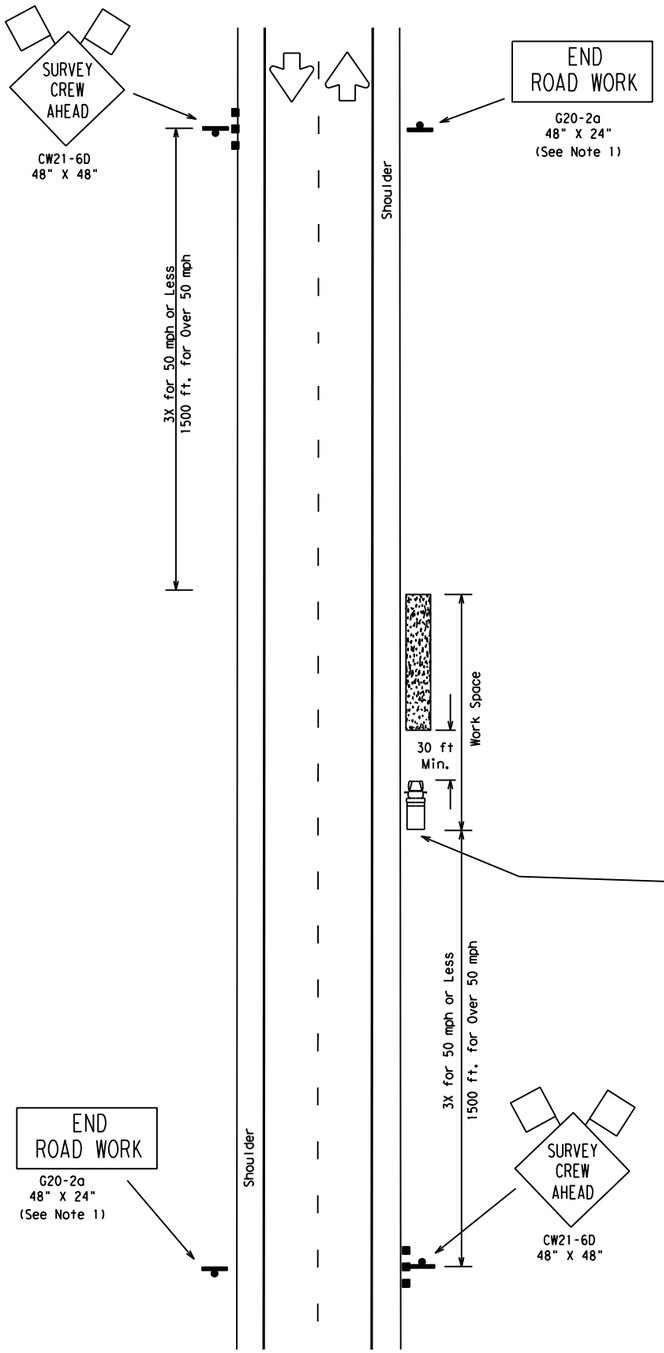
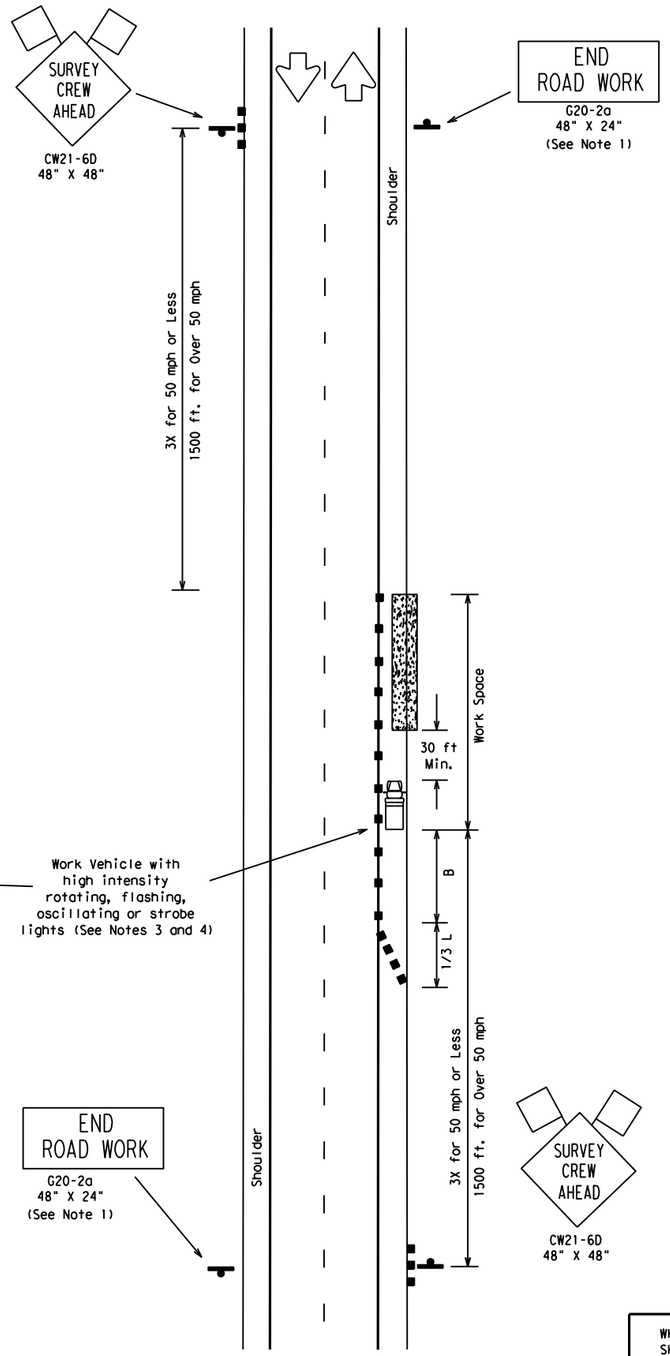


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



TCP (S-1b)
WORK ON SHOULDER

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel (M) Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Channelizing devices on the shoulder taper and tangent section may be omitted for short duration (less than 1 hour) work.
3. If line-of-sight requirements for surveying operations will preclude the placement of the Work Vehicle to protect workers, the channelizing devices mentioned in Note 2 are required.
⚠ 4. A Shadow Vehicle with a Truck Mounted Attenuator and flashing warning lights/arrow panel in caution mode may be used in lieu of the Work Vehicle to protect the work space.
5. The CW20-1D "ROAD WORK AHEAD" sign may be substituted for the CW21-6D "SURVEY CREW AHEAD" sign.
6. This plan may also be used for shoulder work or off shoulder work for multilane undivided roadways.
7. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-1a)

8. Cones may be placed at edge of pavement adjacent to the work space to enhance safety.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
⚠ Corrected misspelling.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-1)-08A

REVISIONS
8-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		36

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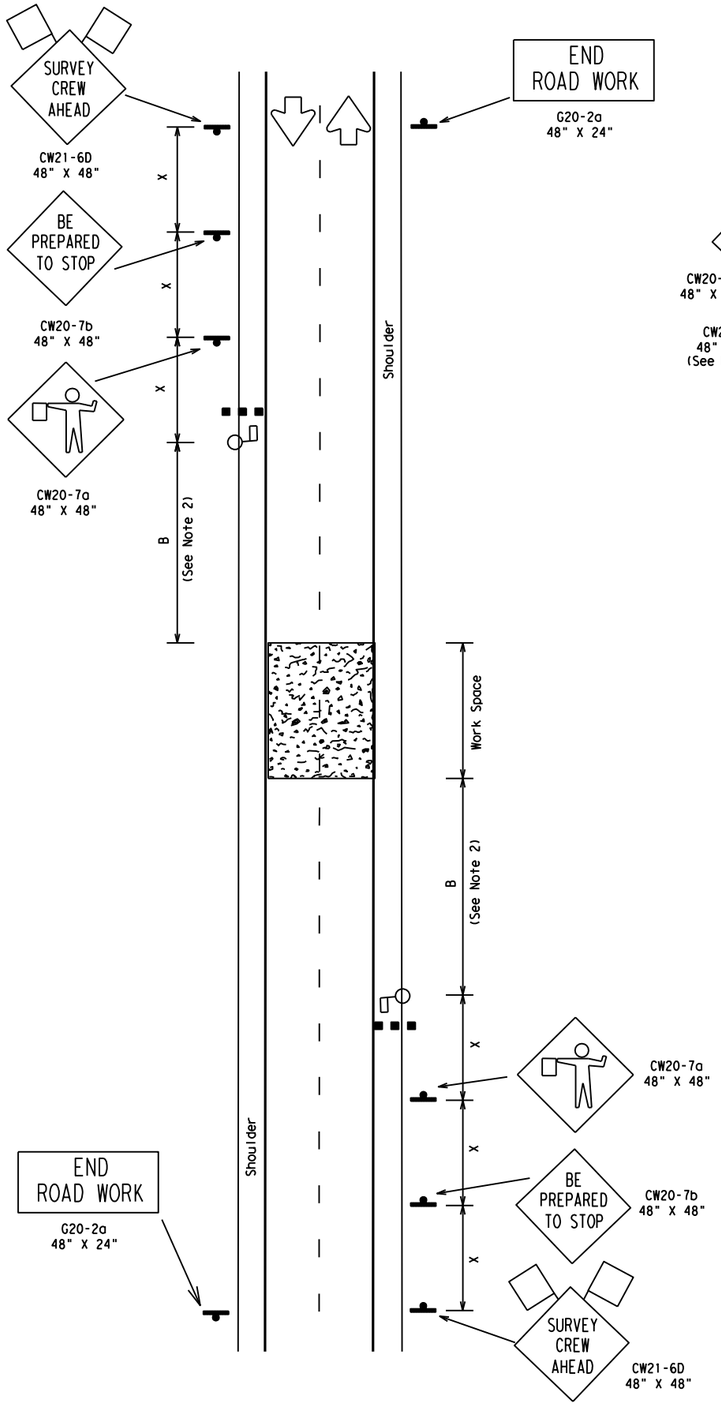
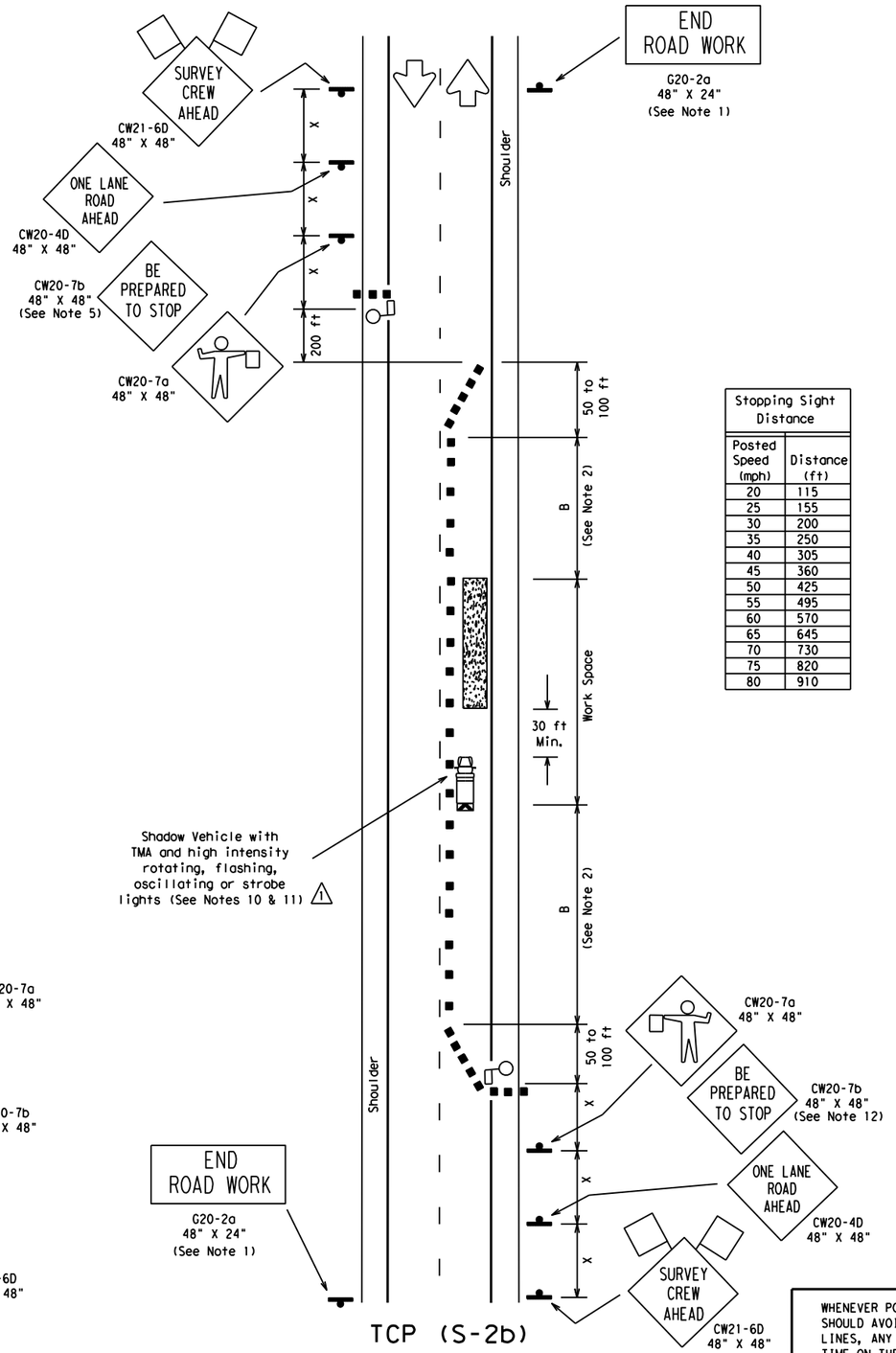


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



TCP (S-2b)
WORK IN ROADWAY
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND
Type III Barricade ■ ■ Channelizing Devices Flag
Heavy Work Vehicle Truck Mounted Attenuator (TMA)
Trailer Mounted Flashing Arrow Panel
Portable Changeable Message Sign (PCMS)
Flagger Sign Post

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:
SHORT DURATION - work that occupies a location up to 1 hour.
SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:
1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Adequate Stopping Sight Distance (see Stopping Sight Distance table) should be maintained from approaching traffic to the flagger or a queue of stopped vehicles. The Buffer Space "B" should be extended around curves or other obstacles, when necessary, to have adequate Stopping Sight Distance to the flagger station.
3. Flaggers should use two-way radios or other means of communication while flagging.
4. The length of the work space should be based on the ability of the flaggers to communicate.
5. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" signs.
6. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads is desirable, but is not required when working less than 15 minutes in area of the side road, as determined by the Engineer.

TCP(S-2a)

7. Road closures shall be less than 20 minutes. Closures less than 5 minutes are desirable.
8. Sign spacing should be increased if traffic repeatedly queues past the CW20-7b "BE PREPARED TO STOP" sign.
9. The surveying instrument should not be located on the paved surface.

TCP (S-2B)

10. For short duration work the Shadow Vehicle with a TMA may be replaced by another Work Vehicle with high intensity rotating, flashing or strobe lights.
11. Shadow Vehicles with a TMA are desirable when workers or equipment are in the work space. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Shadow Vehicle.
12. The CW20-7b "BE PREPARED TO STOP" sign is optional. When used, it should be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign.

WHENEVER POSSIBLE, SURVEY PARTIES SHOULD AVOID, BY THE USE OF OFFSET LINES, ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

8-18-08 Revision
1 Corrected referrence to notes.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2)-08A

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
8-08

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DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		37

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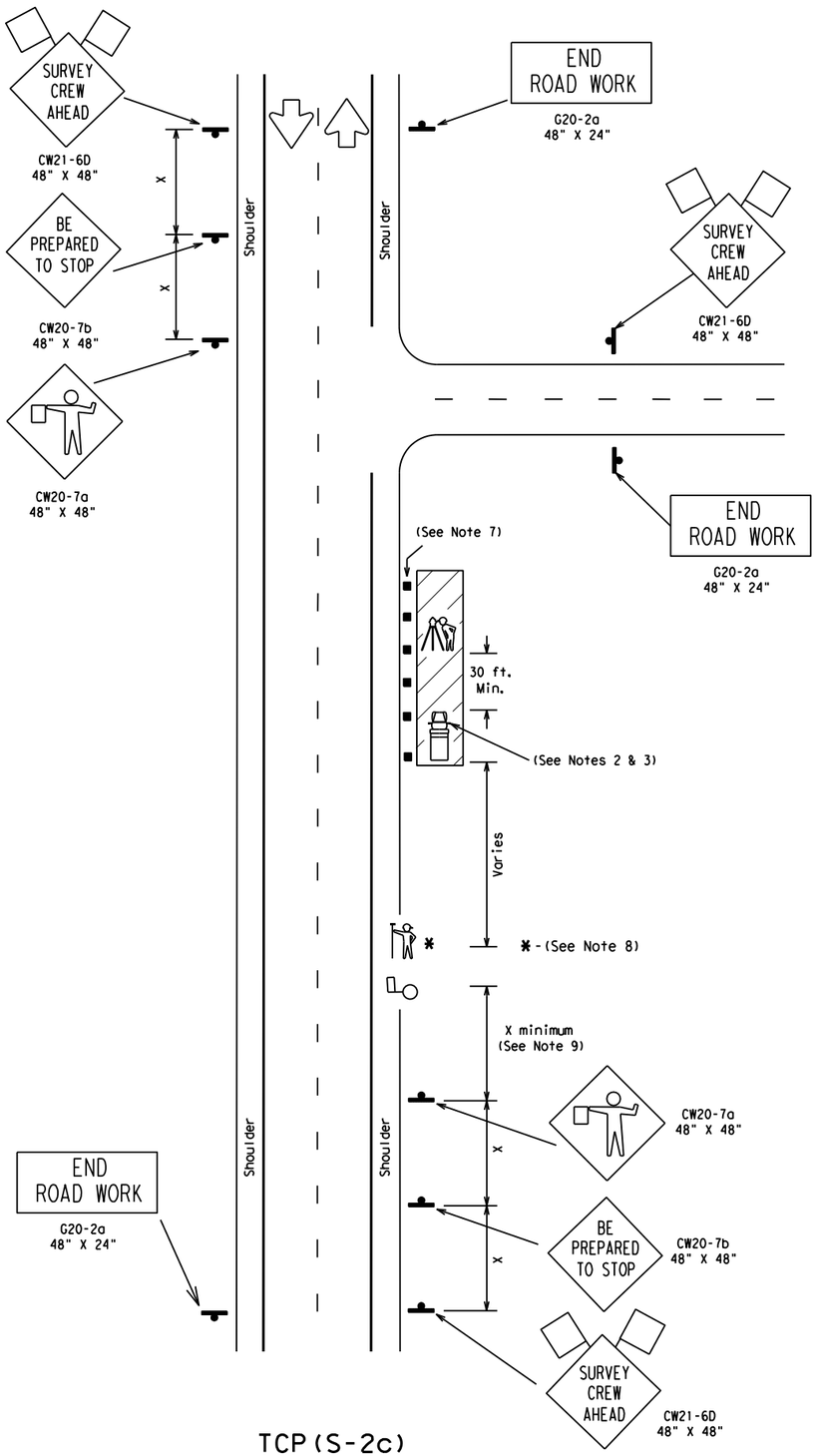


TCP(S-2c)

Stopping Sight Distance	
Posted Speed (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820
80	910

LEGEND

Type III Barricade ■ ■ Channelizing Devices Flag
Work Vehicle Truck Mounted Attenuator (TMA)
Flagger Sign Post Survey Rodman Instrument Person

Posted Speed*	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Min. Sign Spacing "X" Distance	Longitudinal Buffer Space "B"
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'	90'
35		205'	225'	245'	35'	70'-90'	160'	120'
40		265'	295'	320'	40'	80'-100'	240'	155'
45	L=WS	450'	495'	540'	45'	90'-110'	320'	195'
50		500'	550'	600'	50'	100'-125'	400'	240'
55		550'	605'	660'	55'	110'-140'	500'	295'
60		600'	660'	720'	60'	120'-150'	600'	350'
65		650'	715'	780'	65'	130'-165'	700'	410'
70		700'	770'	840'	70'	140'-175'	800'	475'
75		750'	825'	900'	75'	150'-185'	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
	✓	✓		

DEFINITIONS:

MOBILE - work that moves continously or intermittently (stopping up to approximately 15 minutes).

SHORT DURATION - work that occupies a location up to 1 hour.

SHORT TERM STATIONARY - daytime work that occupies a location for more than 1 hour within a single daylight period.

GENERAL NOTES:

1. The G20-2a "END ROAD WORK" sign may be placed on the back of the CW21-6D "SURVEY CREW AHEAD" sign or may be omitted for short duration (less than 1 hour) work.
2. Work Vehicle with high intensity rotating, flashing, oscillating or strobe lights should be used to protect work space.
3. When approved by the engineer, Type III barricades or other channelizing devices may be substituted for the Heavy Work Vehicle.
4. CW20-1D "ROAD WORK AHEAD" signs may be substituted for CW21-6D "SURVEY CREW AHEAD" SIGNS.
5. The CW21-6D "SURVEY CREW AHEAD" sign for low volume intersecting side roads may be omitted when approved by the Engineer.
6. The Surveying Instrument shall not be located on the paved surface.
7. Cones at edge of pavement adjacent to instrument person may be omitted when approved by the Engineer.
8. Rodman may only enter roadway when accompanied by flagger and as traffic allows.
9. The distance between the advance warning signs and the work should not exceed a two mile maximum.
10. Flaggers and Survey Crew should use two-way radios or other means of communication.
11. Survey Crew and Flaggers shall wear high-visibility apparel meeting the ANSI 107-2007 standard performance for Class 2 or Class 3 risk exposure.
12. Additional traffic control devices may be required to address local site conditions.
13. Stopping Sight Distance shall be maintained from approaching traffic to the flagger. See "Stopping Sight Distance" table.

SURVEY PARTIES SHOULD AVOID ANY UNNECCESSARY PERIODS OF TIME ON THE ROAD SURFACE.

This TCP is to cover two lane rural type roadways as determined by the Engineer. All other type roadways will be covered by other established Survey TCP'S.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC CONTROL PLAN FOR SURVEYING OPERATIONS

TCP(S-2c)-10

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

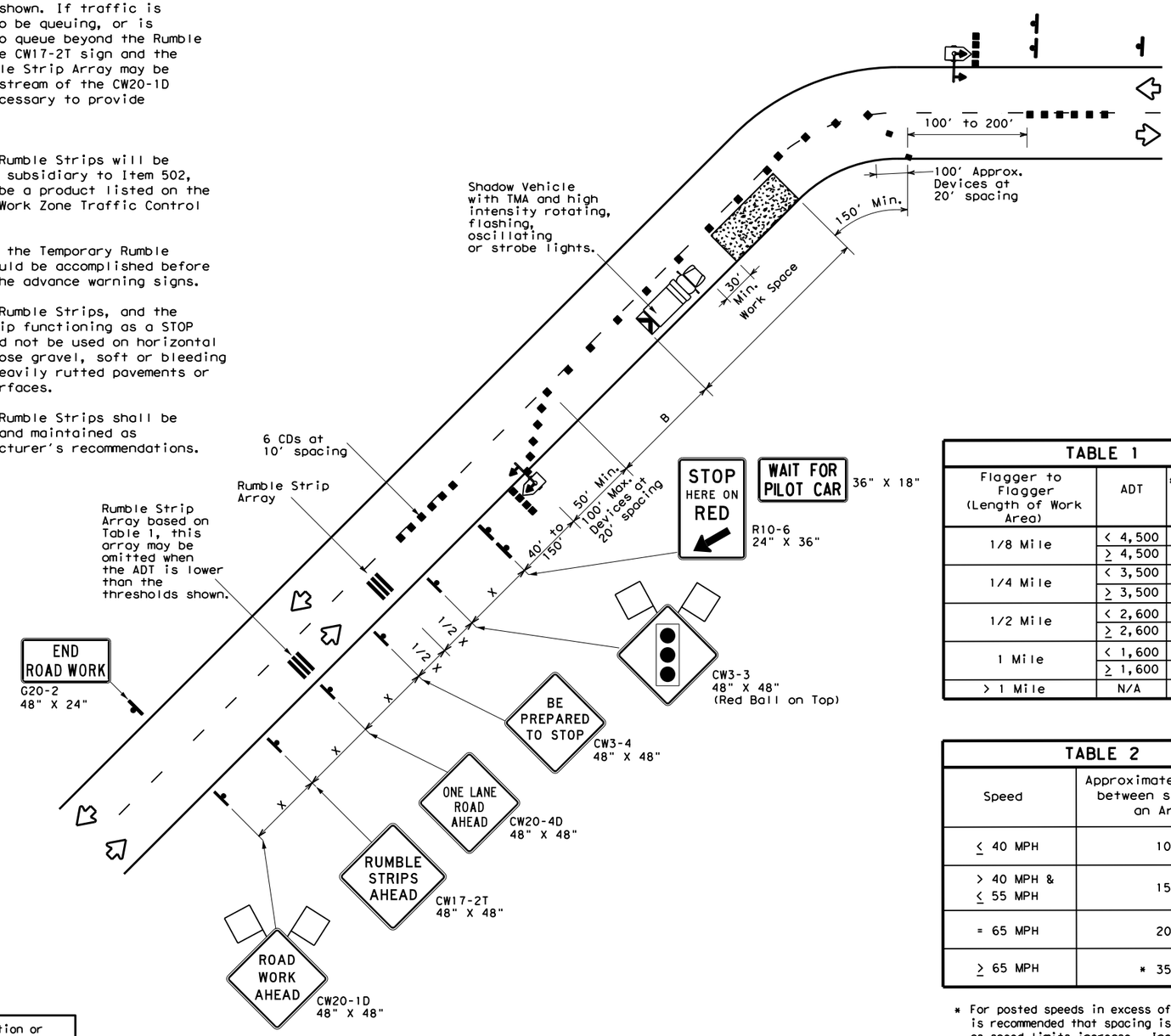
CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		38

212A

RUMBLE STRIP GENERAL NOTES

1. 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.
2. 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.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Removal of the Temporary Rumble Strips should be accomplished before removing the advance warning signs.
5. Temporary Rumble Strips, and the rumble strip functioning as a STOP bar, should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.

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



For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

ONE LANE TWO-WAY CONTROL
WITH PORTABLE TRAFFIC SIGNAL & RUMBLE STRIPS

TABLE 1

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

TABLE 2

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

* 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.

REVIEWED AND APPROVED BY
DISTRICT SAFETY REVIEW TEAM
1-21-2022

LEGEND

	Type 3 Barricade	■ ■	Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Temporary or Portable Traffic Signal	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
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
	✓	✓		

TCP GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. Portable traffic signals should be located to provide adequate stopping sight distance for approaching morotist (See table above).
3. 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.
4. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
5. The R10-6 "STOP HERE ON RED" arrow sign shall be offset so as not to obscure the lenses of the Portable Traffic Signals.
6. Proper alignment of overhead signal with on-coming lane should be ensured.
7. For Short Duration and Short Term Stationary refer to WZ(RS)-22 for rumble strip placement and signs.
8. Use of a pilot car is optional, if a pilot car is used it may control the operation of the signal and the "WAIT FOR PILOT CAR" sign is to be used as shown.
9. If pilot car is used to guide vehicles through traffic control zone, vehicle shall have an identification name displayed and "PILOT CAR FOLLOW ME" (G20-4) sign or message board mounted in a conspicuous position on rear.
10. Channelizing devices on the center-line may be ommitted when a pilot car is leading traffic and approved by the Engineer.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation
Wichita Falls District

TRAFFIC CONTROL PLAN
ONE LANE TWO-WAY CONTROL USING PORTABLE TRAFFIC SIGNAL & RUMBLE STRIPS

REVISIONS

DATE:
FILE:

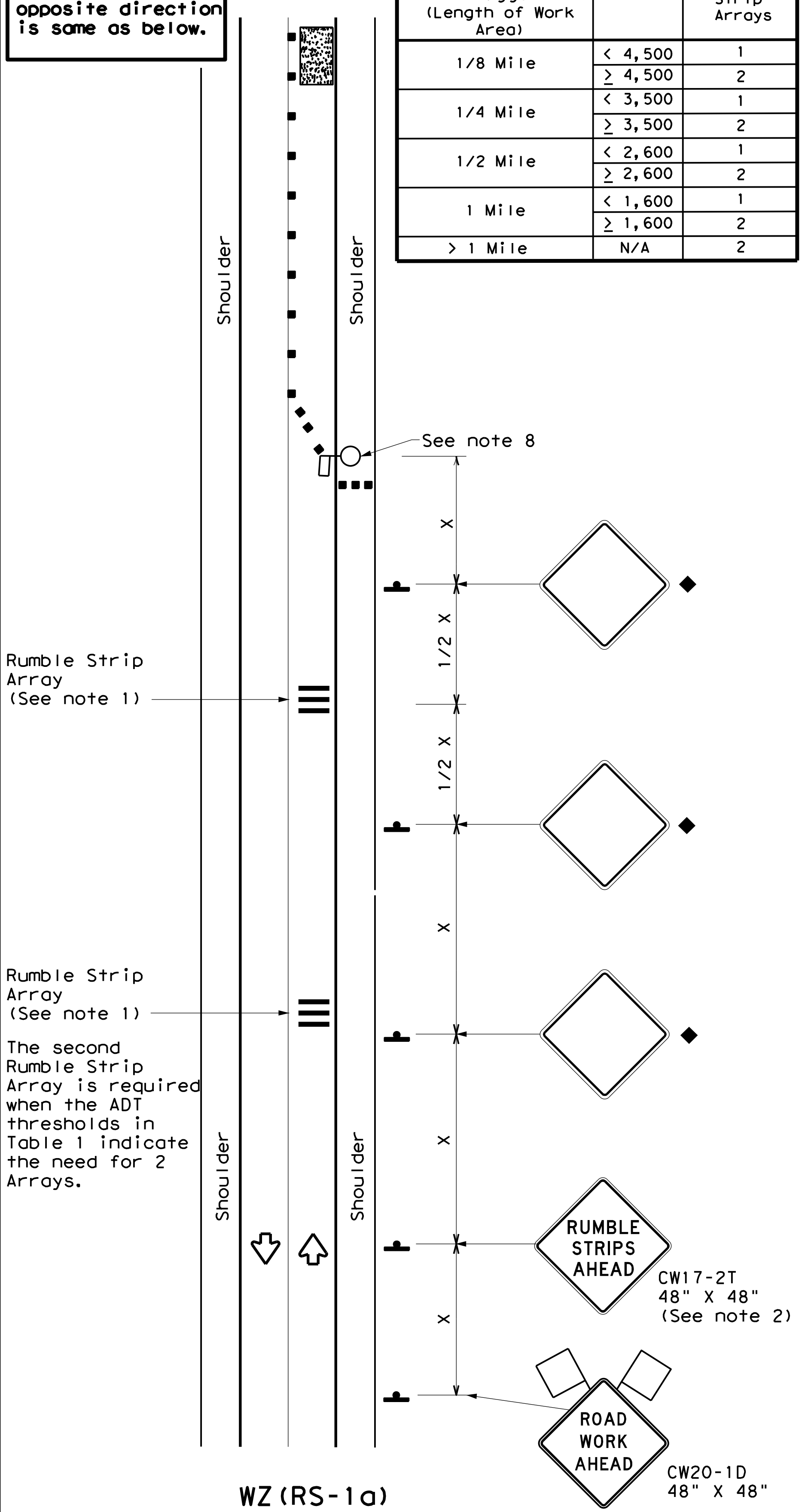
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		39

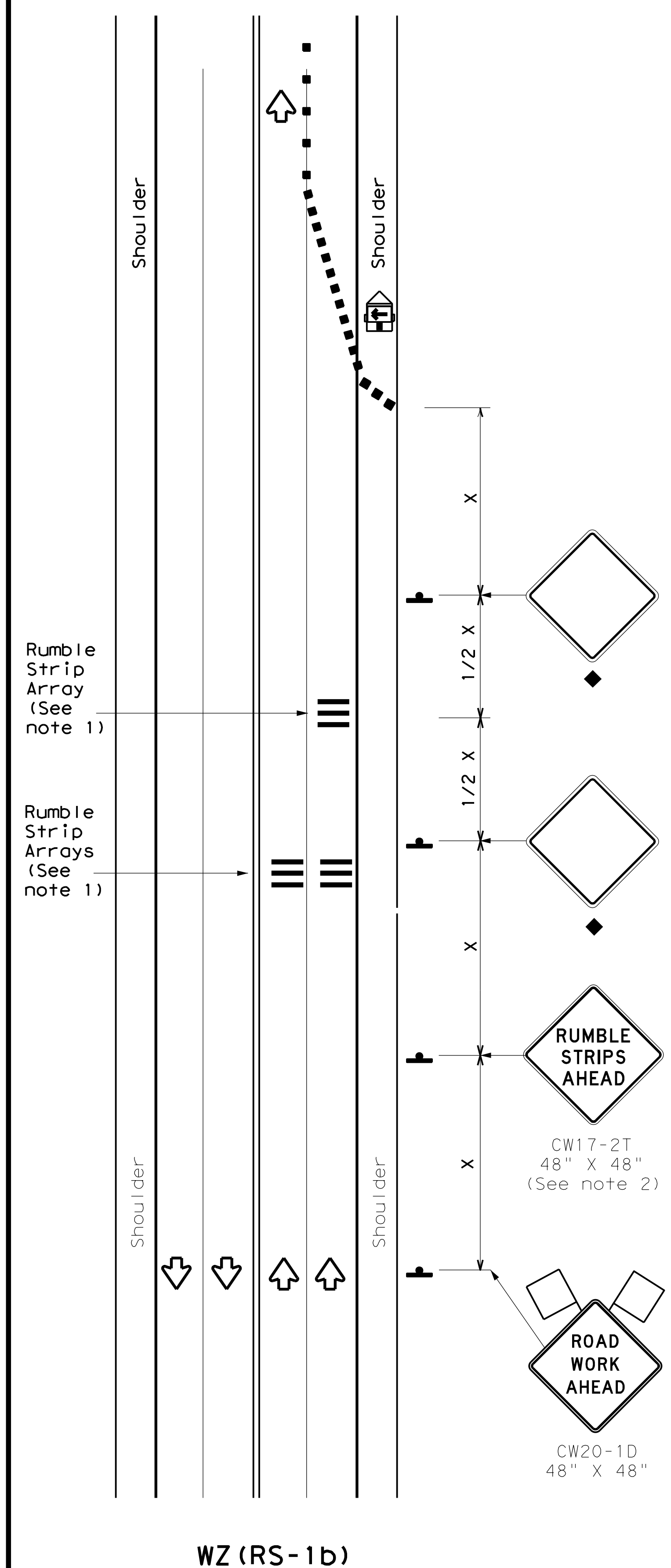
DATE: 3/29/2023 2:57:03 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/...

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

TABLE 1		
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

1. 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.
2. 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.
3. Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
4. Remove Temporary Rumble Strips before removing the advanced warning signs.
5. Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
6. Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
7. This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
8. The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
9. Replace defective Temporary Rumble Strips as directed by the Engineer.
10. Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

◆ **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.**

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

Texas Department of Transportation

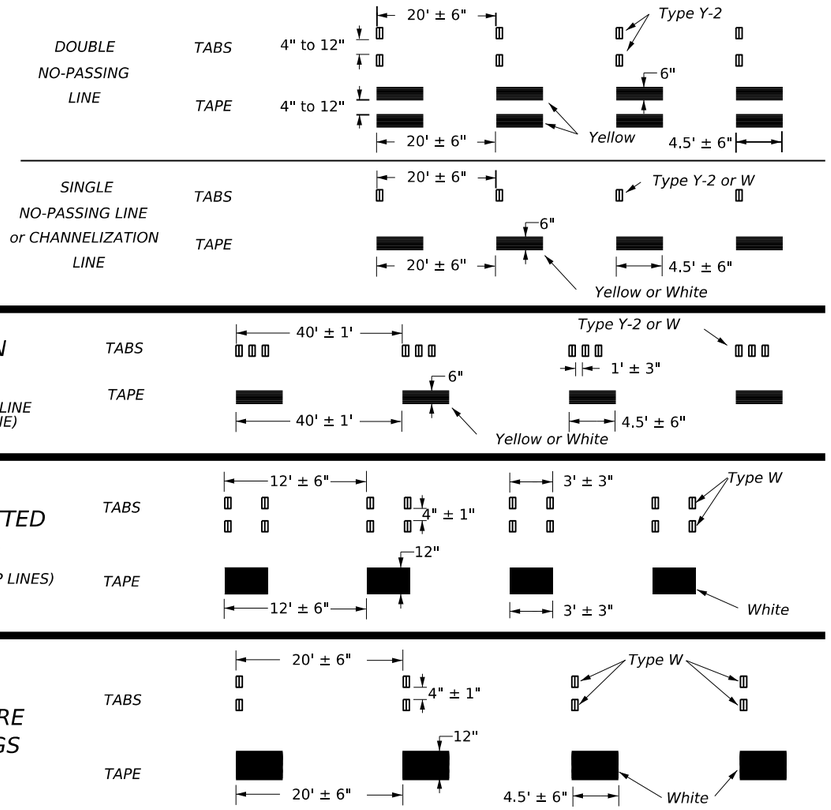
Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2012	CONT 0284	SECT 02	JOB 026	HIGHWAY SH 79
REVISIONS 2-14 1-22 4-16	DIST WFS.	COUNTY THROCKMORTON		SHEET NO. 40

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



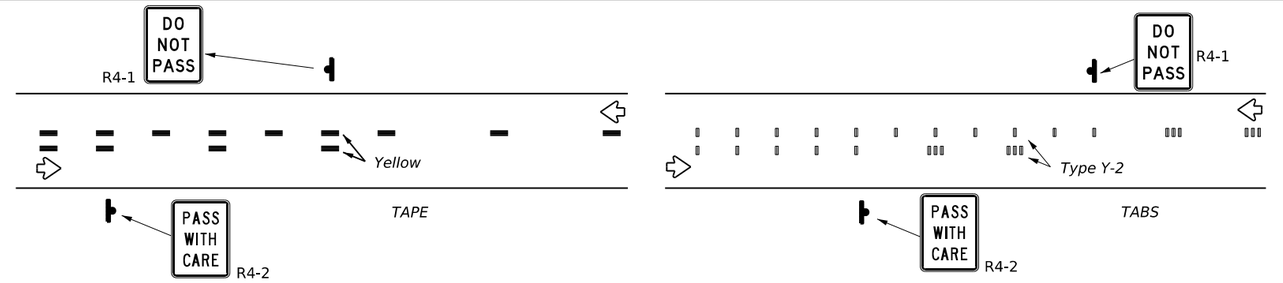
NOTES:

1. Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
2. Short term pavement markings shall NOT be used to simulate edge lines.
3. Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
4. 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.
5. 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.
6. 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.
7. 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).
8. 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.

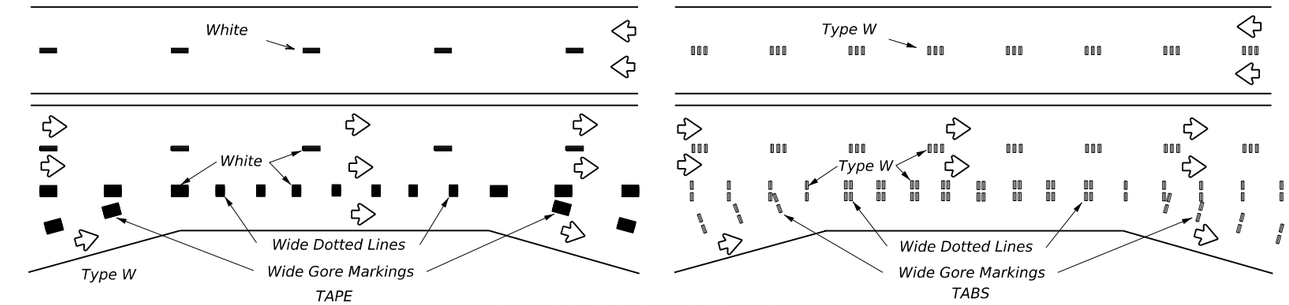
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

1. 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).
2. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
3. 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.
4. 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.

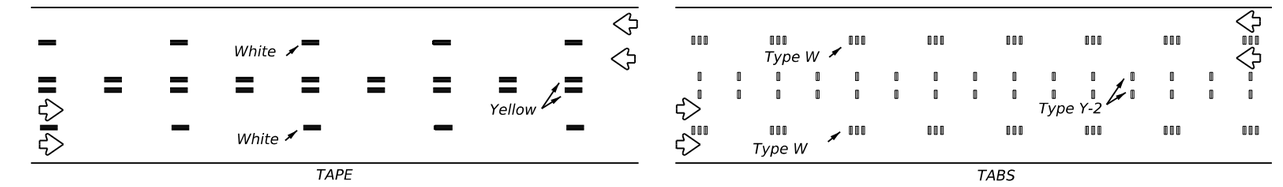
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



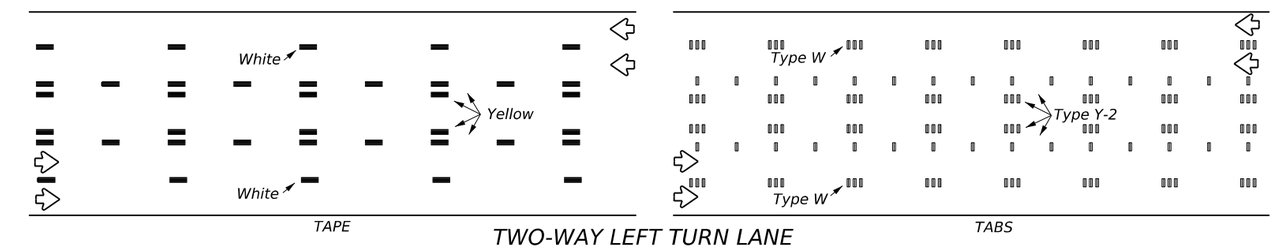
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



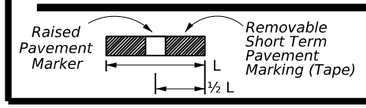
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

1. 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)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
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1-97 2-23	WFS.	THROCKMORTON		41
3-03				

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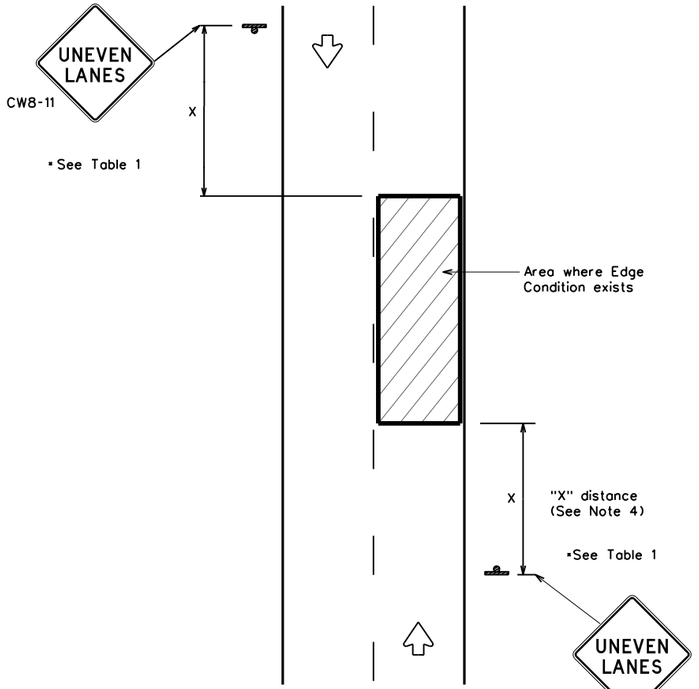
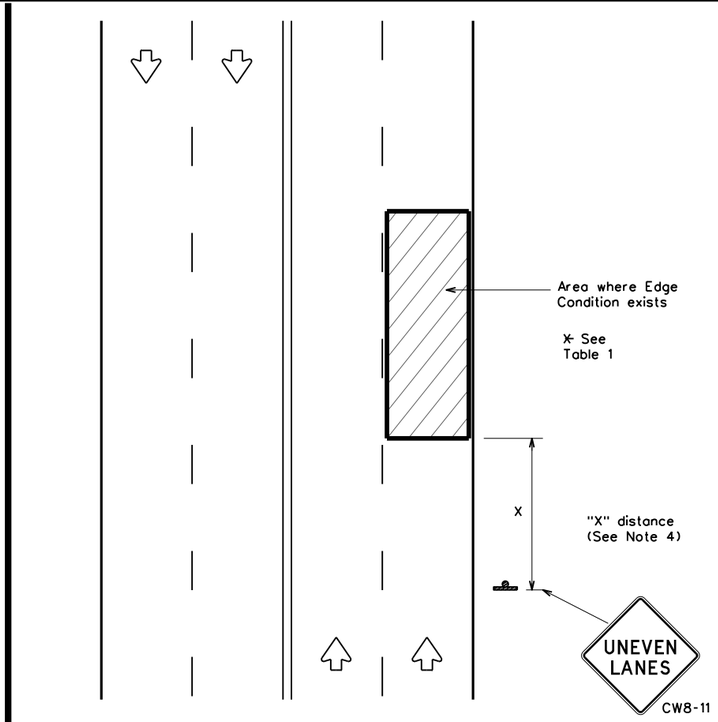
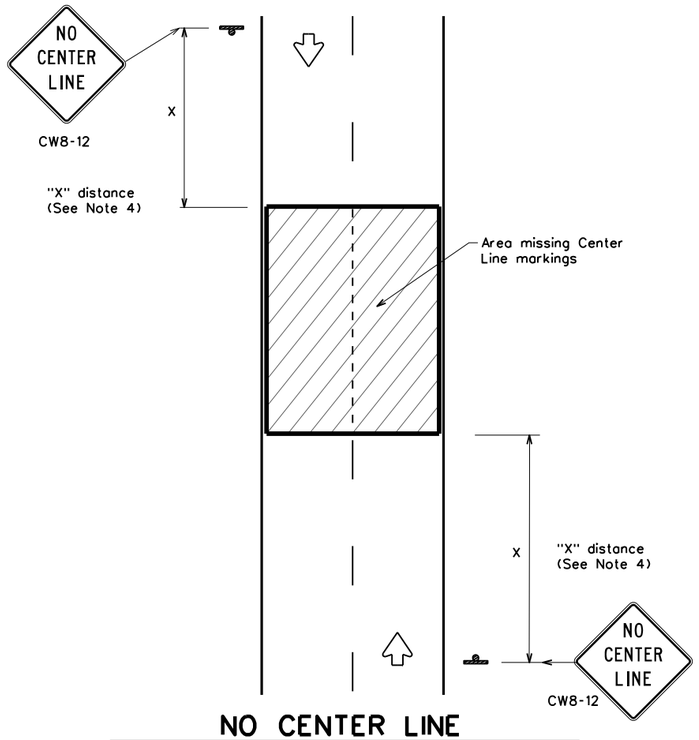


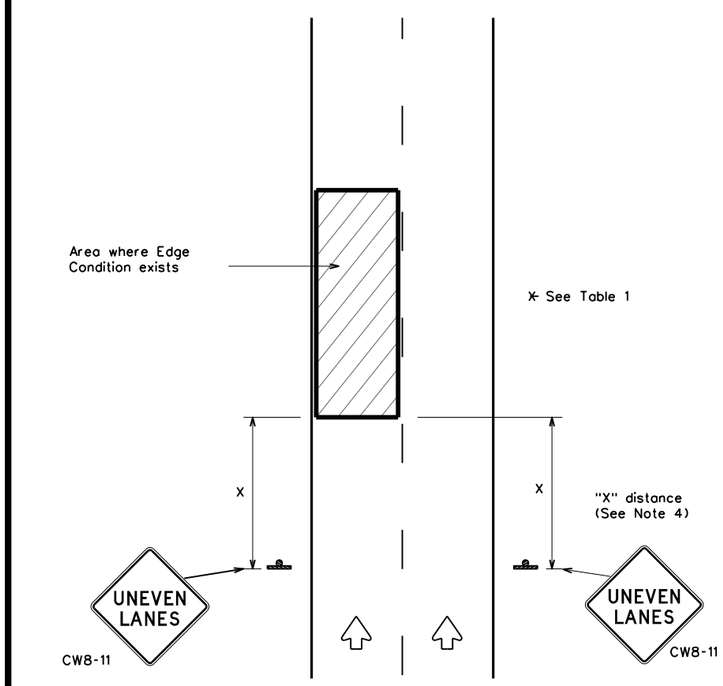
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

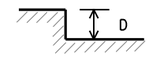
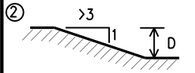
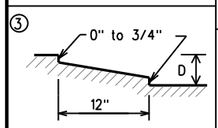
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

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

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

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

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

Texas Department of Transportation

Traffic Operations Division Standard

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	0284	02	026	SH 79
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	WFS.	THROCKMORTON		42

DATE: 3/29/2023 2:57:27 PM
FILE: T:\WFSDESGN\Warren M\SH79\SRT\WZ(UL)-13.dgn

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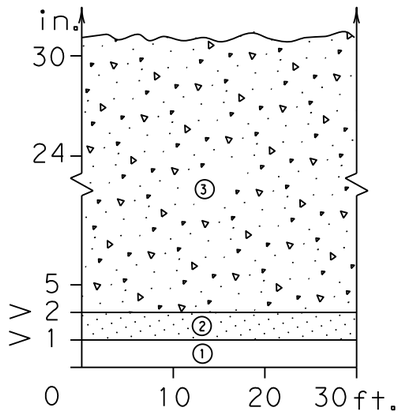
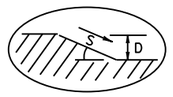
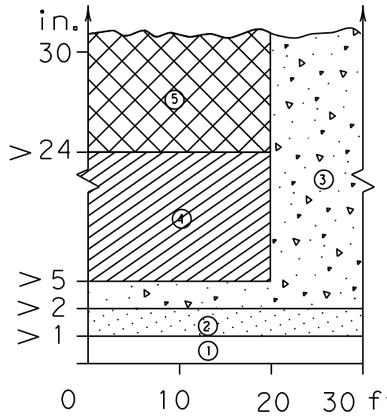
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

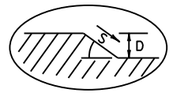


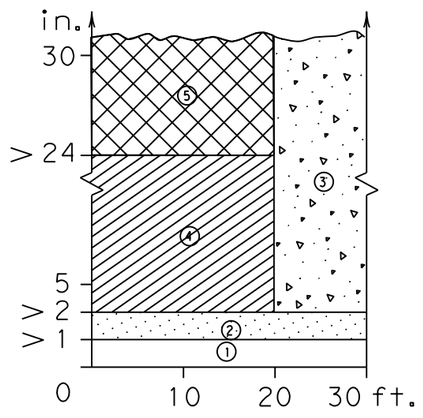
Edge Condition I
S = (3:1) (or flatter)



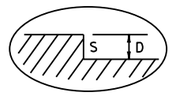


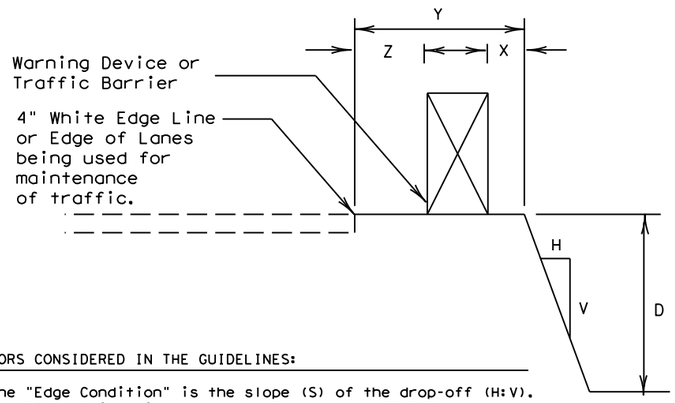
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment.
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a "Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive barrier. Where positive barrier is not indicated, the treatment shown above for Zone- 4 may be used after consideration of other applicable factors.

Edge Condition Notes:

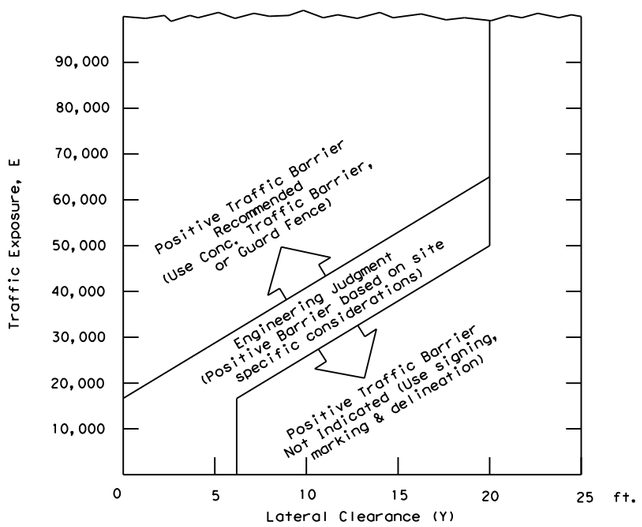
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material as directed by the Egineer, capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▨)



1 E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2 Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3 An approved end treatment should be provided for any positive barrier end located within a lateral offset of 20 feet from the edge of the travel lane.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Byron Lawrence, P.E.

Date 03/30/2023

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
03-01	CONT	SECT	JOB	HIGHWAY
08-01 correct typos	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		43

DATE:
FILE:

Alignment Name: SH 79
Alignment Description:
Alignment Style: Alignment\Baseline

		Station	Northing	Easting
Element: Circular				
PC	( )	0+000.000 R1	7117354.28	1761318.07
PI	( )	0+316.927 R1	7117639.63	1761455.98
CC	( )		7116745.11	1762578.59
PT	( )	0+623.348 R1	7117837.77	1761703.33
Radius:		1400		
Delta:		25.511° Right		
Degree of Curvature (Arc):		4.093°		
Length:		623.348		
Tangent:		316.927		
Chord:		618.212		
Middle Ordinate:		34.55		
External:		35.424		
Back Tangent Direction:		N25.793°E		
Back Radial Direction:		S64.207°E		
Chord Direction:		N38.549°E		
Ahead Radial Direction:		S38.696°E		
Ahead Tangent Direction:		N51.304°E		
Element: Linear				
PT	( )	0+623.348 R1	7117837.77	1761703.33
PI	( )	1+483.744 R1	7118332.94	1762406.95
Tangential Direction:		N54.864°E		
Tangential Length:		860.396		
Element: Linear				
PI	( )	1+483.744 R1	7118332.94	1762406.95
PI	( )	1+840.424 R1	7118538.58	1762698.39
Tangential Direction:		N54.793°E		
Tangential Length:		356.68		
Element: Linear				
PI	( )	1+840.424 R1	7118538.58	1762698.39
PI	( )	1+997.969 R1	7118629.02	1762827.39
Tangential Direction:		N54.969°E		
Tangential Length:		157.545		
Element: Linear				
PI	( )	1+997.969 R1	7118629.02	1762827.39
PI	( )	2+306.780 R1	7118806.19	1763080.31
Tangential Direction:		N54.989°E		
Tangential Length:		308.811		
Element: Linear				
PI	( )	2+306.780 R1	7118806.19	1763080.31
PI	( )	2+601.256 R1	7118975.14	1763321.51
Tangential Direction:		N54.990°E		
Tangential Length:		294.476		
Element: Linear				
PI	( )	2+601.256 R1	7118975.14	1763321.51
PI	( )	2+851.545 R1	7119118.95	1763526.36
Tangential Direction:		N54.930°E		
Tangential Length:		250.289		
Element: Linear				
PI	( )	2+851.545 R1	7119118.95	1763526.36
PI	( )	3+105.772 R1	7119265.76	1763733.91
Tangential Direction:		N54.727°E		
Tangential Length:		254.227		
Element: Linear				
PI	( )	3+105.772 R1	7119265.76	1763733.91
PI	( )	3+315.030 R1	7119385.88	1763905.25
Tangential Direction:		N54.967°E		
Tangential Length:		209.258		
Element: Linear				
PI	( )	3+315.030 R1	7119385.88	1763905.25
PI	( )	3+522.169 R1	7119504.73	1764074.91
Tangential Direction:		N54.988°E		
Tangential Length:		207.139		
Element: Linear				
PI	( )	3+522.169 R1	7119504.73	1764074.91
PI	( )	3+853.627 R1	7119694.81	1764346.44
Tangential Direction:		N55.006°E		
Tangential Length:		331.458		
Element: Linear				
PI	( )	3+853.627 R1	7119694.81	1764346.44
PI	( )	4+669.669 R1	7120163.75	1765014.29
Tangential Direction:		N54.925°E		
Tangential Length:		816.042		
Element: Linear				
PI	( )	4+669.669 R1	7120163.75	1765014.29
PI	( )	4+950.117 R1	7120325.01	1765243.74
Tangential Direction:		N54.899°E		
Tangential Length:		280.447		
Element: Linear				
PI	( )	4+950.117 R1	7120325.01	1765243.73
PC	( )	5+208.043 R1	7120472.97	1765455
Tangential Direction:		N54.994°E		
Tangential Length:		257.926		
Element: Circular				
PC	( )	5+208.043 R1	7120472.98	1765455.01
PI	( )	5+417.422 R1	7120590.95	1765628
CC	( )		7118000.27	1767141.35
PT	( )	5+626.120 R1	7120683.69	1765815.72
Radius:		2993		
Delta:		8.003° Right		
Degree of Curvature (Arc):		1.914°		
Length:		418.077		
Tangent:		209.379		
Chord:		417.737		
Middle Ordinate:		7.297		
External:		7.315		
Back Tangent Direction:		N55.707°E		
Back Radial Direction:		S34.293°E		
Chord Direction:		N59.709°E		
Ahead Radial Direction:		S26.290°E		
Ahead Tangent Direction:		N63.710°E		
Element: Linear				
PT	( )	5+626.120 R1	7120683.69	1765815.72
PI	( )	6+292.341 R1	7120979.26	1766412.79
Tangential Direction:		N63.663°E		
Tangential Length:		666.221		
Element: Linear				
PI	( )	6+292.341 R1	7120979.26	1766412.79
PI	( )	6+687.327 R1	7121154.87	1766766.59
Tangential Direction:		N63.603°E		
Tangential Length:		394.986		
Element: Linear				
PI	( )	6+687.327 R1	7121154.87	1766766.59
PI	( )	7+128.689 R1	7121350.6	1767162.17
Tangential Direction:		N63.674°E		
Tangential Length:		441.362		
Element: Linear				
PI	( )	7+128.689 R1	7121350.6	1767162.17
PI	( )	7+458.534 R1	7121496.99	1767457.76
Tangential Direction:		N63.653°E		
Tangential Length:		329.845		
Element: Linear				
PI	( )	7+458.534 R1	7121496.99	1767457.76
PI	( )	8+501.260 R1	7121958.48	1768392.8
Tangential Direction:		N63.731°E		
Tangential Length:		1042.726		
Element: Linear				
PI	( )	8+501.260 R1	7121958.48	1768392.8
PI	( )	9+330.113 R1	7122327.81	1769134.82
Tangential Direction:		N63.539°E		
Tangential Length:		828.853		
Element: Linear				
PI	( )	9+330.113 R1	7122327.81	1769134.82
PI	( )	11+552.623	7123312.65	1771127.21
Tangential Direction:		N63.697°E		
Tangential Length:		2222.51		
Element: Linear				
PI	( )	11+552.623	7123312.65	1771127.21
PI	( )	12+289.976	7123640.15	1771787.85
Tangential Direction:		N63.631°E		
Tangential Length:		737.354		
Element: Linear				
PI	( )	12+289.976	7123640.15	1771787.85
PI	( )	12+982.283	7123947.4	1772408.24
Tangential Direction:		N63.653°E		
Tangential Length:		692.306		
Element: Linear				
PI	( )	12+982.283	7123947.4	1772408.24
PI	( )	13+524.701	7124188.12	1772894.31
Tangential Direction:		N63.653°E		
Tangential Length:		542.418		
Element: Linear				
PI	( )	13+524.701	7124188.12	1772894.31
PI	( )	13+650.695	7124244.04	1773007.22
Tangential Direction:		N63.653°E		
Tangential Length:		125.994		
Element: Linear				
PI	( )	13+650.695	7124244.04	1773007.22
PI	( )	14+904.481	7124799.25	1774131.37
Tangential Direction:		N63.716°E		
Tangential Length:		1253.785		
Element: Linear				
PI	( )	14+904.481	7124799.25	1774131.37
PI	( )	15+501.482	7125064.88	1774666.02
Tangential Direction:		N63.580°E		
Tangential Length:		597.002		
Element: Linear				
PI	( )	15+501.482	7125064.88	1774666.02
PI	( )	15+981.627	7125276.81	1775096.86
Tangential Direction:		N63.807°E		
Tangential Length:		480.145		
Element: Linear				
PI	( )	15+981.627	7125276.81	1775096.86
PI	( )	16+183.678	7125367.21	1775277.56
Tangential Direction:		N63.423°E		
Tangential Length:		202.051		
Element: Linear				
PI	( )	16+183.678	7125367.21	1775277.56
PI	( )	17+318.150	7125869.12	1776294.97
Tangential Direction:		N63.742°E		
Tangential Length:		1134.472		
Element: Linear				
PI	( )	17+318.150	7125869.12	1776294.97
PI	( )	18+860.874	7126554.81	1777676.93
Tangential Direction:		N63.611°E		
Tangential Length:		1542.724		
Element: Linear				
PI	( )	18+860.874	7126554.81	1777676.93
PI	( )	20+502.620	7127281.97	1779148.86
Tangential Direction:		N63.710°E		
Tangential Length:		1641.746		
Element: Linear				
PI	( )	20+502.620	7127281.97	1779148.86
PI	( )	21+652.794	7127793.32	1780179.11
Tangential Direction:		N63.603°E		
Tangential Length:		1150.175		
Element: Linear				
PI	( )	21+652.794	7127793.32	1780179.11
PI	( )	22+313.015	7128085.01	1780771.4
Tangential Direction:		N63.781°E		
Tangential Length:		660.221		
Element: Linear				
PI	( )	22+313.015	7128085.01	1780771.4
PI	( )	22+672.763	7128244.46	1781093.89
Tangential Direction:		N63.690°E		
Tangential Length:		359.747		
Element: Linear				
PI	( )	22+672.763	7128244.46	1781093.89
PI	( )	23+187.697	7128473	1781555.32
Tangential Direction:		N63.651°E		
Tangential Length:		514.934		
Element: Linear				
PI	( )	23+187.697	7128473	1781555.32
PI	( )	23+670.735	7128686.34	1781988.7
Tangential Direction:		N63.791°E		
Tangential Length:		483.039		
Element: Linear				
PI	( )	23+670.735	7128686.34	1781988.7
PI	( )	24+270.735	7128952.48	1782526.44
Tangential Direction:		N63.667°E		
Tangential Length:		600		
Element: Linear				
PI	( )	24+270.735	7128952.48	1782526.44
PI	( )	25+845.084	7129649.1	1783938.28
Tangential Direction:		N63.738°E		
Tangential Length:		1574.348		
Element: Linear				
PI	( )	25+845.084	7129649.1	1783938.28
PI	( )	26+757.665	7130053.34	1784756.45
Tangential Direction:		N63.707°E		
Tangential Length:		912.582		
Element: Linear				
PI	( )	26+757.665	7130053.34	1784756.45
PI	( )	27+232.931	7130264.27	1785182.34
Tangential Direction:		N63.653°E		
Tangential Length:		475.266		
Element: Linear				
PI	( )	27+232.931	7130264.27	1785182.34
PI	( )	27+646.143	7130447.76	1785552.58
Tangential Direction:		N63.637°E		
Tangential Length:		413.212		
Element: Linear				
PI	( )	27+646.143	7130447.76	1785552.58
PI	( )	28+980.715	7131039.16	1786748.96
Tangential Direction:		N63.696°E		
Tangential Length:		1334.572		
Element: Linear				
PI	( )	28+980.715	7131039.16	1786748.96
PI	( )	30+113.472	7131540.11	1787764.93
Tangential Direction:		N63.753°E		
Tangential Length:		1132.757		
Element: Linear				
PI	( )	30+113.472	7131540.11	1787764.93
PI	( )	31+341.503	7132084.88	1788865.51
Tangential Direction:		N63.665°E		
Tangential Length:		1228.031		

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

SH 79 ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		44

CK DW CK DW

DATE: 3/29/2023 3:44:01 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020264 - Design/Plan Set/3. Roadway/SH 79 ALIGNMENT DATA

Element: Linear				
PI	( )	31+341.503	7132084.88	1788865.51
PI	( )	31+701.009	7132243.82	1789187.98
	Tangential Direction:	N63.762°E		
	Tangential Length:	359.506		
Element: Linear				
PI	( )	31+701.009	7132243.82	1789187.98
PI	( )	32+094.376	7132417.24	1789541.05
	Tangential Direction:	N63.840°E		
	Tangential Length:	393.367		
Element: Linear				
PI	( )	32+094.376	7132417.24	1789541.05
PI	( )	32+972.695	7132806.7	1790328.3
	Tangential Direction:	N63.678°E		
	Tangential Length:	878.319		
Element: Linear				
PI	( )	32+972.695	7132806.7	1790328.3
PI	( )	33+541.803	7133059.08	1790838.39
	Tangential Direction:	N63.675°E		
	Tangential Length:	569.107		
Element: Linear				
PI	( )	33+541.803	7133059.08	1790838.39
PI	( )	33+954.830	7133241.92	1791208.74
	Tangential Direction:	N63.724°E		
	Tangential Length:	413.027		
Element: Linear				
PI	( )	33+954.830	7133241.92	1791208.74
PI	( )	34+186.198	7133343.67	1791416.54
	Tangential Direction:	N63.912°E		
	Tangential Length:	231.368		
Element: Linear				
PI	( )	34+186.198	7133343.67	1791416.54
PI	( )	34+481.691	7133474.68	1791681.4
	Tangential Direction:	N63.682°E		
	Tangential Length:	295.493		
Element: Linear				
PI	( )	34+481.691	7133474.68	1791681.4
PI	( )	35+457.683	7133907.56	1792556.14
	Tangential Direction:	N63.671°E		
	Tangential Length:	975.992		
Element: Linear				
PI	( )	35+457.683	7133907.56	1792556.14
PI	( )	35+907.966	7134106.08	1792960.3
	Tangential Direction:	N63.840°E		
	Tangential Length:	450.283		
Element: Linear				
PI	( )	35+907.966	7134106.08	1792960.3
PI	( )	37+360.847	7134749	1794263.19
	Tangential Direction:	N63.736°E		
	Tangential Length:	1452.881		
Element: Linear				
PI	( )	37+360.847	7134749	1794263.19
PI	( )	37+688.184	7134895.18	1794556.07
	Tangential Direction:	N63.476°E		
	Tangential Length:	327.337		
Element: Linear				
PI	( )	37+688.184	7134895.18	1794556.07
PI	( )	37+849.294	7134967.24	1794700.17
	Tangential Direction:	N63.434°E		
	Tangential Length:	161.111		
Element: Linear				
PI	( )	37+849.294	7134967.24	1794700.17
PI	( )	38+095.811	7135077.2	1794920.8
	Tangential Direction:	N63.507°E		
	Tangential Length:	246.517		
Element: Linear				
PI	( )	38+095.811	7135077.2	1794920.8
PI	( )	38+335.384	7135183.84	1795135.33
	Tangential Direction:	N63.569°E		
	Tangential Length:	239.573		
Element: Linear				
PI	( )	38+335.384	7135183.84	1795135.33
PI	( )	38+568.595	7135286.5	1795344.73
	Tangential Direction:	N63.884°E		
	Tangential Length:	233.211		
Element: Linear				
PI	( )	38+568.595	7135286.5	1795344.73
PI	( )	39+159.135	7135546.9	1795874.76
	Tangential Direction:	N63.835°E		
	Tangential Length:	590.54		
Element: Linear				
PI	( )	39+159.135	7135546.9	1795874.76
PI	( )	39+853.711	7135854.14	1796497.69
	Tangential Direction:	N63.747°E		
	Tangential Length:	694.576		
Element: Linear				
PI	( )	39+853.711	7135854.14	1796497.69
PC	( )	40+059.679	7135946.32	1796681.88
	Tangential Direction:	N63.411°E		
	Tangential Length:	205.967		

Element: Circular				
PC	( )	40+059.679	7135946.32	1796681.88
PI	( )	40+611.817	7136195.17	1797174.76
CC	( )		7138502.06	1795391.53
PT	( )	41+150.562	7136609.46	1797539.75
	Radius:	2863		
	Delta:	21.831° Left		
	Degree of Curvature (Arc):	2.001°		
	Length:	1090.883		
	Tangent:	552.138		
	Chord:	1084.296		
	Middle Ordinate:	51.8		
	External:	52.755		
	Back Tangent Direction:	N63.212°E		
	Back Radial Direction:	S26.788°E		
	Chord Direction:	N52.296°E		
	Ahead Radial Direction:	S48.620°E		
	Ahead Tangent Direction:	N41.380°E		
Element: Linear				
PT	( )	41+150.562	7136609.46	1797539.75
PI	( )	41+369.386	7136772.77	1797685.4
	Tangential Direction:	N41.728°E		
	Tangential Length:	218.824		
Element: Linear				
PI	( )	41+369.386	7136772.77	1797685.4
PI	( )	41+584.519	7136934.08	1797827.75
	Tangential Direction:	N41.429°E		
	Tangential Length:	215.133		
Element: Linear				
PI	( )	41+584.519	7136934.08	1797827.75
PI	( )	41+800.930	7137097	1797970.19
	Tangential Direction:	N41.161°E		
	Tangential Length:	216.411		
Element: Linear				
PI	( )	41+800.930	7137097	1797970.19
PI	(BL CL-)	42+200.257	7137396.51	1798234.3
	Tangential Direction:	N41.407°E		
	Tangential Length:	399.327		
Element: Linear				
PI	( )	42+200.257	7137396.51	1798234.3
PI	( )	42+450.257	7137584.56	1798399.04
	Tangential Direction:	N41.219°E		
	Tangential Length:	250		
Element: Linear				
PI	( )	42+450.257	7137584.56	1798399.04
PI	( )	42+650.257	7137735.53	1798530.21
	Tangential Direction:	N40.986°E		
	Tangential Length:	200		
Element: Linear				
PI	( )	42+650.257	7137735.53	1798530.21
PI	( )	42+850.254	7137885.87	1798662.12
	Tangential Direction:	N41.264°E		
	Tangential Length:	199.997		
Element: Linear				
PI	(BL CL-2)	42+850.254	7137885.87	1798662.12
PI	( )	43+100.254	7138072.89	1798828.01
	Tangential Direction:	N41.574°E		
	Tangential Length:	250		
Element: Linear				
PI	(BL CL-3)	43+100.254	7138072.89	1798828.01
PI	( )	43+650.183	7138485.98	1799191.02
	Tangential Direction:	N41.308°E		
	Tangential Length:	549.929		
Element: Linear				
PI	(BL CL-4)	43+650.183	7138485.98	1799191.02
PI	( )	43+850.183	7138636.24	1799323.01
	Tangential Direction:	N41.296°E		
	Tangential Length:	200		
Element: Linear				
PI	(BL CL-5)	43+850.183	7138636.24	1799323.01
PC	( )	44+100.180	7138824.71	1799487.27
	Tangential Direction:	N41.073°E		
	Tangential Length:	249.997		
Element: Circular				
PC	(BL CL-6)	44+100.180	7138824.71	1799487.27
PI	( )	44+722.990	7139301.76	1799887.66
CC	( )		7136901.83	1801778.25
PT	( )	45+328.251	7139579.34	1800445.19
	Radius:	2991		
	Delta:	23.525° Right		
	Degree of Curvature (Arc):	1.916°		
	Length:	1228.071		
	Tangent:	622.81		
	Chord:	1219.463		
	Middle Ordinate:	62.808		
	External:	64.155		
	Back Tangent Direction:	N40.007°E		
	Back Radial Direction:	S49.993°E		
	Chord Direction:	N51.770°E		
	Ahead Radial Direction:	S26.468°E		
	Ahead Tangent Direction:	N63.532°E		

Element: Linear				
PT	( )	45+328.251	7139579.34	1800445.19
PI	( )	45+535.624	7139676.58	1800628.35
	Tangential Direction:	N62.036°E		
	Tangential Length:	207.373		
Element: Linear				
PI	( )	45+535.624	7139676.58	1800628.35
PI	( )	45+957.476	7139872.6	1801001.9
	Tangential Direction:	N62.311°E		
	Tangential Length:	421.853		
Element: Linear				
PI	( )	45+957.476	7139872.6	1801001.9
PI	( )	46+183.447	7139977.14	1801202.24
	Tangential Direction:	N62.446°E		
	Tangential Length:	225.971		
Element: Linear				
PI	( )	46+183.447	7139977.14	1801202.24
PI	( )	46+496.264	7140121.89	1801479.55
	Tangential Direction:	N62.437°E		
	Tangential Length:	312.817		
Element: Linear				
PI	( )	46+496.264	7140121.89	1801479.55
PI	( )	46+730.189	7140230.26	1801686.85
	Tangential Direction:	N62.401°E		
	Tangential Length:	233.925		
Element: Linear				
PI	( )	46+730.189	7140230.26	1801686.85
PI	( )	47+024.927	7140367.09	1801947.91
	Tangential Direction:	N62.339°E		
	Tangential Length:	294.739		
Element: Linear				
PI	( )	47+024.927	7140367.09	1801947.91
PI	( )	47+267.661	7140479.32	1802163.14
	Tangential Direction:	N62.459°E		
	Tangential Length:	242.734		
Element: Linear				
PI	( )	47+267.661	7140479.32	1802163.14
PC	( )	47+474.348	7140575.37	1802346.15
	Tangential Direction:	N62.311°E		
	Tangential Length:	206.687		
Element: Circular				
PC	( )	47+474.348	7140575.37	1802346.15
PI	( )	47+909.968	7140782.25	1802729.51
CC	( )		7142319.59	1801404.88
PT	( )	48+331.951	7141130.81	1802990.79
	Radius:	1982		
	Delta:	24.792° Left		
	Degree of Curvature (Arc):	2.891°		
	Length:	857.603		
	Tangent:	435.62		
	Chord:	850.929		
	Middle Ordinate:	46.205		
	External:	47.307		
	Back Tangent Direction:	N61.647°E		
	Back Radial Direction:	S28.353°E		
	Chord Direction:	N49.251°E		
	Ahead Radial Direction:	S53.145°E		
	Ahead Tangent Direction:	N36.855°E		
Element: Linear				
PT	( )	48+331.951	7141130.81	1802990.79
PI	( )	48+593.373	7141335.18	1803153.81
	Tangential Direction:	N38.577°E		
	Tangential Length:	261.421		
Element: Linear				
PI	( )	48+593.373	7141335.18	1803153.81
PI	( )	48+849.449	7141535.95	1803312.76
	Tangential Direction:	N38.369°E		
	Tangential Length:	256.077		
Element: Linear				
PI	( )	48+849.449	7141535.95	1803312.76
PI	( )	49+049.449	7141692.87	1803436.77
	Tangential Direction:	N38.320°E		
	Tangential Length:	200		
Element: Linear				
PI	( )	49+049.449	7141692.87	1803436.77
PI	( )	49+249.449	7141849.78	1803560.78
	Tangential Direction:	N38.320°E		
	Tangential Length:	200		
Element: Linear				
PI	(BL CL-8)	49+249.449	7141849.78	1803560.78
PC	( )	49+667.980	7142176.92	1803821.83
	Tangential Direction:	N38.589°E		
	Tangential Length:	418.531		
Element: Circular				
PC	( )	49+667.980	7142176.92	1803821.83
PI	( )	50+192.761	7142575.17	1804163.57
CC	( )		7141228.75	1804926.77
PT	( )	50+675.336	7142663.82	1804680.81
	Radius:	1456		
	Delta:	39.641° Right		
	Degree of Curvature (Arc):	3.935°		
	Length:	1007.355		
	Tangent:	524.78		
	Chord:	987.384		
	Middle Ordinate:	86.254		
	External:	91.685		
	Back Tangent Direction:	N40.634°E		
	Back Radial Direction:	S49.366°E		
	Chord Direction:	N60.454°E		
	Ahead Radial Direction:	S9.726°E		
	Ahead Tangent Direction:	N80.274°E		

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

SH 79 ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		45

DATE: 3/29/2023 3:44:03 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020264 - Design/Plan Set/3. Roadway/SH 79 ALIGNMENT DATA

Element: Linear				
PT	( )	50+675.336	7142663.82	1804680.81
PI	( )	51+050.059	7142733.3	1805049.04
Tangential Direction:	N79.314°E			
Tangential Length:	374.723			
Element: Linear				
PI	( )	51+050.059	7142733.3	1805049.04
PI	( )	51+350.058	7142788.34	1805343.94
Tangential Direction:	N79.429°E			
Tangential Length:	299.999			
Element: Linear				
PI	(BL CL-12)	51+350.058	7142788.34	1805343.94
PI	( )	51+550.058	7142824.52	1805540.65
Tangential Direction:	N79.578°E			
Tangential Length:	200			
Element: Linear				
PI	(BL CL-13)	51+550.058	7142824.52	1805540.65
PI	( )	51+850.058	7142878.79	1805835.7
Tangential Direction:	N79.578°E			
Tangential Length:	300			
Element: Linear				
PI	(BL CL-14)	51+850.058	7142878.79	1805835.7
PI	( )	52+200.023	7142942.79	1806179.76
Tangential Direction:	N79.463°E			
Tangential Length:	349.965			
Element: Linear				
PI	(BL CL-15)	52+200.023	7142942.79	1806179.76
PI	( )	52+450.017	7142987.62	1806425.7
Tangential Direction:	N79.669°E			
Tangential Length:	249.993			
Element: Linear				
PI	(BL CL-16)	52+450.017	7142987.62	1806425.7
PI	( )	52+700.016	7143033.17	1806671.52
Tangential Direction:	N79.503°E			
Tangential Length:	250			
Element: Linear				
PI	(BL CL-17)	52+700.016	7143033.17	1806671.52
PI	( )	53+100.013	7143107.13	1807064.61
Tangential Direction:	N79.345°E			
Tangential Length:	399.996			
Element: Linear				
PI	(BL CL-18)	53+100.013	7143107.13	1807064.61
PI	( )	53+648.597	7143206.62	1807604.1
Tangential Direction:	N79.551°E			
Tangential Length:	548.584			
Element: Linear				
PI	(BL CL-19)	53+648.597	7143206.62	1807604.1
PI	( )	53+848.597	7143242.74	1807800.81
Tangential Direction:	N79.594°E			
Tangential Length:	200			
Element: Linear				
PI	(BL CL-20)	53+848.597	7143242.74	1807800.81
PI	( )	54+098.588	7143289.05	1808046.48
Tangential Direction:	N79.324°E			
Tangential Length:	249.991			
Element: Linear				
PI	(BL CL-21)	54+098.588	7143289.05	1808046.48
PI	( )	54+348.967	7143335.59	1808292.49
Tangential Direction:	N79.287°E			
Tangential Length:	250.38			
Element: Linear				
PI	(BL CL-22)	54+348.967	7143335.59	1808292.49
PI	( )	54+548.597	7143371	1808488.96
Tangential Direction:	N79.784°E			
Tangential Length:	199.63			
Element: Linear				
PI	( )	54+548.597	7143371	1808488.96
PI	( )	54+898.597	7143433.95	1808833.25
Tangential Direction:	N79.639°E			
Tangential Length:	350			
Element: Linear				
PI	( )	54+898.597	7143433.95	1808833.25
PI	( )	55+398.597	7143523.87	1809325.1
Tangential Direction:	N79.639°E			
Tangential Length:	500			
Element: Linear				
PI	( )	55+398.597	7143523.87	1809325.1
PI	( )	56+698.613	7143760.76	1810603.35
Tangential Direction:	N79.501°E			
Tangential Length:	1300.016			

Element: Linear				
PI	( )	56+698.613	7143760.76	1810603.35
PC	( )	56+949.522	7143806.25	1810850.1
Tangential Direction:	N79.556°E			
Tangential Length:	250.909			
Element: Circular				
PC	( )	56+949.522	7143806.25	1810850.1
PI	( )	58+005.240	7143992.01	1811889.34
CC	( )		7132968.04	1812787.45
PT	( )	59+054.522	7143976.91	1812944.95
Radius:	11010			
Delta:	10.954° Right			
Degree of Curvature (Arc):	0.520°			
Length:	2105			
Tangent:	1055.718			
Chord:	2101.795			
Middle Ordinate:	50.269			
External:	50.499			
Back Tangent Direction:	N79.865°E			
Back Radial Direction:	S10.135°E			
Chord Direction:	N85.343°E			
Ahead Radial Direction:	S0.820°W			
Ahead Tangent Direction:	S89.180°E			
Element: Linear				
PT	( )	59+054.522	7143976.91	1812944.95
PI	( )	59+451.882	7143970.19	1813342.26
Tangential Direction:	S89.031°E			
Tangential Length:	397.36			
Element: Linear				
PI	( )	59+451.882	7143970.19	1813342.26
PI	( )	59+654.313	7143965.32	1813544.63
Tangential Direction:	S88.620°E			
Tangential Length:	202.431			
Element: Linear				
PI	( )	59+654.313	7143965.32	1813544.63
PI	( )	59+981.732	7143958.66	1813871.98
Tangential Direction:	S88.836°E			
Tangential Length:	327.419			
Element: Linear				
PI	( )	59+981.732	7143958.66	1813871.98
PI	( )	60+364.617	7143951.05	1814254.79
Tangential Direction:	S88.860°E			
Tangential Length:	382.884			
Element: Linear				
PI	( )	60+364.617	7143951.05	1814254.79
PI	( )	60+618.080	7143945.34	1814508.19
Tangential Direction:	S88.711°E			
Tangential Length:	253.464			
Element: Linear				
PI	( )	60+618.080	7143945.34	1814508.19
PI	( )	61+484.354	7143926.15	1815374.25
Tangential Direction:	S88.730°E			
Tangential Length:	866.273			
Element: Linear				
PI	( )	61+484.354	7143926.15	1815374.25
PI	( )	61+706.939	7143921.33	1815596.78
Tangential Direction:	S88.760°E			
Tangential Length:	222.586			
Element: Linear				
PI	( )	61+706.939	7143921.33	1815596.78
PI	( )	61+932.226	7143916.4	1815822.02
Tangential Direction:	S88.748°E			
Tangential Length:	225.286			
Element: Linear				
PI	( )	61+932.226	7143916.4	1815822.02
PI	( )	62+307.464	7143908.46	1816197.17
Tangential Direction:	S88.787°E			
Tangential Length:	375.238			
Element: Linear				
PI	( )	62+307.464	7143908.46	1816197.17
PI	( )	62+520.098	7143903.26	1816409.74
Tangential Direction:	S88.598°E			
Tangential Length:	212.634			
Element: Linear				
PI	( )	62+520.098	7143903.26	1816409.74
PI	( )	62+779.664	7143897.24	1816669.24
Tangential Direction:	S88.671°E			
Tangential Length:	259.565			
Element: Linear				
PI	( )	62+779.664	7143897.24	1816669.24
PI	( )	63+104.269	7143889.38	1816993.75
Tangential Direction:	S88.612°E			
Tangential Length:	324.605			
Element: Linear				
PI	( )	63+104.269	7143889.38	1816993.75
PI	( )	63+573.273	7143879.31	1817462.64
Tangential Direction:	S88.771°E			
Tangential Length:	469.004			

Element: Linear				
PI	( )	63+573.267	7143879.31	1817462.64
PC	( )	63+609.879	7143878.53	1817499.23
Tangential Direction:	S88.775°E			
Tangential Length:	36.606			
Element: Circular				
PC	( )	63+609.879	7143878.53	1817499.23
PI	( )	63+930.525	7143871.74	1817819.81
CC	( )		7155210.99	1817739.38
PT	( )	64+251.001	7143883.08	1818140.26
Radius:	11335			
Delta:	3.241° Left			
Degree of Curvature (Arc):	0.505°			
Length:	641.122			
Tangent:	320.647			
Chord:	641.037			
Middle Ordinate:	4.533			
External:	4.534			
Back Tangent Direction:	S88.786°E			
Back Radial Direction:	S1.214°W			
Chord Direction:	N89.594°E			
Ahead Radial Direction:	S2.027°E			
Ahead Tangent Direction:	N87.973°E			
Element: Linear				
PT	( )	64+251.001	7143883.08	1818140.26
PI	( )	64+593.073	7143898.37	1818481.99
Tangential Direction:	N87.438°E			
Tangential Length:	342.072			
Element: Linear				
PI	( )	64+593.073	7143898.37	1818481.99
PI	( )	64+891.786	7143914	1818780.29
Tangential Direction:	N87.001°E			
Tangential Length:	298.713			
Element: Linear				
PI	( )	64+891.786	7143914	1818780.29
PI	( )	65+313.512	7143936.97	1819201.39
Tangential Direction:	N86.877°E			
Tangential Length:	421.726			
Element: Linear				
PI	( )	65+313.512	7143936.97	1819201.39
PI	( )	65+583.370	7143951.95	1819470.83
Tangential Direction:	N86.819°E			
Tangential Length:	269.858			
Element: Linear				
PI	( )	65+583.370	7143951.95	1819470.83
PI	( )	65+833.100	7143964.94	1819720.22
Tangential Direction:	N87.018°E			
Tangential Length:	249.73			
Element: Linear				
PI	( )	65+833.100	7143964.94	1819720.22
PI	( )	66+258.351	7143986.63	1820144.92
Tangential Direction:	N87.075°E			
Tangential Length:	425.251			
Element: Linear				
PI	( )	66+258.351	7143986.63	1820144.92
PI	( )	66+983.336	7144025.5	1820868.86
Tangential Direction:	N86.927°E			
Tangential Length:	724.984			
Element: Linear				
PI	( )	66+983.336	7144025.5	1820868.86
PI	( )	67+256.059	7144039.33	1821141.23
Tangential Direction:	N87.094°E			
Tangential Length:	272.724			
Element: Linear				
PI	( )	67+256.059	7144039.33	1821141.23
PI	( )	67+522.181	7144052.8	1821407.02
Tangential Direction:	N87.099°E			
Tangential Length:	266.122			
Element: Linear				
PI	( )	67+522.181	7144052.8	1821407.02
PI	( )	68+468.624	7144102.34	1822352.16
Tangential Direction:	N87.000°E			
Tangential Length:	946.443			
Element: Linear				
PI	( )	68+468.624	7144102.34	1822352.16
PI	( )	68+792.065	7144120.52	1822675.09
Tangential Direction:	N86.776°E			
Tangential Length:	323.441			
Element: Linear				
PI	( )	68+792.065	7144120.52	1822675.09
PI	( )	69+158.388	7144139.66	1823040.91
Tangential Direction:	N87.005°E			
Tangential Length:	366.323			
Element: Linear				
PI	( )	69+158.388	7144139.66	1823040.91
PI	( )	69+659.709	7144166.1	1823541.54
Tangential Direction:	N86.977°E			
Tangential Length:	501.321			

STATE OF TEXAS
BRYSON P. LAWRENCE
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PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

SH 79 ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		46

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DATE: 3/29/2023 3:44:04 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/02840202/4 - Design/Plan Set/3. Roadway/SH 79 ALIGNMENT DATA

Element: Linear				
PI	( )	69+659.709	7144166.1	1823541.54
PI	( )	70+610.529	7144216.49	1824491.02
Tangential Direction:		N86.962°E		
Tangential Length:		950.82		
Element: Linear				
PI	( )	70+610.529	7144216.49	1824491.02
PI	( )	70+910.519	7144232.34	1824790.59
Tangential Direction:		N86.972°E		
Tangential Length:		299.99		
Element: Linear				
PI	( )	70+910.519	7144232.34	1824790.59
PI	( )	72+034.509	7144289.35	1825913.13
Tangential Direction:		N87.093°E		
Tangential Length:		1123.99		
Element: Linear				
PI	( )	72+034.509	7144289.35	1825913.13
PI	( )	73+910.802	7144386.15	1827786.93
Tangential Direction:		N87.043°E		
Tangential Length:		1876.293		
Element: Linear				
PI	( )	73+910.802	7144386.15	1827786.93
PI	( )	74+160.602	7144399.4	1828036.38
Tangential Direction:		N86.959°E		
Tangential Length:		249.8		
Element: Linear				
PI	( )	74+160.602	7144399.4	1828036.38
PI	( )	74+378.037	7144411.15	1828253.49
Tangential Direction:		N86.904°E		
Tangential Length:		217.434		
Element: Linear				
PI	( )	74+378.037	7144411.15	1828253.49
PI	( )	74+734.945	7144428.9	1828609.96
Tangential Direction:		N87.149°E		
Tangential Length:		356.908		
Element: Linear				
PI	( )	74+734.945	7144428.9	1828609.96
PI	( )	74+960.073	7144440.96	1828834.77
Tangential Direction:		N86.928°E		
Tangential Length:		225.128		
Element: Linear				
PI	( )	74+960.073	7144440.96	1828834.77
PI	( )	75+284.920	7144458.64	1829159.13
Tangential Direction:		N86.882°E		
Tangential Length:		324.847		
Element: Linear				
PI	( )	75+284.920	7144458.64	1829159.13
PI	( )	75+859.684	7144489.47	1829733.07
Tangential Direction:		N86.925°E		
Tangential Length:		574.764		
Element: Linear				
PI	( )	75+859.684	7144489.47	1829733.07
PI	( )	76+159.363	7144505.17	1830032.34
Tangential Direction:		N86.997°E		
Tangential Length:		299.678		
Element: Linear				
PI	( )	76+159.363	7144505.17	1830032.34
PI	( )	76+459.284	7144521.34	1830331.82
Tangential Direction:		N86.909°E		
Tangential Length:		299.921		
Element: Linear				
PI	( )	76+459.284	7144521.34	1830331.82
PI	( )	76+883.995	7144543.59	1830755.95
Tangential Direction:		N86.997°E		
Tangential Length:		424.711		
Element: Linear				
PI	( )	76+883.995	7144543.59	1830755.95
POT	( )	77+081.475	7144554.14	1830953.15
Tangential Direction:		N86.937°E		
Tangential Length:		197.48		

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SH 79
ALIGNMENT DATA

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		47

DATE: 3/29/2023 3:44:05 PM
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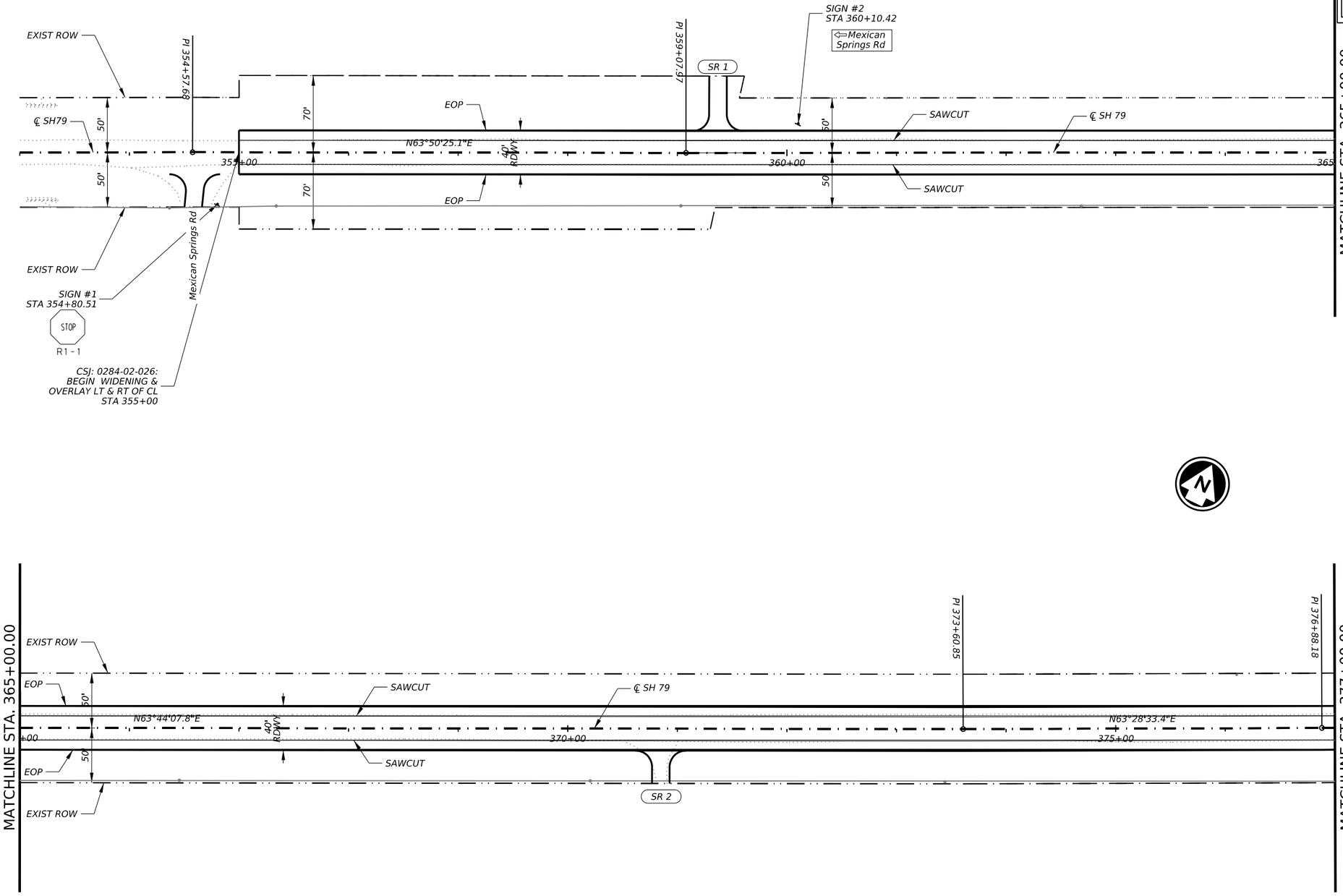

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SH 79
PLAN LAYOUT

SHEET 1 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		48

DATE: 3/29/2023 2:58:26 PM
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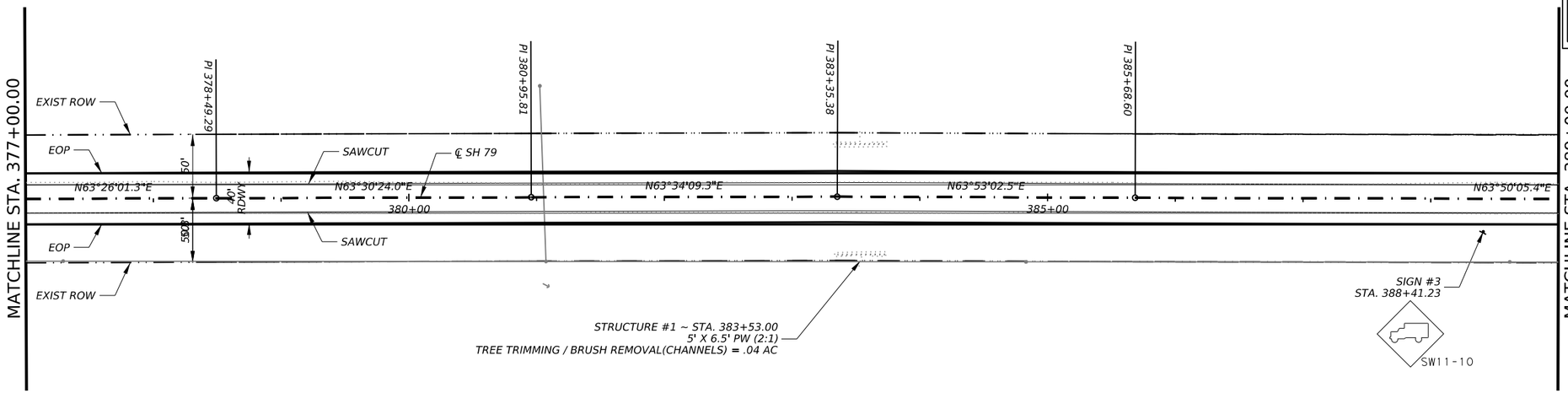
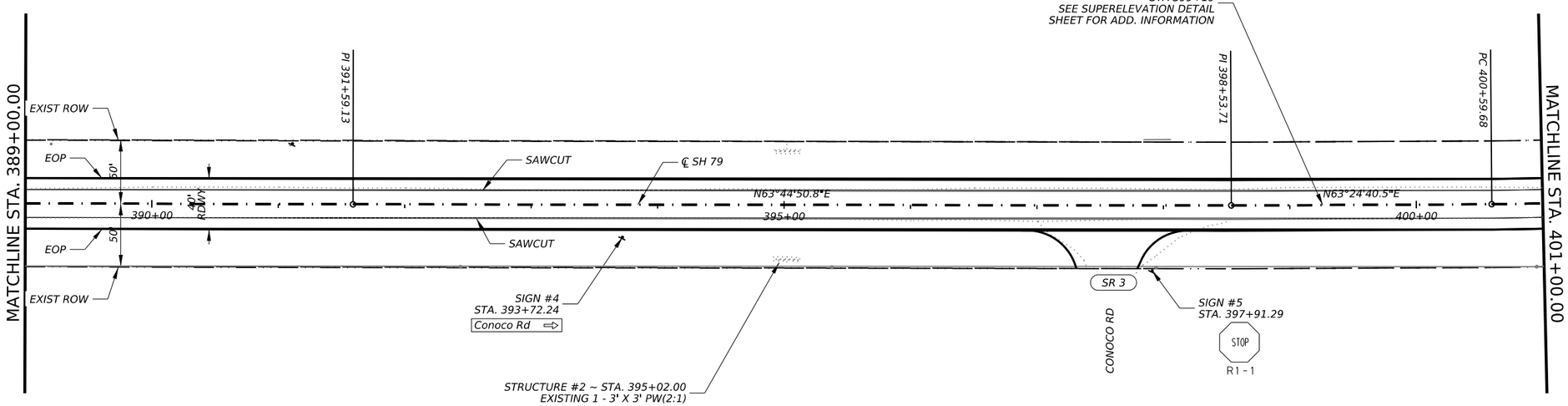


LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree



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Bryson Lawrence, P.E.

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Texas Department of Transportation

SH 79
PLAN LAYOUT

SHEET 2 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		49

DATE: 3/29/2023 2:58:30 PM
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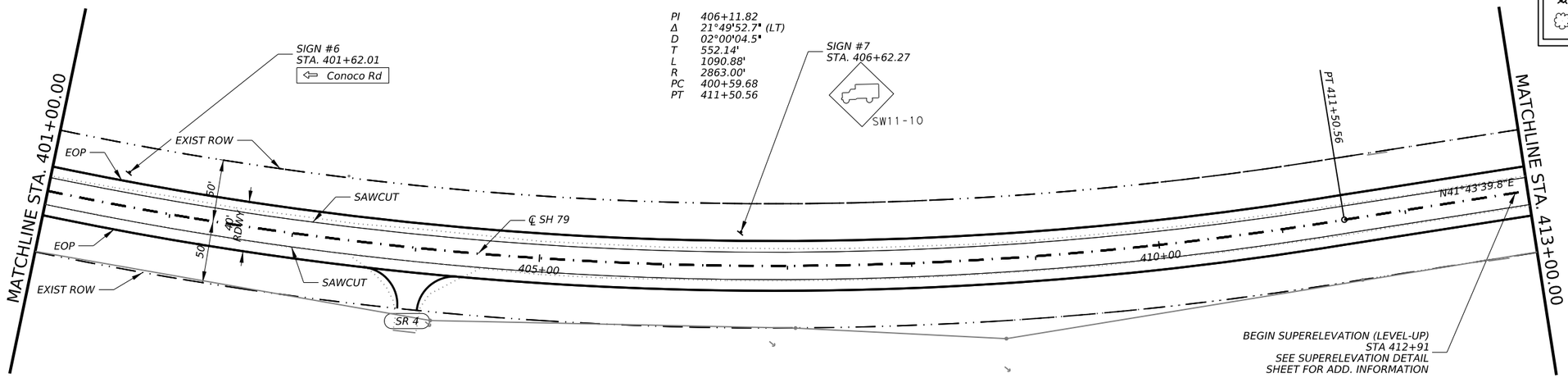

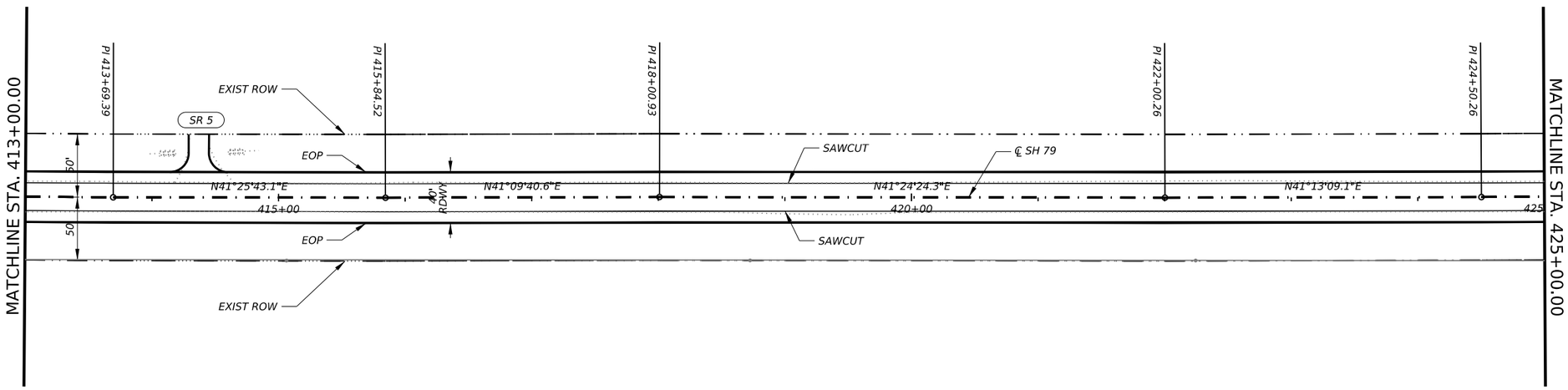

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 3 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		50

DATE: 3/29/2023 2:58:34 PM
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DW:
CK:
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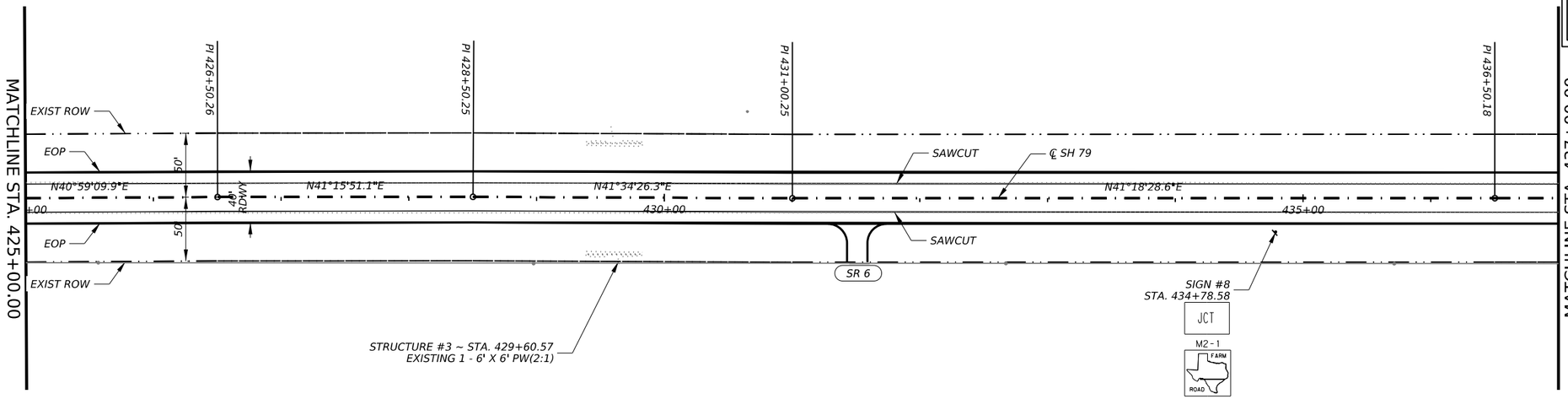

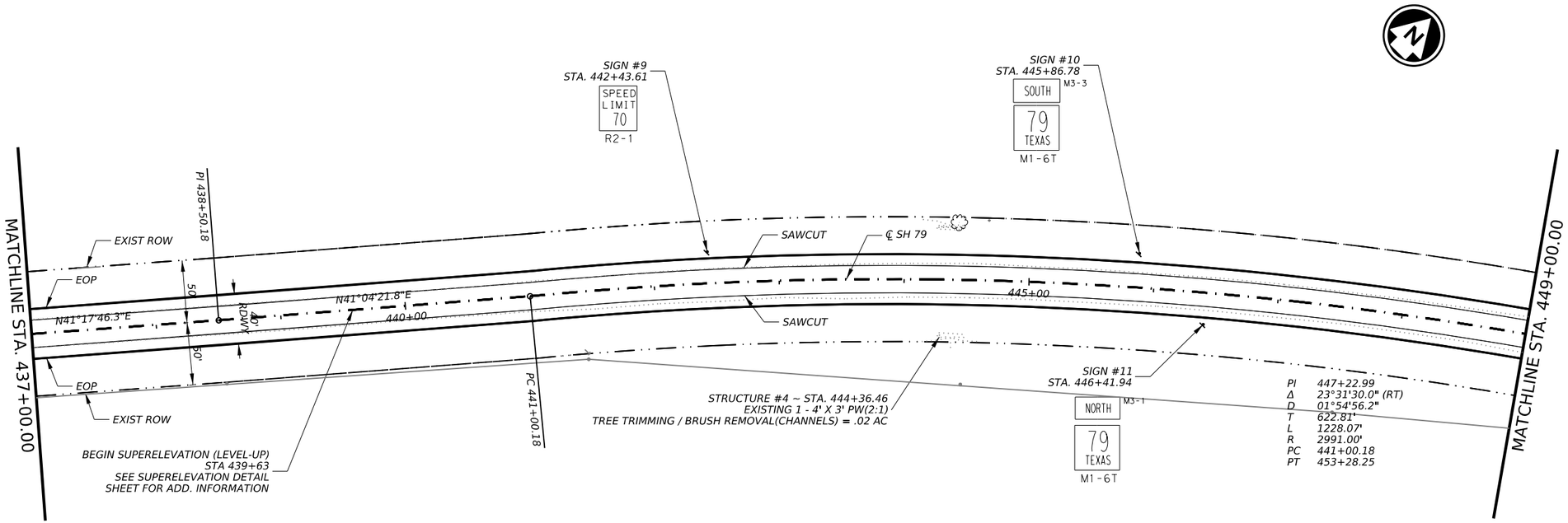

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

PI	447+22.99
Δ	23°31'30.0" (RT)
D	01°54'56.2"
T	622.81'
L	1228.07'
R	2991.00'
PC	441+00.18
PT	453+28.25

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SH 79
PLAN LAYOUT

SHEET 4 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		51

DATE: 3/29/2023 2:58:37 PM
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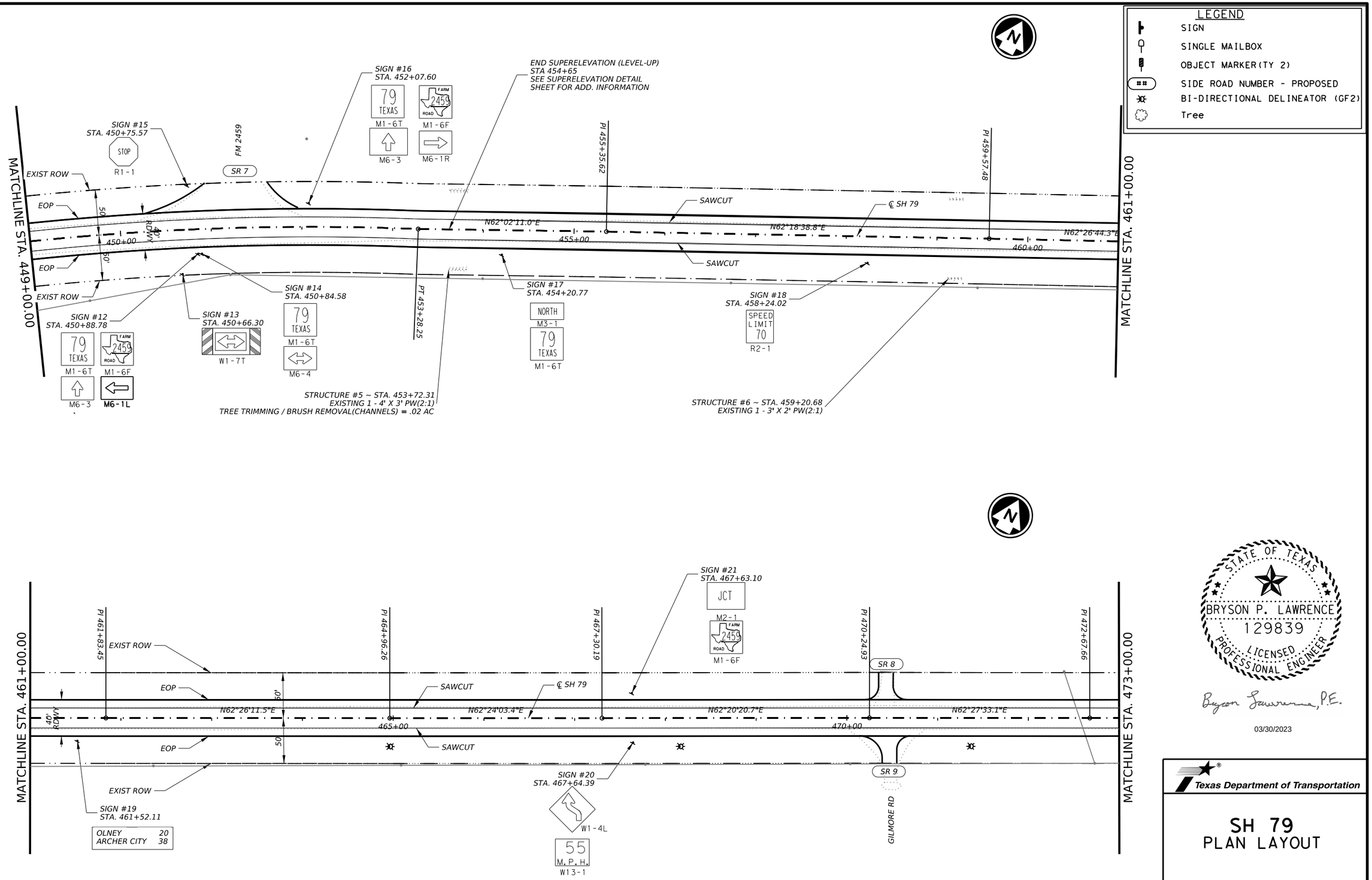

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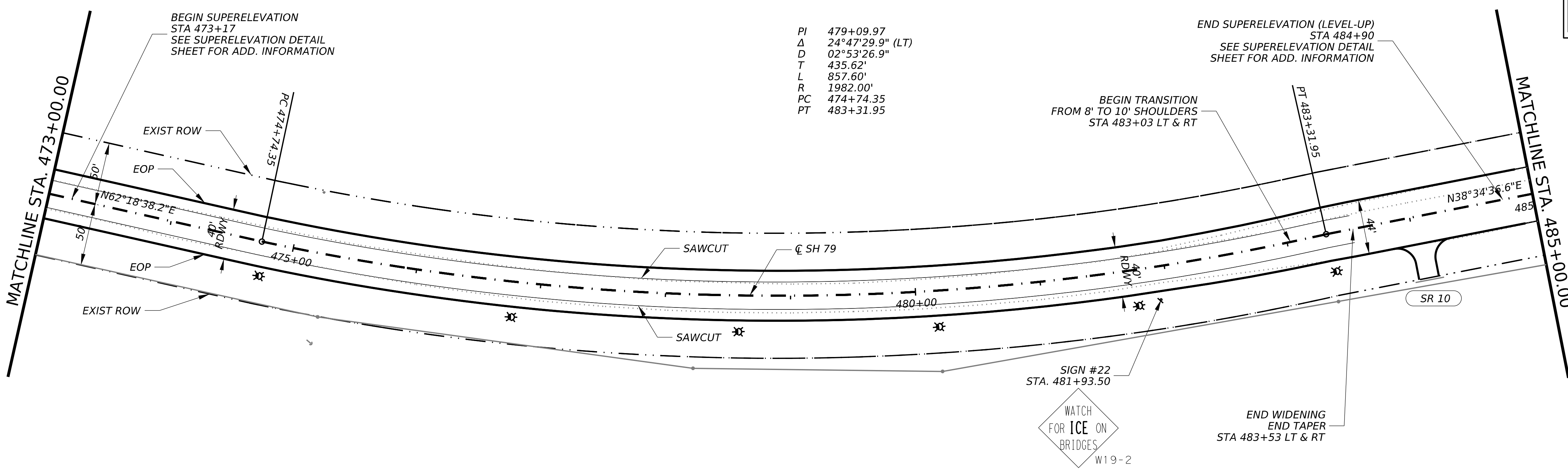
SH 79
PLAN LAYOUT

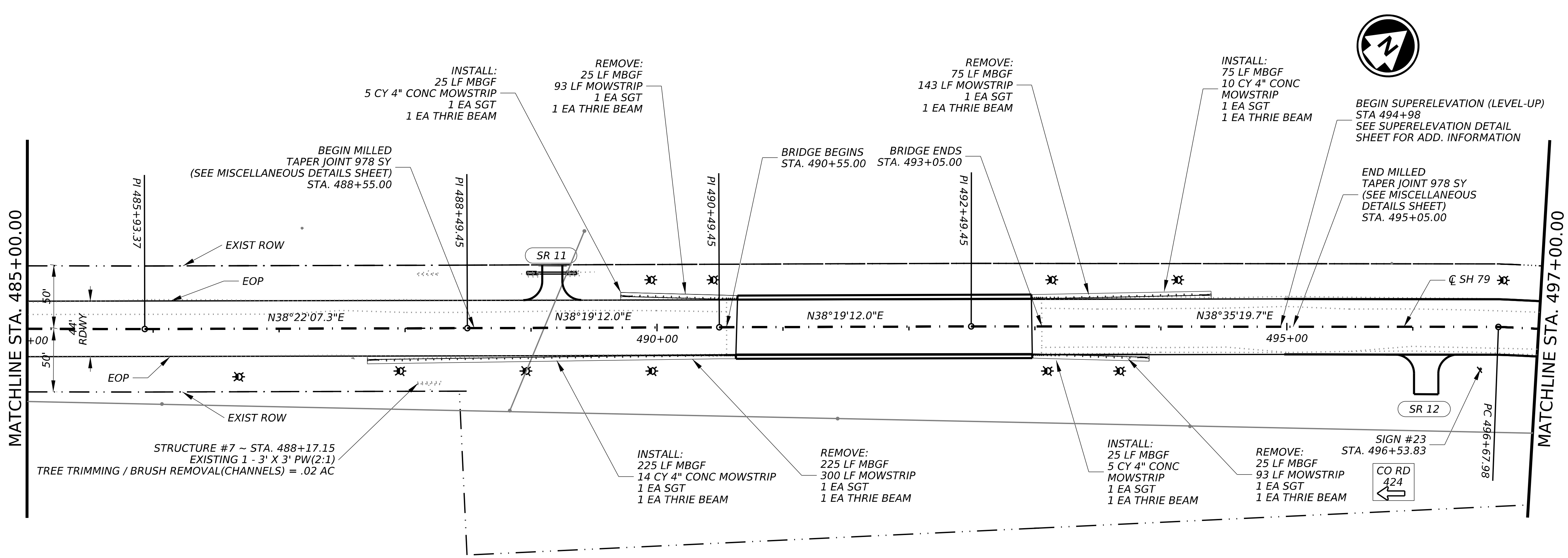
SHEET 5 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		52

LEGEND

	SIGN
	SINGLE MAILBOX
	OBJECT MARKER(TY 2)
##	SIDE ROAD NUMBER - PROPOSED
	BI-DIRECTIONAL DELINEATOR (GF2)
	Tree





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SH 79
PLAN LAYOUT

SHEET 6 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		53

DATE: 3/29/2023 2:58:45 PM
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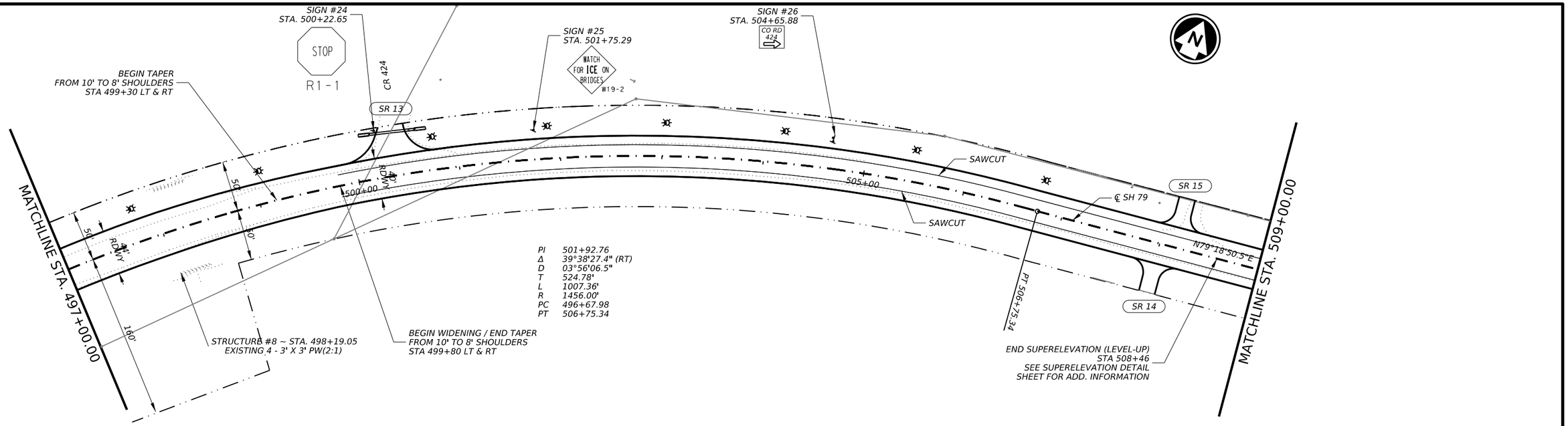

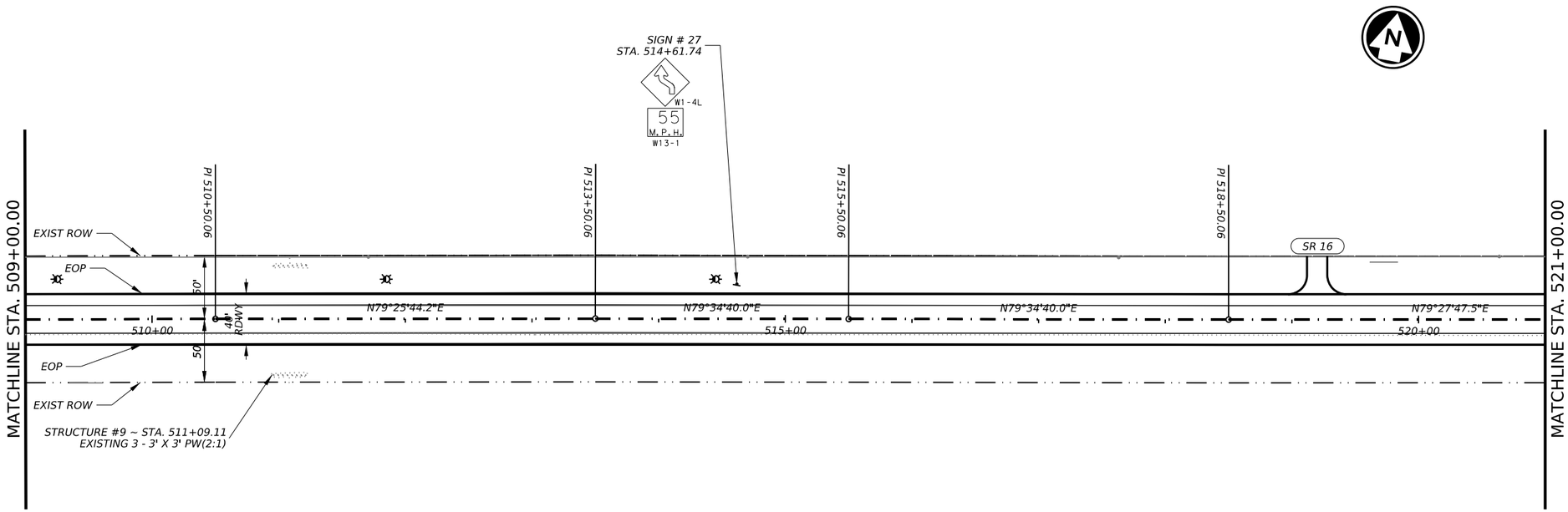

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SH 79
PLAN LAYOUT

SHEET 7 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		54

DATE: 3/29/2023 2:58:49 PM
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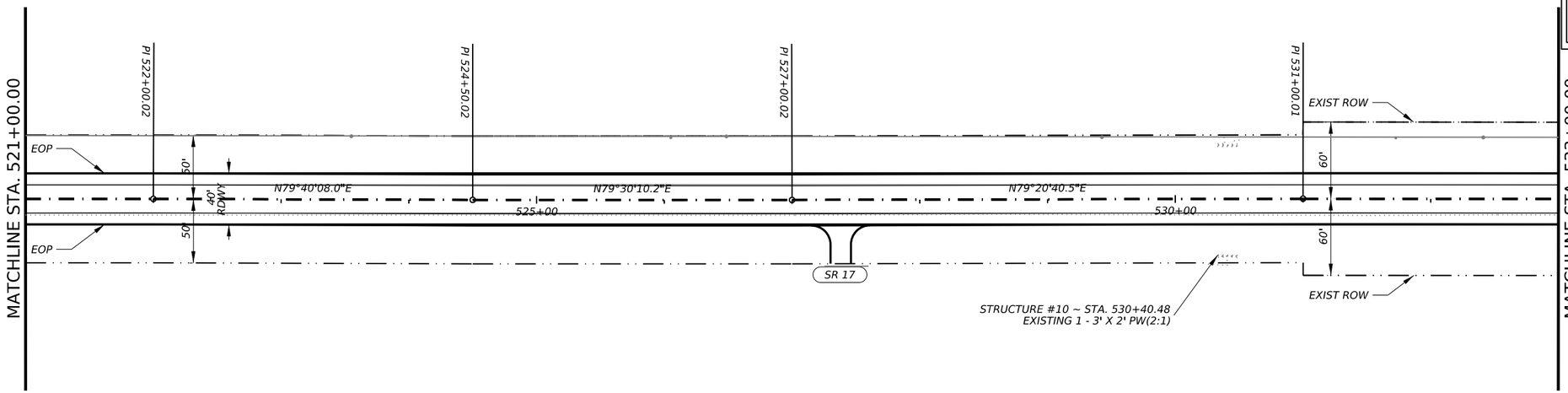

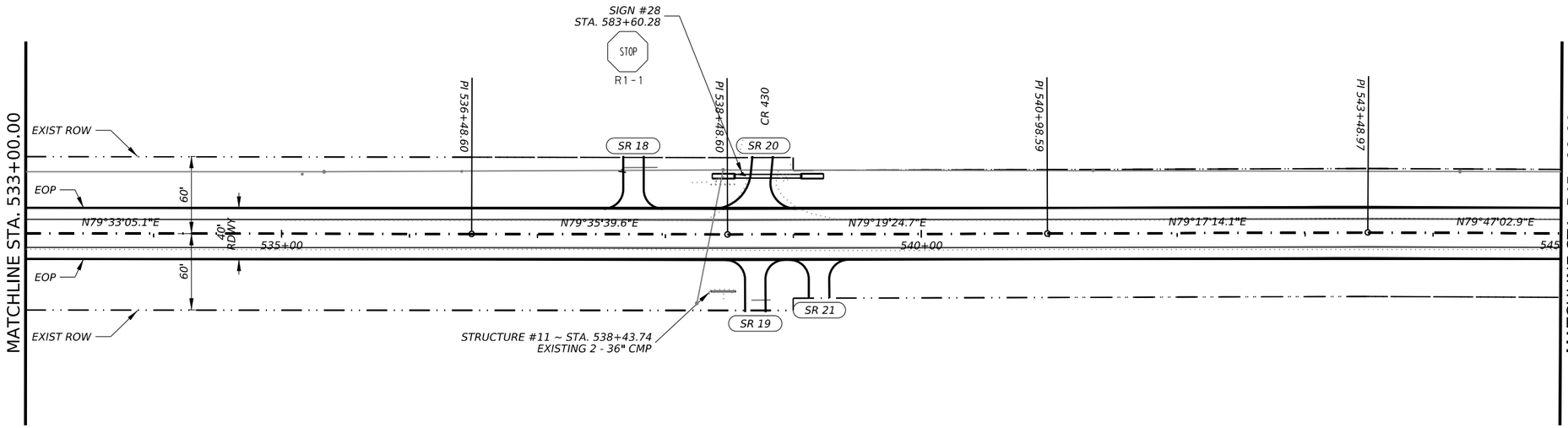

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 8 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		55

DATE: 3/29/2023 2:58:52 PM
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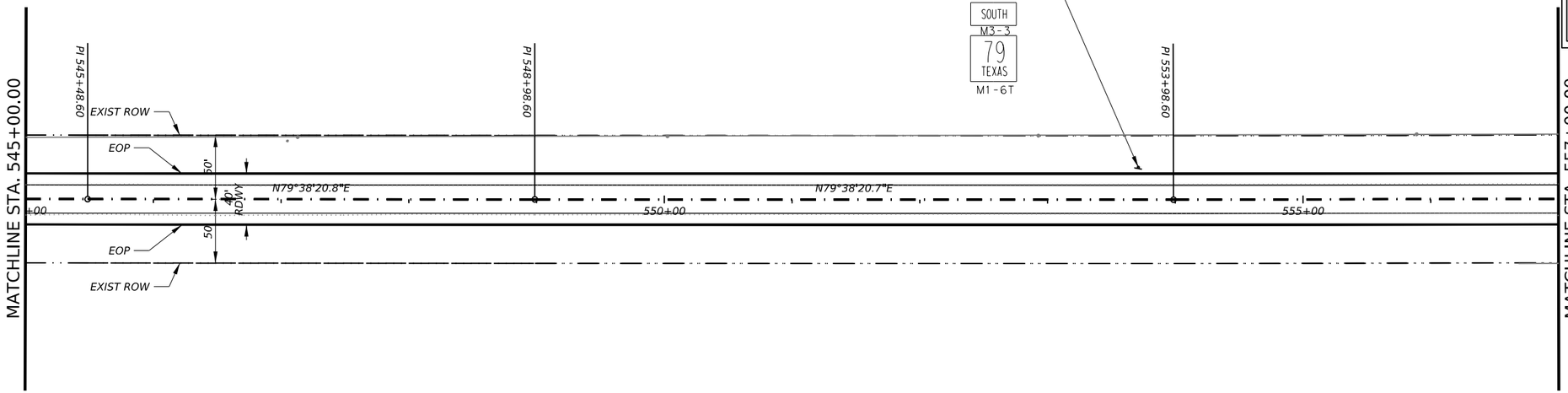

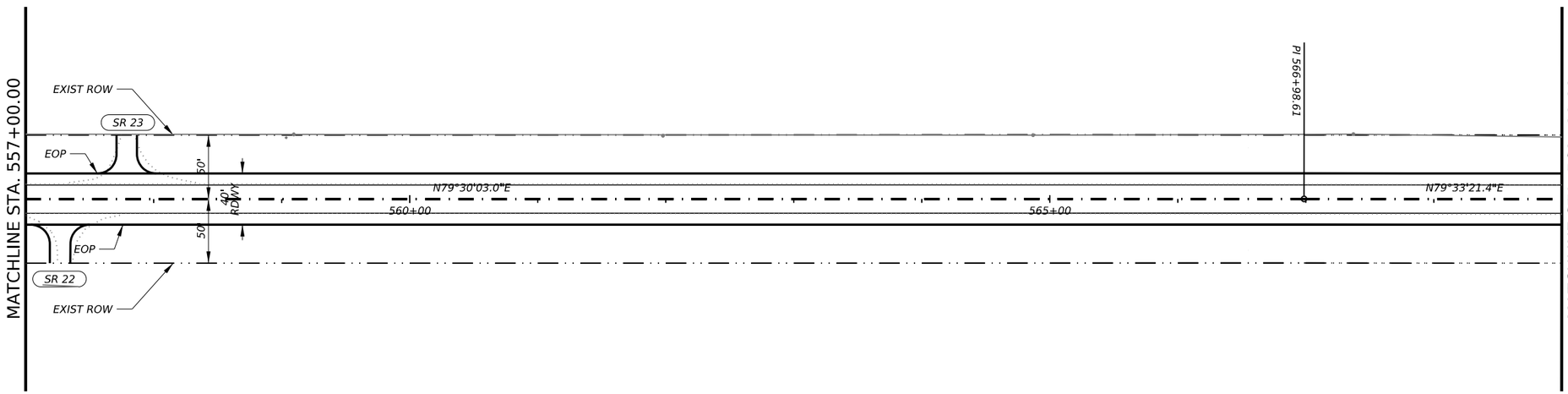

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 9 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		56

DATE: 3/29/2023 2:58:56 PM
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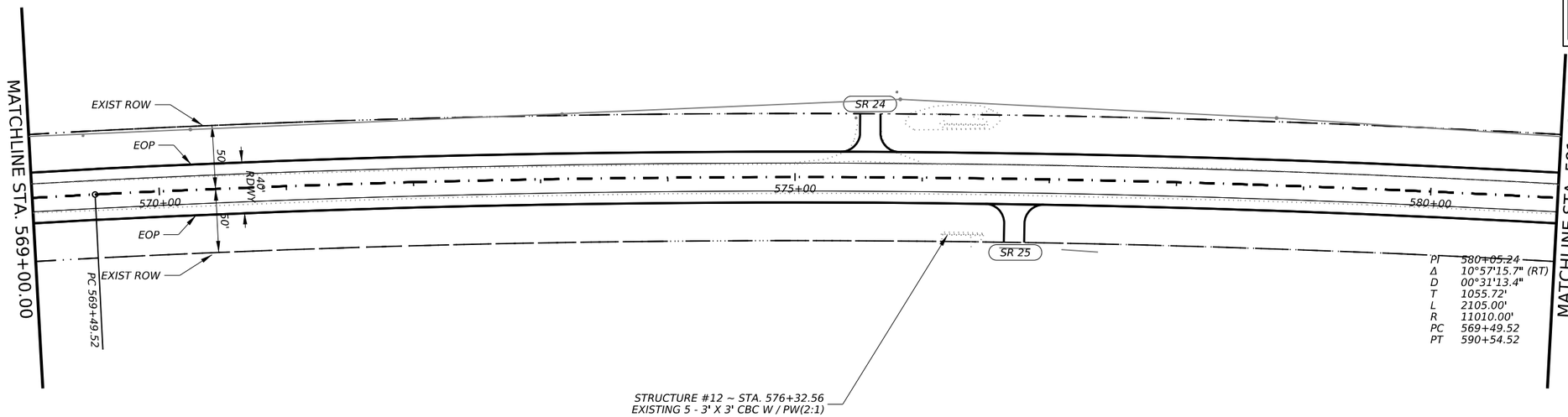
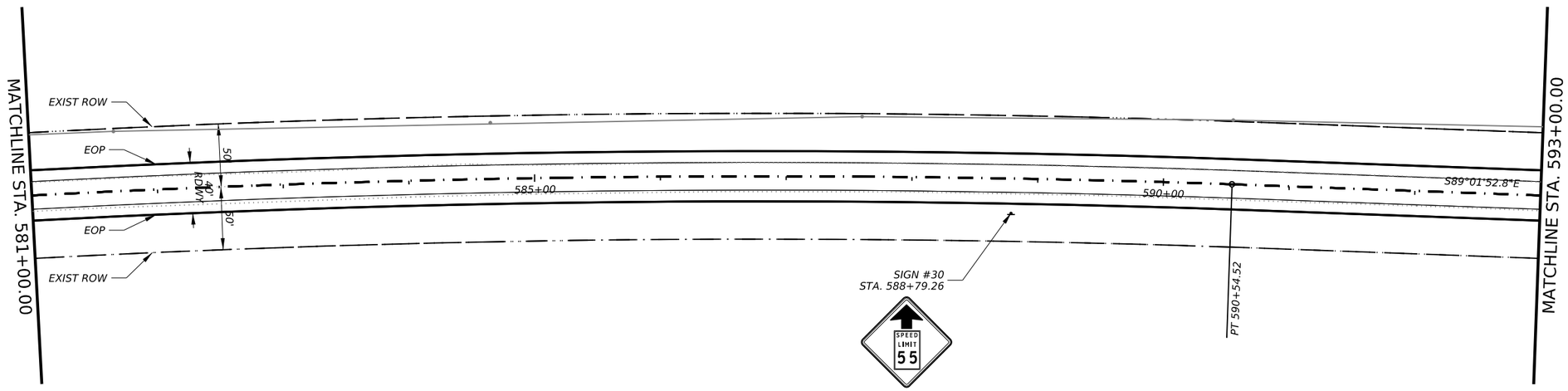
CK:





LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 10 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		57

DATE: 3/29/2023 2:59:00 PM
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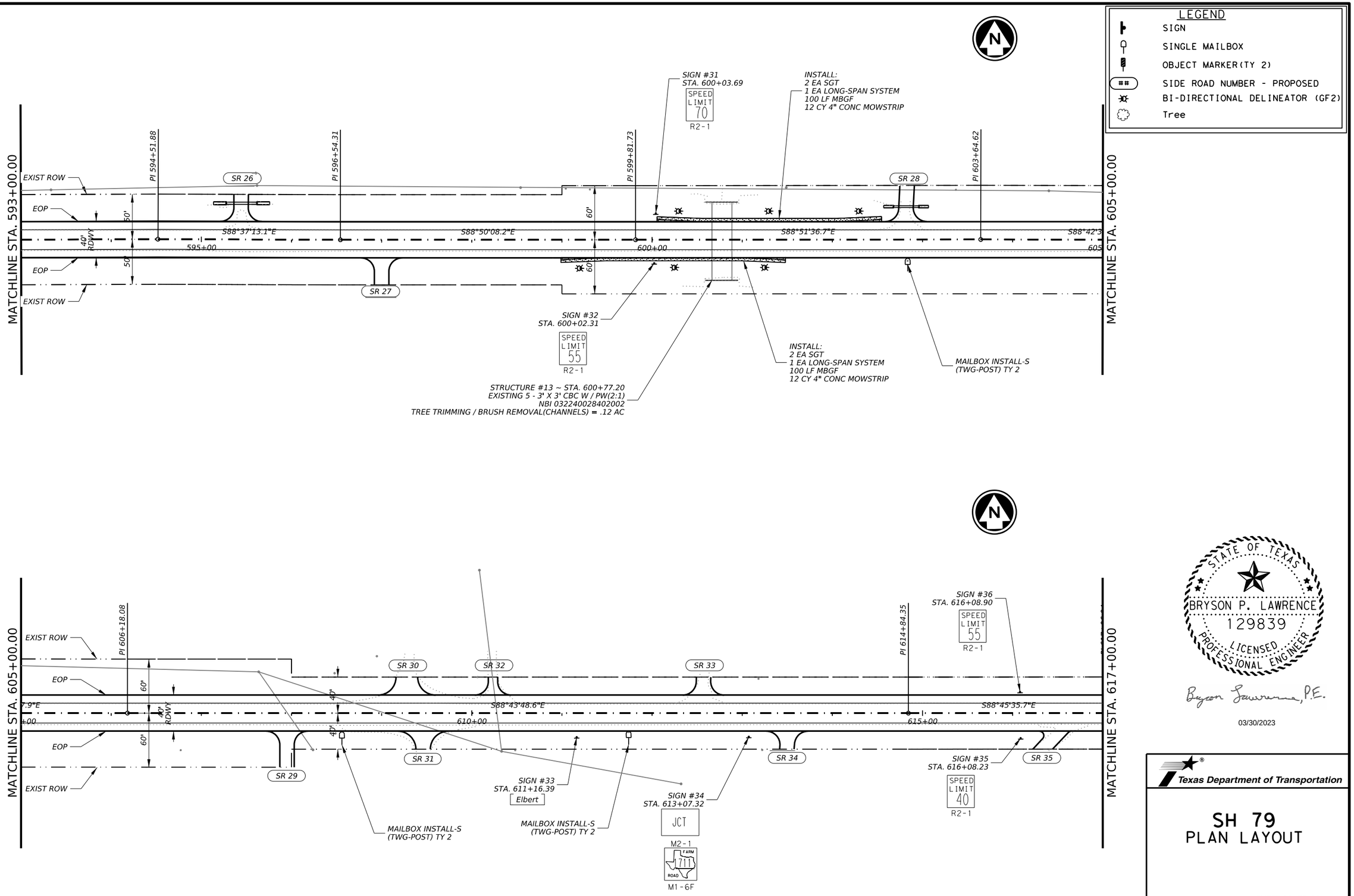

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03/30/2023

Texas Department of Transportation

SH 79
PLAN LAYOUT

SHEET 11 OF 18

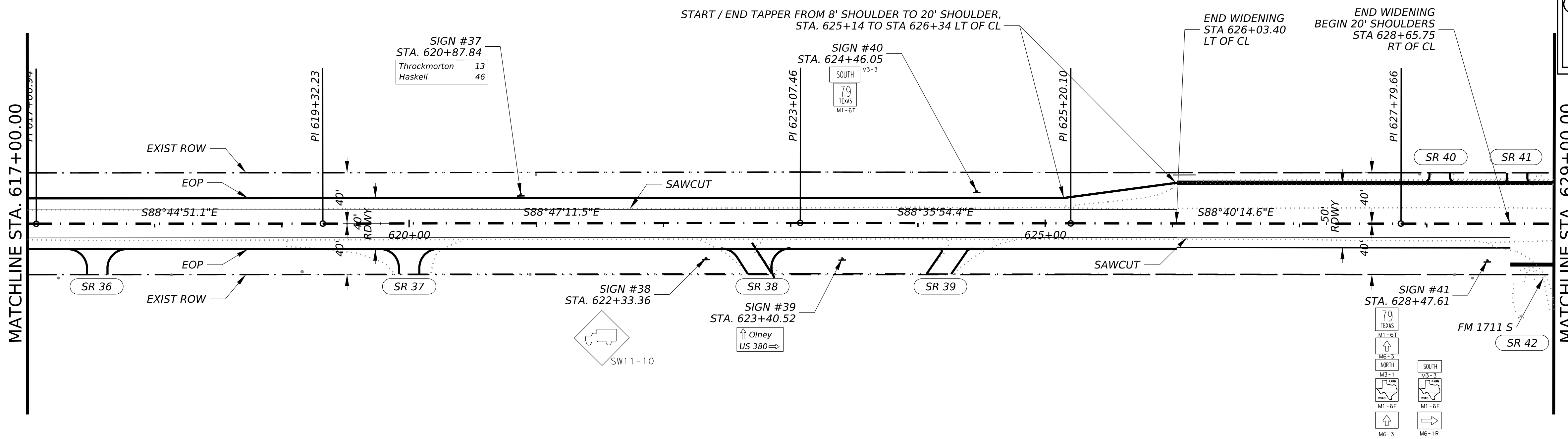
CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		58

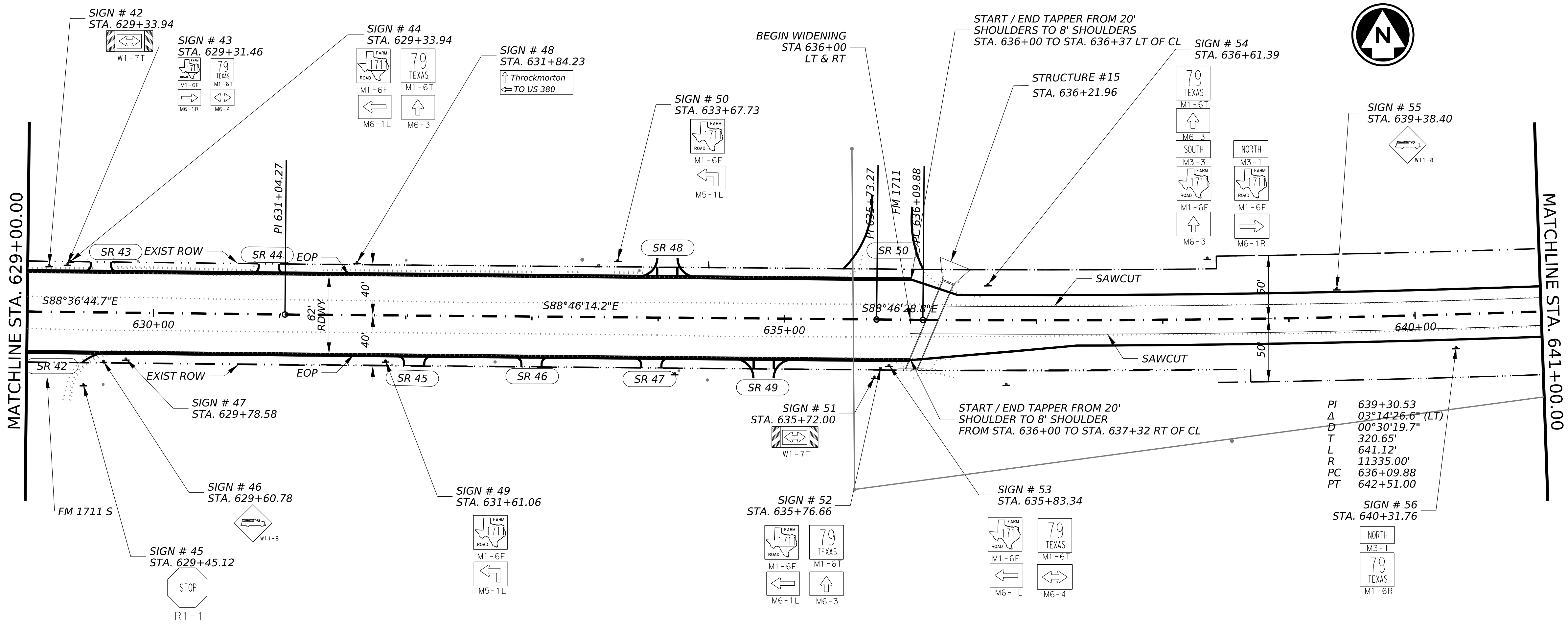
DATE: 3/29/2023 2:59:04 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/028402026/4 - Design/Plan Set/3. Roadway/SH 79 PLAN LAYOUT.dgn

DW: CK: DW: CK:

LEGEND

Symbol	Description
	SIGN
	SINGLE MAILBOX
	OBJECT MARKER(TY 2)
##	SIDE ROAD NUMBER - PROPOSED
	BI-DIRECTIONAL DELINEATOR (GF2)
	Tree





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Bryson Lawrence, P.E.

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Texas Department of Transportation

SH 79
PLAN LAYOUT

SHEET 12 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST		COUNTY	SHEET NO.
WFS.		THROCKMORTON	59

DATE: 3/29/2023 2:59:08 PM
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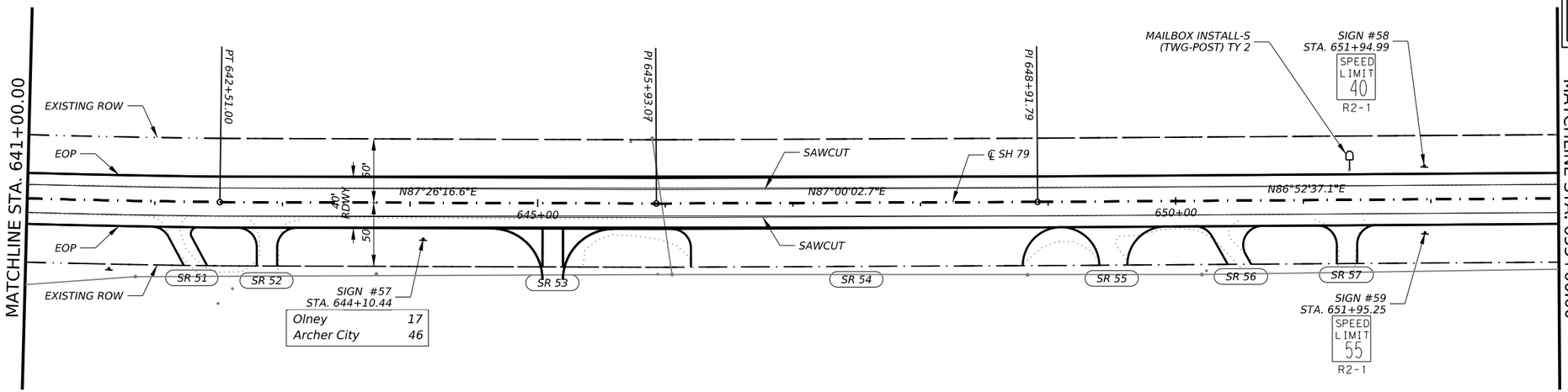

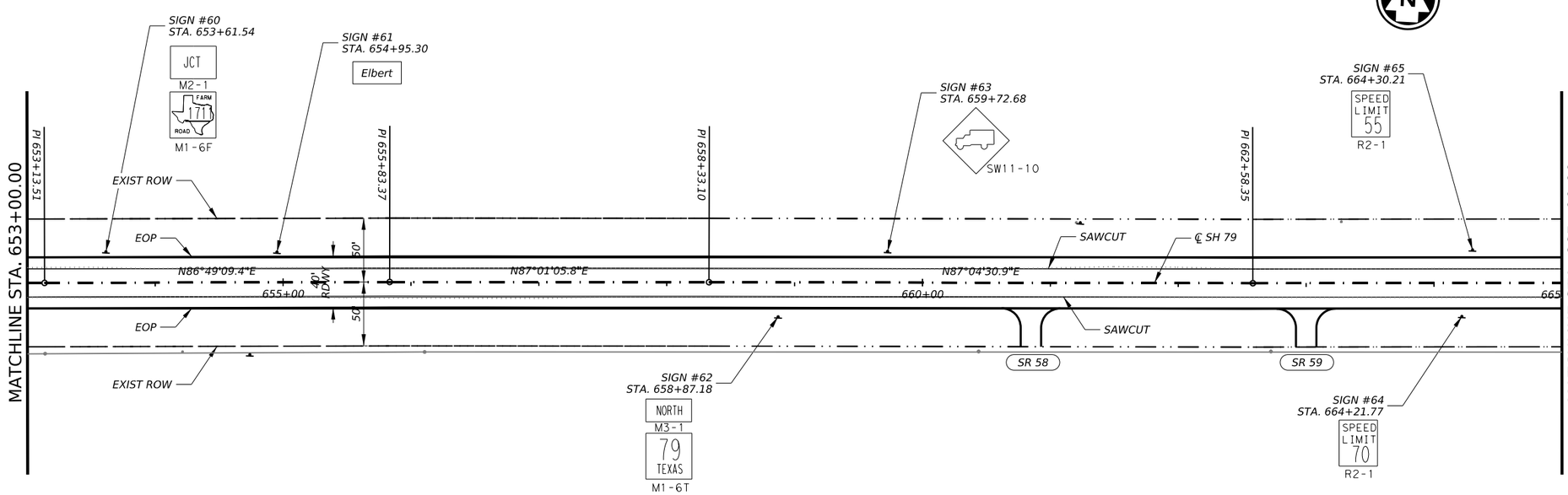

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

STATE OF TEXAS
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Bryson Lawrence, P.E.

05/05/2023

Texas Department of Transportation

SH 79
PLAN LAYOUT

SHEET 13 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		60

DATE: 5/5/2023 2:12:00 PM
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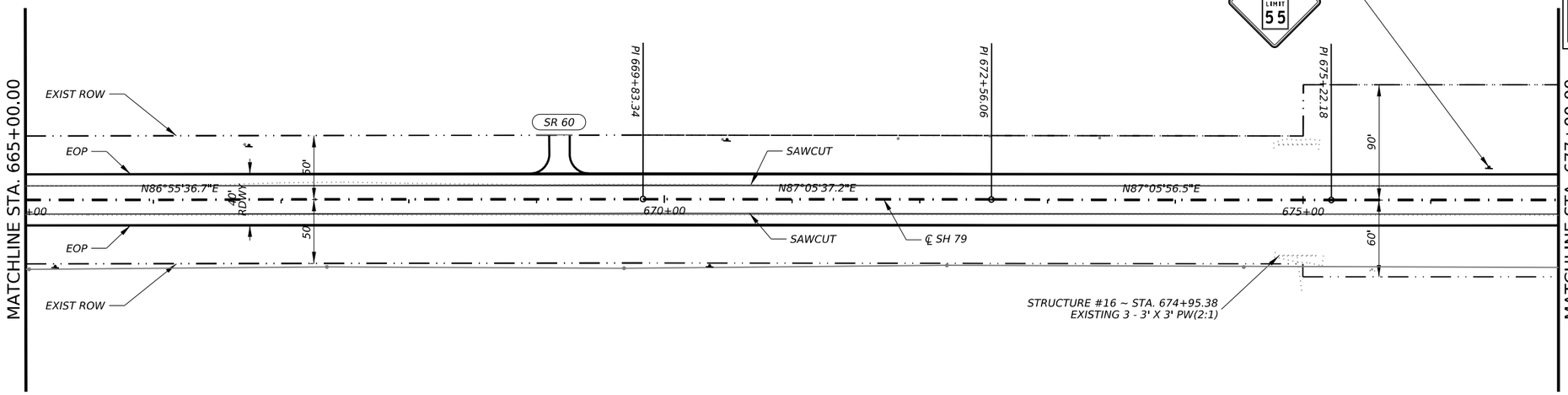

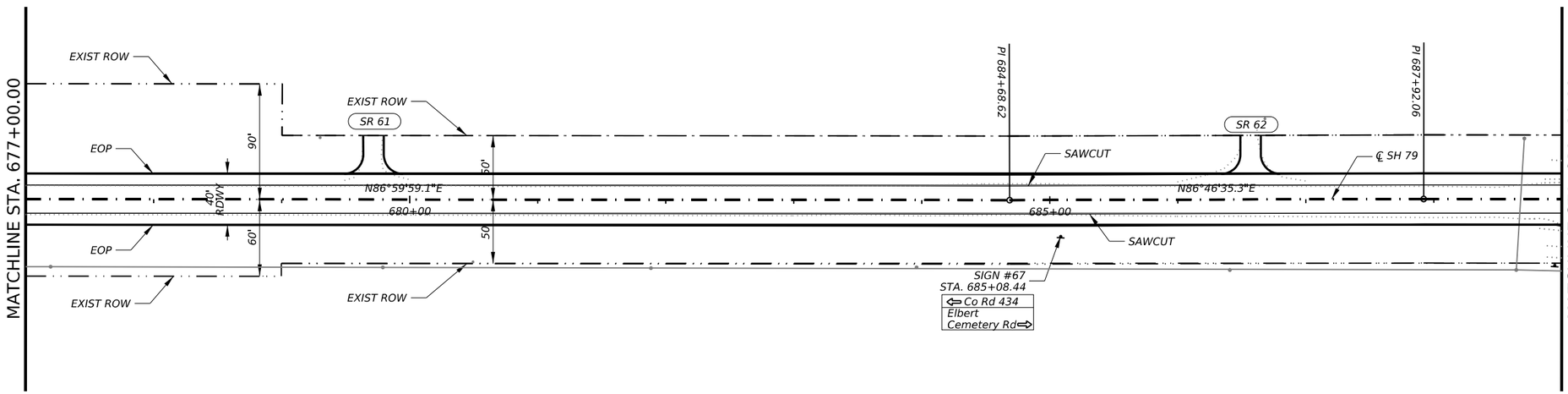

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 14 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		61

DATE: 5/5/2023 2:13:31 PM
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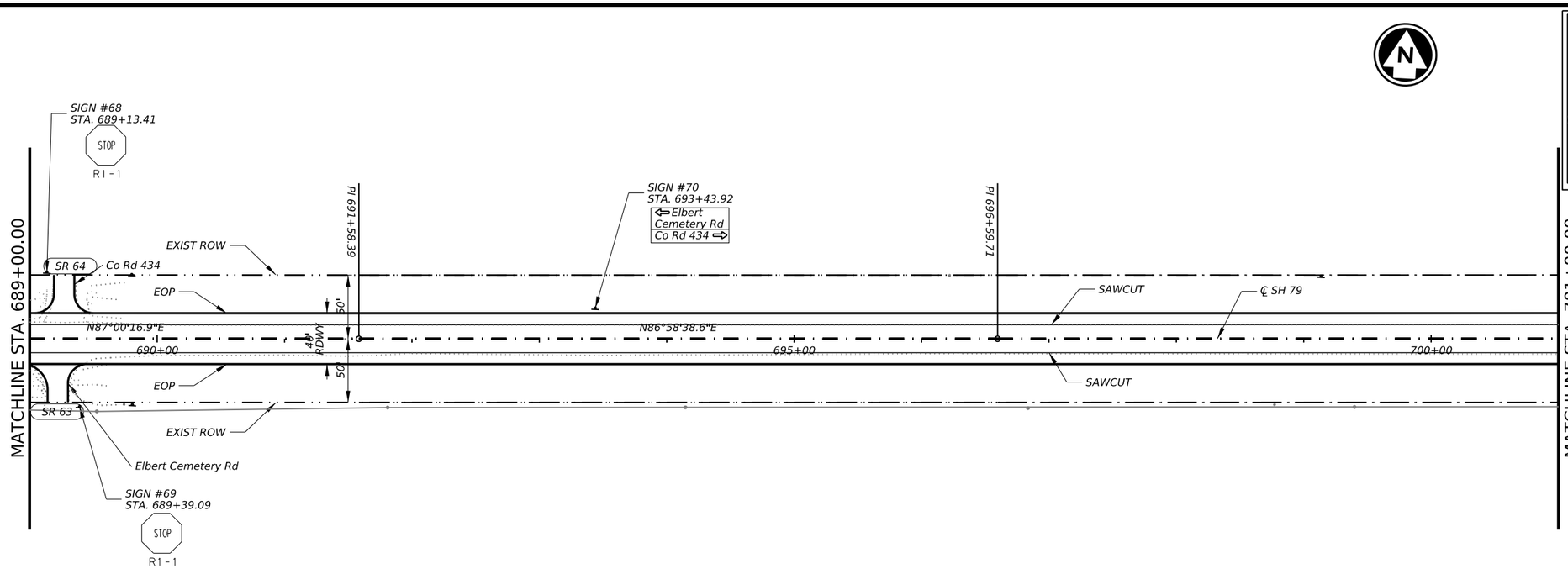

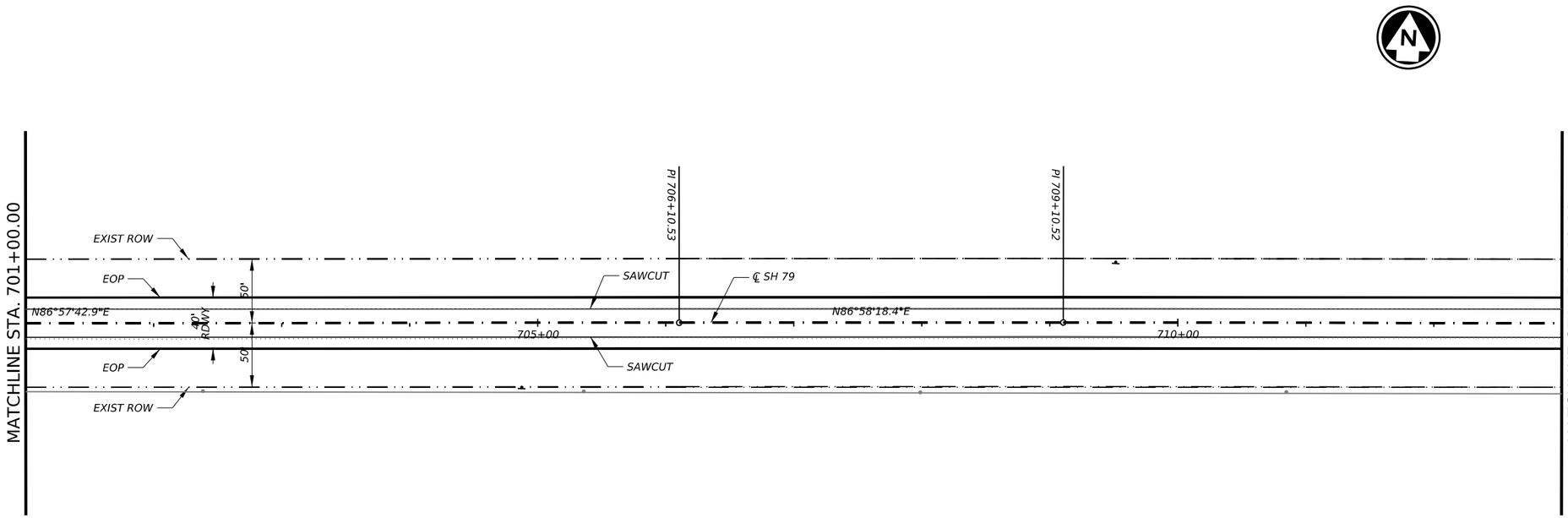

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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Texas Department of Transportation

SH 79
PLAN LAYOUT

SHEET 15 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		62

DATE: 3/29/2023 2:59:20 PM
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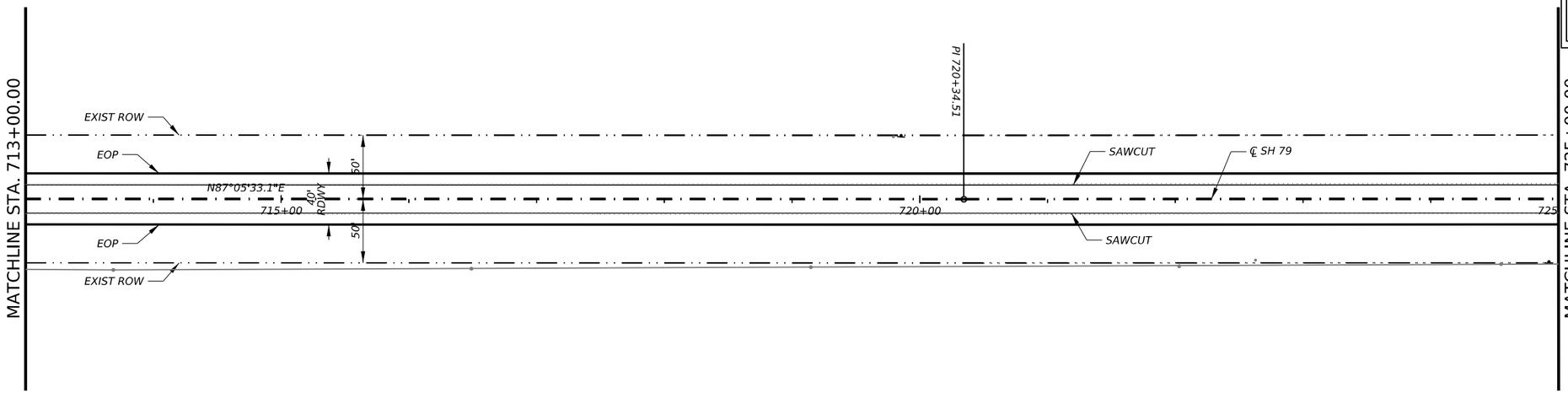

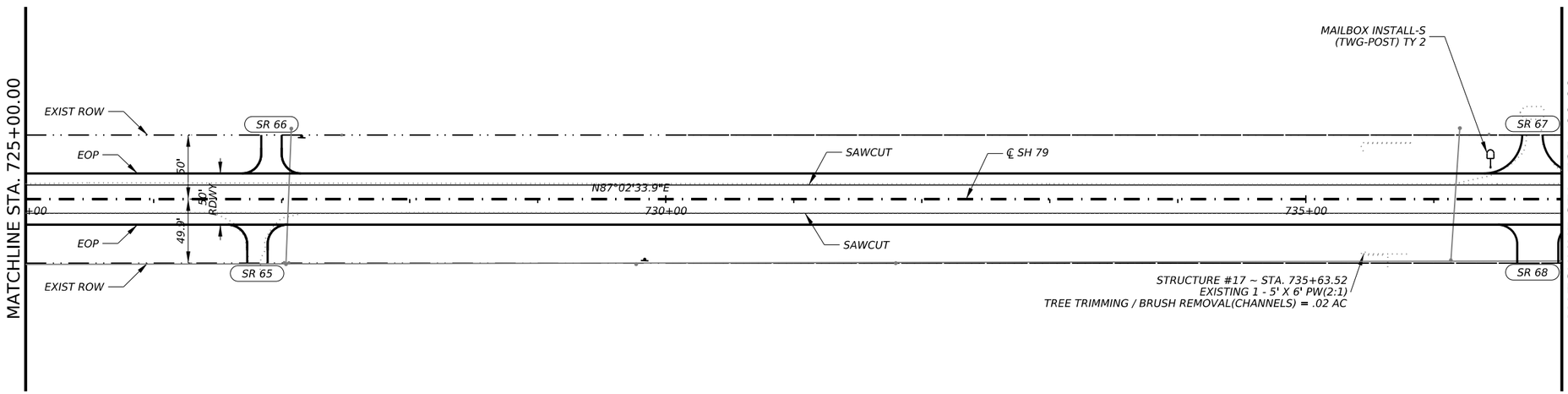

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 16 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		63

DATE: 3/29/2023 2:59:24 PM
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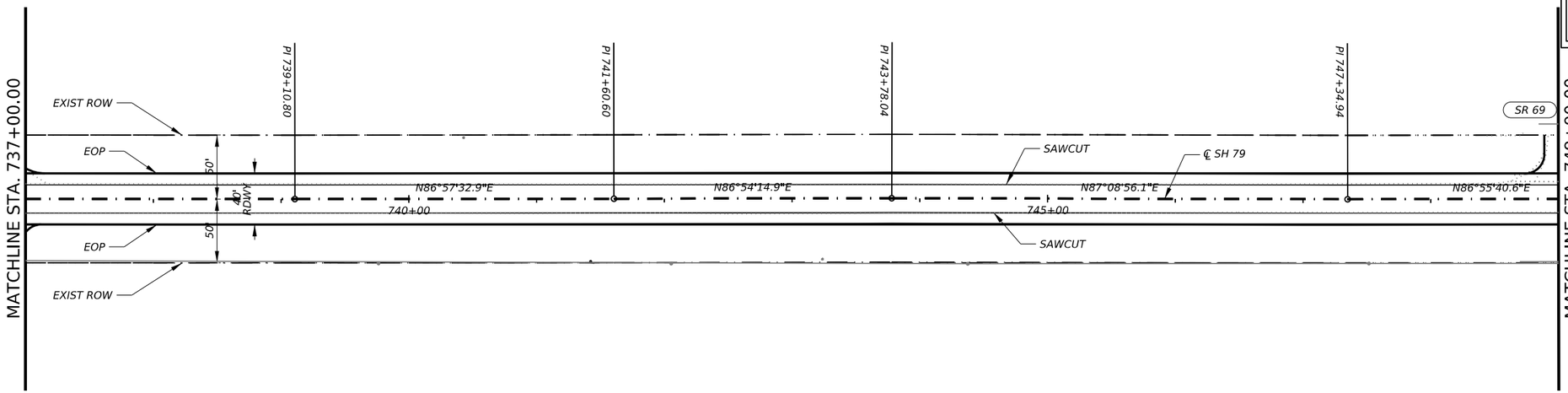

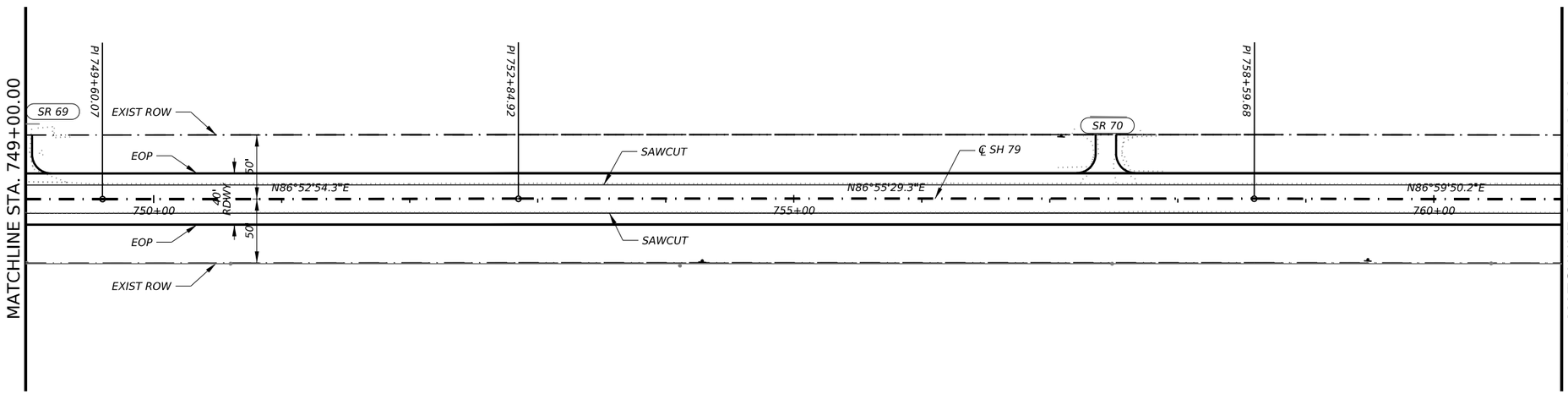

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 17 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		64

DATE: 3/29/2023 2:59:28 PM
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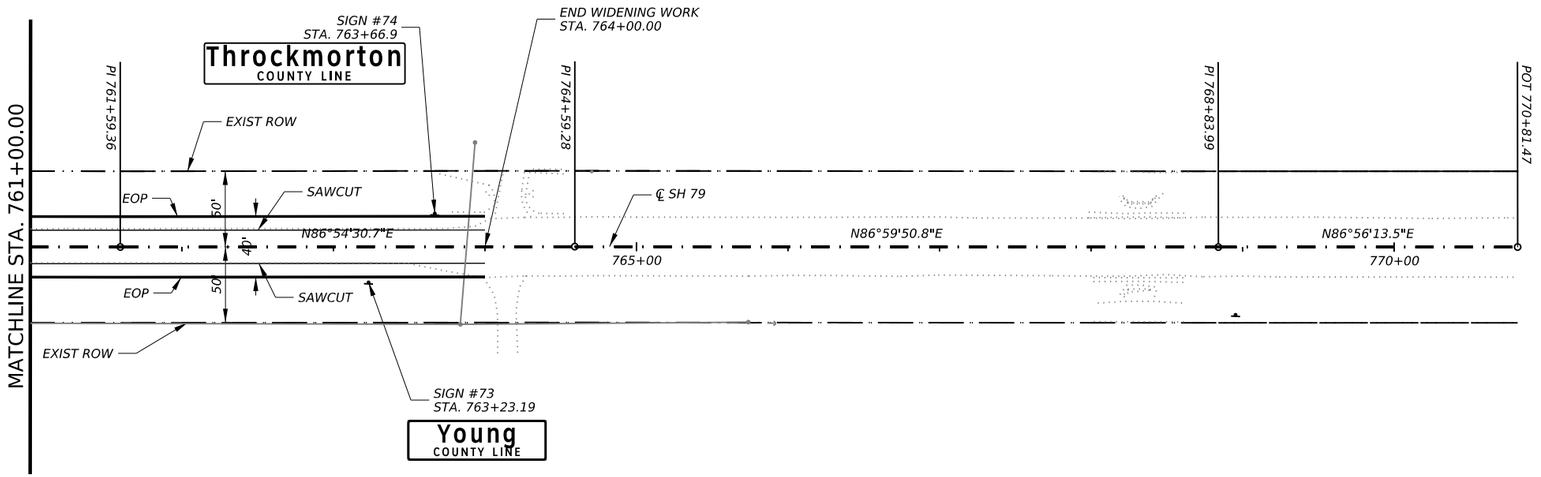

LEGEND

- SIGN
- SINGLE MAILBOX
- OBJECT MARKER(TY 2)
- ## SIDE ROAD NUMBER - PROPOSED
- BI-DIRECTIONAL DELINEATOR (GF2)
- Tree

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SH 79
PLAN LAYOUT

SHEET 18 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		65

DATE: 3/29/2023 2:59:32 PM
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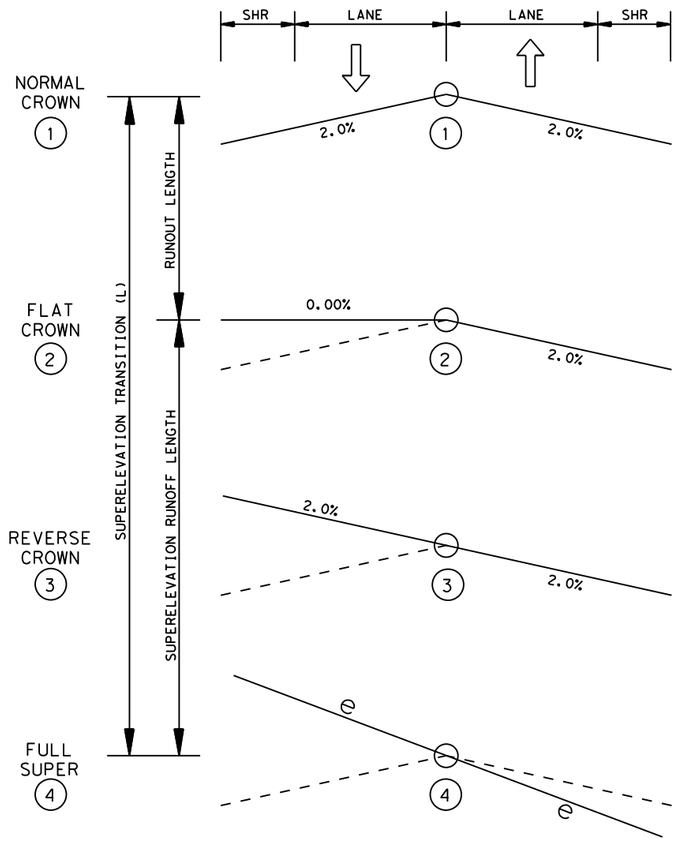


SUPERELEVATION ROTATION
TWO LANE HIGHWAY

NOTE:
FOR GRAPHICAL REPRESENTATION ONLY
SEE TABLE FOR ACTUAL PLAN SLOPES

e = PROPOSED SUPERELEVATION RATE

THE CROSS SLOPE BREAK BETWEEN THE SHOULDER AND TRAVELED LANE SHOULD BE LIMITED TO AN ALGEBRAIC DIFFERENCE OF 6%.

SH79 SUPERELEVATION DATA

PC STATION	PT STATION	RADIUS (FT)	DESIGN SPEED	PROPOSED SUPERELEVATION RATE (%)	CALCULATED TRANSITION LENGTH Lct (FT)	BEGIN TRANSITION LEFT SHOULDER	BEGIN TRANSITION LEFT LANE	BEGIN TRANSITION RIGHT LANE	BEGIN TRANSITION RIGHT SHOULDER	BEGIN FULL SUPER	END FULL SUPER	END TRANSITION LEFT SHOULDER	END TRANSITION LEFT LANE	END TRANSITION RIGHT LANE	END TRANSITION RIGHT SHOULDER
496+67.98	506+75.34	RT	60	6	213	494+98.00	494+98.00	496+04.00	496+04.00	497+11.00	506+33.00	508+46.00	508+46.00	507+40.00	507+40.00
474+74.35	483+31.95	LT	60	5.4	197	474+23.00	474+23.00	473+17.00	473+17.00	475+14.00	482+93.00	483+84.00	483+84.00	484+90.00	484+90.00
441+00.18	453+28.25	RT	60	4.4	171	439+63.00	439+63.00	440+70.00	440+70.00	441+34.00	452+94.00	454+65.00	454+65.00	453+58.00	453+58.00
400+59.68	411+50.56	LT	60	4.6	176	400+26.00	400+26.00	399+19.00	399+19.00	400+95.00	411+15.00	411+84.00	411+84.00	412+91.00	412+91.00

NOTES:

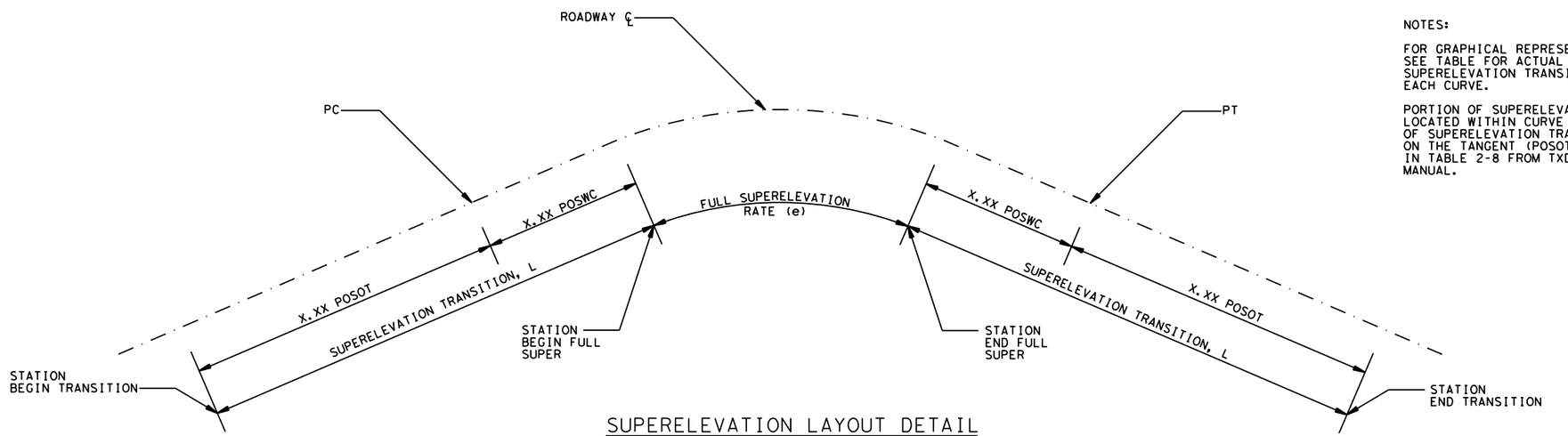
REFER TO ROADWAY DESIGN MANUAL (RDM) OR AASHTO A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS FOR DETAILS NOT SHOWN.

Emax IS BASED ON A VALUE OF 6 PERCENT.

MULTILANE ADJUSTMENT FACTOR USED FOR MORE THAN ONE LANE BEING ROTATED. SEE TABLE 2-7 RDM.

PORTION OF SUPERELEVATION TRANSITION LOCATED ON THE TANGENT IS BASED ON TABLE 2-8 OF RDM.

AXIS OF ROTATION IS LOCATED AT CENTERLINE OF ROADWAY.



SUPERELEVATION LAYOUT DETAIL

NOTES:

FOR GRAPHICAL REPRESENTATION ONLY SEE TABLE FOR ACTUAL VALUES OF SUPERELEVATION TRANSITION (L) FOR EACH CURVE.

PORTION OF SUPERELEVATION TRANSITION LOCATED WITHIN CURVE (POSWC) AND PORTION OF SUPERELEVATION TRANSITION LOCATED ON THE TANGENT (POSOT) IS BASED ON DATA IN TABLE 2-8 FROM TXDOT ROADWAY DESIGN MANUAL.

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SH 79 SUPERELEVATION LAYOUT

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CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		66

DATE: 3/29/2023 2:59:44 PM
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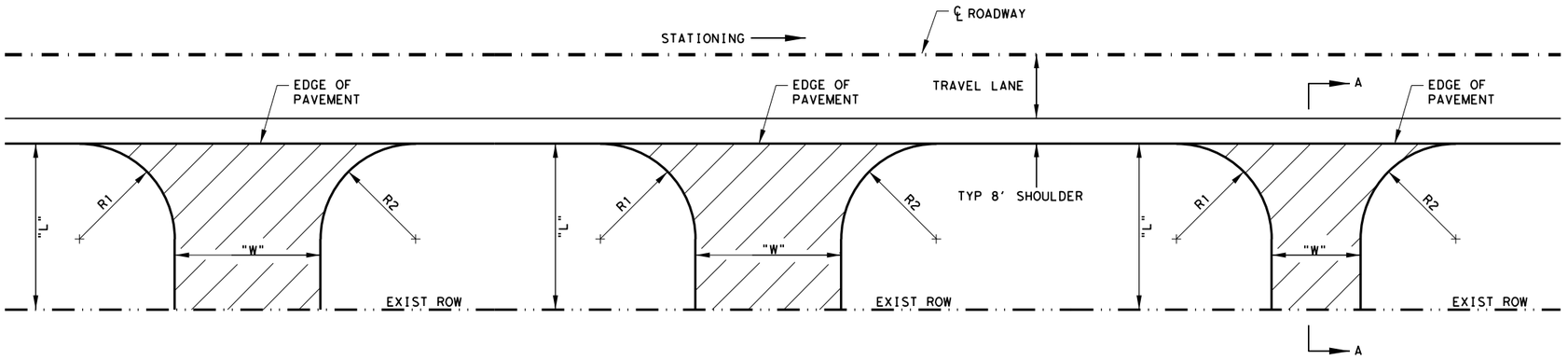
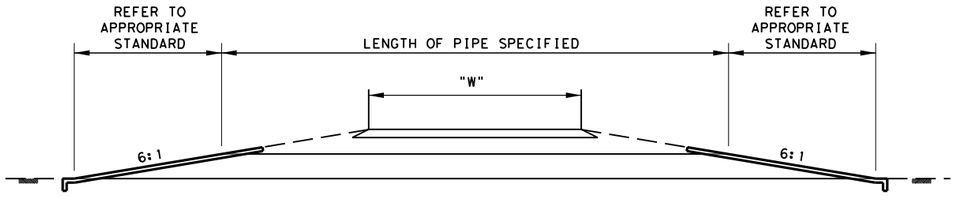


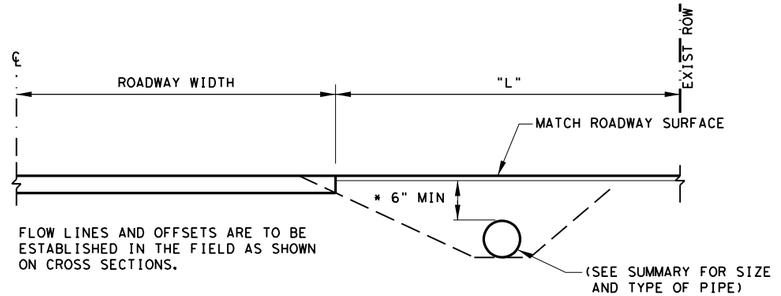
PLAN OF TYPICAL FM ROAD INTERSECTION DETAIL

PLAN OF TYPICAL COUNTY ROAD

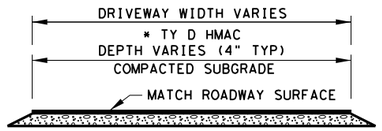
PLAN OF TYPICAL PRIVATE DRIVEWAY



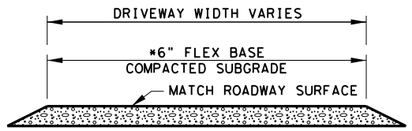
DETAIL SHOWING MEASUREMENT OF SIDEROAD PIPE



SECTION A-A SIDEROAD W/ PIPE



ACP SIDEROAD TYPICAL SECTION



BASE SIDEROAD TYPICAL SECTION

* FOR CONTRACTORS INFORMATION ONLY.
SUBSIDIARY TO ITEM 530

ALL COUNTY ROAD AND FARM ROAD INTERSECTIONS WILL BE PAVED ACP (ITEM 530) FOLLOWING THESE DETAILS UNLESS OTHERWISE NOTED IN PLAN LAYOUT SHEETS OR DESIGNATED BY ENGINEER

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SH 79 SIDEROAD DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		67

DATE: 3/29/2023 2:59:54 PM
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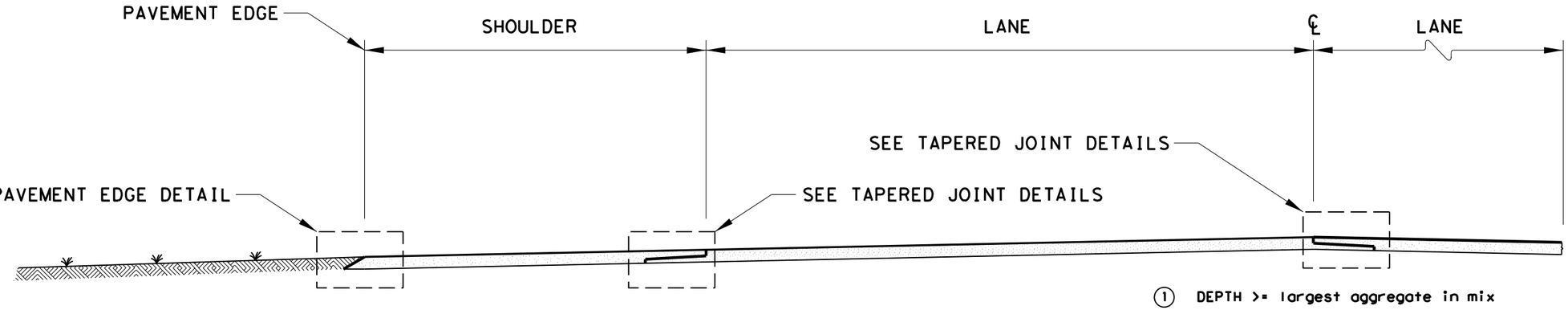
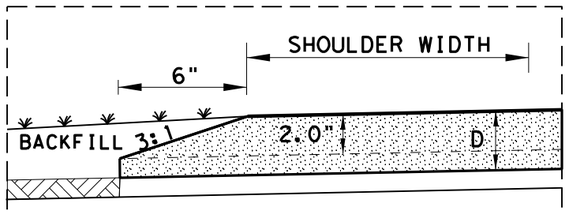
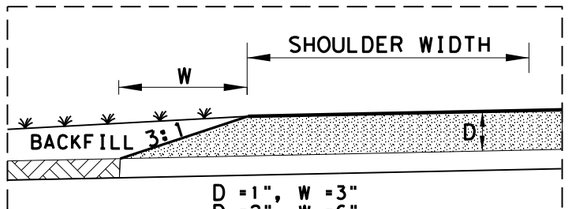


① DEPTH >= largest aggregate in mix

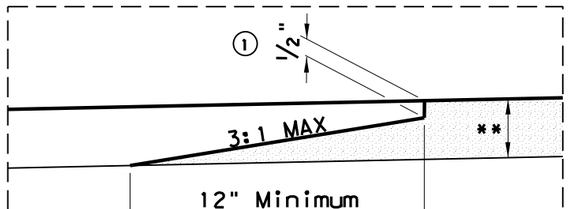


TAPERED PAVEMENT EDGE DETAIL"SAFETY EDGE" WHEN D IS > 2.0"

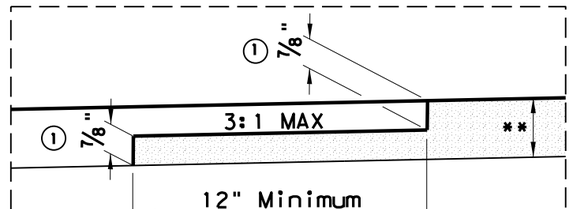


D =1", W =3"
D =2", W =6"

TAPERED PAVEMENT EDGE DETAIL"SAFETY EDGE" WHEN D IS 2.0" OR LESS



TAPERED JOINT DETAIL HMA LIFT THICKNESS LESS THAN 2"



TAPERED JOINT DETAIL HMA LIFT THICKNESS MORE THAN 2"

** SEE TYPICAL SECTION FOR DEPTH AND TYPE OF HMA.

NOTES:

LONGITUDINAL JOINTS SHALL BE CONSTRUCTED BY TAPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL EXTEND BEYOND THE NORMAL LANE WIDTH. THE TAPERED PORTION OF THE MAT SHALL BE CONSTRUCTED BY THE USE OF AN APPROVED SCREED ATTACHMENT WHICH WILL PRODUCE THE DESIRED SHAPE WITH THE MAIN SCREED. USE OF AN EXTERNAL STRIKE-OFF DEVICE TO MODIFY THE MAT SHAPE AFTER PASSING OF THE SCREED WILL NOT BE ALLOWED. TACK COAT SHALL BE APPLIED TO THE IN-PLACE TAPER BEFORE THE ADJACENT MAT IS PLACED. FINAL DENSITY REQUIREMENTS FOR THE ENTIRE PAVEMENT, INCLUDING THE TAPER AREA, WILL REMAIN UNCHANGED.

PAVEMENT EDGES SHALL BE CONSTRUCTED BY TAPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL BE PLACED WITHIN THE NORMAL LANE WIDTH UNLESS OTHERWISE SHOWN ON THE PLANS. THE TAPERED PORTION OF THE MAT SHALL BE CONSTRUCTED BY THE USE OF AN APPROVED SCREED ATTACHMENT WHICH WILL PRODUCE THE DESIRED SHAPE WITH THE MAIN SCREED. USE OF AN EXTERNAL STRIKE-OFF DEVICE TO MODIFY THE MAT SHAPE AFTER PASSING OF THE SCREED WILL NOT BE ALLOWED. COMPACTION OF THE PAVEMENT EDGE TAPER WILL BE REQUIRED TO AS NEAR TO FINAL DENSITY AS POSSIBLE.

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03/30/2023

SH 79
HOT MIX
LONGITUDINAL
JOINT DETAILS

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		68

DATE: 3/29/2023 3:00:03 PM
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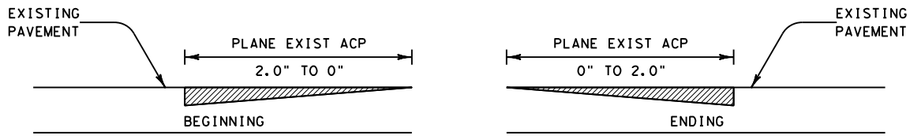


TYPICAL PLANING & OVERLAY @ BEGINNING AND ENDING OF PROJECT DETAIL ①

TYPICAL PLANING @ BRIDGE DECK DETAIL ②

PLANE AND OVERLAY THE FOLLOWING BRIDGES
CSJ: 0284-01-026
MILLER CREEK BRIDGE: 032240028402015
STA 490+55.00 TO 493+05.00

NOTES:

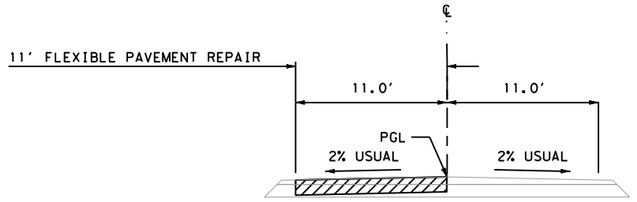
① THIS DETAIL SHALL BE USED FOR CONSTRUCTING BUTT JOINTS AT ALL BEGINNING/ENDING PROJECT LOCATIONS AND SHALL BE TAPERED AS SHOWN OR AS DIRECTED BY THE ENGINEER.

② THESE DETAILS SHALL BE USED FOR BRIDGE DECK MILLING AT AT THE BRIDGE LOCATIONS LISTED AND SHALL BE TAPERED AT A RATE OF 1" PER STA. OR AS DIRECETED BY THE ENGINEER USING ITEM 354-06021.

FLEXIBLE PAVEMENT STRUCTURE REPAIR WILL INCLUDE REMOVAL OF EXISTING ACP/BASE MATERIAL AND PLACEMENT OF TY B ACP PG64-22.

③ VERIFY LOCATIONS WITH THE ENGINEER PRIOR TO BEGINNING PAVEMENT REPAIR.

COORDINATE FLEXIBLE PAVEMENT STRUCTURE REPAIR WITH THE ENGINEER PRIOR TO CONSTRUCTING THE WIDENING.



SH 79

PROPOSED TYPICAL PAVEMENT REPAIR SECTION (SAME FOR BOTH LANES OF TRAVEL) ③

FLEXIBLE PAVEMENT STRUCTURE REPAIR(4")					
STA	TO	STA	LENGTH	WIDTH	SY
461+00.00	TO	463+00.00	200	11	244
475+00.00	TO	480+00.00	500	11	611
487+50.00	TO	490+55.00	305	11	373
493+05.00	TO	493+55.00	50	11	61
499+80.00	TO	505+00.00	520	11	636
				TOTAL	1925

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SH 79

MISCELLANEOUS DETAILS

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SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0284	02	026	FM 79
DIST	COUNTY		SHEET NO.
03	THROCKMORTON		69

DATE: 3/29/2023 3:00:16 PM
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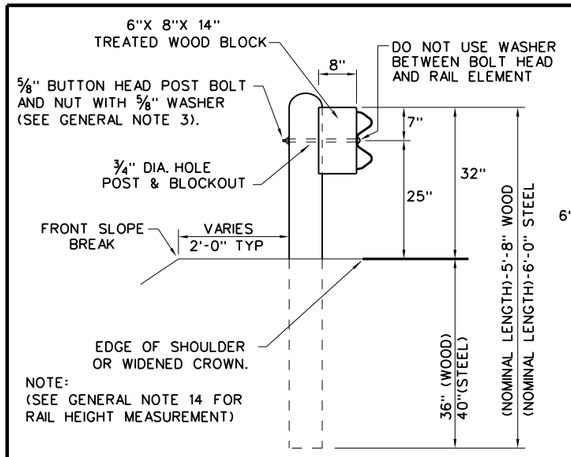
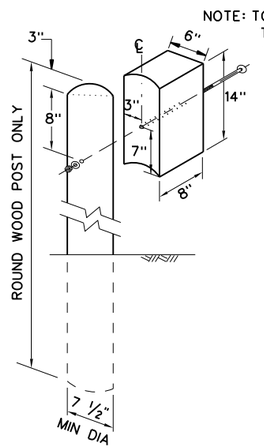
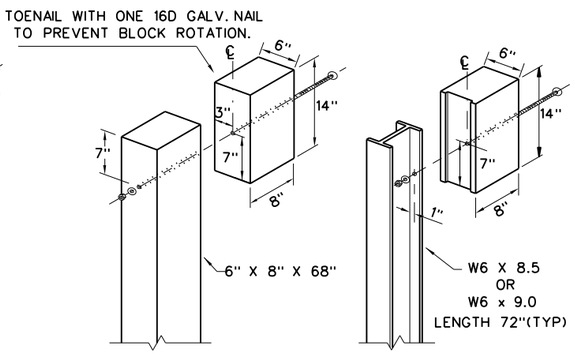


TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

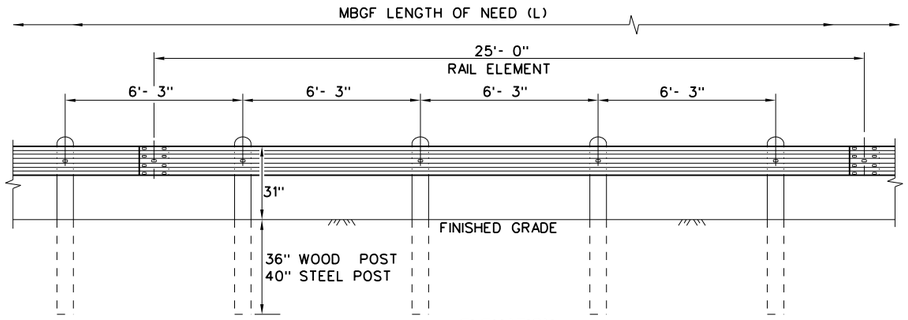
NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



WOOD BLOCK TO RECTANGULAR WOOD POST

ROUTED WOOD BLOCK TO I-BEAM STEEL POST

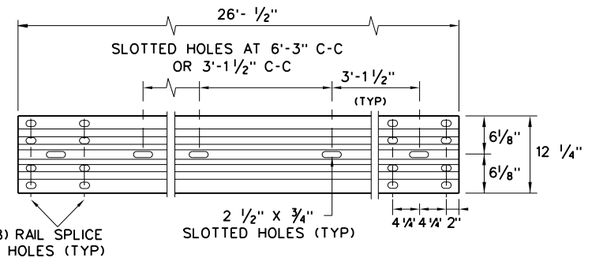
NOTE: * "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

ELEVATION MID-SPAN RAIL SPLICE

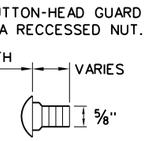
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

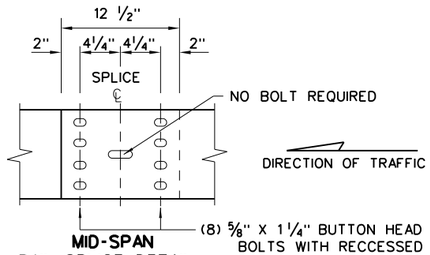
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



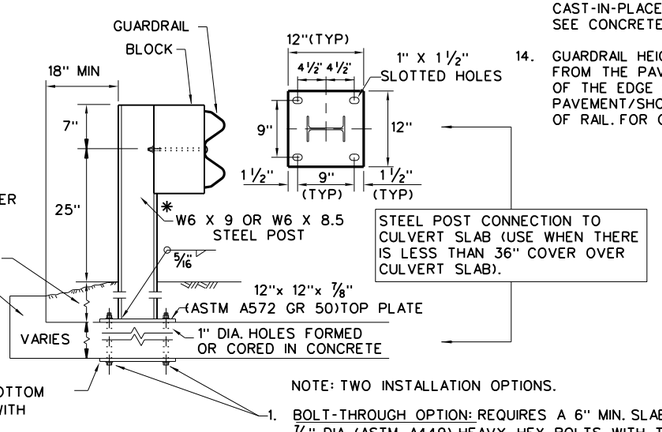
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

12" X 12" X 1/4"(ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

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.

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

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 5/8" WASHER (FWC16a) 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.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

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REVISIONS	0284	02	026	SH 79
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	WFS.	THROCKMORTON		70

DATE: 3/29/2023
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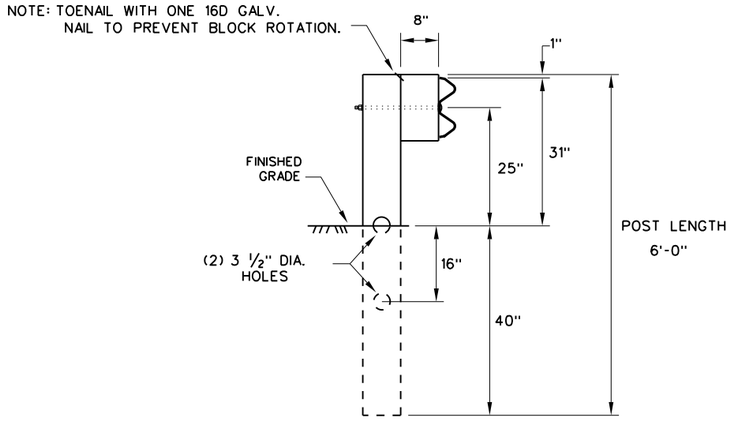
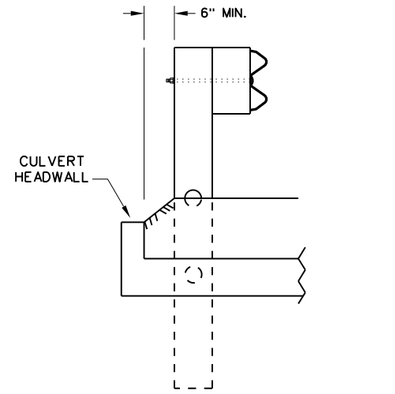


RECTANGULAR CRT POST (6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



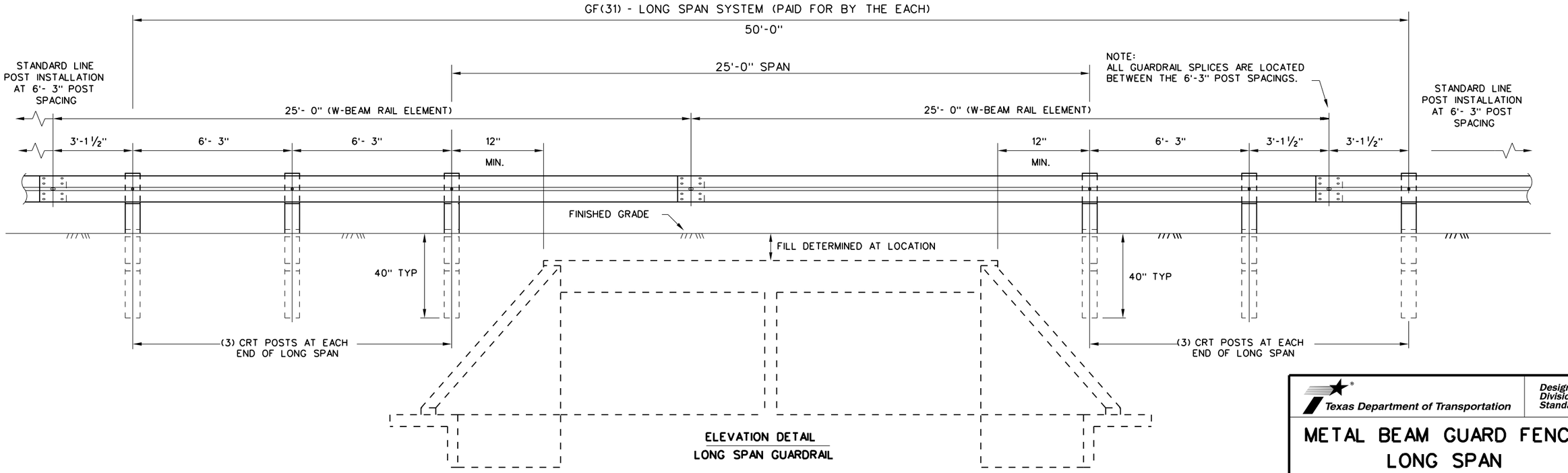
LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 1/2" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

DIRECTION OF TRAFFIC

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



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE LONG SPAN TL-3 MASH COMPLIANT

GF(31)LS-19

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	WFS.	THROCKMORTON		71

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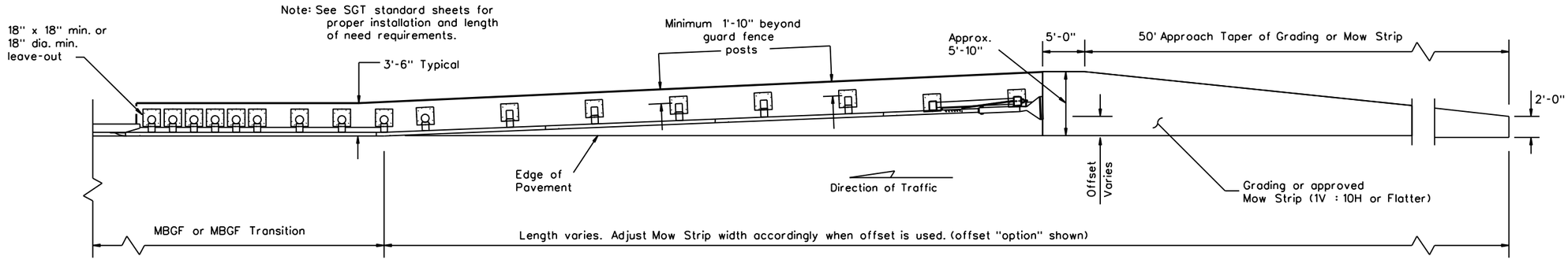
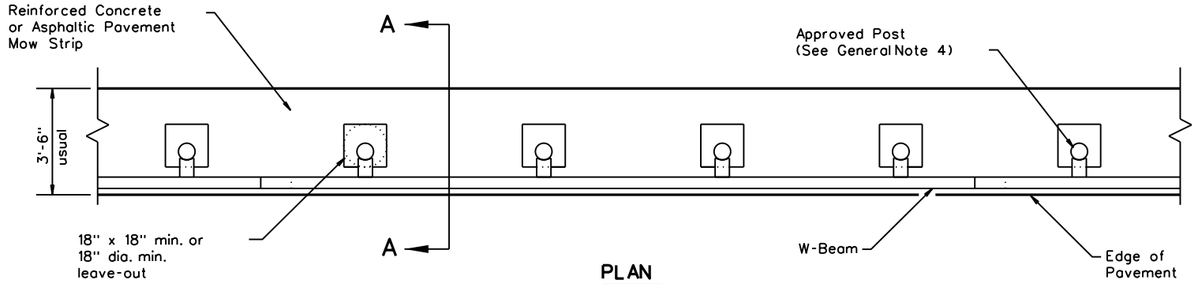
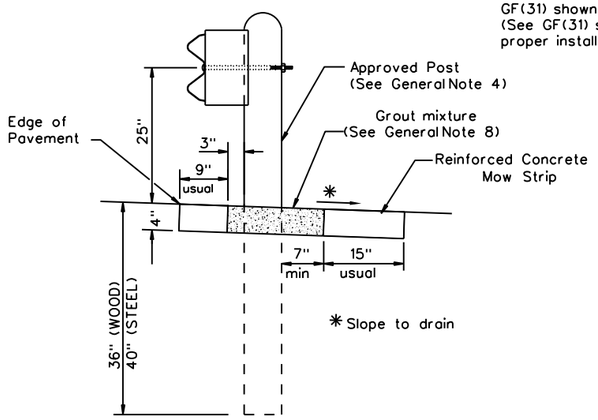


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



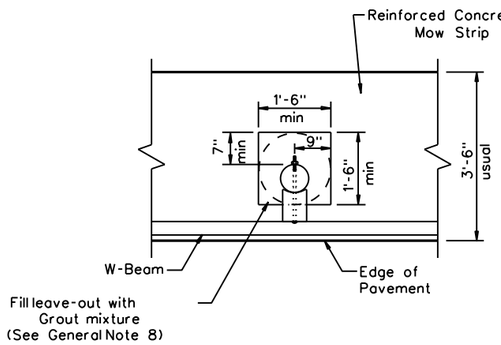
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

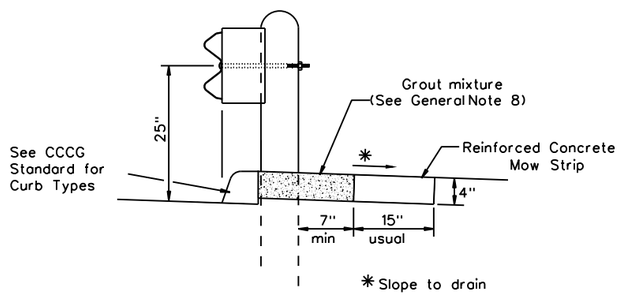
Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

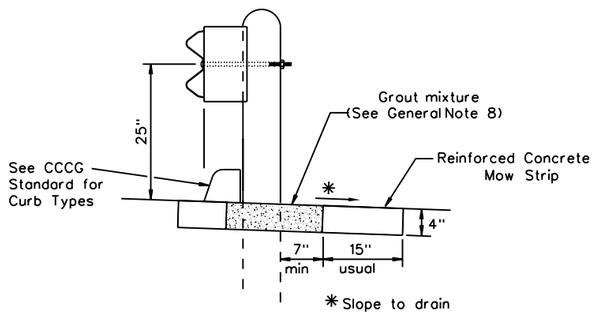
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type I or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



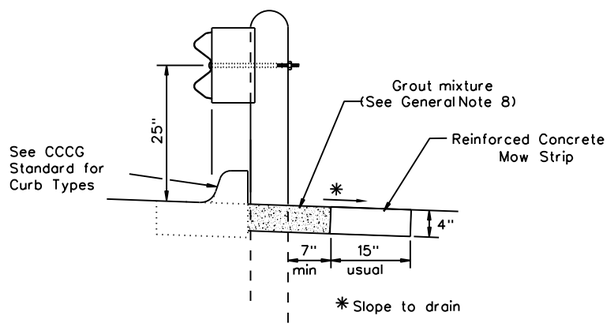
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

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	WFS.	THROCKMORTON		72

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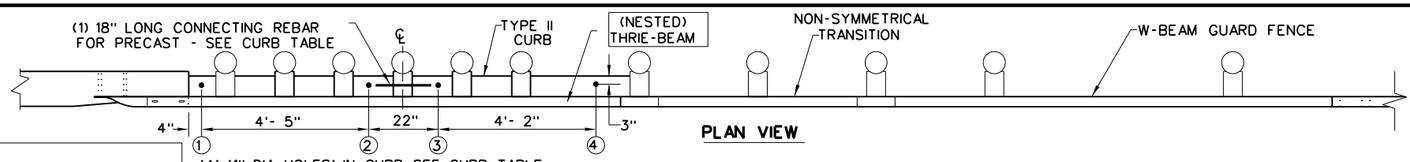
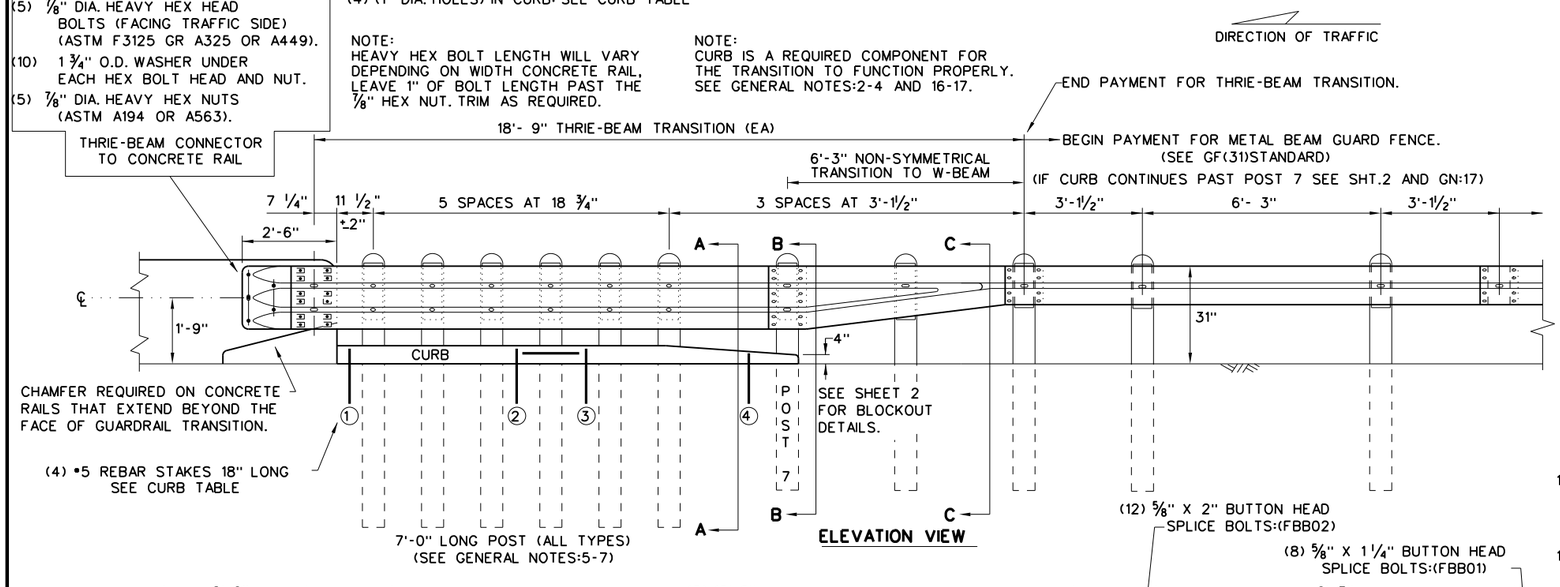


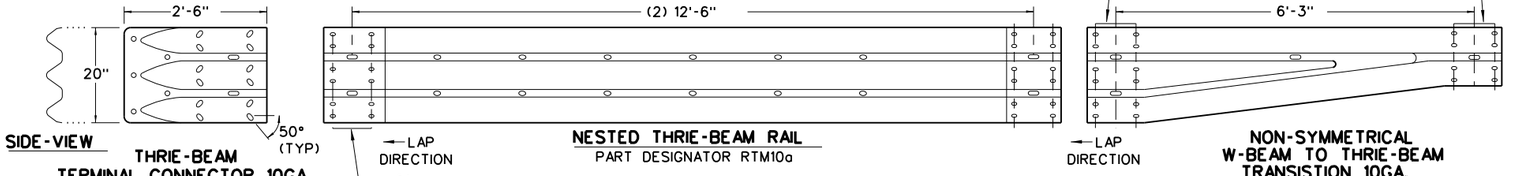
(5) 1" DIA. HOLES.
(5) ⅞" DIA. HEAVY HEX HEAD BOLTS (FACING TRAFFIC SIDE) (ASTM F3125 GR A325 OR A449).
(10) 1 ¾" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
(5) ⅞" DIA. HEAVY HEX NUTS (ASTM A194 OR A563).

NOTE:
HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE ⅞" HEX NUT. TRIM AS REQUIRED.

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

DIRECTION OF TRAFFIC

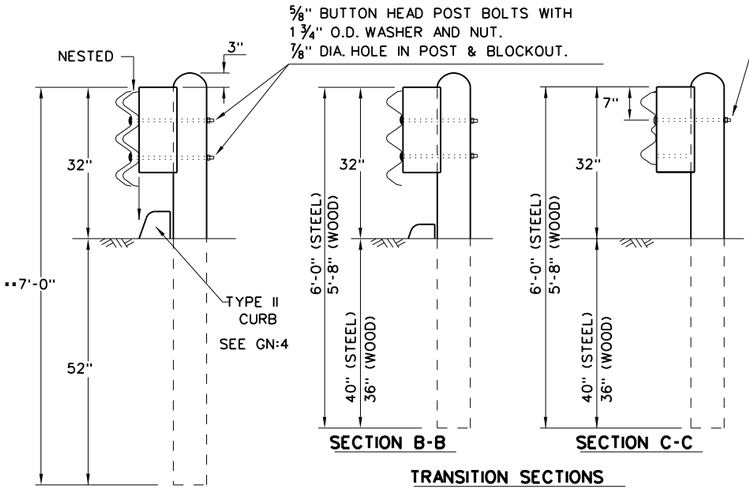




(12) ⅝" X 2" BUTTON HEAD SPLICE BOLTS WITH RECESSED NUTS:(FBB02)
(12) RECTANGULAR GUARDRAIL PLATE WASHERS:(FWR03)

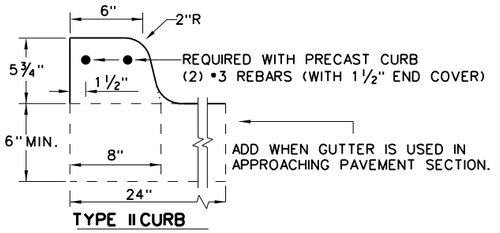
PLATE WASHER INSTRUCTIONS

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



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

THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE : *
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



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

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

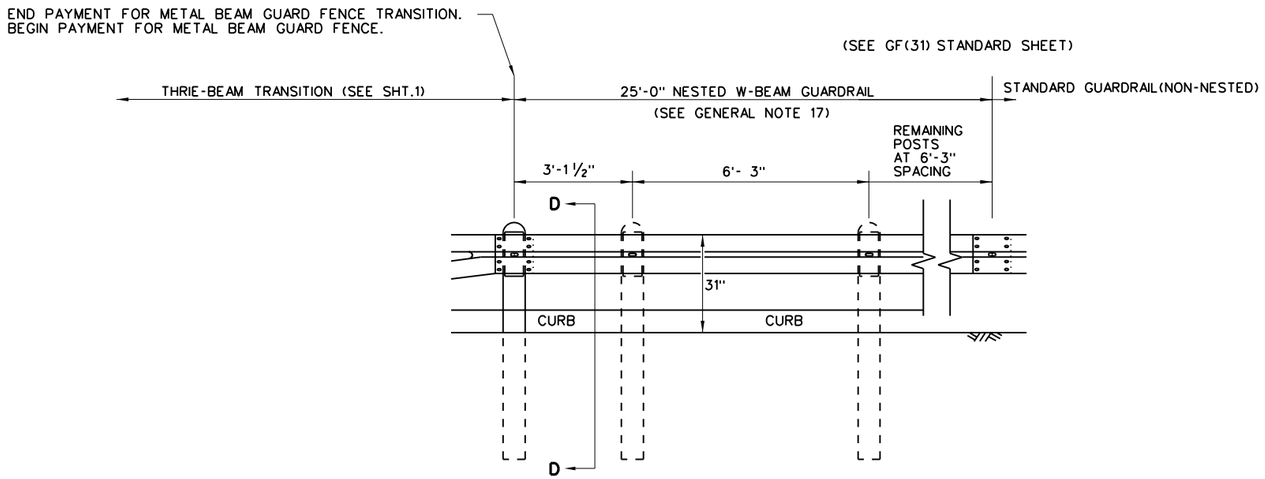
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

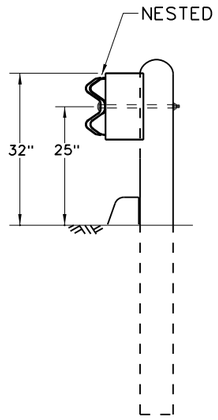
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		73

DATE: 3/29/2023
FILE: T:\WFSDESGN\Warren M\SH79\Roadway Standards DGN\GF(31)TRTL3-20.dgn

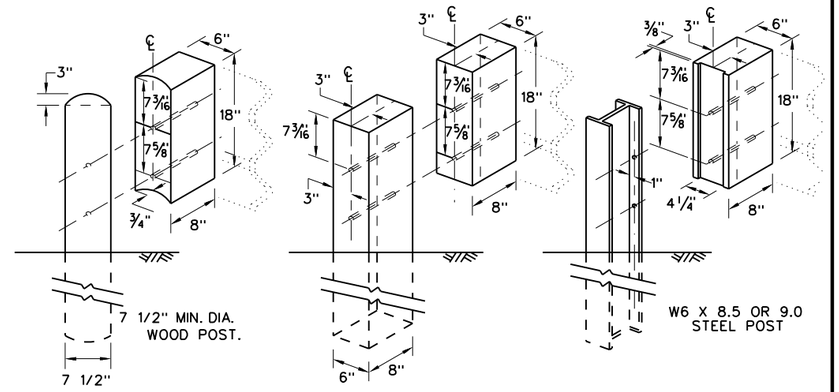
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

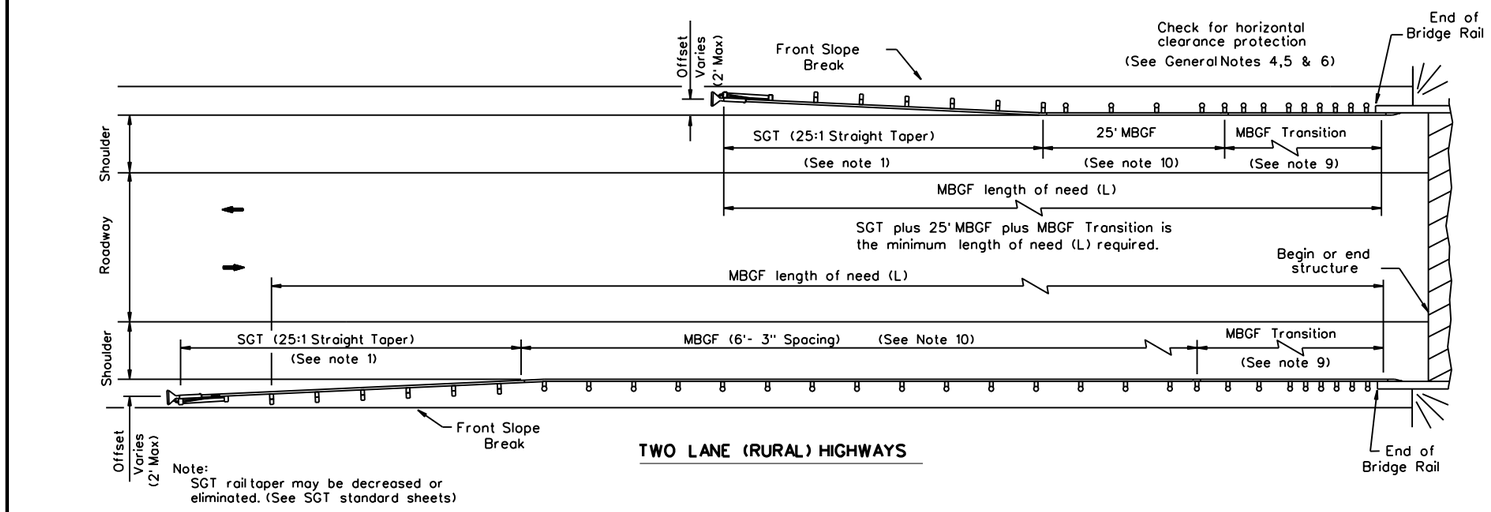
Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

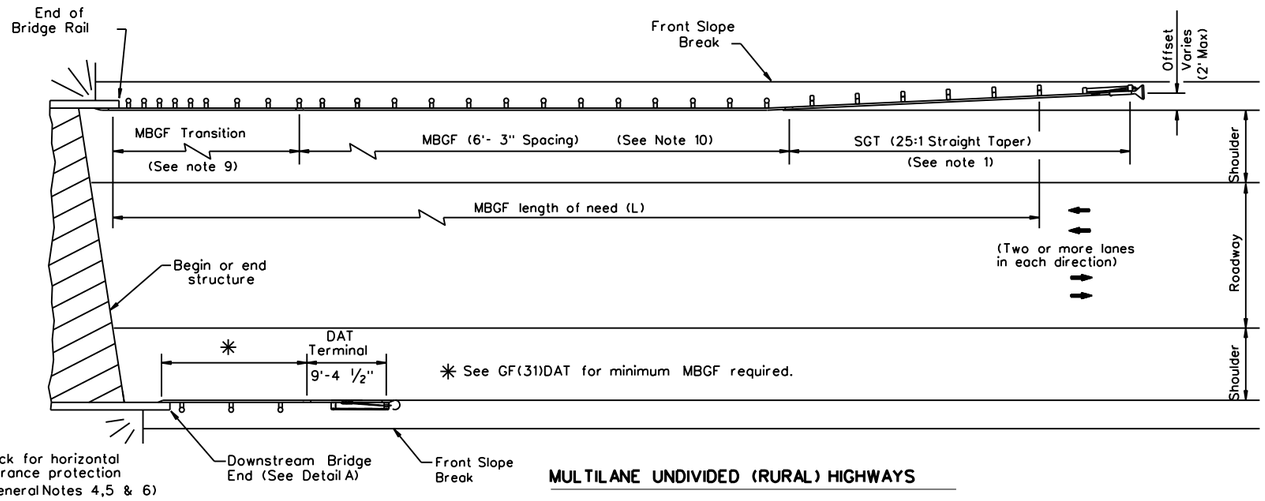
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		74

DATE: 3/29/2023 3:00:49 PM
FILE: T:\WFSDESGN\Warren M\SH79\Roadway Standards DGN\BED14.dgn

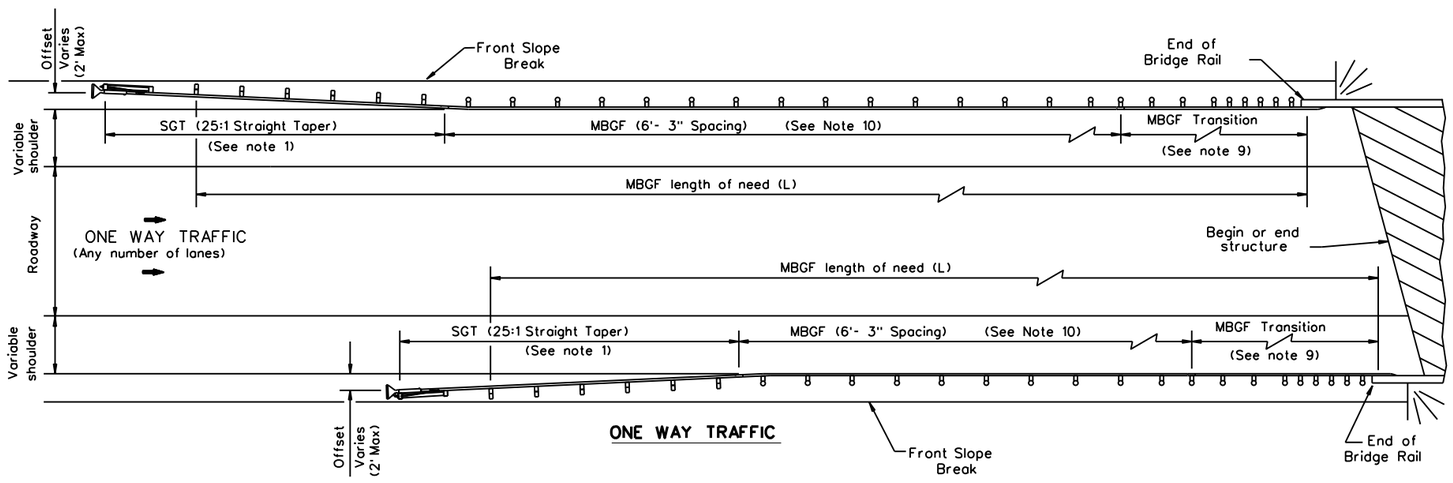


Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)

TWO LANE (RURAL) HIGHWAYS



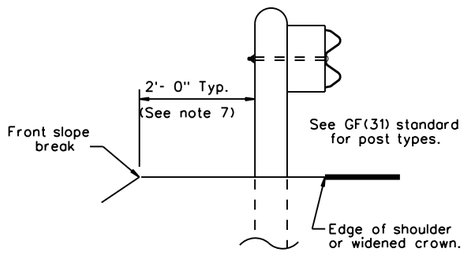
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



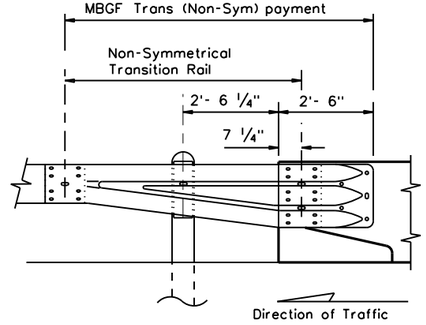
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

BRIDGE END DETAILS

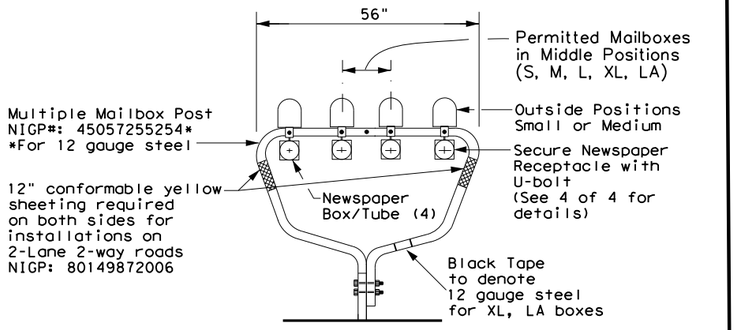
(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

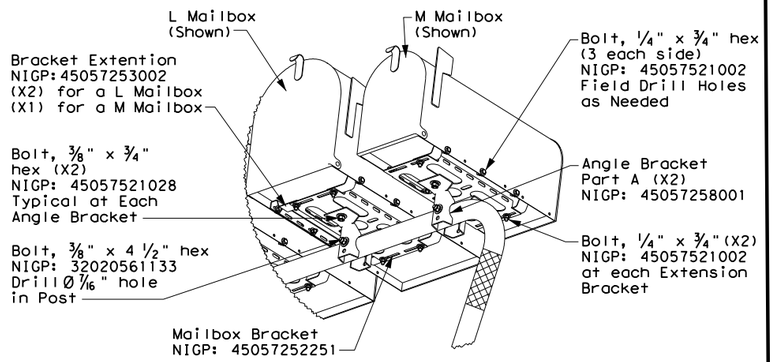
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		75

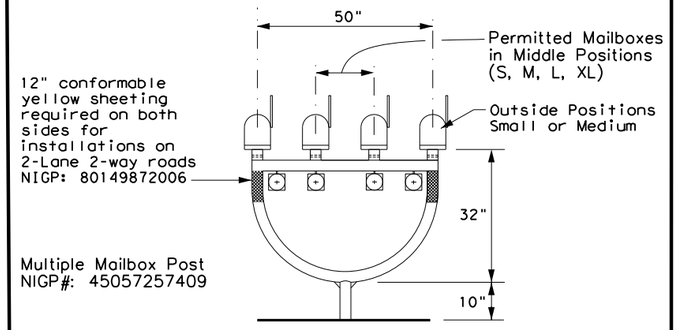
DATE:
FILE:

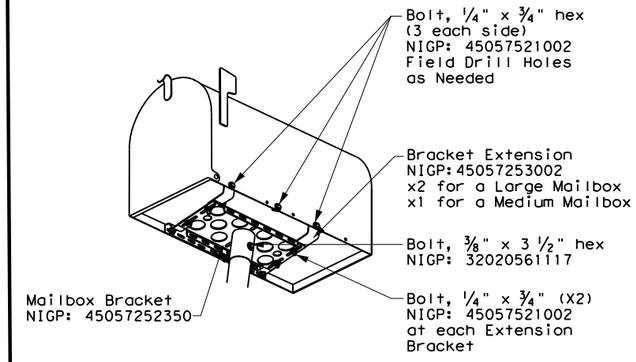
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

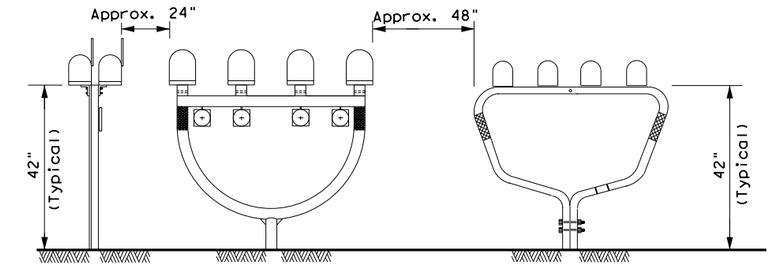
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

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

GENERAL NOTES:

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

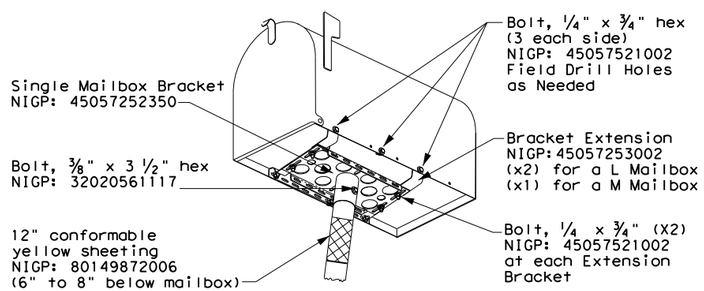
TYPICAL INSTALLATION MEASUREMENTS

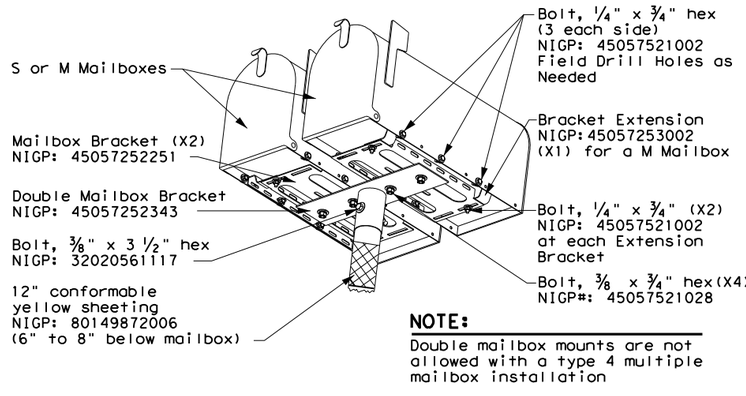


NOTE:

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

TYPE 2 and 4 - SINGLE/DOUBLE

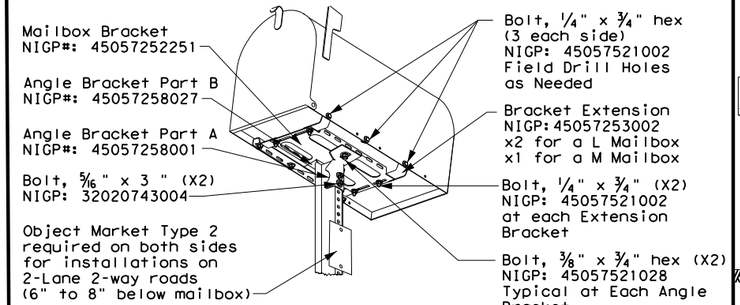


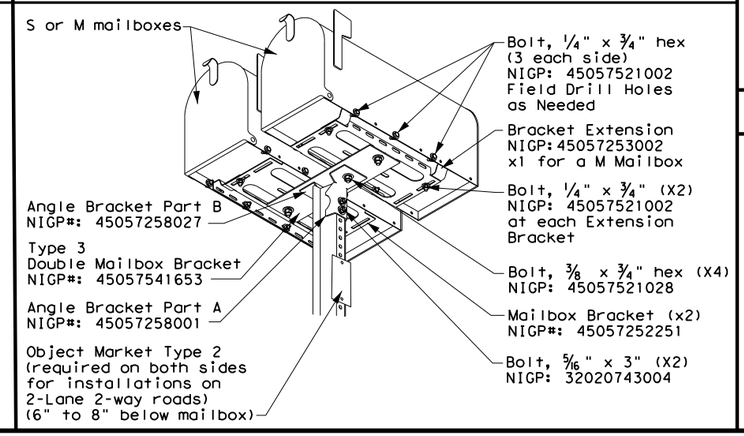


NOTE:

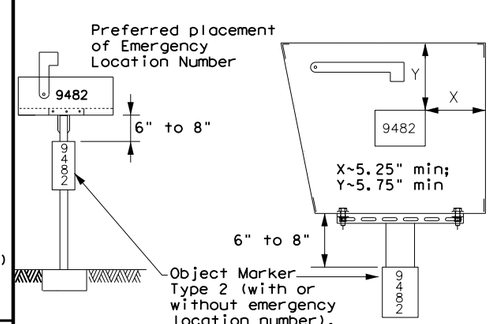
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

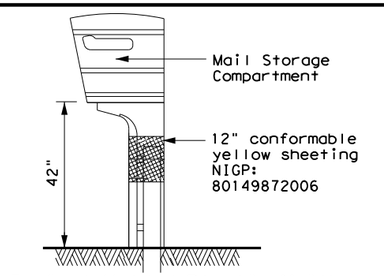


NOTES:

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

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation — Maintenance Division Standard

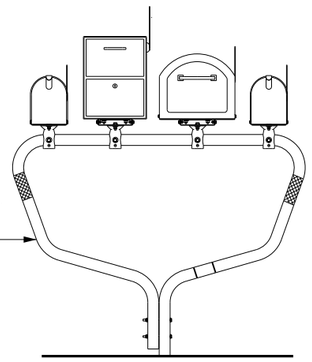
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

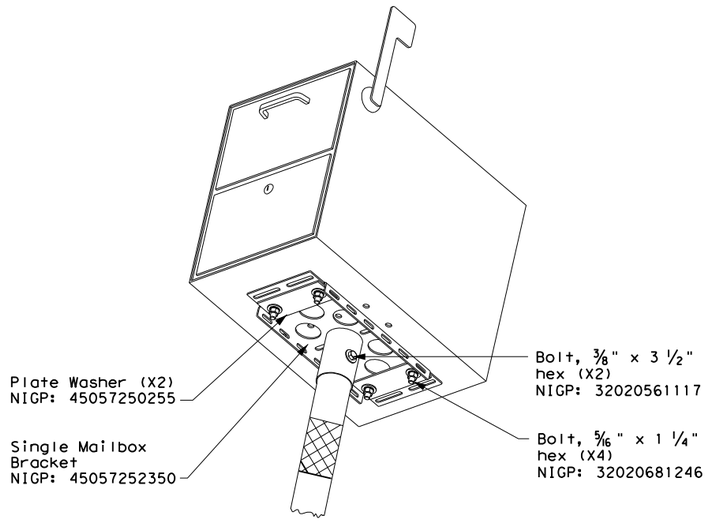
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		76

DATE:
FILE:

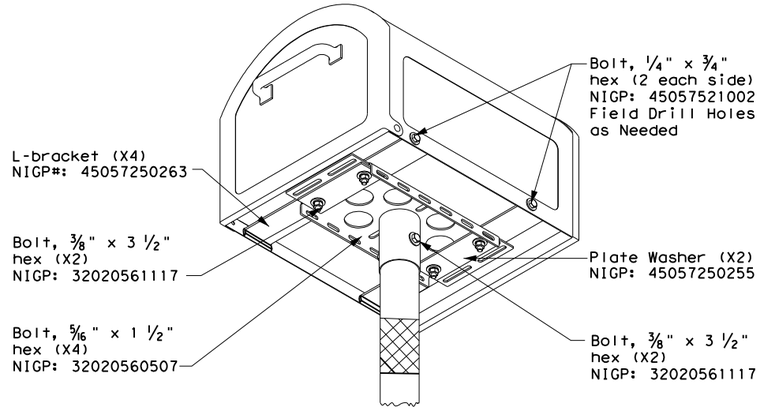
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

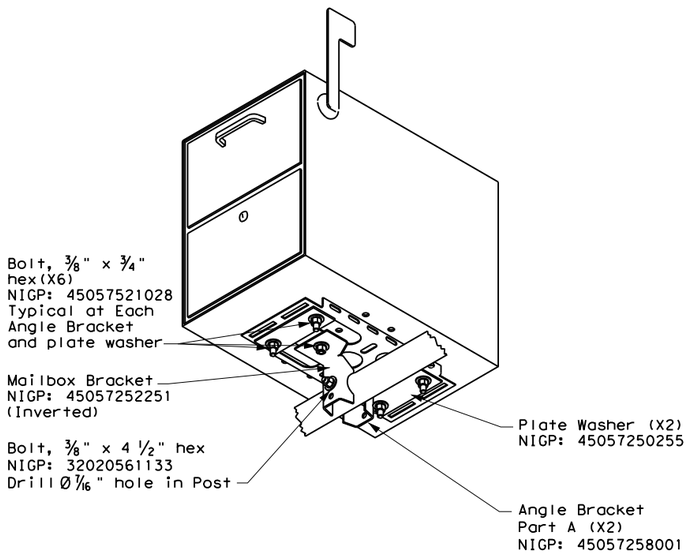


TYPE 2/4 - SINGLE XL MAILBOX

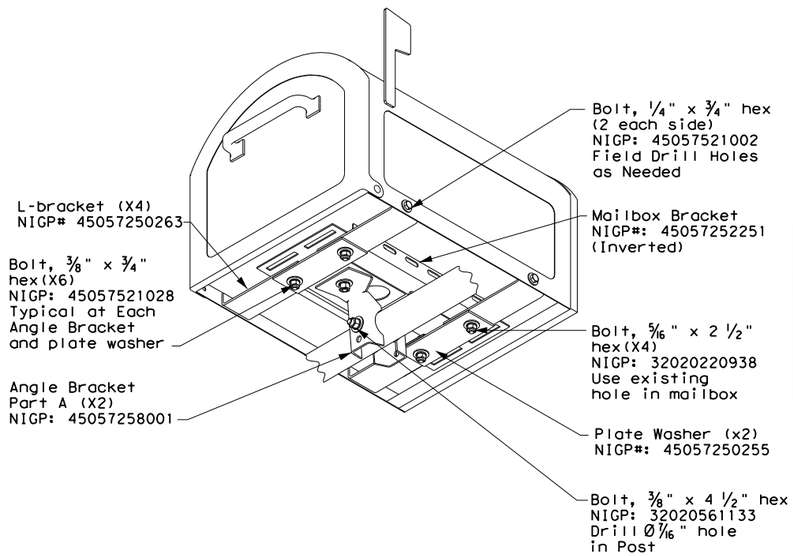


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

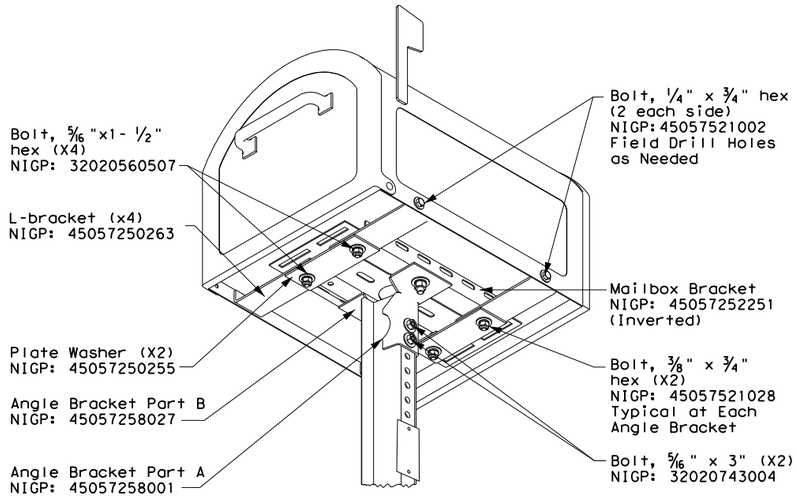
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation — Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

MB(2)-21

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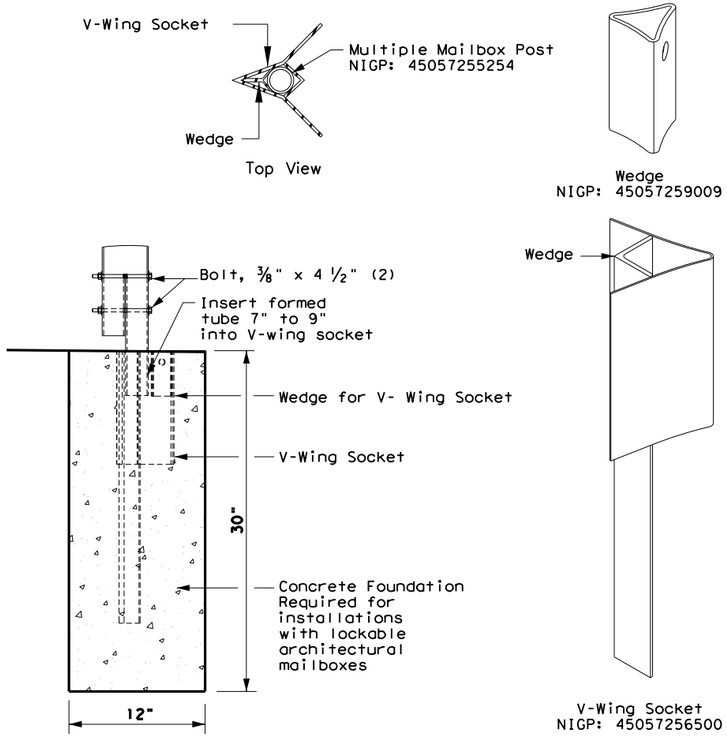
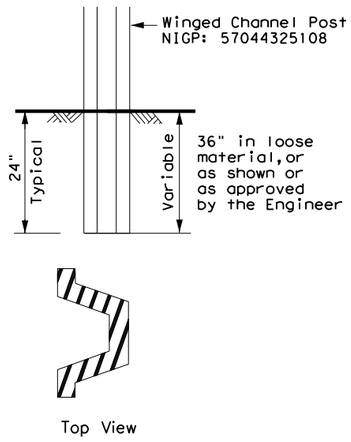
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		77

TYPE 1 - SUPPORT/FOUNDATION
Thin Wall Tube w/ V-LOC Anchorage

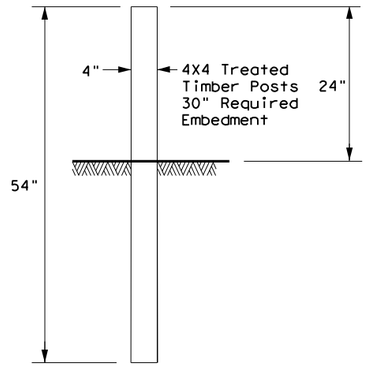


TYPE 3 - SUPPORT/FOUNDATION

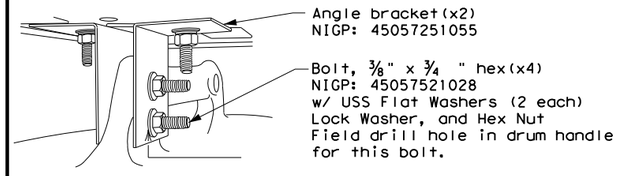


NOTES:
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT

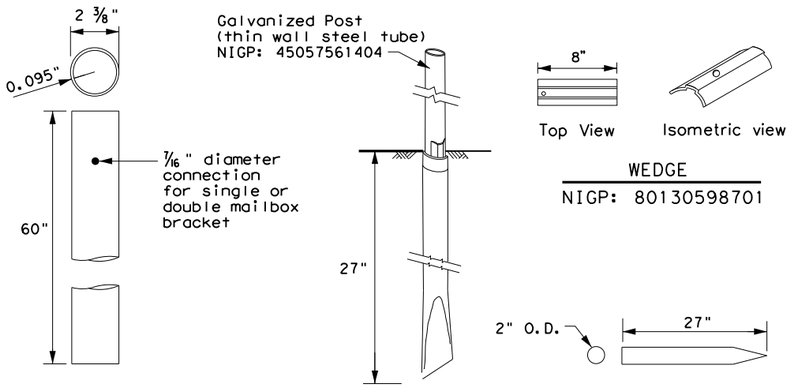


Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

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

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

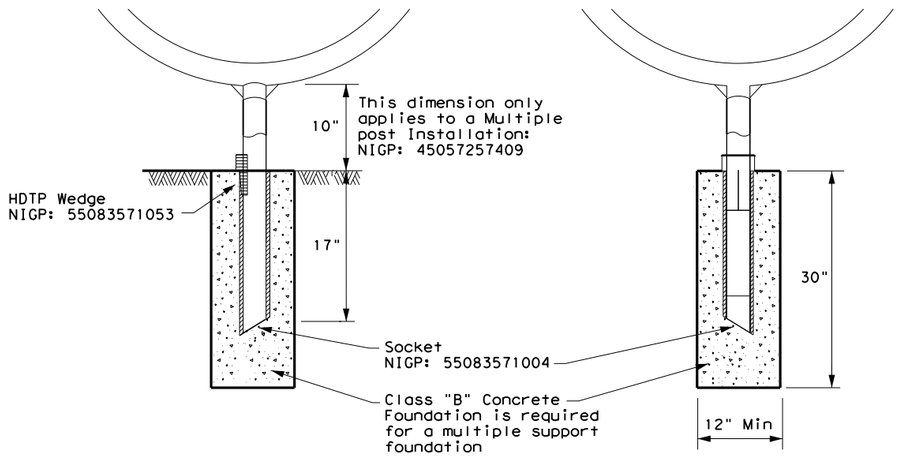
TYPE 2 - SUPPORT/FOUNDATION
Thin Wall Steel Tube w/Wedge Anchor System



MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION
Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation | Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
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	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		78

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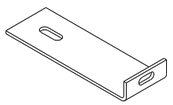
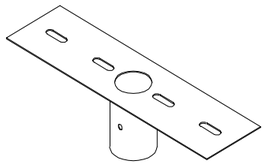
DATE:
FILE:

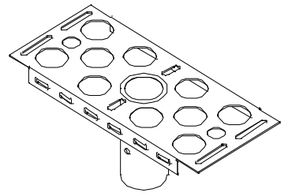
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: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



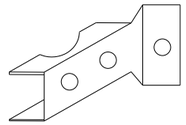
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



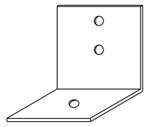
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



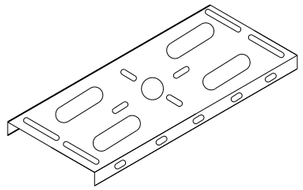
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



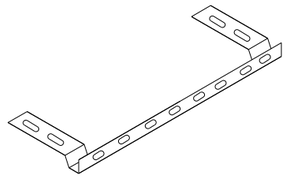
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



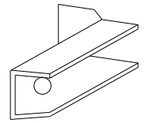
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



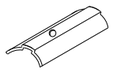
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



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



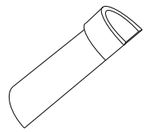
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



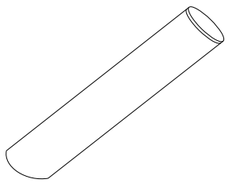
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

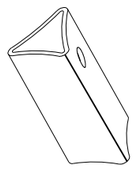


NIGP: 55083571053
Type 4 Mailbox Wedge

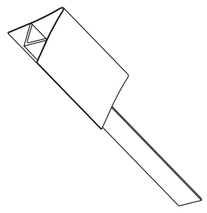


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

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

NOTES:

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

BID CODES FOR CONTRACTS

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

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

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

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

Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		79

DATE: 3/29/2023
FILE: T:\WFSDESIGN\Warren M\SH79\Roadway Standards DGN\SGT(10S)31-16.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN:533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN:4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN:3500G
⅝" HGR NUT PN:3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANGLE STRUT PN:15202G

ANCHOR PADDLE PN:15204A

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

POST(1)

POST(0)

PLAN VIEW

TRAFFIC FLOW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

BEGIN LENGTH OF NEED

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼"

3'-1½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT
(1) 1¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT
(2)½" X 6'-9 ⅝"

SoftStop FACE
SEE GN(3)
& NOTE:B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN:61G

SoftStop ANCHOR RAIL (12GA) PN:15215G

3'-1½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

SEE NOTE:C

ANCHOR PADDLE PN:15204A

END OF ANCHOR RAIL PN:15215G

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN:61G

RAIL 25'-0" PN:15215G

31"

RAIL HEIGHT

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE NOTE: A

(8) ⅝"x 1- ¼" GR BOLTS PN:3360G
⅝" HEX NUTS PN:3340G

POST 40" DEPTH (TYP 1-8)

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

(8) ⅝"x 1- ¼" HGR BOLTS PN:3360G
⅝" HEX NUTS PN:3340G

SEE DETAIL 3

6'-1⅜"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN:3500G
(1) ⅝" HGR HEX NUT PN:3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN:105286

(2) ⅝" ROUND WASHERS PN:3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN:15207G

ANCHOR PLATE WASHER ½" THICK PN:15206G

1" ROUND WASHER F463 PN:4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN:105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN:3240G

1" NUT PN:3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN:3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN:3717G

(4) ¾" FLAT WASHER (TYP) PN:3701G

(2) ¾" HEX NUT (TYP) PN:3704G

6'- 1⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN:15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN:15205A

TRAFFIC FLOW

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN:6777B

6" X 8" X 14" BLOCKOUT WOOD PN:4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN:3340G

⅝" X 10" HGR POST BOLT PN:3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN:3500G

⅝" HGR NUT PN:3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

6'-0" (W6 X 8.5) I-BEAM POST PN: 533G

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN:3500G

⅝" HGR NUT PN:3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

6'-0" (W6 X 8.5) (SYTP) I-BEAM POST PN:15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST HEIGHT 17"- ½"

4'- 9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5) (SYTP) I-BEAM POST PN:15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN:620237B
3. 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.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT 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.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE:B	PART PN:5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE:C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4)AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN:61G ANCHOR RAIL 25'-0" PN:15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅜")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

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

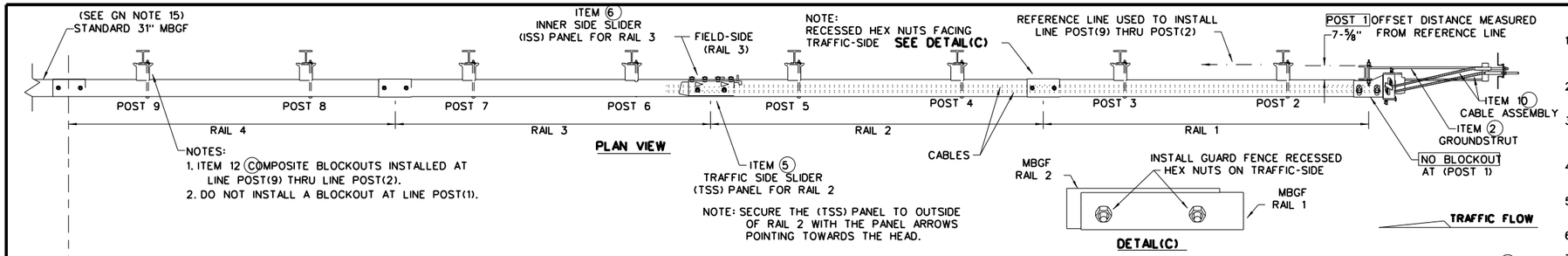
Texas Department of Transportation

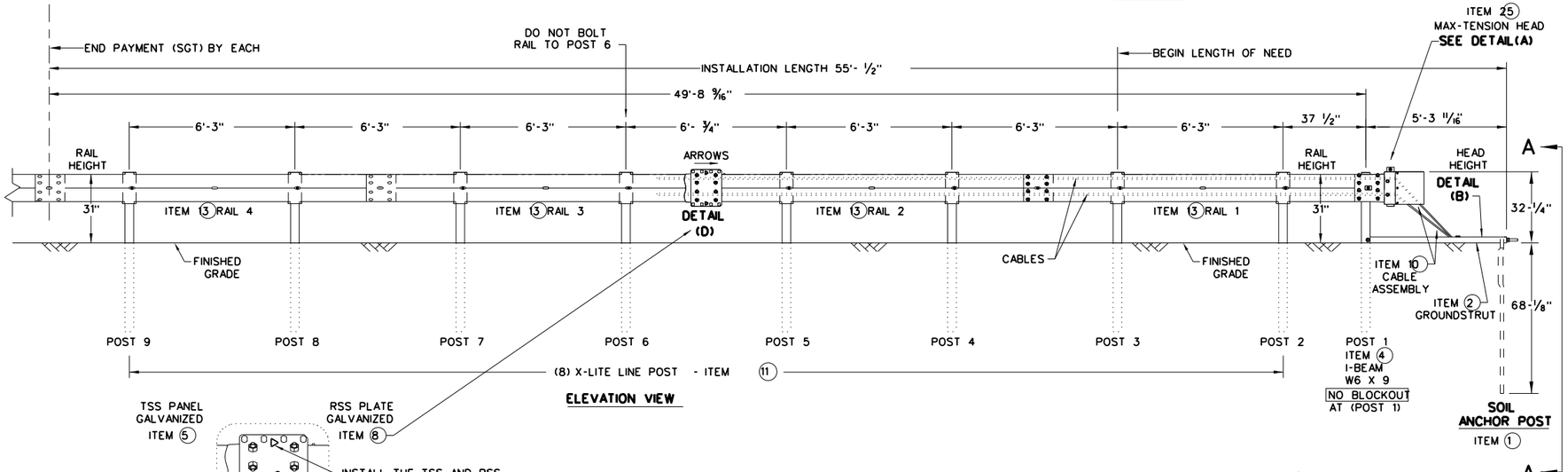
Design Division Standard

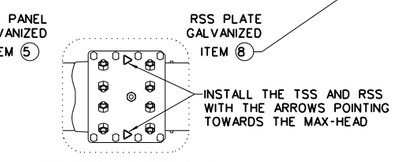
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

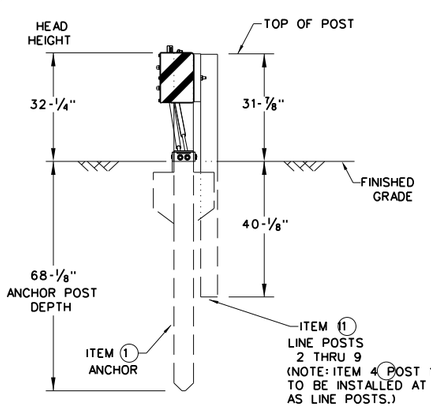
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		80

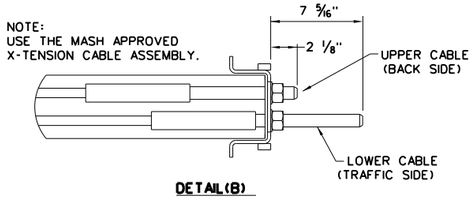
DATE: 3/29/2023
FILE: T:\WFSDESGN\Warren M\SH79\Roadway Standards DGN\SGT(11S)31-18.dgn

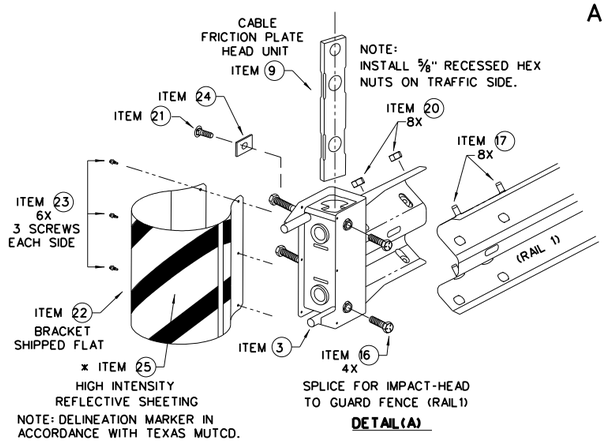


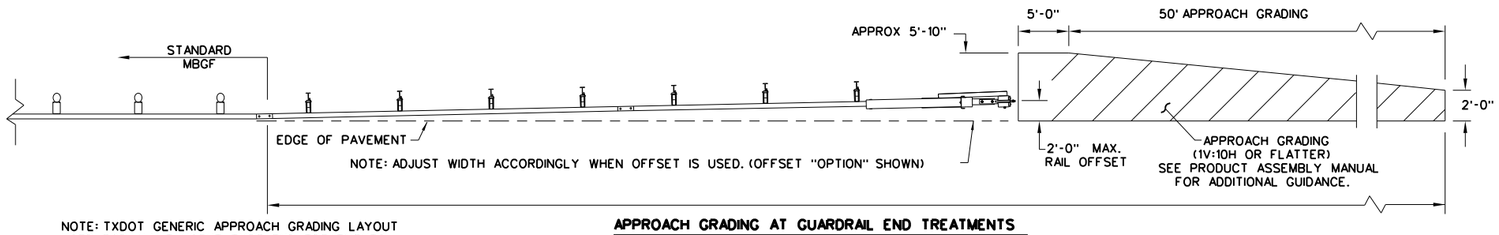












GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
x 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
x x 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
x x 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

x TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

x x ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		81

DATE: 3/29/2023
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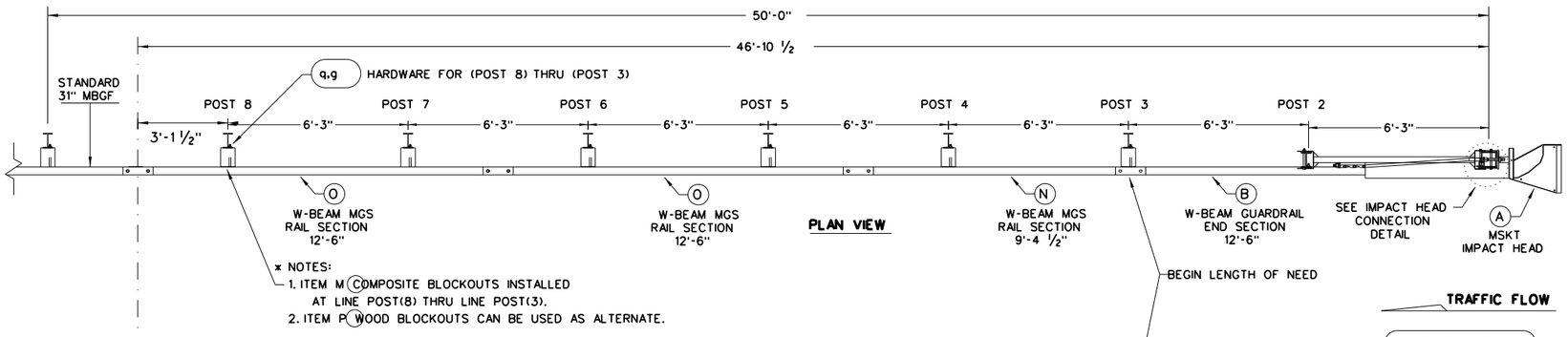


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

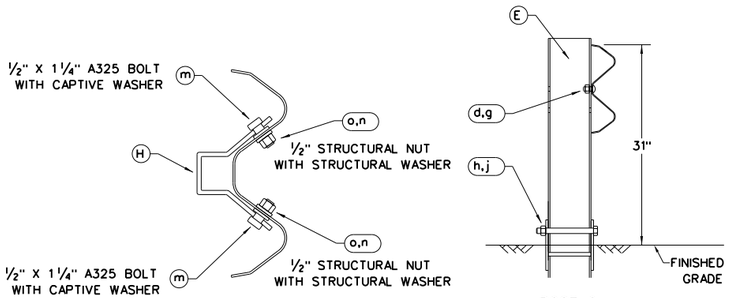
GENERAL NOTES

1. 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
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. 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.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. 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.
8. 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.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. 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	5/16" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/16" WASHER	W0516
c	2	5/16" 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 1/16" O.D. x 3/16" 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

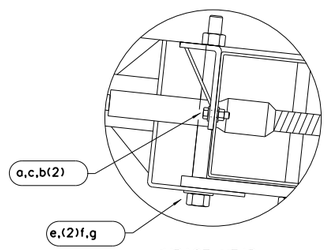
SEE NOTES: *

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

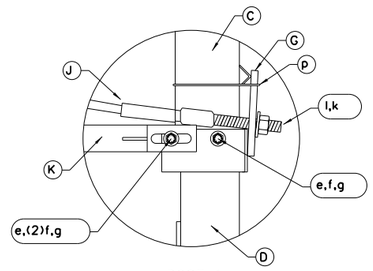


SECTION B-B
ANCHOR BRACKET

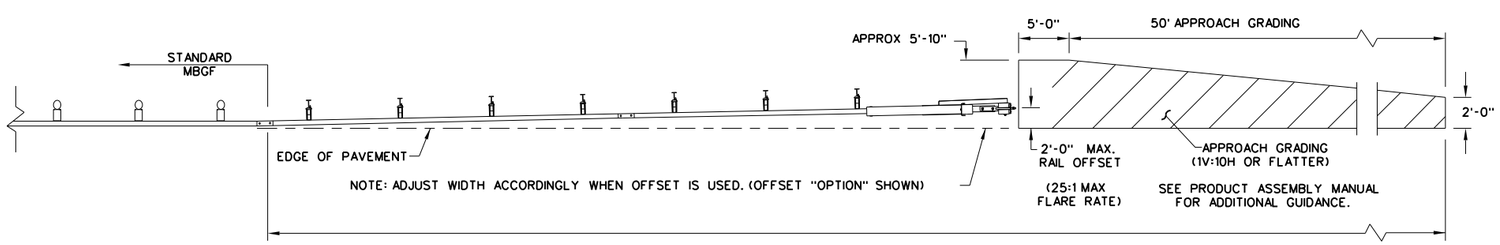
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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.

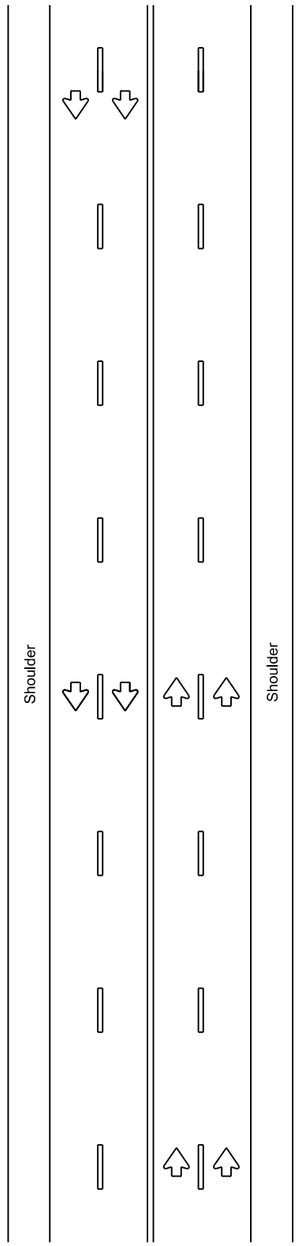
Texas Department of Transportation

Design Division Standard

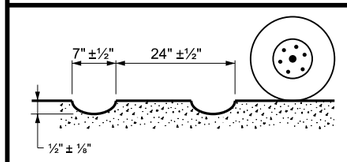
SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP		CK: CL
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0284	02	026	SH 79	
	DIST	COUNTY		SHEET NO.	
	WFS.	THROCKMORTON		82	

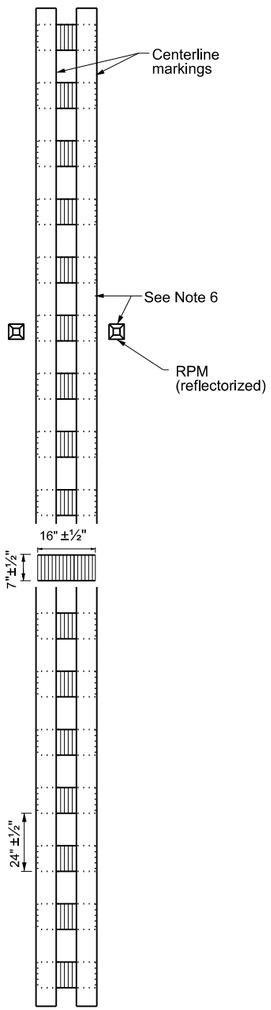
CENTERLINE RUMBLE STRIPS



MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

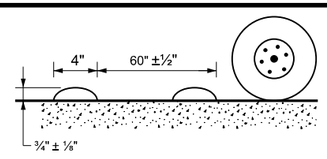


PROFILE VIEW

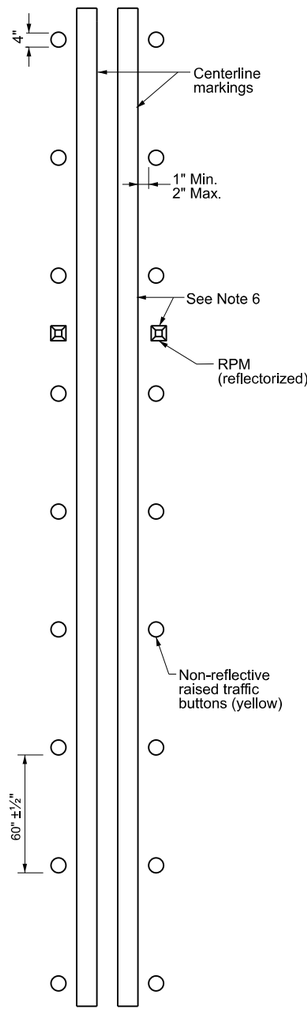


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

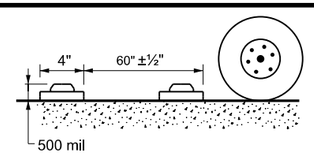


PROFILE VIEW

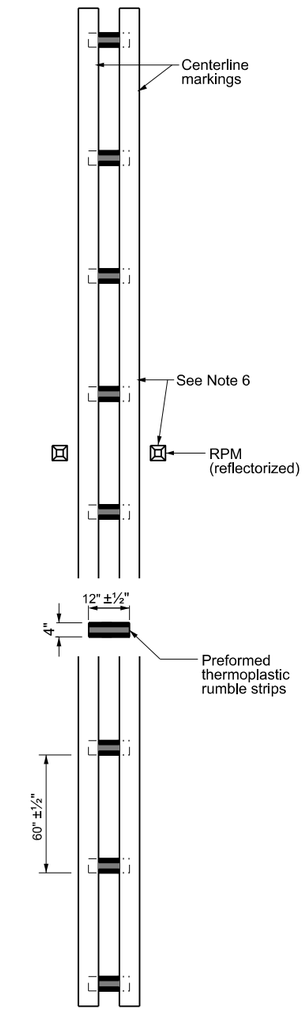


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

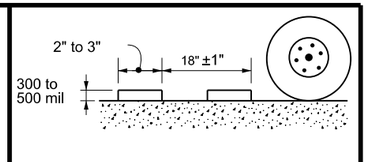


PROFILE VIEW

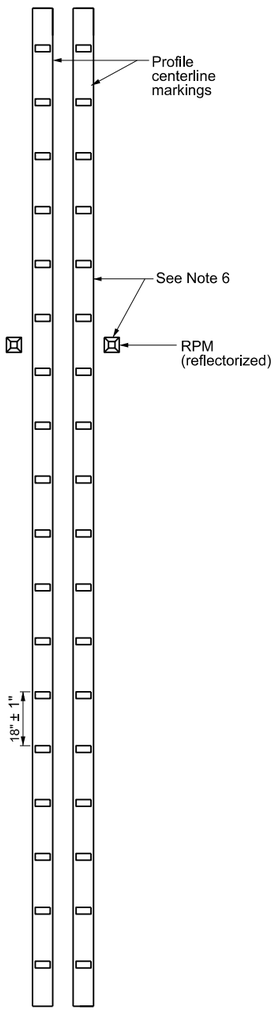


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on multilane undivided highways.
2. Centerline and edge line rumble strips or profile markings shall not be placedon 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 beused if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and nomore than 150 feet in advance of bridges, railroad crossing, intersections ordriveways 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 for normal centerline spacing. For wider medians, specify in the plans the exact placement of the rumble strips. Place the rumble strips under each centerline marking or centered in the middle of the median.

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 color of the button should be yellow for a continuous no passing roadway. The button will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. Consideration shall be given to bicyclists. See RS(6).

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

12. See standard sheet RS(2).

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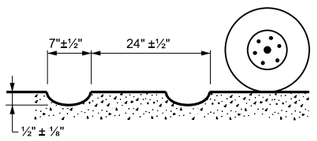
Texas Department of Transportation

Traffic Safety Division Standard

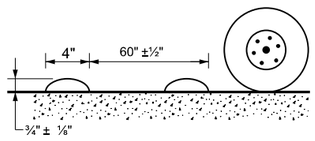
CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS RS(3)-23

FILE: rs(3)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
10-13 1-23	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		83

CENTERLINE RUMBLE STRIPS



PROFILE VIEW



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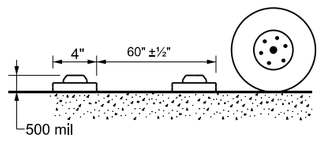

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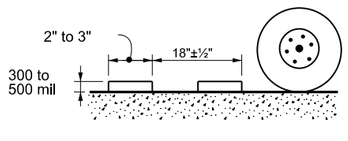

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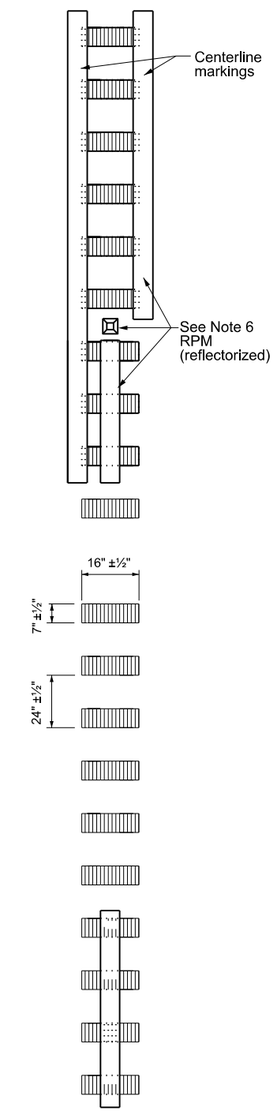
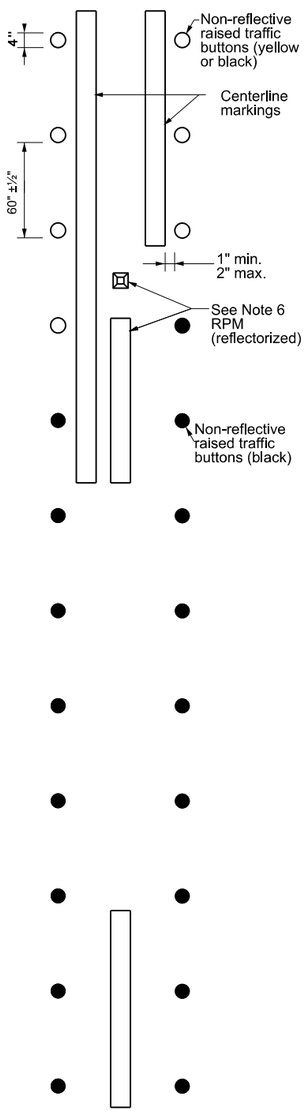
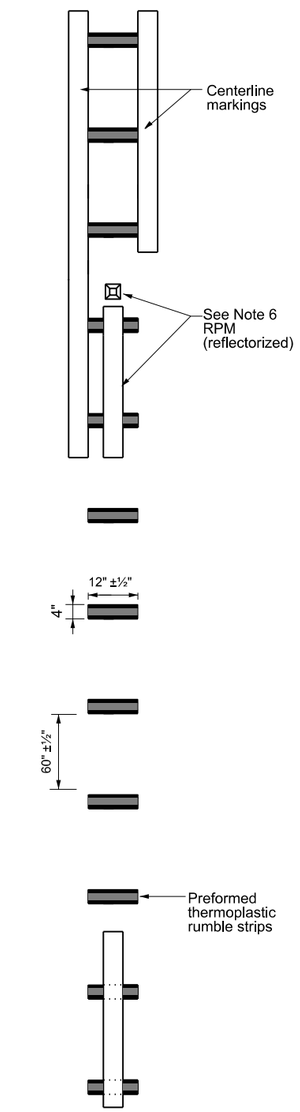


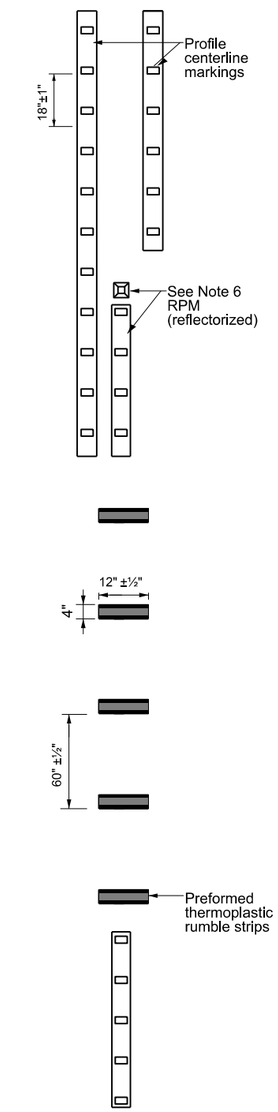
PLAN VIEW
OPTION 1



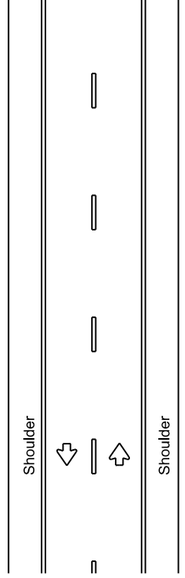
PLAN VIEW
OPTION 2



PLAN VIEW
OPTION 3



PLAN VIEW
OPTION 4



TWO LANE TWO-WAY HIGHWAYS

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).

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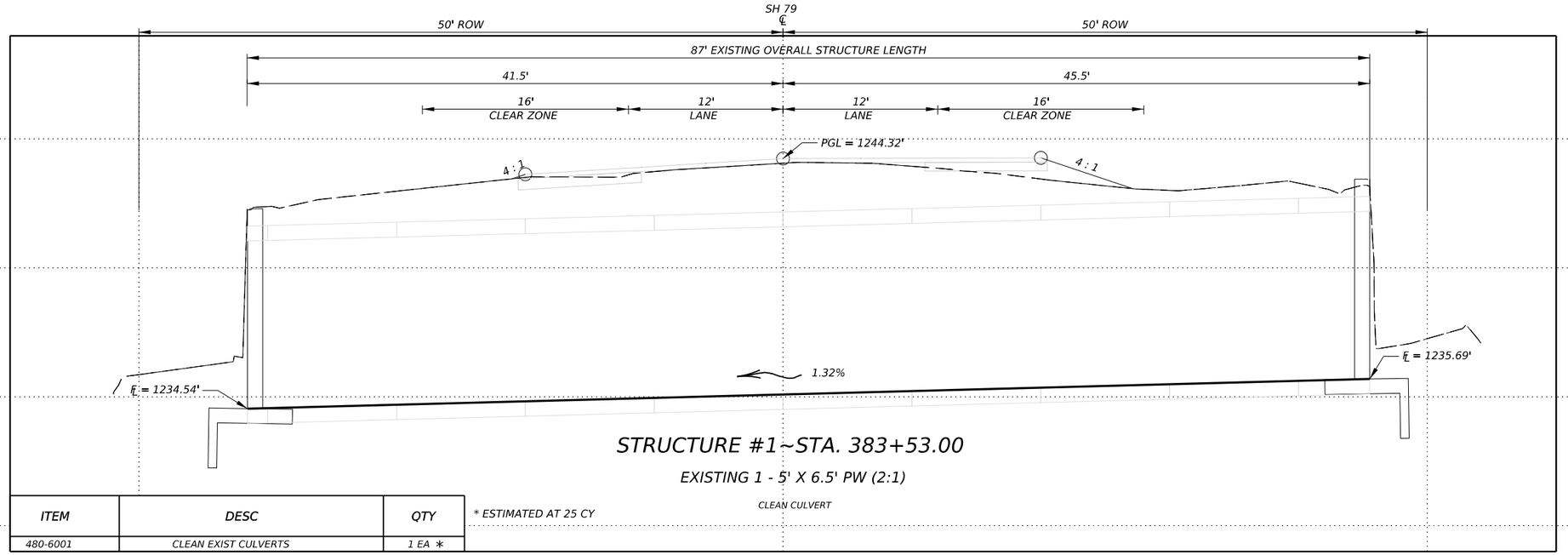
Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
10-13	DIST	COUNTY		SHEET NO.
1-23	WFS.	THROCKMORTON		84



STRUCTURE #1~STA. 383+53.00

EXISTING 1 - 5' X 6.5' PW (2:1)

CLEAN CULVERT

ITEM	DESC	QTY
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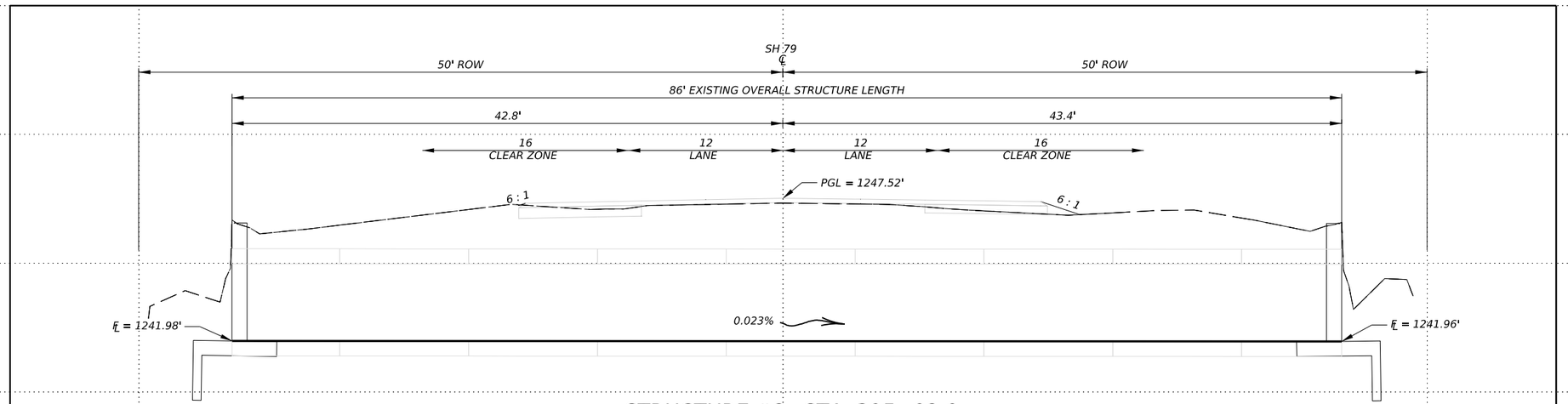
* ESTIMATED AT 25 CY



STRUCTURE #2~STA. 395+02.0

EXISTING 1 - 3' X 3' PW(2:1)

CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 13 CY

BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

SH 79
CULVERT PROFILES

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		85

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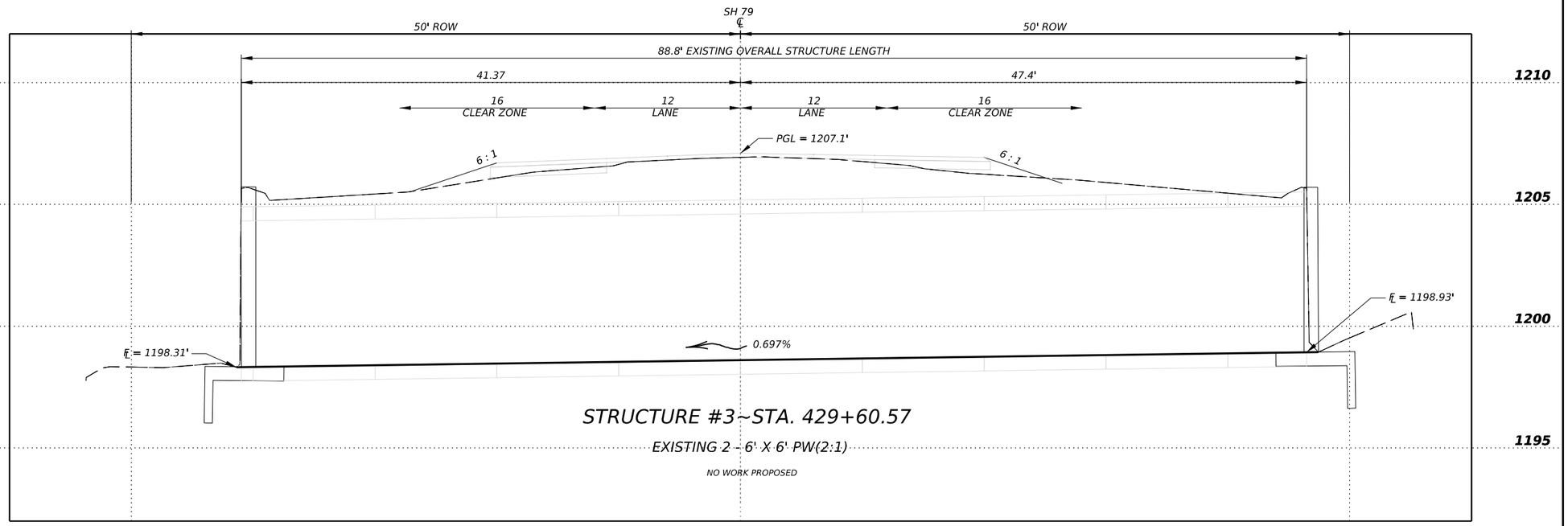

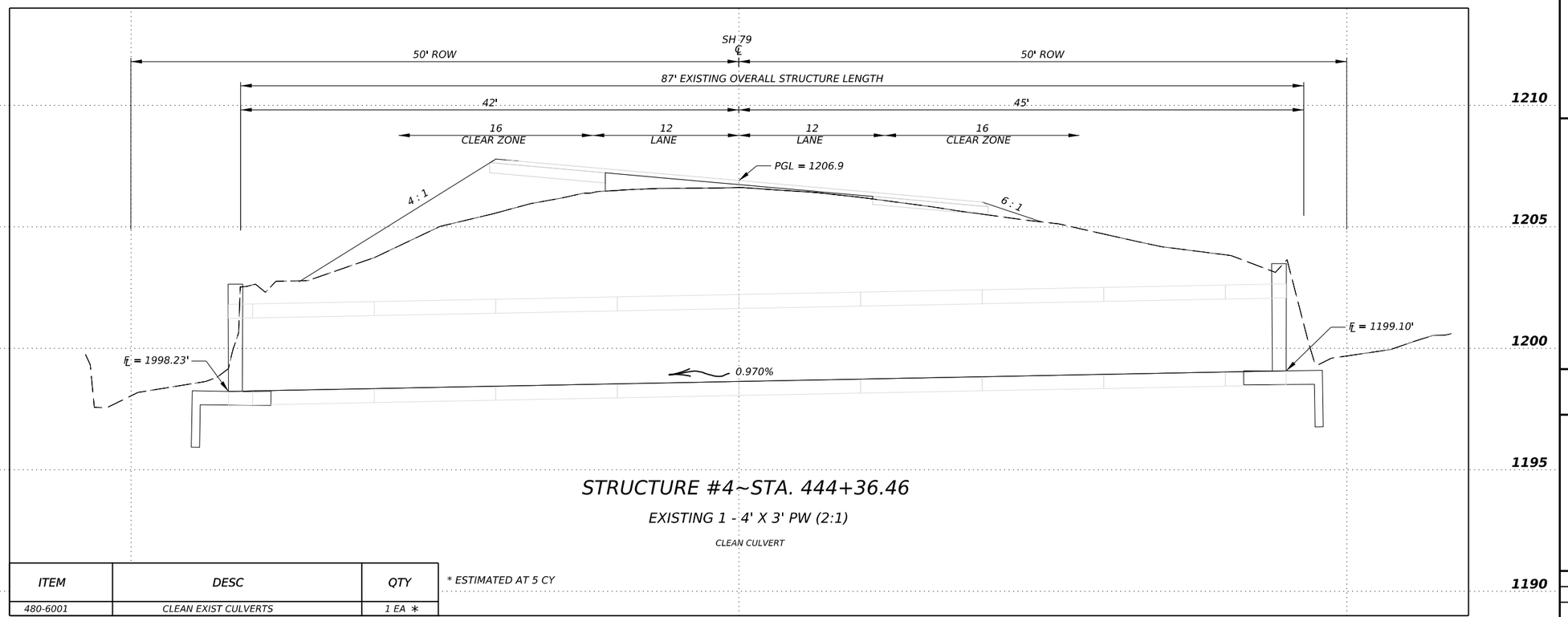

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 5 CY

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SH 79
CULVERT PROFILES

2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		86

DATE: 3/29/2023 3:02:23 PM
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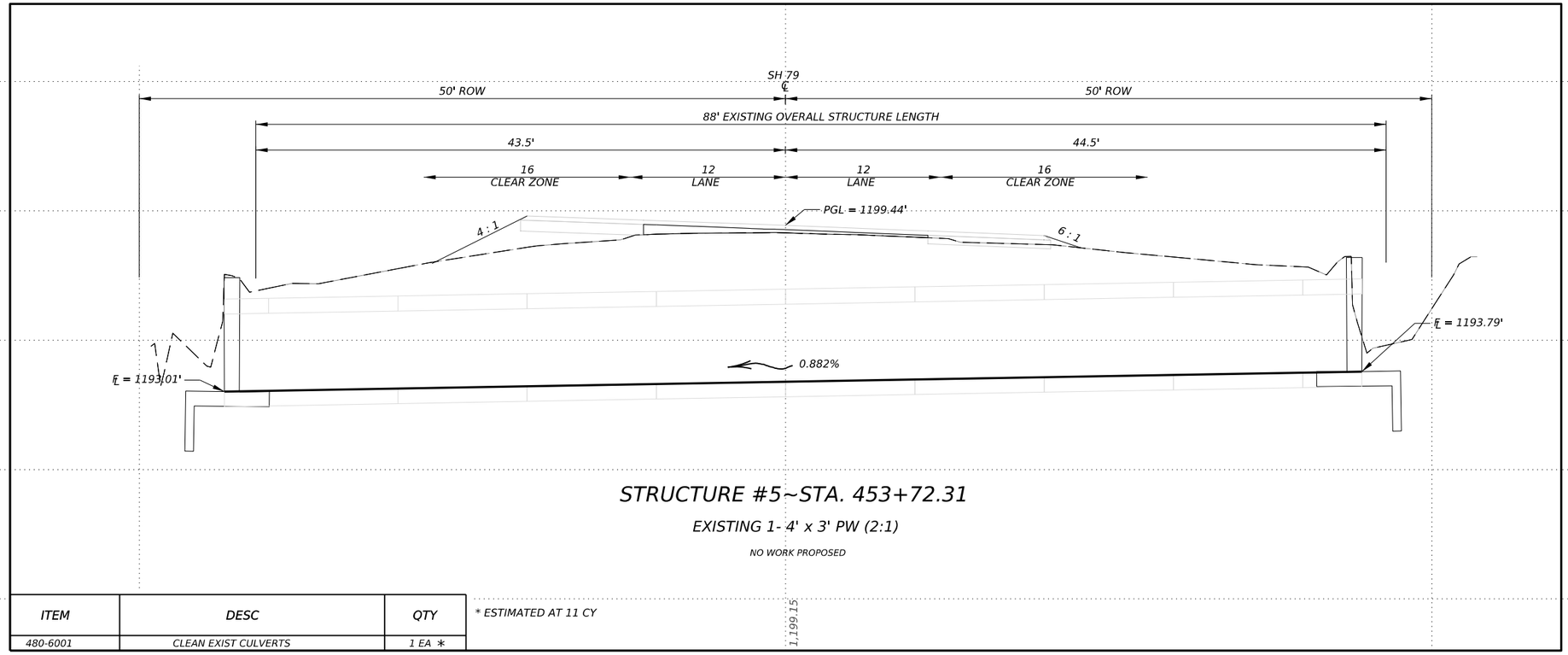


STRUCTURE #5~STA. 453+72.31

EXISTING 1- 4' x 3' PW (2:1)

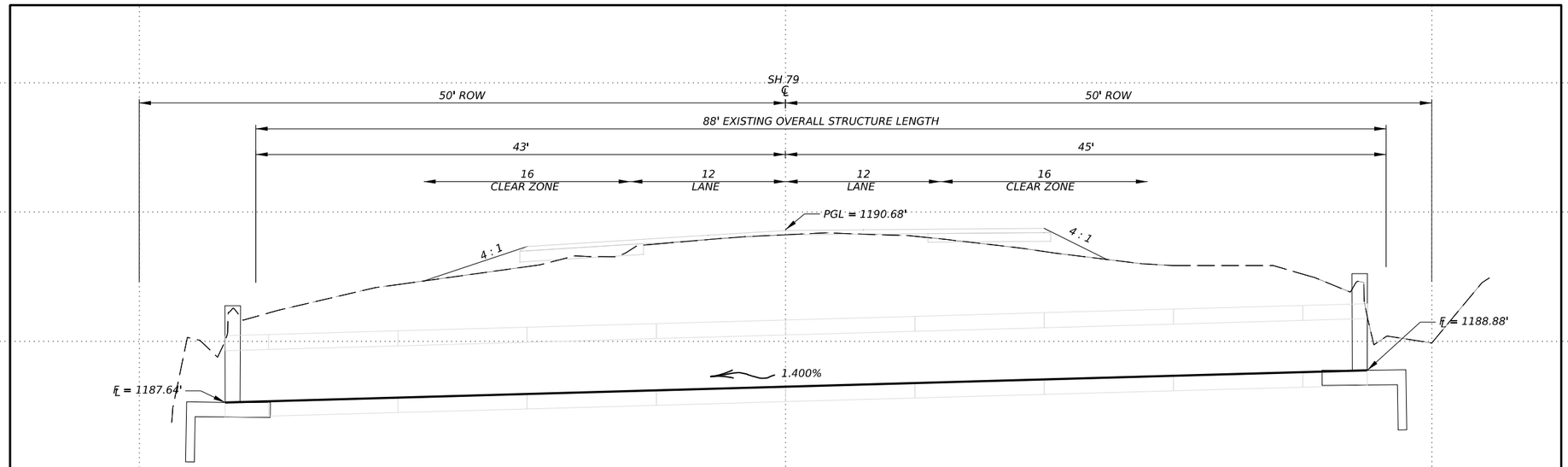
NO WORK PROPOSED

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 11 CY

1,199.15

0+00



STRUCTURE #6~STA. 459+20.68

EXISTING 1 - 3' x 2' PW (2:1)

CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 13 CY

1,194.12

0+00

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SH 79
CULVERT PROFILES

2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		87

DATE: 3/29/2023 3:02:27 PM
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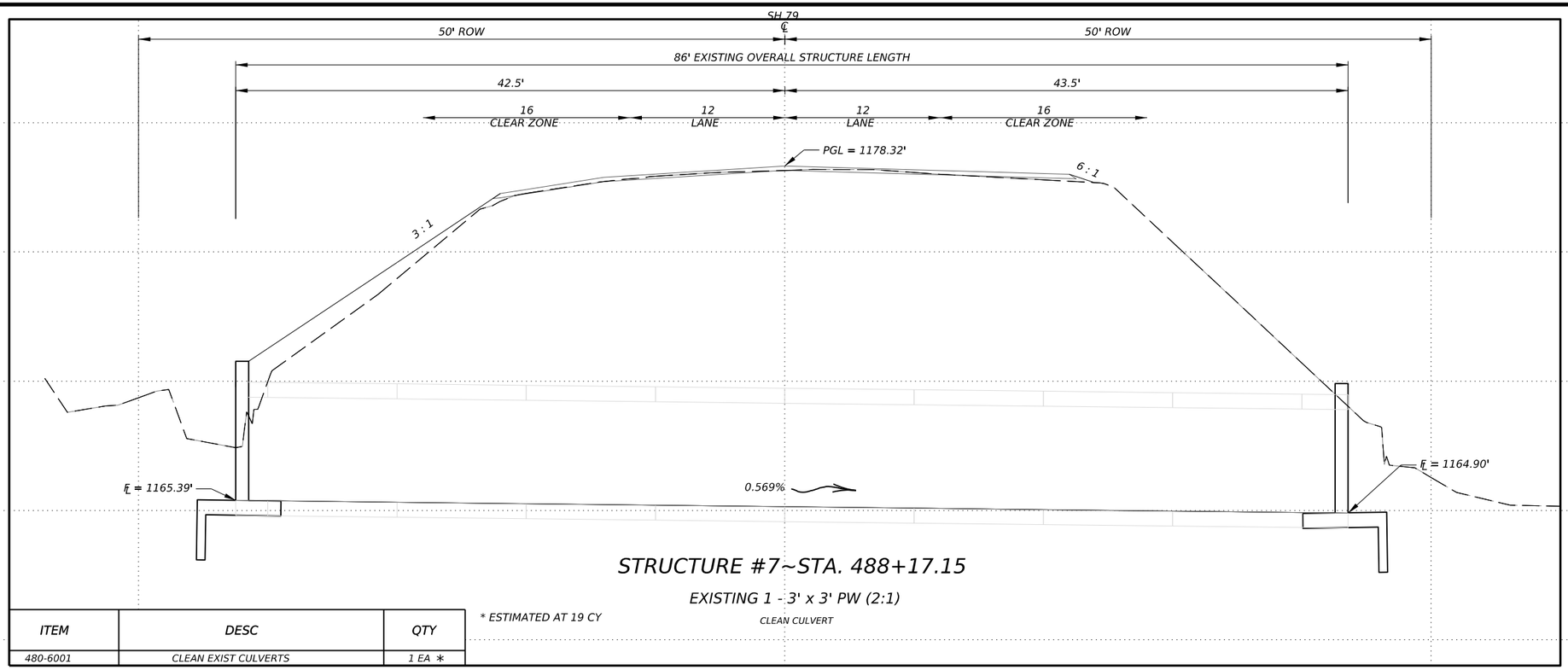


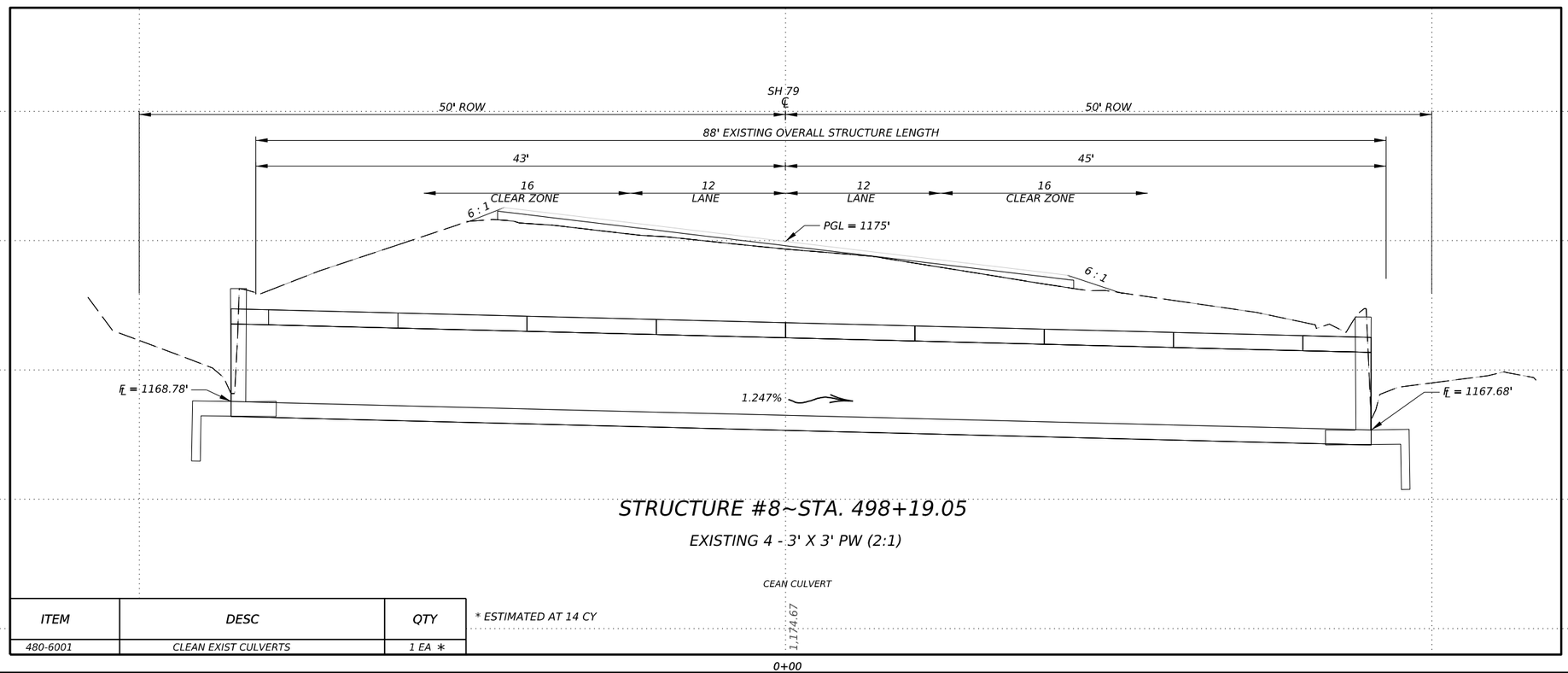
STRUCTURE #7~STA. 488+17.15

EXISTING 1 - 3' x 3' PW (2:1)

CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 19 CY



STRUCTURE #8~STA. 498+19.05

EXISTING 4 - 3' X 3' PW (2:1)

CEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 14 CY

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SH 79
CULVERT PROFILES

2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		88

DATE: 3/29/2023 3:02:31 PM
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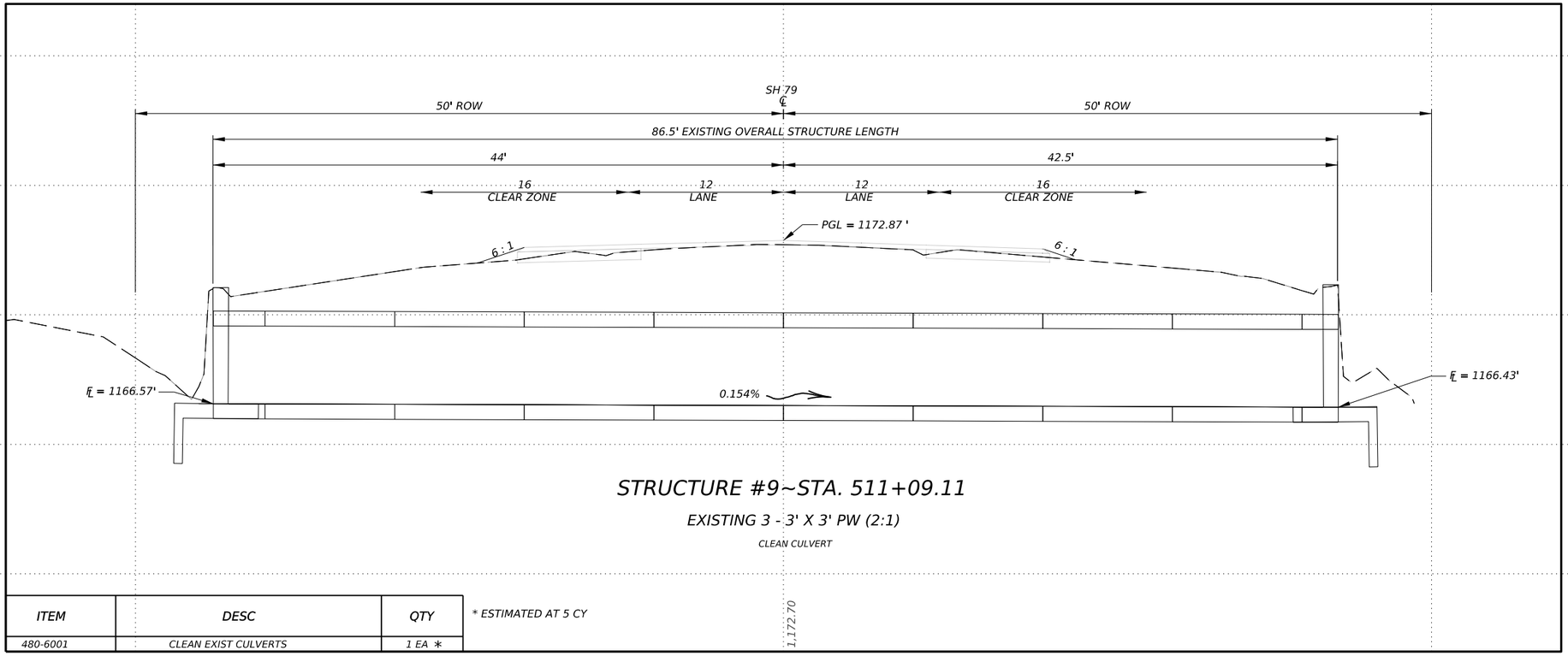


STRUCTURE #9~STA. 511+09.11

EXISTING 3 - 3' X 3' PW (2:1)

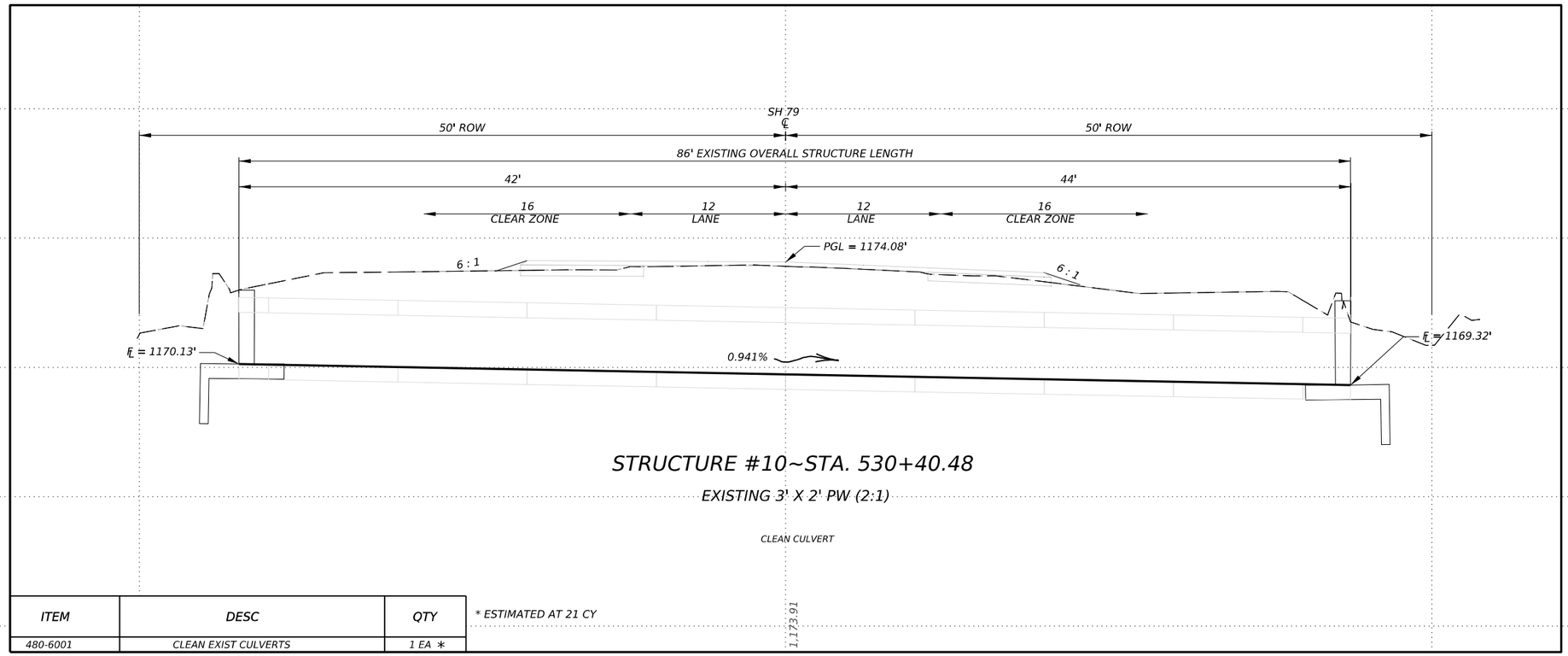
CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 5 CY

1,172.70

0+00



STRUCTURE #10~STA. 530+40.48

EXISTING 3' X 2' PW (2:1)

CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 21 CY

1,173.91

0+00

DATE: 3/29/2023 3:02:35 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284402026/4 - Design/Plan Set/5. Drainage/CULVERT PROFILES .dgn

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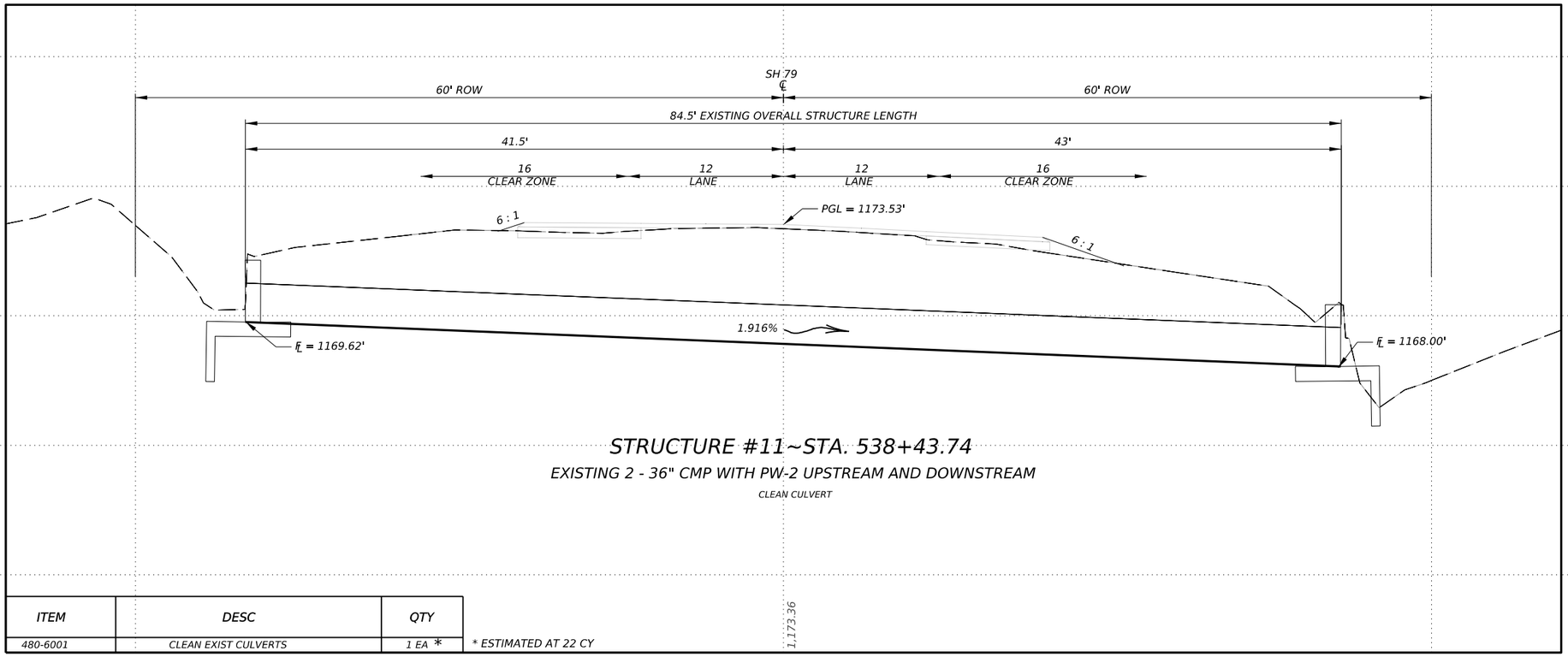
SH 79
CULVERT PROFILES

2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		89



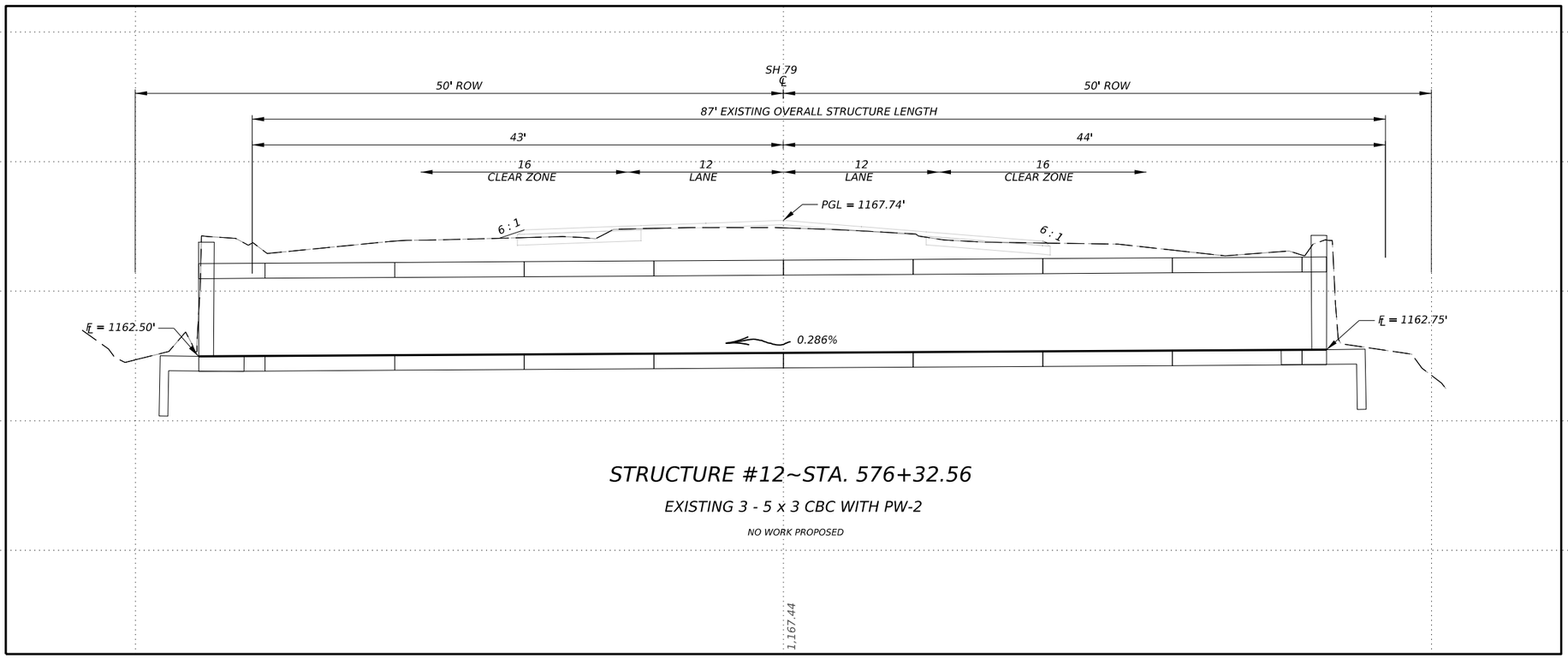
STRUCTURE #11~STA. 538+43.74

EXISTING 2 - 36" CMP WITH PW-2 UPSTREAM AND DOWNSTREAM

CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 22 CY



STRUCTURE #12~STA. 576+32.56

EXISTING 3 - 5 x 3 CBC WITH PW-2

NO WORK PROPOSED

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SH 79
CULVERT PROFILES

2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		90

DATE: 3/29/2023 3:02:39 PM
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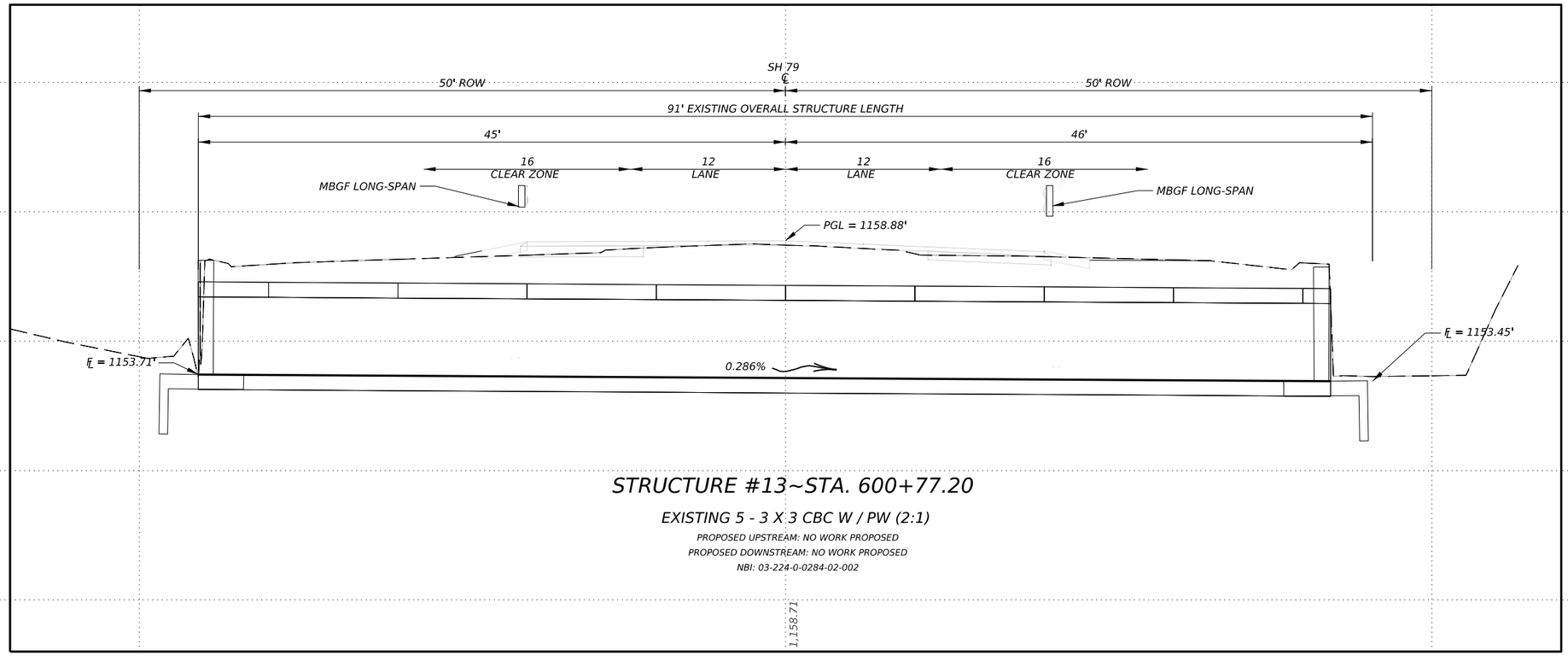
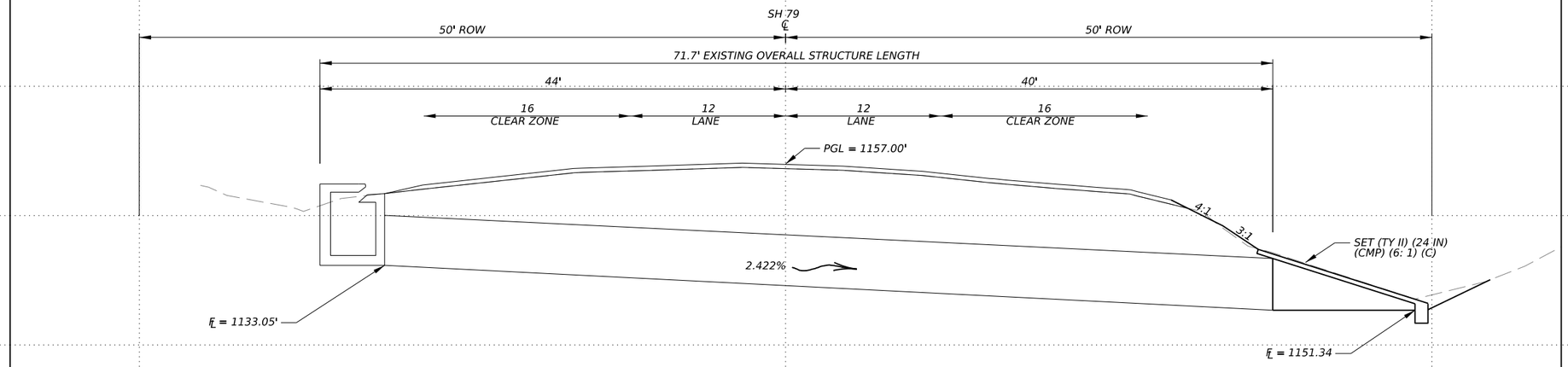


STRUCTURE #13~STA. 600+77.20

EXISTING 5 - 3 X 3 CBC W / PW (2:1)

PROPOSED UPSTREAM: NO WORK PROPOSED
PROPOSED DOWNSTREAM: NO WORK PROPOSED
NBI: 03-224-0-0284-02-002

ITEM	DESC	QTY
467-6379	SET (TY II) (24 IN) (CMP) (6: 1) (C)	1 EA



STRUCTURE #14~STA.

EXISTING 24" CMP W / UPSTREAM = CURB DROP INLET & DOWSTREAM = NO EXISTING END TREATMENT

PROPOSED UPSTREAM = NO WORK PROPOSED
PROPOSED DOWNSTREAM = INSTALL SET (TY II) (24 IN) (CMP) (6: 1) (C)

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SH 79
CULVERT PROFILES

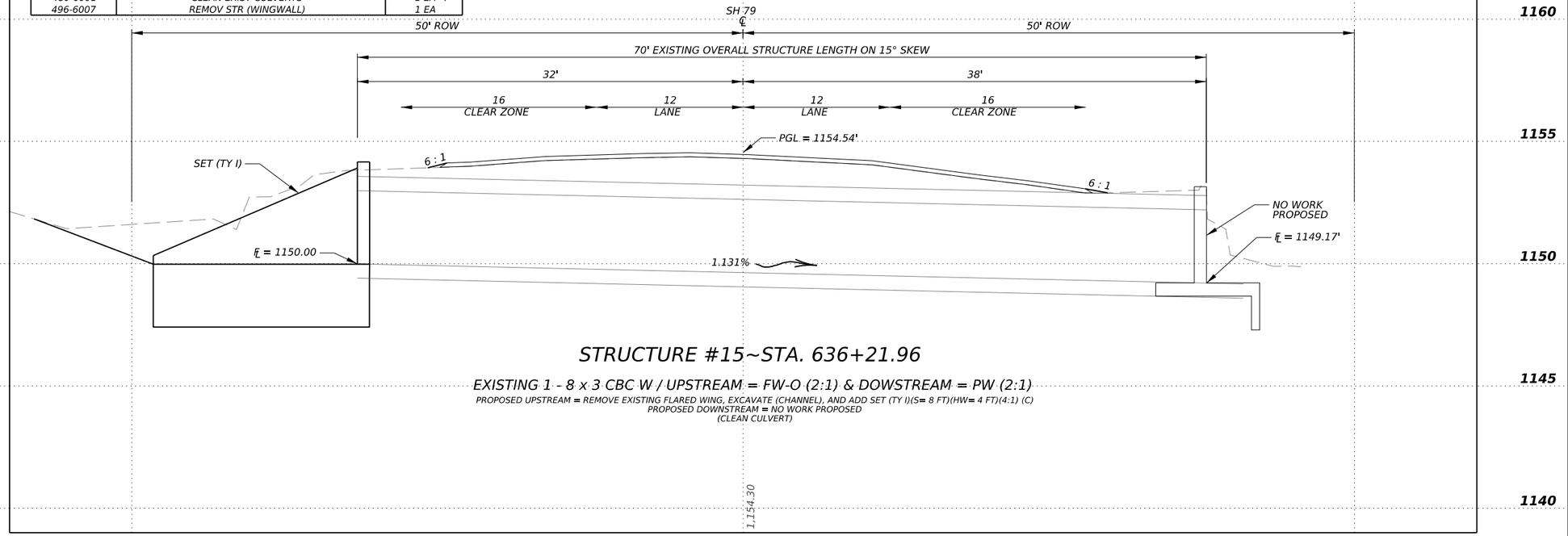
2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		91

DATE: 3/29/2023 3:02:43 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284402026/4 - Design/Plan Set/5. Drainage/CULVERT PROFILES .dgn

ITEM	DESC	QTY
110-6002	EXCAVATION (CHANNEL)	10 CY
432-6002	RIPRAP (CONC) (5 IN)	3.1CY
467-6270	SET (TY I)(S= 8 FT)(HW= 4 FT)(4:1) (C)	1EA
480-6001	CLEAN EXIST CULVERTS	1 EA *
496-6007	REMOV STR (WINGWALL)	1 EA

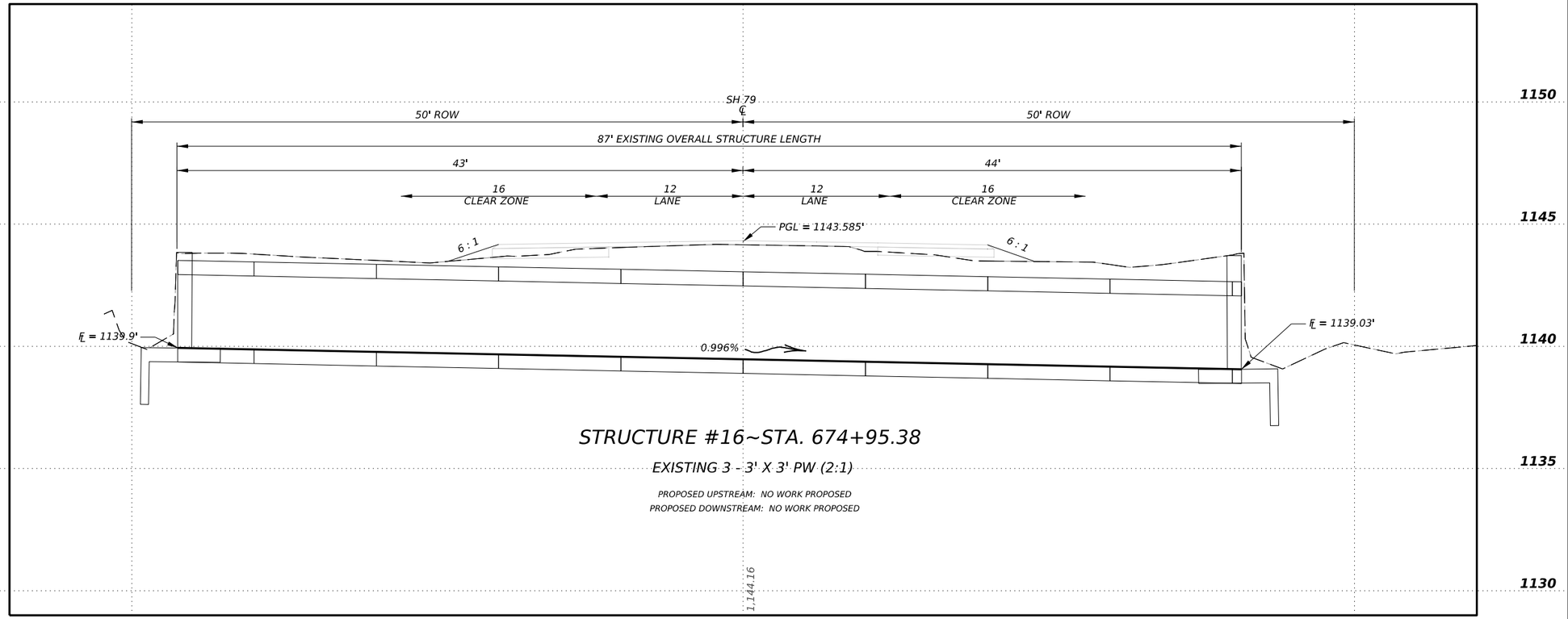
* ESTIMATED AT 32 CY



STRUCTURE #15~STA. 636+21.96

EXISTING 1 - 8 x 3 CBC W / UPSTREAM = FW-O (2:1) & DOWSTREAM = PW (2:1)

PROPOSED UPSTREAM = REMOVE EXISTING FLARED WING, EXCAVATE (CHANNEL), AND ADD SET (TY I)(S= 8 FT)(HW= 4 FT)(4:1) (C)
PROPOSED DOWNSTREAM = NO WORK PROPOSED
(CLEAN CULVERT)



STRUCTURE #16~STA. 674+95.38

EXISTING 3 - 3' X 3' PW (2:1)

PROPOSED UPSTREAM: NO WORK PROPOSED
PROPOSED DOWNSTREAM: NO WORK PROPOSED

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SH 79
CULVERT PROFILES

2023

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		92

DATE: 3/29/2023 3:02:46 PM
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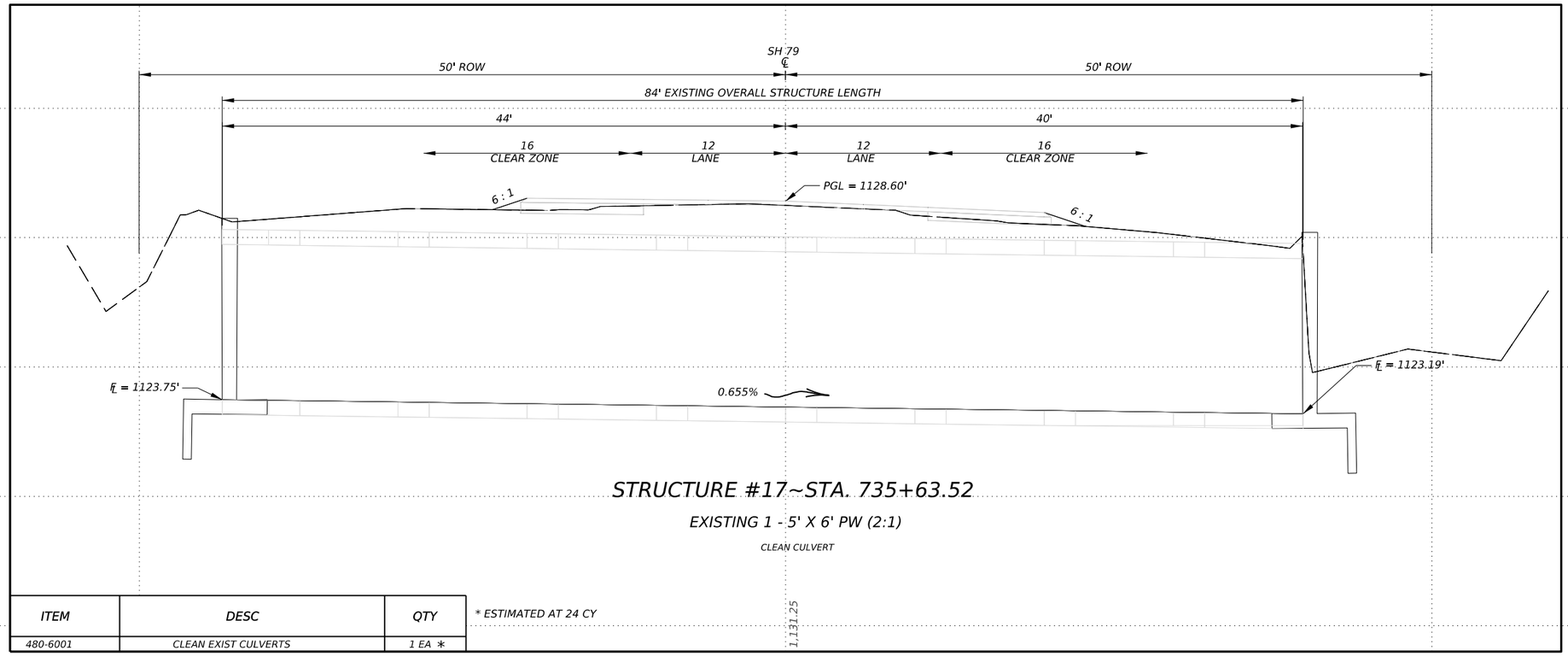

STRUCTURE #17~STA. 735+63.52

EXISTING 1 - 5' X 6' PW (2:1)

CLEAN CULVERT

ITEM	DESC	QTY
480-6001	CLEAN EXIST CULVERTS	1 EA *

* ESTIMATED AT 24 CY

1.131.25

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SH 79
CULVERT PROFILES

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		93

DATE: 3/29/2023 3:02:50 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284026/4 - Design/Plan Set/5. Drainage/CULVERT PROFILES .dgn

CK: DW: CK: DW:

Culvert Station and/or Creek Name	Description of Box Culert No.Spans ~ Span X Height	Max Fill Height (ft)	Applicable Box Culvert Standard	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope (SL:1)	T Culvert Top Slab Thick's (in)	U Culvert Wall Thick's (in)	C Estimated Curb Height (ft)	Hw Height of Wing (ft)	A Curb to End of Wingwall (ft)	B Offset of End of Wingwall (ft)	Lw Length of Longest Wingwall (ft)	Ltw Culvert Toewall Length (ft)	Atw Anchor Toewall Length (ft)	Riprap Apron (C.Y.)	Class "C" Conc. (Curb) (CY)	Class "C" Conc. (Wing.) (CY)	Total Wingwall Area (SF)
STRUCTURE #15~STA. 636+21.96 (Lt)	1 ~ 8' X 3'	3'	SCC-8	SETB-FW-O	0	4:1	8"	7"	.75	4.167	N/A	8.853	15.333	N/A	25.705	3.1	0.3	7.6	N/A

DATE: 3/29/2023 3:03:05 PM
FILE: T:\WFSDESGN\Warren M\SH79\Drainage DGN\BCS.dgn

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 flared 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 = Offset 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.

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Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		94

DATE: 3/29/2023 4:41:44 PM
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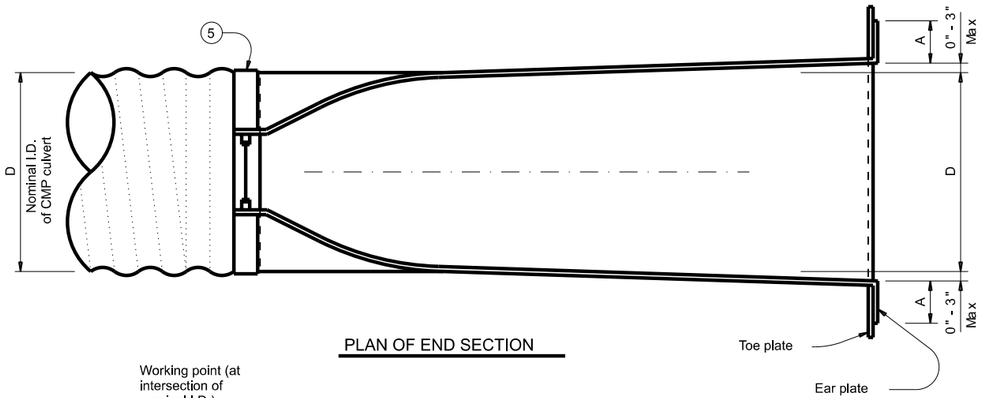
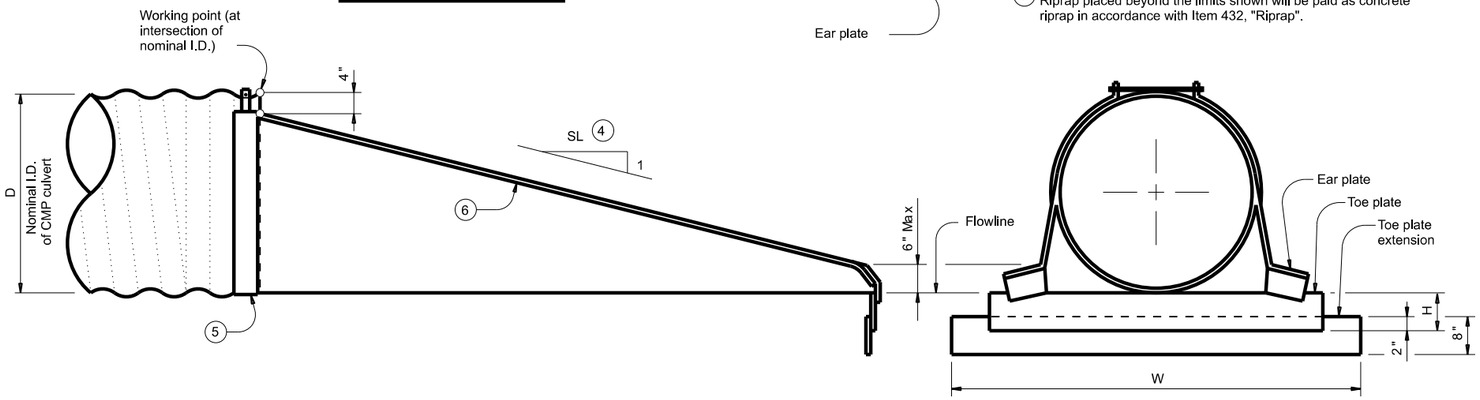


PLAN OF END SECTION



SIDE ELEVATION OF END SECTION

END ELEVATION OF END SECTION

1. Provide size of pipe runner as shown in the tables. Cross pipe is the same size as the pipe runner. Cross pipe stub out and bottom anchor pipe are the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Length table.
2. Values shown are minimum requirements.
3. Provide all 3-piece apron sections with 12 gage sides and 10 gage center panels.
4. Recommended values of slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.
5. Connection between corrugated metal pipe (CMP) culvert and galvanized prefabricated end section may be with strap and bolt as shown or other combinations of threaded rods and/or coupling bands.
6. Reinforce upper edge of prefabricated end section with minimum $\frac{3}{8}$" dia smooth or deformed bar (pre-galvanized).
7. Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".

CROSS PIPE LENGTHS, PIPE RUNNER LENGTHS, AND REQUIRED PIPE SIZES (1)

D (Nominal) (Culvert I.D.)	Cross Pipe Length	3:1 Side Slope		4:1 Side Slope		6:1 Side Slope	
		Pipe Runner Length	Pipe Runner Size	Pipe Runner Length	Pipe Runner Size	Pipe Runner Length	Pipe Runner Size
≤ 24"	N/A	N/A	N/A	N/A	N/A	N/A	N/A
30"	3' - 11"	5' - 0"	3.500 x 0.216	7' - 1"	3.500 x 0.216	11' - 3"	4.500 x 0.237
36"	4' - 5"	6' - 7"	3.500 x 0.216	9' - 2"	3.500 x 0.216	14' - 4"	4.500 x 0.237
42"	4' - 11"	8' - 2"	3.500 x 0.216	11' - 2"	4.500 x 0.237	17' - 4"	4.500 x 0.237
48"	5' - 5"	9' - 9"	3.500 x 0.216	13' - 3"	4.500 x 0.237	20' - 4"	5.563 x 0.258
54"	5' - 11"	11' - 3"	4.500 x 0.237	15' - 4"	4.500 x 0.237	23' - 5"	5.563 x 0.258
60"	6' - 5"	12' - 10"	4.500 x 0.237	17' - 4"	4.500 x 0.237	26' - 5"	5.563 x 0.258

PREFABRICATED END SECTION INFORMATION

D (Nominal) (Culvert I.D.)	Pipe Runner Required	H (2)	A (2)	W (2)	Gage (2)
≤ 24"	No	6"	9"	D + 24"	16
30"	Skew > 15°	9"	12"	D + 32"	14
36"	All skews	9"	12"	D + 32"	14
≥ 42	All skews	12"	16"	D + 40"	12/10 (3)

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTH (1)

HSS Size	STD Size	Max Pipe Runner Length
2.375 x 0.154	2"	N/A
3.500 x 0.216	3"	10' - 0"
4.500 x 0.237	4"	19' - 8"
5.563 x 0.258	5"	34' - 2"

MATERIAL NOTES:

Provide pipe runners, cross pipes, and anchor pipes conforming to ASTM A1085, A500 Gr B, A53 (Type E or S, Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except reinforcement, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specification.

Toe plate extensions are required only when shown elsewhere in the plans.

Concrete riprap is required only when pipe runners are required, unless otherwise shown in the plans. Provide concrete riprap in accordance with Item 432, "Riprap". Use Bottom Anchor Toewall Option B1 when an alternate end section with pre-attached pipe runners is supplied.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of reinforcing steel in concrete riprap unless noted otherwise.

GENERAL NOTES:

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

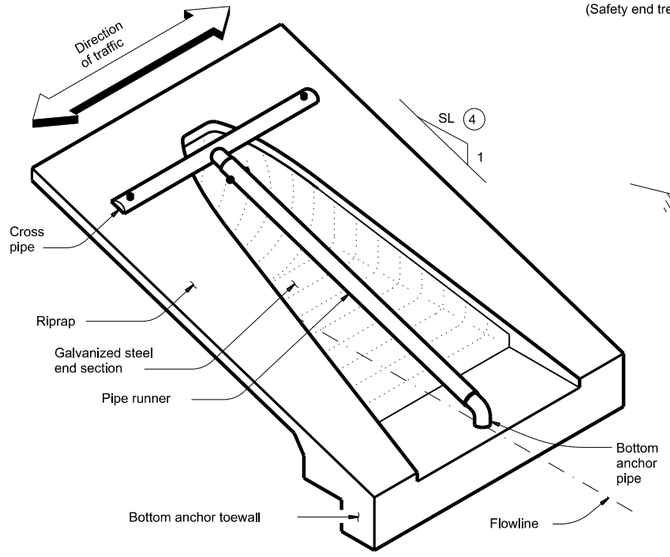
Alternate styles of end sections, including those with pre-attached pipe runners, may be supplied. Alternate styles must meet all of the following: design values shown in tables for pipe runner size; H, A, W, and gage for end section; and material requirements noted.

All pipe runners, calculations, and dimensions are based on the End Section shown on this standard. Alternate styles of end sections will require that appropriate adjustments be made to the values presented on this standard.

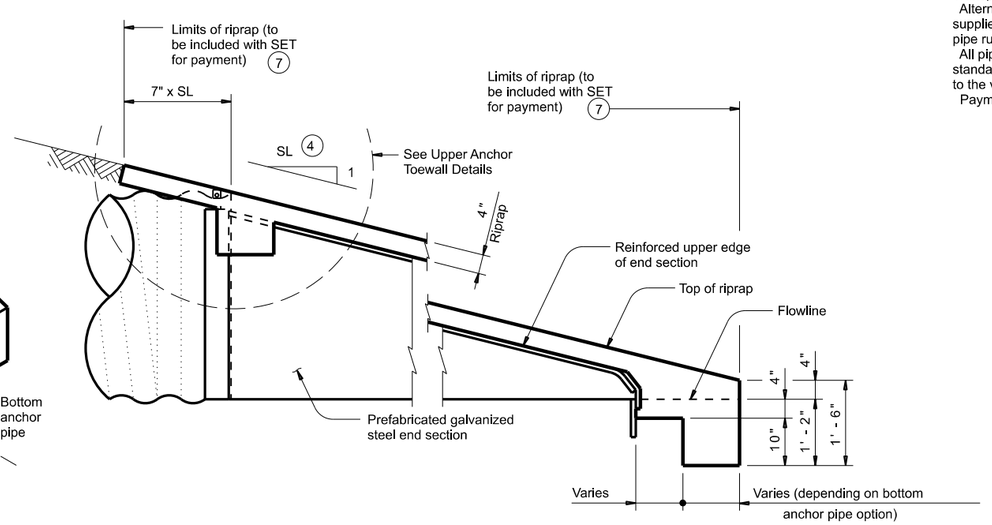
Payment for riprap and toewall is included in price bid for each safety end treatment.

PREFABRICATED GALVANIZED STEEL END SECTION DETAILS

(Safety end treatment and riprap not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Pipe runners are not shown for clarity.)

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT

FOR 12" TO 60" DIA CMP CULVERTS
TYPE II ~ CROSS DRAINAGE

GS-ES-CD

FILE: gsescdse-20.dgn	DN: TxDOT	CK: TxDOT	DW: JRP	CK: GAF
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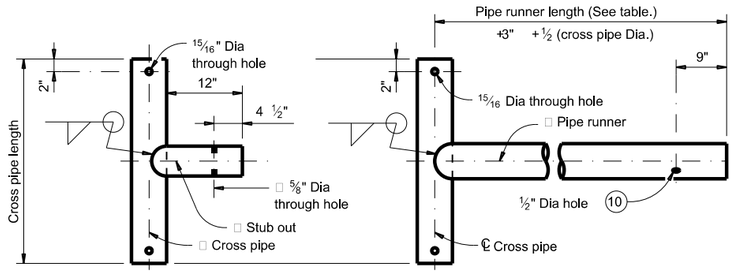
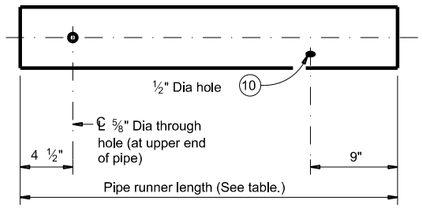
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		95

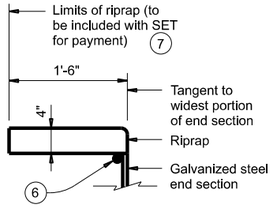


OPTION A1 OPTION A2

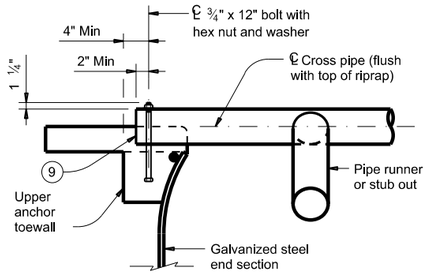
CROSS PIPE AND CONNECTIONS DETAILS



PIPE RUNNER DETAILS

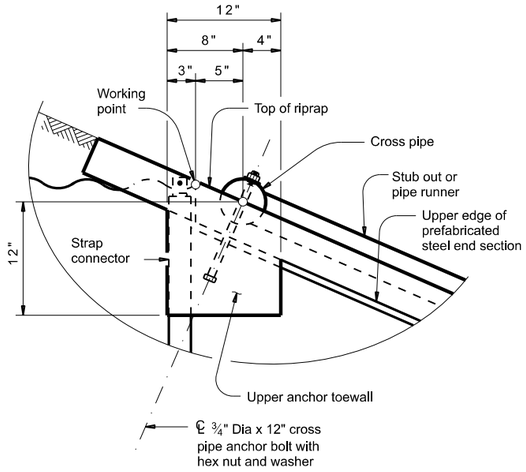


SHOWING TYPICAL RIPRAP



SHOWING CROSS PIPE AND UPPER ANCHOR TOEWALL

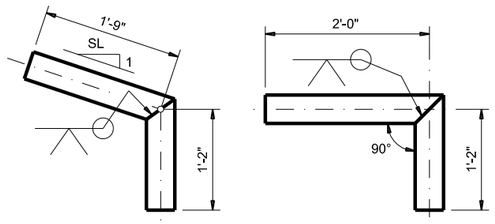
SECTION A-A



UPPER ANCHOR TOEWALL DETAILS

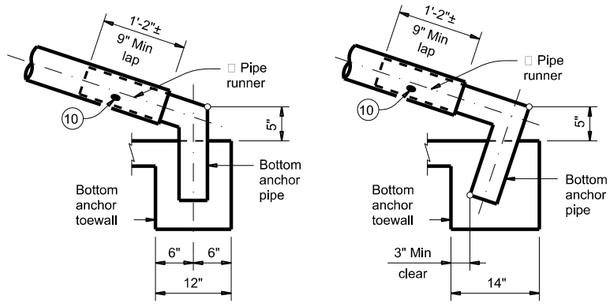
ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (12)

Nominal Culvert I.D.	3:1 Side Slope	4:1 Side Slope	6:1 Side Slope
12"	0.5	0.6	0.9
15"	0.6	0.7	1.0
18"	0.6	0.8	1.1
21"	0.7	0.8	1.2
24"	0.7	0.9	1.3
27"	0.8	1.0	1.4
30"	0.9	1.1	1.5
33"	0.9	1.1	1.6
36"	1.0	1.2	1.7
42"	1.1	1.4	1.9
48"	1.2	1.5	2.1
54"	1.3	1.7	2.3
60"	1.5	1.8	2.6



OPTION B1 OPTION B2 (11)

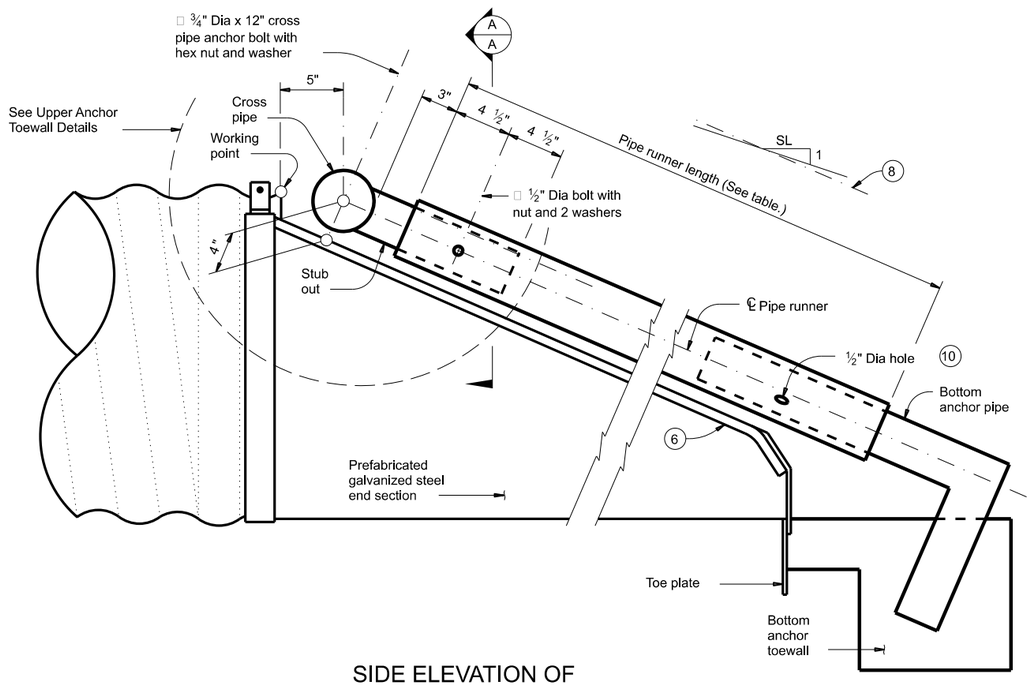
BOTTOM ANCHOR PIPE DETAILS



OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(End section and riprap are not shown for clarity.)



SIDE ELEVATION OF PIPE RUNNER INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Pipe Option B2. Riprap not shown for clarity.)

(6) Reinforce upper edge of prefabricated end section with minimum ⅜" dia smooth or deformed bar (pre-galvanized).

(7) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".

(8) Note that actual slope of pipe runner may vary slightly from side slope of riprap and upper edge of prefabricated end section.

(9) Take care of ensure that riprap concrete does not flow into the crosspipe so as to permit disassembly of the bolted connection to allow cleanout access.

(10) After installation, inspect the ⅜" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(11) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

(12) Quantities shown are for one end of one corrugated metal pipe (CMP) culvert . For multiple pipe culverts quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

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SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT

FOR 12" TO 60" DIA CMP CULVERTS
TYPE II ~ CROSS DRAINAGE

GS-ES-CD

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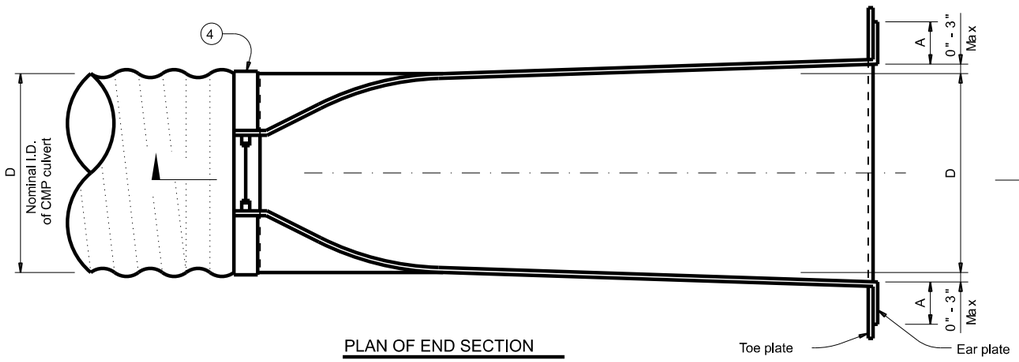
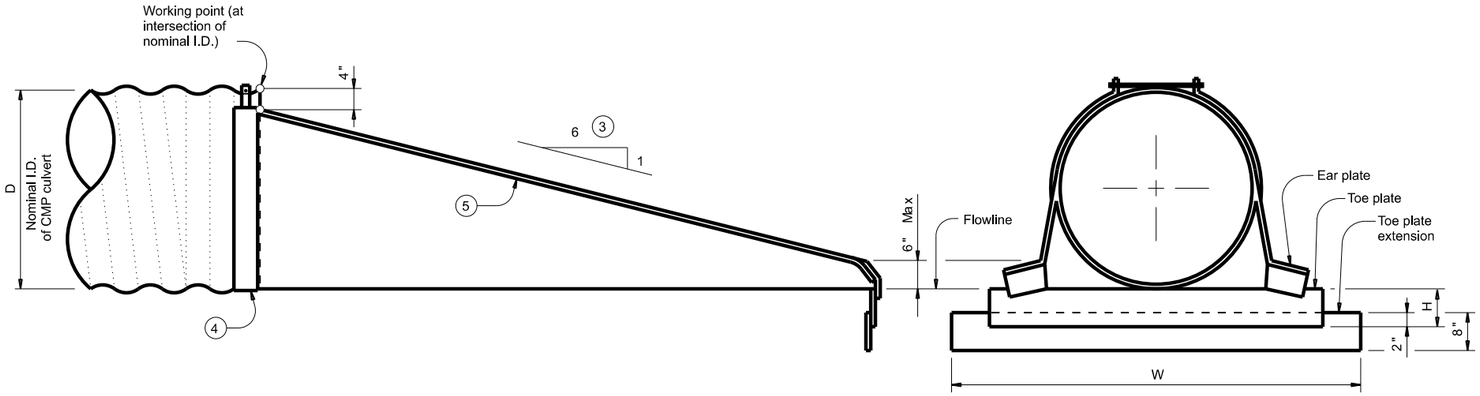
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		96



PLAN OF END SECTION



SIDE ELEVATION OF END SECTION

END ELEVATION OF END SECTION

1. Provide size and lengths of cross pipes as shown in the tables, except the first cross pipe from the bottom and the saddle pipe must be 3 b".
2. Provide all 3-piece apron sections with 12 gage sides and 10 gage center panels.
3. Match cross slope as shown elsewhere in the plans. All quantities, calculations, and dimensions shown herein are based on the 6:1 Slope. 6:1 slope or flatter is required for vehicle safety.
4. Connection between corrugated metal pipe (CMP) culvert and galvanized prefabricated end section may be with strap and bolt as shown or other combinations of threaded rods and/or coupling bands.
5. Reinforce upper edge of prefabricated end section with minimum b" dia smooth or deformed bar (pre-galvanized).
6. Values shown are minimum requirements.
7. Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".

CROSS PIPE LENGTHS AND REQUIRED PIPE SIZES (1)

D (Nominal) Culvert I.D.)	Cross Pipe Length	Cross Pipes Required	Cross Pipe Size
≤ 30"	N/A	No	N/A
36"	4' - 5"	Yes	4.500 x 0.237
42"	4' - 11"		
48"	5' - 5"	Yes	5.563 x 0.258
54"	5' - 11"		
60"	6' - 5"		

PREFABRICATED END SECTION INFORMATION

D (Nominal) (Culvert I.D.)	H (6)	A (6)	W (6)	Gage (6)
≤ 24"	6"	9"	D + 24"	16
30"	9"	12"	D + 32"	14
36"	9"	12"	D + 32"	14
≥ 42	12"	16"	D + 40"	12/10 (2)

STANDARD PIPE SIZES (1)

HSS Size	STD Size
4.000 x 0.154	2"
4.500 x 0.216	3"
5.563 x 0.237	4"

MATERIAL NOTES:

Provide cross pipes and saddle pipes conforming to ASTM A1085, A500 Gr B, A53 (Type E or S, Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except reinforcement, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specification.

Toe plate extensions are required only when shown elsewhere in the plans.

Concrete riprap is required only when cross pipes are required, unless otherwise shown in the plans. Provide concrete riprap in accordance with Item 432, "Riprap". Bolted anchor toewall may be omitted when an alternate end section with pre-attached cross pipes is supplied.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of reinforcing steel in concrete riprap unless noted otherwise.

GENERAL NOTES:

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

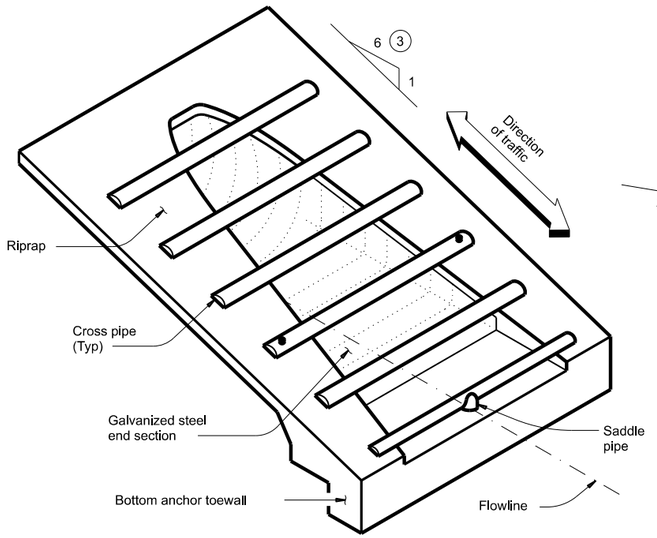
Alternate styles of end sections, including those with pre-attached cross pipes, may be supplied. Alternate styles must meet all of the following: design values shown in tables for cross pipe size; spacing of cross pipes and location of first cross pipe; H, A, W, and gage for end section; and material requirements noted.

All cross pipes, calculations, and dimensions are based on the end section shown on this standard. Alternate styles of end sections will require that appropriate adjustments be made to the values presented on this standard.

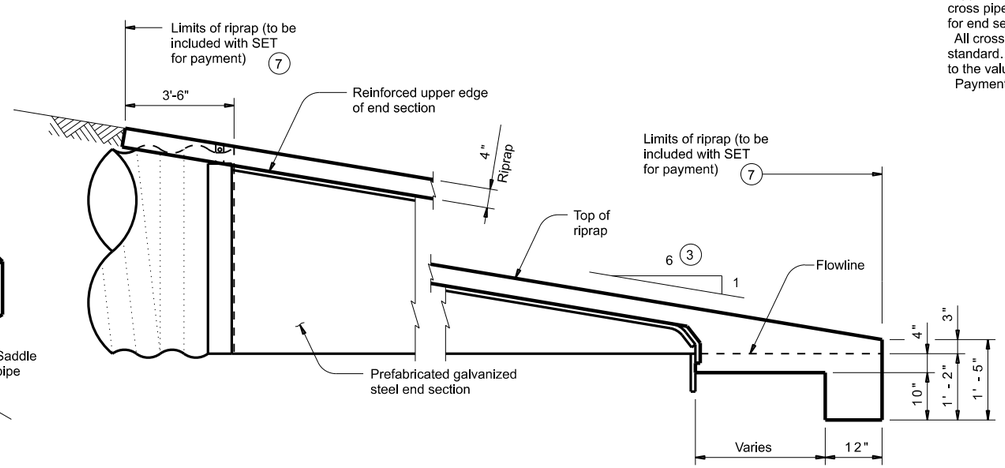
Payment for riprap and toewall is included in price bid for each safety end treatment.

PREFABRICATED GALVANIZED STEEL END SECTION DETAILS

(Safety end treatment and riprap are not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Cross pipes are not shown for clarity.)

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT

FOR 12" TO 60" DIA CMP CULVERTS
TYPE II ~ PARALLEL DRAINAGE

GS-ES-PD

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	WFS.	THROCKMORTON		97

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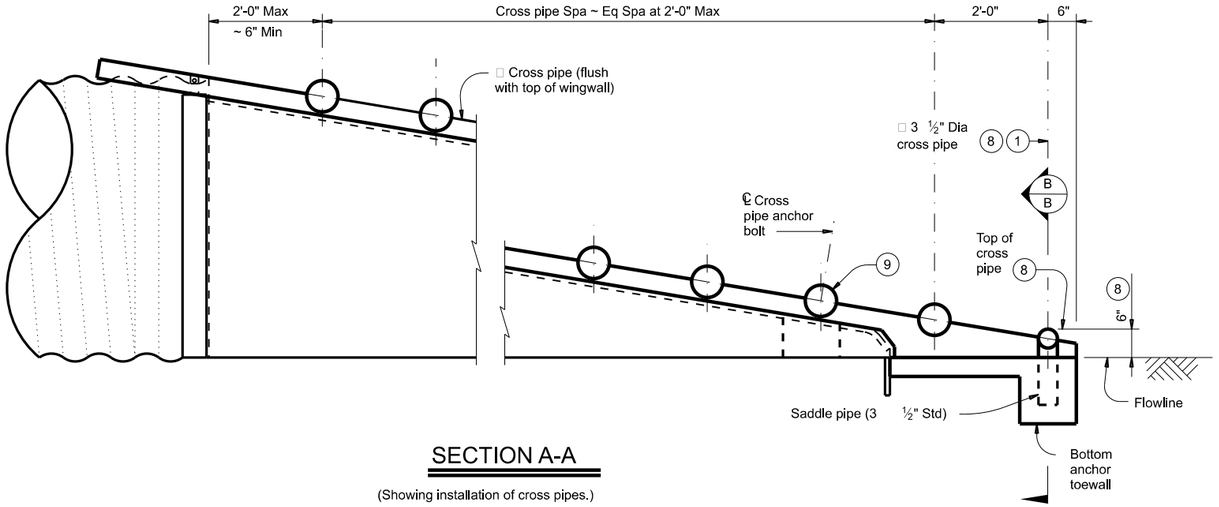
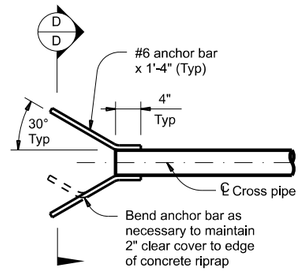
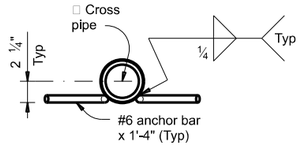


SECTION A-A

(Showing installation of cross pipes.)



PART PLAN

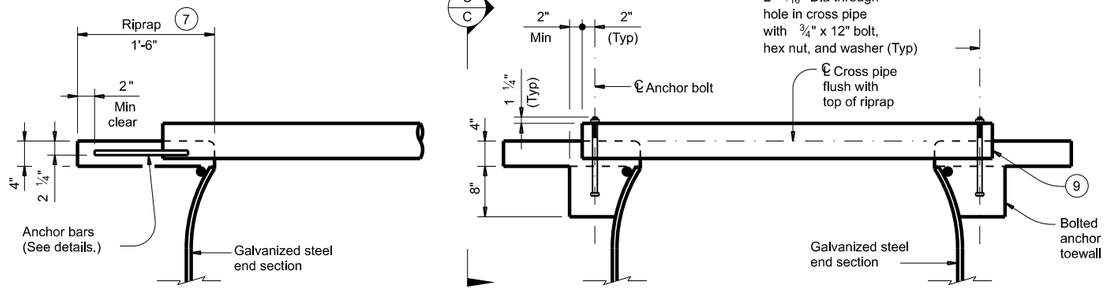


SECTION D-D

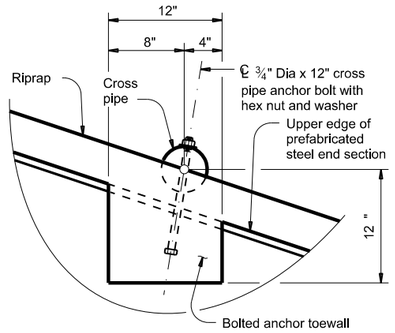
ANCHOR BAR DETAILS

ESTIMATED CONCRETE RIPRAP QUANTITIES

D (Nominal Culvert I.D.)	Concrete (CY)
12"	0.8
15"	0.9
18"	1.0
21"	1.1
24"	1.2
27"	1.3
30"	1.4
33"	1.5
36"	1.6
42"	1.8
48"	2.0
54"	2.2
60"	2.4

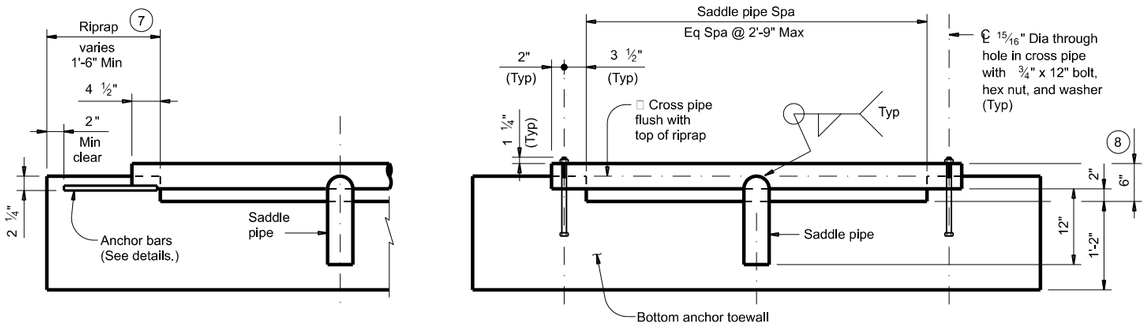


SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE



SECTION C-C

(Showing bolted anchor details.)



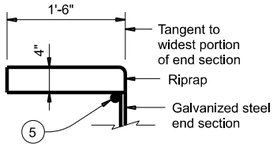
SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

WITH ANCHOR BARS & RIPRAP

WITH BOLTED ANCHOR

SECTION B-B

(Showing installation of cross pipes.)



CROSS SECTION OF TYPICAL RIPRAP

(1) Provide size and lengths of cross pipes as shown in the tables, except the first cross pipe from the bottom and the saddle pipe must be 3 ½". All other values shown are minimum requirements.

(5) Reinforce upper edge of prefabricated end section with minimum ⅜" diameter smooth or deformed bar (pre-galvanized).

(7) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap".

(8) The proper installation of the first cross pipe is critical for vehicle safety. The top of the first cross pipe must be placed at no more than 6" above the flow line.

(9) The third cross pipe from the bottom of the culvert must always be installed using a bolted connection. Ensure that concrete does not flow into this cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(10) Riprap quantities shown are for one end of one culvert only. For multiple culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

Texas Department of Transportation

Bridge Division Standard

PREFABRICATED GALVANIZED STEEL END SECTION SAFETY END TREATMENT

FOR 12" TO 60" DIA C.M.P. CULVERTS
TYPE II ~ PARALLEL DRAINAGE

GS-ES-PD

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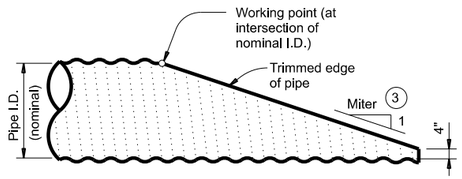
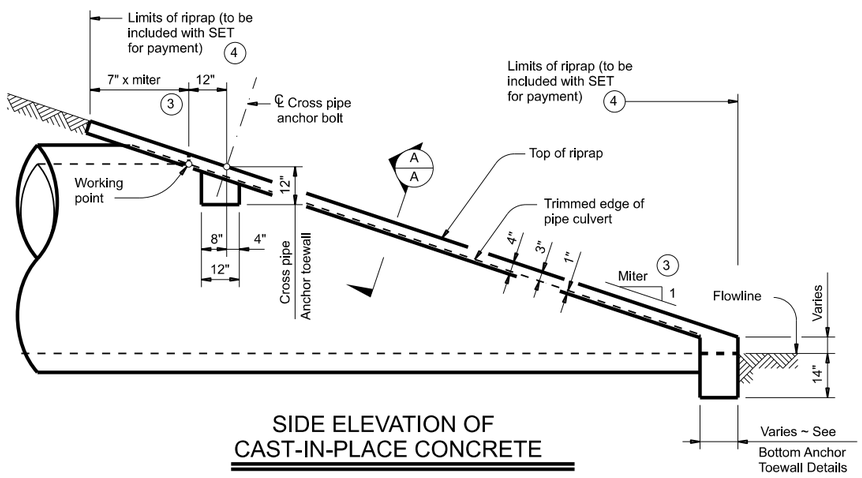
	WFS.	THROCKMORTON		98



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

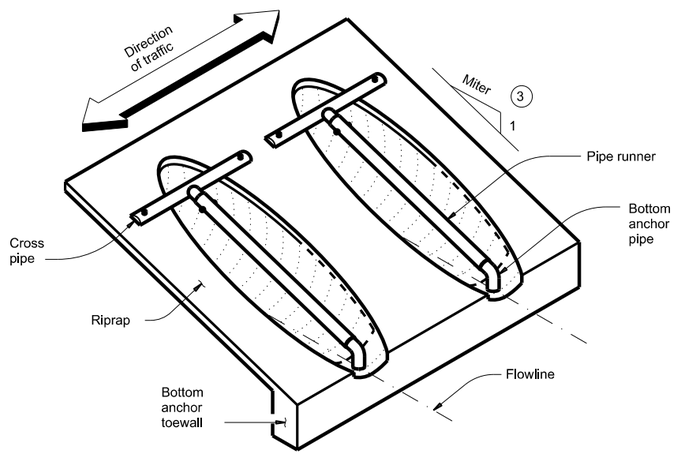
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' - 7"	3' - 5"	N/A	N/A	N/A	5' - 10"	N/A	N/A	N/A	8' - 1"	N/A	N/A	N/A	12' - 9"
27"	1' - 8"	3' - 8"	N/A	N/A	5' - 5"	6' - 11"	N/A	N/A	7' - 7"	9' - 7"	N/A	N/A	11' - 11"	14' - 11"
30"	1' - 10"	3' - 11"	N/A	N/A	6' - 4"	8' - 0"	N/A	N/A	8' - 9"	11' - 0"	N/A	N/A	13' - 8"	17' - 0"
33"	1' - 11"	4' - 2"	6' - 2"	6' - 5"	7' - 3"	9' - 1"	8' - 6"	8' - 10"	10' - 0"	12' - 5"	13' - 3"	13' - 9"	15' - 5"	19' - 2"
36"	2' - 1"	4' - 5"	6' - 11"	7' - 3"	8' - 2"	10' - 2"	9' - 6"	9' - 11"	11' - 2"	13' - 10"	14' - 9"	15' - 3"	17' - 2"	21' - 3"
42"	2' - 4"	4' - 11"	8' - 6"	8' - 10"	9' - 11"	12' - 4"	11' - 7"	12' - 0"	13' - 6"	16' - 8"	17' - 9"	18' - 5"	20' - 8"	25' - 7"
48"	2' - 7"	5' - 5"	10' - 1"	10' - 5"	11' - 9"	N/A	13' - 7"	14' - 2"	15' - 10"	N/A	20' - 9"	21' - 6"	24' - 2"	N/A
54"	3' - 0"	5' - 11"	11' - 8"	12' - 1"	N/A	N/A	15' - 8"	16' - 3"	N/A	N/A	23' - 10"	24' - 8"	N/A	N/A
60"	3' - 3"	6' - 5"	13' - 3"	N/A	N/A	N/A	17' - 9"	N/A	N/A	N/A	26' - 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' - 0"
4" STD	4.500"	4.026"	19' - 8"
5" STD	5.563"	5.047"	34' - 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.

(2) This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) Miter = slope of mitered end of pipe culvert.

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(5) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

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SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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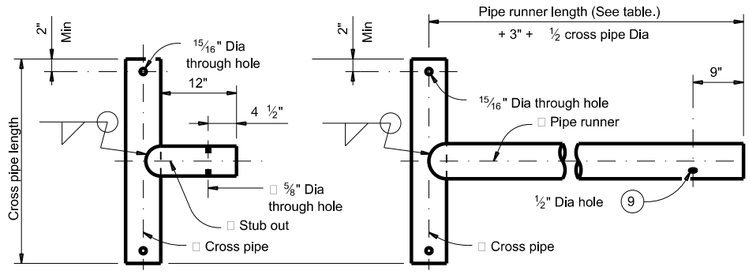
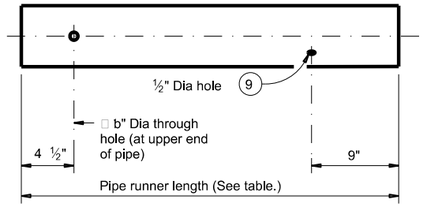
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		99



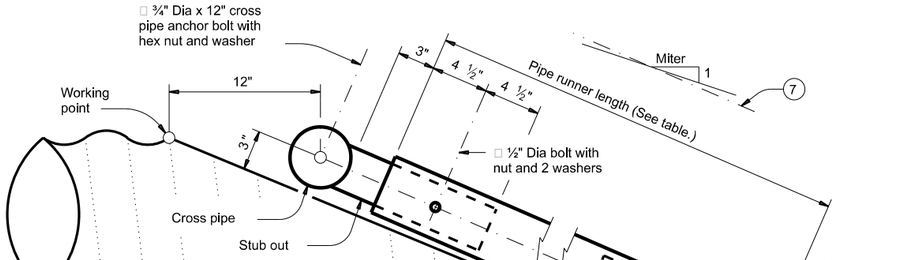
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



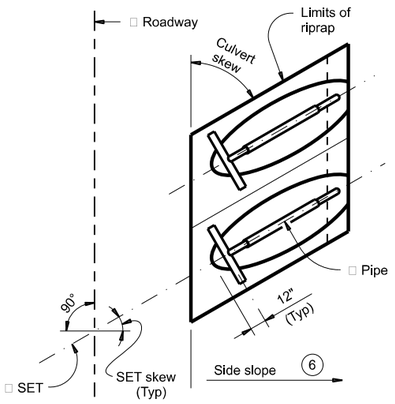
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

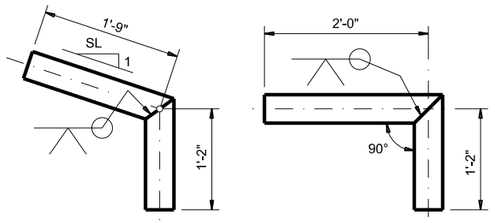


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)

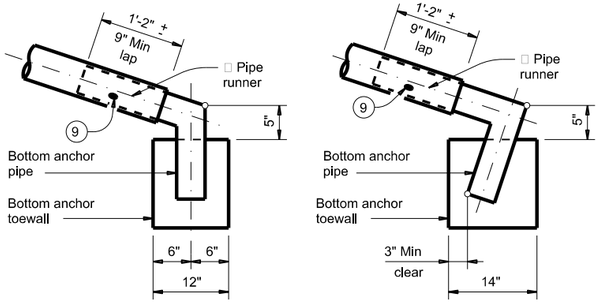


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

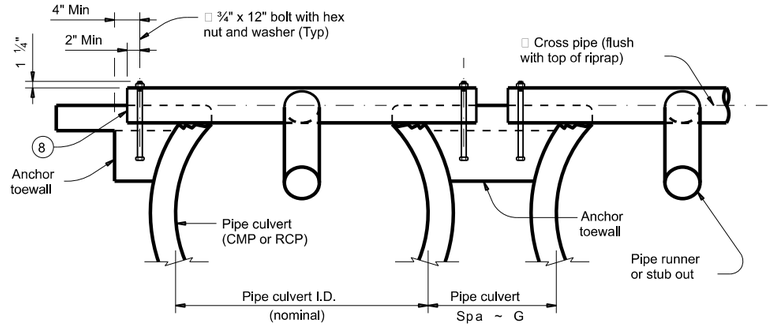
BOTTOM ANCHOR PIPE DETAILS (10)



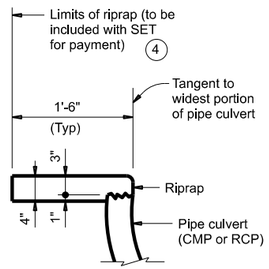
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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SHEET 2 OF 2

Texas Department of Transportation

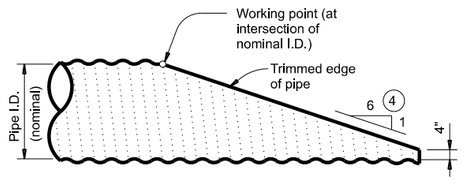
Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

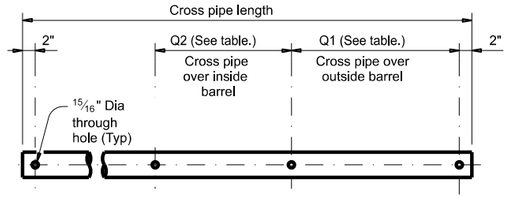
FILE: setpdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		100



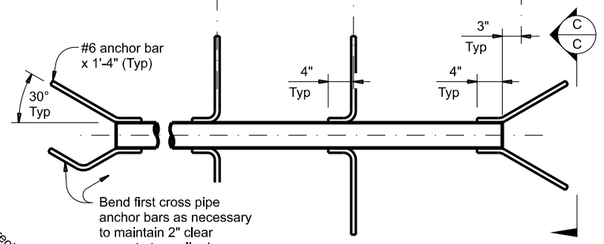
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

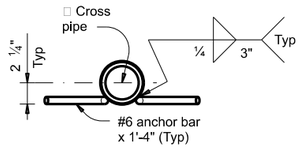
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

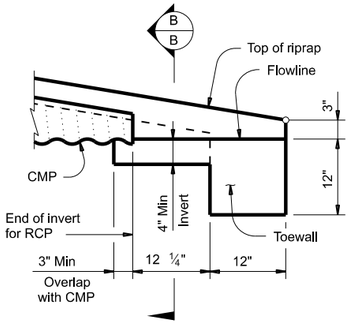


PIPE WITH ANCHOR BARS



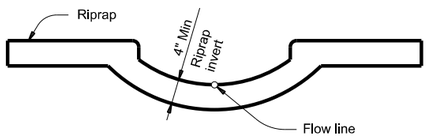
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

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

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

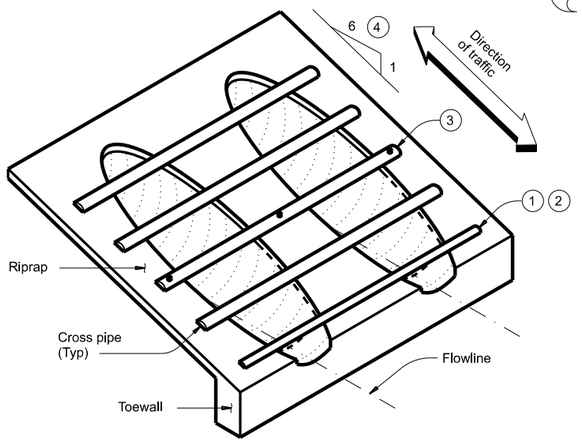
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

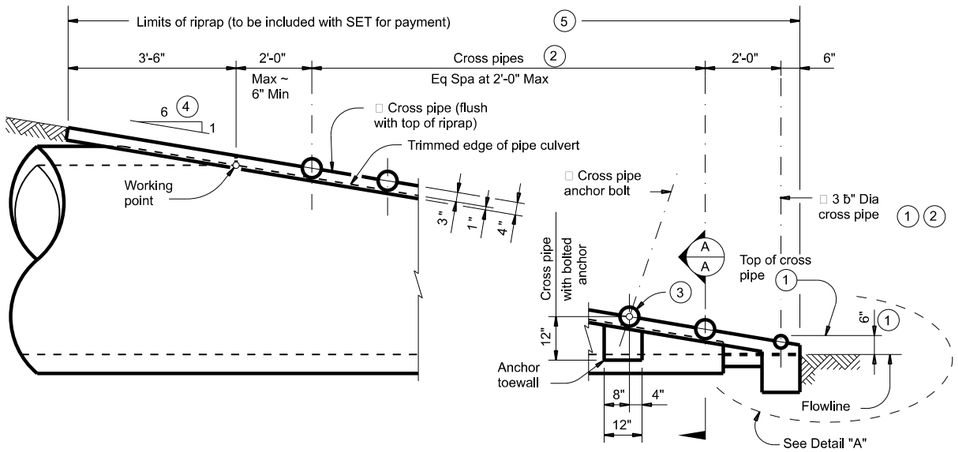
Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

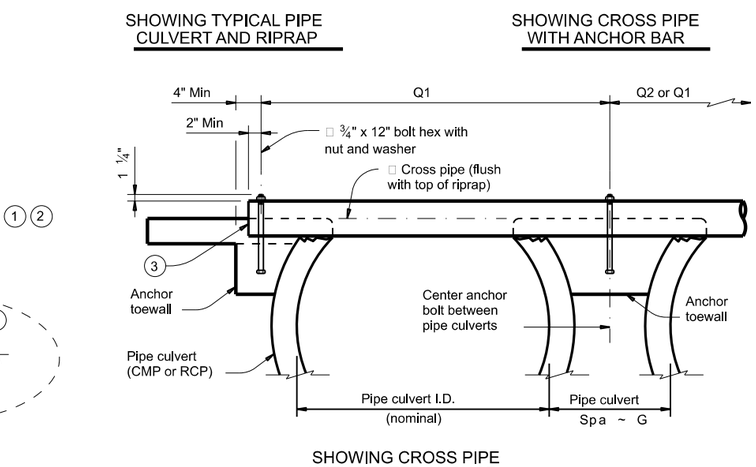


ISOMETRIC VIEW OF TYPICAL INSTALLATION



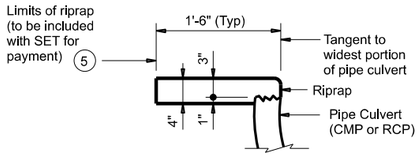
SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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

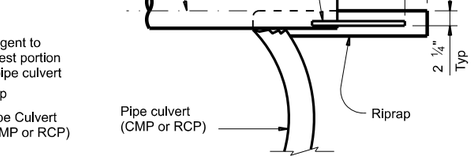


SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-PD

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (Two~Wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw (9)	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.585
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WING WALL REINFORCING
(Two~Wings)

Bar	Size	No.	Spa
D	#5 ~	1'-0"	
E	#4 ~	1'-0"	
F	#4 ~	1'-0"	
G	#6 4 ~		
M	#4 4 ~		
P	#4 ~	1'-0"	
R	#5 6 ~		
V	#4 ~	1'-0"	

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4 ~	1'-0"	
Q	#4 1 ~		
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

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

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.

(3) 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 Lw.

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extend Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

TABLE OF MAXIMUM WING HEIGHTS (9)

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

WING DIMENSION CALCULATIONS:

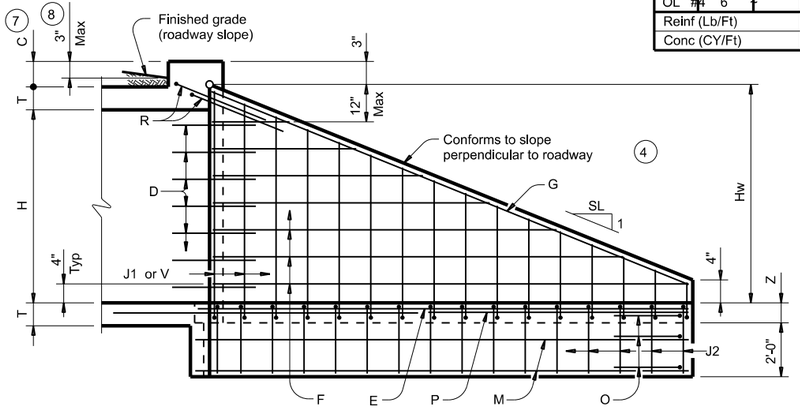
Hw = H + T + C - 0.250' (9)
A = (Hw - 0.333') (SL)
B = (A) (tan (30°))
Lw = (A) ÷ cos (30°))

For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = (Lc) + (2B)
Total Wingwall Area (two wings ~ SF)
= (Hw + 0.333') (Lw)

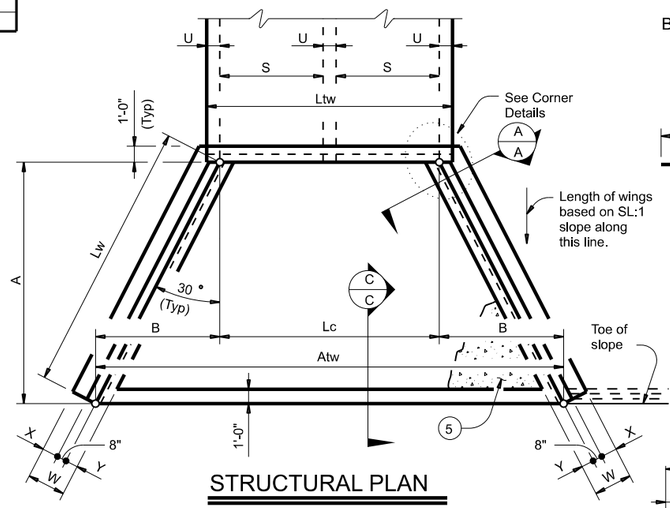
Hw = Height of wingwall (feet)
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)

See applicable box culvert standard for H, S, T, and U values.
See Table of Maximum Wall Heights for limits on Hw.



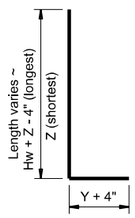
INSIDE ELEVATION OF WINGWALL

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

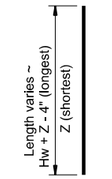


STRUCTURAL PLAN

(Showing dimensions.)



BARS J1



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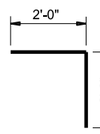
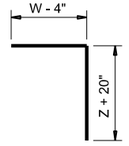


BARS L



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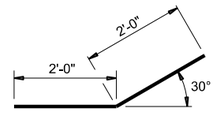

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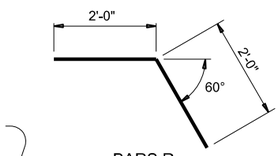
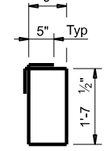
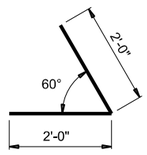


BARS R



BARS K
(Length = 5'-5")



BARS OL

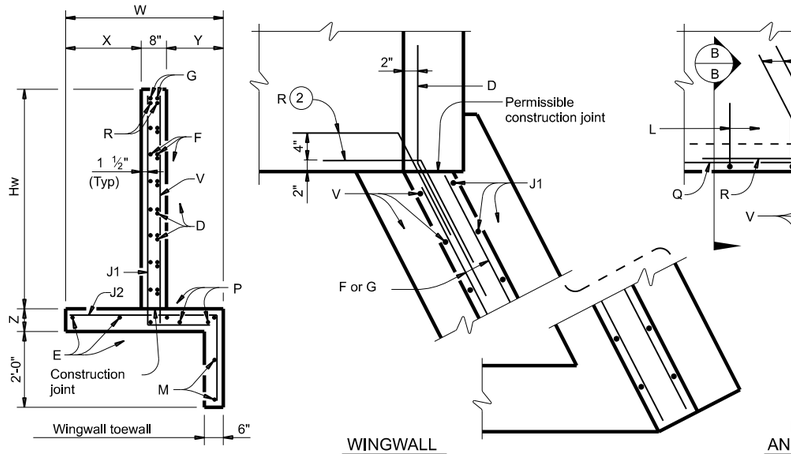
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f'c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

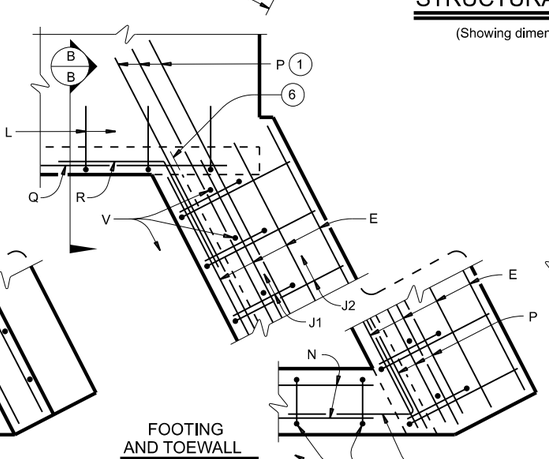
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing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

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



SECTION A-A

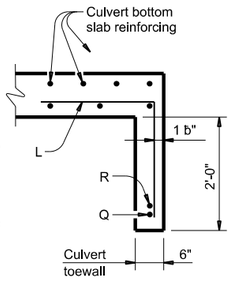
WINGWALL



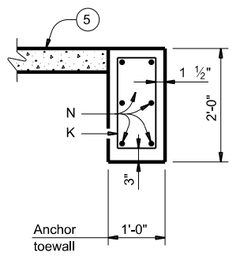
FOOTING AND TOEWALL

CORNER DETAILS

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



SECTION B-B (5)



SECTION C-C

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE:	setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0284	02	026	SH 79
		DIST	COUNTY		SHEET NO.
		WFS.	THROCKMORTON		102

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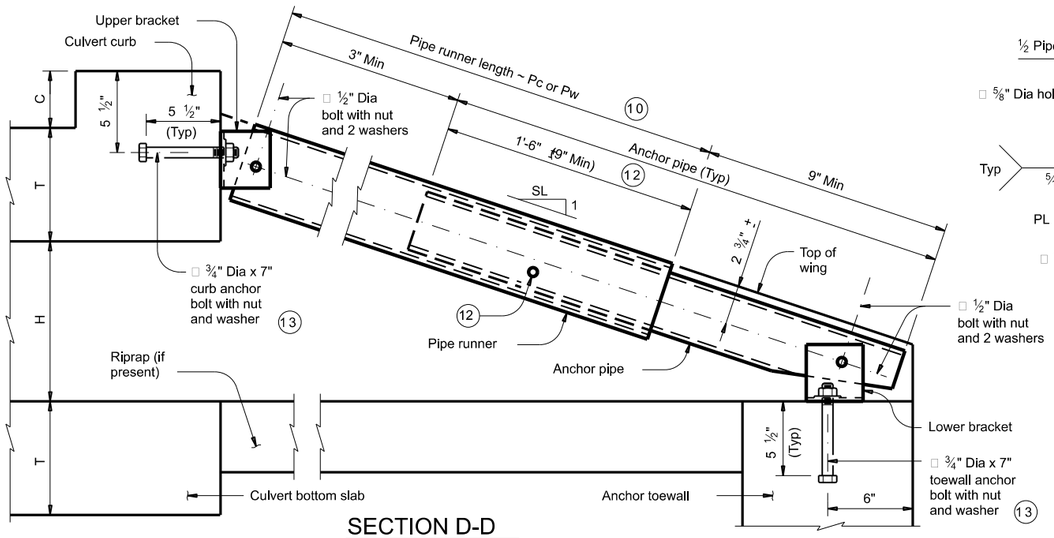
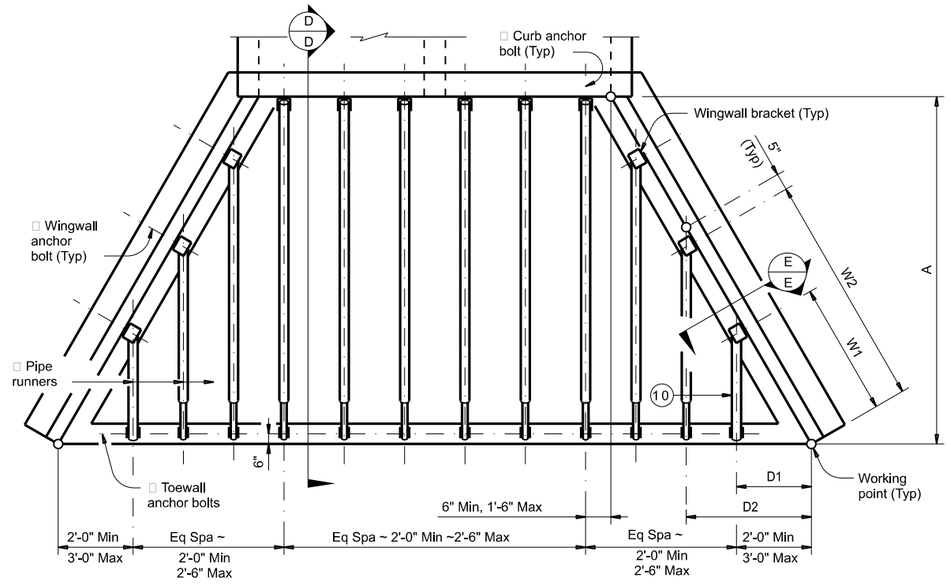
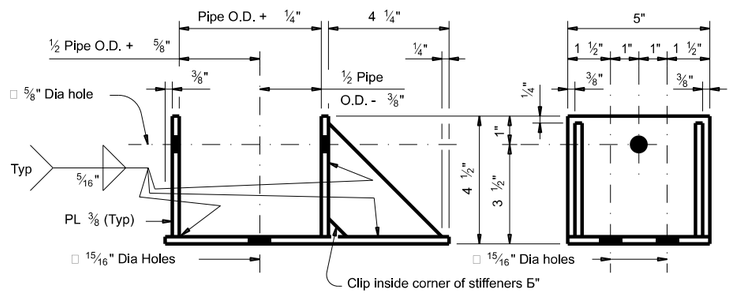


SECTION D-D

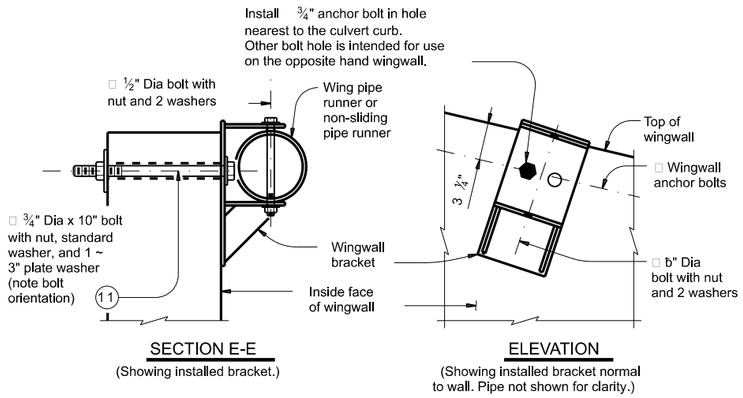
(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)



PIPE RUNNER PLAN



ELEVATION SIDE VIEW

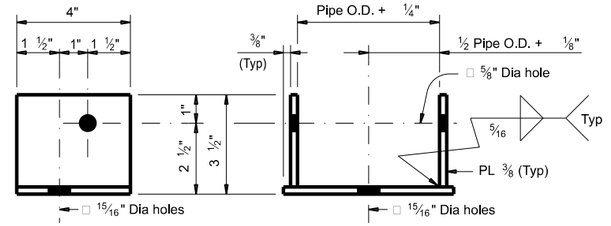


SECTION E-E
(Showing installed bracket.)

ELEVATION
(Showing installed bracket normal to wall. Pipe not shown for clarity.)

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

WINGWALL BRACKET DETAILS



SIDE VIEW ELEVATION

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

UPPER AND LOWER BRACKET DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

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

(10) If pipe runner length (Pw) is 1'-9" or less replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.

(11) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(12) After installation of pipe runner, use the b" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(13) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 b". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

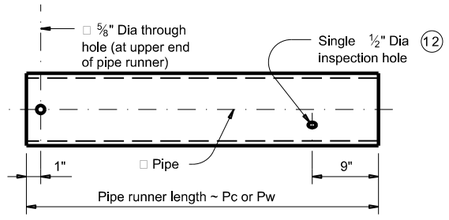
PIPE RUNNER DIMENSION CALCULATIONS:

Wn = (2.000) (Dn) - (0.416')
Pwn = (Dn) (K2) - (2.063')
Pw1 Non-Sliding Pipe Runner (If required)
= (D1) (K2) - (0.563')
Pc = (A) (K1) - (1.688')

Wn = Distance from working point to centerline anchor bolt measured along bottom inside face of wing (feet)
Dn = Distance from working point to centerline pipe runner measured along outside face of anchor toewall (feet)
Pw = Wingwall pipe runner length (feet)
Pc = Curb pipe runner length (feet)
K = Constant values for use in formulas

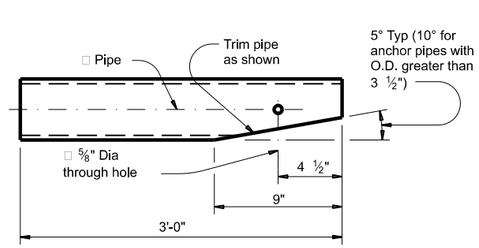
Slope SL:1	K1	K2
3:1	~ 1.054 ~	1.826
4:1	~ 1.031 ~	1.785
6:1	~ 1.014 ~	1.756

n = Wing pipe runner number

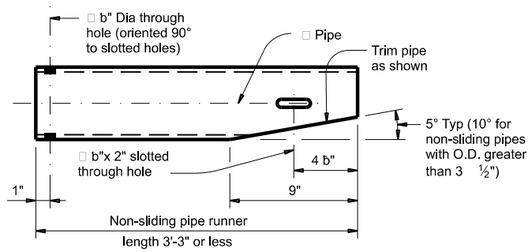


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

Texas Department of Transportation — Bridge Division Standard

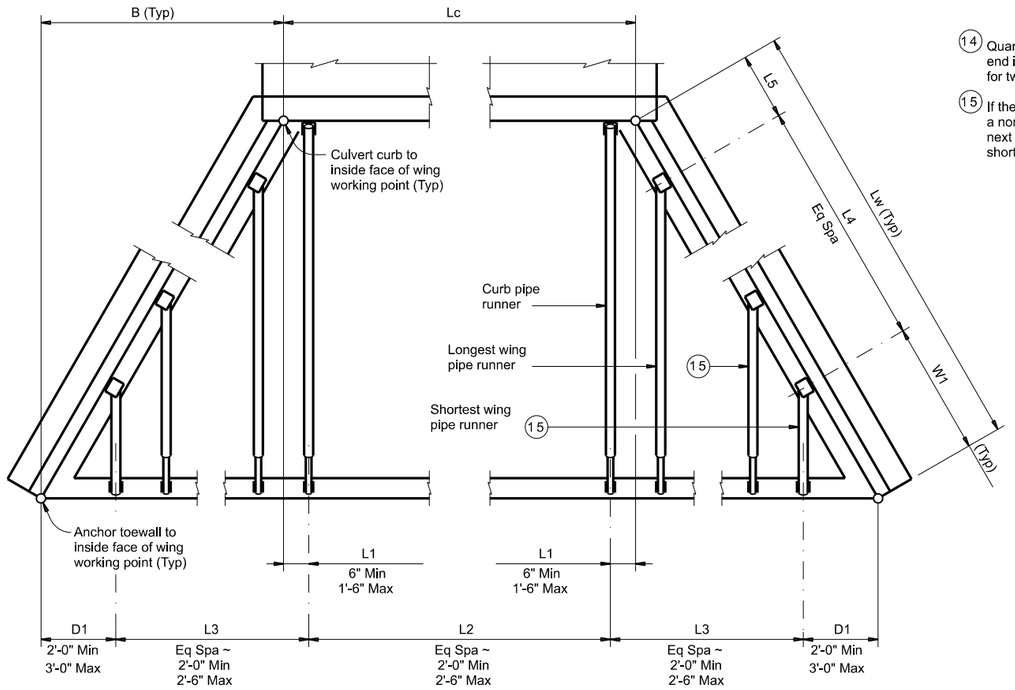
SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE:	setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0284	02	026	SH 79
		DIST	COUNTY		SHEET NO.
		WFS.	THROCKMORTON		103

Culvert Station and/or Creek Name (14)	Applicable Wing or End Treatment Standard	Lc	Input a value for L1 between 0.5 and 1.5 so that "Test L1" Is OK Try to max(imize(2'-6"max) L2 Spa		L2 values are dependant on the L1 value Input by the user L2			Input a value for D1 between 2.0 and 3.0 so that "Test L3" Is OK Try to max(imize(2'-6"max) L3 Spa		L3 values are dependant on the D1 value Input by the user L3			W1	L4			L5	Curb Pipe Runner (Pc)		Short Pw	non-sliding pipe	Curb, wing and/or Non-Sliding Pipe		3'-0" Anchor Pipe	
			L1	Test L1	L2 No. Spa	L2 Spa	L2 O'all Lgth	D1	Test L3	L3 No. Spa	L3 Spa	L3 O'all Lgth		L4 No. Spa	L4 Spa	L4 O'all Lgth		No.	Length			Size	Total Lgth	Anchor Pipe Size	Total Lgth
STRUCTURE #15~STA. 636+21.96	SETB-FW-Q	8,000	0,500	OK	3	2,333	7,000	3,000	OK	3	2,118	6,353	5,583	2	4,235	8,470	3,652	4	14,125	3,292	N/A	4"	98,938	3"	30,000



PIPE RUNNER LAYOUT

(14) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

(15) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

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©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
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		WFS.	THROCKMORTON		104

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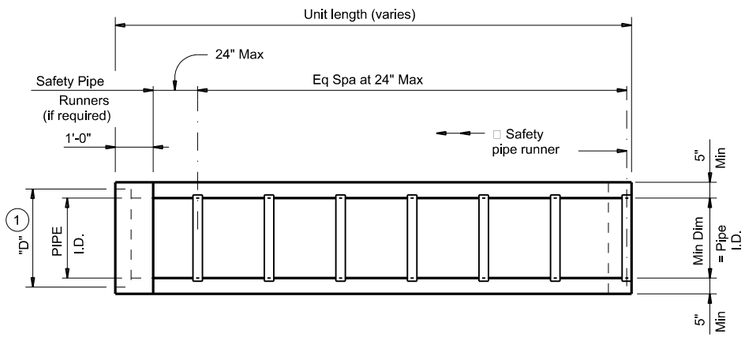
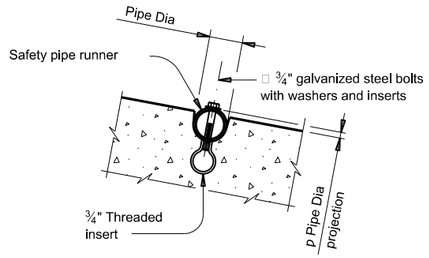


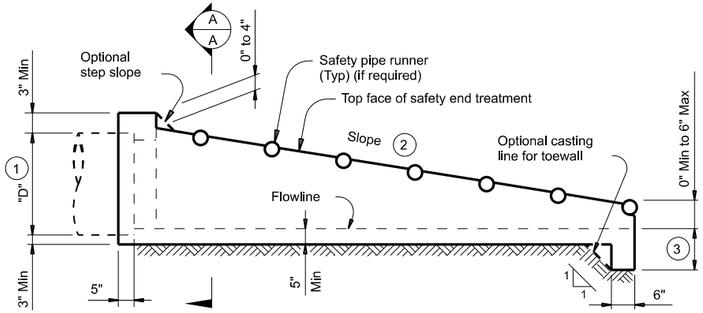
PLAN

(Showing bell end connection.)



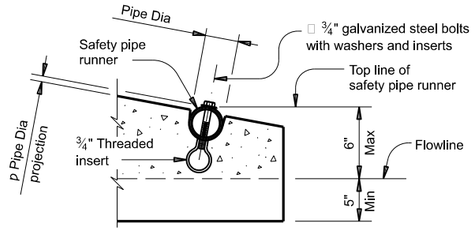
INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

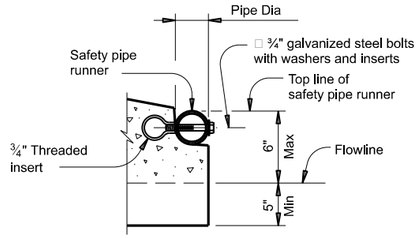


LONGITUDINAL ELEVATION

(Showing bell end connection.)



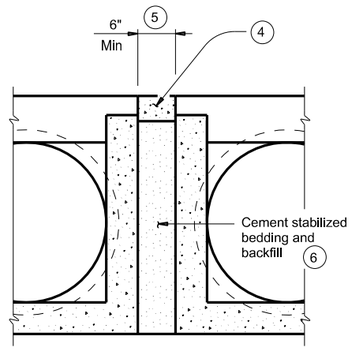
OPTION A



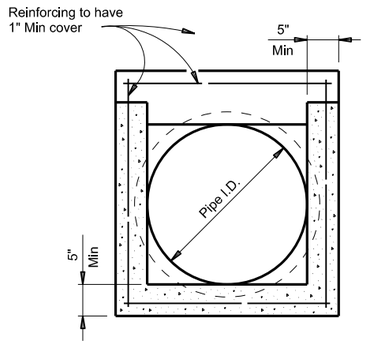
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

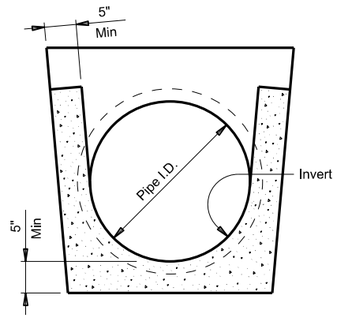
(If required)



MULTIPLE PIPE INSTALLATION

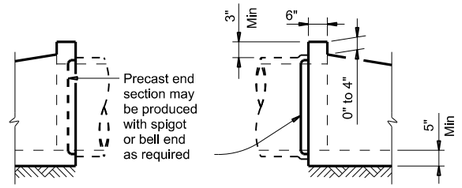


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' - 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' - 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' - 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' - 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' - 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' - 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	2.7"	52.50"	6:1	21' - 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

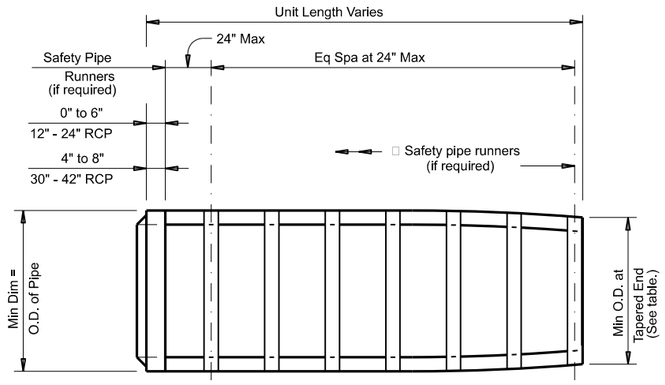
Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

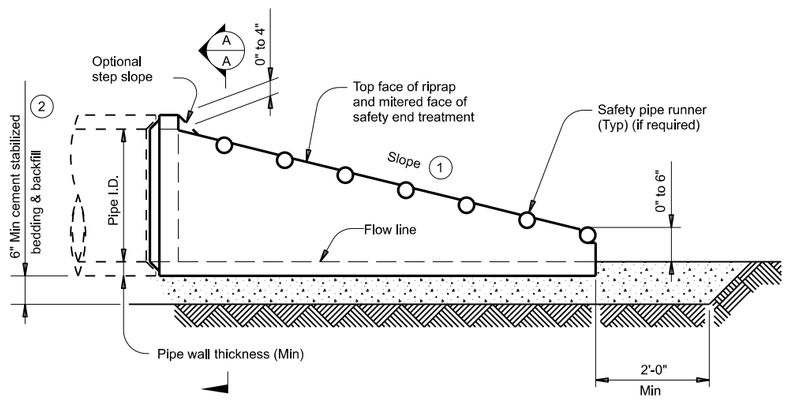
PSET-SP

FILE: psetspss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		105



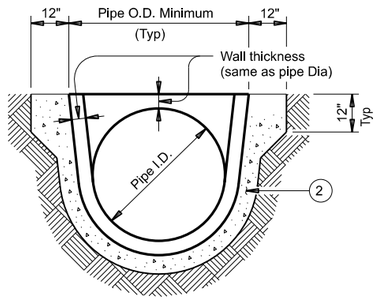
PLAN VIEW - 12" THRU 24"

(Showing spigot end connection.)

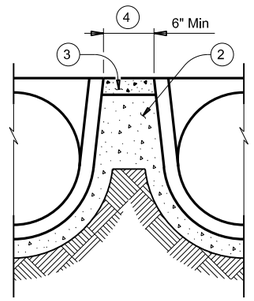


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)

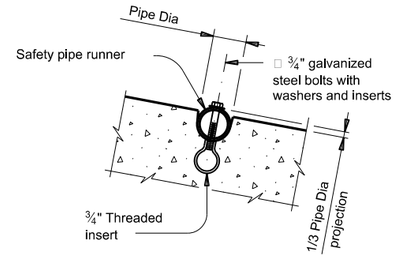


SECTION A-A



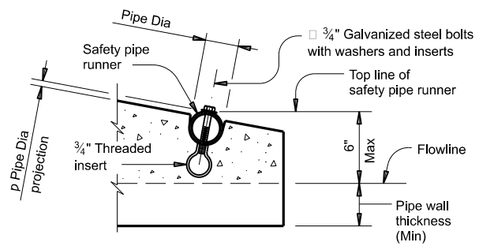
MULTIPLE PIPE INSTALLATION

1. Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.
2. Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
3. Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".
4. Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.
5. Safety pipe runners are required for multiple pipe culverts with more than two pipes.

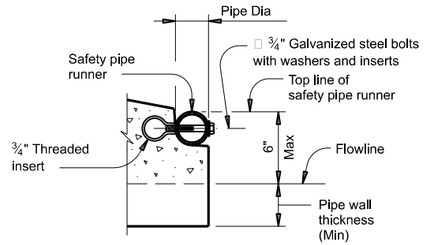


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



OPTION A



OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4' - 0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5' - 8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7' - 3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10' - 6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12' - 1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15' - 4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18' - 7"	Yes	Yes	4" STD	4.500"	4.026"

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

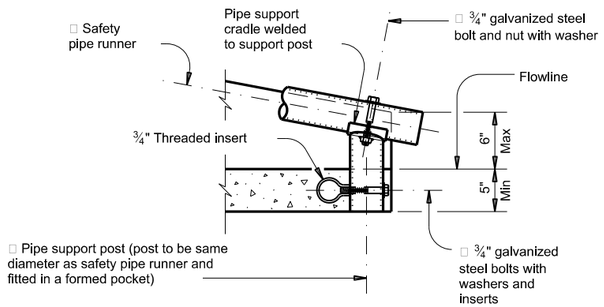
PSET-RP

FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		106

DATE: 3/29/2023 3:03:52 PM
FILE: T:\WFSDESGN\Warren M\SH79\Drainage DGN\PSET-RP.dgn

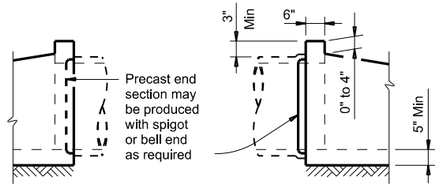
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"			> 30°	Yes
				6:1	11' - 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"	> 15°	Yes	> 15°	Yes
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"	> 0°	Yes		
				6:1	17' - 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



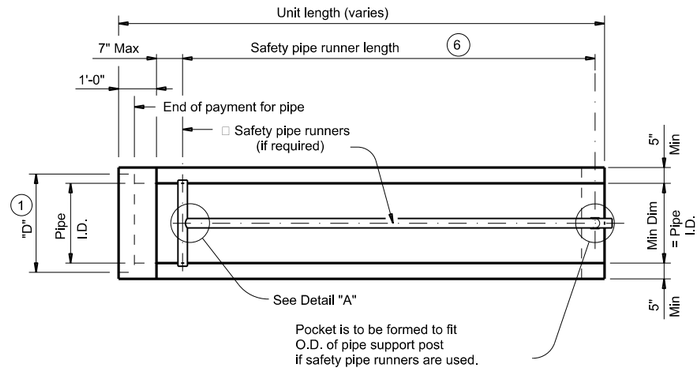
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



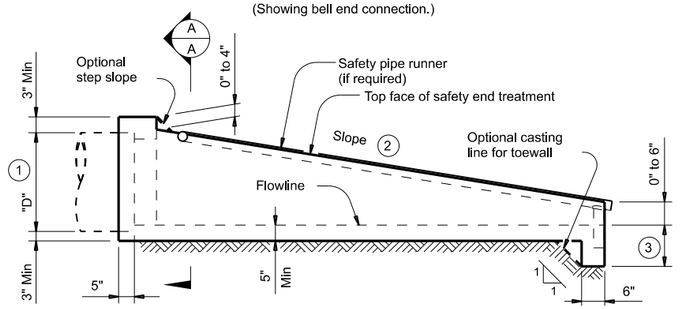
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



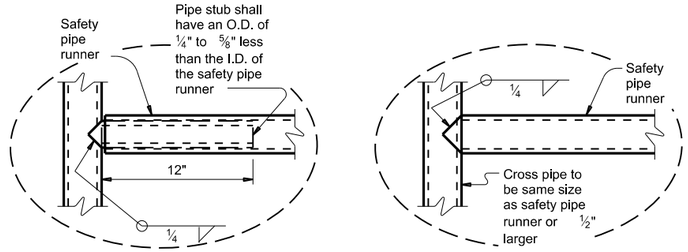
PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

(Showing bell end connection.)

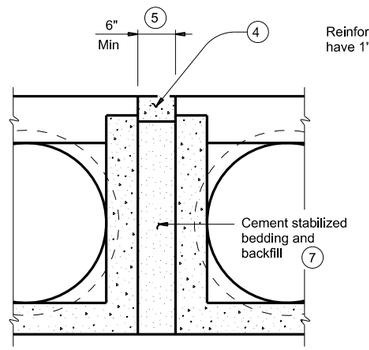


OPTION A

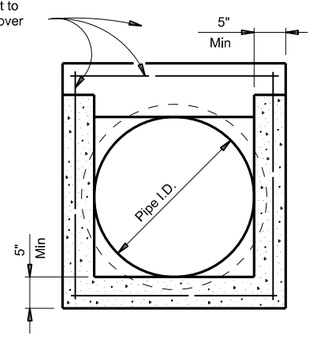
DETAIL A

(If required)

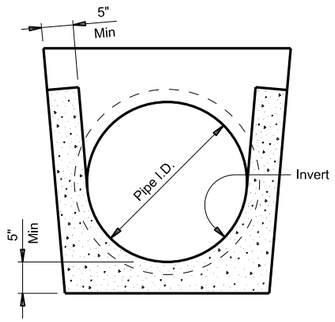
OPTION B



MULTIPLE PIPE INSTALLATION

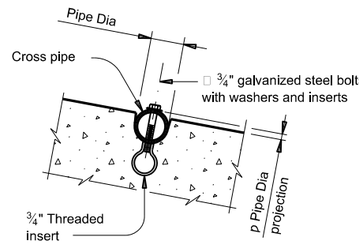


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 ½" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		107

DATE: 3/29/2023 4:41:46 PM
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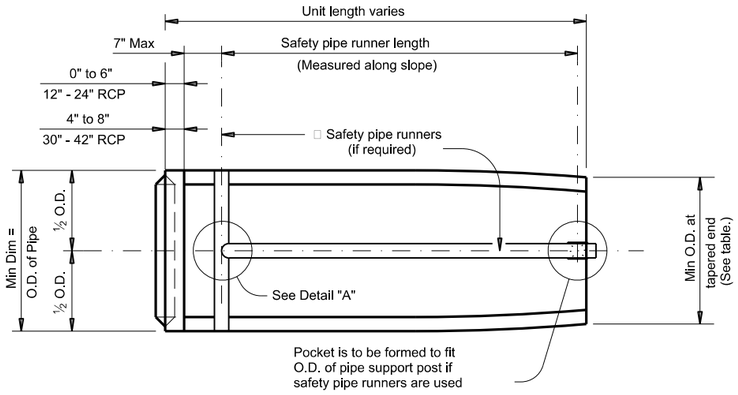
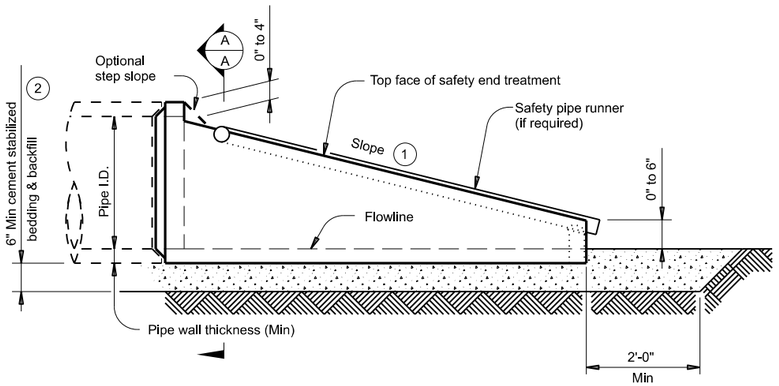


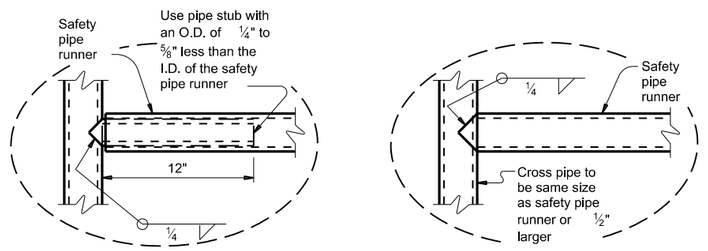
PLAN VIEW

(Showing spigot end connection.)



LONGITUDINAL ELEVATION

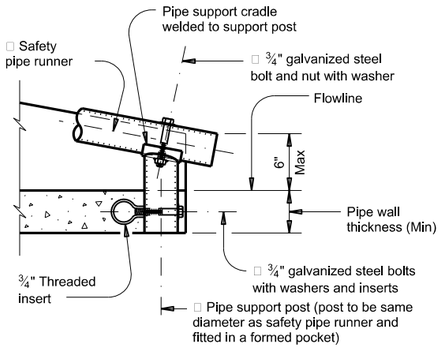
(Showing spigot end connection.)



OPTION A

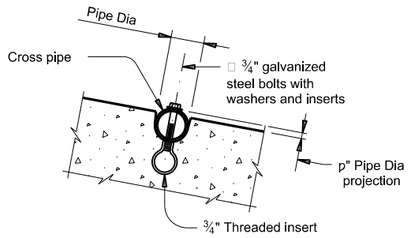
OPTION B

DETAIL A



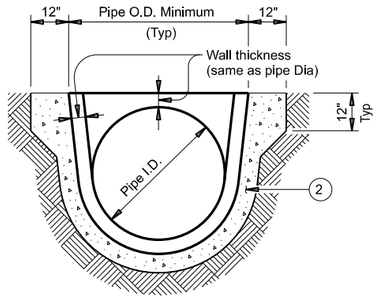
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

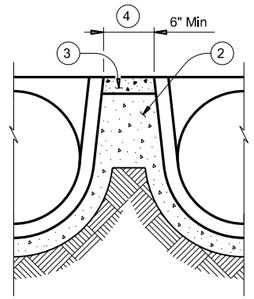


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 ½" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

1. Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.
2. Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.
3. Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap be considered subsidiary to the Item "Safety End Treatment".
4. Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' - 0"	≤ 45°	No	≤ 45°	No
					4:1	2' - 8"				
					6:1	4' - 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' - 10"	≤ 45°	No	≤ 45°	No
					4:1	3' - 9"				
					6:1	5' - 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
					4:1	4' - 10"				
					6:1	7' - 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' - 3"	≤ 45°	No	≤ 30°	No
					4:1	7' - 0"			> 30°	Yes
					6:1	10' - 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' - 3"	≤ 15°	No	≤ 15°	No
					4:1	8' - 2"	> 15°	Yes	> 15°	Yes
					6:1	12' - 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' - 10"	= 0°	No	≥ 0 °	Yes
					4:1	10' - 4"	> 0°	Yes		
					6:1	15' - 4"				
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' - 6"	≥ 0 °	Yes	≥ 0 °	Yes
					4:1	12' - 6"				
					6:1	18' - 7"				

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (CRP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

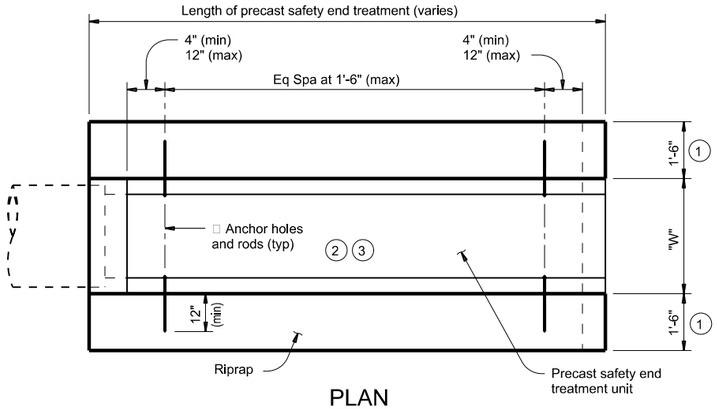
Bridge Division Standard

PRECAST SAFETY END TREATMENT

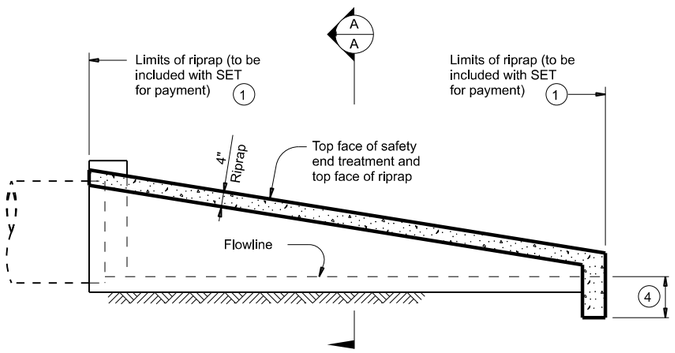
TYPE II ~ CROSS DRAINAGE

PSET-RC

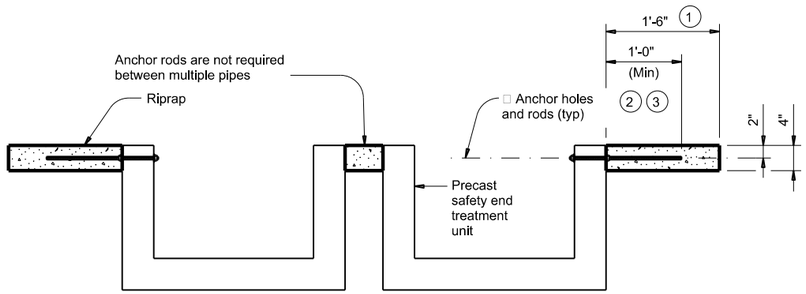
FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		108



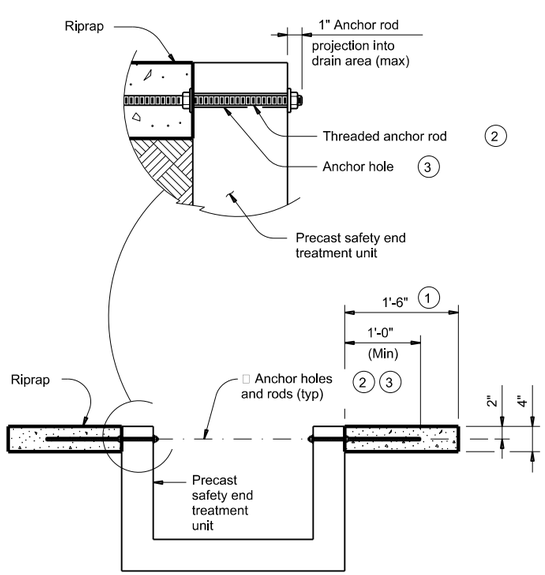
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY)

5

Nominal Culvert (Pipe) I.D.	PSET-SC and PSET-SP Standards				PSET-RC and PSET-RP Standards			
	Unit Width "W"	Side Slope			Unit Width "W"	Side Slope		
		3:1	4:1	6:1		3:1	4:1	6:1
12"	23.0"	0.1	0.2	0.2	16.0"	0.1	0.1	0.2
15"	26.5"	0.2	0.2	0.3	19.5"	0.1	0.2	0.2
18"	30.0"	0.2	0.2	0.3	23.0"	0.2	0.2	0.3
24"	37.0"	0.3	0.3	0.5	30.0"	0.2	0.3	0.4
30"	44.5"	0.3	0.4	0.6	37.0"	0.3	0.3	0.5
36"	51.5"	0.4	0.5	0.7	44.0"	0.3	0.4	0.6
42"	58.5"	0.5	0.6	0.8	51.0"	0.4	0.5	0.7

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".
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. The anchor rods shown are always required.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".
Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.
For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.
Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II RIPRAP DETAILS

PSET-RR

FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		109

DATE: 3/29/2023 4:41:47 PM
FILE: T:\WFSDESGN\Warren M\SH79\Drainage DGN\Added\PSET-RR.dgn

LOCATION			DOUBLE SOLID	SOLID LEFT BROKEN RIGHT	SOLID RIGHT BROKEN LEFT	BROKEN
STA	TO	STA				
354+00.00	TO	373+13.00	X			
373+13.00	TO	385+13.00		X		
385+13.00	TO	391+46.00				X
391+46.00	TO	403+43.00			X	
403+43.00	TO	405+70.00	X			
405+70.00	TO	417+16.00		X		
417+16.00	TO	428+54.00				X
428+54.00	TO	440+48.00			X	
440+48.00	TO	450+35.00	X			
450+35.00	TO	451+82.00				X
451+82.00	TO	458+17.00		X		
458+17.00	TO	470+65.00			X	
470+65.00	TO	503+90.00	X			
503+90.00	TO	515+06.00		X		
515+06.00	TO	622+94.00				X
622+94.00	TO	628+87.00			X	
629+42.00	TO	635+63.00	X			
635+63.00	TO	641+53.00		X		
641+53.00	TO	764+00.00				X

Texas Department of Transportation

SH 79

PAVMENT MARKING TABLE

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		110

DATE: 3/29/2023 3:04:25 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284026/4 - Design/Plan Set/8. Traffic/SH 79 pavement marking table

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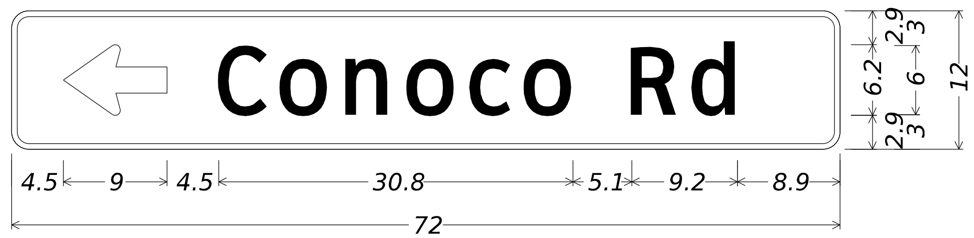
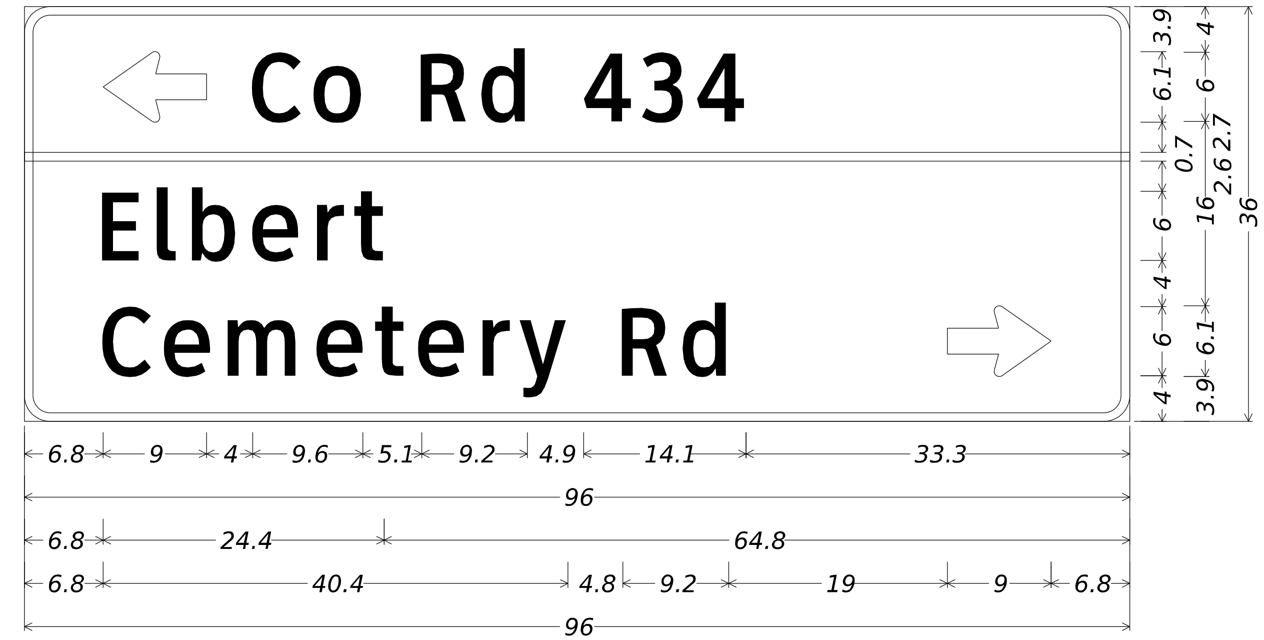


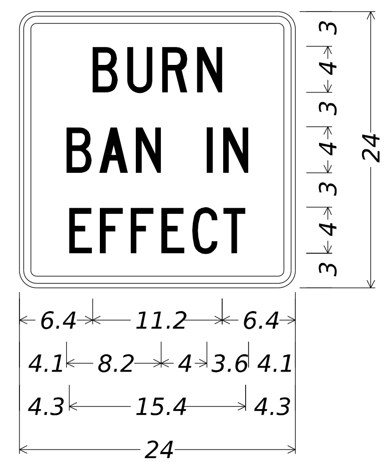
D21-1TL_VARx12;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Conoco Rd", ClearviewHwy-3-W;

D21-1TR_VARx12;
1.5" Radius, 0.5" Border, White on Green;
"Conoco Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;

D21-1aTL_VARx24;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Mexican", ClearviewHwy-3-W;
"Springs Rd", ClearviewHwy-3-W;



D21-3T(1)_VARx36;
2.3" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°; "Co Rd 434", ClearviewHwy-3-W;
"Elbert", ClearviewHwy-3-W; "Cemetery Rd", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;



R19-10aT_24x24;
1.5" Radius, 0.6" Border, 0.4" Indent, Black on White;
"BURN" Red, C;
"BAN IN" Red, C;
"EFFECT" Red, C;

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

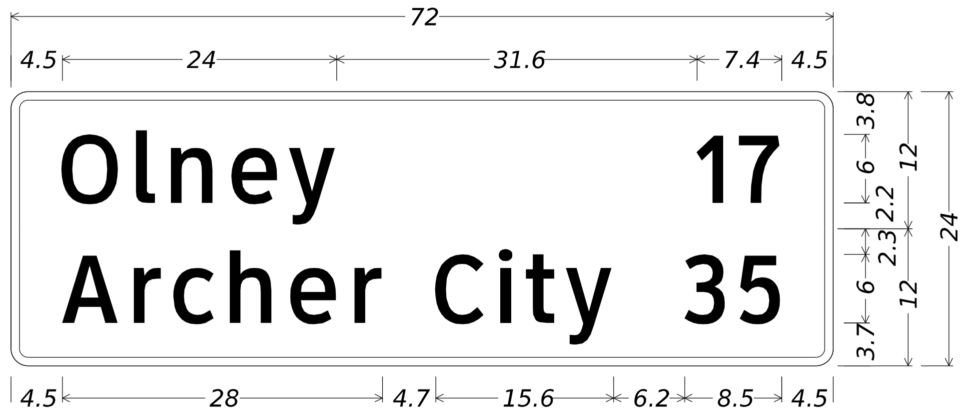
SH 79

SMALL SIGN DETAILS

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH079
DIST	COUNTY		SHEET NO.
WFS	Throckmorton		111

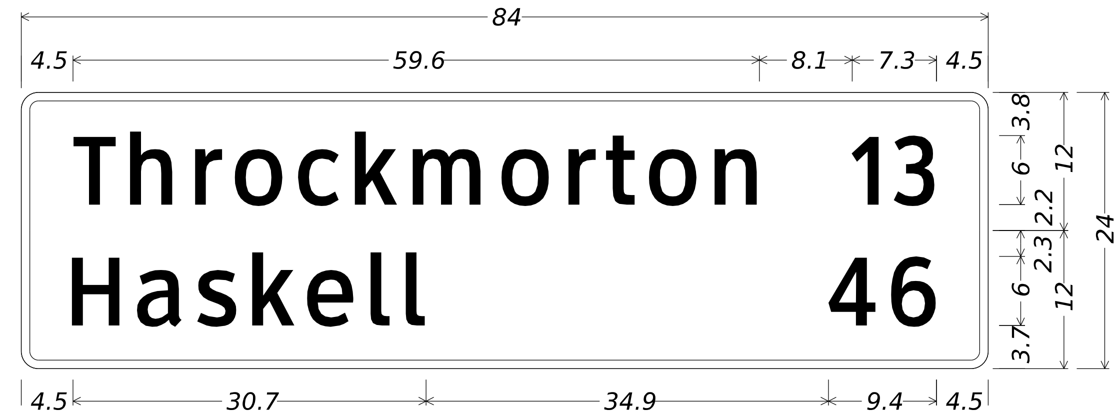
DATE: 3/29/2023
FILE: pw:...:TXDOT2/Documents/03 - WFS/Design Projects/0284020026/4 - Design/Plan Set/8. Traffic/SMALL SIGN DETAILS



D2-2 6in;

1.5" Radius, 0.8" Border, White on Green;
"Olney", ClearviewHwy-3-W; "17", ClearviewHwy-3-W;

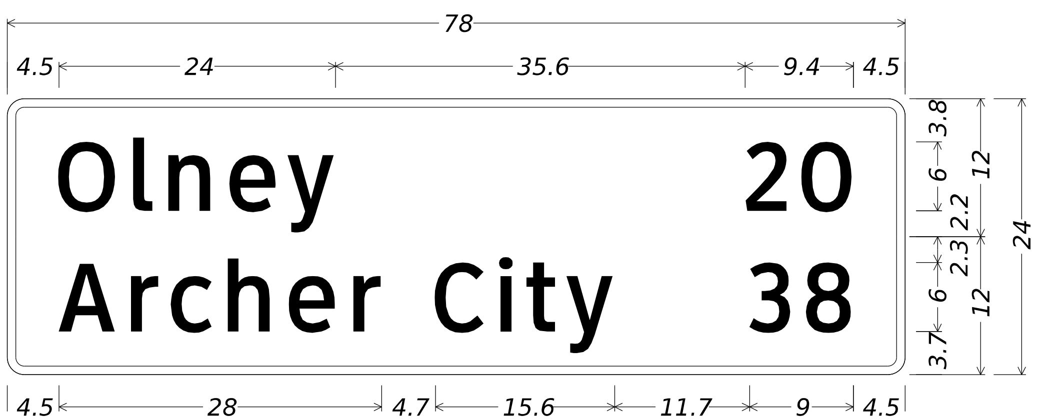
1.5" Radius, 0.8" Border, White on Green;
"Archer City", ClearviewHwy-3-W; "35", ClearviewHwy-3-W;



D2-2 6in;

1.5" Radius, 0.8" Border, White on Green;
"Throckmorton", ClearviewHwy-3-W; "13", ClearviewHwy-3-W;

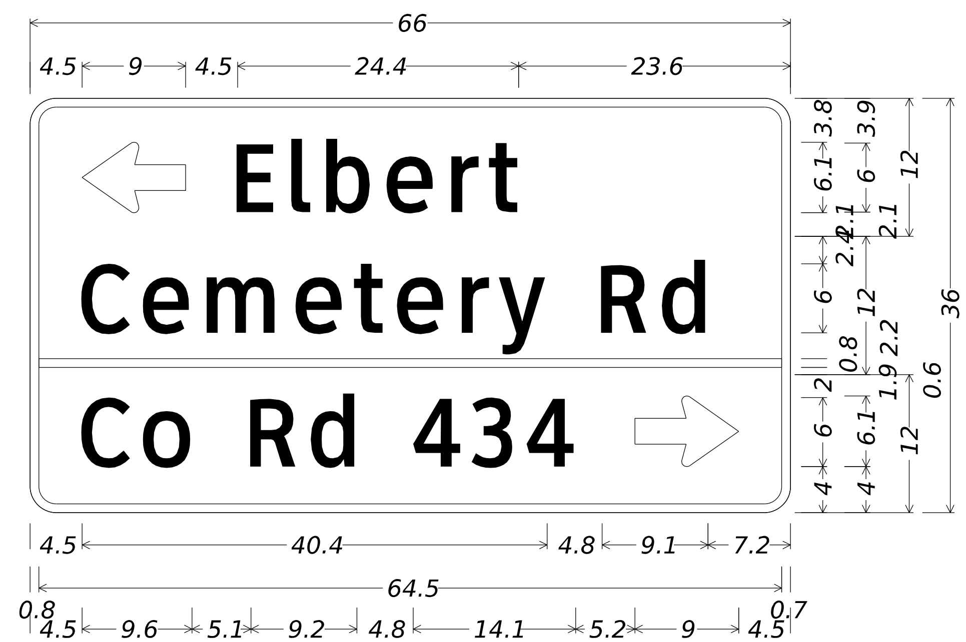
1.5" Radius, 0.8" Border, White on Green;
"Haskell", ClearviewHwy-3-W; "46", ClearviewHwy-3-W;



D2-2 6in;

1.5" Radius, 0.8" Border, White on Green;
"Olney", ClearviewHwy-3-W; "20", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on Green;
"Archer City", ClearviewHwy-3-W; "38", ClearviewHwy-3-W;

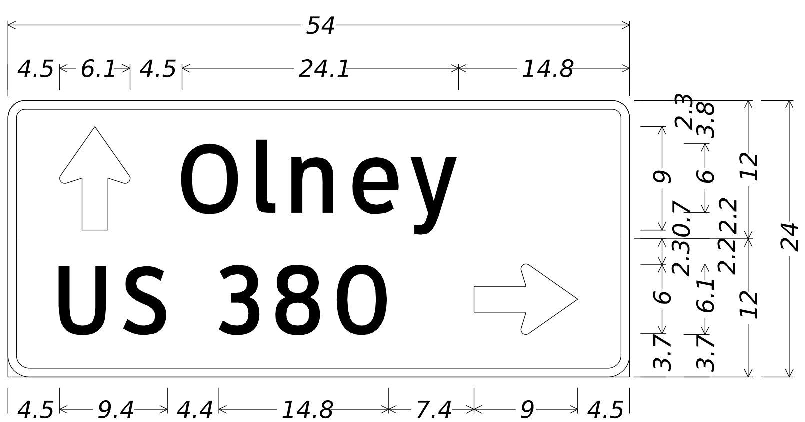


D21-3T(2)_VARx36;

2.3" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°;
"Elbert", ClearviewHwy-3-W;

2.3" Radius, 0.8" Border, White on Green;
"Cemetery Rd", ClearviewHwy-3-W;

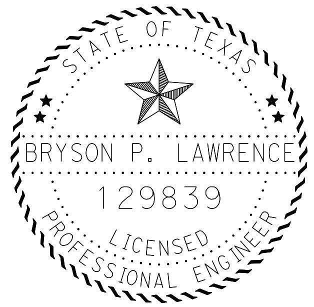
2.3" Radius, 0.8" Border, White on Green;
"Co Rd 434", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;



D1-2 6in UP-RT;

1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 90°;
"Olney", ClearviewHwy-3-W;

1.9" Radius, 0.8" Border, White on Green;
"US 380", ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0°;



Bryson Lawrence, P.E.

04/25/2023

Texas Department of Transportation

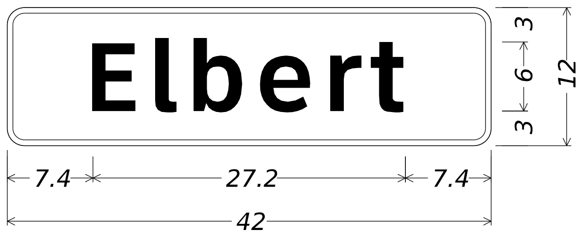
SH 79

SMALL SIGN DETAILS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH079
DIST	COUNTY		SHEET NO.
WFS	Throckmorton		112

DATE: 4/25/2023 11:06:24 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020026/4 - Design/Plan Set/8. Traffic/SMALL SIGN DETAILS



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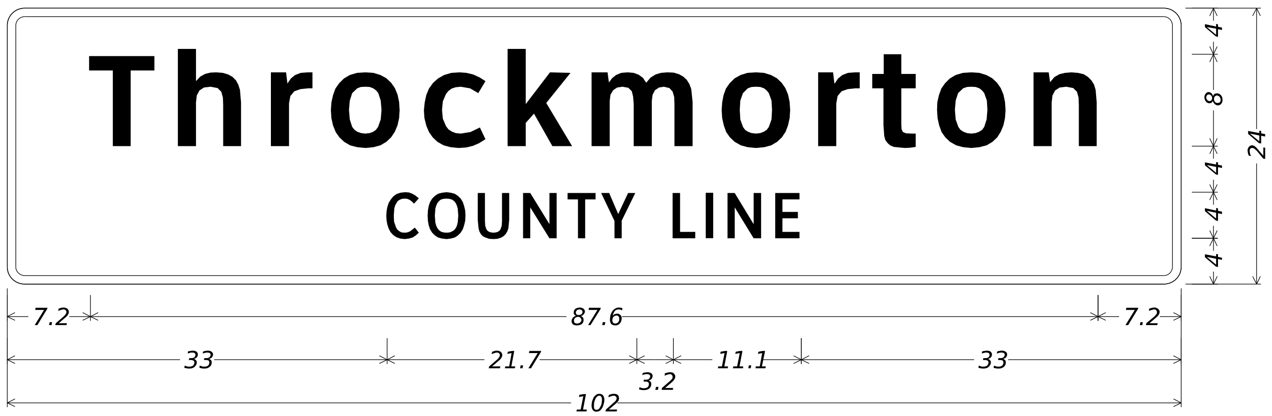
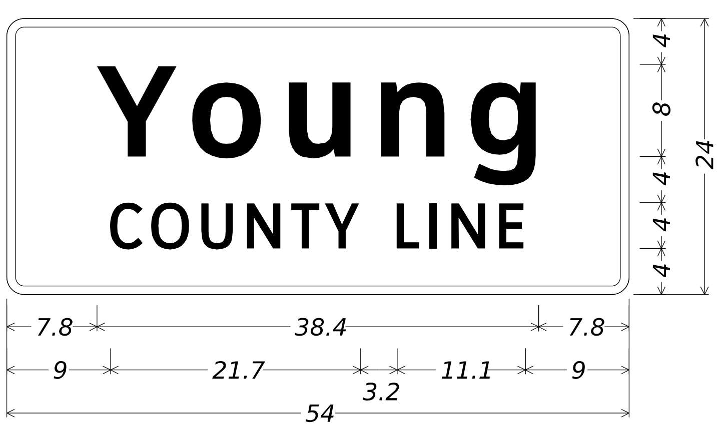


I-2dT 8in;
1.5" Radius, 0.8" Border, White on Green;
"Throckmorton", ClearviewHwy-5-W-R; "COUNTY LINE", ClearviewHwy-3-W;



I-2dT 8in;
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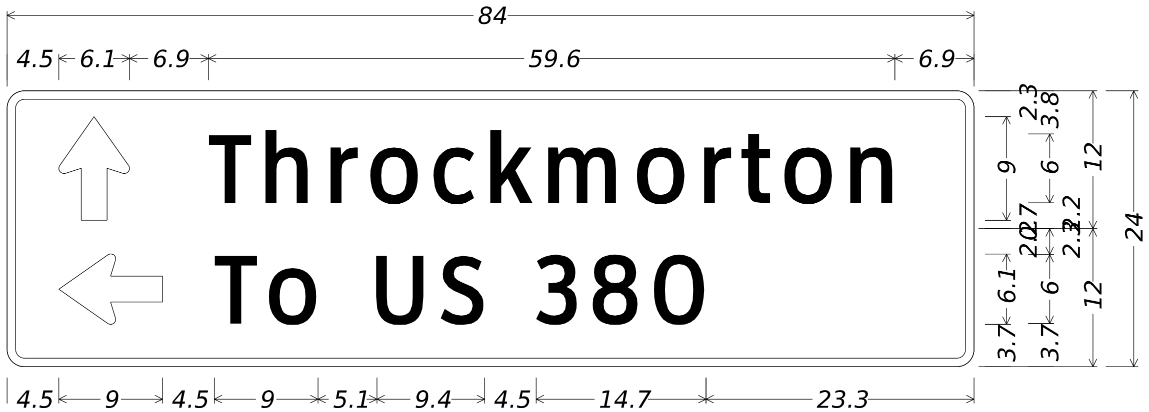
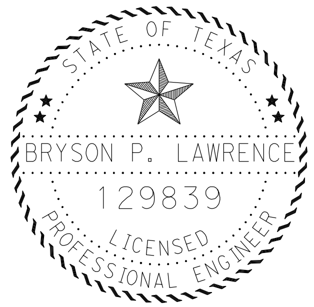
"Young", ClearviewHwy-5-W-R;
"COUNTY LINE", ClearviewHwy-3-W;



D1-2 6in UP-LT;

1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 90°; "Throckmorton", ClearviewHwy-3-W;

1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180°; "To US 380", ClearviewHwy-3-W;



Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

SH 79

SMALL SIGN DETAILS

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH079
DIST	COUNTY		SHEET NO.
WFS	Throckmorton		113

DATE: 3/29/2023
FILE: pw:\\TXDOT2\Documents/03 - WFS/Design Projects/0284020026/4 - Design/Plan Set/8. Traffic/SMALL SIGN DETAILS

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE (FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80)	POSTS (1 or 2)	ANCHOR TYPE (UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic)	MOUNTING DESIGNATION: PREFABRICATED (P = "Plain", T = "T", U = "U")	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext (BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels)	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE (TY N, TY S)
	1	R1-1	STOP	36 x 36	X		TWT	1	WS	P		
	2	D21-1aT	<--- Mexican Springs Rd	60 x 24	X		10BWG	1	SA	T		
	3	W11-10L	SYMBOL - BE ALERT FOR TRUCKS ENTERING LT	36 x 36	X		TWT	1	WS	T		
	4	D21-1TR	Conoco Rd -->	72 x 12	X		TWT	1	WS	T		
	5	R1-1	STOP	36 x 36	X		TWT	1	WS	P		
	6	D21-1TL	<-- Conoco Rd	72 x 12	X		TWT	1	WS	T		
	7	w11-10l	SYMBOL - BE ALERT FOR TRUCKS ENTERING LT	36 x 36	X		TWT	1	WS	P		
	8	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		TWT	1	WS	P		
		M2-1	JCT <AUXILIARY SIGN>	21 x 15								
	9	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	10	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	X		TWT	1	WS	P		
		M1-6T	(ROUTE #) TEXAS	24 x 24								
	11	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		TWT	1	WS	P		
		M1-6T	(ROUTE #) TEXAS	24 x 24								
	12	M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X		10BWG	1	SA	U		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M1-6T	(ROUTE #) TEXAS	24 x 24								
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
	13	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X		S80	1	SA	T		
	14	M1-6T	(ROUTE #) TEXAS	24 x 24	X		TWT	1	WS	P		
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15								
	15	r1-1	STOP	48 x 48	X		10BWG	1	SA	T		
	16	M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X		10BWG	1	SA	U		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M1-6T	(ROUTE #) TEXAS	24 x 24								
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
	17	M3-1	NORTH <AUXILIARY SIGN>	24 x 12	X		TWT	1	WS	P		
		M1-6T	(ROUTE #) TEXAS	24 x 24								
	18	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	SA	P		
	19	d2-2	OLNEY 20, ARCHER CITY 38	78 x 24	X		10BWG	1	SA	U		
	20	W1-4L	SYMBOL - REVERSE CURVE LEFT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	(SPEED) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	21	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		TWT	1	WS	P		
		M2-1	JCT <AUXILIARY SIGN>	21 x 15								
	22	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		TWT	1	WS	P		
	22A - 2	W1-8L	<CHEVRON LEFT>	18 x 24	X		TWT	1	WS	P		
		W1-8R	<CHEVRON RIGHT>	18 x 24	X							
	23	d20-1t	CO RD 424	24 x 24	X		TWT	1	WS	P		
	24	r1-1	STOP	36 x 36	X		TWT	1	WS	P		
	25	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	X		TWT	1	WS	P		
	26	d20-1t	CO RD 424	24 x 24	X		TWT	1	WS	P		
	27	W1-4r	SYMBOL - REVERSE CURVE RIGHT	36 x 36	X		10BWG	1	SA	P		
		W13-1P	(SPEED) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
	28	r1-1	STOP	36 x 36	X		TWT	1	WS	P		
	29	M3-3	SOUTH <AUXILIARY SIGN>	24 x 12	X		TWT	1	WS	P		
		M1-6T	(ROUTE #) TEXAS	24 x 24								
	30	w3-5	<SYMBOL - REDUCED SPEED AHD> (SPEED)	36 x 36	X		TWT	1	WS	T		
	31	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	32	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	33	I-2CT	Elbert	42 x 12	X		S80	1	SA	T		
	34	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		TWT	1	WS	P		
		M2-1	JCT <AUXILIARY SIGN>	21 x 15								
	35	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	36	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	37	d2-2	Throckmorton 13, Haskell 46	84 x 24	X		S80	1	SA	U		
	38	w11-10l	SYMBOL - BE ALERT FOR TRUCKS ENTERING LT	36 x 36	X		TWT	1	WS	P		
	39	d1-1	° Olney, US 380 -->	54 x 24	X		S80	1	SA	T		
	40	M1-6T	(ROUTE #) TEXAS	24 x 24	X		TWT	1	WS	P		
		M3-3	SOUTH <AUXILIARY SIGN>	24 x 12								
	41	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		S80	1	SA	U		

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/

NOTE:

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

SHEET 1 OF 3

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-16 8-16	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		114

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION: PREFABRICATED	MOUNTING DESIGNATION	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY = TYPE TY N TY S
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
		M1-6T	(ROUTE #) TEXAS	24 x 24								
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M3-1	NORTH <AUXILIARY SIGN>	24 x 12								
		M3-3	SOUTH <AUXILIARY SIGN>	24 x 12								
	42	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X		S80	1	SA	T		
	43	M1-6T	(ROUTE #) TEXAS	24 x 24	X		10BWG	1	SA	U		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
	44	M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15	X		10BWG	1	SA	u		
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M1-6T	(ROUTE #) TEXAS	24 x 24								
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
	45	r1-1	STOP	48 x 48	X		10BWG	1	SA	T		
	46	W11-8l	SYMBOL - BE ALERT FOR EMRGNCY VEHS LT	36 x 36	X		TWT	1	WS	P		
	47	R7-11D	PARALLEL PARKING <BI-DIR.ARROW>	12 x 18	X		TWT	1	WS	P		
	48	d1-1	° Throckmorton <-- To US 380	30 x 12	X		TWT	1	WS	T		
		R7-11D	PARALLEL PARKING <BI-DIR.ARROW>	12 x 18								
	49	m1-6f	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		TWT	1	WS	P		
		M5-1L	<ARROW - STRAIGHT THEN LEFT> <AUX. SIGN>	21 x 15								
		R7-11D	PARALLEL PARKING <BI-DIR.ARROW>	12 x 18								
	50	m1-6f	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		10BWG	1	SA	T		
		M5-1L	<ARROW - STRAIGHT THEN LEFT> <AUX. SIGN>	21 x 15								
		R7-11D	PARALLEL PARKING <BI-DIR.ARROW>	25 x 24								
	51	W1-7T	<BI-DIRECTIONAL LRG ARRW w/ CHEVRONS>	96 x 36	X		S80	1	SA	T		
	52	M1-6T	(ROUTE #) TEXAS	24 x 24	X		10BWG	1	SA	U		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
	53	M1-6T	(ROUTE #) TEXAS	24 x 24	X		10BWG	1	SA	U		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
	54	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		S80	1	SA	T		
		M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24								
		M1-6T	(ROUTE #) TEXAS	24 x 24								
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
		M6-3	<ARROW - VERTICAL STRGHT> <AUX. SIGN>	21 x 15								
		M6-1	<ARROW - HORIZ. STRGHT> <AUXILIARY SIGN>	21 x 15								
		M3-1	NORTH <AUXILIARY SIGN>	24 x 12								
		M3-3	SOUTH <AUXILIARY SIGN>	24 x 12								
	55	W11-8r	SYMBOL - BE ALERT FOR EMRGNCY VEHS RT	36 x 36	X		TWT	1	WS	P		
	56	M1-6R	(ROUTE #) TEXAS	24 x 24	X		TWT	1	WS	P		
		M3-1	NORTH <AUXILIARY SIGN>	24 x 12								
	57	d2-2	Olney 17, Archer City 35	78 x 24	X		S80	1	SA	t		
	58	r2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	59	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	60	M1-6F	<FM SHIELD> FARM ROAD (ROUTE #)	24 x 24	X		TWT	1	WS	P		
		M2-1	JCT <AUXILIARY SIGN>	21 x 15								
	61	d1-1	Elbert	42 x 12	X		S80	1	SA	T		
	62	M1-6T	(ROUTE #) TEXAS	24 x 24	X		TWT	1	WS	P		
		M3-1	NORTH <AUXILIARY SIGN>	24 x 12								
	63	w11-10r	SYMBOL - BE ALERT FOR TRUCKS ENTERING RT	36 x 36	X		TWT	1	WS	P		
	64	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	65	R2-1	SPEED LIMIT (SPEED)	30 x 36	X		TWT	1	WS	P		
	66	w3-5	<SYMBOL - REDUCED SPEED AHD> (SPEED)	36 x 36	X		TWT	1	WS	T		
	67	D21-3T(1)	<-- Elbert Cemetery Rd, Co Rd 434 -->	96 x 36	X		S80	1	SA	T		

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/

NOTE:

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

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SHEET 2 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 0284	SECT 02	JOB 026	HIGHWAY SH 79
REVISIONS 4-16 8-16	DIST WFS.		COUNTY THROCKMORTON	SHEET NO. 115

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	68	r1-1	STOP	36 x 36	X		TWT	1	WS	P		
	69	r1-1	STOP	36 x 36	X		TWT	1	WS	P		
	70	D21-3T(2)	<-- Elbert Cemetery Rd, Co Rd 434 -->	66 x 36	X		S80	1	SA	T		
	71	I-2dT	YOUNG County Line	60 x 24	X		10BWG	1	SA	U		
	72	I-2dT	Throckmorton County Line	102 x 24	X		S80	1	SA	T		
		R19-10aT	Burn Ban In Effect	24 x 24	x							

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/

NOTE:

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

SHEET 3 OF 3

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT 0284	SECT 02	JOB 026	HIGHWAY SH 79
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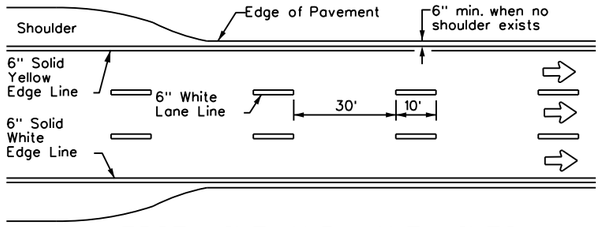
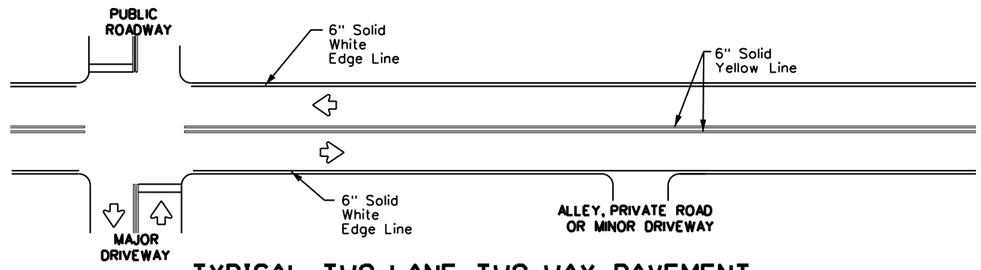
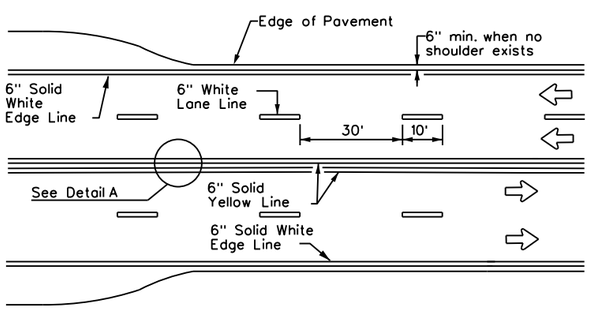
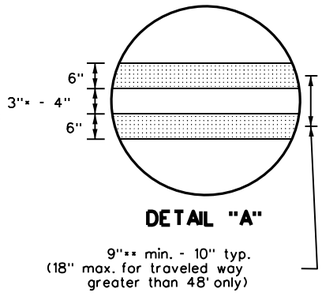


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

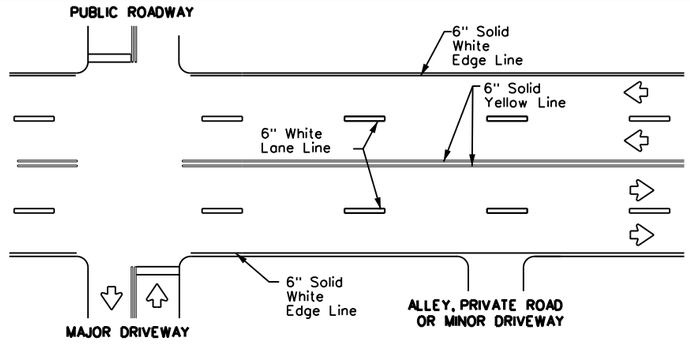




CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

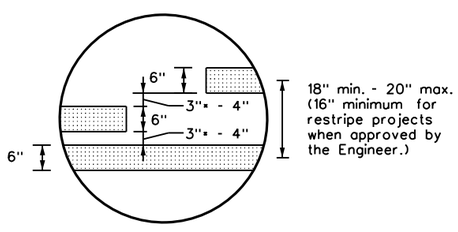
* 2" minimum for restripe projects when approved by the Engineer.

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



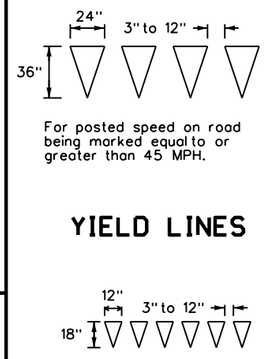
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

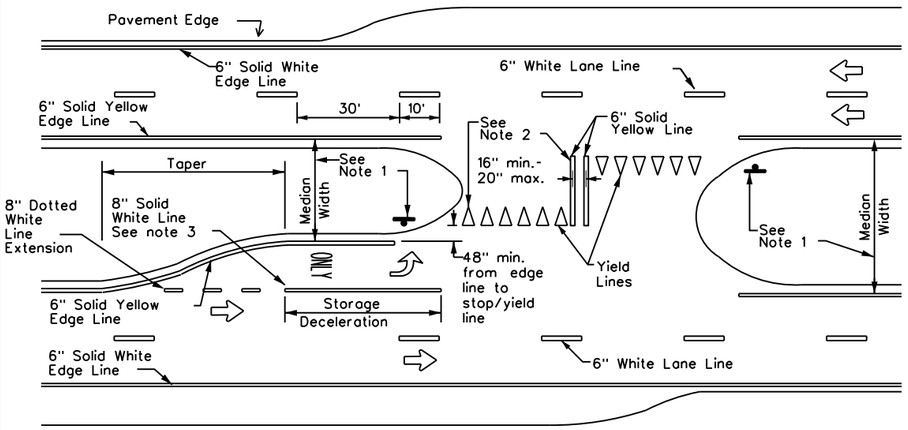
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

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





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

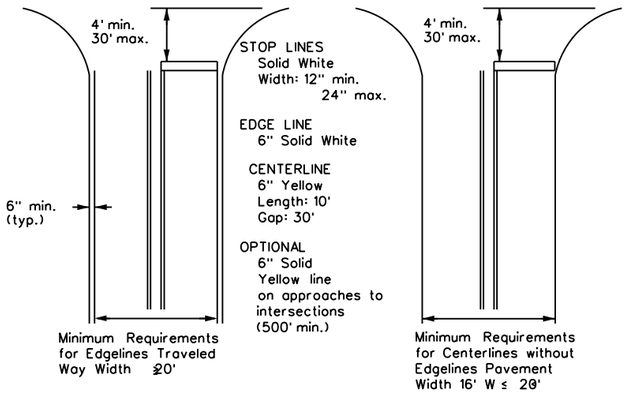
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. 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.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. 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.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	WFS.	THROCKMORTON		117
5-00 2-12				

22A

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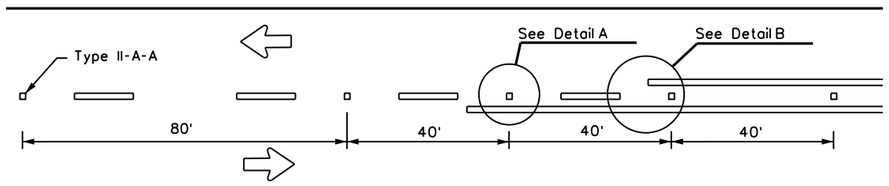
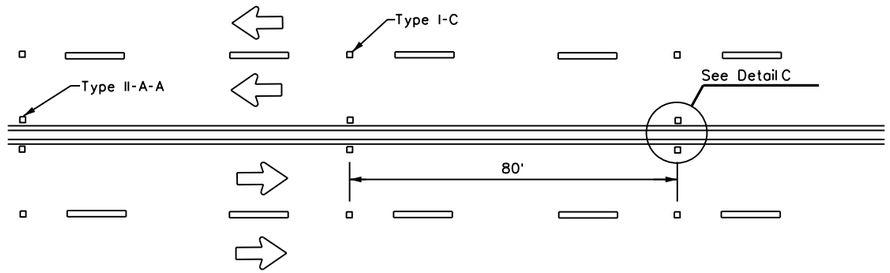
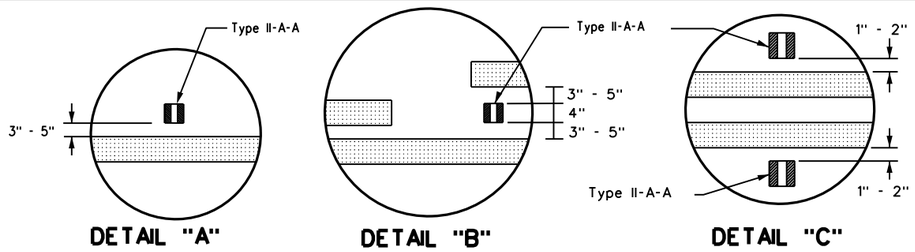
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

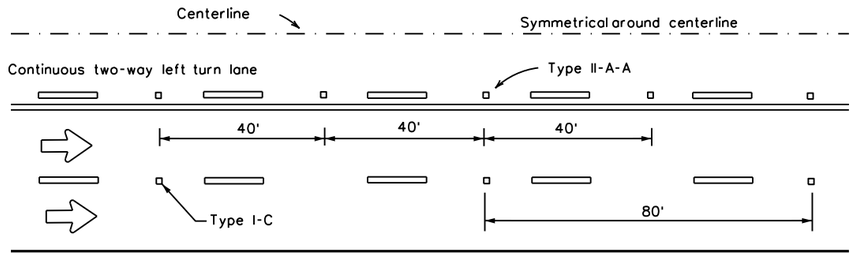


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

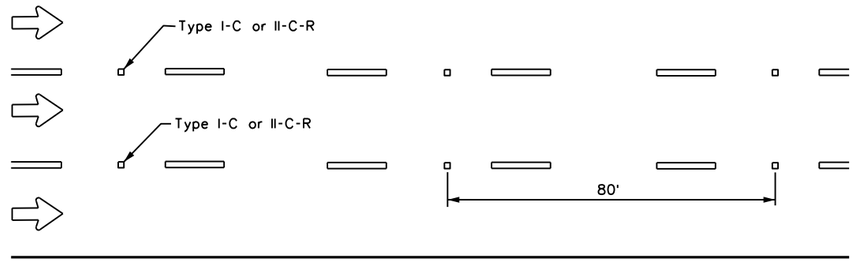


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



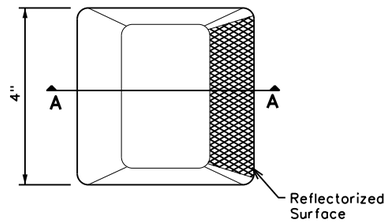
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

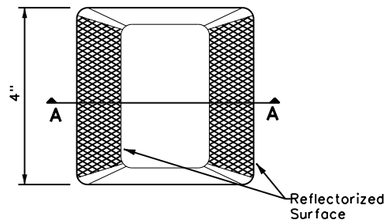
See Note 3.

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

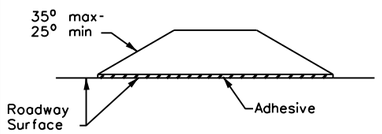
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

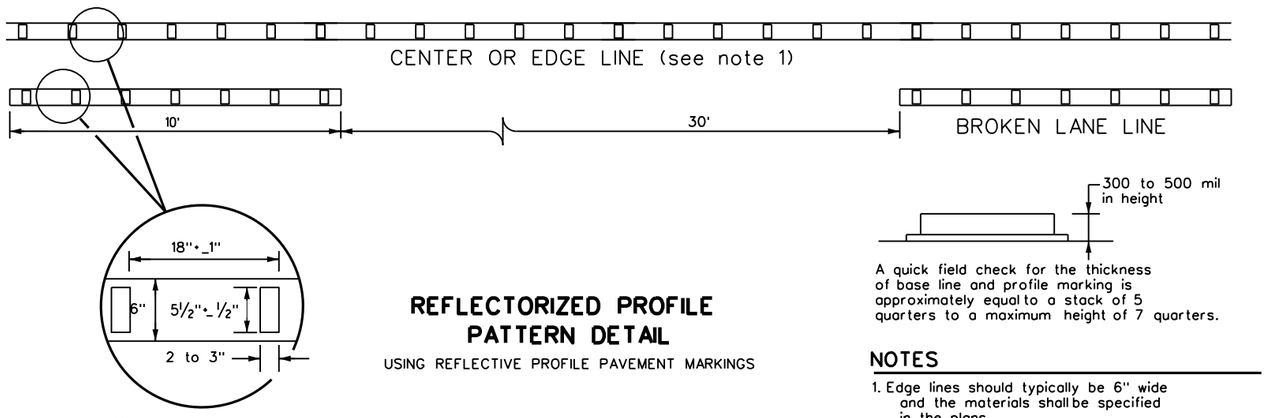


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

NOTES

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		118

22B

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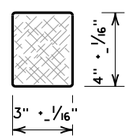
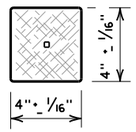
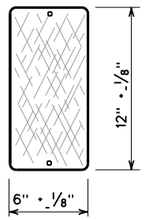
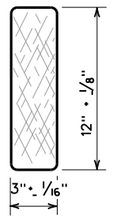
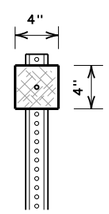
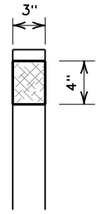
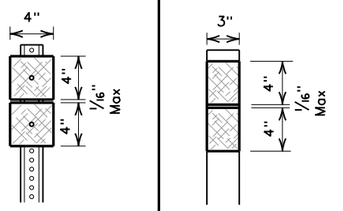
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE
1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

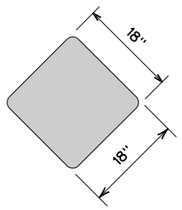
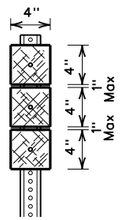
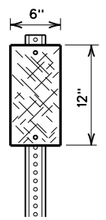
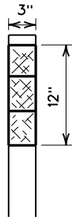
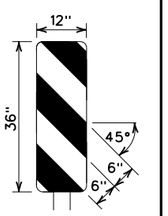
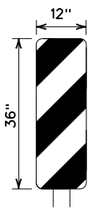
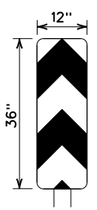
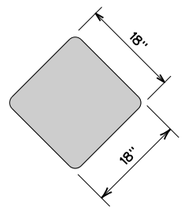
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

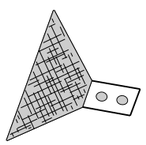
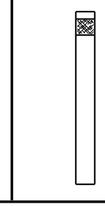
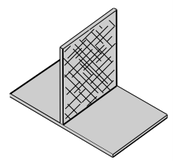
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B or C Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C Sheeting			Red -Type B or C 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)

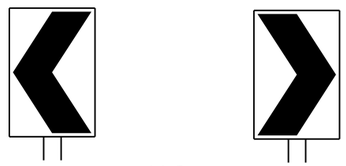
	GF1	GF2	CTB
DEVICE			

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.

SHEETING: Yellow, White, Red

NOTE
1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

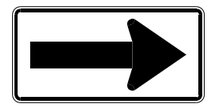
CHEVRONS

DEVICE:  W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

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).

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION D & OM(1)-20

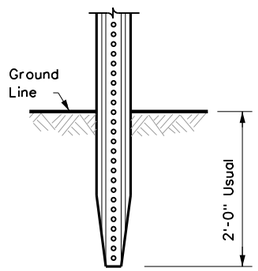
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WFS.	THROCKMORTON		119

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

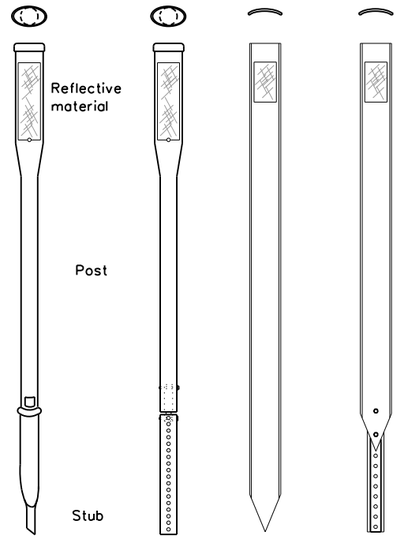


NOTES

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.

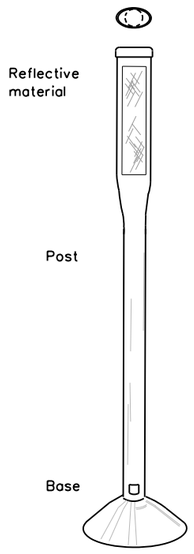
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



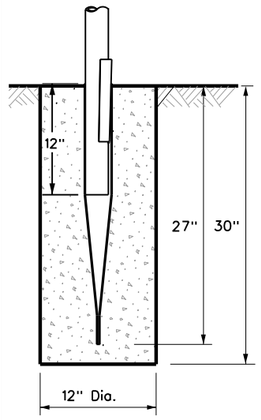
SURFACE MOUNT

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.

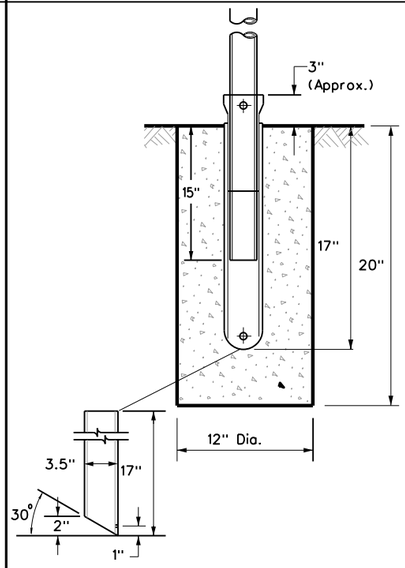
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

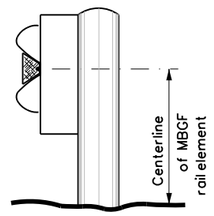
NOTE

1. Install per manufacturer's recommendations.

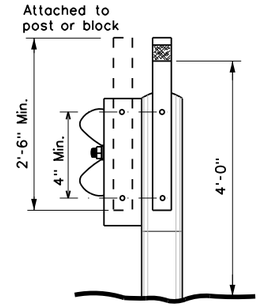
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

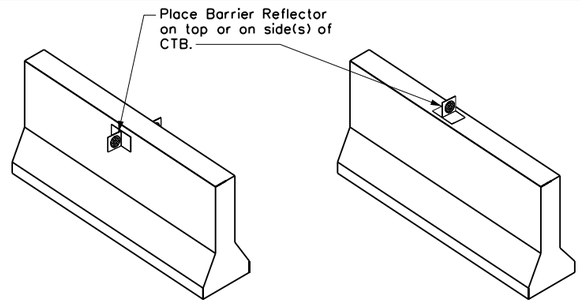
GF1



GF2



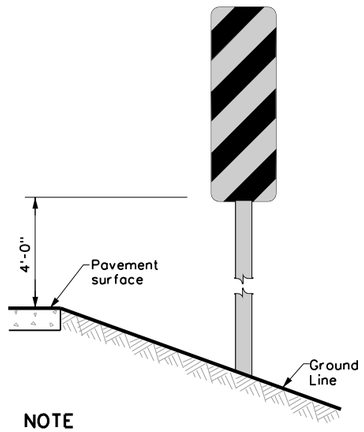
CONCRETE TRAFFIC BARRIER (CTB)



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.

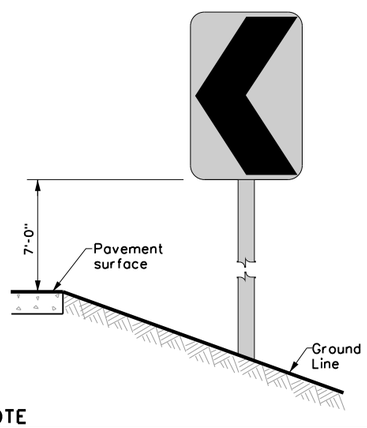
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

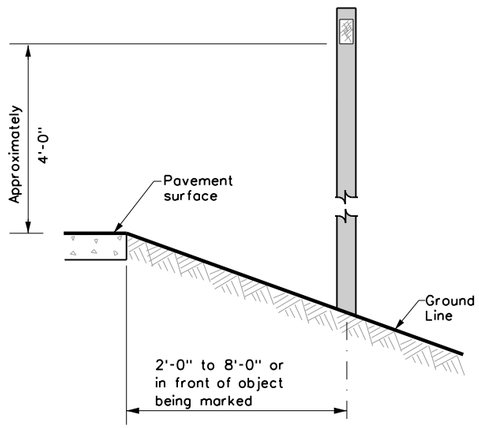
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WFS.	THROCKMORTON		120

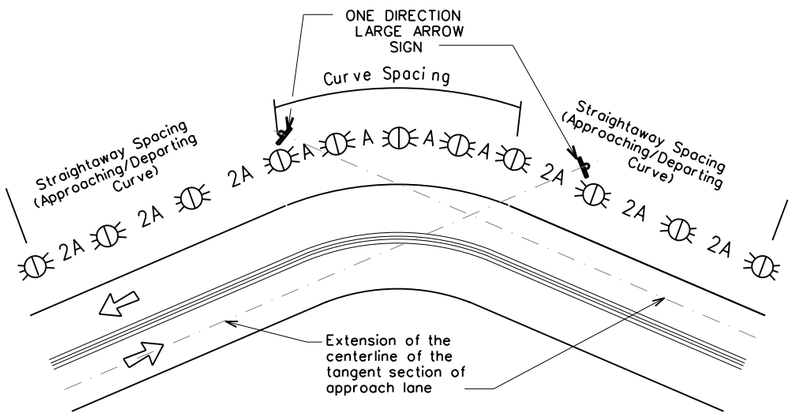
20B

DATE: 3/29/2023 3:15:04 PM
FILE: T:\WFSDESGN\Warren M\SH79\SIGNS DGN\D&OM(2)-20.dgn

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

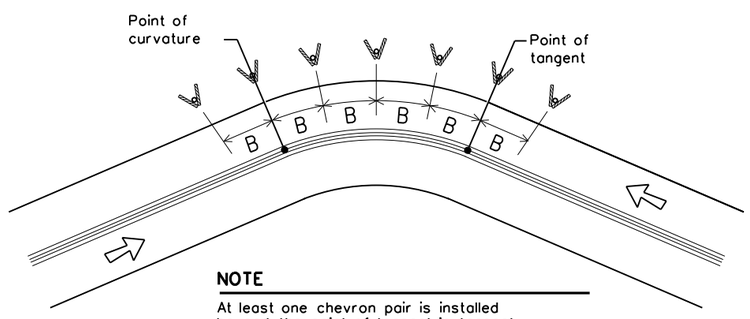
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

1. 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.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND

	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	WFS.	THROCKMORTON		121

20C

DATE: 3/29/2023 3:15:09 PM
FILE: T:\WFSDESGN\Warren M\SH79\SIGNS DGN\D&OM(3)-20.dgn

DATE: 3/29/2023 3:15:12 PM
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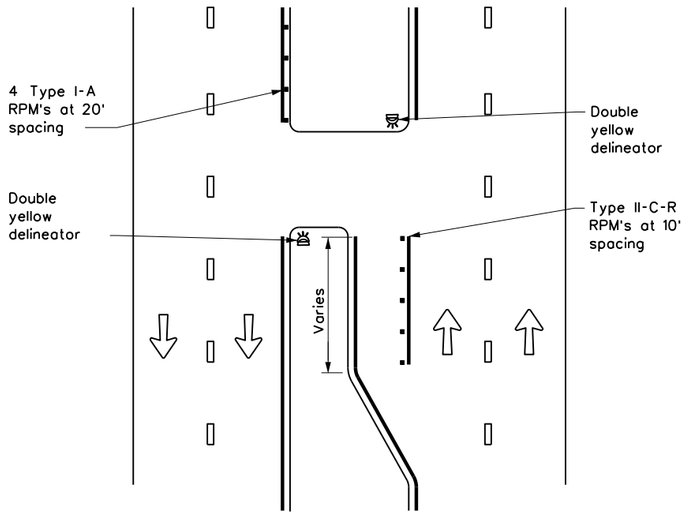
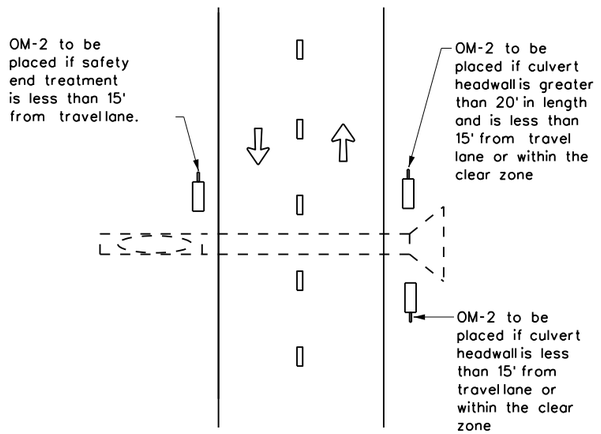
CROSSOVERS



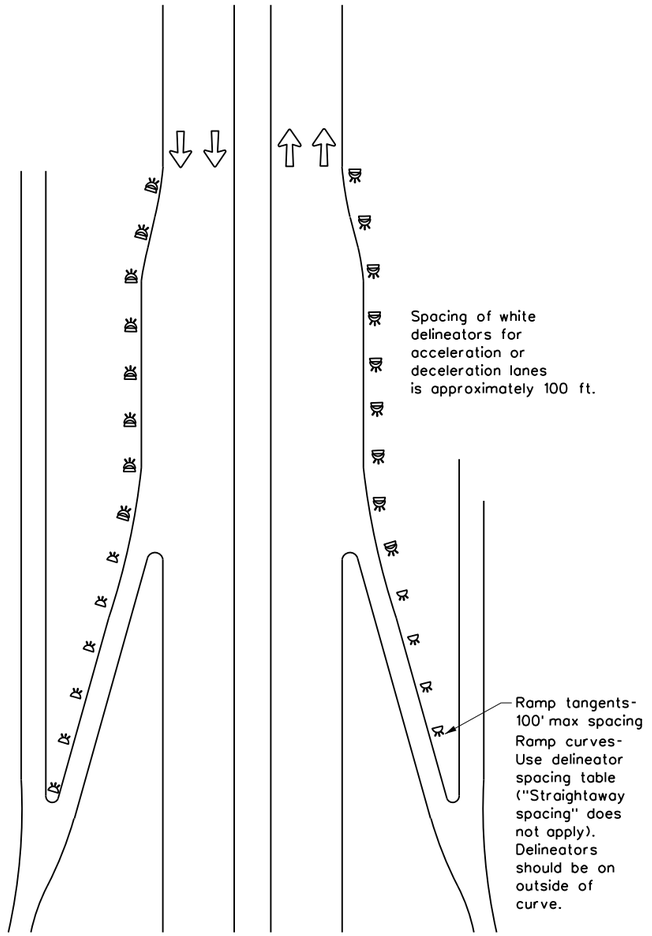
DETAIL 1

FOR CULVERTS WITHOUT MBGF



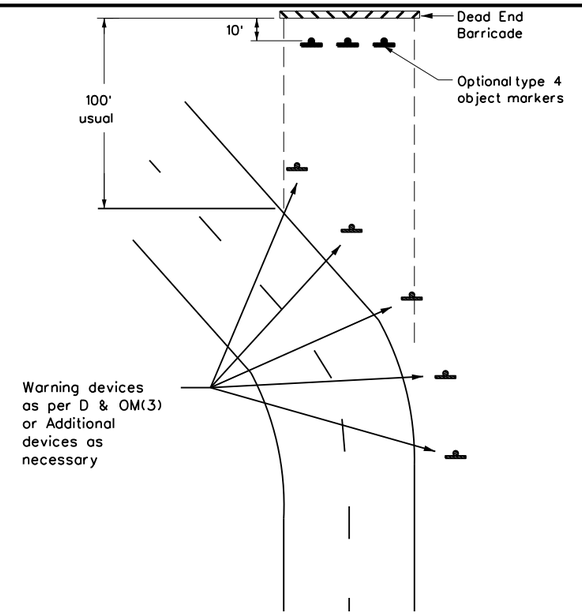
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



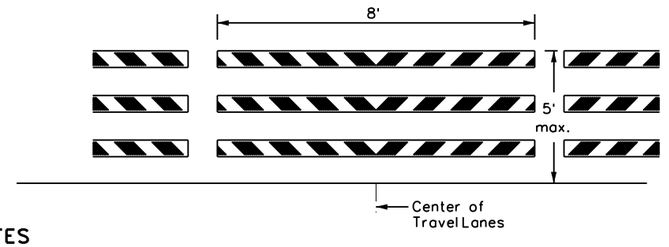
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

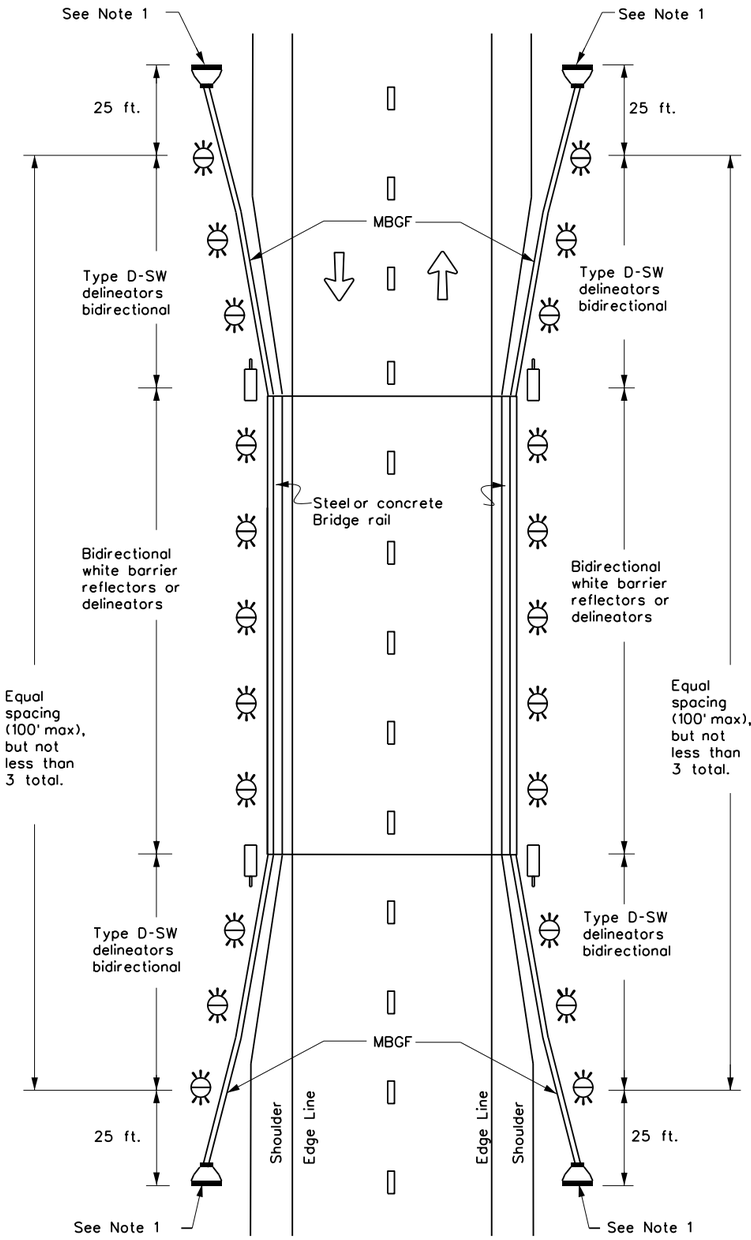
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
3-15	DIST	COUNTY		SHEET NO.
7-20	WFS.	THROCKMORTON		122

20D

DATE: DATE TIME
FILE: DOCUMENT NAME

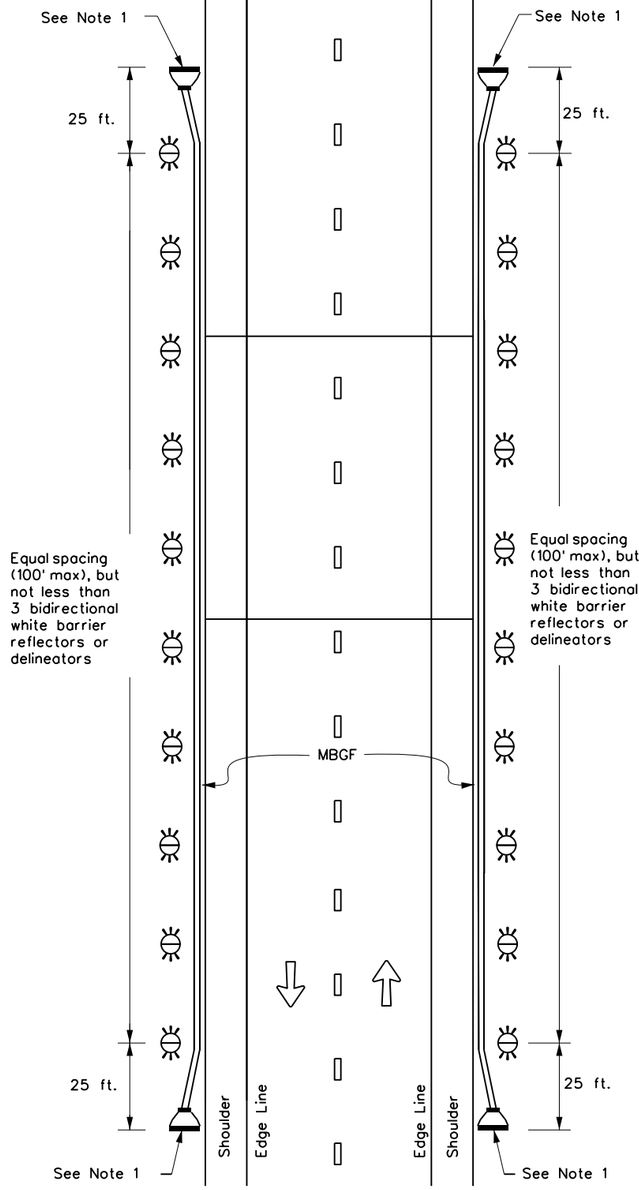
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

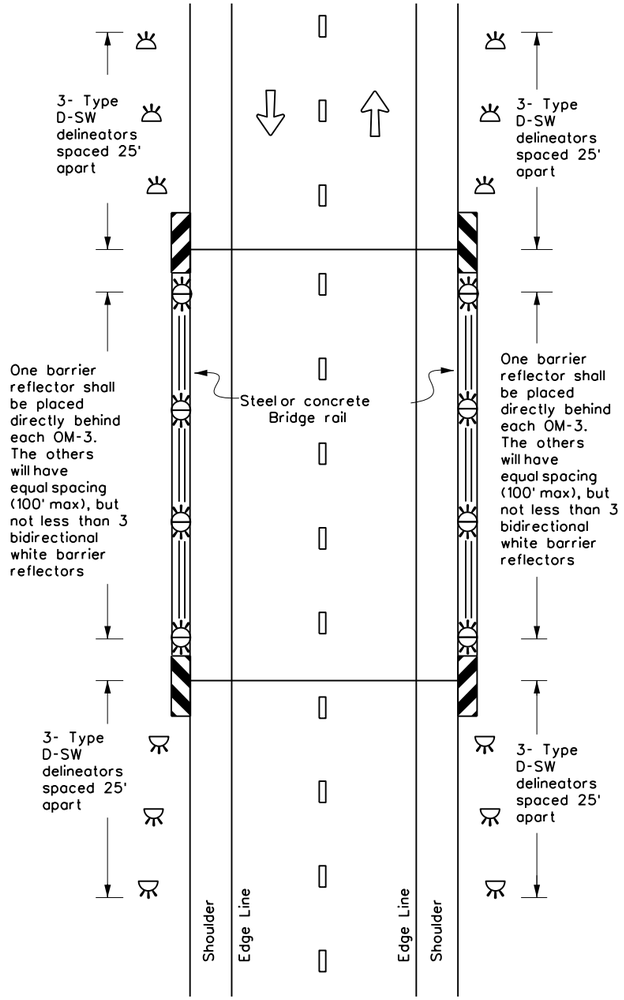
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

Texas Department of Transportation

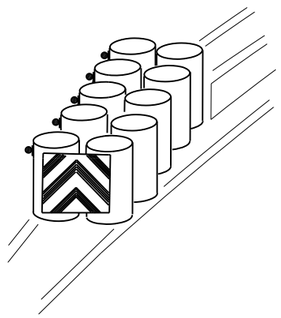
Traffic Safety Division Standard

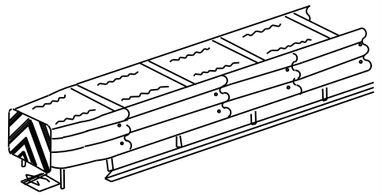
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

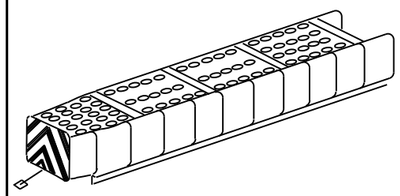
D & OM(5)-20

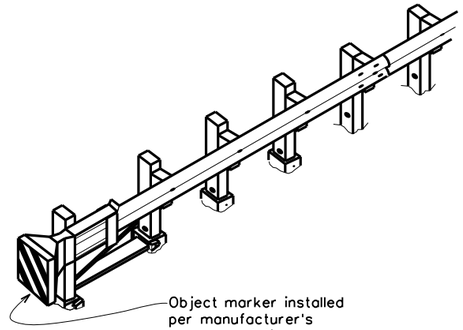
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
7-20	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		123

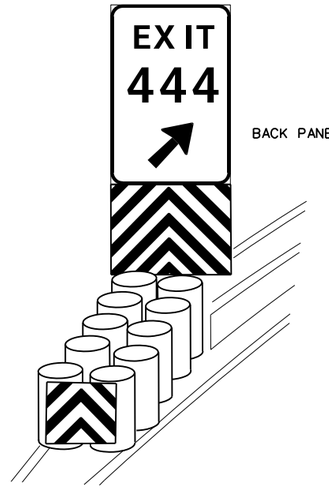
20E

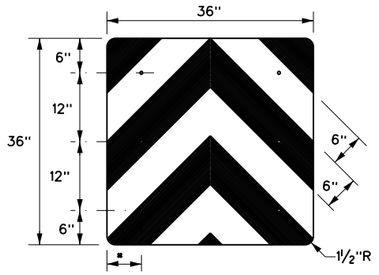


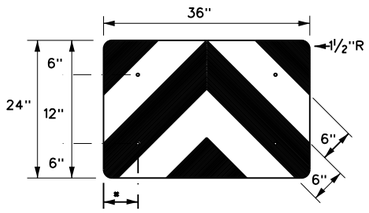




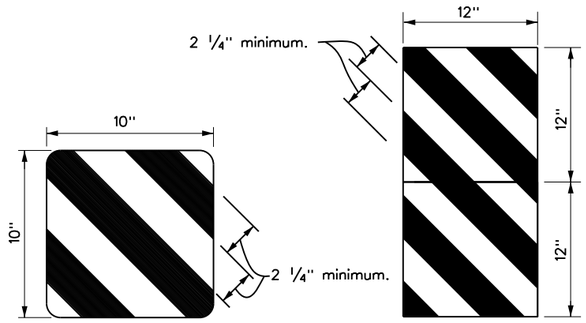




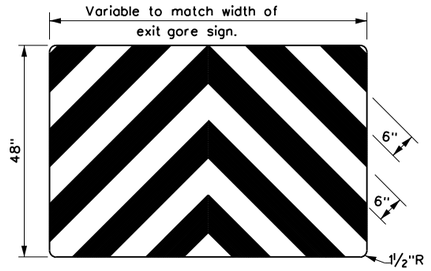


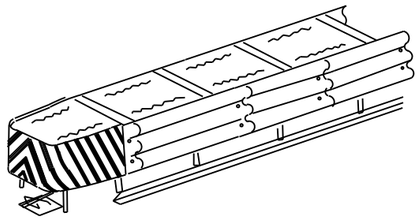


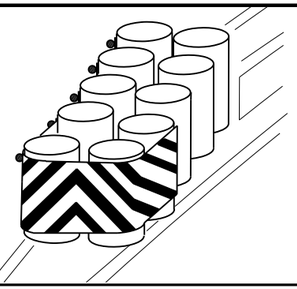
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

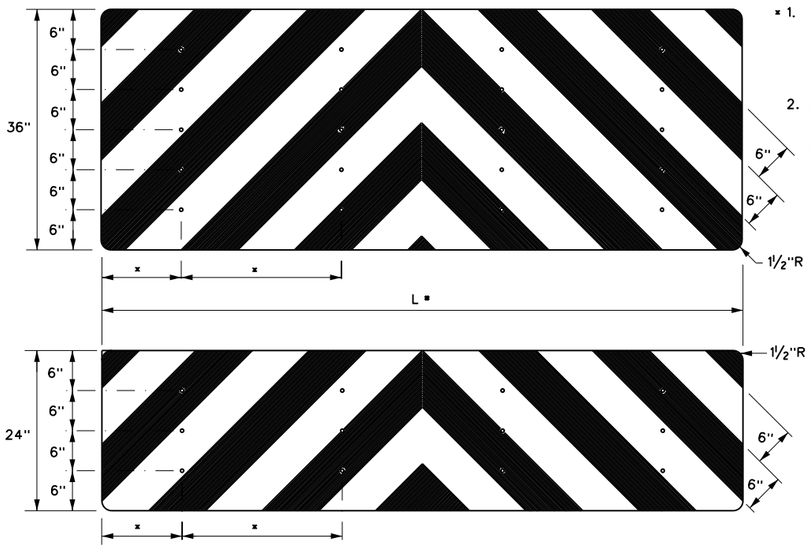


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

* 1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers 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 ¼".

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.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	WFS.	THROCKMORTON		124
4-98 7-20				

20G

DATE: 3/29/2023 3:15:17 PM
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DATE: 3/29/2023 3:15:20 PM
FILE: T:\WFSDESIGN\Warren M\SH79\SIGNS DGN\SMD(GEN)-08.dgn

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)

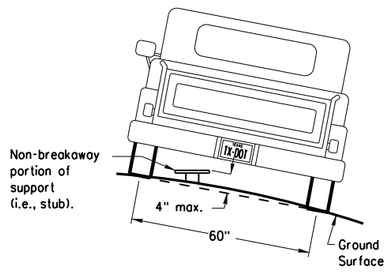
Anchor Type

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))

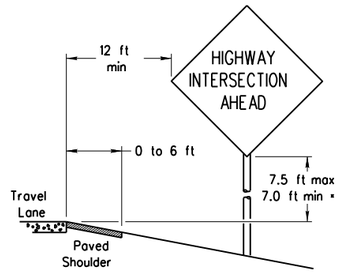
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

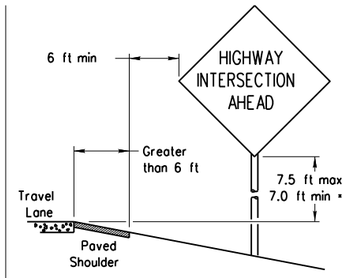
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

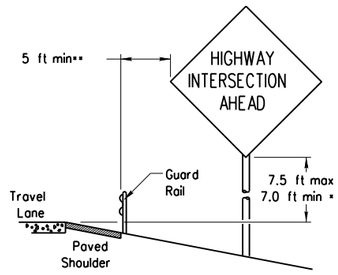
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



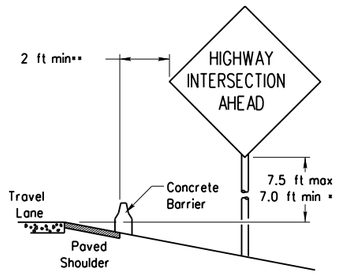
GREATER THAN 6 FT. WIDE

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.

BEHIND BARRIER



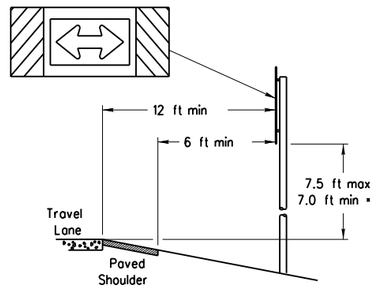
BEHIND GUARDRAIL



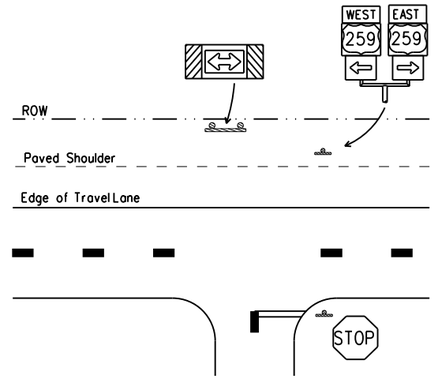
BEHIND CONCRETE BARRIER

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

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.



* 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

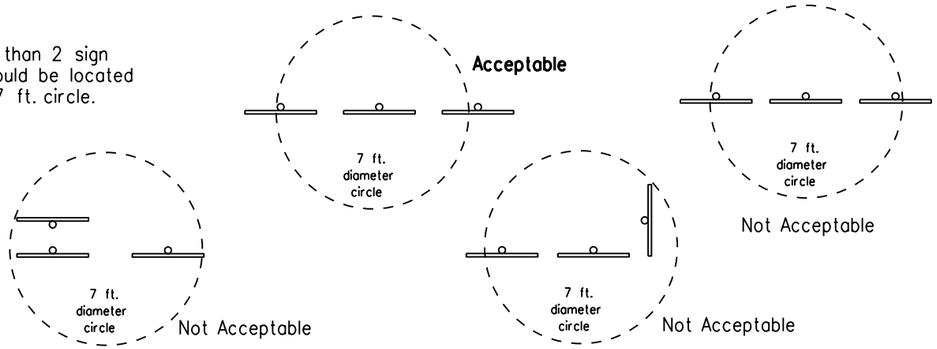
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

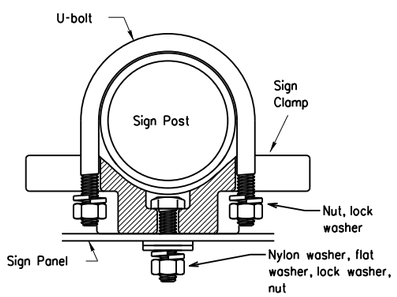
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

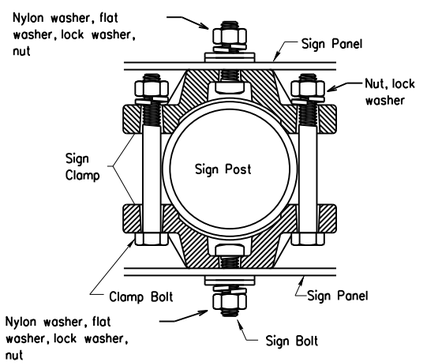


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

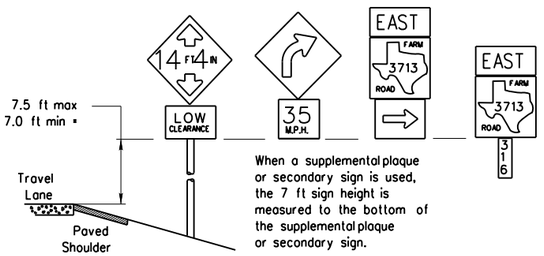
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



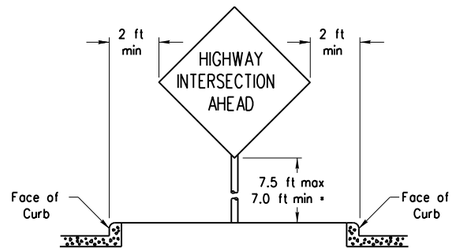
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



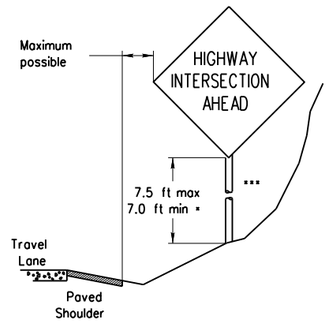
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

Texas Department of Transportation
Traffic Operations Division

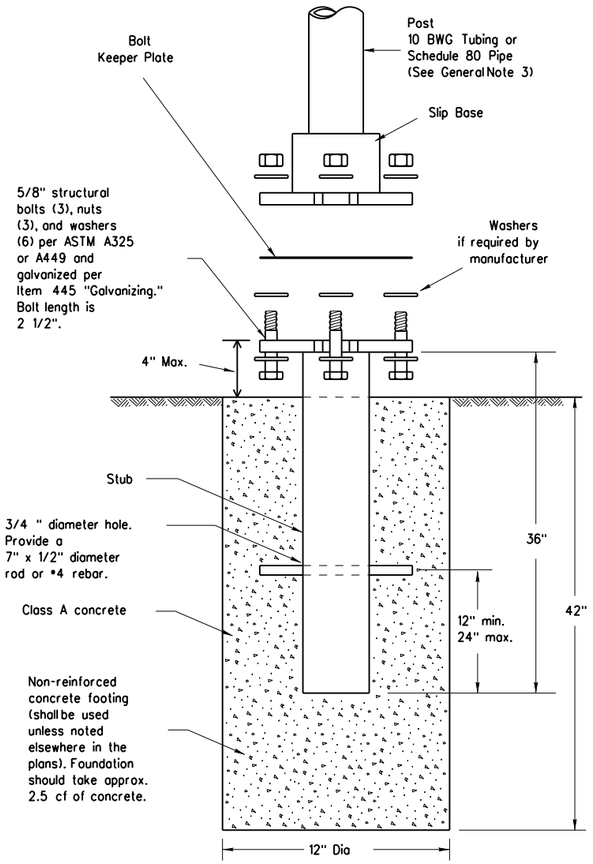
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		125

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

1. 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.
2. 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
3. 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
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

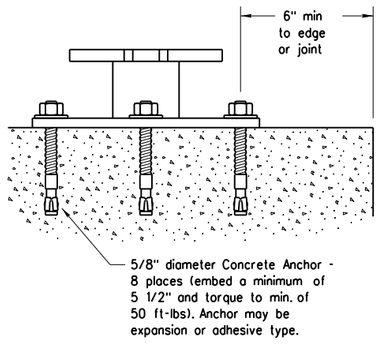
Foundation

1. 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.
2. 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.
3. 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.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

1. 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.
2. 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 XXXXX(X)SB(X-XXXX)

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

© TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		126

DATE: 3/29/2023 3:15:23 PM
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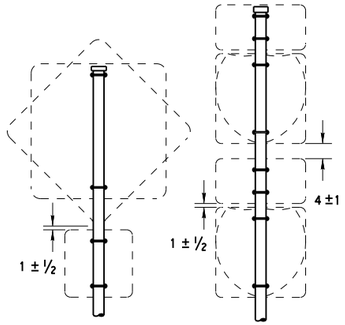
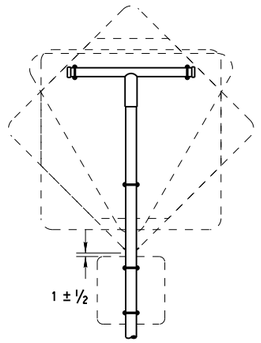


SM RD SGN ASSM TY XXXXX(1)XX(P)



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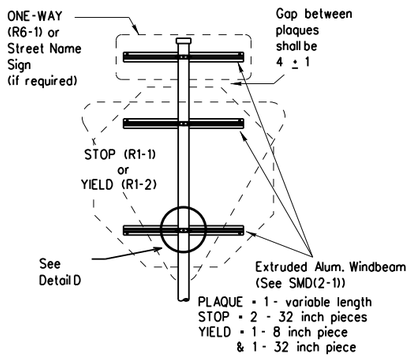

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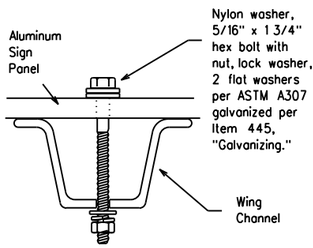

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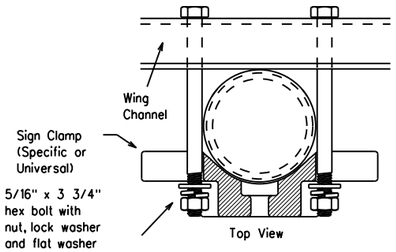

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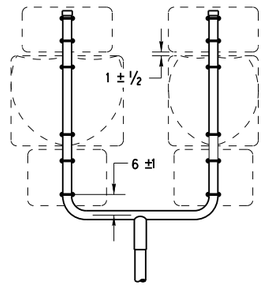

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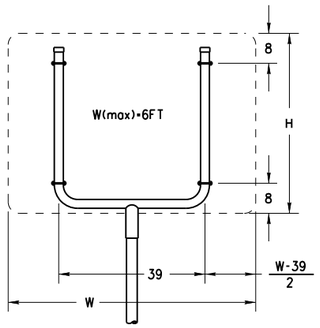

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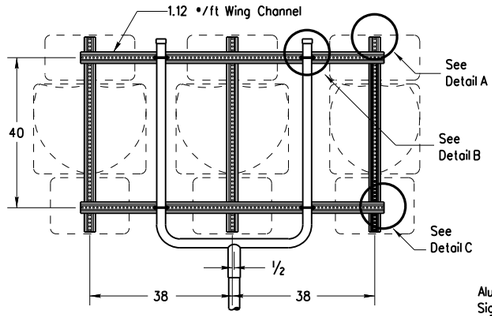
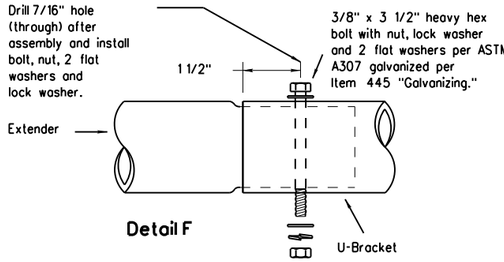
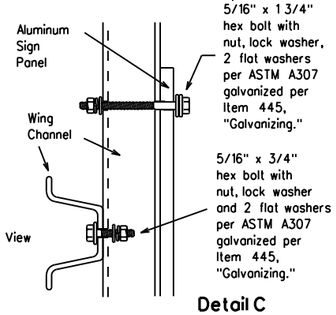


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail F

Splices shall only be allowed behind the sign substrate.



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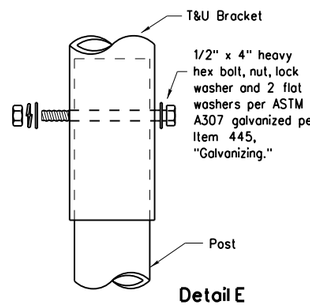
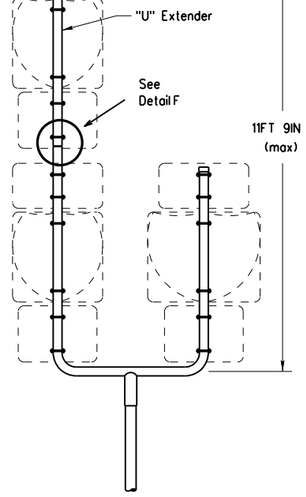


Detail E



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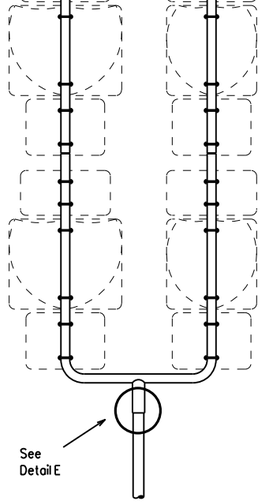

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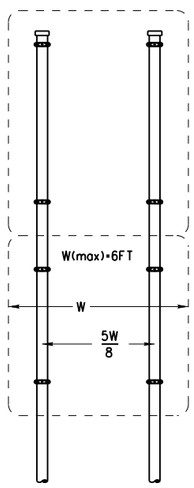

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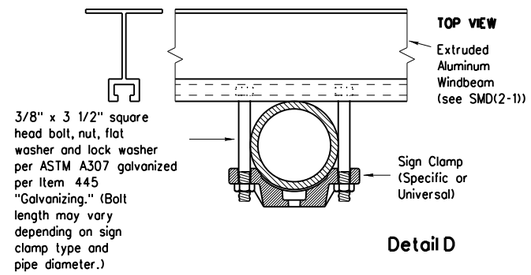
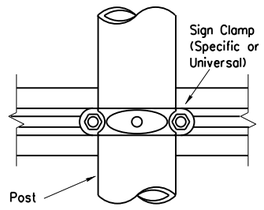
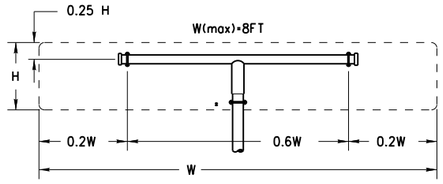


Detail D

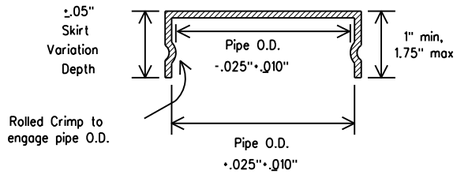




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

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

1. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
10. 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.
11. Post open ends shall be fitted with Friction Caps.
12. 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)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		127

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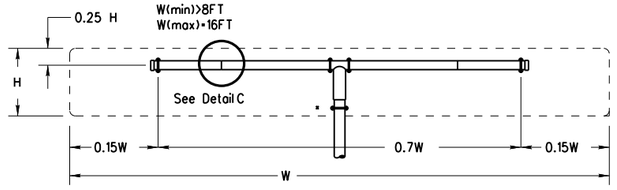
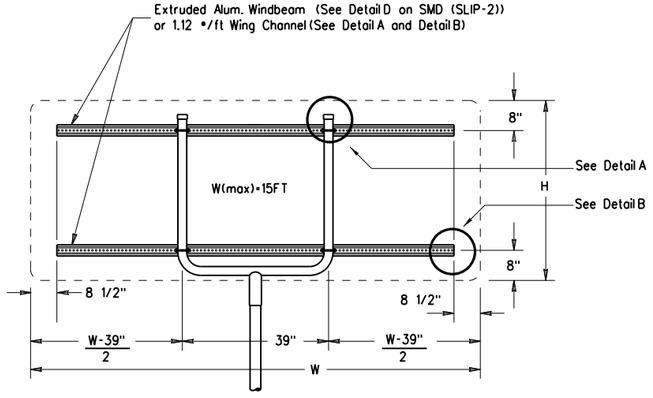
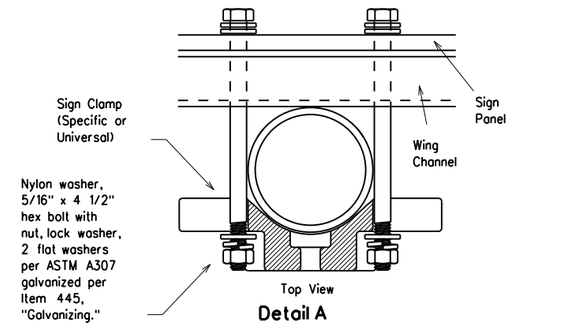


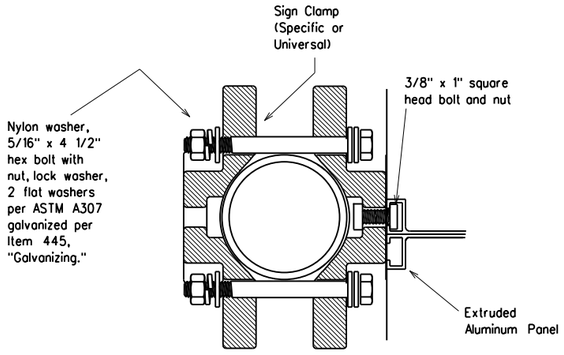
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



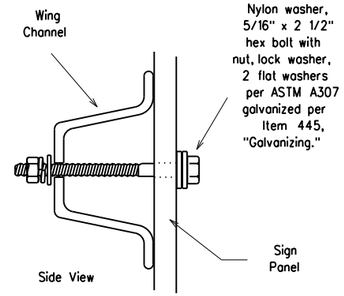
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



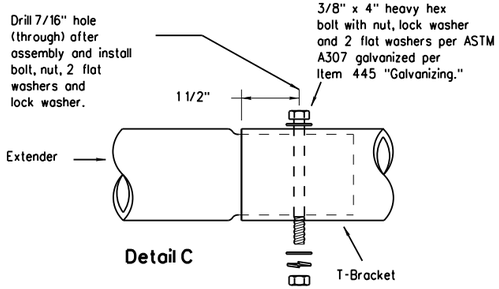
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

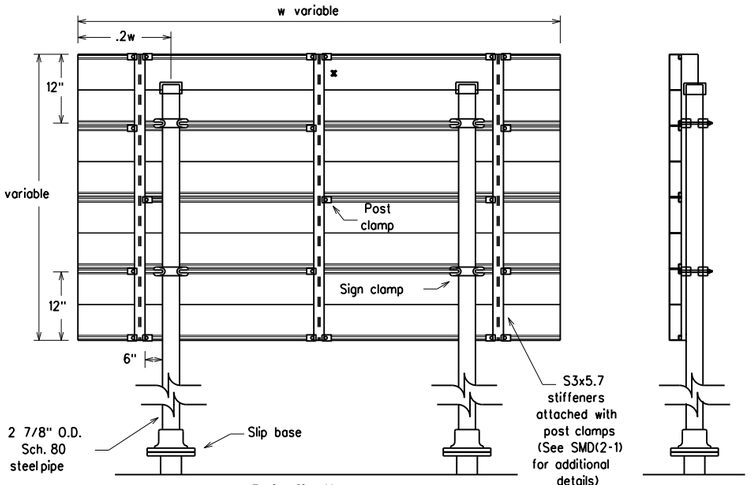


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

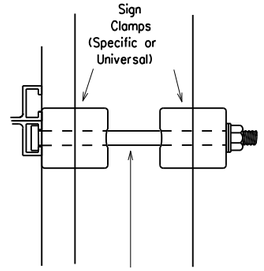


Typical Sign Mount

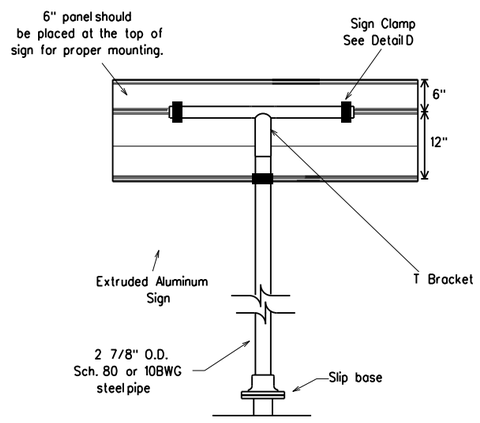
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

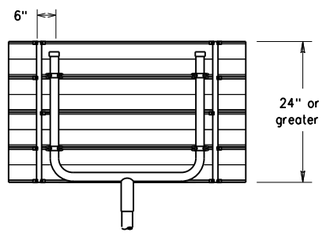
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

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

1. 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.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. 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.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. 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.
6. 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.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. 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."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. 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.
11. 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)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

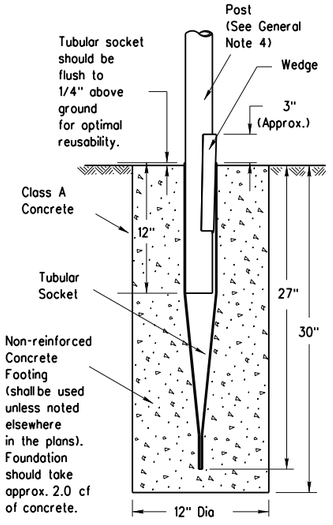
REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79

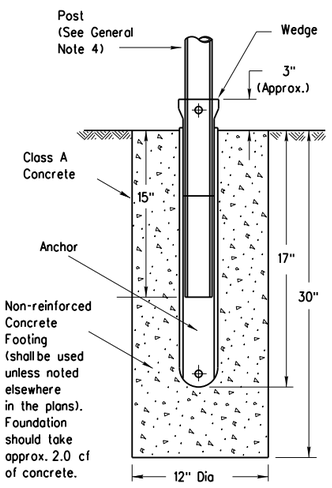
DIST	COUNTY	SHEET NO.
WFS.	THROCKMORTON	128

Wedge Anchor Steel System



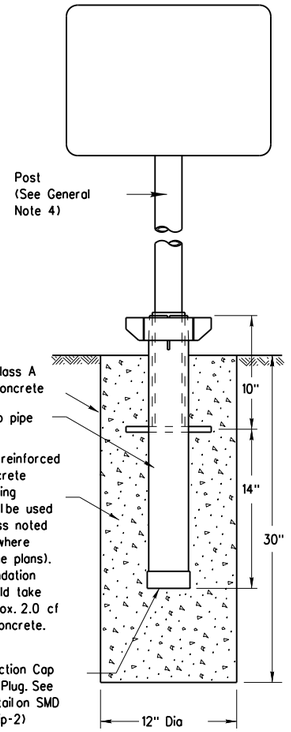
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

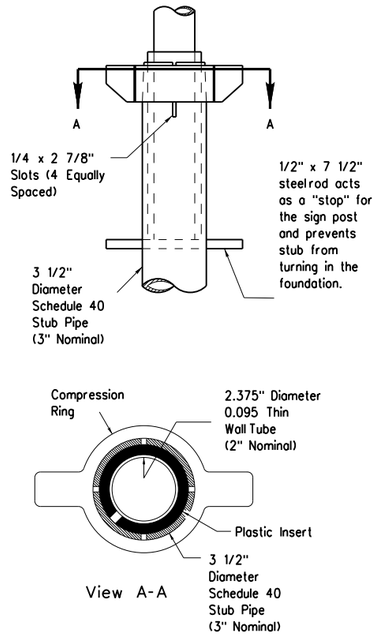


SMD RD SGN ASSM TY TWT(X)WP(X)

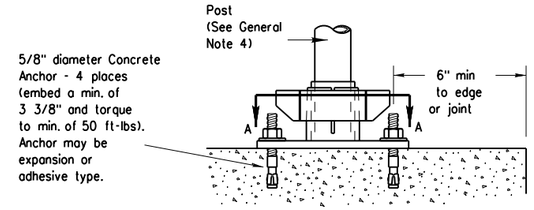
Universal Anchor System with Thin-Walled Tubing Post



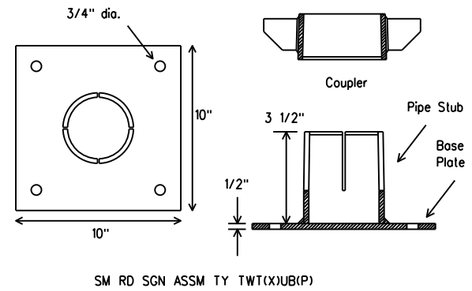
SM RD SGN ASSM TY TWT(X)UA(P)



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.

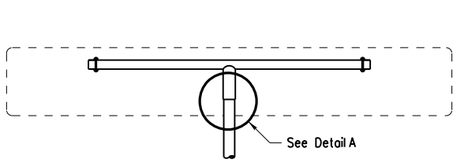


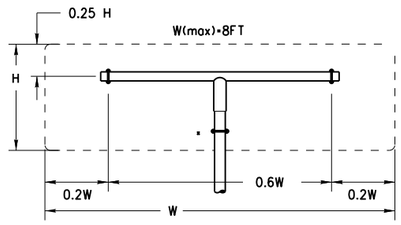
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized 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, "Epoxies 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)

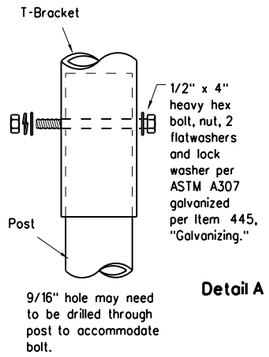
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





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:

1. 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.
2. 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.
3. 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
4. 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.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. 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

1. 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.
2. 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.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. 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.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. 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.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. 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

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

REVISIONS 9-08

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79

DIST	COUNTY	SHEET NO.
WFS.	THROCKMORTON	129

26E

DATE: 3/29/2023 3:15:32 PM
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DATE: 3/29/2023 3:15:35 PM
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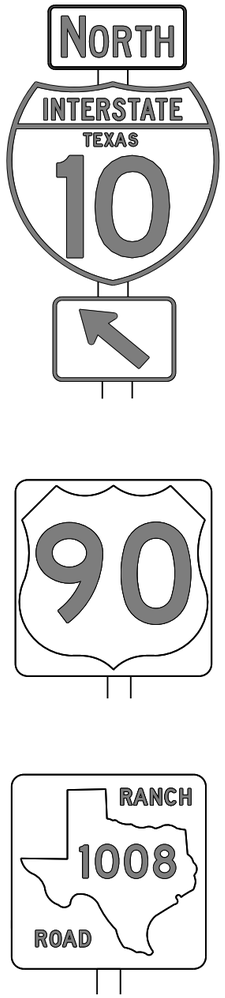
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

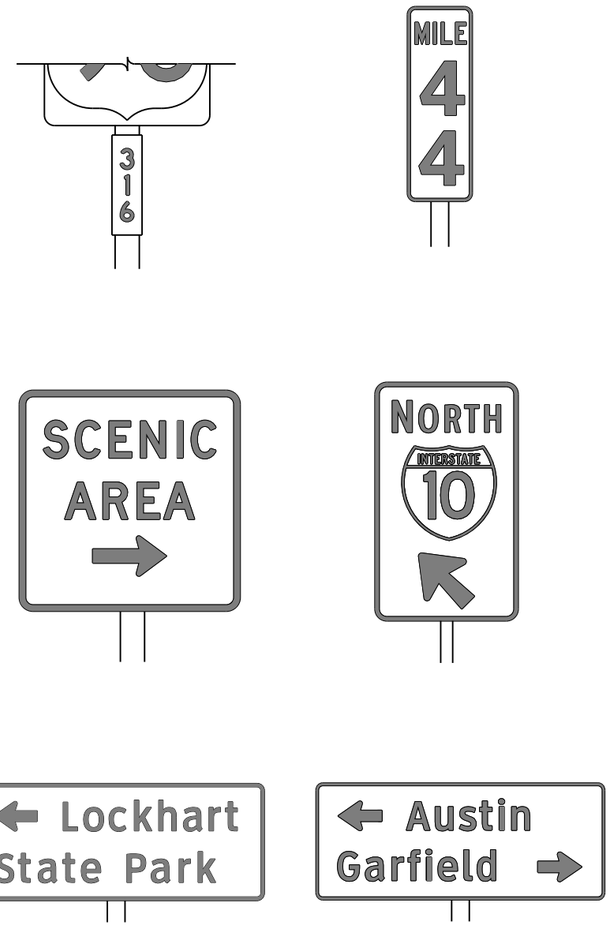
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. 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

3. 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).

4. 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.

5. 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.

6. 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.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

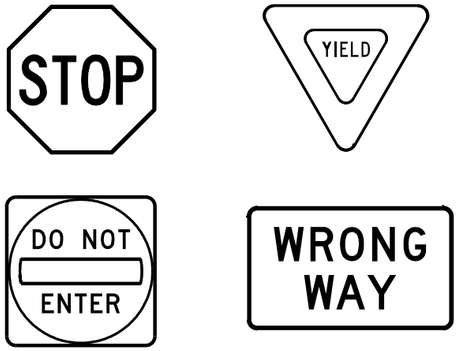
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		130

DATE: DATE TIME
FILE: DOCUMENT NAME

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

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

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

GENERAL NOTES

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

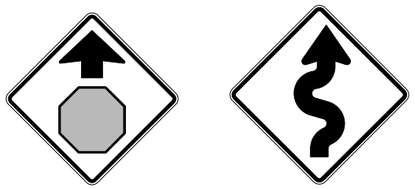
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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

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

http://www.txdot.gov/

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} 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_{FL} OR C_{FL} SHEETING
LEGEND,BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

Texas Department of Transportation

Traffic Operations Division Standard

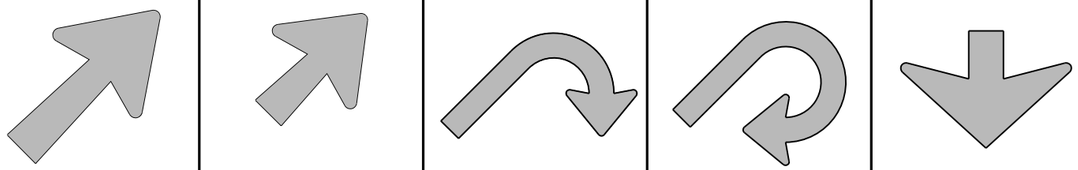
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	C	S	J	HWY
12-03 7-13 9-08	DIST	COUNTY		SHEET NO.
	DST	CTY		131

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



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

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

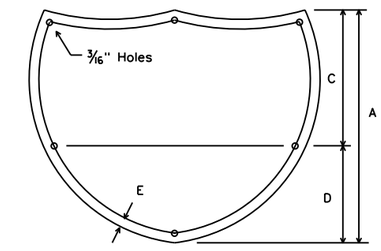
NOTE

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

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

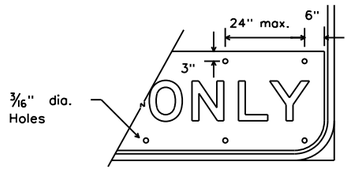
http://www.txdot.gov/

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

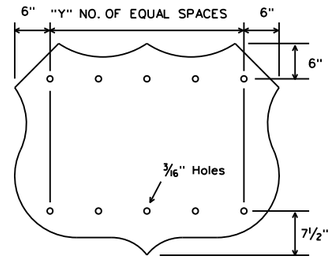


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1½
48	28	20	1¾

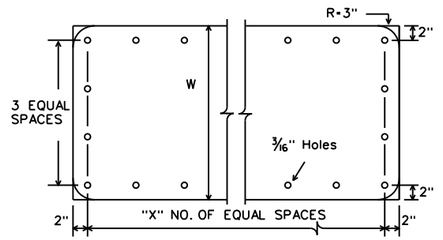


EXIT ONLY PANEL



U.S. ROUTE MARKERS

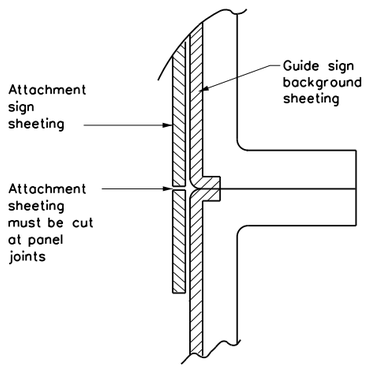
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

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

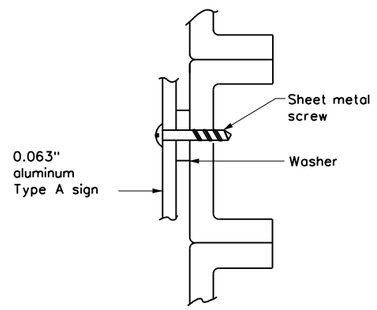
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



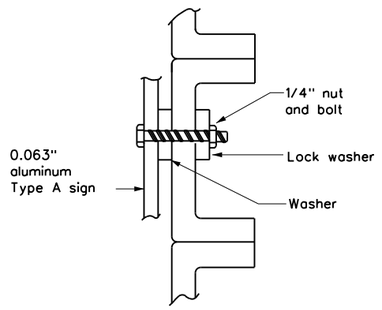
DIRECT APPLIED ATTACHMENT

NOTE:

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



SCREW ATTACHMENT



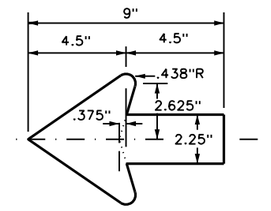
NUT/BOLT ATTACHMENT

NOTE:

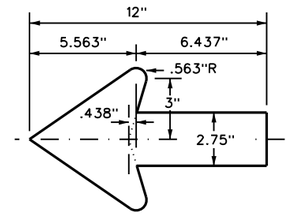
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

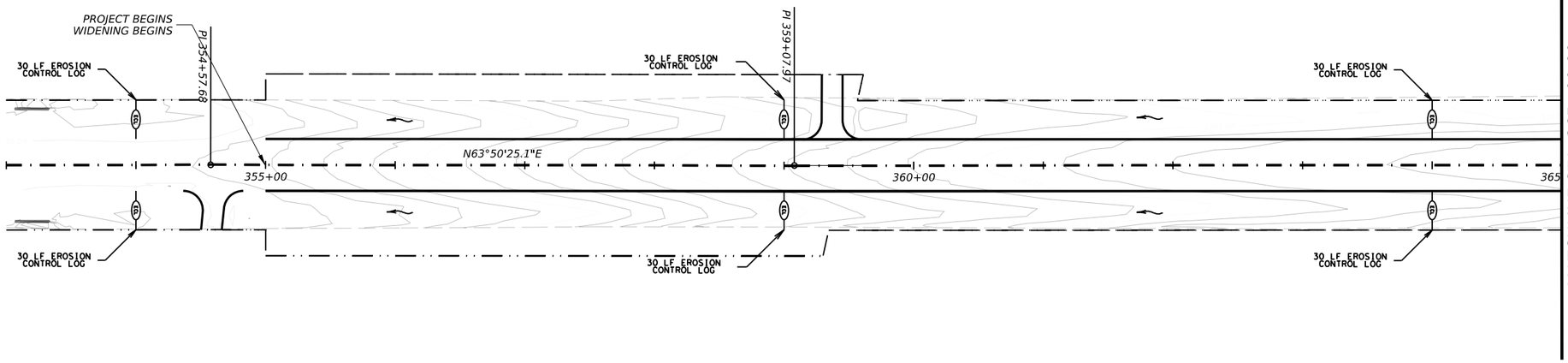
FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	C	S	J	HWY
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	DST	CTY		132

DATE: DATE TIME
FILE: DOCUMENT NAME

CK:
DW:
CK:
DW:

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFDZ — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



LOCATION NO.	BMP PLACEMENT					
	DATE INSTALLED	DATE DISTURBED	DATE MAINTAINED	DATE REPLACED	DATE STABILIZED	DATE REMOVED
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2						
3						
4						
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6						
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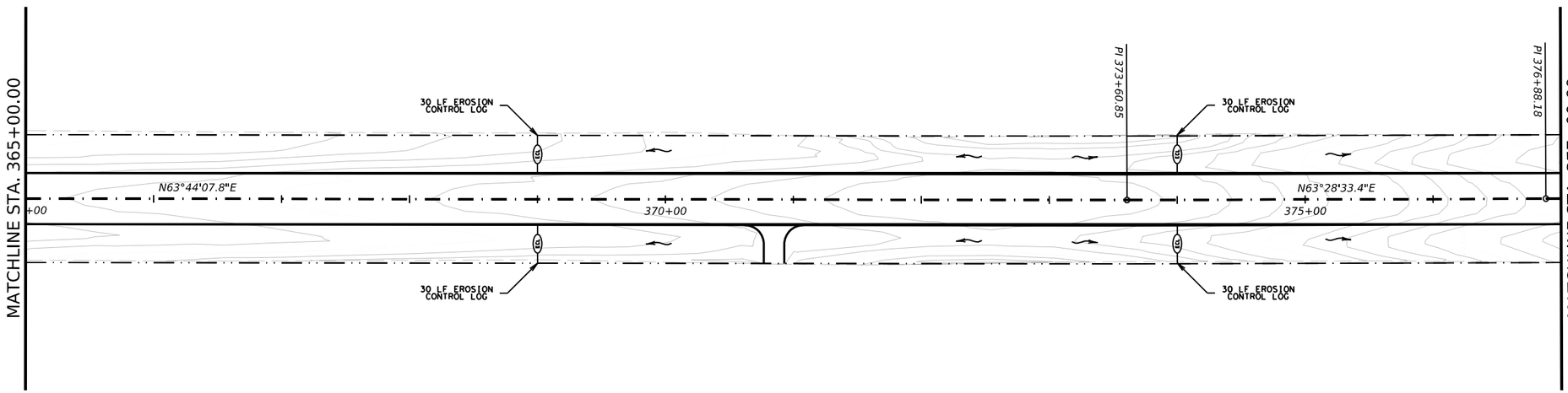
12						
13						



STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

SHEET 1 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		133

DATE: 3/29/2023 3:16:06 PM
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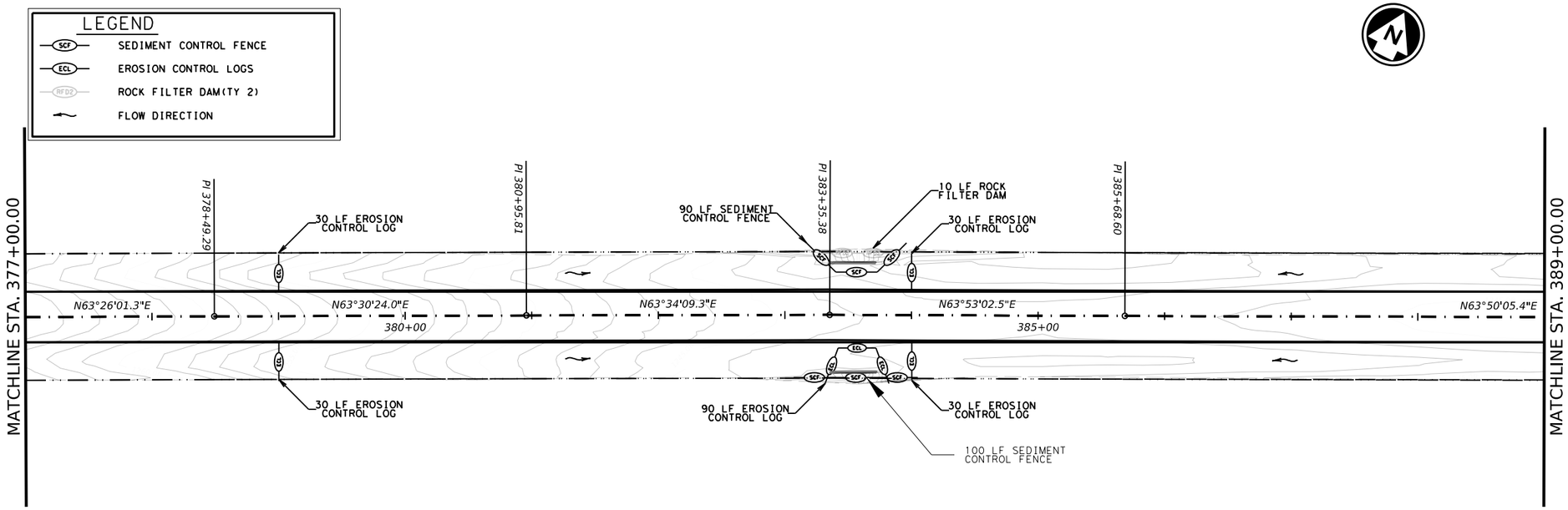

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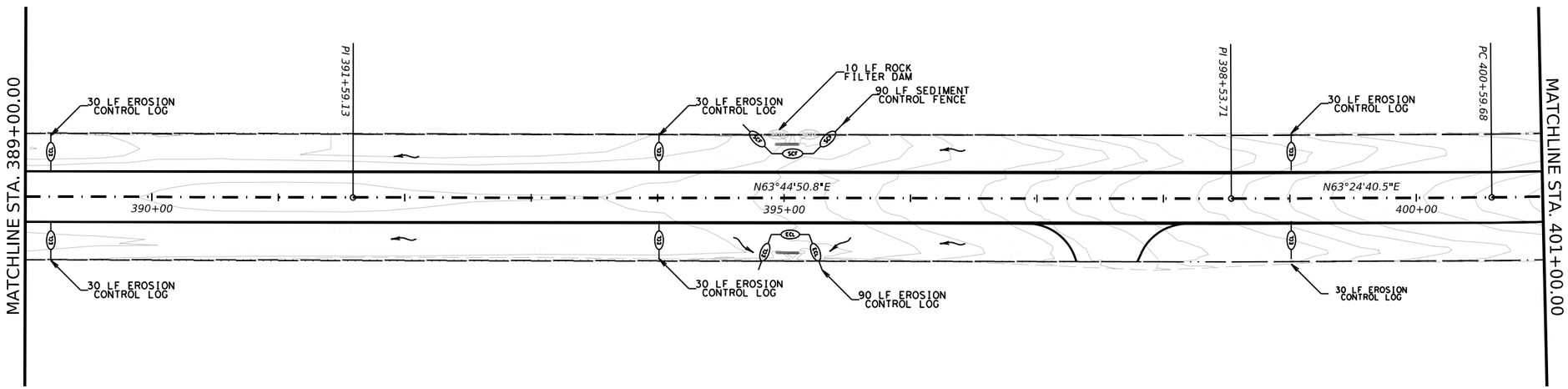

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SH 79
SW3P LAYOUT

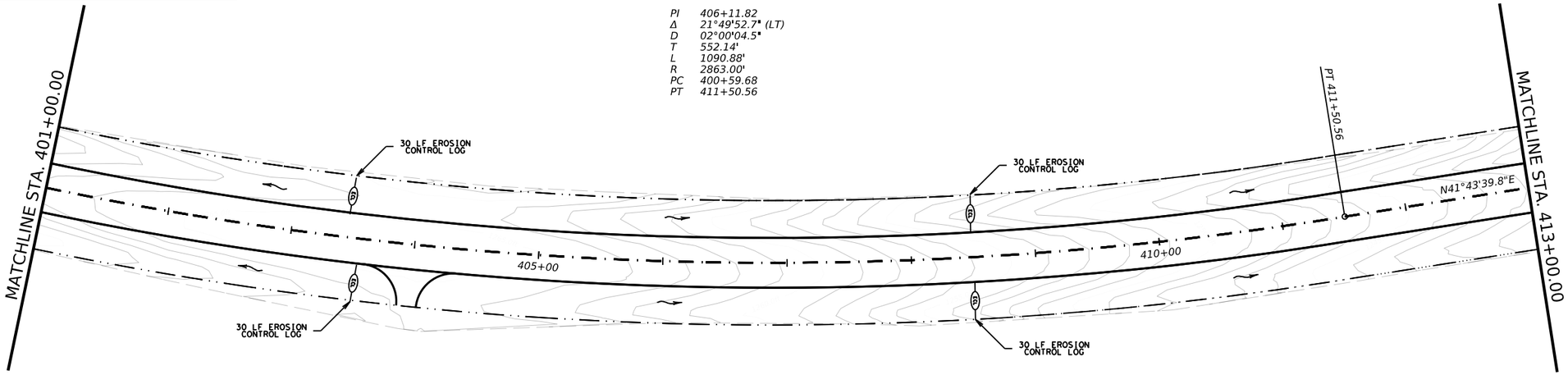
SHEET 2 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		134

DATE: 3/29/2023 3:16:09 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020026/4 - Design/Plan Set/9. Environmental/SH 79 SW3P LAYOUT.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFDZ — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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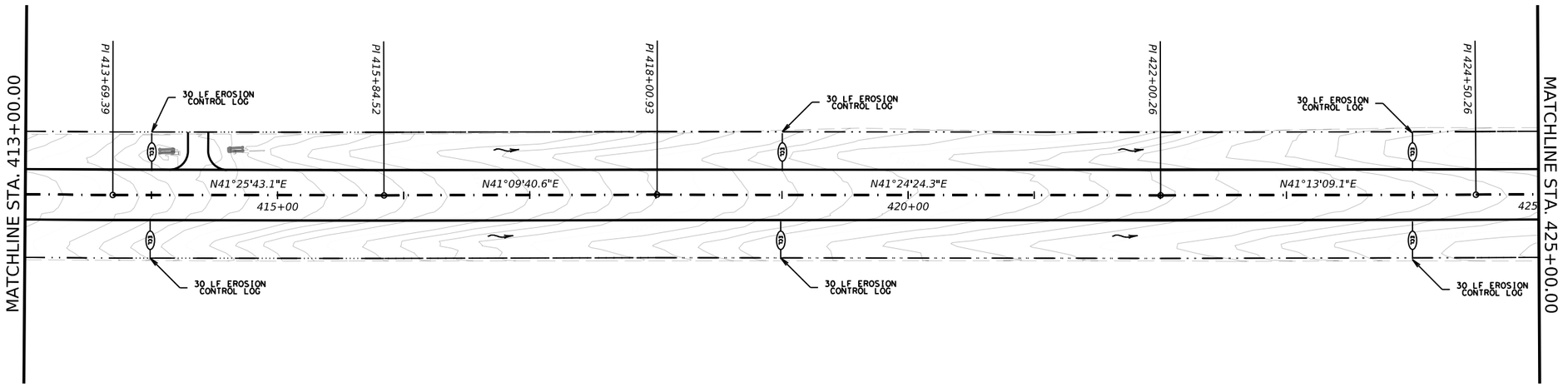

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SH 79
SW3P LAYOUT

SHEET 3 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		135

DATE: 3/29/2023 3:16:11 PM
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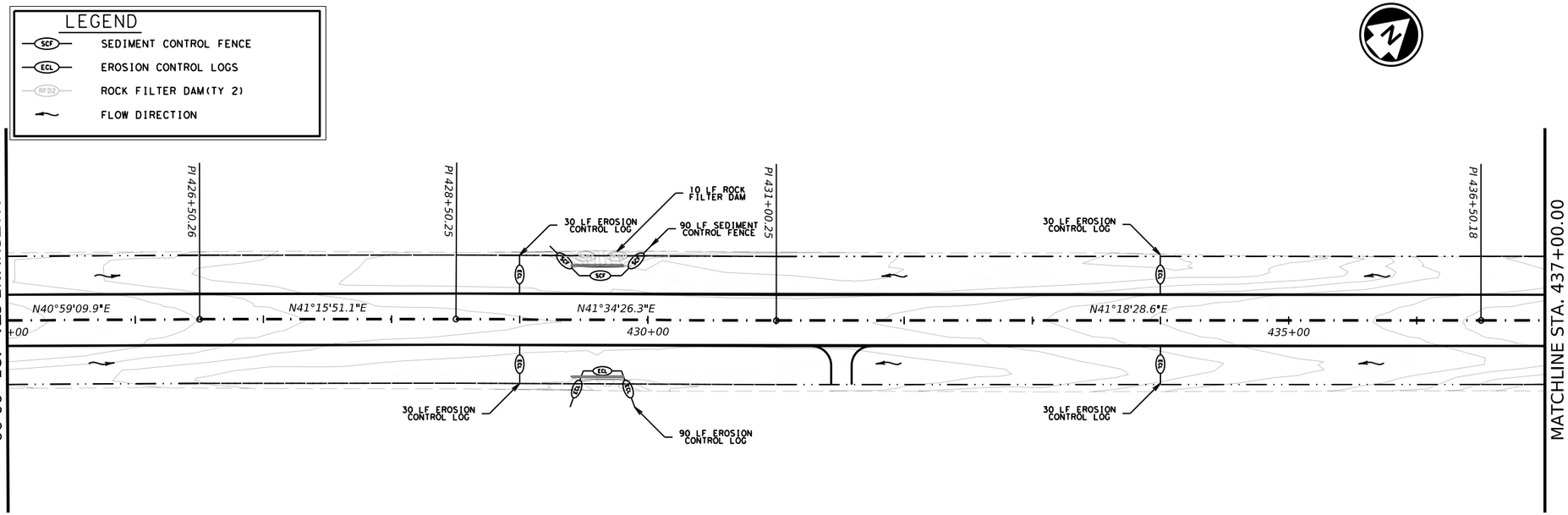

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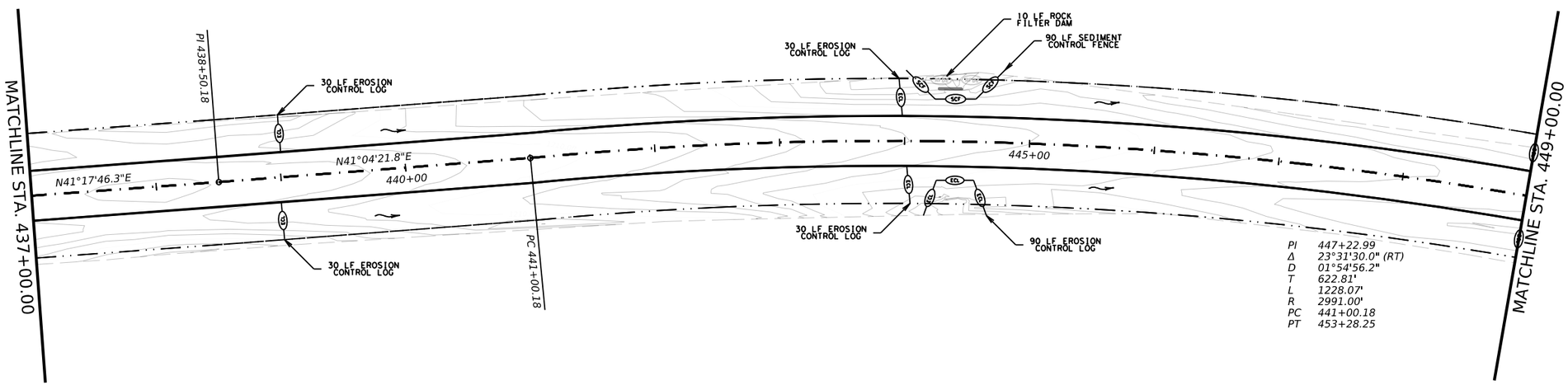

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SH 79
SW3P LAYOUT

SHEET 4 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		136

DATE: 3/29/2023 3:16:15 PM
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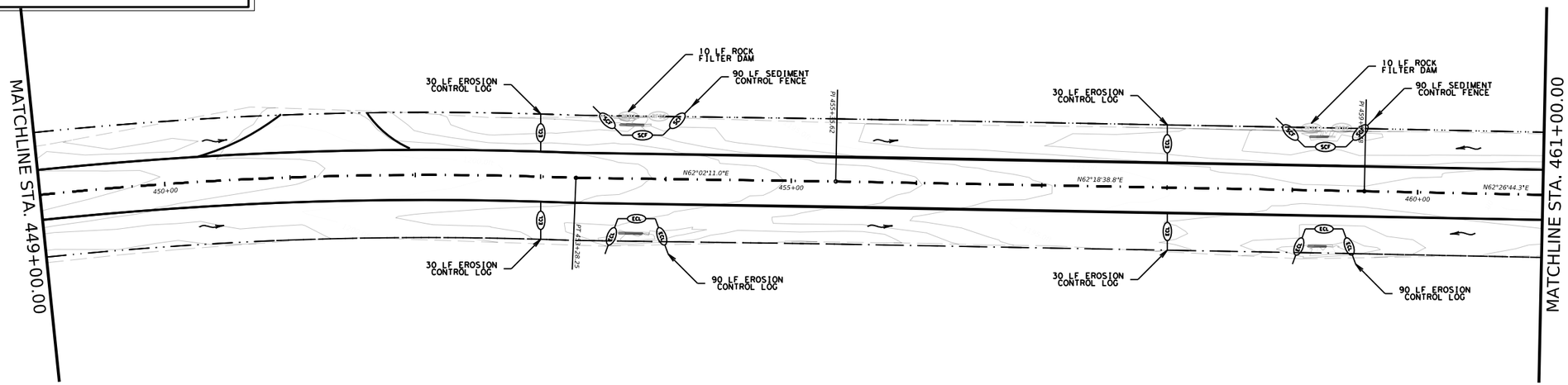
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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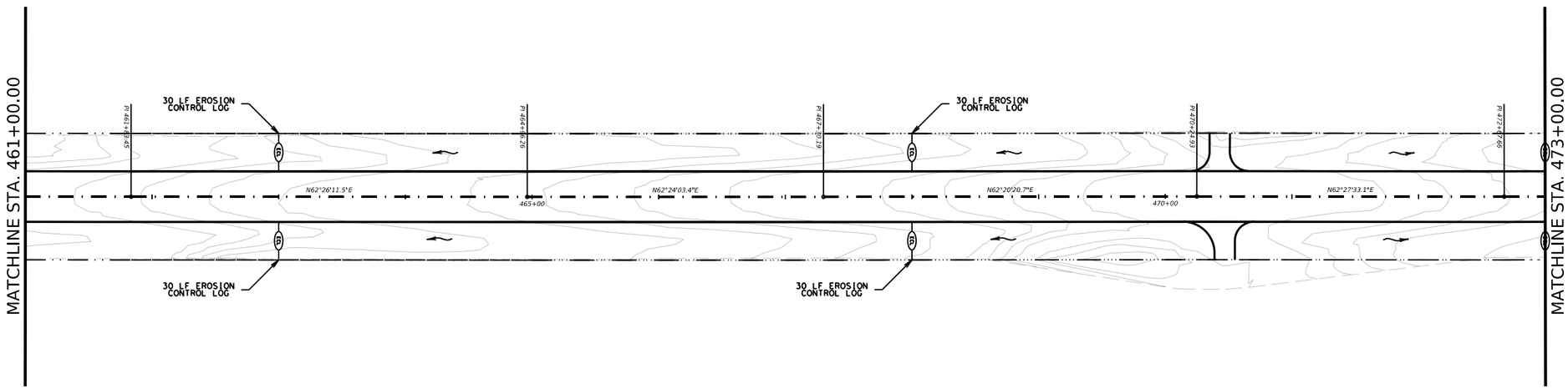

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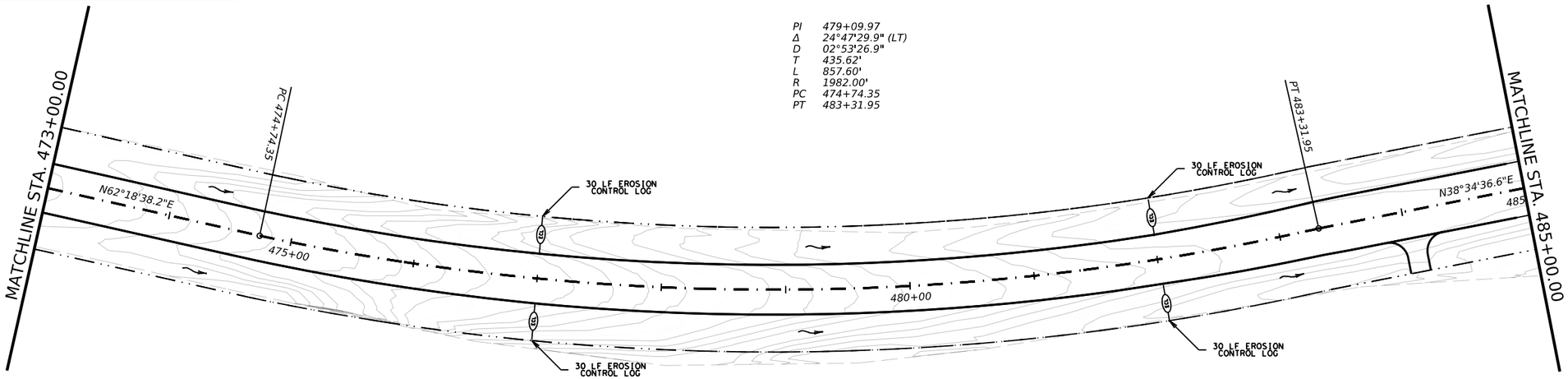
SH 79
SW3P LAYOUT

SHEET 5 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		137

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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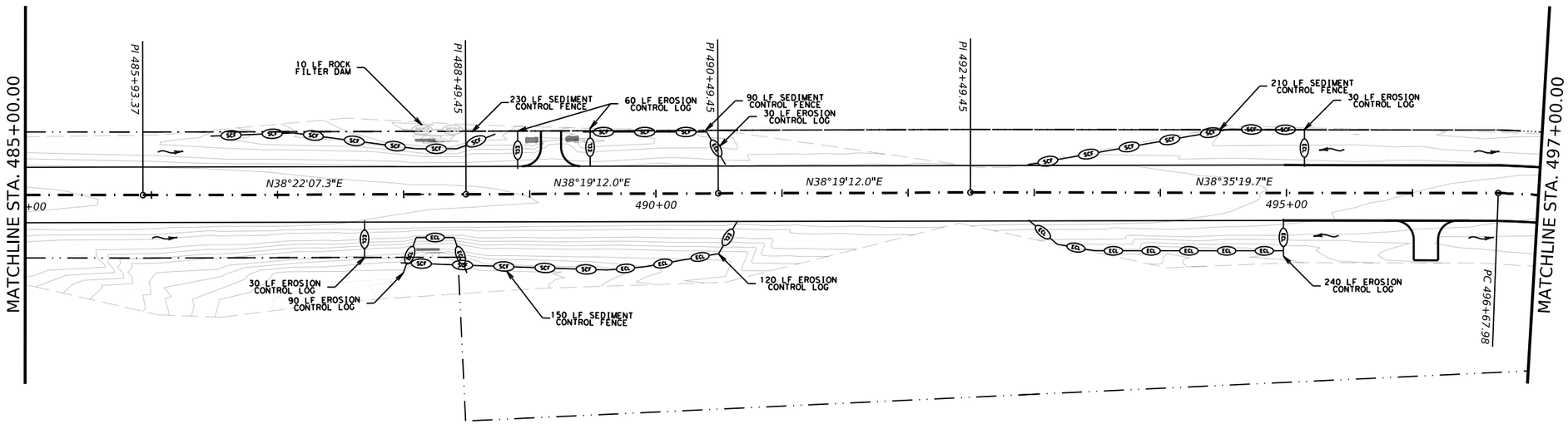

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SH 79
SW3P LAYOUT

SHEET 6 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		138

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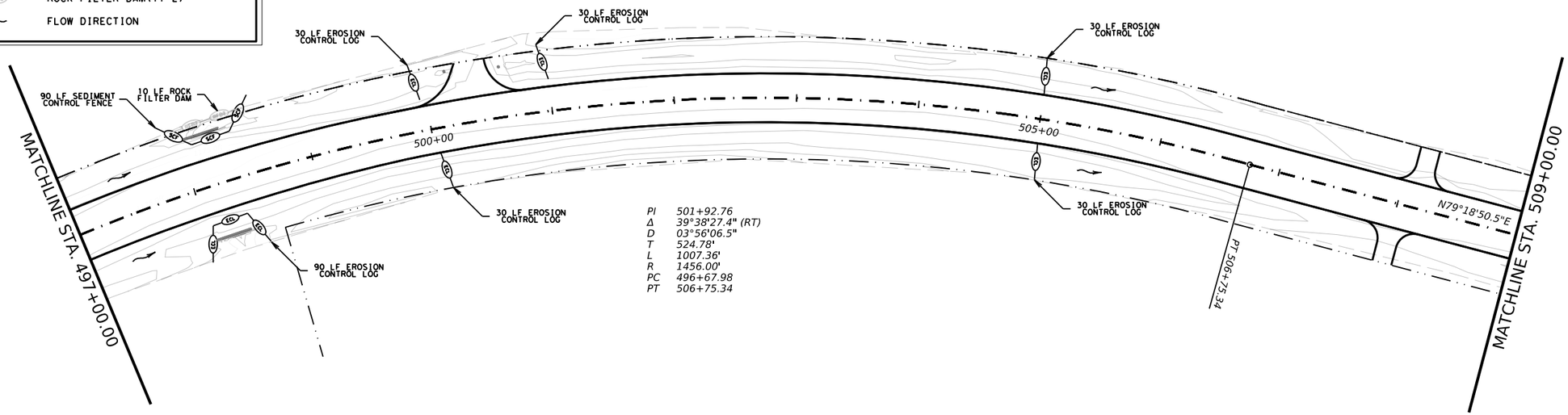
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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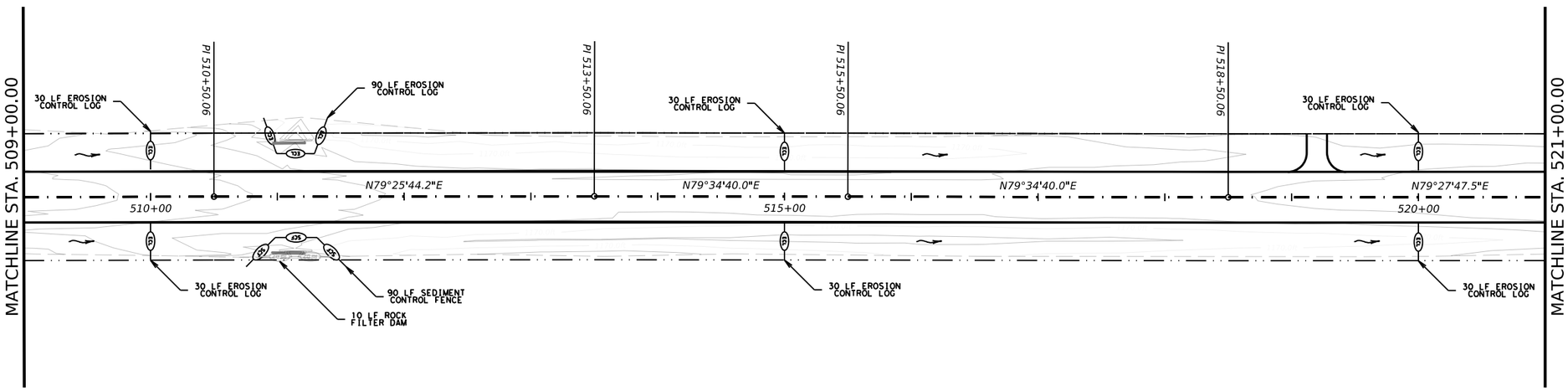

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SH 79
SW3P LAYOUT

SHEET 7 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		139

DATE: 3/29/2023 3:16:23 PM
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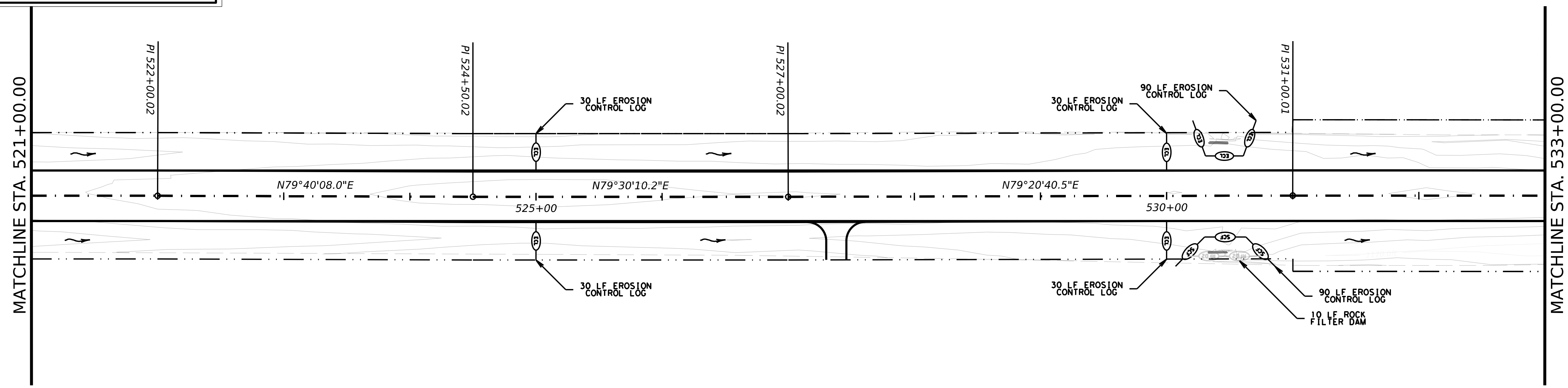
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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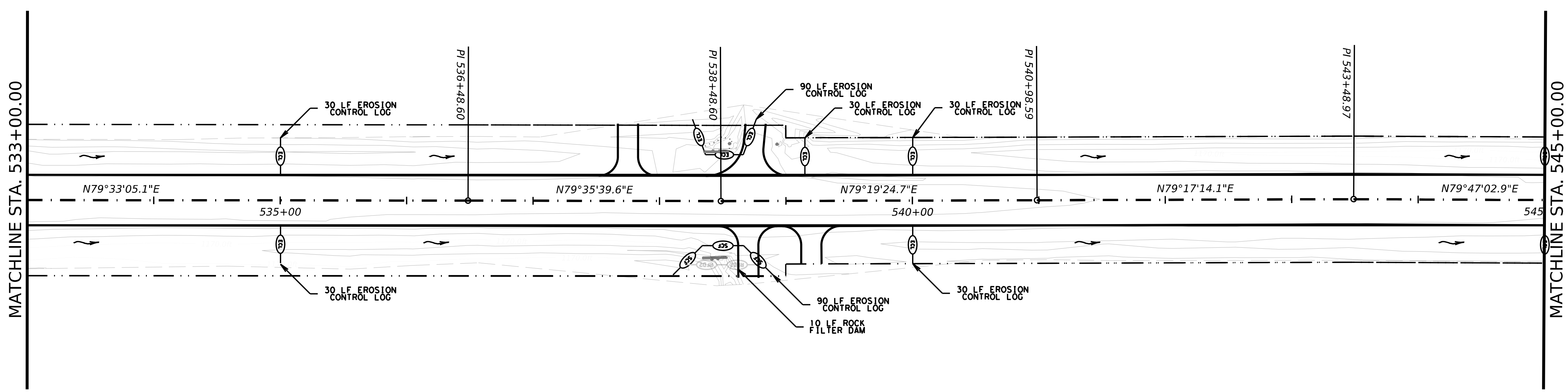

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SH 79
SW3P LAYOUT

SHEET 8 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		140

DATE: 3/29/2023 3:16:26 PM
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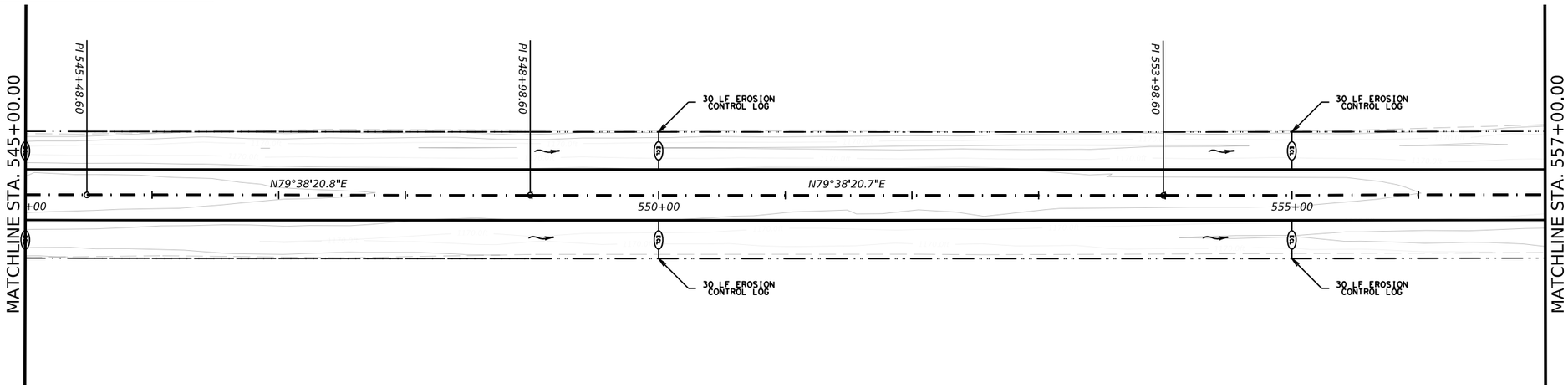
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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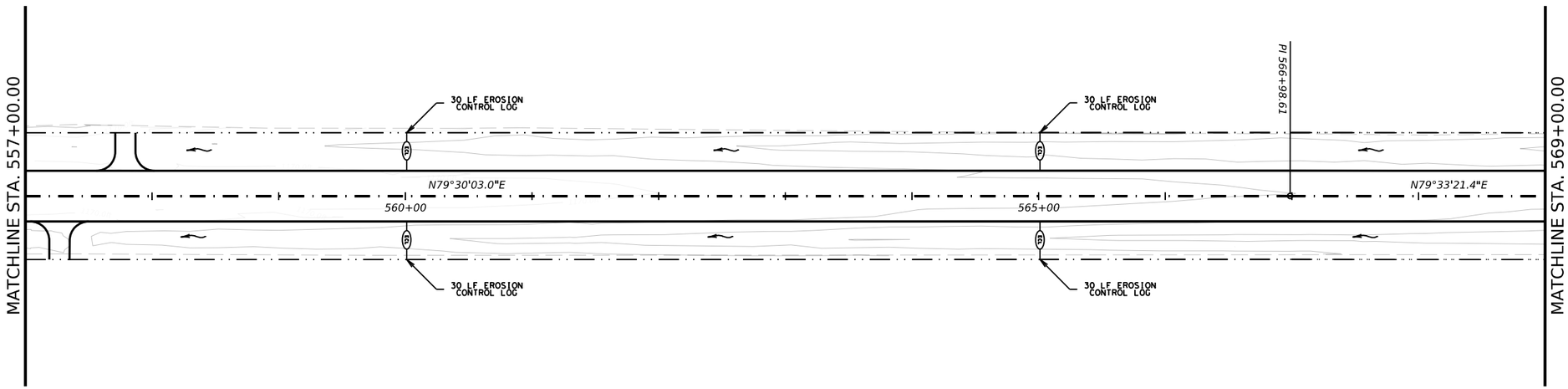

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03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

SHEET 9 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		141

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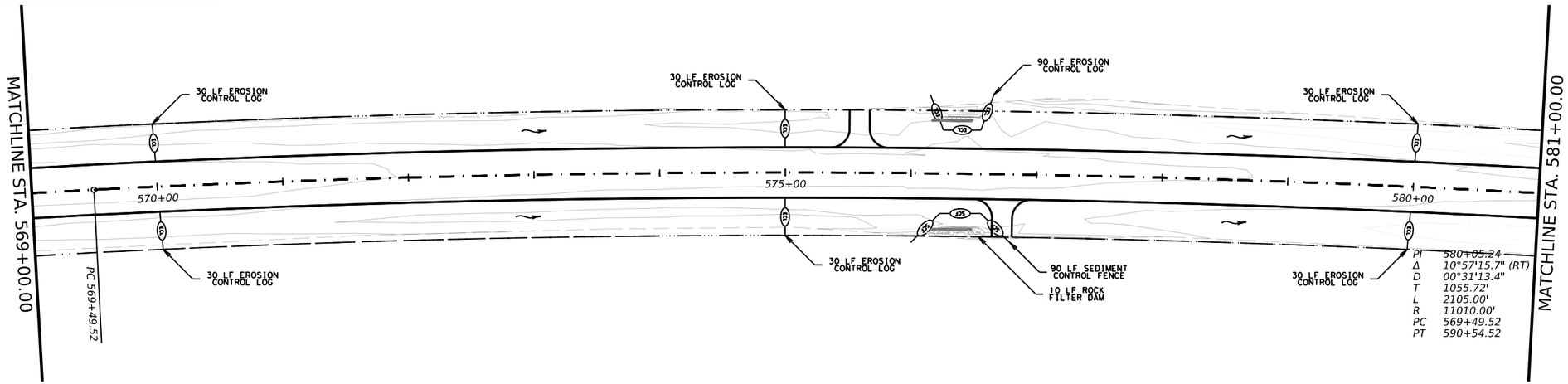
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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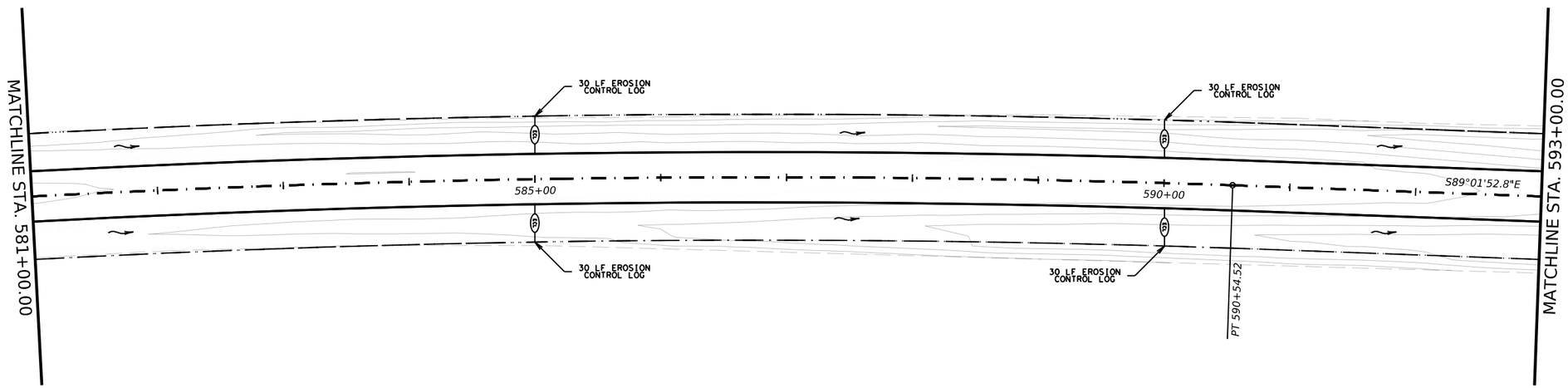

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03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

SHEET 10 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		142

DATE: 3/29/2023 3:16:32 PM
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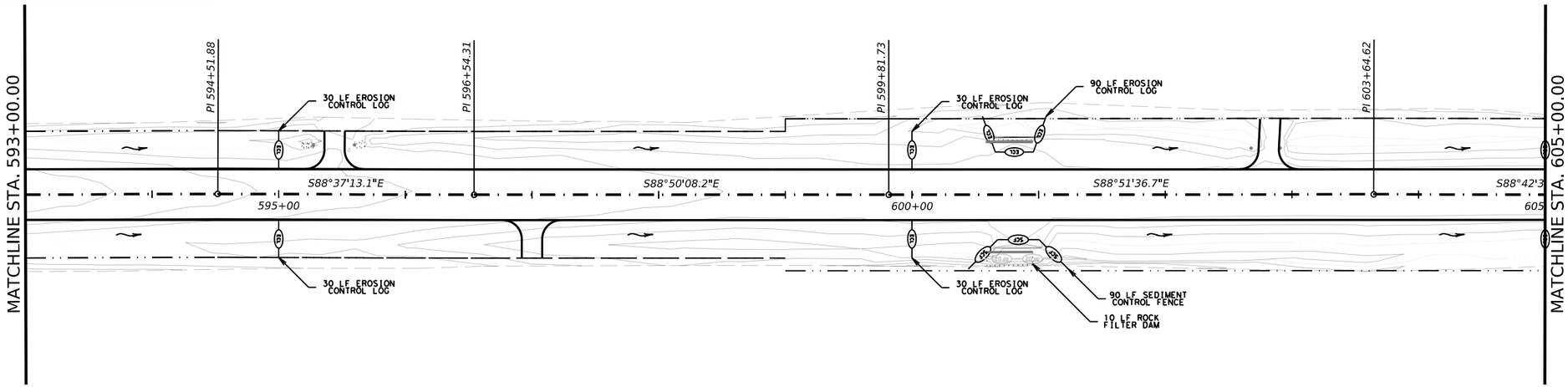
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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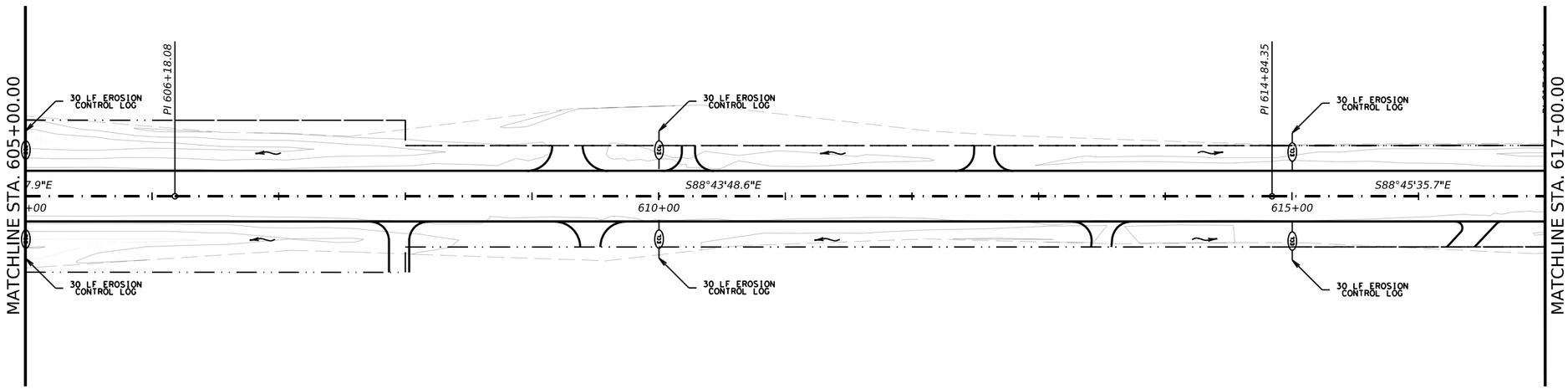

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03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

SHEET 11 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		143

DATE: 3/29/2023 3:16:35 PM
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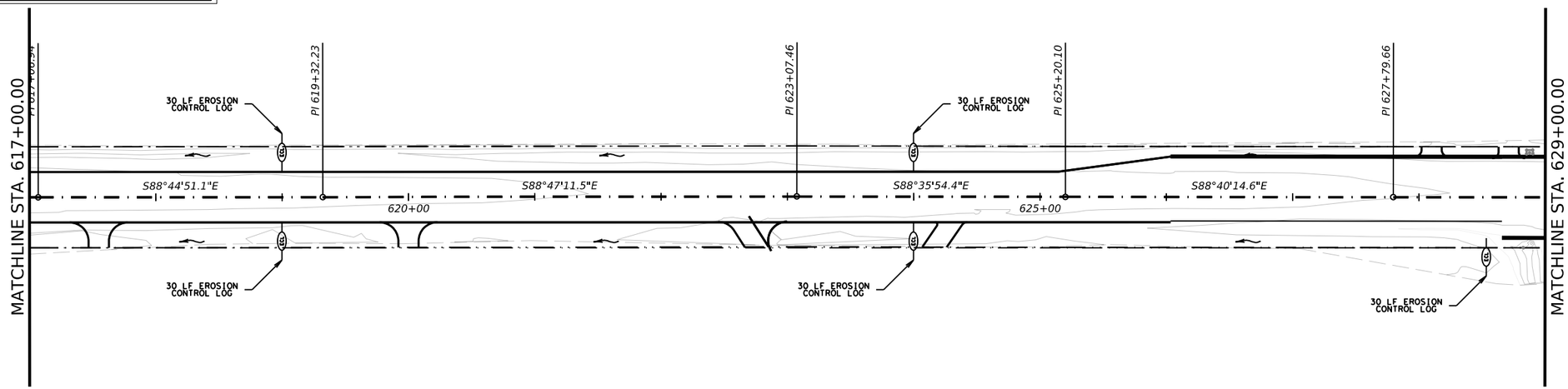
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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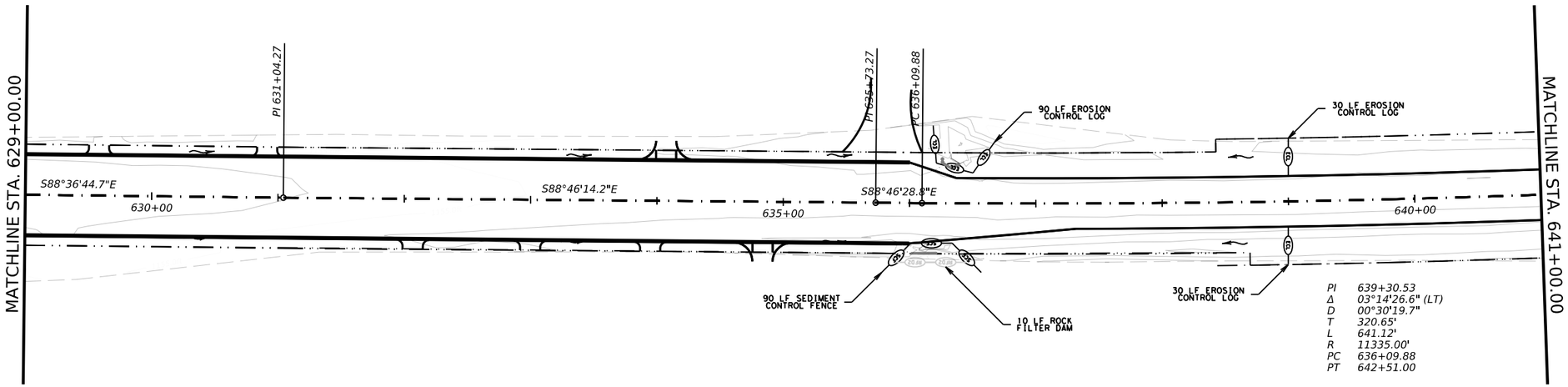

PI	639+30.53
Δ	03°14'26.6" (LT)
D	00°30'19.7"
T	320.65'
L	641.12'
R	11335.00'
PC	636+09.88
PT	642+51.00

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SH 79
SW3P LAYOUT

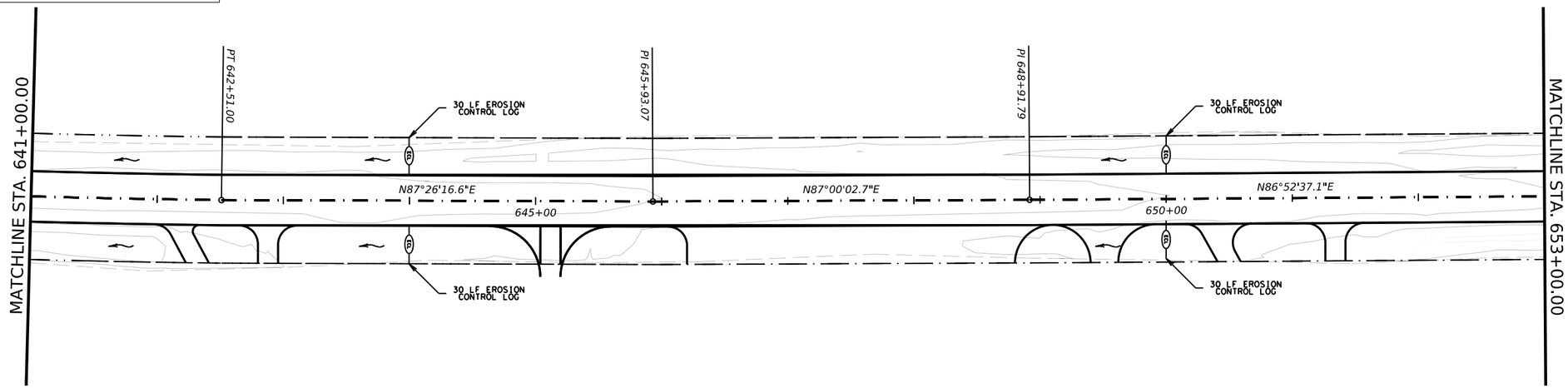
SHEET 12 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		144

DATE: 3/29/2023 3:16:39 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284026/4 - Design/Plan Set/9. Environmental/SH 79 SW3P LAYOUT.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



LOCATION NO.	BMP PLACEMENT					
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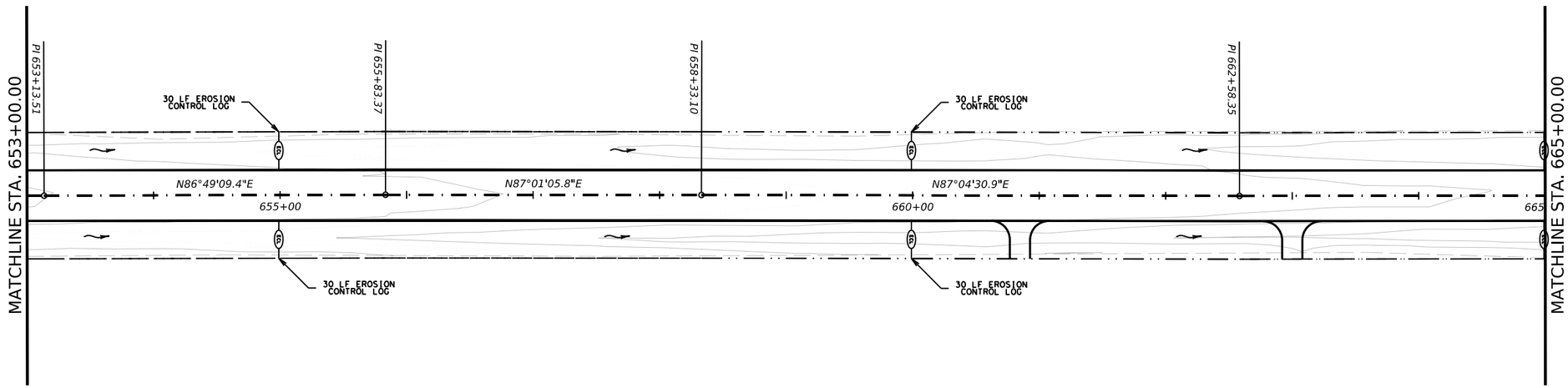

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03/30/2023

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SH 79
SW3P LAYOUT

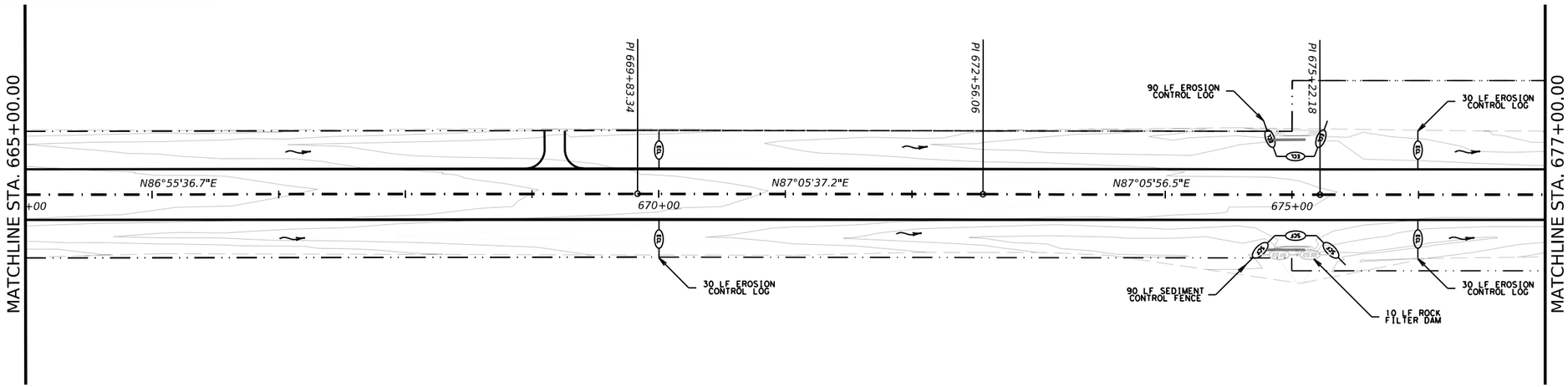
SHEET 13 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		145

DATE: 3/29/2023 3:16:41 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/028402026/4 - Design/Plan Set/9. Environmental/SH 79 SW3P LAYOUT.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



LOCATION NO.	BMP PLACEMENT					
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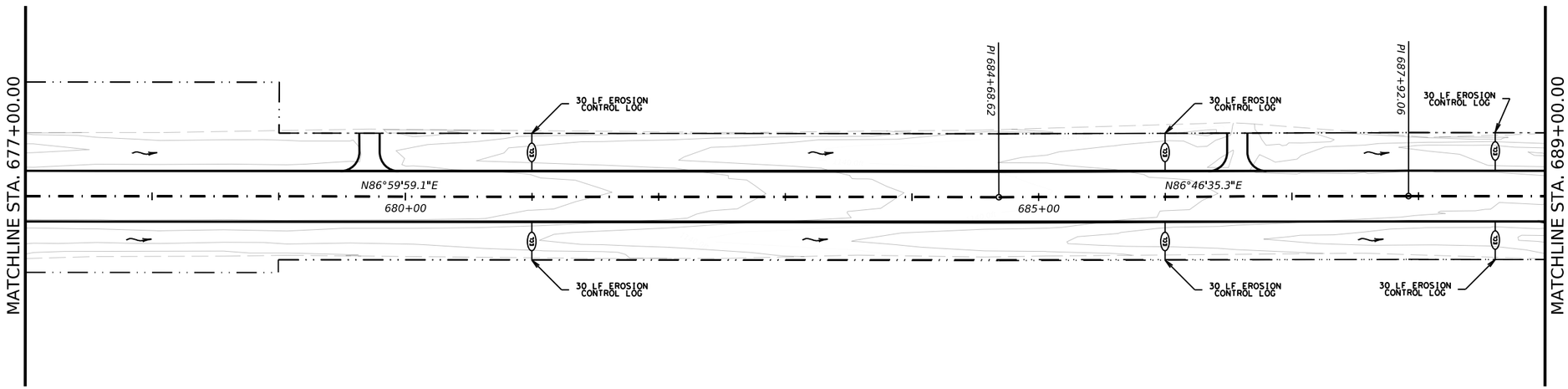

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SH 79
SW3P LAYOUT

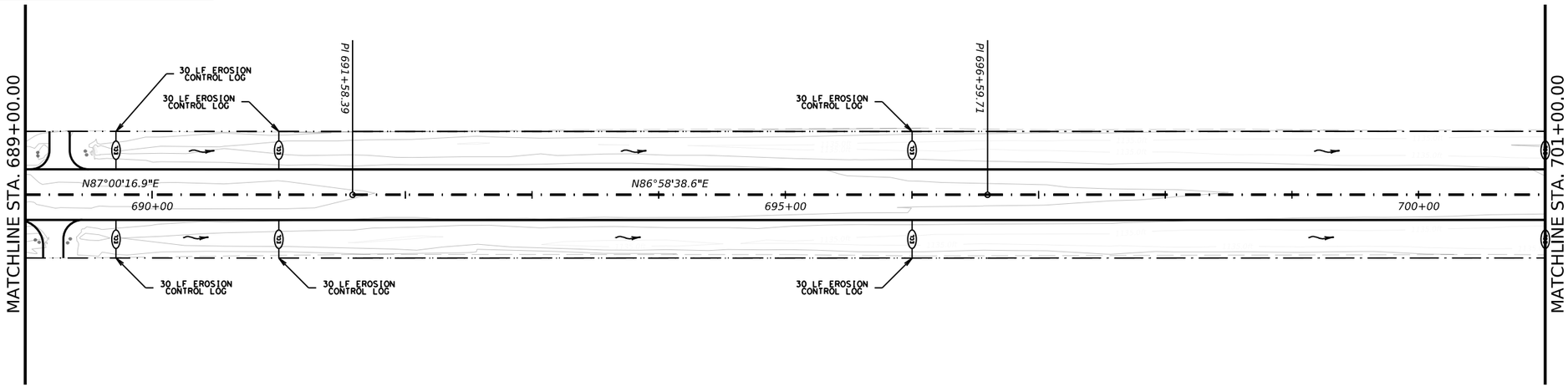
SHEET 14 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		146

DATE: 3/29/2023 3:16:44 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/028402026/4 - Design/Plan Set/9. Environmental/SH 79 SW3P LAYOUT.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



LOCATION NO.	BMP PLACEMENT					
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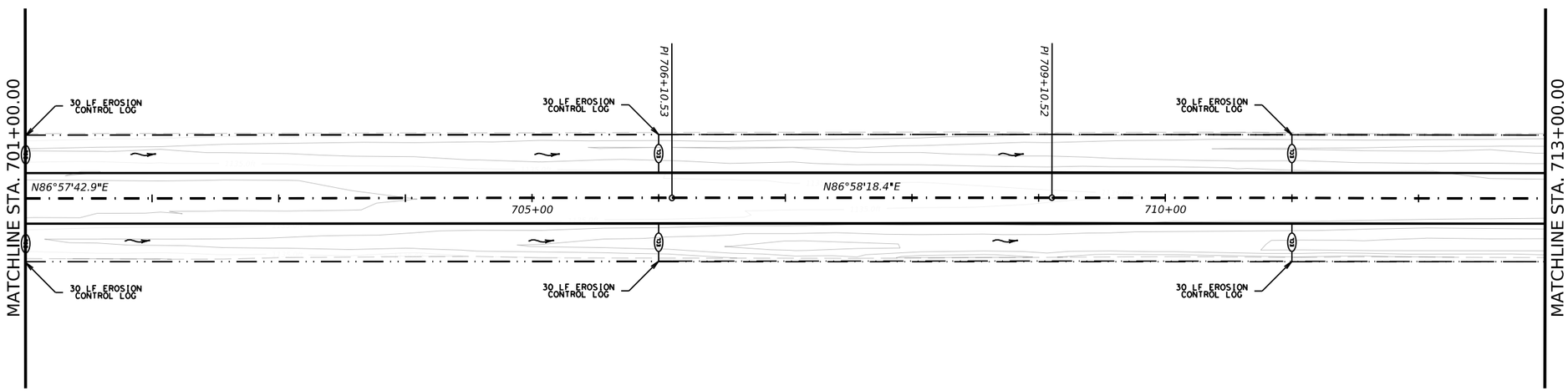

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129839
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PROFESSIONAL ENGINEER

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03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

SHEET 15 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		147

DATE: 3/29/2023 3:16:47 PM
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DW:
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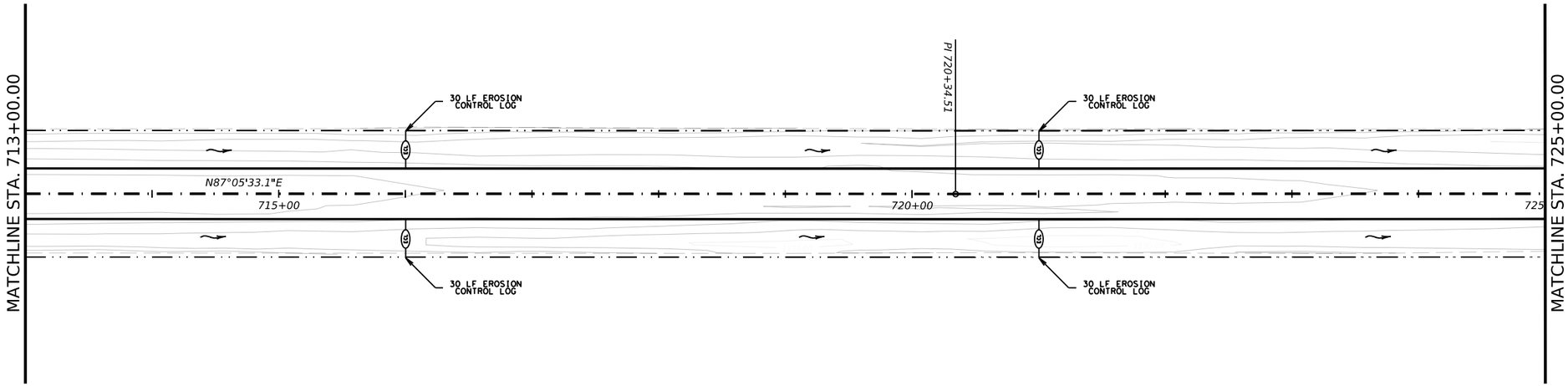
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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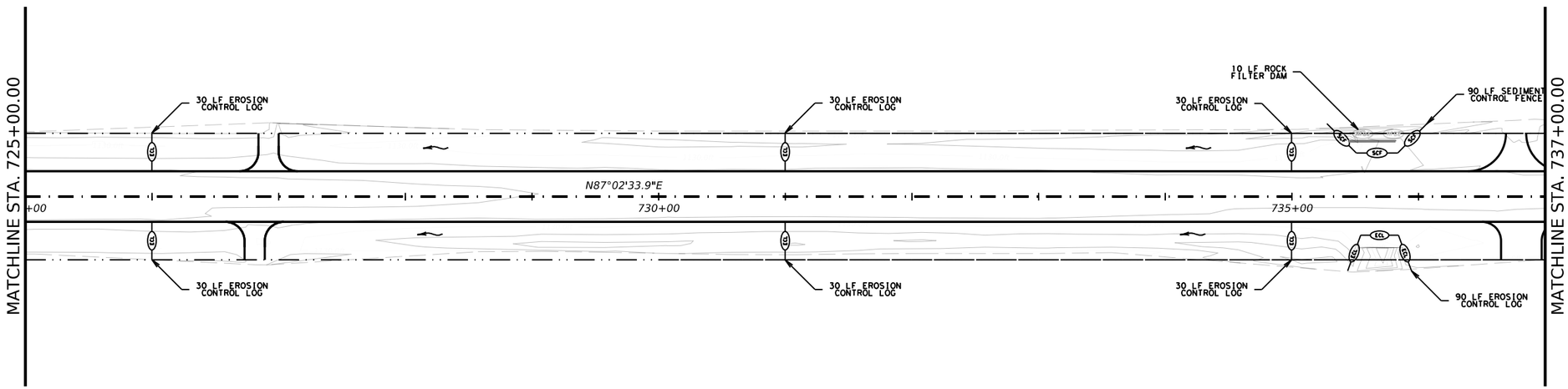

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SH 79
SW3P LAYOUT

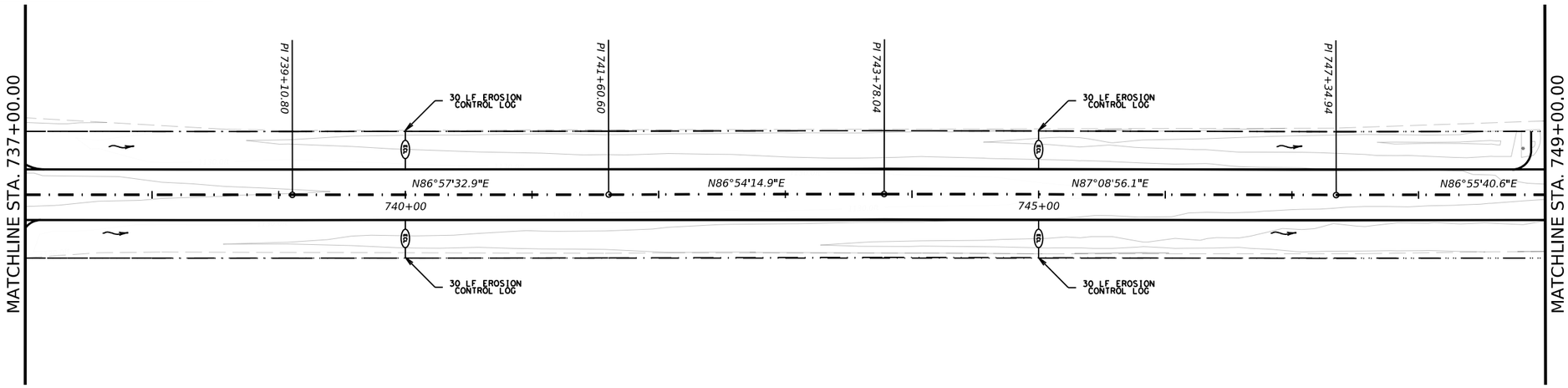
SHEET 16 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		148

DATE: 3/29/2023 3:16:51 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284020264 - Design/Plan Set/9. Environmental/SH 79 SW3P LAYOUT.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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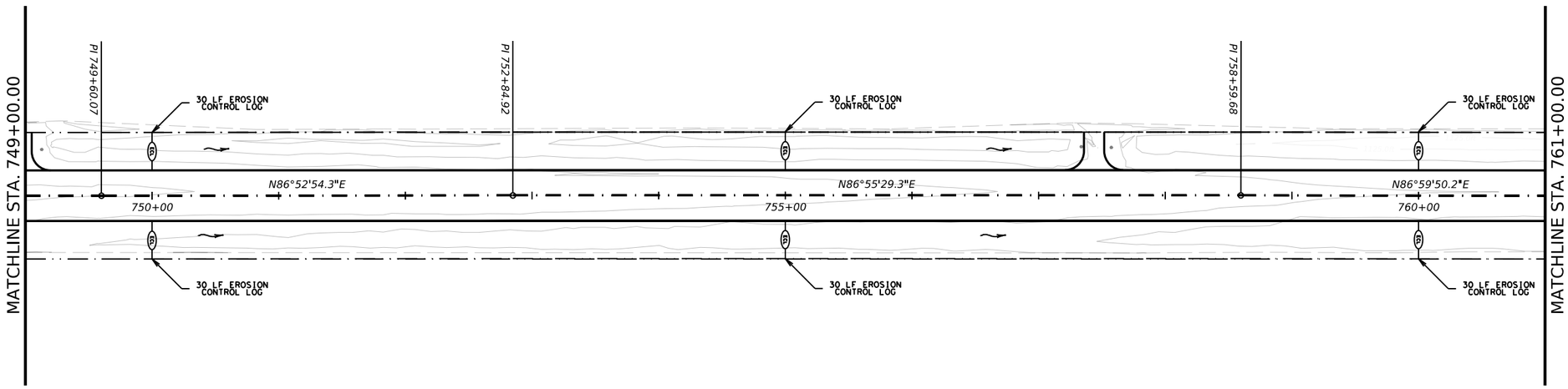

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03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

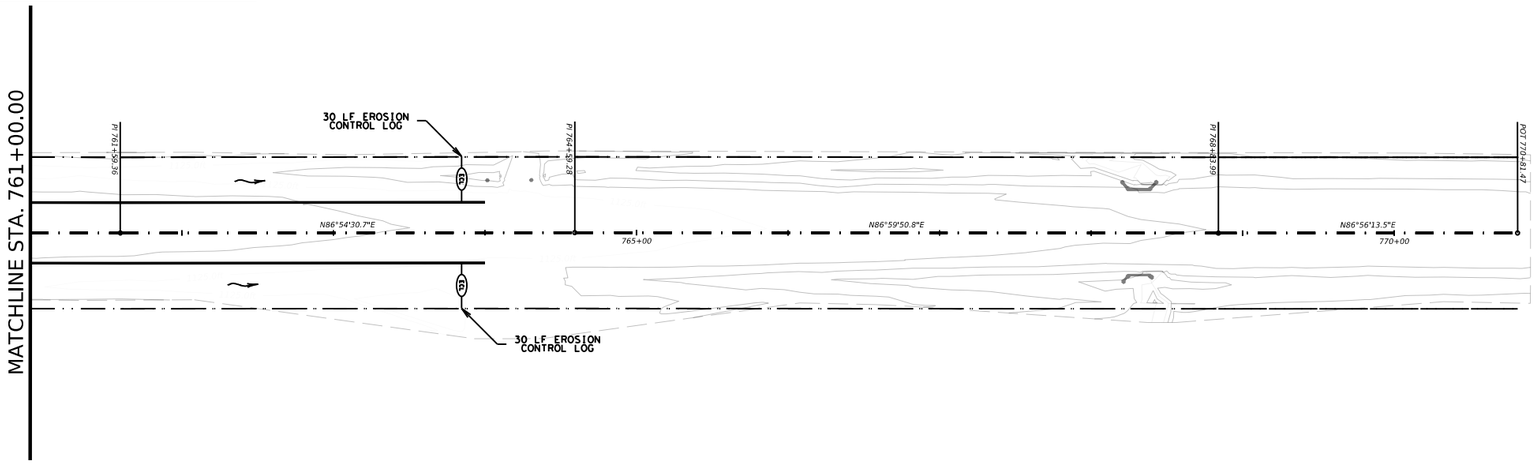
SHEET 17 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		149

DATE: 3/29/2023 3:16:54 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284026/4 - Design/Plan Set/9. Environmental/SH 79 SW3P LAYOUT.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



LOCATION NO.	BMP PLACEMENT					
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03/30/2023

Texas Department of Transportation

SH 79
SW3P LAYOUT

SHEET 18 OF 18

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		150

DATE: 3/29/2023 3:16:57 PM
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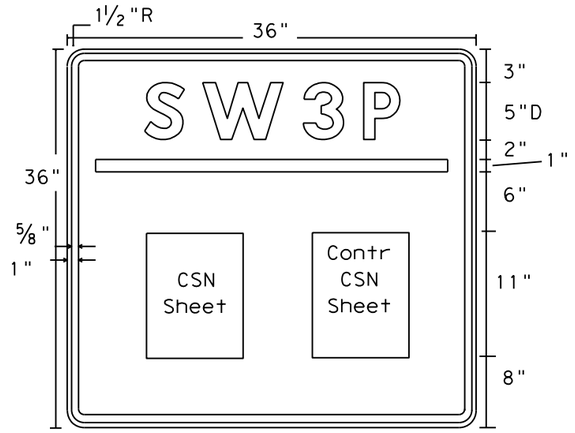


SW3P SIGN

TxDOT Large or Small Construction Site Notice (CSN) & Contractor Large or Small Construction Site Notice (CCSN)

Sign Dimensions

36" X 36"

Letters - White
Numbers - White
Border - White
Background - Blue

GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN & CCSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. Signs should be placed just inside the right of way line at the project limits at a readable height. If the sign cannot be placed outside the clear zone, it must adhere to the TMUTCD. If placed outside the clear zone, SW3P sign may be placed perpedicular or parallel to ROW line.
5. Final location of the signs will be approved by the Engineer.

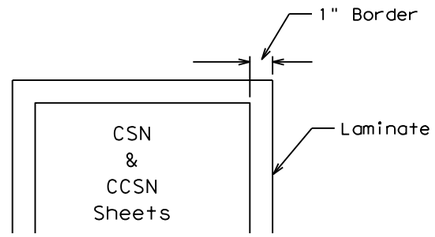
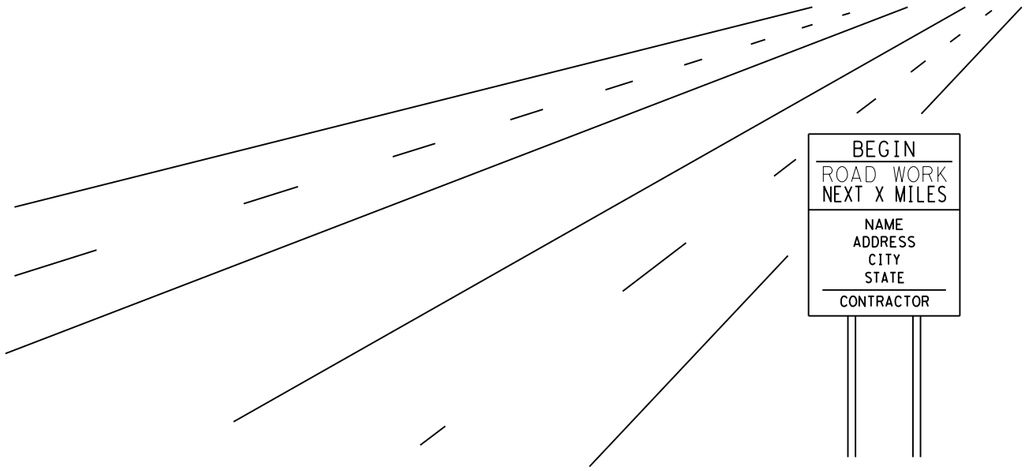
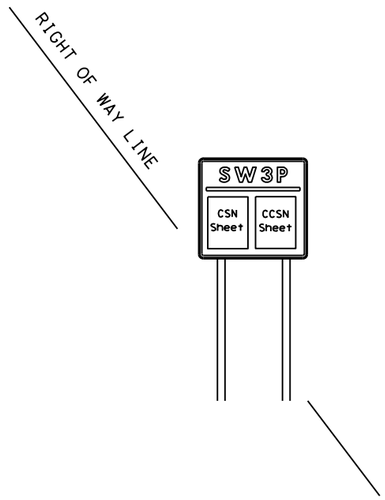


Figure 1





DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

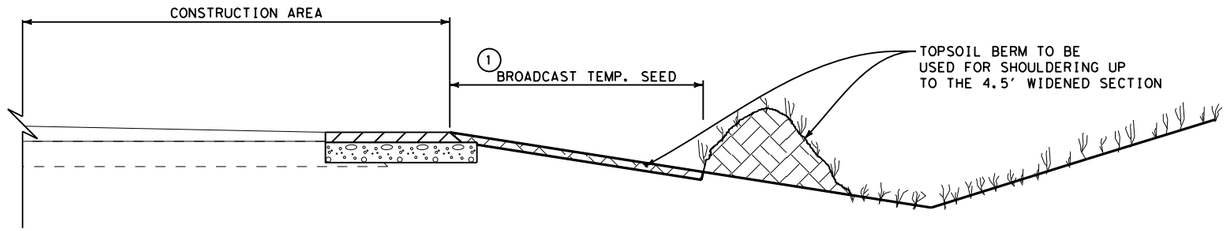
Texas Department of Transportation
WICHITA FALLS DISTRICT STANDARD

SH 79

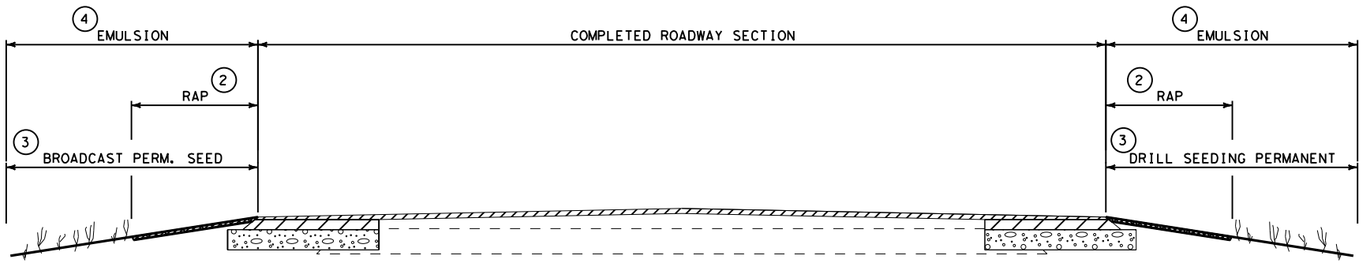
SW3P SIGN

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT 2023	DISTRICT	FEDERAL AID PROJECT		HIGHWAY
	WFS.	SEE TITLE SHEET		SH 79
REVISION DATE: 5/12/17	COUNTY	CONTROL	SECT	JOB	SHEET
	THROCKMORTON	0284	02	026	151

LEVELS DISPLAYED
PATH:



PROPOSED TEMPORARY
SEEDING TYPICAL



PROPOSED PERMANENT
SEEDING TYPICAL

NOTES:

1. BROADCAST TEMPORARY SEED ESTIMATED @ 15' ONCE THE NATIVE TOP SOIL BERM HAS BEEN SHOULDERED UP TO THE WIDENED SECTION. REFER TO THE WFS-TA-VES PLAN SHEET FOR SEEDING MIXTURES.
2. REFER TO THE GENERAL NOTES FOR THE LOCATION OF THE RECYCLED ASPHALT PAVEMENT. PLACEMENT DISTANCE IS TO BE A MINIMUM OF 4' OR AS NEEDED TO ACHIEVE SMOOTH TIE IN TO EXISTING FRONT SLOPE. REFER TO BMP#15 ON WFS-TA-BMP PLAN SHEET. (USE TOP SOIL BERM IF THERE IS NO RAP AVAILABLE)
3. DRILL SEEDING PERMANENT SEED ESTIMATED @ 15' ONCE ALL DISTURBANCE ACTIVITIES HAVE BEEN COMPLETED. REFER TO THE VEGETATIVE ESTABLISHMENT PLAN SHEET FOR SEEDING MIXTURES.
4. EMULSION HAS BEEN ESTIMATED AT A MINIMUM OF 5' REFER TO THE BASIS OF ESTIMATES FOR THE APPLICATION RATE.

MULTIPLE MOBILIZATIONS WILL BE REQUIRED DURING THE TEMPORARY SEEDING OPERATIONS. THE CONTRACTOR WILL NEED TO ADJUST WIDENING OPERATIONS DURING THIS PHASE OF CONSTRUCTION IN ORDER TO ESTABLISH VEGETATION AS ROAD IS BEING WIDENED. VEGETATION ESTABLISHMENT SHALL BE ONGOING AS ROAD WORK PROGRESSES.

N. T. S.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
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PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

SH 79
VEGETATIVE ESTABLISHMENT DETAIL

Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0284	02	026	SH 79
DIST	COUNTY		SHEET NO.
WFS.	THROCKMORTON		152

DATE: 3/29/2023 3:17:11 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/03 - WFS/Design Projects/0284026/4 - Design/Plan Set/9. Environmental/VEGETATIVE ESTABLISHMENT DETAIL.dgn

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 any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

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):
0284-02-026

1.2 PROJECT LIMITS:
From: Mexican Springs Rd

To: Throckmorton County Line

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 33.2678702 ,(Long) -98.9533626

END: (Lat) 33.2382605 ,(Long) -99.0754403

1.4 TOTAL PROJECT AREA (Acres): 93.078

1.5 TOTAL AREA TO BE DISTURBED (Acres): 7.679

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Grading, excavation, culvert and channel cleaning, ditch grading, embankment erosion, sediment controls, and seeding.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Leeray Clay	0-1% grades, Covered with 90-100% grass and 10-15% trees with a few gravel county roads and driveways.

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
☐ 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
Unnamed	Red River

* 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)

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	F 2023(922)		153
STATE	STATE DIST.	COUNTY	
TEXAS	03	THROCKMORTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0284	02	026	SH 79

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

- [x] ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- [x] ☐ Temporary Seeding
- ☐ [x] Permanent Planting, Sodding or Seeding
- [x] ☐ Biodegradable Erosion Control Logs
- [x] ☐ 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

- [x] ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- [x] ☐ Inlet Protection
- [x] ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- [x] ☐ 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

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

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

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

2.8 INSPECTIONS:

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

2.9 MAINTENANCE:

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

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
	F 2023(922)		154
STATE	STATE DIST.	COUNTY	
TEXAS	03	THROCKMORTON	
CONT.	SECT.	JOB	HIGHWAY NO.
0284	02	026	SH 79

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. None

- [ ] No Action Required
- [x] Required Action

Action No.

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

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

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

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

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

III. CULTURAL RESOURCES

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

- [ ] No Action Required
- [x] Required Action

Action No.

1. If burial remains and/or artifacts are discovered cease work and contact the WFS District Environmental Coordinator. If discovered, tribes request immediate notification by TxDOT.

2. No impacts off right-of-way are permitted without coordinating with the DEQC and/or EC.

IV. VEGETATION RESOURCES

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

- [ ] No Action Required
- [x] Required Action

Action No.

1. Impacts to vegetation should be kept to the minimum necessary. Associated impacts will be the minimum necessary to perform the work.

2. Trees shall be trimmed rather than removed when feasible.

3. Disturbed areas would be re-vegetated according to TxDOT's standard practices for rural areas, which to the extent practicable, is in compliance with Executive Memorandum on Beneficial Landscaping, if applicable.

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

- [ ] No Action Required
- [x] Required Action

Action No.

Bird BMPs: Migratory birds may arrive in the project area to breed during construction of the proposed project. Per the Migratory Bird Treaty Act (MBTA), measures would be taken to avoid disturbing or killing of migratory birds. Prior to construction, perform daytime surveys for nests including under bridges and in culverts to determine if they are active before removal. Nests that are active should not be disturbed. Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season, March through August. Avoid the removal of unoccupied, inactive nests, as practicable. Prevent the establishment of active nests prior to nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair. Do not collect, capture, relocate, or transport birds, eggs, young, or active nests without a permit.

Alternative Bat BMP: In all instances, avoid harm or death to bats. If bats are encountered during construction stop work in the area and contact district environmental coordinator (Nellie Bennett) at 940 720 7733. Bats should only be handled as a last resort and after communication with TPWD.

Mammal BMPs: Contractor will be advised of the potential occurrence of the long-tailed weasel, eastern spotted skunk, mountain lion, to avoid harming the species if encountered, and to avoid unnecessary impacts to dens.

Terrestrial Reptile BMPs: Visually inspect excavation areas for trapped wildlife prior to backfilling. Inform contractors that if reptiles are found on project site allow species to safely leave the project area.

Amphibian and Aquatic Reptile BMPs: Contractors will be advised of potential occurrence of the Woodhouse's Toad in the project area, and to avoid harming them if encountered. Project specific locations (PSLs) within state-owned ROW should be located in uplands away from aquatic features.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

- [ ] Yes
- [x] No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

- [ ] Yes
- [ ] No

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

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

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

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

- [ ] No Action Required
- [x] Required Action

If sheen or other contamination is visible in the waters of the U.S., or on the project site, the site shall be immediately cleaned up in accordance with local, state and federal regulations.

VII. OTHER ENVIRONMENTAL ISSUES

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

- [ ] No Action Required
- [x] Required Action

Action No.

1. Keep noise to a minimum. Reduce idling of vehicles and equipment.

2. Maintain project site. Minimize dust and airborne particles to the maximum extent practical.

3. Collect sanitary waste in accordance with local regulations by a sanitary waste collector. Portable units shall not be placed in or near a waterway or drainage area.

4. TxDOT EMS Policy Statement (English & Spanish) should be displayed at the construction site.

5. Collect all waste materials, trash, and debris from the construction site daily and deposit into a metal dumpster having a secure cover.

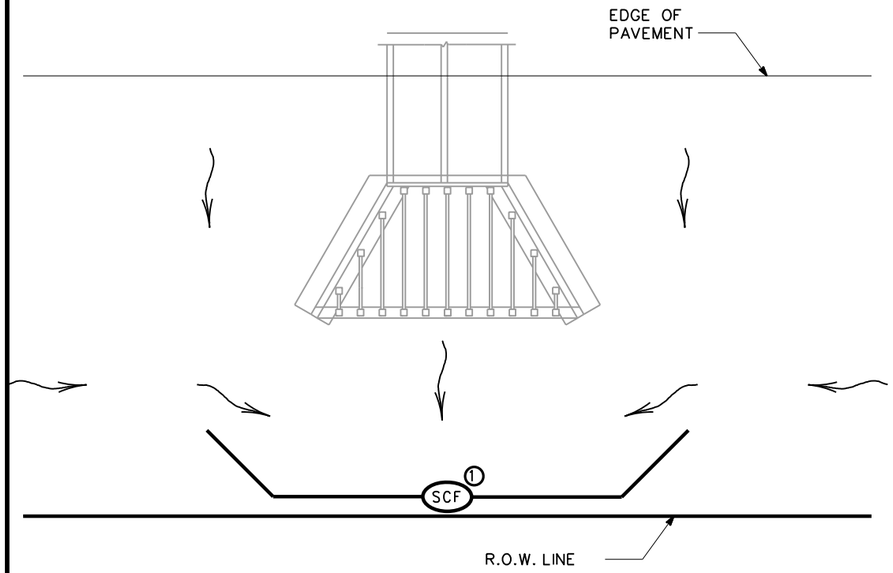
Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

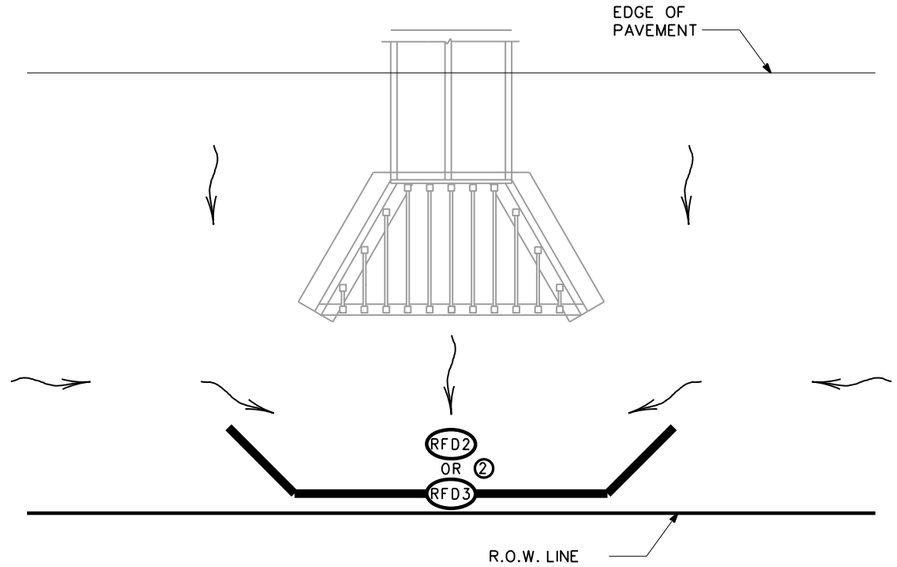
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR			
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY			
REVISIONS 12-12-2011 (DS)	0284	02	026	SH 79			
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.			
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	WFS.	THROCKMORTON		155			



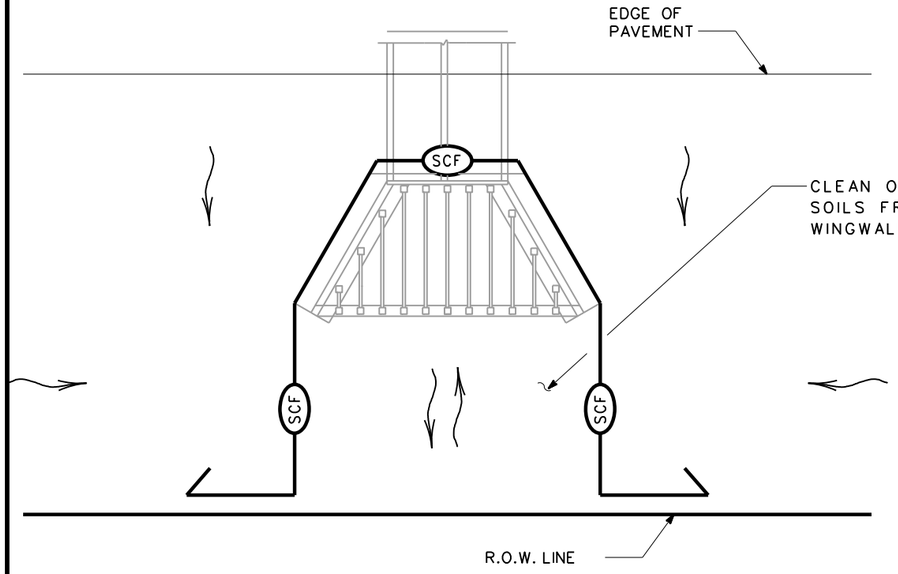
BEST MANAGEMENT PRACTICE (BMP) #1

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



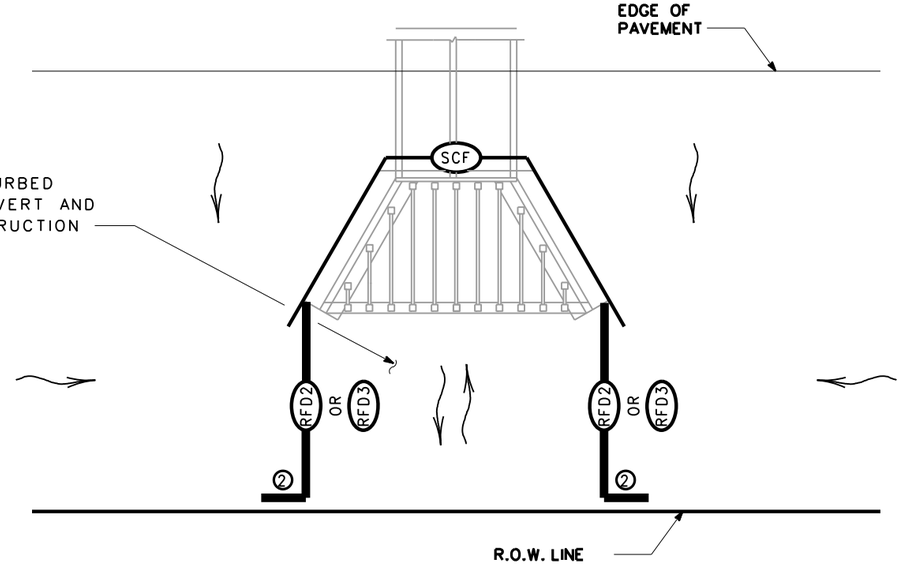
BEST MANAGEMENT PRACTICE (BMP) #2

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #3

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #4

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

1. EXTEND SILT FENCE SO STORM WATER DOES NOT GO AROUND THE ENDS. USE L-HOOKS ON ENDS AS REQUIRED.

2. EXTEND ROCK FILTER DAM SO STORM WATER DOES NOT GO AROUND THE ENDS.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

SCALE = NTS SHEET 1 OF 5

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

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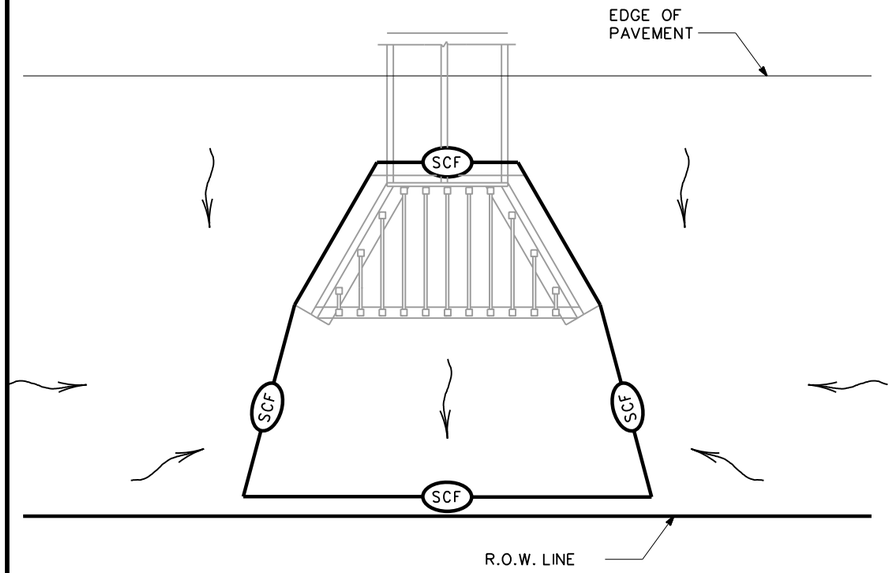
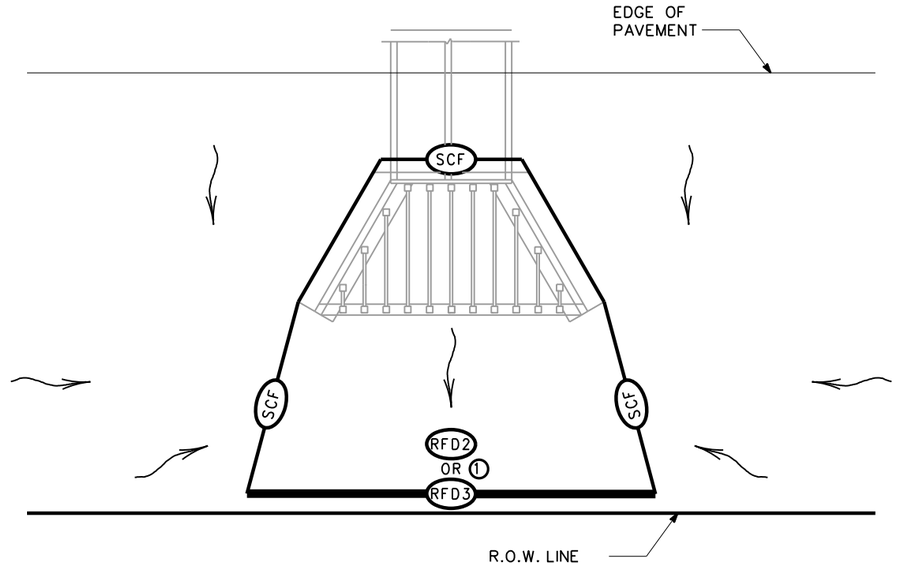
REVISIONS JULY 2019	0284	02	026	SH 79	
	DIST	COUNTY		SHEET NO.	
	WFS.	THROCKMORTON		156	



BEST MANAGEMENT PRACTICE (BMP) •5

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) •6

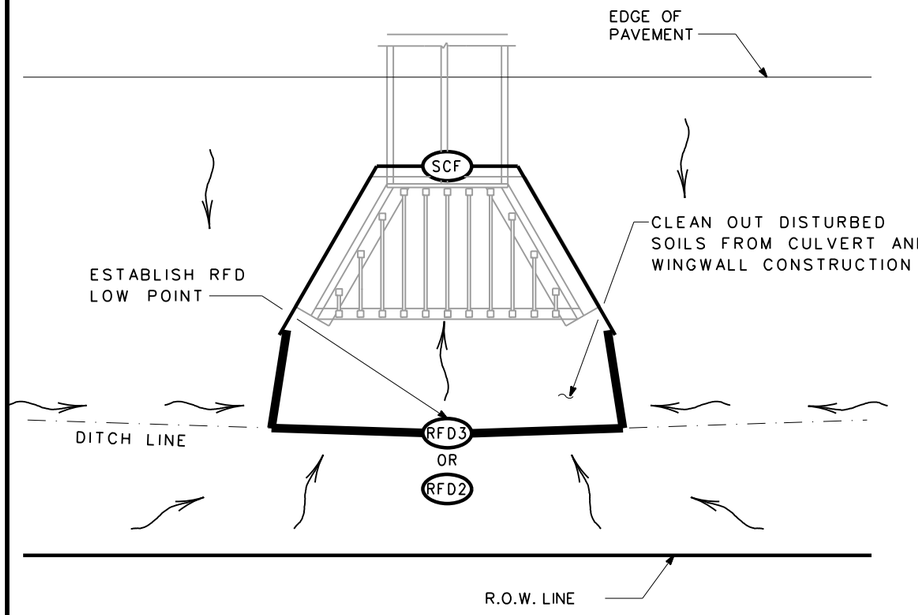
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

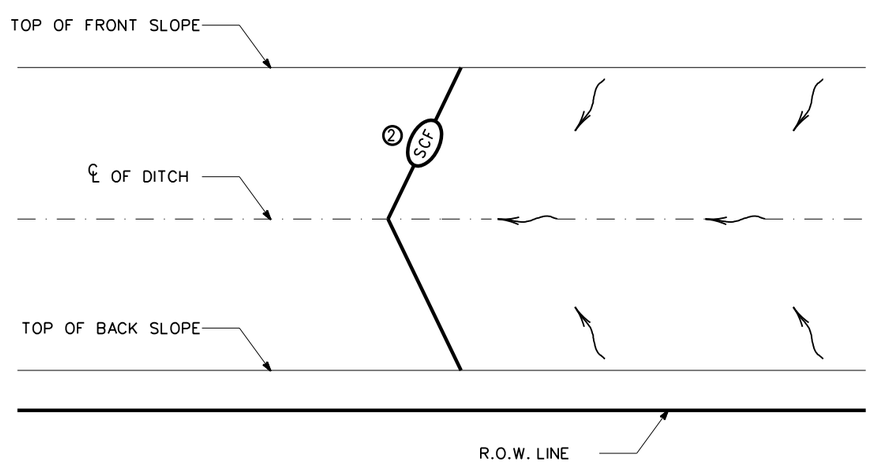
(1) PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.

(2) ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.



BEST MANAGEMENT PRACTICE (BMP) •7

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) •8

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE

STATE OF TEXAS
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SCALE • NTS SHEET 2 OF 5

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

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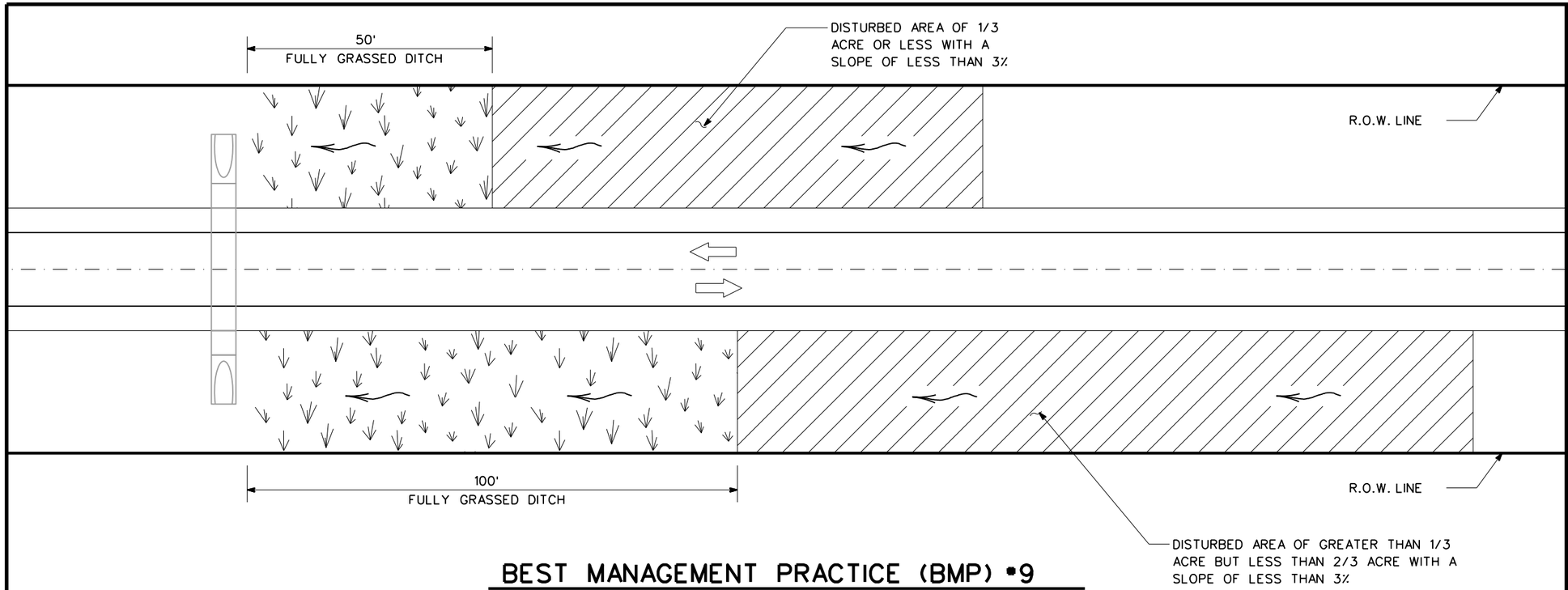
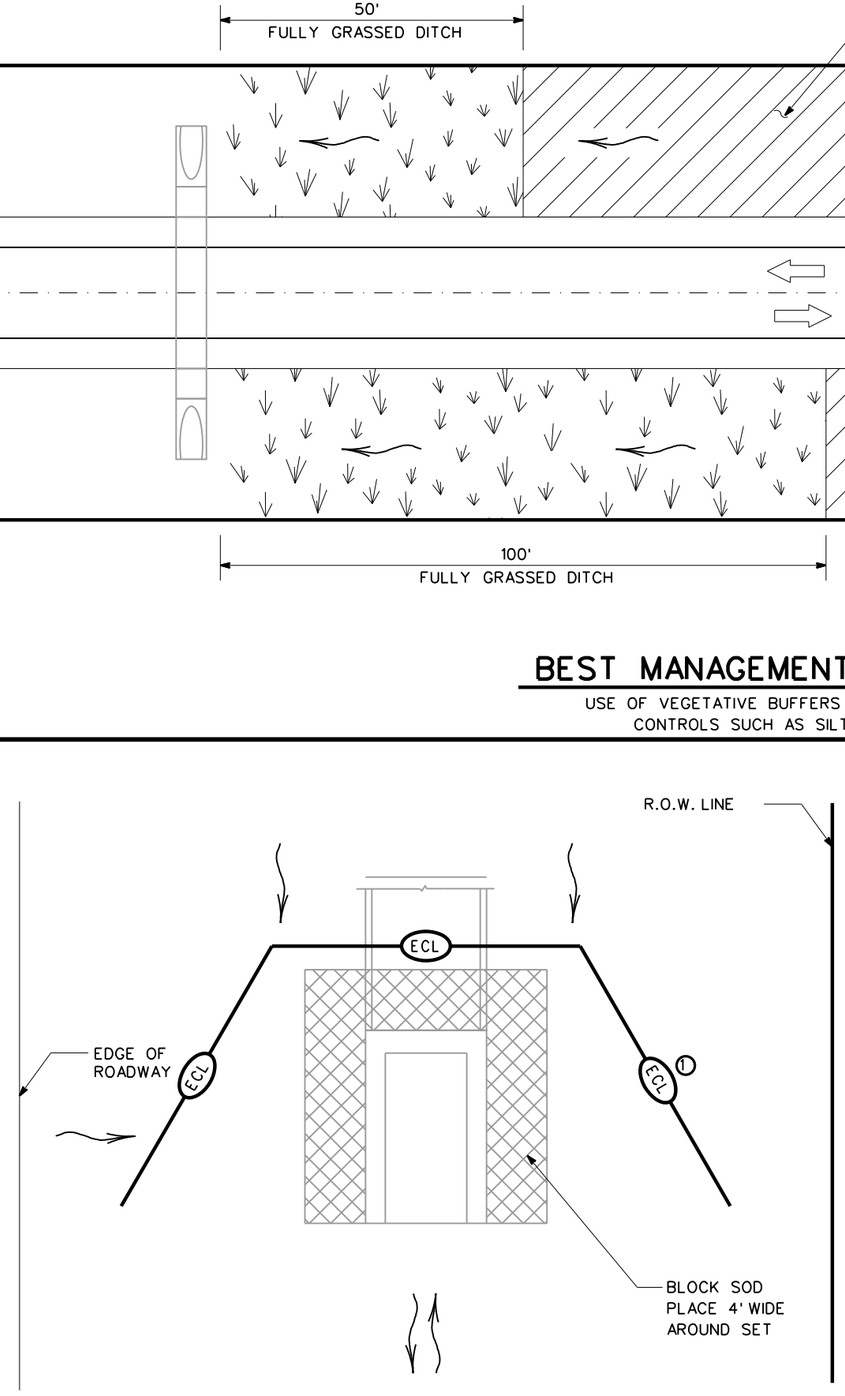
	WFS.	THROCKMORTON		157



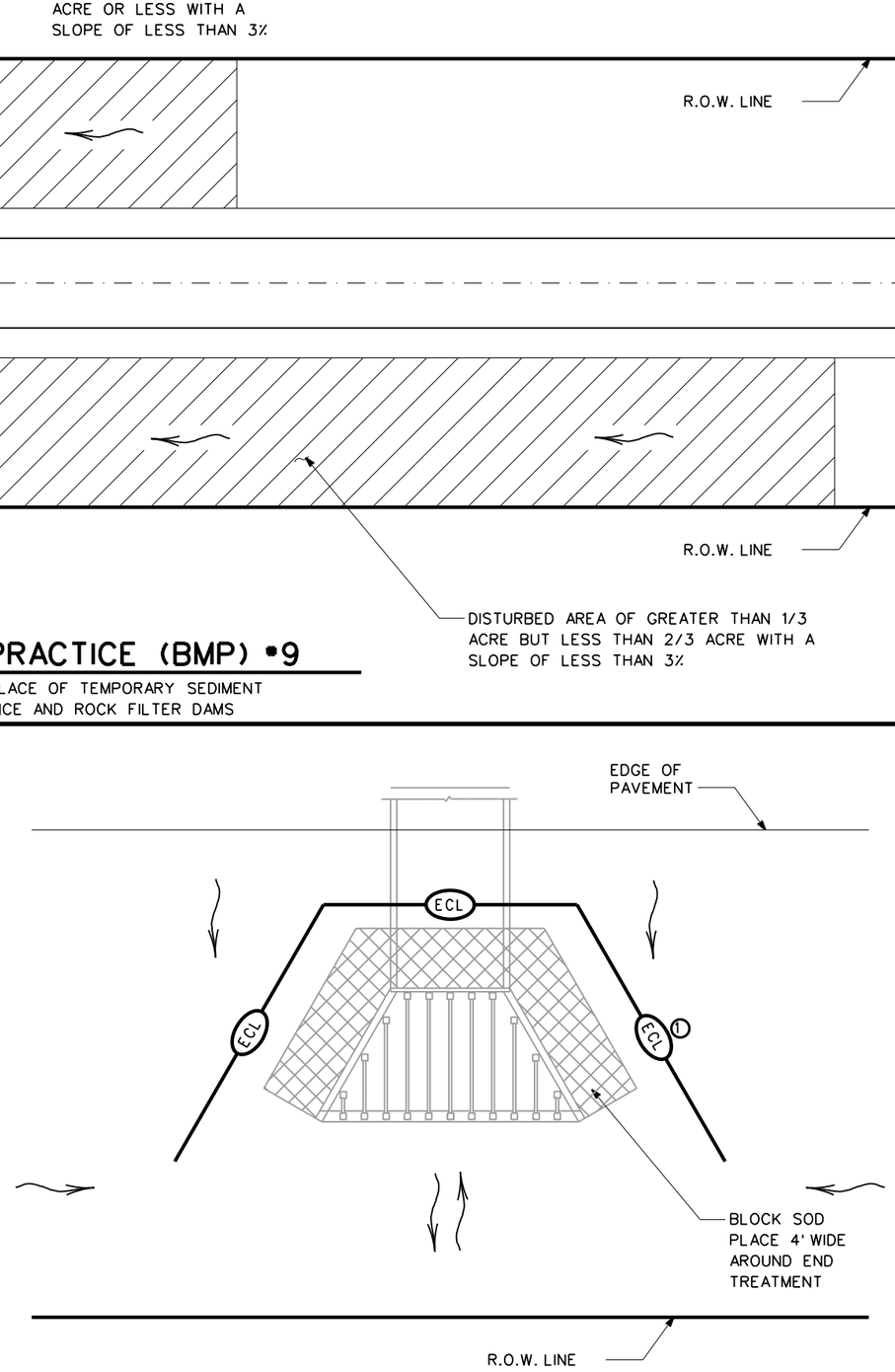
BEST MANAGEMENT PRACTICE (BMP) #9

USE OF VEGETATIVE BUFFERS IN PLACE OF TEMPORARY SEDIMENT CONTROLS SUCH AS SILT FENCE AND ROCK FILTER DAMS



BEST MANAGEMENT PRACTICE (BMP) #10

SEDIMENT CONTROL AT
PARALLEL DRAINAGE STRUCTURE ENTRANCE/EXIT



BEST MANAGEMENT PRACTICE (BMP) #11

SEDIMENT CONTROL AT
CROSS DRAINAGE STRUCTURE ENTRANCE/EXIT

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
ECL	EROSION CONTROL LOG
	SOD

NOTES:

1. SEDIMENT CONTROL FENCE, OR OTHER DEVICES CAN BE SUBSTITUTED AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
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Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
WHITE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
BLACK	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

SIGN GENERAL NOTES:

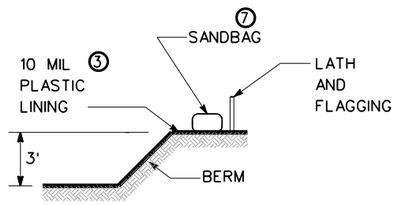
A. THE ALPHABETS AND LATERAL SPACING BETWEEN LETTERS AND NUMERALS SHALL CONFORM WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", (TMUTCD) LATEST EDITION, AND THE "COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST". LATERAL SPACING OF TEXT SHALL PROVIDE A BALANCED APPEARANCE. ALL MATERIALS SHALL CONFORM TO DEPARTMENT SPECIFICATIONS.

B. LEGEND AND BORDER MAY BE APPLIED BY REVERSE SCREENING PROCESS WITH TRANSPARENT COLORED INK, CUT-OUT WHITE REFLECTIVE SHEETING APPLIED TO COLORED BACKGROUND OR COMBINATION THEREOF. BACKGROUND SHALL BE REFLECTIVE SHEETING TYPE C.

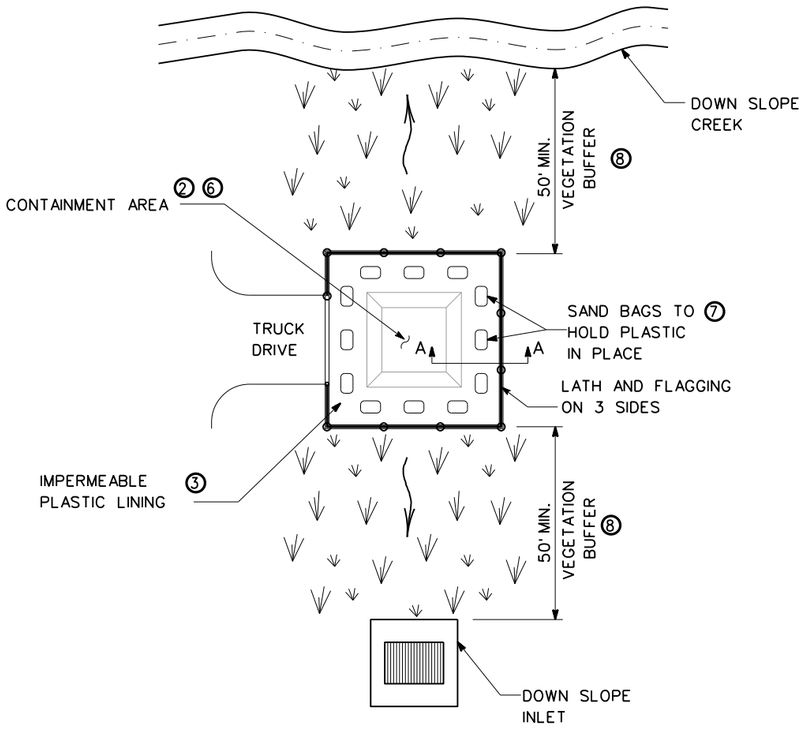
C. FINAL SIGN LOCATION SHALL BE AS APPROVED BY THE ENGINEER. IF THE SIGN CANNOT BE PLACED OUTSIDE THE CLEAR ZONE, IT MUST ADHERE TO THE TMUTCD. IF PLACED OUTSIDE THE CLEAR ZONE, SIGN MAY BE PLACED PERPENDICULAR OR PARALLEL TO ROW LINE.

D. SIGN DIMENSION IS 42" WIDE X 24" TALL WITH 5" BLACK LETTERS.

CONCRETE WASHOUT SIGN DETAIL (10)

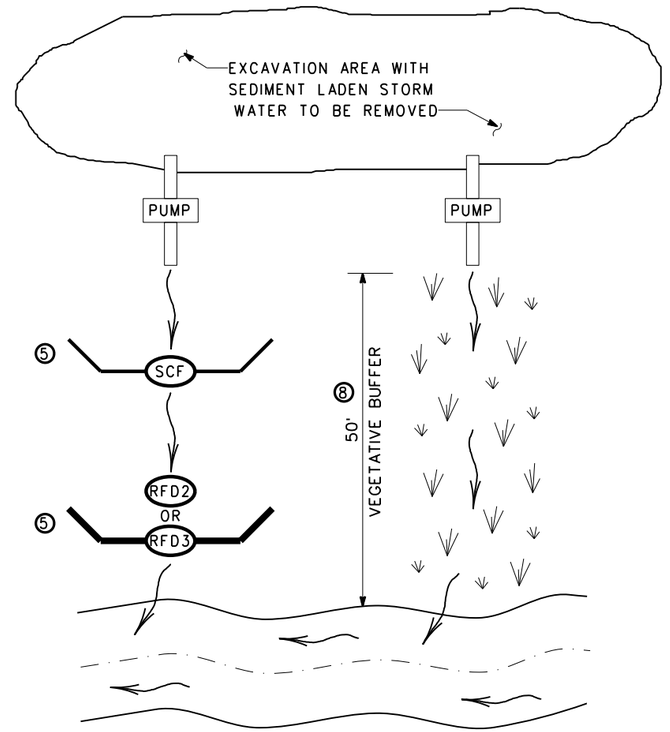


SECTION A-A



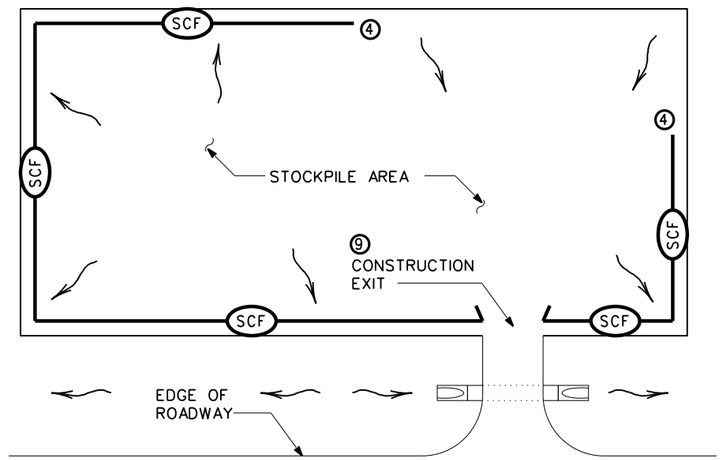
BEST MANAGEMENT PRACTICE (BMP) •12

CONCRETE TRUCK WASHOUT AREA (10)



BEST MANAGEMENT PRACTICE (BMP) •13

PUMPED STORM WATER SEDIMENT CONTROLS (1)



BEST MANAGEMENT PRACTICE (BMP) •14

STOCKPILE SEDIMENT CONTROL

	VEGETATIVE BUFFER
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)

NOTES:

(1) PUMPED STORM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS.

(2) WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.

(3) EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING. USE 10 MIL PLASTIC LINING MINIMUM.

(4) START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED

(5) ROCK FILTER DAMS, SEDIMENT CONTROL FENCE, OR OTHER DEVICES CAN BE SUBSTITUTED AS DIRECTED.

(6) ACTUAL SIZE,LAYOUT, & LOCATION WILL BE DETERMINED IN THE FIELD.

(7) AN EARTHEN BERM MAY BE USED IN LIEU OF SANDBAGS.

(8) VEGETATIVE BUFFER SHOULD HAVE AT A MINIMUM 70% VEGETATIVE COVERAGE

(9) PLACEMENT OF DEVICES FOR OFFSITE TRACKING AS APPLICABLE AND/OR DIRECTED BY THE ENGINEER.

(10) ALL ITEMS REQUIRED FOR CONCRETE WASHOUT AND SIGN SHALL BE SUBSIDIARY TO ITEM 506.

STATE OF TEXAS
BRYSON P. LAWRENCE
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Texas Department of Transportation
Wichita Falls District

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

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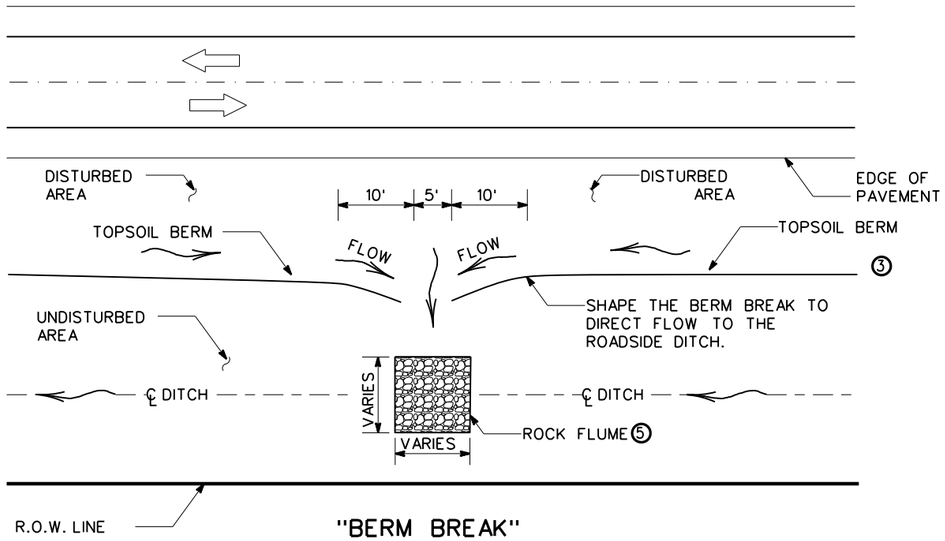
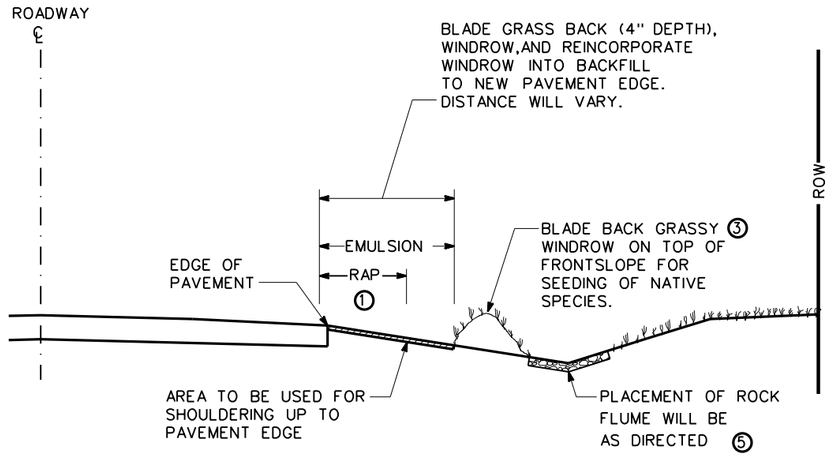


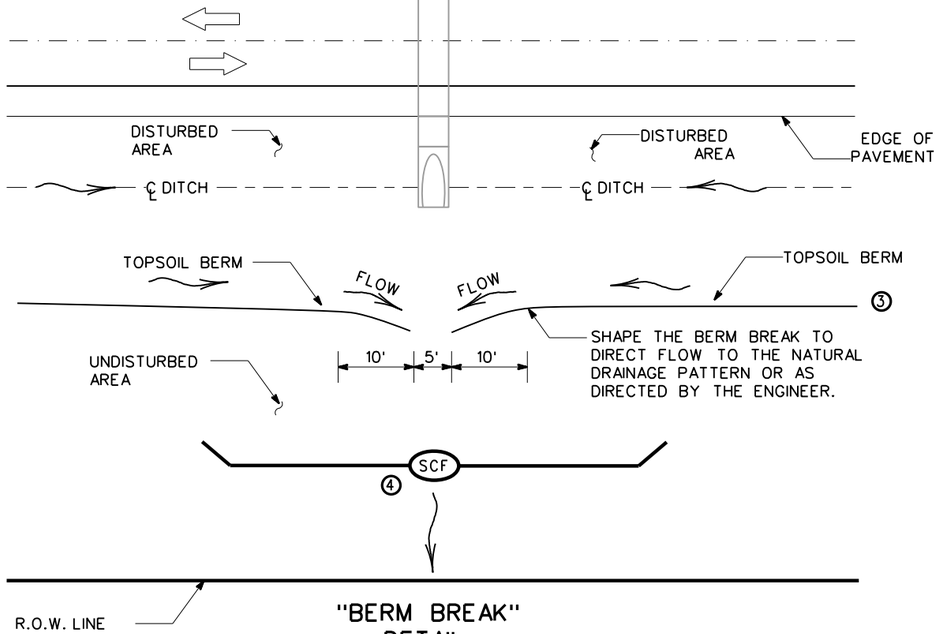
"BERM BREAK" DETAIL PLAN VIEW ②



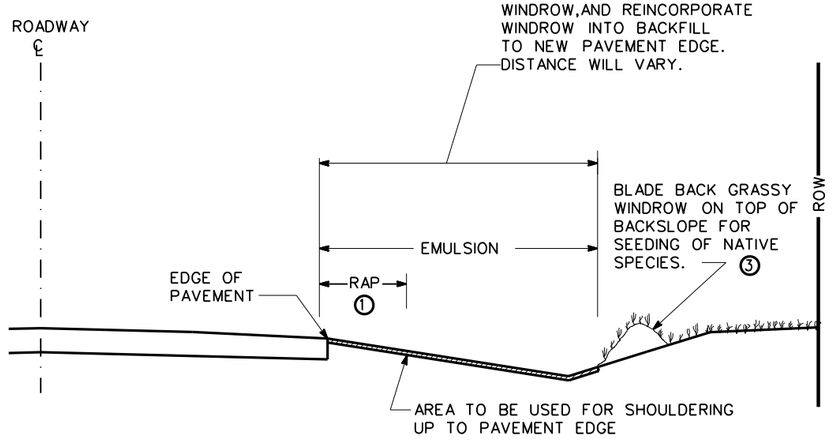
TYPICAL DITCH SECTION SHOWING BERM/WINDROW OF TOPSOIL

BEST MANAGEMENT PRACTICE (BMP) #15

SEDIMENT CONTROL AND BERM DETAIL WITH BERM ON FRONTSLOPE



"BERM BREAK" DETAIL PLAN VIEW ②



TYPICAL DITCH SECTION SHOWING BERM/WINDROW OF TOPSOIL

BEST MANAGEMENT PRACTICE (BMP) #16

SEDIMENT CONTROL AND BERM DETAIL AT CROSS DRAINAGE STRUCTURE WITH BERM ON BACKSLOPE

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
	ROCK FLUME~ENERGY DISSAPATOR
	BERM

NOTES:

1. AS DIRECTED PLACE RAP ADJACENT TO EDGE OF PAVEMENT AS A BACKFILL MATERIAL. PLACEMENT DISTANCE IS TO BE A MINIMUM OF 4' OR AS NEEDED TO ACHIEVE SMOOTH TIE IN TO EXISTING FRONT SLOPE.

2. BREAK BERM SO THAT MAXIMUM FLOW LENGTH ALONG THE BERM IS LESS THAN 1000'. BREAK BERM IN LOW AREAS WHERE FLOW MAY OVERTOP THE BERM. DO NOT BREAK BERM ON HILLTOPS OR WHERE RUNOFF AND SEDIMENT FLOW DIRECTLY OFF THE ROW.

3. LOCATION OF BERM WILL VARY. BERM COULD BE PLACED ON FRONTSLOPE OR BACKSLOPE DEPENDING ON FIELD CONDITIONS. SEE SPECIFIC SW3P LAYOUT SHEET FOR MORE DETAILS ON LOCATION OF BERM.

4. ROCK FILTER DAMS, SEDIMENT CONTROL FENCE, EROSION CONTROL LOGS, ROCK FLUME, OR OTHER DEVICES CAN BE SUBSTITUTED AS DIRECTED. DEVICE MAY NOT BE NEEDED IN ALL LOCATIONS. SEE SPECIFIC SW3P LAYOUT SHEET FOR MORE DETAILS ON LOCATION OF DEVICES.

5. PLACE ROCK FLUME DISSAPATOR AS DIRECTED BY THE ENGINEER. SIZE AND LOCATIONS OF ROCK FLUME WILL VARY. PROVIDE ROCK OR RUBBLE WITH A 3" TO 6" AGGREGATE. SECURE ROCK WITH 20-GAUGE GALVANIZED WOVEN WIRE MESH WITH 1" DIAMTER HEXAGONAL OPENINGS. ROCK SHOULD BE PLACED ON THE MESH AND MESH SHALL BE FOLDED AT THE UPSTREAM SIDE OVER THE ROCK AND TIGHTLY SECURED TO ITSELF ON THE DOWNSTREAM SIDE USING WIRE TIES. PAYMENT WILL BE MADE BY ITEM TEMP PAVED FLUME (INSTALL).

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

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Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT 2009	CONT	SECT	JOB	HIGHWAY
REVISIONS JULY 2019	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		160

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERMANENT) (URBAN) (SAND or CLAY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 1st THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP: BUFFALO GRASS (Texoka) COMMON BERMUDA GRASS (HULLED) BLUE GRAMA (NATIVE)	4.0 LBS PLS / ACRE 5.0 LBS PLS / ACRE 1.5 LBS PLS / ACRE @1/4 -1/2" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (URBAN) WARM SEASON SEEDING

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: LATE SPRING & SUMMER SEED FROM MAY 16th THROUGH AUGUST 31st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) COMMON BERMUDA GRASS (UNHULLED) FOXTAIL MILLET	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 15. LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERMANENT) (RURAL) (CLAY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 1st THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP: GREEN SPRANGLETOP SIDEOATS GRAMA BUFFALOGRASS BERMUDA GRASS BLACKWELL SWITCHGRASS ILLINOIS BUNDLEFLOWER	1.5 LBS PLS / ACRE 1.5 LBS PLS / ACRE 3.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 0.5 LBS PLS / ACRE @1/4 -1/2" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (RURAL) WARM SEASON SEEDING

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: LATE SPRING & SUMMER SEED FROM MAY 16th THROUGH AUGUST 31st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) BERMUDA GRASS (UNHULLED) GREEN SPRANGLETOP FOXTAIL MILLET	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 20. LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (PERMANENT) (RURAL) (SANDY)

"WARM SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
PERMANENT: EARLY SPRING SEED FROM FEBRUARY 1st THROUGH May 15th. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP: GREEN SPRANGLETOP BERMUDA GRASS SAND LOVEGRASS SAND DROPSEED WEEPING LOVEGRASS BLUE GRAMA PARTRIDGE PEAS (COMANCHE)	1.5 LBS PLS / ACRE 2.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE 1.0 LBS PLS / ACRE @1/4 -1/2" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

NOTES:

1. SEE NOTES ON TA-VES SHEET 2 OF 2 FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

SCALE = NTS SHEET 1 OF 2

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATION FOR VEGETATION ESTABLISHMENT SHEET

WFS-TA-VES

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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REVISIONS JULY 2019	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		161

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (URBAN) COOL SEASON SEEDING

"COOL SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: EARLY FALL SEED FROM SEPTEMBER 1st THROUGH DECEMBER 1st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) COMMON BERMUDA GRASS (UNHULLED) TALL FESCUE ANNUAL RYE GRASS	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 15.0 LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

ITEM 164 SEEDING FOR EROSION CONTROL

SEED (TEMPORARY) (RURAL) COOL SEASON SEEDING

"COOL SEASON" PLANTING DATES	SEED MIXTURE	PURE LIVE SEED RATE & PLANT DEPTH.
TEMPORARY: EARLY FALL SEED FROM SEPTEMBER 1st THROUGH DECEMBER 1st. AS AREAS OF THE ROW ARE PREPARED AND DETERMINED READY FOR DRILL SEEDING.	NEW CROP SEED: TYPE : BUFFALOGRASS (TEXOKA) BERMUDA GRASS (UNHULLED) GREEN SPRANGLETOP WESTERN WHEATGRASS CANADA WILD RYE GRASS ELBON RYE GRASS	 3.0 LBS PLS / ACRE 4.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 3.0 LBS PLS / ACRE 2.0 LBS PLS / ACRE 15.0 LBS PLS / ACRE @ 1" Soil Depth
SOIL PREPARATION EQUIPMENT AND PRACTICES: RIPPER --- DISK --- HARROW --- CULTI-PACKER .		

NOTES:

1. ALL SEED MIXTURE TYPES SHALL BE PURCHASED IN PRE- MIXED BAGS, "BY TYPE" BLENDED BY THE GROWER SHIPPER.
2. SOILS THAT ARE COMPACTED, HAVE CLODS, SHALL BE REWORKED UNTIL READY FOR SEEDING. AS DIRECTED.
3. ALL SOIL SURFACES SHALL BE LEVEL WITH NATURAL FLOWING SMOOTH GRADES. NO TIRE RUTS OR FURTHER TRAFFIC ALLOWED.
4. SOIL SURFACE SHALL BE FIRM BUT NOT COMPACTED, ALLOWING 1/4" DEPRESSION UNDER NORMAL FOOT TRAFFIC.
5. SEED 100% OF THE BED AREA. NO SKIPS OR VOID AREAS ALLOWED. EXAMPLE:AREAS AROUND SIGN POSTS AND INLETS.
6. SEED UP TO THE FIRST 6" OF THE EDGE OF PAVEMENT. AS DIRECTED, HAND RAKE ISOLATED SEEDED AREAS.
7. WEIGH ALL CALIBRATED SEED SAMPLES FOR ACCURACY AND PRESENT DOCUMENTATION TO ENGINEER.

FOR DRILL SEEDING

8. USE ONLY PROFESSIONAL NATIVE GRASS OR TURF GRASS (MULTI- 3 BIN) DRILL SEEDERS. NO DROP SEEDERS ALLOWED. OTHER TYPES OF SEEDERS AS APPROVED BY THE ENGINEER.
9. CALIBRATE DRILL SEEDER FOR SPECIFIED (PLS) PER ACRE BEFORE DRILL SEEDING.
10. DRILL SEEDER MUST BE EQUIPPED WITH THE LARGE FRONT CUTTING COULTERS DURING THE INSPECTION OF DRILL SEEDER.

FOR BROADCAST SEEDING

11. USE ONLY COMMERCIAL TYPE CYCLONE TYPE SPREADERS.
12. CALIBRATE CYCLONE SPREADER FOR 1000 Sq. Ft. (PLS) PER ACRE BEFORE SEEDING.
13. TO PREVENT SEED SEPARATION IN SPREADERS, SPREAD ALL SEED TYPES INDEPENDENTLY IN A SEPARATE APPLICATION.
14. IMMEDIATELY AFTER SEEDING, IN ONE OR TWO OPERATIONS, CULTI-PACK THE SEEDED SOILS AND FIRM SEED INTO SURFACE.
15. DISCONTINUE SEEDING IF WIND EXCEEDS 10 MPH.

ITEM 314 EMULSIFIED ASPHALT TREATMENT

TIME SCHEDULE	FUNCTIONAL USE:
IMMEDIATELY AFTER: SOIL PREPARATION OR WITHIN 24 HOURS AFTER SEEDING, APPLY THE TACK COAT TO DESIGNATED SOIL SURFACES.	SOIL EROSION CONTROL,OR MOISTURE RETENTION BARRIER.

NOTES:

1. ALL TRUCK APPLICATIONS SHALL BE COMPLETED IN ONE PASS OF THE DISTRIBUTOR. ALL TOUCH UP WORK WILL BE FINISHED BY HAND AND HOSE PROCEDURES. APPLY FROM EDGE OF PAVEMENT THROUGH THE FULL SPECIFIED AREAS.
2. ENGINEER WILL INSPECT FOR ACCURACY THE OVERALL DEPTH OF THE APPLIED TACK COAT MATERIALS.
3. FURTHER VEHICULAR TRAFFIC IS NOT ALLOWED ON LAID BY TACK COAT SURFACES. AT THE CONTRACTORS EXPENSE ALL DAMAGES TO TACK COAT SURFACES WILL BE RE -SHOT AS DIRECTED BY THE ENGINEER.
4. USE MATERIALS AS SPECIFIED FOR EROSION CONTROL ON TABLE 18 IN ITEM 300 ASPHALTS, OILS, AND EMULSIONS, AT A RATE OF 0.25 GAL/SY.

ITEM 166 FERTILIZER

TIME SCHEDULE	FUNCTIONAL USE:
AFTER TOPSOIL PLOWING PREPARATIONS ARE COMPLETED, FERTILIZE ROW SOIL SURFACES AND HARROW 2" TO 4" DEEP INTO PLACE.	PLANT NUTRIENTS FOR PLANT AND ROOT DEVELOPMENT.

FERTILIZER SHALL BE EVENLY DISTRIBUTED AT A RATE OF 100 LBS OF NITROGEN PER ACRE.
THE BREAK DOWN OF THE NITROGEN ELEMENT SHALL BE IN A 50% SLOW RELEASE FORM.
ANALYSIS OF THE (NPK) IS: 3:1:1 OR AS DIRECTED BY THE AREA ENGINEER.

ITEM 166 NOTES:

1. BROADCAST SPECIFIED FERTILIZER FROM THE EDGE OF PAVEMENT, THROUGH THE ENTIRE ROW SEED BED AREA. APPLICATIONS FOR EDGE OF PAVEMENT, CULVERTS, SIGN POST AREAS, GUARD RAILS AND ISOLATED AREAS SHALL BE APPLIED BY WALK BEHIND SPREADERS AND BY HAND. NO FERTILIZER ALLOWED ON PAVEMENT SURFACES.

2. ALL SPREADERS SHALL BE CALIBRATED BY THE CONTRACTOR AND THE ENGINEER FOR ACCURACY AND PERFORMANCE. SHALL USE UNOPENED 50• BAGS OF SPECIFIED FERTILIZER FOR DAILY CALIBRATIONS. APPLICATION SHALL BE A EVEN DISTRIBUTION OF PRODUCT ON DESIGNATED SOIL SURFACES.

3. FERTILIZER SHALL BE DELIVERED IN 50• BAGS UNLESS OTHERWISE SPECIFIED OR APPROVED PRIOR TO DELIVERY. BAGS SHALL BE CLEARLY LABELED SHOWING CONTENTS. IF BULK FERTILIZER IS APPROVED,DOCUMENTATION WILL BE REQUIRED FOR EACH LOAD OF MATERIAL DELIVERED VERIFYING AUTHENTICITY OF THE MATERIAL. CULTURAL PROCEDURES ARE UNDER THE DIRECTION OF THE TXDOT AREA ENGINEER.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

03/30/2023

SCALE = NTS SHEET 2 OF 2

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATION FOR VEGETATION ESTABLISHMENT SHEET

WFS-TA-VES

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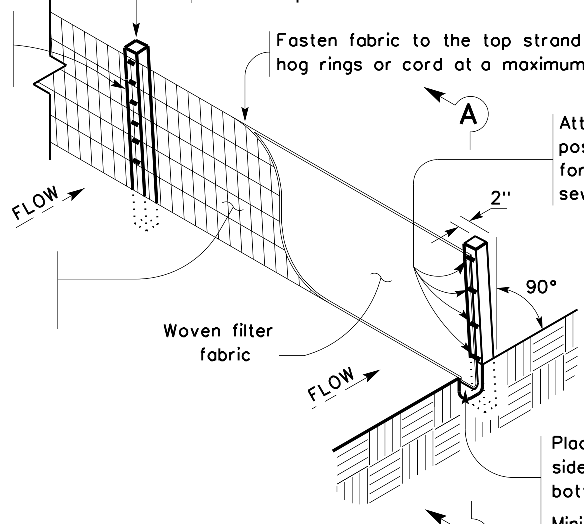
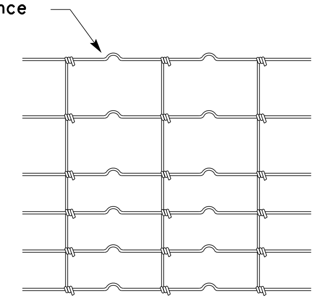
	CONT	SECT	JOB	HIGHWAY
REVISIONS JULY 2019	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		162



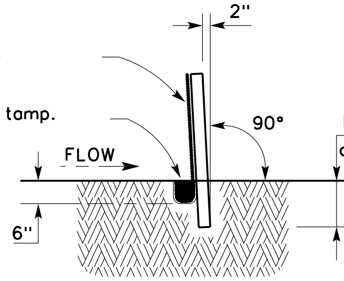
TEMPORARY SEDIMENT CONTROL FENCE

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.



SECTION A-A

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 ^{2}. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

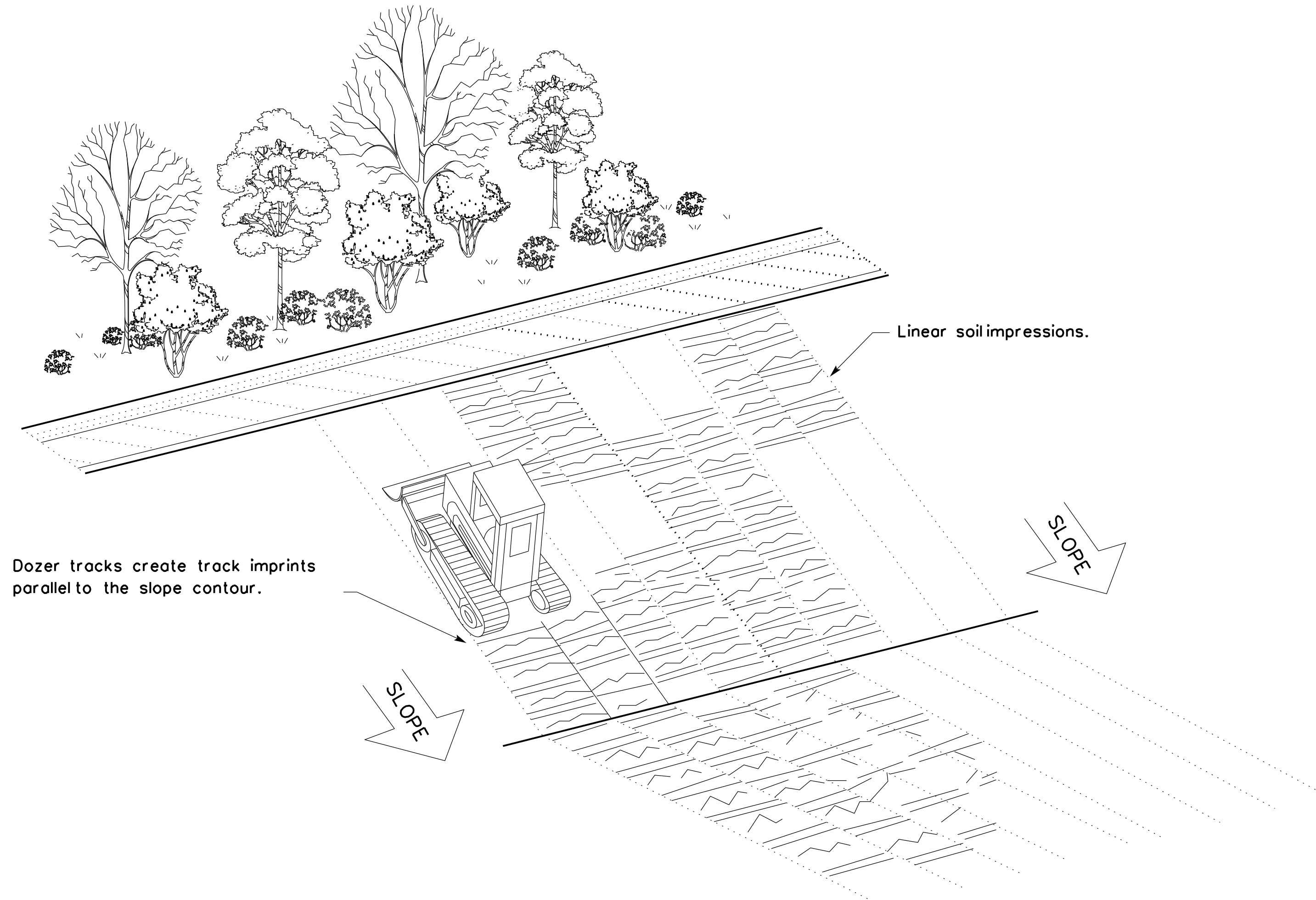
LEGEND

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 continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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	WFS.	THROCKMORTON		163

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3/29/2023

DATE: 3/29/2023
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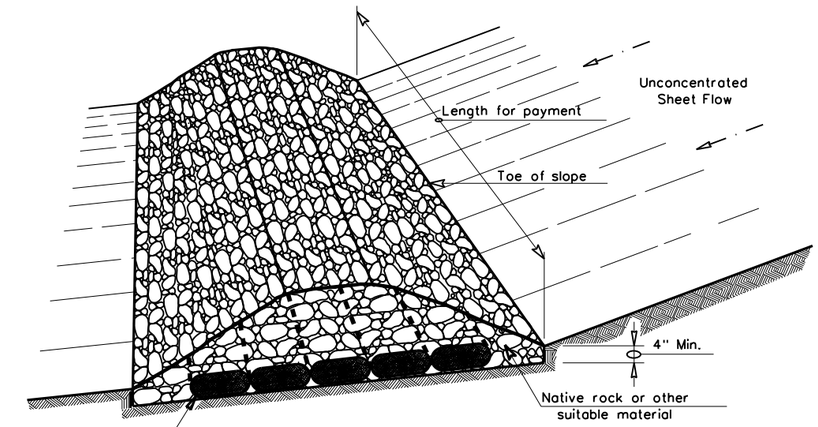
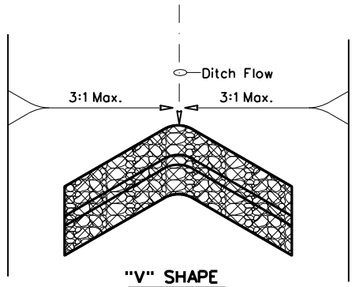
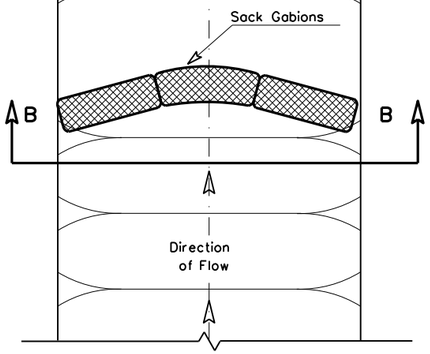


FILTER DAM AT TOE OF SLOPE

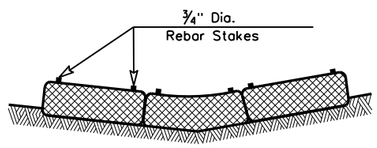
RFD1



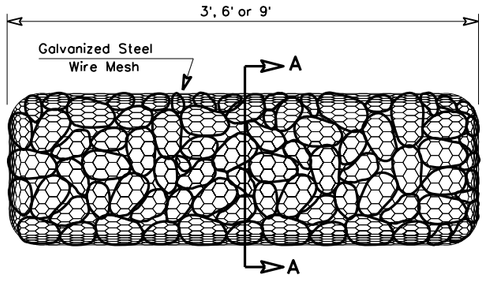
"V" SHAPE
PLAN VIEW



PLAN VIEW

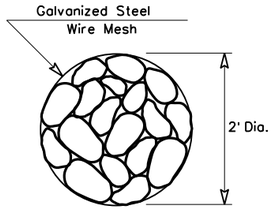


SECTION B-B

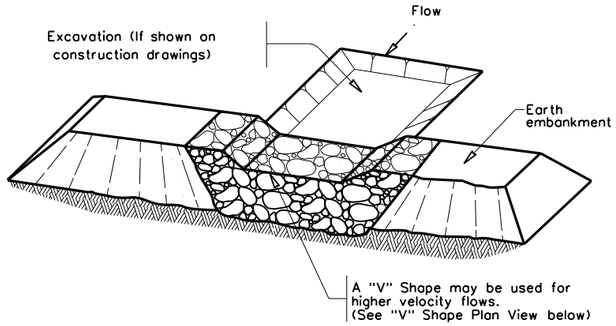


TYPE 4 (SACK GABIONS)

RFD4

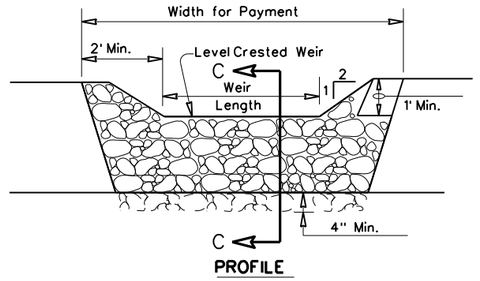


SECTION A-A

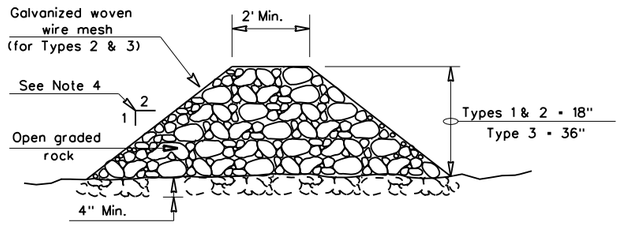


FILTER DAM AT SEDIMENT TRAP

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^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

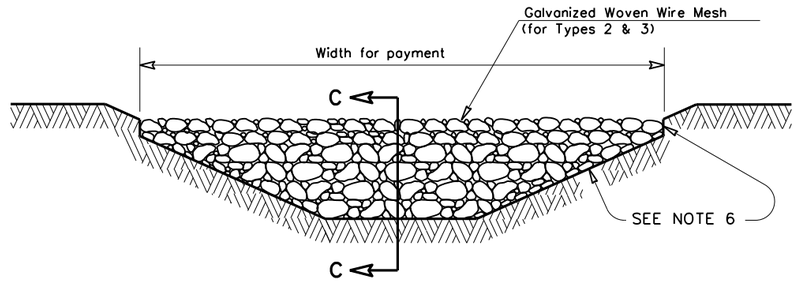
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity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

Texas Department of Transportation — Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS		
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REVISIONS	0284	02	026	SH 79		
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DATE: 3/29/2023
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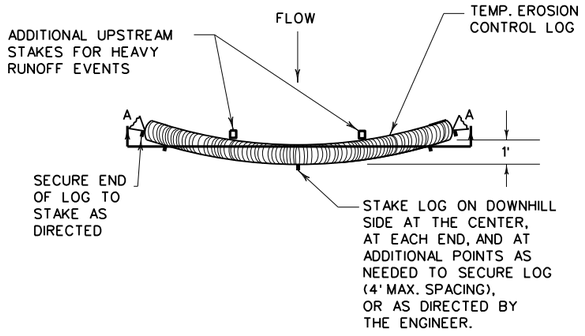
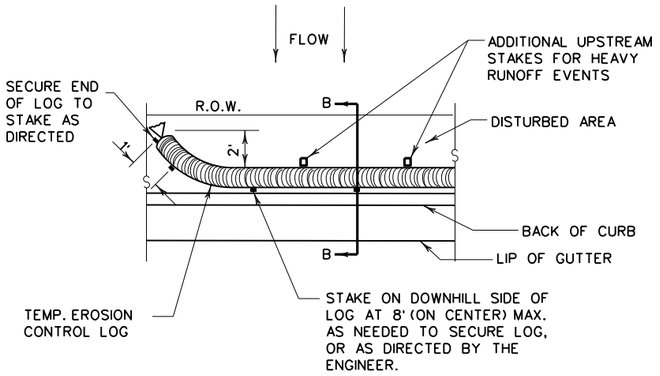


PLAN VIEW



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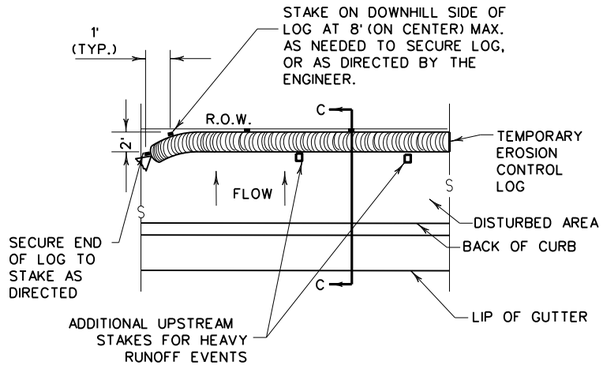
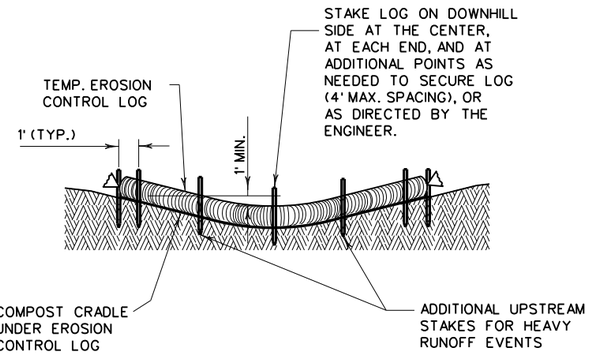


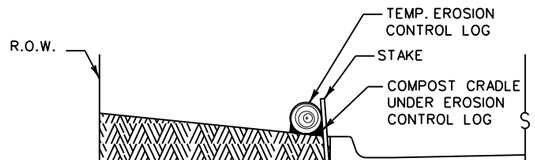
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

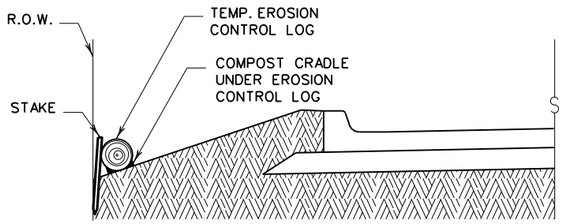
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

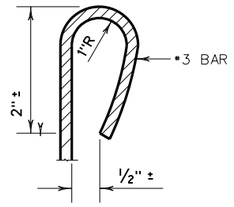
CL-BOC



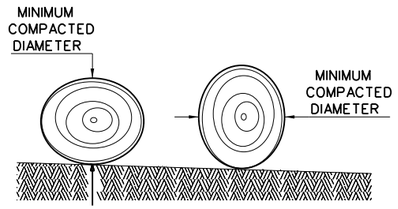
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		165

DATE: 3/29/2023
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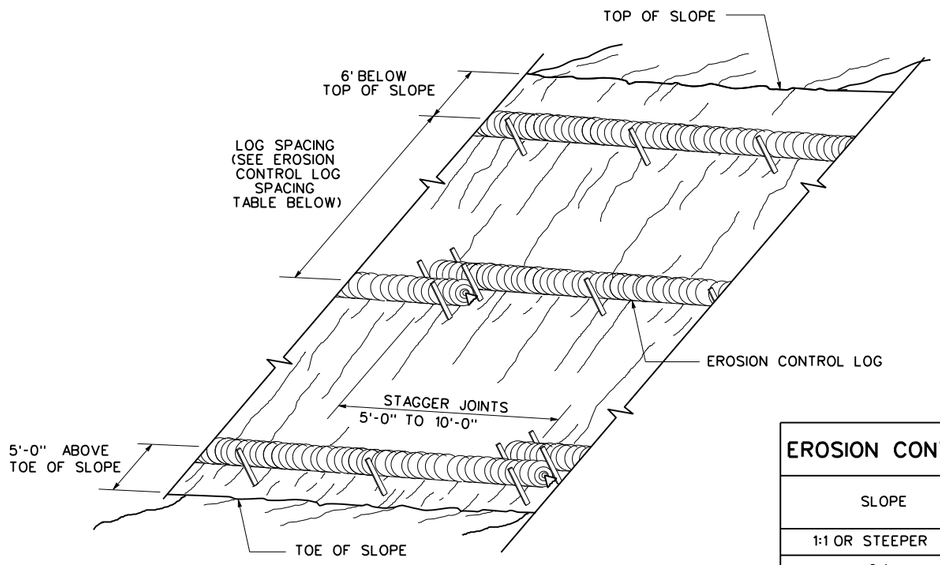
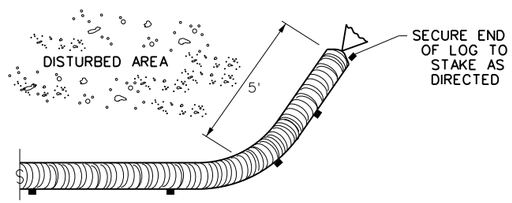


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

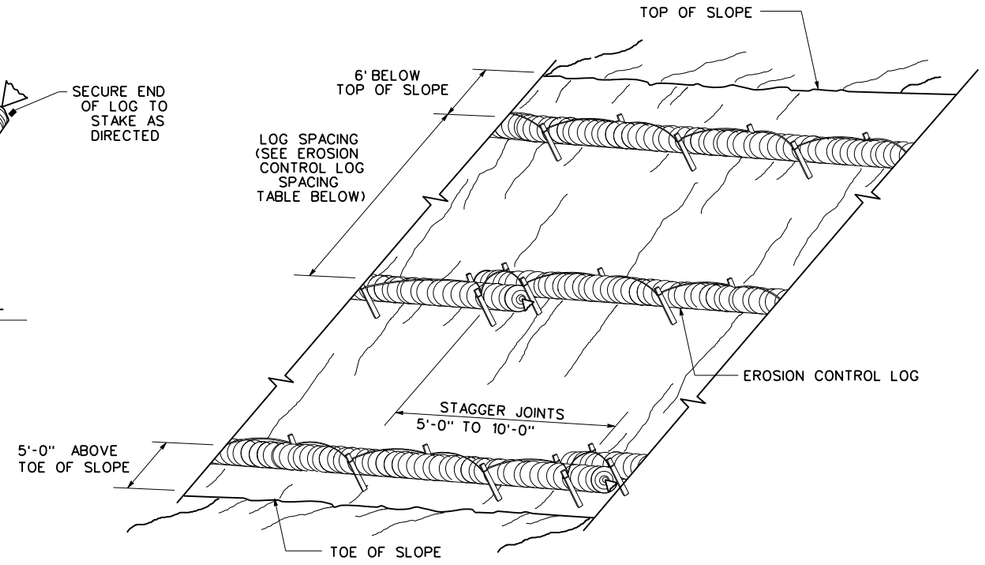
CL-SST



END SECTION RAP DETAIL

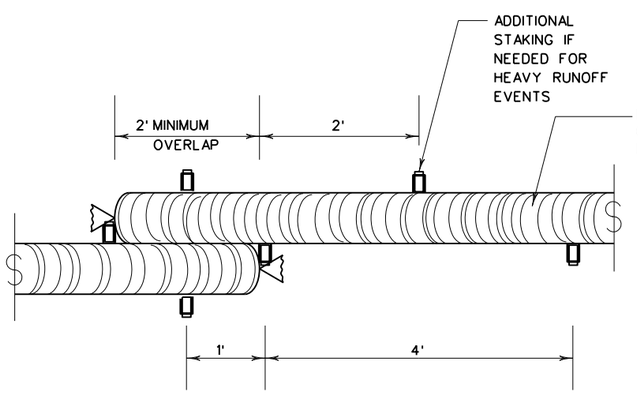
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

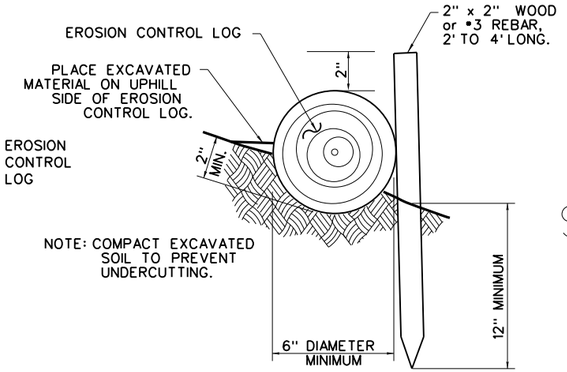
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

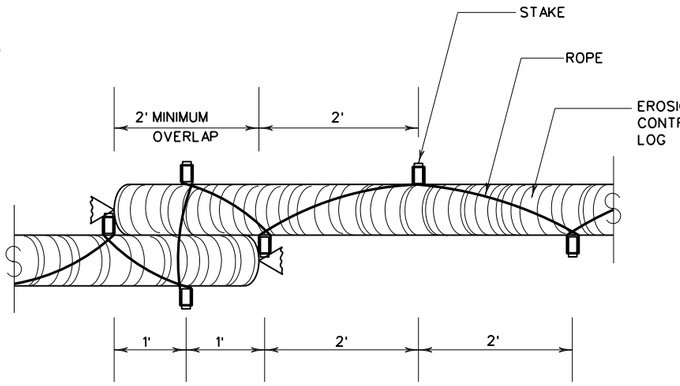


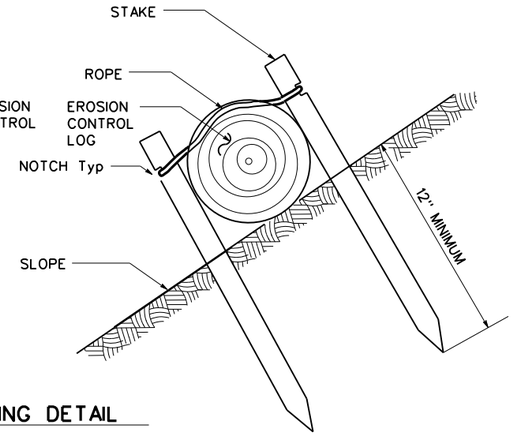


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

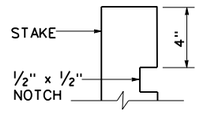
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		166

DATE: 3/29/2023
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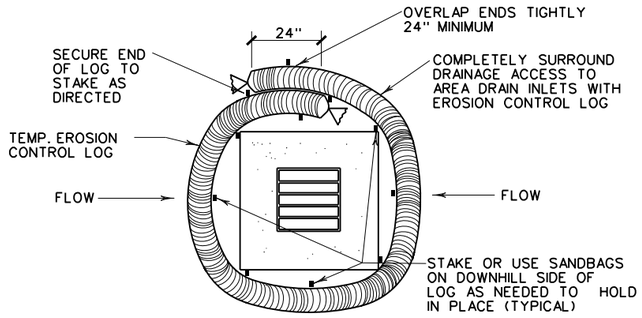
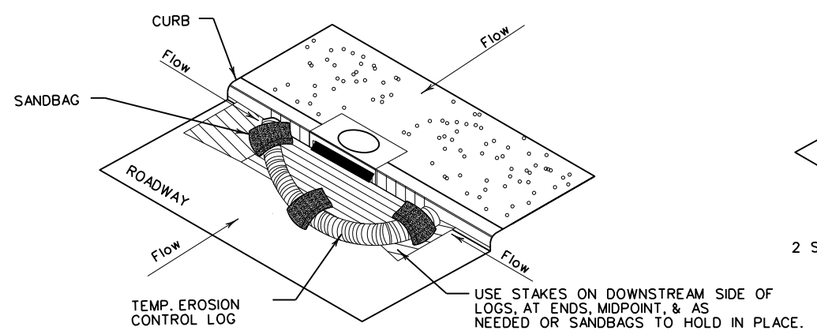


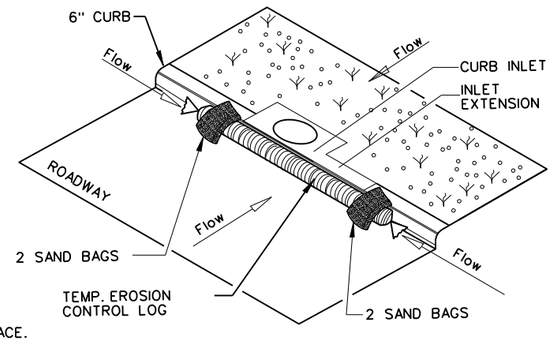
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

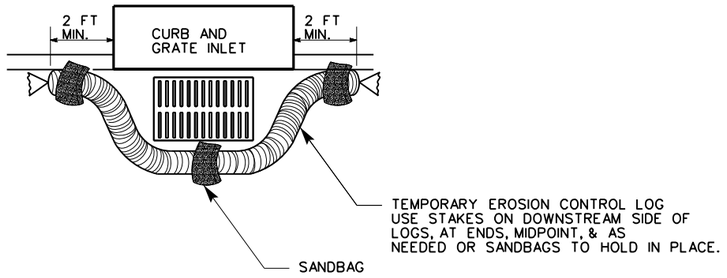
CL-CI



EROSION CONTROL LOG AT CURB INLET

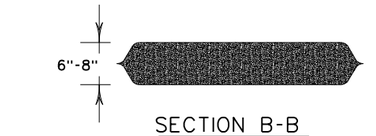
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

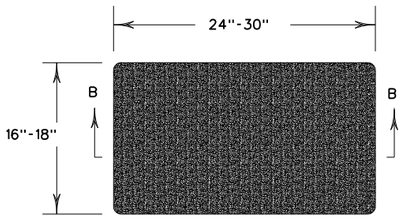


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

Texas Department of Transportation

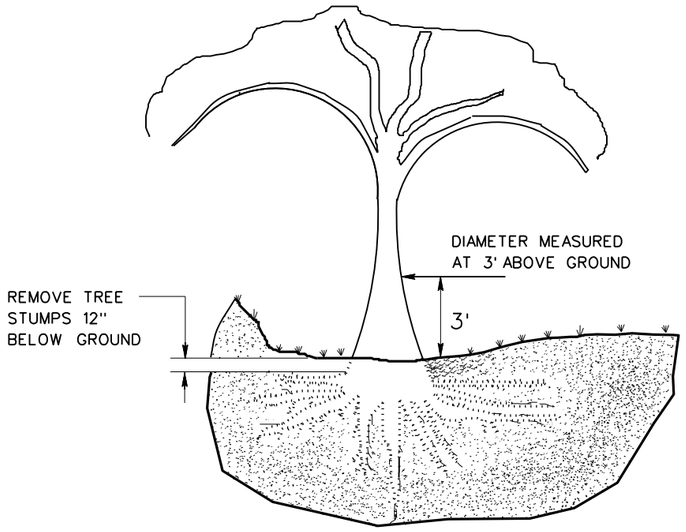
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

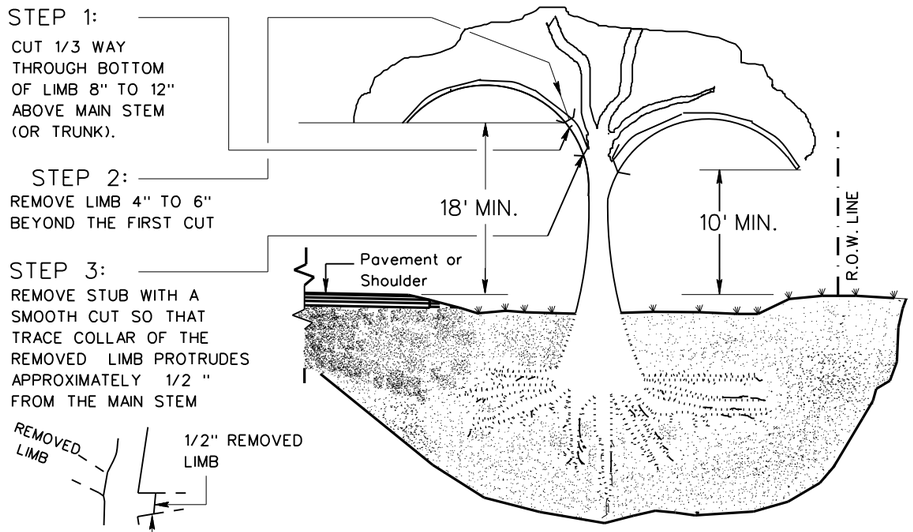
EROSION CONTROL LOG

EC(9)-16

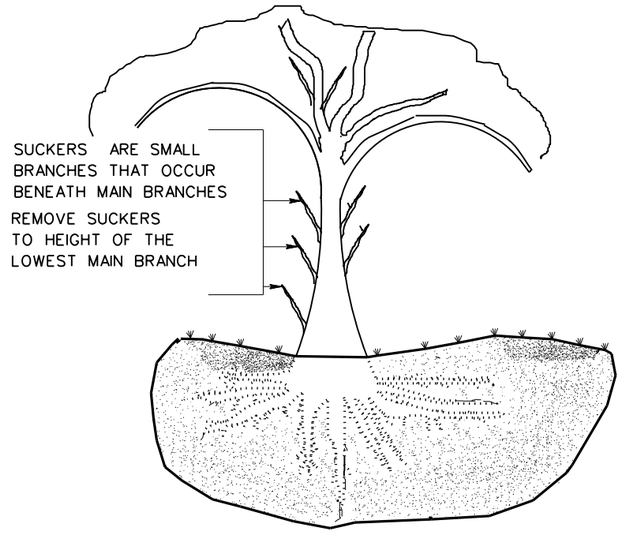
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		167



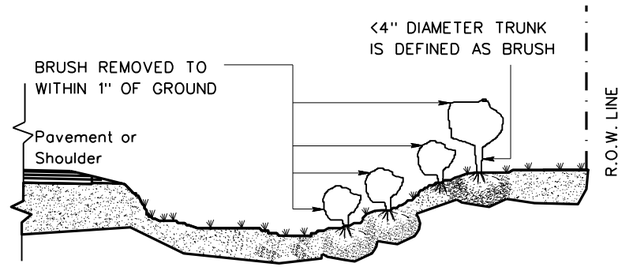
TREE REMOVAL



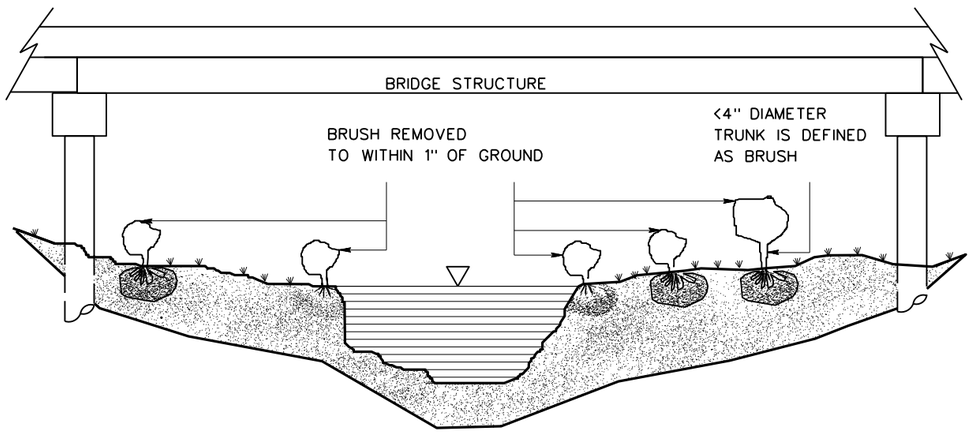
TREE TRIMMING



STEPS 1,2 AND 3 APPLY WHEN REMOVING LIMBS 2" IN DIAMETER OR LARGER.



BRUSH REMOVAL



BRUSH REMOVAL UNDER BRIDGE AND IN CHANNEL

GENERAL NOTES:

TREE TRIMMING

1. TRIM AND REMOVE ALL TREE LIMBS ON THE PAVEMENT SIDE OF THE TRUNK 18' ABOVE THE PAVEMENT OR BRIDGE DECK ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

2. TRIM AND REMOVE ALL TREE LIMBS BETWEEN THE TRUNK AND R.O.W. LINE 10' ABOVE NATURAL GROUND, TERRAIN OR OTHER STRUCTURE ELEVATION, UNLESS OTHERWISE SHOWN ON THE PLANS.

TREE REMOVAL

3. FOR TREES MARKED FOR REMOVAL, THE DIAMETER OF TREES ARE DETERMINED BY MEASUREMENT OF THE TRUNK CIRCUMFERENCE 3' ABOVE THE GROUND. TREES WITH TRUNKS OF LESS THAN 4" DIAMETER ARE CONSIDERED TO BE BRUSH. TREES WITH MULTIPLE TRUNKS AT THE POINT OF MEASUREMENT ARE MEASURED AND PAID FOR SEPARATELY.

4. MEASUREMENTS FOR PAYMENT OF TREE DIAMETERS ARE DIVIDED INTO THE RANGES SHOWN IN TABLE 1.

TABLE 1
TREE TRUNK SIZE FOR TREE REMOVAL PAYMENT

PAY ITEM	RANGE FOR PAY ITEMS			
	TRUNK DIAMETER *		TRUNK CIRCUMFERENCE	
	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO	LOWER LIMIT IS GREATER THAN	UPPER LIMIT IS LESS THAN OR EQUAL TO
752 6005	4	12	12 1/2	37 1/2
752 6006	12	18	37 1/2	56 1/2
752 6007	18	24	56 1/2	75 1/2
752 6008	24	30	75 1/2	94
752 6009	30	36	94	113
752 6010	36	42	113	132
752 6011	42	48	132	151
752 6012	48	60	151	188 1/2
752 6013	60	72	188 1/2	226
752 6019	72	84	226	264
	84	GREATER THAN 84	264	NOT APPLICABLE

*SEE GENERAL NOTE *3.

Texas Department of Transportation — Maintenance Division Standard

TREE AND BRUSH REMOVAL

TRB-15(1)

FILE:	DN:JEO	CK:LJB	DW:JEO	CK:
© TxDOT MARCH 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0284	02	026	SH 79
Revised table 1 to 2014 Specification	DIST	COUNTY		SHEET NO.
	WFS.	THROCKMORTON		168

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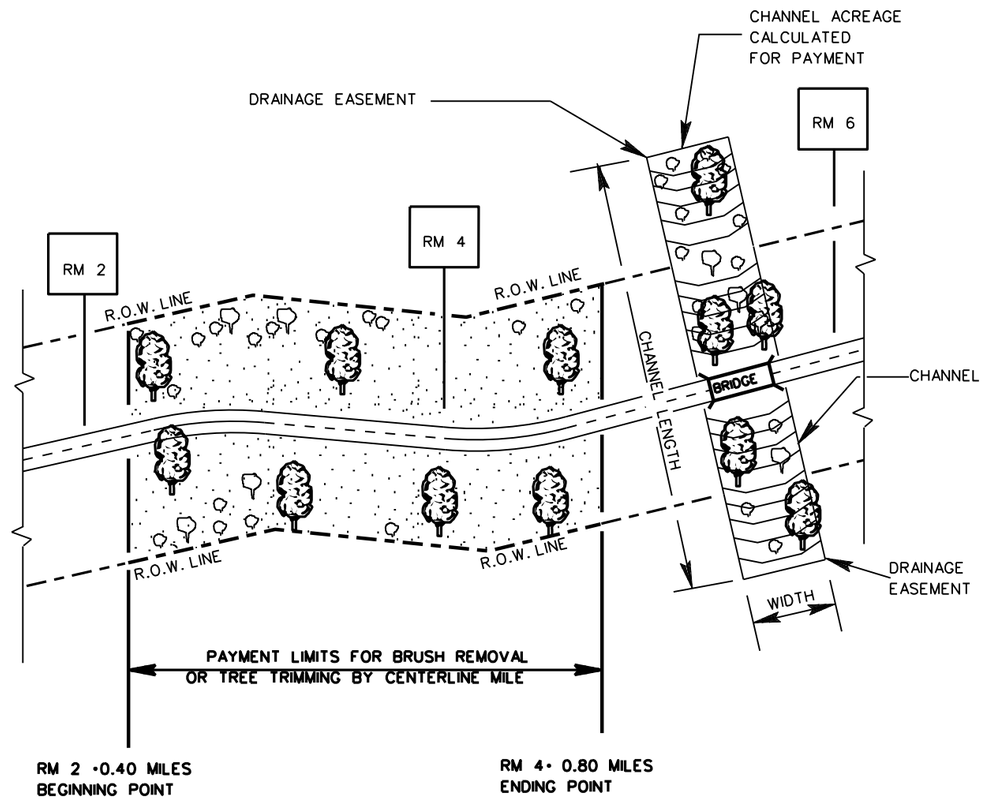
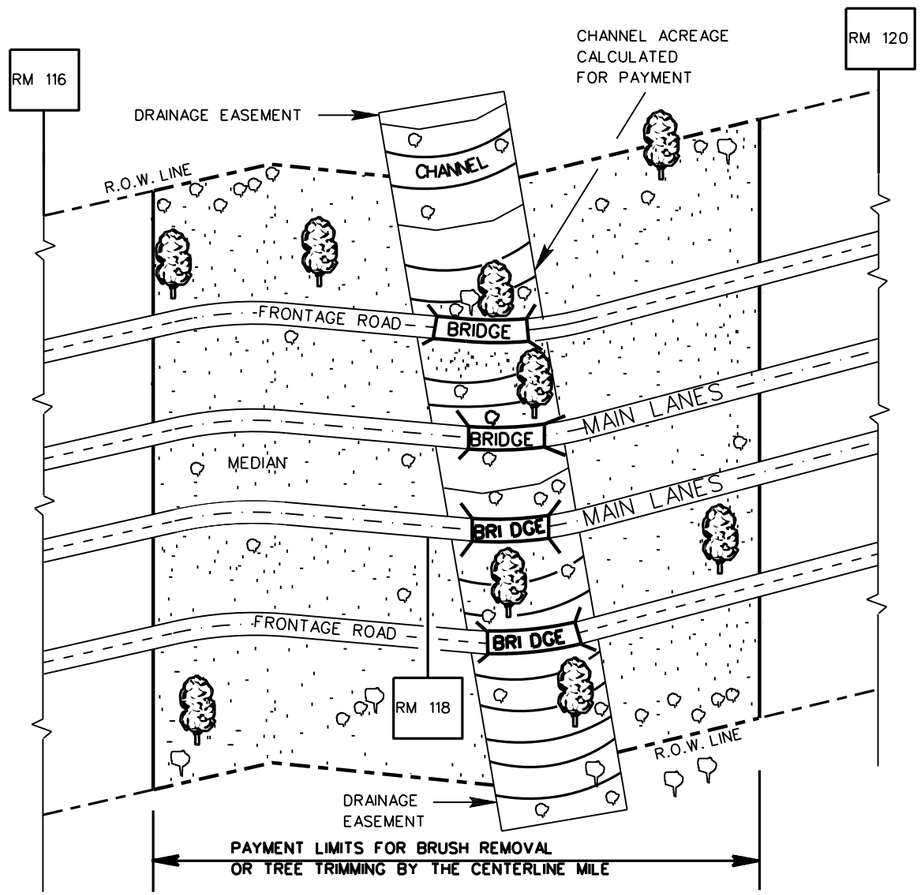
LEVELS DISPLAYED
1



BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: UNDIVIDED HIGHWAY



BRUSH REMOVED TO
WITHIN 1" OF GROUND
<4" DIAMETER TRUNK
IS DEFINED AS BRUSH
UNLESS OTHERWISE DIRECTED

EXAMPLE: DIVIDED HIGHWAY WITH FRONTAGE ROADS

GENERAL NOTES:

TREE TRIMMING AND BRUSH REMOVAL

1. PAYMENT BY THE CENTERLINE MILE IS MADE TO THE NEAREST 1/100 (0.01) MILE.

2. LIMITS OF WORK ARE SHOWN AS DISTANCES FROM REFERENCE MARKERS (RM).

3. PAY ITEMS BY THE CENTERLINE MILE INCLUDE ALL TREE TRIMMING OR BRUSH REMOVAL IN THE RIGHT OF WAY ON BOTH SIDES OF THE HIGHWAY. FOR DIVIDED HIGHWAYS, THE MEDIAN IS INCLUDED. FOR HIGHWAYS WITH FRONTAGE ROADS, THE AREAS BETWEEN THE FRONTAGE ROADS AND MAIN LANES, AND THE AREAS OUTSIDE OF THE FRONTAGE ROADS ARE INCLUDED.

4. BRUSH REMOVAL AND TREE TRIMMING UNDER BRIDGES, IN AND ALONG CHANNELS AND EASEMENTS ARE PAID FOR BY THE ACRE FOR AREAS DESIGNATED ON THE PLANS.

Texas Department of Transportation
Maintenance Division
Standard Plans

TREE AND BRUSH REMOVAL

TRB-15(2)

NOT TO SCALE — SHEET 2 OF 2

FILE: TRB-15(2).DGN	DRAWN: JEO	CHECKED: DM&JB	DW:-	CK:-	NEG NO.:		
© TxDOT APRIL 2015	MODIFIED:	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
REVISED: 5/13/2004	LJB	WFS.					169
REVISED: 9/24/2004	LJB	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
REVISED: APRIL 2015	JEO	THROCKMORTON		0284	02	026	SH 79