SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FM 1630
DESIGN SPEED = 50 MPH
AADT (2021) = 881
AADT (2041) = 1357
FUNCT CLASS: MAJOR COLLECTOR

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	STP 2B23(120)HES		1
STATE	DIST.	COUNTY	
TEXAS	WFS	COOKE	
CONT.	SECT.	JOB	HIGHWAY NO.
1609	01	029,ETC.	FM 1630

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT NO.: STP 2B23(120)HES
CONTROL SECTION JOB : 1609-01-029, ETC.

COOKE COUNTY
FM 1630

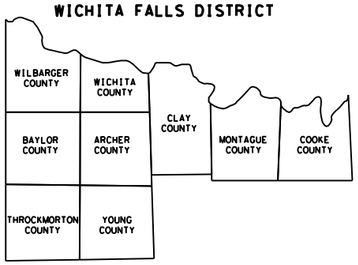
LIMITS: FROM MONTAGUE COUNTY LINE
TO CR 341, ETC.

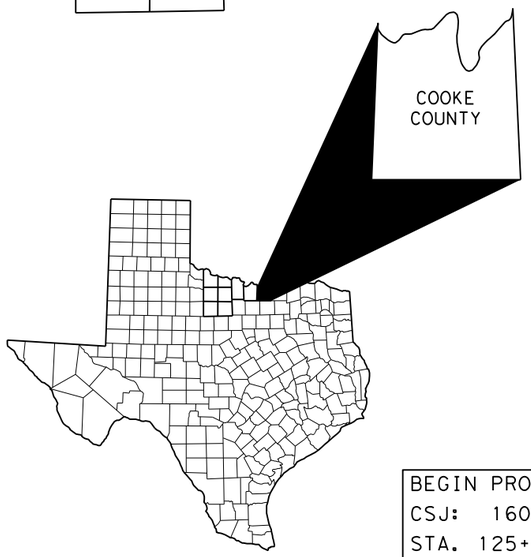
TOTAL LENGTH OF PROJECT =	BRIDGE	= 115.00FT.	=	0.022MI.
	ROADWAY	= 29652.00FT.	=	5.616MI.
	TOTAL	= 29767.00FT.	=	5.638MI.

TYPE OF WORK: HAZARD ELIMINATION & SAFETY
CONSISTING OF: ADDITIONAL PAVEMENT WIDTH & RUMBLESTRIPS

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

WICHITA FALLS DISTRICT





BEGIN PROJECT
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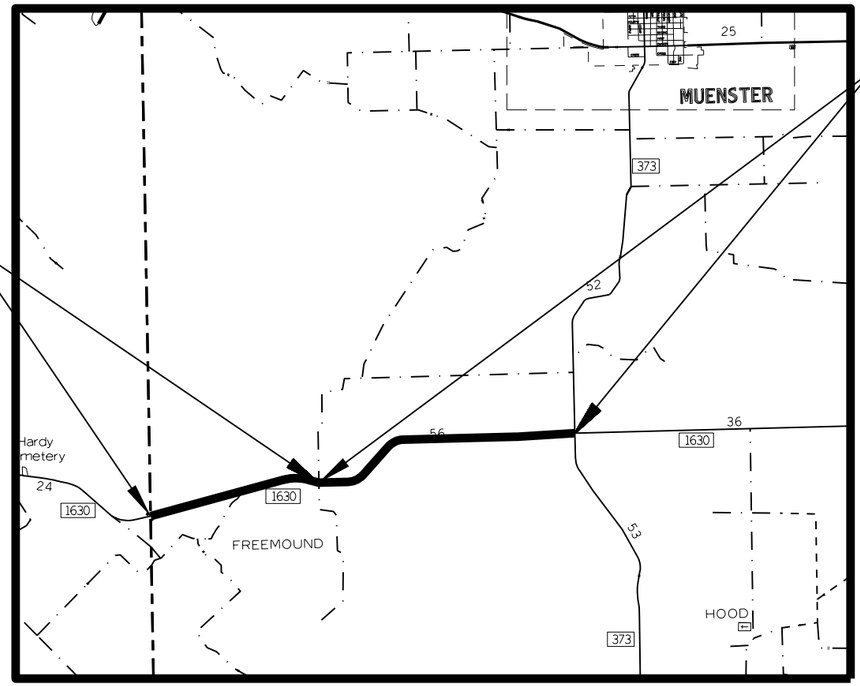
REF. MARKER 546+0.016

END PROJECT
STA. 242+92.82
REF. MARKER 548+0.215



BEGIN PROJECT
CSJ: 1609-01-030
STA. 242+92.82
REF. MARKER 548+0.215

END PROJECT
STA. 422+87.00
REF. MARKER 550+1.639

NO EXCEPTIONS
NO EQUATIONS
NO RAILROAD CROSSINGS

Texas Department of Transportation ®

SUBMITTED FOR LETTING 04/27/2023
Bryson Lawrence, P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING 04/27/2023
James S. Reaves P.E.
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

RECOMMENDED FOR LETTING 04/27/2023
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: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\1. General\TITLESHEET.dgn
DATE: 4/26/2023

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	13-15	QUANTITY SUMMARY
	16	SIDEROAD SUMMARY
		TRAFFIC CONTROL PLAN
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		TRAFFIC CONTROL PLAN STANDARDS
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##	32	TCP(1-2)-18
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##	36	TCP(3-3)-14
##	37	TCP(S-1)-08A
##	38	TCP(S-2)-08A
##	39	TCP(S-2c)-10
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##	109	CH-PW-0
##	110	PW
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	SHEET NO.	DESCRIPTION
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	158-162	WFS-TA-BMP
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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 THIS PROJECT.

Bryson Lawrence, P.E. — 04/27/2023

NAME — DATE

FM 1630
INDEX OF SHEETS

Texas Department of Transportation

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		2

FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\1. General\INDEX OF SHEETS.dgn

NOTES:

SEE VEGETATIVE ESTABLISHMENT DETAIL FOR SEEDING AND WATERING DETAILS.

SEE THE PLAN LAYOUT SHEETS FOR LOCATIONS TO RECEIVE 0" TO 2" PLANING.

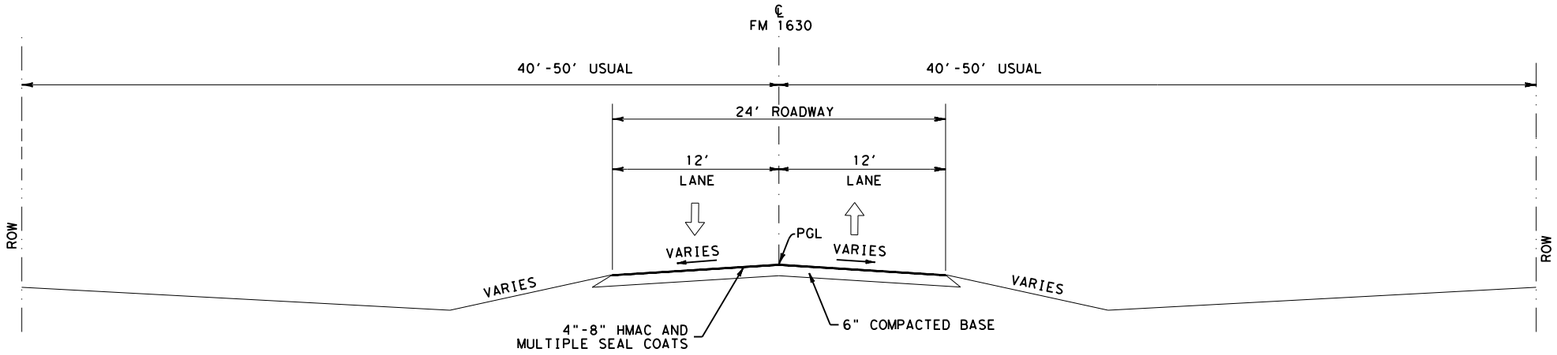
MAILBOX TUROUTS SHALL BE THE SAME PAVEMENT STRUCTURE AS THE ADJACENT PAVEMENT SECTION.

① INSTALL CENTERLINE RUMBLE STRIPS.

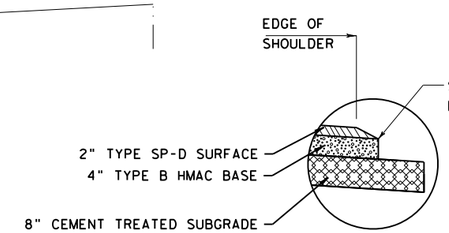
② INSTALL EDGE LINE RUMBLE STRIPS.

③ NO PAVEMENT WORK AT BRIDGE LOCATION SEE PLAINING DETAIL FOR STA RANGES

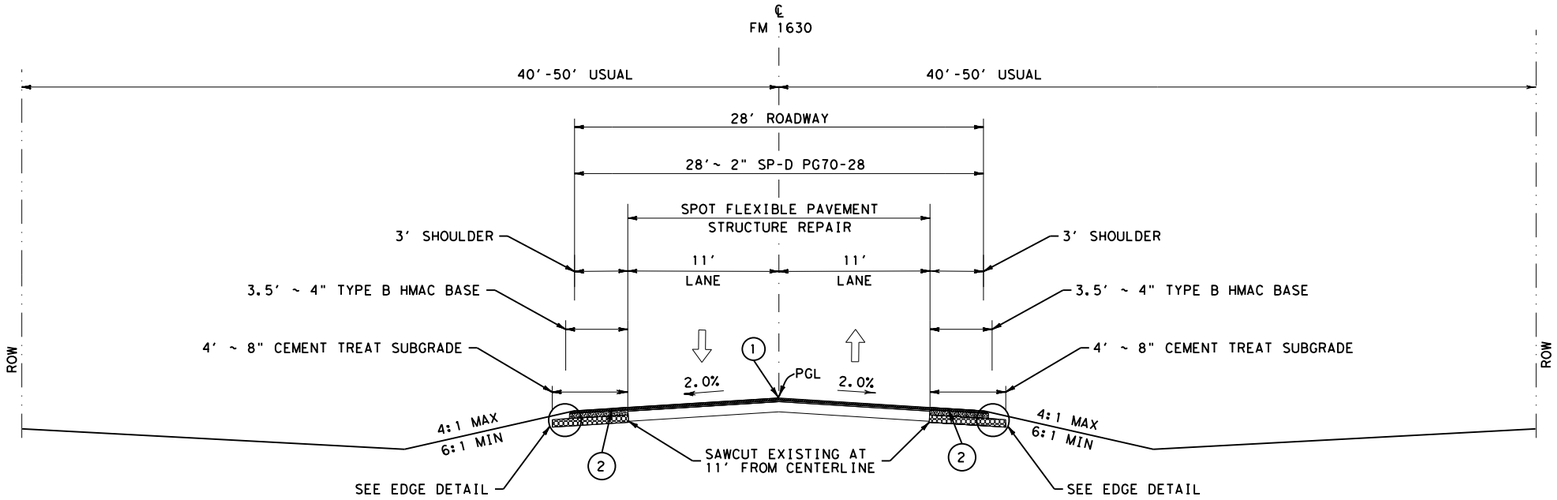
④ D-GR HMA TY-D PG70-22 LEVEL-UP STATION LIMITS TO BE INSTALLED PRIOR TO WIDENING (SEE SUPER ELEVATION DETAIL SHEET FOR ADDITIONAL INFORMATION)



FM 1630
EXISTING TYPICAL SECTION
CSJ 1609-01-029
STA. 125+20.00 TO STA. 132+92.94
STA. 134+07.94 TO STA. 163+53.00
STA. 168+90.00 TO STA. 242+92.82
CSJ 1609-01-030
STA. 356+00.00 TO STA. 422+87.00



EDGE DETAIL



FM 1630
PROPOSED TYPICAL SECTION
CSJ 1609-01-029
③ STA. 125+20.00 TO STA. 132+92.94
STA. 134+07.94 TO STA. 163+53.00
STA. 168+90.00 TO STA. 216+75.00
④ STA. 216+75.00 TO STA. 242+92.82
CSJ 1609-01-030
STA. 356+00.00 TO STA. 422+87.00

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
TYPICAL SECTIONS

SHEET 1 OF 3

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		3

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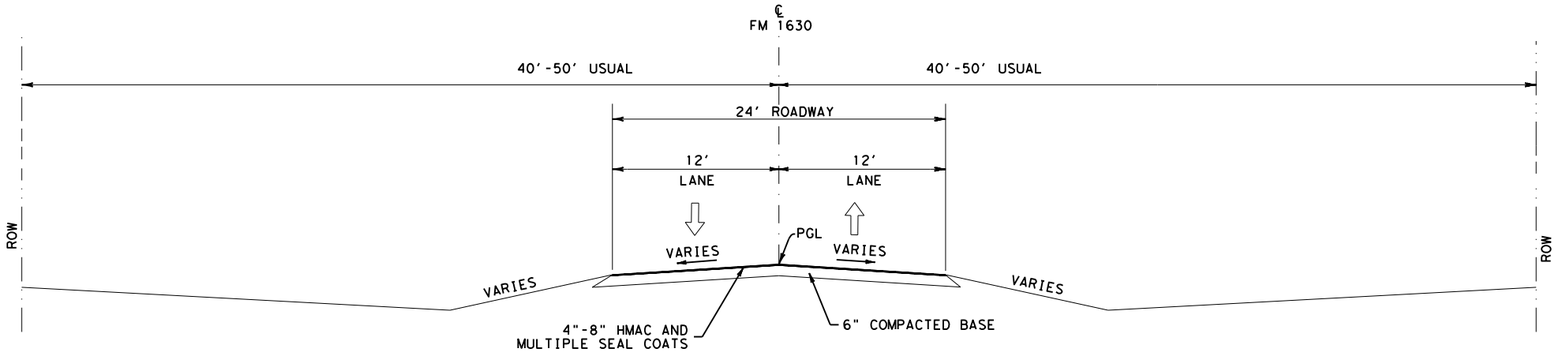
NOTES:

SEE VEGETATIVE ESTABLISHMENT DETAIL FOR SEEDING AND WATERING DETAILS.

SEE THE PLAN LAYOUT SHEETS FOR LOCATIONS TO RECEIVE 0" TO 2" PLANING.

(1) INSTALL CENTERLINE RUMBLE STRIPS.

(2) INSTALL EDGLINELINE RUMBLE STRIPS.



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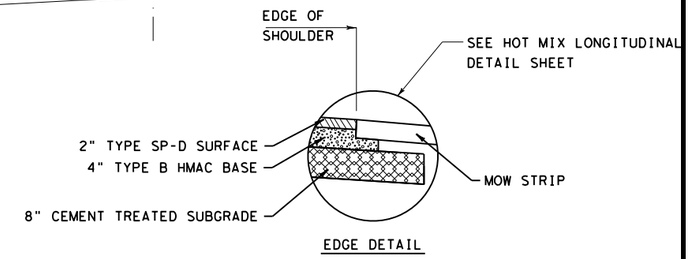
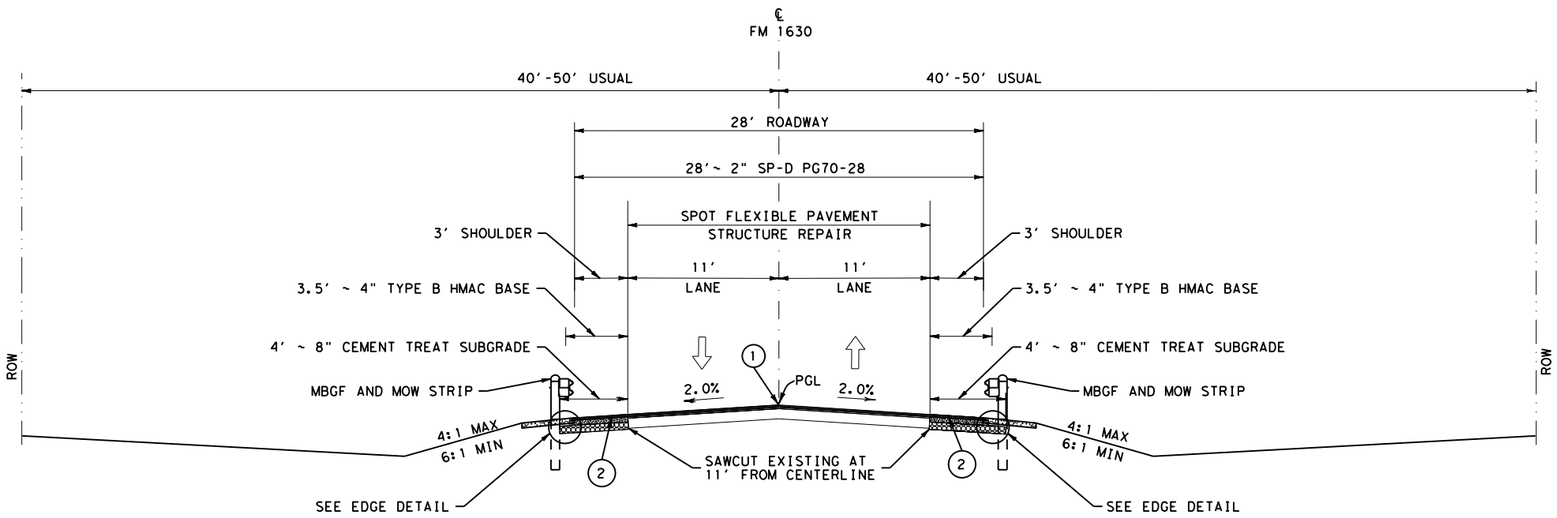
CSJ 1609-01-029
STA. 163+53.00 TO 168+90.00



EDGE DETAIL



FM 1630
PROPOSED TYPICAL SECTION
CSJ 1609-01-029
STA. 163+53.00 TO 168+90.00

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
TYPICAL SECTIONS

SHEET 2 OF 3

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		4

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

SEE THE PLAN LAYOUT SHEETS FOR LOCATIONS TO RECEIVE 0" TO 2" PLANING.

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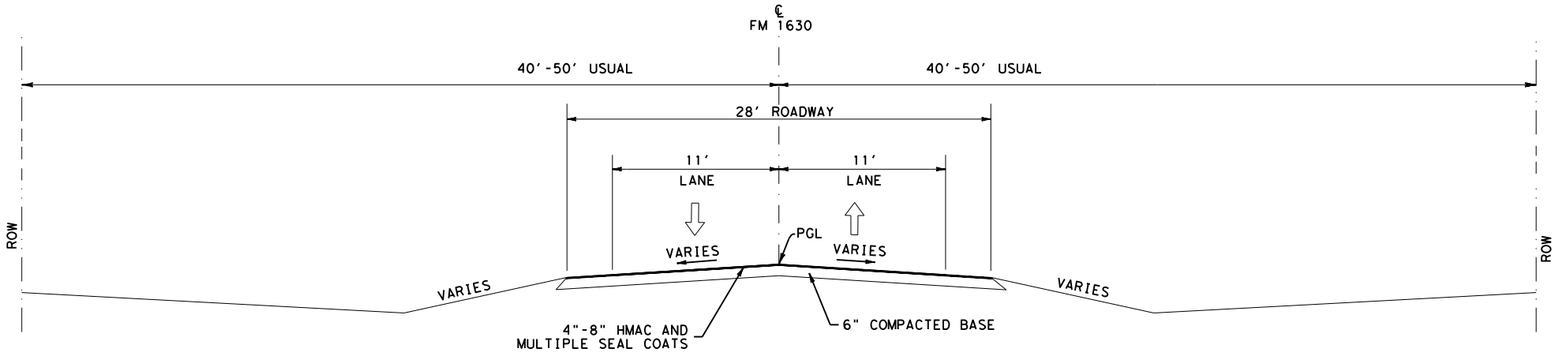
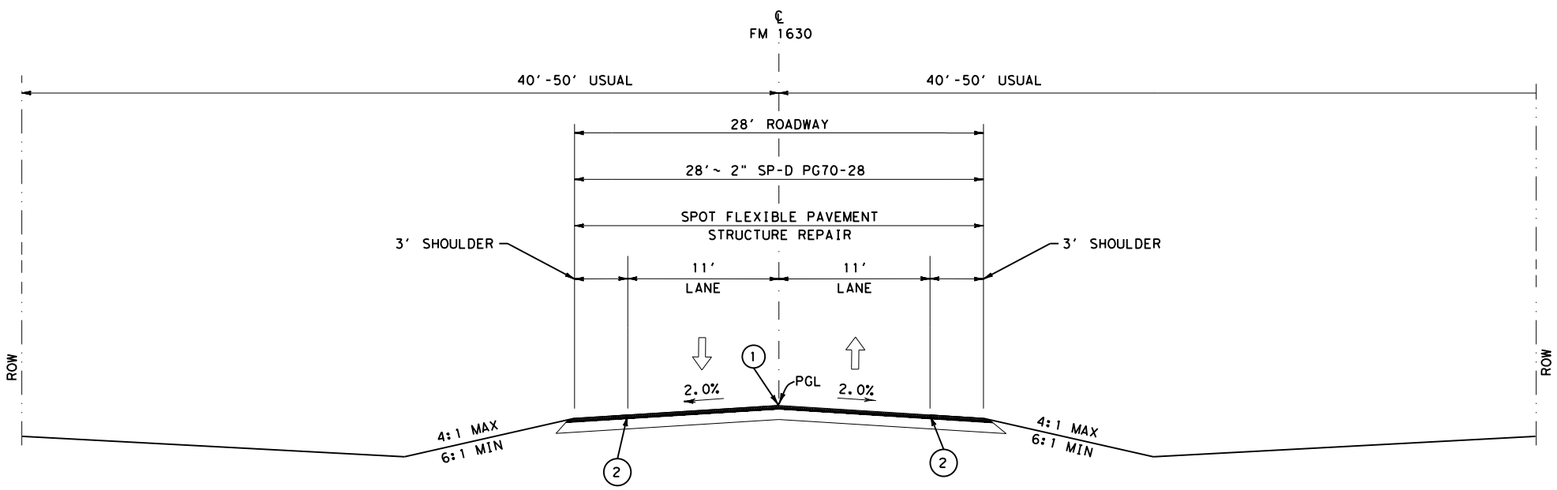


FM 1630
EXISTING TYPICAL SECTION
STA. 242+92.82 TO STA. 246+00.00
STA. 246+00.00 TO STA. 258+00.00
STA. 258+00.00 TO STA. 275+00.00
STA. 275+00.00 TO STA. 296+00.00
STA. 296+00.00 TO STA. 311+75.00
STA. 311+75.00 TO STA. 356+00.00



FM 1630
PROPOSED TYPICAL SECTION
③ STA. 242+92.82 TO STA. 246+00.00
STA. 246+00.00 TO STA. 258+00.00
③ STA. 258+00.00 TO STA. 275+00.00
STA. 275+00.00 TO STA. 296+00.00
③ STA. 296+00.00 TO STA. 311+75.00
STA. 311+75.00 TO STA. 356+00.00

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STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
TYPICAL SECTIONS

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		5

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 (8”)	4.00% by weight Est. @ 120 LB/CU FT	TON
310 – Prime Coat (MC-30)	0.25 GAL/SY	GAL
314 – Emulsified Asphalt Treatment (Erosion Control)(CSS-1H)	0.25 GAL/SY	GAL
3076 – Dense Graded Hot Mix Asphalt	110 LB / SY / Inch	TON
3077 – Superpave D SAC-B PG 70-28	110 LB / SY / Inch	TON
3084 – Bonding Course	0.10 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):

Colby Shelton, P.E. Colby.Shelton@txdot.gov

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

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

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page. The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

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 at the preconstruction conference.

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 various bid items.

The Contractor’s responsible person as described in item 7.2.6.1 must be able to respond within 45 minutes of being notified.

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. The windrow shall only be done where construction operations is ongoing. Refer to the WFS-TA-BMP and the Vegetative Establishment Detail for additional information. The Recycled Asphalt Pavement that will be used for shouldering up to the final overlay will come from the stockpile located at the Southwest corner of FM 1630 & FM 373. Additional RAP if needed, will be located at the

Northeast corner of FM 1630 and FM 677. This work will not be paid for directly but is considered subsidiary to the various bid items.

Slopes and grades shown in the typical sections may be changed in the field as directed by the Engineer to facilitate positive drainage. No direct payment shall be made for this work.

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. Mowing of weeds and tall vegetation, if needed, to prevent loss of soil moisture or choking out of grass seedlings. Mowing will be done as directed by the Engineer and will not be paid for directly.

Item 166 - Fertilizer
Fertilize all areas of the project that are seeded.

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. The target range value of 150 to 200 psi Unconfined Compressive Strength is required.

Item 351 – Flexible Pavement Structure Repair
Complete full depth repair locations in one day and reopen to traffic. No full depth repair locations will be left open overnight unless otherwise directed.
Provide asphalt concrete pavement Type - B PG 64-22.

All testing of HMAC for pavement structure repair will be waived as directed by the Engineer.

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.

Fog seal surface for butt joints to protect subgrade and prevent failures. Use rate as directed by the Engineer. Subsidiary to Item 351.

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

Stockpile material produced from this operation at the Southwest corner of FM 1630 & FM 373.

Item 403– Special Shoring
The Contractor is responsible for identifying temporary special shoring areas prior to bidding the project.

For this project shoring (special shoring) is defined as follows:

"Shoring (Shoring system)" means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Protect trenches, vertical walls and boring pits 5 ft. deep or deeper in accordance with OSHA Standards and Interpretations, 29 CFR 1926, Subpart P, “Excavations.”

Item 432 – Riprap
The use of synthetic fiber reinforcement shall not be allowed for this item.

Item 502 - Barricades, Signs, and Traffic Handling
Work vehicles within 30 feet of the traveled way shall have strobe lights or rotating beacons in use.

Contractor shall store all traffic control devices not currently being used at a location approved by the Engineer.

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. Widening on both sides of the road will not be allowed unless otherwise directed by Engineer.

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.

Contractor shall not set up traffic control at multiple locations. All work and traffic control operations shall be completed prior to advancing to next location unless otherwise directed by the Engineer.

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.

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
The construction, operation, and maintenance for the proposed project will be consistent with all local, state, and federal regulations. The Storm Water Pollution Prevention Plan (SW3P), SW3P Plan Sheets, EPIC and standards shall be updated in accordance with permits, policies, and/or procedures.

The disturbed area for this project, as shown on the plans, is 8.945 acres. The total disturbed area (TDA) will establish the required authorization for storm water discharges. The TDA of the project will be determined by the sum of the disturbed area within the project limits and all disturbed areas of a project specific location (PSL) located within the project limits and within one mile of the project area. The Department and the Contractor will obtain authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans based on the TDA of the project. The Contractor shall obtain any required authorization from the TCEQ for the discharge of storm water from any PSL and for any construction support activities on or off the project right-of-way as determined by the TDA. When the TDA results in land disturbance equal to or greater than one (1) acre and less than five (5) acres the Contractor shall provide a copy of the Construction Site Notice (CSN) to the Engineer. Furthermore, if the activities result in land disturbance of equal to or greater than five (5) acres the Contractor shall provide a copy of the CSN and Notice of Intent (NOI) to the Engineer which shall include any PSL located in the project limits or within one mile of the project limits.

The Contractor shall dispose of all construction debris so as to not have a harmful effect on the environment and in a manner acceptable to the Engineer.

Failure to make necessary corrections to SW3P items based on SW3P inspections will be cause for withholding the monthly estimate until such corrections are made.

If sediment escapes the construction site, immediately stop all work on the project, remove the sediment and modify the SW3P to prevent future non-compliance issues.
Every effort to preserve vegetation shall be made where it does not compromise safety or substantially interfere with project construction. Trees shall be trimmed rather than removed where possible.

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

Item 530 - Intersections, Driveways, and Turnouts
Removal of existing asphalt 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 asphaltic concrete drives to create a smooth joint with the proposed driveway or street.

Install the mailbox turnouts as shown on MB-22 Case 1. Use the same pavement structure as the adjacent widened pavement section. Payment for materials used to construct extra widening will be paid for under Item 530, by the SY. Use the same construction practices used in performing the widening. Consider any additional work subsidiary to the various bid items for the widening.

Item 560 - Mailbox Assemblies
Provide temporary installation as to not interrupt mail service. Contact the mail carrier for this route to determine the most desirable relocation place. For temporary mailbox supports, use type 6 as shown on the MB (3)-21 standard.

Item 585 – Ride Quality for Pavement Surfaces
Use Surface Test Type B pay adjustment schedule 3 on this project.

Item 644 – Small Roadside Sign Assemblies
The Contractor shall provide a DHT #162508 “Southern Plains Slipbase Housing” or equivalent as approved by the Engineer.

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 658 - Delineator and Object Marker Assemblies
Contractor shall use wedge anchor system (WAP) for all delineators and object markers on this project. Cast wedge anchor system for object markers into proposed headwalls as directed by the Engineer.

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 the base hot mix. No Substitute PG Binder will be allowed on this project.

Use of a side paving machine will be allowed for the placement of the Type B mixture.

Level-up shall be performed prior to widening the roadway. Locations are to be selected and approved by the Engineer prior to level-up.

Item 3077 – Superpave Mixtures
Provide mixture Type D SP SAC-B using PG binder 70-28 for the surface hot mix. No substitute PG Binder will be allowed on this project.

The use of Recycled Asphalt Shingles (RAS) will not be permitted and no more than 10% Recycled Asphalt Pavement (RAP) will be permitted in the surface mix for this project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1609-01-029 **DISTRICT** Wichita Falls **COUNTY** Cooke
HIGHWAY FM 1630

			CONTROL SECTION JOB		**1609-01-029**		**1609-01-030**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00176526**		**A00176527**			
			COUNTY		**Cooke**		**Cooke**			
			HIGHWAY		**FM 1630**		**FM 1630**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	104-6054	REMOVING CONCRETE(MOW STRIP)		LF	350.000				350.000	
	110-6001	EXCAVATION (ROADWAY)		CY	3,255.000		1,387.000		4,642.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)		CY	1,358.000		894.000		2,252.000	
	134-6002	BACKFILL (TY B)		STA			112.000		112.000	
	162-6002	BLOCK SODDING		SY	540.000				540.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)		SY	13,000.000		20,000.000		33,000.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)		SY	13,000.000		20,000.000		33,000.000	
	164-6029	CELL FBR MLCH SEED(TEMP)(WARM)		SY	1,390.000				1,390.000	
	164-6031	CELL FBR MLCH SEED(TEMP)(COOL)		SY	1,390.000				1,390.000	
	164-6035	DRILL SEEDING (PERM) (RURAL) (CLAY)		SY	13,000.000		20,000.000		33,000.000	
	168-6001	VEGETATIVE WATERING		MG	73.000		112.000		185.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)		SY	1,390.000				1,390.000	
	216-6001	PROOF ROLLING		HR	25.000		25.000		50.000	
	275-6001	CEMENT		TON	146.000		87.000		233.000	
	275-6010	CEMENT TREAT (SUBGRADE) (8")		SY	10,059.000		5,855.000		15,914.000	
	310-6009	PRIME COAT (MC-30)		GAL	2,515.000		1,464.000		3,979.000	
	314-6013	EMULS ASPH (EROSN CONT)(CSS-1H)		GAL	3,271.000		4,998.000		8,269.000	
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")		SY	6,300.000		4,000.000		10,300.000	
	354-6002	PLAN & TEXT ASPH CONC PAV(0" TO 2")		SY	1,251.000		624.000		1,875.000	
	403-6001	TEMPORARY SPL SHORING		SF	1,056.000		500.000		1,556.000	
	432-6017	RIPRAP (STONE TY R)(DRY)(18 IN)		CY	21.000				21.000	
	432-6026	RIPRAP (STONE COMMON)(DRY)(18 IN)		CY	21.000				21.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)		CY	71.000				71.000	
	442-6008	STR STEEL (MISCELLANEOUS BRIDGE)		LB	8,406.000				8,406.000	
	460-6002	CMP (GAL STL 18 IN)		LF	126.000		60.000		186.000	
	460-6003	CMP (GAL STL 24 IN)		LF	40.000		25.000		65.000	
	460-6005	CMP (GAL STL 36 IN)		LF	25.000				25.000	
	462-6051	CONC BOX CULV (5 FT X 3 FT)(EXTEND)		LF			60.000		60.000	
	462-6058	CONC BOX CULV (7 FT X 3 FT)(EXTEND)		LF			28.000		28.000	
	462-6077	CONC BOX CULV (10 FT X 9 FT)(EXTEND)		LF	20.000				20.000	
	464-6003	RC PIPE (CL III)(18 IN)		LF	48.000		80.000		128.000	
	464-6005	RC PIPE (CL III)(24 IN)		LF	46.000		2.000		48.000	
	464-6008	RC PIPE (CL III)(36 IN)		LF	24.000				24.000	
	466-6097	HEADWALL (CH - PW - 0) (DIA= 24 IN)		EA	6.000				6.000	
	466-6101	HEADWALL (CH - PW - 0) (DIA= 36 IN)		EA	2.000				2.000	
	466-6179	WINGWALL (PW - 1) (HW=4 FT)		EA			4.000		4.000	
	466-6188	WINGWALL (PW - 2) (HW=13 FT)		EA	2.000				2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1609-01-029 **DISTRICT** Wichita Falls **COUNTY** Cooke
HIGHWAY FM 1630

			CONTROL SECTION JOB		**1609-01-029**		**1609-01-030**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00176526**		**A00176527**			
			COUNTY		**Cooke**		**Cooke**			
			HIGHWAY		**FM 1630**		**FM 1630**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	467-6348	SET (TY II) (18 IN) (CMP) (6: 1) (P)		EA	8.000		6.000		14.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)		EA	2.000		8.000		10.000	
	467-6380	SET (TY II) (24 IN) (CMP) (6: 1) (P)		EA	2.000		2.000		4.000	
	467-6390	SET (TY II) (24 IN) (RCP) (4: 1) (C)		EA	2.000				2.000	
	467-6419	SET (TY II) (30 IN) (RCP) (4: 1) (C)		EA	2.000				2.000	
	467-6444	SET (TY II) (36 IN) (CMP) (6: 1) (P)		EA	2.000				2.000	
	467-6580	SET (REMOV & REINSTALL)		EA			1.000		1.000	
	496-6005	REMOV STR (WINGWALL)		EA	2.000				2.000	
	496-6007	REMOV STR (PIPE)		LF	150.000		125.000		275.000	
	500-6001	MOBILIZATION		LS	1.000				1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	10.000				10.000	
	506-6002	ROCK FILTER DAMS (INSTALL) (TY 2)		LF	10.000		70.000		80.000	
	506-6011	ROCK FILTER DAMS (REMOVE)		LF	10.000		70.000		80.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	460.000		70.000		530.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	460.000		70.000		530.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")		LF	1,620.000		500.000		2,120.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	1,620.000		500.000		2,120.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)		LF			120.000		120.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)		LF			120.000		120.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)		LF			120.000		120.000	
	530-6005	DRIVEWAYS (ACP)		SY	810.000		884.000		1,694.000	
	530-6008	TURNOUTS (ACP)		SY	97.000		66.000		163.000	
	530-6016	DRIVEWAYS (BASE)		SY	1,432.000		1,330.000		2,762.000	
	533-6001	RUMBLE STRIPS (SHOULDER)		LF	23,496.000		13,120.000		36,616.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)		LF	11,748.000		6,560.000		18,308.000	
	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	
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	75.000				75.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION		EA	1.000				1.000	
	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	3.000				3.000	
	545-6002	CRASH CUSH ATTEN (DES SOURCE)		EA			2.000		2.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)		EA			2.000		2.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)		EA			2.000		2.000	
	560-6007	MAILBOX INSTALL-S (WC-POST) TY 3		EA	1.000		5.000		6.000	
	560-6008	MAILBOX INSTALL-D (WC-POST) TY 3		EA	1.000		1.000		2.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 1609-01-029 **DISTRICT** Wichita Falls **COUNTY** Cooke
HIGHWAY FM 1630

			CONTROL SECTION JOB		**1609-01-029**		**1609-01-030**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00176526**		**A00176527**			
			COUNTY		**Cooke**		**Cooke**			
			HIGHWAY		**FM 1630**		**FM 1630**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL		
	560-6013	MAILBOX INSTALL-M (TWW-POST) TY 4		EA	1.000				1.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)		EA	8.000		12.000		20.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)		EA	2.000		7.000		9.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)		EA	1.000		1.000		2.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)		EA			1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM		EA	11.000		17.000		28.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)		EA	4.000				4.000	
	658-6016	INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)		EA	12.000				12.000	
	658-6081	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND(BI)		EA	22.000		38.000		60.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)		EA	12.000		4.000		16.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2		EA	2,137.000		3,087.000		5,224.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)		LF	40,877.000		59,210.000		100,087.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)		LF	990.000		1,430.000		2,420.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)		LF	36,840.000		53,210.000		90,050.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)		LF	36.000		48.000		84.000	
	672-6009	REFL PAV MRKR TY II-A-A		EA	510.000		737.000		1,247.000	
	752-6004	TREE TRIMMING / BRUSH REMOVAL(CHANNELS)		AC	0.750				0.750	
	752-6005	TREE REMOVAL (4" - 12" DIA)		EA	10.000				10.000	
	752-6006	TREE REMOVAL (12" - 18" DIA)		EA	1.000				1.000	
	752-6007	TREE REMOVAL (18" - 24" DIA)		EA	4.000				4.000	
	3076-6006	D-GR HMA TY-B PG70-22		TON	1,996.000		1,127.000		3,123.000	
	3076-6047	D-GR HMA TY-D PG70-28 (LEVEL-UP)		TON	1,210.000		2,460.000		3,670.000	
	3077-6059	SP MIXESSP-DSAC-B PG70-28		TON	4,164.000		6,159.000		10,323.000	
	3084-6001	BONDING COURSE		GAL	2,740.000		4,029.000		6,769.000	
	6056-6001	PREFORMED IN-LANE(TRANS) RUMBLE STRIP		LF			92.000		92.000	
	6185-6002	TMA (STATIONARY)		DAY	65.000		65.000		130.000	
	6185-6005	TMA (MOBILE OPERATION)		DAY	6.000		6.000		12.000	
	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	

SUMMARY OF ROADWAY ITEMS

FM 1630	104 6054 REMOVING CONCRETE (MOW STRIP)	110 6001 EXCAVATION (ROADWAY)	132 6003 EMBANKMENT (FINAL)(ORD COMP)(TY B)	134 6002 BACKFILL (TY B)	216 6001 PROOF ROLLING	275 6001 CEMENT	275 6010 CEMENT TREAT (SUBGRADE) (8")	310 6009 PRIME COAT (MC-30)	314 6013 EMULS ASPH (EROSN CONT)(CSS-1H)	351 6004 FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	354 6002 PLAN & TEXT ASPH CONC PAV(0" TO 2")	432 6026 RIPRAP (STONE COMMON)(DRY)(18 IN)	432 6045 RIPRAP (MOW STRIP)(4 IN)
	LF	CY	CY	STA	HR	TON	SY	GAL	GAL	SY	SY	CY	CY
CSJ: 1609-01-029					25					6300			
STA 124+00.00 to STA 150+00.00	350	601	201			21	1580	395	690		1251		30
STA 150+00.00 TO STA 176+00.00		854	386			37	2530	632	722			21	41
STA 176+00.00 TO STA 202+00.00		907	136			34	2311	578	722				
STA 202+00.00 TO STA 228+00.00		583	261			34	2311	578	722				
STA 228+00.00 TO STA 242+92.82		310	374			20	1327	332	415				
CSJ: 1609-01-029 Total =	350	3255	1358		25	146	10059	2515	3271	6300	1251	21	71
CSJ: 1609-01-030					25					4000			
STA 242+92.82 TO STA 254+00.00				11					308				
STA 254+00.00 TO STA 280+00.00				26					722				
STA 280+00.00 TO STA 306+00.00				26					722				
STA 306+00.00 TO STA 332+00.00				26					722				
STA 332+00.00 TO STA 358+00.00		15	31	23		3	178	44	722				
STA 358+00.00 TO STA 384+00.00		555	447			34	2311	578	722				
STA 384+00.00 TO STA 410+00.00		562	272			34	2311	578	722				
STA 410+00.00 TO STA 423+00.00		255	144			16	1055	264	358		624		
CSJ: 1609-01-030 Total =		1387	894	112	25	87	5855	1464	4998	4000	624		
PROJECT TOTALS	**350**	**4642**	**2252**	**112**	**50**	**233**	**15914**	**3979**	**8269**	**10300**	**1875**	**21**	**71**

SUMMARY OF ROADWAY ITEMS (CONT.)

FM 1630	530 6008 TURNOUTS (ACP)	540 6001 MTL W-BEAM GD FEN (TIM POST)	540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM)	542 6001 REMOVE METAL BEAM GUARD FENCE	542 6002 REMOVE TERMINAL ANCHOR SECTION	542 6004 RM MTL BM GD FENCE TRANS (THRIE-BEAM)	544 6001 GUARDRAIL END TREATMENT (INSTALL)	544 6003 GUARDRAIL END TREATMENT (REMOVE)	560 6007 MAILBOX INSTALL-S (WC-POST) TY 3	560 6008 MAILBOX INSTALL-D (WC-POST) TY 3	560 6013 MAILBOX INSTALL-M (TWW-POST) TY 4	658 6014 INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	658 6016 INSTL DEL ASSM (D-SW)SZ (BRF)GF1 (BI)
	SY	LF	EA	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA
CSJ: 1609-01-029													
STA 124+00.00 to STA 150+00.00	30	100	4	75	1	4	4	3			1	4	4
STA 150+00.00 TO STA 176+00.00		450					4						8
STA 176+00.00 TO STA 202+00.00													
STA 202+00.00 TO STA 228+00.00	38								1	1			
STA 228+00.00 TO STA 242+92.82													
CSJ: 1609-01-029 Total =	68	550	4	75	1	4	8	3	1	1	1	4	12
CSJ: 1609-01-030													
STA 242+92.82 TO STA 254+00.00													
STA 254+00.00 TO STA 280+00.00													
STA 280+00.00 TO STA 306+00.00									1				
STA 306+00.00 TO STA 332+00.00													
STA 332+00.00 TO STA 358+00.00									2				
STA 358+00.00 TO STA 384+00.00	22									1			
STA 384+00.00 TO STA 410+00.00	22								1				
STA 410+00.00 TO STA 423+00.00	22								1				
CSJ: 1609-01-030 Total =	66								5	1			
PROJECT TOTALS	**134**	**550**	**4**	**75**	**1**	**4**	**8**	**3**	**6**	**2**	**1**	**4**	**12**

SUMMARY OF ROADWAY ITEMS (CONT.)

FM 1630	658 6081 INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND (BI)	658 6100 INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	3076 6006 D-GR HMA TY-B PG70-22	3076 6043 D-GR HMA TY-D PG70-22 (LEVEL-UP)	3077 6059 SP MIXES SP-D SAC-B PG70-28	3084 6001 BONDING COURSE
	EA	EA	TON	TON	TON	GAL
CSJ: 1609-01-029						
STA 124+00.00 to STA 150+00.00		2	358		963	503
STA 150+00.00 TO STA 176+00.00		2	493		911	498
STA 176+00.00 TO STA 202+00.00		4	445		890	485
STA 202+00.00 TO STA 228+00.00	10	2	445	478	890	696
STA 228+00.00 TO STA 242+92.82	12	2	255	732	510	558
CSJ: 1609-01-029 Total =	22	12	1996	1210	4164	2740
CSJ: 1609-01-030						
STA 242+92.82 TO STA 254+00.00	4			225	379	265
STA 254+00.00 TO STA 280+00.00	17			1168	890	803
STA 280+00.00 TO STA 306+00.00	11			716	890	672
STA 306+00.00 TO STA 332+00.00	6			351	890	593
STA 332+00.00 TO STA 358+00.00			34		890	485
STA 358+00.00 TO STA 384+00.00		2	445		890	485
STA 384+00.00 TO STA 410+00.00			445		890	485
STA 410+00.00 TO STA 423+00.00		2	203		440	241
CSJ: 1609-01-030 Total =	38	4	1127	2460	6159	4029
PROJECT TOTALS	**60**	**16**	**3123**	**3670**	**10323**	**6769**

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FM 1630

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		13

SUMMARY OF DRAINAGE ITEMS

FM 1630	403 6001 TEMPORARY SPL SHORING	462 6051 CONC BOX CULV (5 FT X 3 FT)(EXTEND)	462 6058 CONC BOX CULV (7 FT X 3 FT)(EXTEND)	464 6005 RC PIPE (CL III)(24 IN)	464 6008 RC PIPE (CL III)(36 IN)	466 6097 HEADWALL (CH - PW - 0) (DIA= 24 IN)	466 6101 HEADWALL (CH - PW - 0) (DIA= 36 IN)	466 6179 WINGWALL (PW - 1) (HW=4 FT)	467 6390 SET (TY II) (24 IN) (RCP) (4: 1) (C)	467 6419 SET (TY II) (30 IN) (RCP) (4: 1) (C)	467 6580 SET (REMOV & REINSTALL)	752 6004 TREE TRIMMING / BRUSH REMOVAL(C HANNELS)	752 6005 TREE REMOVAL (4" - 12" DIA)	752 6006 TREE REMOVAL (12" - 18" DIA)	752 6007 TREE REMOVAL (18" - 24" DIA)
	SF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	AC	EA	EA	EA
CSJ: 1609-01-029															
STRUCTURE #2 STA 148+27.56										2					
STRUCTURE #4 STA 174+36.85				4					2			0.25		1	2
STRUCTURE #5 STA 178+50.93				12		2									
STRUCTURE #6 STA 201+22.51				16		2						0.25			1
STRUCTURE #7 STA 205+28.87				14		2						0.25	10		1
STRUCTURE #8 STA 239+19.38					24		2								
CSJ: 1609-01-029 Total =				46	24	6	2		2	2		0.75	10	1	4
CSJ: 1609-01-030															
STRUCTURE #12 STA 302+43.31				2							1				
STUCTURE #16 STA 370.32.84	500	60						2							
STRUCTURE #17 STA 414+39.34			28					2							
CSJ: 1609-01-030 Total =	500	60	28	2				4			1				
PROJECT TOTALS	**500**	**60**	**28**	**48**	**24**	**6**	**2**	**4**	**2**	**2**	**1**	**0.75**	**10**	**1**	**4**

SUMMARY OF BRIDGE ITEMS

FM 1630	403 6001 TEMPORARY SPL SHORING	432 6017 RIPRAP (STONE TY R)(DRY)(18 IN)	442 6008 STR STEEL (MISCELLA NEOUS BRIDGE)	462 6077 CONC BOX CULV (10 FT X 9 FT)(EXTEND)	466 6188 WINGWALL (PW - 2) (HW=13 FT)	496 6005 REMOV STR (WINGWALL)
	SF	CY	LB	LF	EA	EA
NBI: 03-049-1609-01-004						
STRUCTURE #1 STA 133+22.08			8406			
NBI: 03-049-1609-01-002						
STRUCTURE #3 STA 166+21.00	1050	21		20	2	2
PROJECT TOTALS	**1050**	**21**	**8406**	**20**	**2**	**2**

SUMMARY OF SIGNING ITEMS

FM 1630	644 6001 IN SM RD SN SUP&AM TY10BWG(1) SA(P)	644 6004 IN SM RD SN SUP&AM TY10BWG(1) SA(T)	644 6007 IN SM RD SN SUP&AM TY10BWG(1) SA(U)	644 6033 IN SM RD SN SUP&AM TYS80(1)SA(U)	644 6076 REMOVE SM RD SN SUP&AM
	EA	EA	EA	EA	EA
1609-01-029	8	2	1		11
1609-01-030	12	7	1	1	21
PROJECT TOTALS	**20**	**9**	**2**	**1**	**32**

SUMMARY OF PAVEMENT MARKING ITEMS

FM 1630	533 6001 RUMBLE STRIPS (SHOULDER)	533 6002 RUMBLE STRIPS (CENTERLIN E)	662 6111 WK ZN PAV MRK SHT TERM (TAB)TY Y-2	666 6309 RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	666 6318 RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	666 6321 RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	668 6076 PREFAB PAV MRK TY C (W) (24") (SLD)	672 6009 REFL PAV MRKR TY II-A-A	6056 6001 PREFORMED IN-LANE(TR ANS) RUMBLE STRIP	6185 6005 TMA (MOBILE OPERATION)
	LF	LF	EA	LF	LF	LF	LF	EA	LF	DAY
CSJ: 1609-01-029										
STA 125+20.00 TO STA 242+92.82	23496	11748	2137	40877	990	36840	36	510		6
CSJ: 1609-01-030										
STA 356+00.00 TO STA 421+59.66	13120	6560	3087	59210	1430	53210	48	737	92	6
PROJECT TOTALS	**36616**	**18308**	**5224**	**100087**	**2420**	**90050**	**84**	**1247**	**92**	**12**

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FM 1630

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		14

SUMMARY OF EROSION CONTROL ITEMS

FM 1630	162 6002	164 6009	164 6011	164 6029	164 6031	164 6035	168 6001	169 6001	506 6002	506 6011	506 6038	506 6039	506 6041	506 6043
	BLOCK SODDING	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	CELL FBR MLCH SEED(TEMP)(WARM)	CELL FBR MLCH SEED(TEMP) (COOL)	DRILL SEEDING (PERM) (RURAL) (CLAY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	ROCK FILTER DAMS (INSTALL) (TY 2)	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	SY	SY	SY	MG	SY	LF	LF	LF	LF	LF	LF
CSJ: 1609-01-029		13000	13000			13000	73							
STA 124+00.00 to STA 150+00.00	540			540	540			540			10	10	820	820
STA 150+00.00 TO STA 176+00.00				850	850			850			10	10	560	560
STA 176+00.00 TO STA 202+00.00											20	20	80	80
STA 202+00.00 TO STA 228+00.00									10	10	400	400	60	60
STA 228+00.00 TO STA 242+92.82											20	20	100	100
CSJ: 1609-01-029 Total =	540	13000	13000	1390	1390	13000	73	1390	10	10	460	460	1620	1620
CSJ: 1609-01-030		20000	20000			20000	112							
STA 242+92.82 TO STA 254+00.00														
STA 254+00.00 TO STA 280+00.00											40	40	60	60
STA 280+00.00 TO STA 306+00.00									30	30			120	120
STA 306+00.00 TO STA 332+00.00											10	10	40	40
STA 332+00.00 TO STA 358+00.00											20	20	80	80
STA 358+00.00 TO STA 384+00.00									20	20			100	100
STA 384+00.00 TO STA 410+00.00													40	40
STA 410+00.00 TO STA 423+00.00									20	20			60	60
CSJ: 1609-01-030 Total =		20000	20000			20000	112		70	70	70	70	500	500
PROJECT TOTALS	**540**	**33000**	**33000**	**1390**	**1390**	**33000**	**185**	**1390**	**80**	**80**	**530**	**530**	**2120**	**2120**

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

FM 1630	512 6001	512 6025	512 6049	545 6001	545 6003	545 6005
	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	PORT CTB (MOVE)(SGL SLP)(TY 1)	PORT CTB (REMOVE)(SGL SLP)(TY 1)	CRASH CUSH ATTEN (INSTL)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)
	LF	LF	LF	EA	EA	EA
CSJ: 1609-01-030						
STUCTURE #16 STA 370.32.84	120	120	120	2	2	2
PROJECT TOTALS	**120**	**120**	**120**	**2**	**2**	**2**

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FM 1630

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		15

SUMMARY OF SIDEROAD QUANTITIES

PLAN LAYOUT SHEET	LOCATION	SIDE ROAD NUMBER	"W"	"L"	RADII		AREA	460 6002	460 6003	460 6005	467 6348	467 6380	464 6003	467 6363	467 6444	496 6007	530 6005	530 6016	COMMENTS
								CMP (GAL STL 18 IN)	CMP (GAL STL 24 IN)	CMP (GAL STL 36 IN)	SET (TY II) (18 IN) (CMP) (6: 1) (P	SET (TY II) (24 IN) (CMP) (6: 1) (P	RC PIPE (CL III)(18 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P	SET (TY II) (36 IN) (CMP) (6: 1) (P	REMOV STR (PIPE)	DRIVEWAYS (ACP)	DRIVEWAYS (BASE)	
			FT	FT	R1	R2	SY	LF	LF	LF	EA	EA	LF	LF	EA	LF	SY	SY	
CSJ: 1609-01-029																			
1 OF 12	126+10 LT	SR 01	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE, NO REPLACEMENT
	128+45 RT	SR 02	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
	128+46 LT	SR 03	14	36	15	15	67			25					2	25		67	MATCH PROPOSED ROADWAY GRADE
	146+00 RT	SR 04	14	36	15	0	50	40			2							50	MATCH PROPOSED ROADWAY GRADE
	146+16 LT	SR 05	14	36	15	0	50											50	MATCH PROPOSED ROADWAY GRADE
	146+10 LT	SR 06	25	36	15	15	111											111	MATCH PROPOSED ROADWAY GRADE
	146+35 LT	SR 07	30	42	15	10	148											148	MATCH PROPOSED ROADWAY GRADE
2 OF 12	175+97 LT	SR 08	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
3 OF 12	177+07 RT	SR 09	30	36	25	25	150										150		MATCH PROPOSED ROADWAY GRADE
	183+40 LT	SR 10	14	36	15	15	67	20			2							0	
	193+12 RT	SR 11	30	55	25	20	208										208		MATCH PROPOSED ROADWAY GRADE (COUNTY ROAD 343)
	196+23 LT	SR 12	50	36	15	15	211										211		MATCH PROPOSED ROADWAY GRADE
	202+00 LT	SR 13	16	51	15	10	99											99	MATCH PROPOSED ROADWAY GRADE
4 OF 12	203+87 LT	SR 14	14	85	5	15	139											139	MATCH PROPOSED ROADWAY GRADE
	211+25 RT	SR 15	15	38	20	15	67	20			2							79	MATCH PROPOSED ROADWAY GRADE
	221+32 LT	SR 16	30	36	15	15	131											131	MATCH PROPOSED ROADWAY GRADE
	223+55 LT	SR 17	14	41	15	10	72											72	MATCH PROPOSED ROADWAY GRADE
	225+12 RT	SR 18	14	40	15	15	73											73	MATCH PROPOSED ROADWAY GRADE
	225+27 LT	SR 19	14	45	10	15	78											78	MATCH PROPOSED ROADWAY GRADE
5 OF 12	229+20 LT	SR 20	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
	240+95 LT	SR 21	25	36	25	25	130						48	2		40	130		MATCH PROPOSED ROADWAY GRADE (COUNTY ROAD 341)
	241+11 RT	SR 22	25	36	15	15	111	46			2						111		MATCH PROPOSED ROADWAY GRADE (COUNTY ROAD 341)
CSJ: 1609-01-029 SUB TOTAL =								126		25	8		48	2	2	65	810	1432	
6 OF 12	246+18 LT	*SR 23	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
	264+50 RT	SR 24	14	36	15	5	62											62	MATCH PROPOSED ROADWAY GRADE
	283+25 LT	SR 25	14	36	5	15	62											62	MATCH PROPOSED ROADWAY GRADE
7 OF 12	284+40 RT	SR 26	25	36	15	15	111										111		MATCH PROPOSED ROADWAY GRADE
	298+65 RT	SR 27	35	36	25	25	170										170		MATCH PROPOSED ROADWAY GRADE
	305+13 LT	SR 28	14	36	15	15	67										67		MATCH PROPOSED ROADWAY GRADE
8 of 12	316+90 RT	SR 29	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
	317+88 RT	SR 30	14	36	5	15	62	20			2							62	MATCH PROPOSED ROADWAY GRADE
	318+95 LT	SR 31	14	36	15	15	67	20			2							67	MATCH PROPOSED ROADWAY GRADE
	318+50 LT	SR 32	14	36	15	15	67	20			2							67	MATCH PROPOSED ROADWAY GRADE
	318+65 RT	SR 33	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
9 OF 12	334+50 LT	SR 34	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
	344+35 RT	SR 35	14	36	25	25	86											86	MATCH PROPOSED ROADWAY GRADE
	353+85 LT	SR 36	14	36	25	5	72											72	MATCH PROPOSED ROADWAY GRADE
	354+10 LT	SR 37	14	36	5	25	72										72		MATCH PROPOSED ROADWAY GRADE
	354+89 RT	SR 38	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
	357+88 RT	SR 39					0									20		0	REMOVE CULVERT AND RE-GRADE DITCH
10 OF 12	367+17 LT	SR 40	14	36	15	15	67		25			2				25		67	MATCH PROPOSED ROADWAY GRADE
	379+72 RT	SR 41					0									20		0	REMOVE CULVERT AND RE-GRADE DITCH
	380+70 RT	SR 42	10	40	15	5	51						20	2		20		51	MATCH PROPOSED ROADWAY GRADE
	382+90 LT	SR 43	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
11 OF 12	387+50 LT	SR 44	30	36	15	15	131											131	MATCH PROPOSED ROADWAY GRADE
	391+56 LT	SR 45	14	36	15	15	67						20	2		20		67	MATCH PROPOSED ROADWAY GRADE
	400+33 LT	SR 46	14	36	15	15	67											67	MATCH PROPOSED ROADWAY GRADE
12 OF 12	413+75 RT	SR 47	14	36	15	15	67						20	2		20		67	MATCH PROPOSED ROADWAY GRADE
	422+30 RT	SR 48	28	36	50	50	232										232		MATCH PROPOSED ROADWAY GRADE (FM 373 INTERSECTION)
	422+31 LT	SR 49	28	36	50	50	232										232		MATCH PROPOSED ROADWAY GRADE (FM 373 INTERSECTION)
CSJ: 1609-01-030 SUB TOTAL =								60	25		6	2	60	6		125	884	1330	
PROJECT TOTAL =								186	25	25	14	2	108	8	2	190	1694	2762	

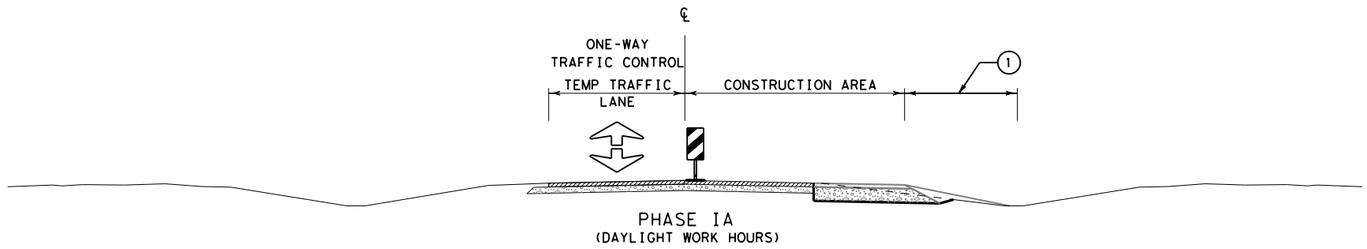
* SR 23 IS IN CSJ: 1609-01-030, BUT IS LOCATED ON SHEET #5.

FM 1630

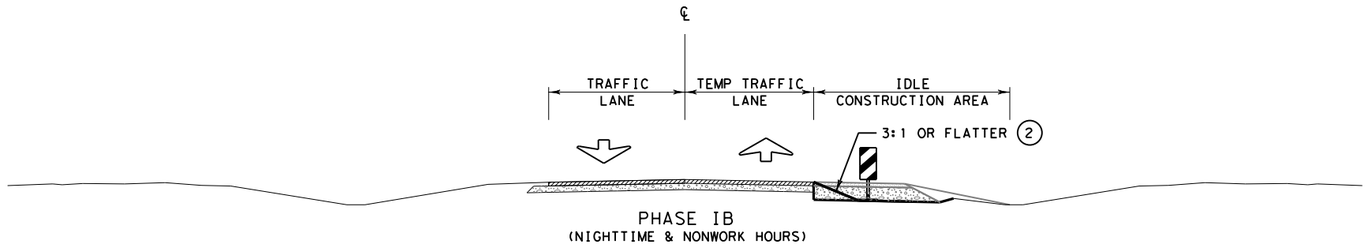
SIDEROAD SUMMARY

SHEET 1 OF 1

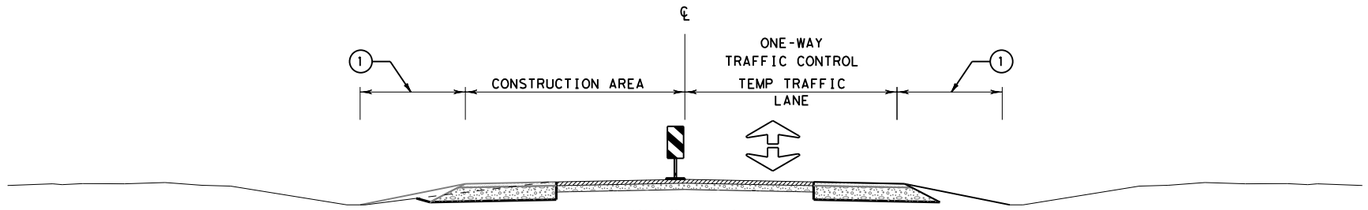
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		16



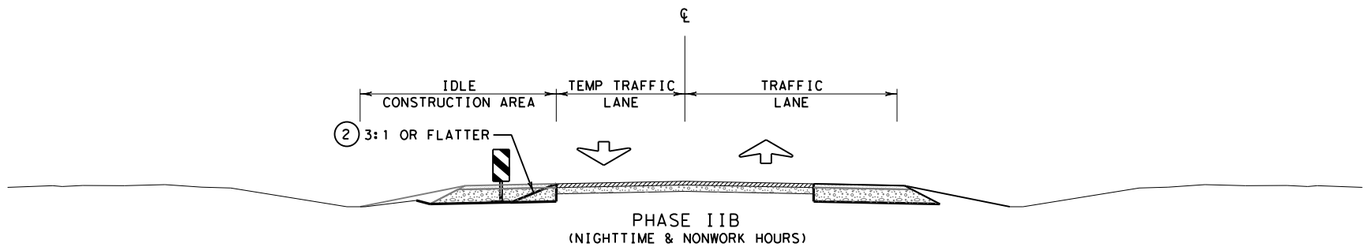
PHASE IA
(DAYLIGHT WORK HOURS)



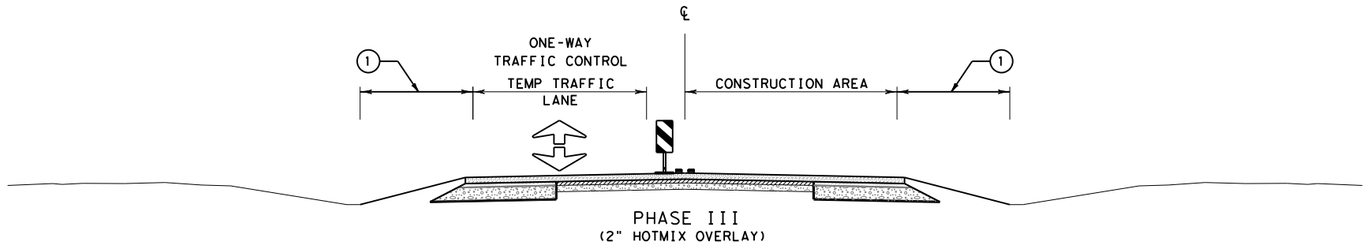
PHASE IB
(NIGHTTIME & NONWORK HOURS)



PHASE IIA
(DAYLIGHT WORK HOURS)



PHASE IIB
(NIGHTTIME & NONWORK HOURS)



PHASE III
(2" HOTMIX OVERLAY)

SEQUENCE OF WORK:

PHASE I CONSTRUCTION TO INCLUDE EXTENDING STRUCTURES, FLEXIBLE PAVEMENT REPAIR, LEVEL-UP ON ALL CURVES TO ADJUST SUPER ELEVATIONS, WIDENING ROADWAY PAVEMENT, INSTALLING BMP'S, & TEMPORARY SEEDING.

PHASE II CONSTRUCTION TO INCLUDE EXTENDING STRUCTURES, WIDENING ROADWAY PAVEMENT, INSTALLING BMP'S, & TEMPORARY SEEDING.

PHASE III CONSTRUCTION TO INCLUDE HOTMIX OVERLAY FOR EACH SIDE OF THE ROAD AND PERMANENT SEEDING.

NOTES:

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

WIDENING ON BOTH SIDES OF THE ROAD WILL NOT BE ALLOWED UNLESS OTHERWISE DIRECTED BY ENGINEER.

MAXIMUM WIDENING LENGTH MAY BE EXTENDED BY THE ENGINEER WHEN THE CONTRACTOR PROVES TO HAVE ADEQUATE FORCES & EQUIPMENT TO PERFORM MORE WORK.

MAXIMUM LANE CLOSURE WITH ONE-WAY TRAFFIC CONTROL SHALL BE ONE MILE.

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.

THE PORTION OF THIS PROJECT WHICH COINCIDES WITH EXISTING ROADS AND / OR PRIVATE DRIVES SHALL BE MAINTAINED AS ALL-WEATHER ROADS AND KEPT OPEN AT ALL TIMES UNLESS OTHERWISE APPROVED BY THE ENGINEER. THIS WILL BE CONSIDERED SUBSIDIARY TO TRAFFIC HANDLING AND BARRICADES.

CW 8-9a "SHOULDER DROP-OFF" SIGNS SHALL BE PLACED DURING PHASES IB & IIB AT A MAXIMUM SPACING OF 1,800 FT. PLACE OTHER SIGNS AND DEVICES AS REQUIRED ON THE EDGE CONDITION SHEET.

PHASES I, II & III CHANNELIZING DEVICES SHOWN ARE BACK TO BACK MOUNTED PORTABLE VERTICAL PANELS ON SELF-RIGHTING SUPPORTS AS DESCRIBED ON BC(9)-14. OTHER APPROVED BASES AND SUPPORTS MAY BE USED AT THE CONTRACTOR'S OPTION AND ENGINEER'S APPROVAL.

BARRICADE & CONSTRUCTION STDS BC(1-12)-14 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.

SCALE = N.T.S.

(1) - SEE THE VEGETATIVE ESTABLISHMENT DETAIL SHEET FOR BACKFILL OPERATIONS.

(2) - THE 3:1 SLOPE BACKFILL FOR END OF DAY OPERATIONS SHALL BE DURABLE CRUSHED STONE TYPE OF FLEXIBLE BASE OR OTHER MATERIALS APPROVED BY THE ENGINEER. WHEN WORK IS RESUMED ON THIS EXCAVATED 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 110-6001 EXCAVATION (ROADWAY).

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
SEQUENCE OF WORK

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		17

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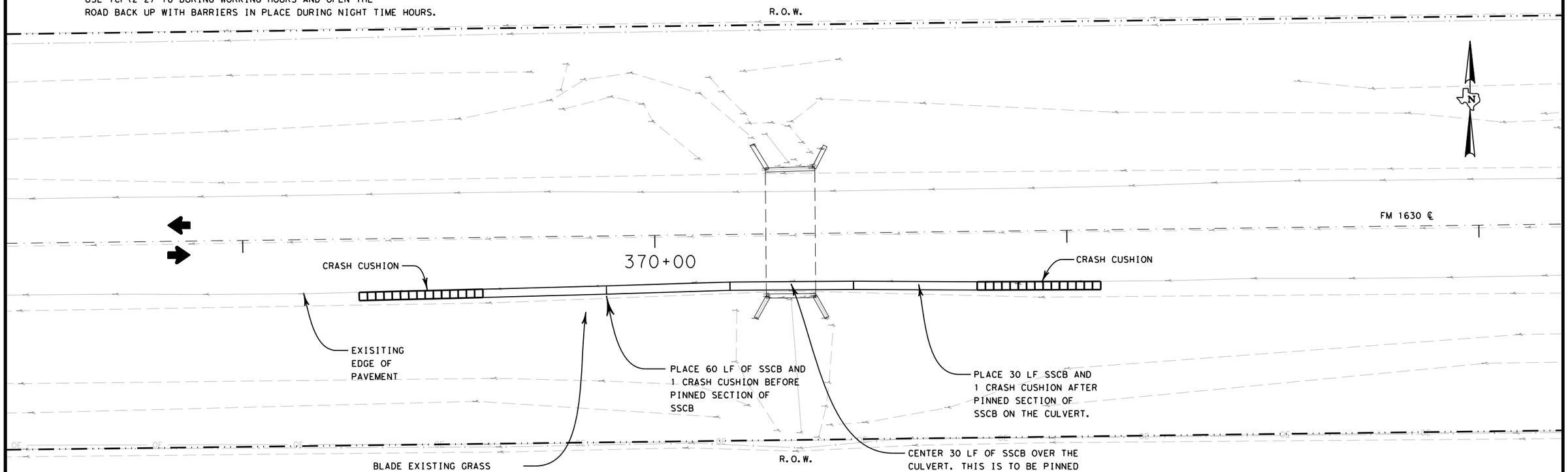
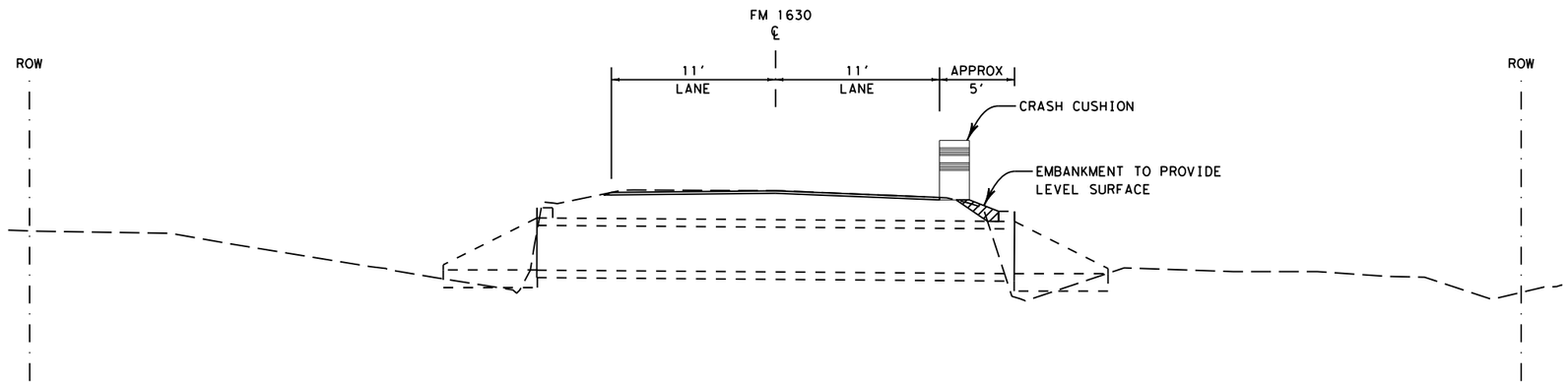
NOTES: PLACE PORTABLE SSCB PRIOR TO EXTENDING CULVERTS.
AFTER ONE SIDE IS EXTENDED MOVE BARRIERS TO THE
OPPOSITE SIDE OF THE ROAD AND BEGIN STRUCTURE WORK.
USE TCP(2-2)-18 DURING WORKING HOURS AND OPEN THE
ROAD BACK UP WITH BARRIERS IN PLACE DURING NIGHT TIME HOURS.





STRUCTURE TYPICAL

NOT TO SCALE

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
CULVERT WIDENING TCP
(STRUCTURE #16)

Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		18

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FILE: T:\WFSDESGN\Plans\1609-01\029x4 - Design\Plan Set\2. TCP\CULVERT WIDENING TCP.dgn

DATE: 4/26/2023 4:09:04 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\Standard to be delete\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

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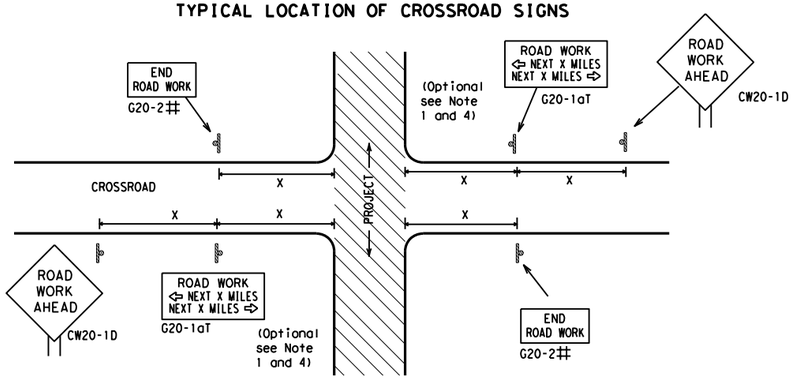
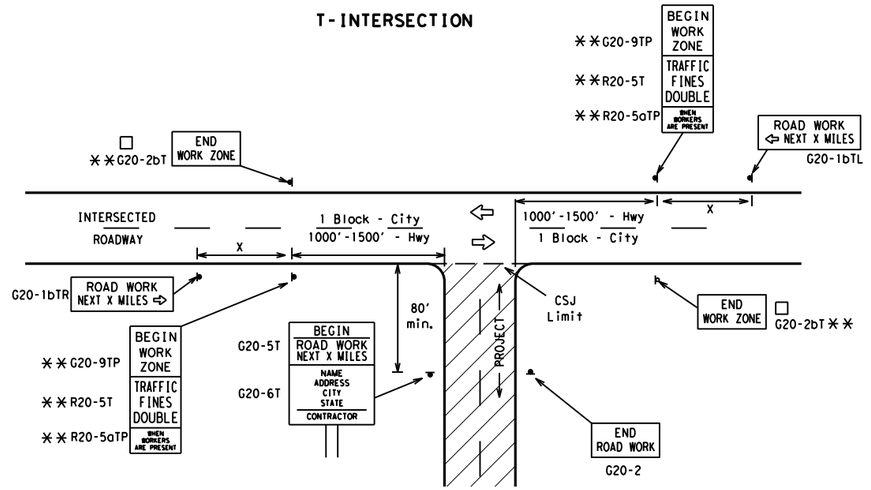
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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]

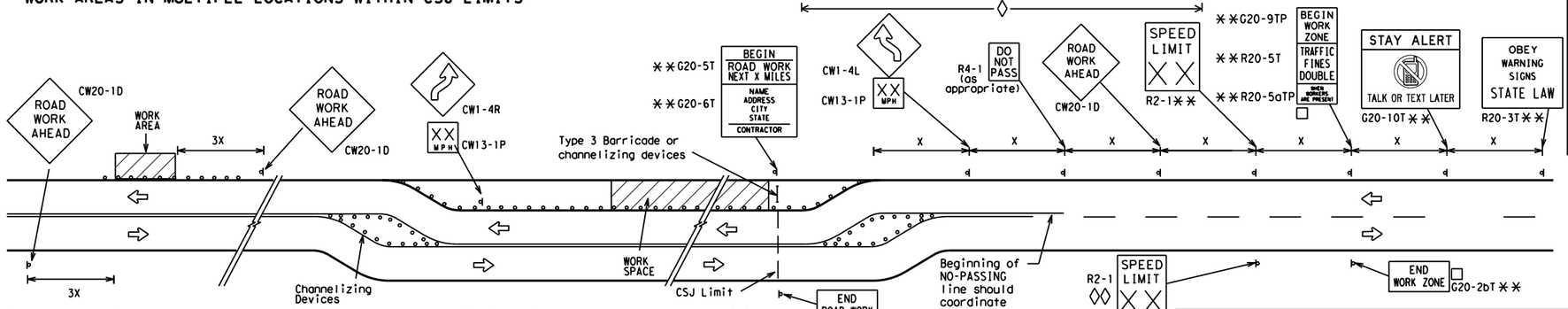
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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.

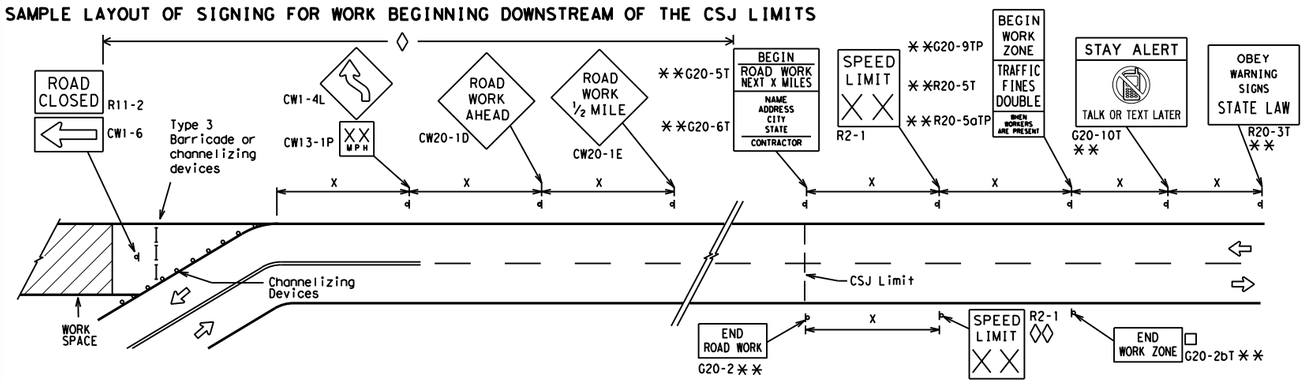
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

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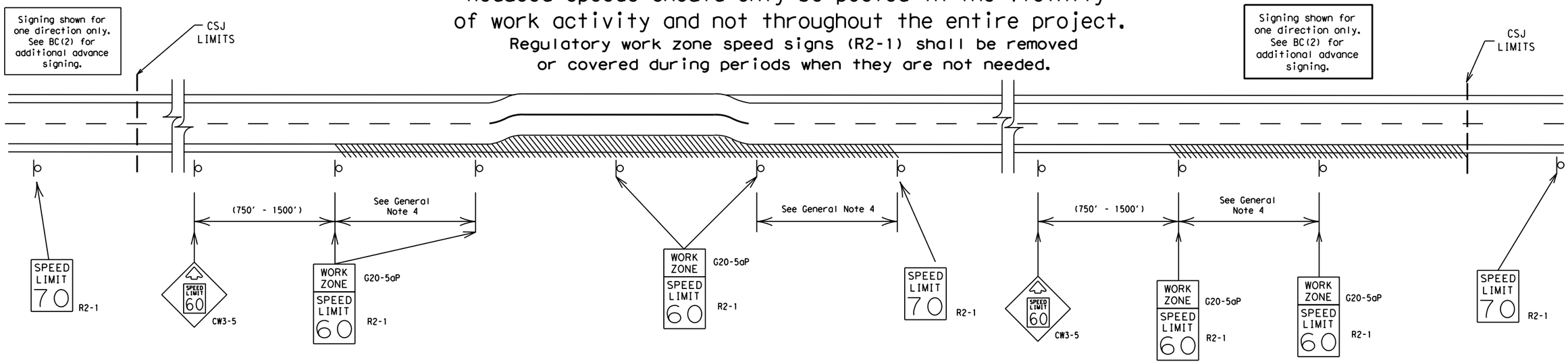
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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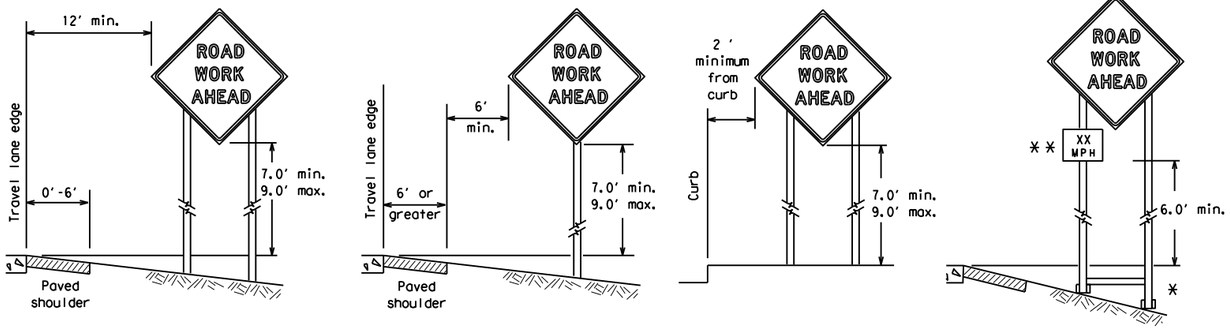
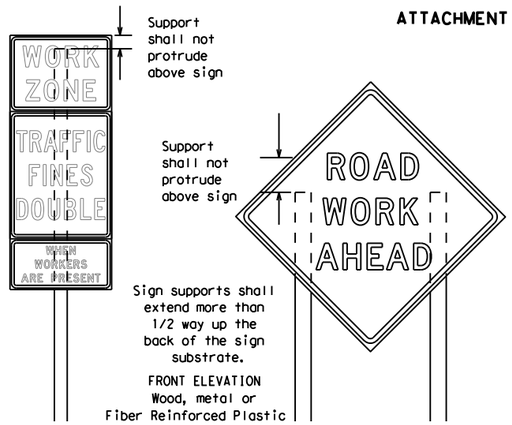
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

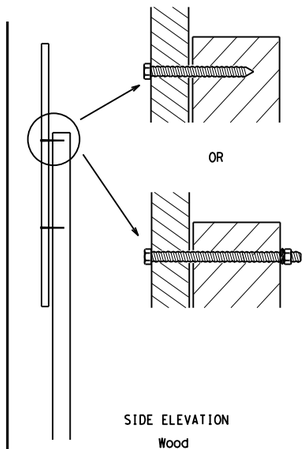


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





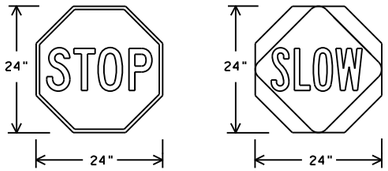
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.
7-13 5-21	WFS	COOKE		22

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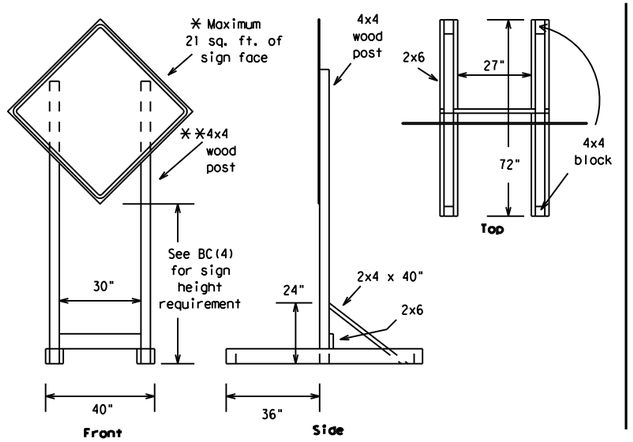
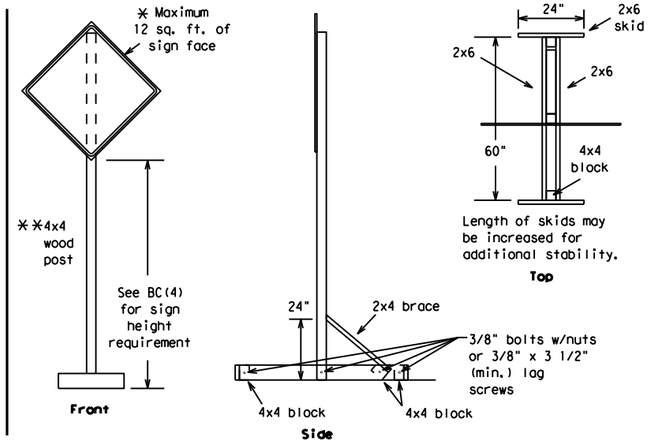
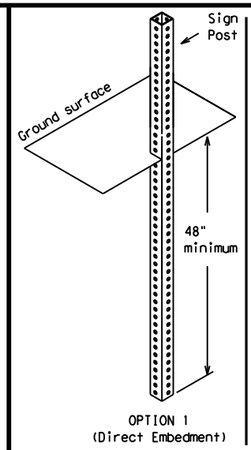
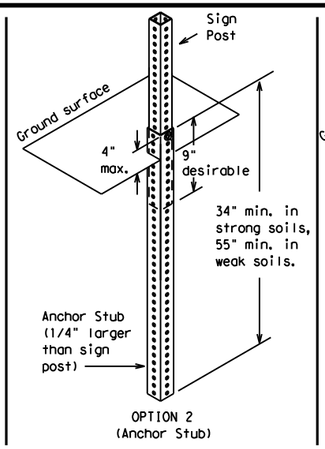


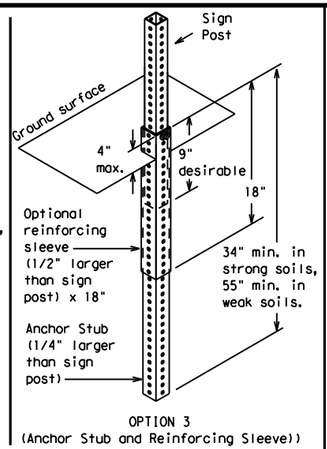


SKID MOUNTED WOOD SIGN SUPPORTS

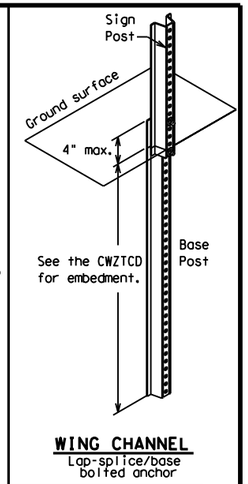
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







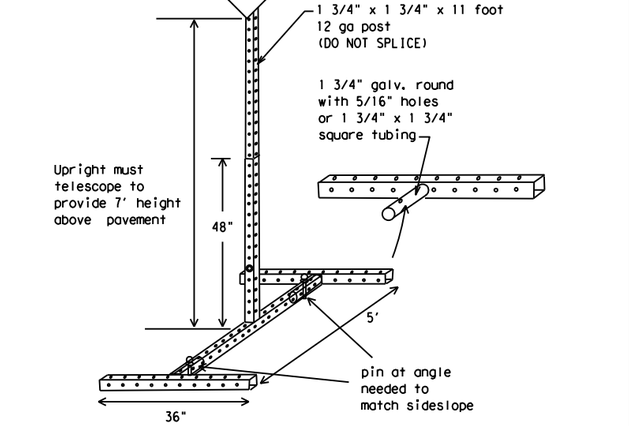
PERFORATED SQUARE METAL TUBING

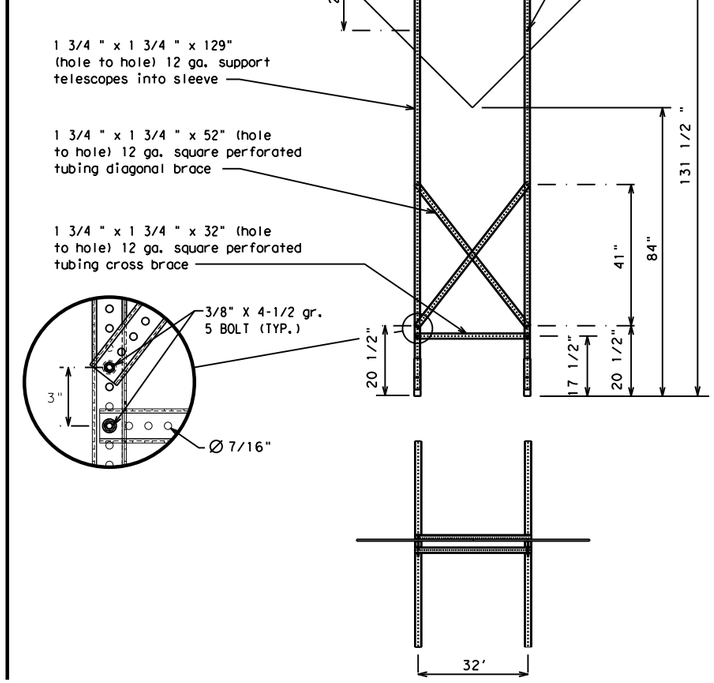


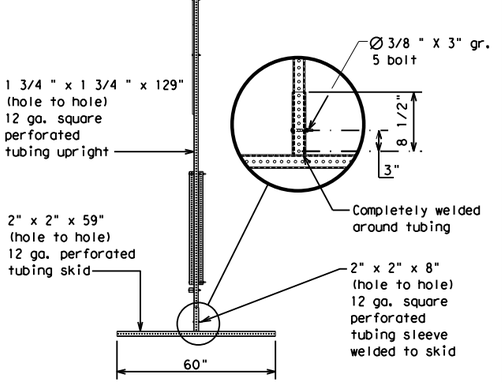
WING CHANNEL
Lap-splice/base bolted anchor

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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	COOKE		23

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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	1609	01	029, etc.	FM 1630
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	COOKE		24

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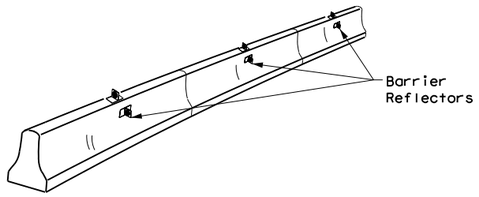
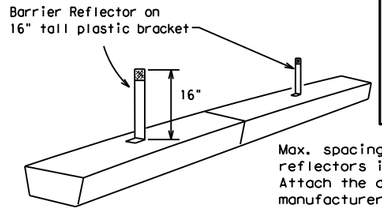
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



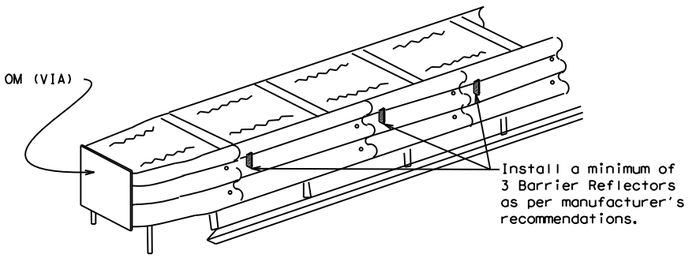
CONCRETE TRAFFIC BARRIER (CTB)

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)



DELINEATION OF END TREATMENTS

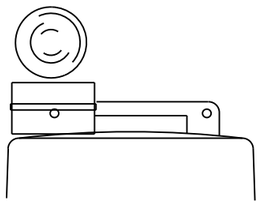
LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

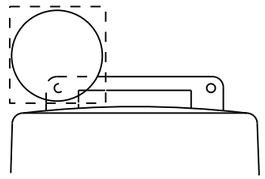
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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

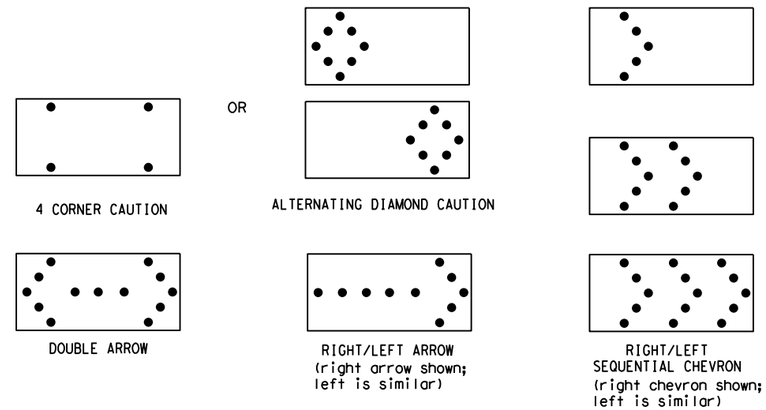
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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
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REVISIONS	1609	01	029, etc.	FM 1630
9-07 8-14	DIST	COUNTY		SHEET NO.
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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:

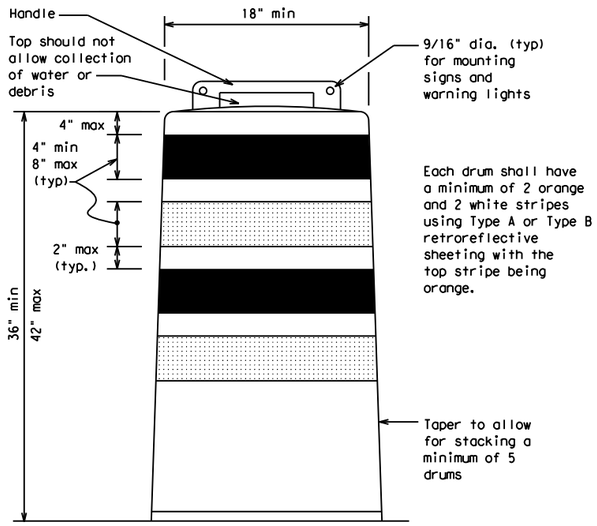
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

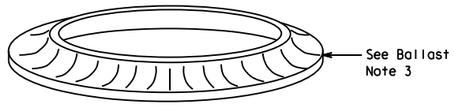
RETROREFLECTIVE SHEETING

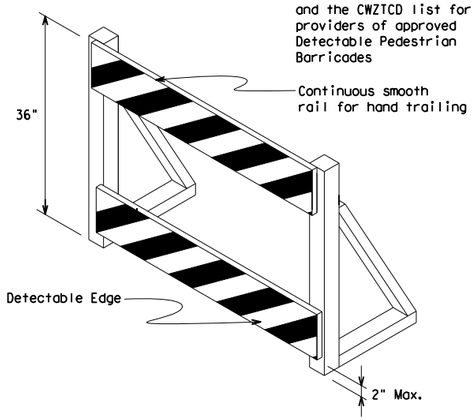
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

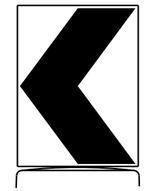




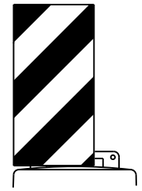


DETECTABLE PEDESTRIAN BARRICADES

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
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REVISIONS	1609	01	029, etc.	FM 1630
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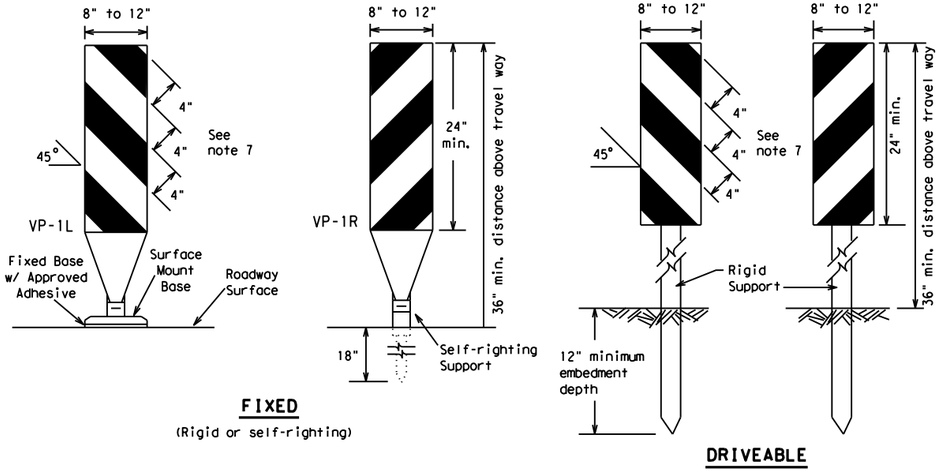
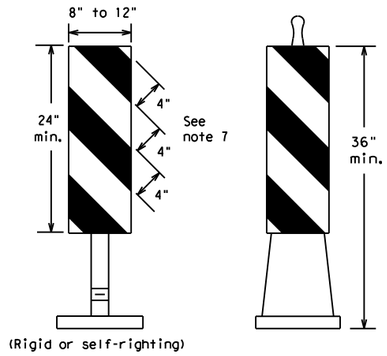


FIXED
(Rigid or self-righting)

DRIVEABLE

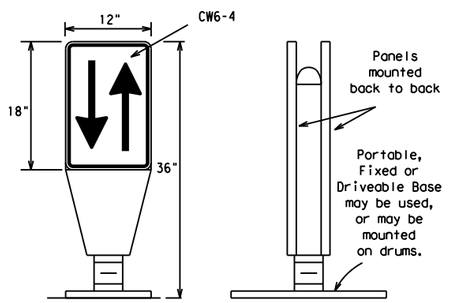


(Rigid or self-righting)

PORTABLE

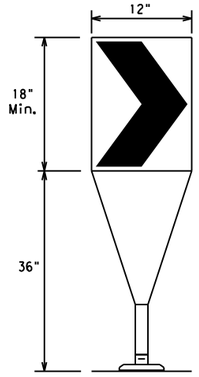
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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)



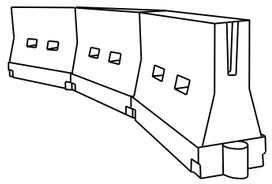
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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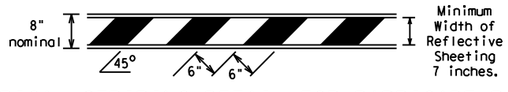
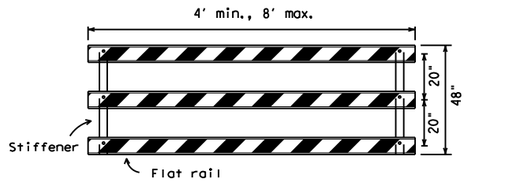
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



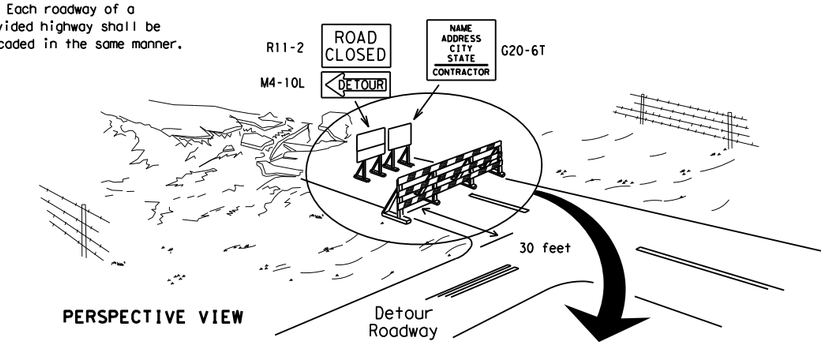
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

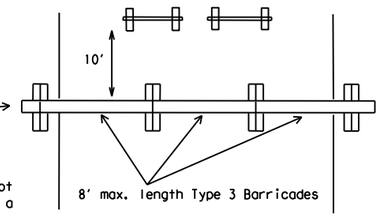
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

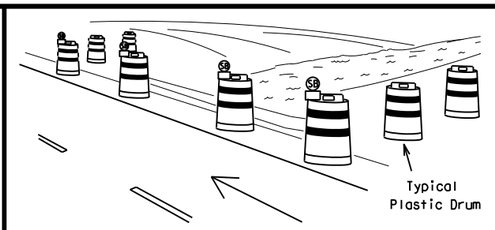
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

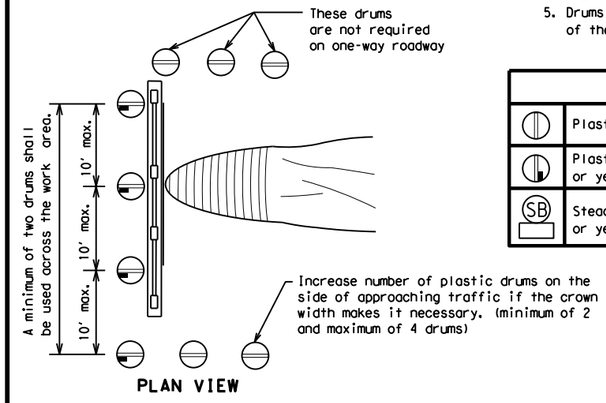
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

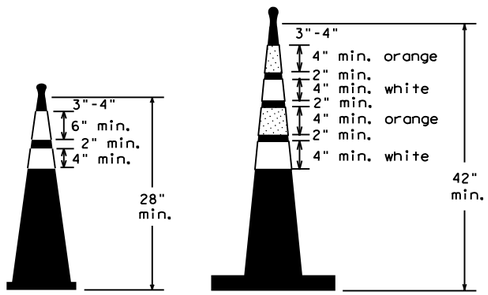
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

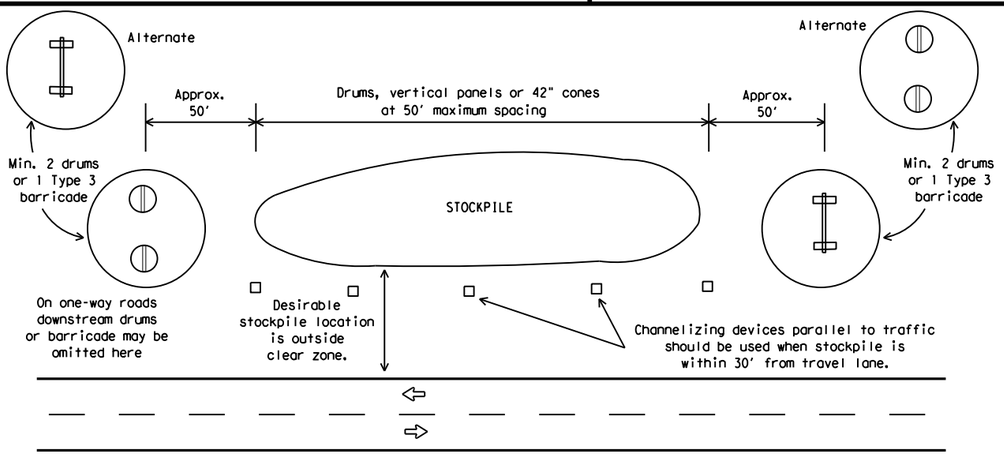
PLAN VIEW

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
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WFS	COOKE		28

104

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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.

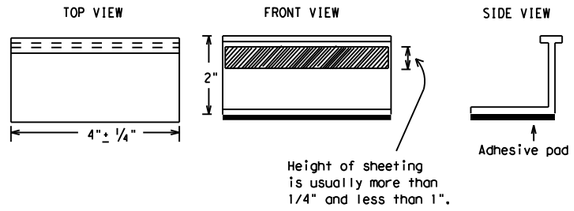
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	WFS	COOKE		29
11-02 8-14				

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DATE: 4/26/2023 4:09:17 PM
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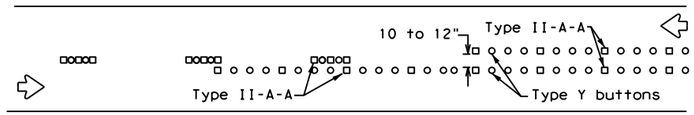
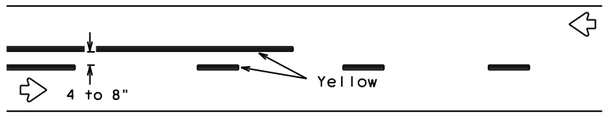
PAVEMENT MARKING PATTERNS

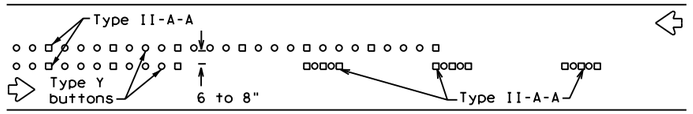
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



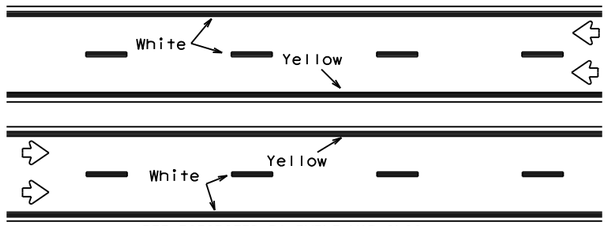
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



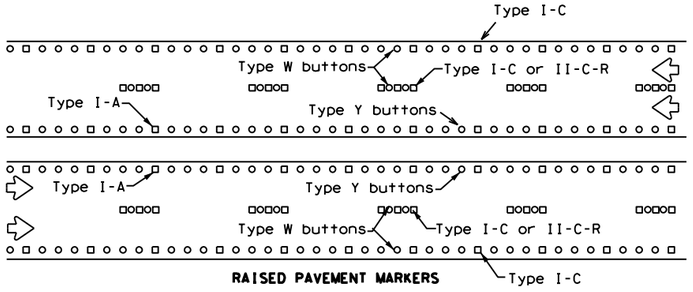
RAISED PAVEMENT MARKERS - PATTERN B

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



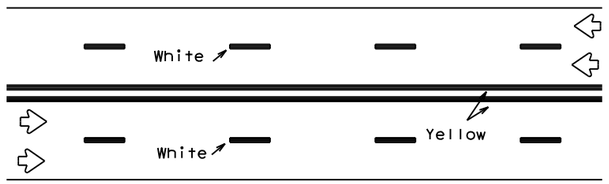
REFLECTORIZED PAVEMENT MARKINGS



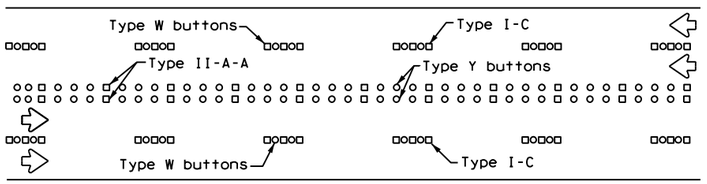
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



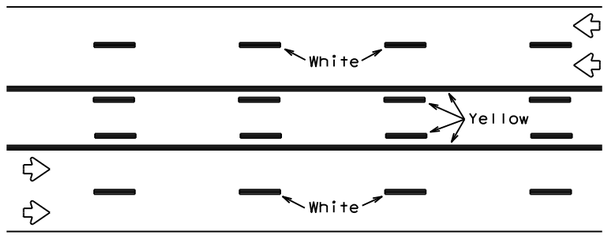
REFLECTORIZED PAVEMENT MARKINGS



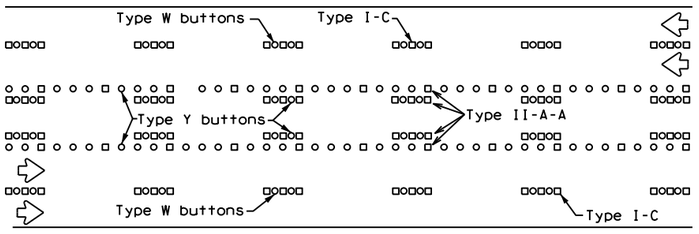
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

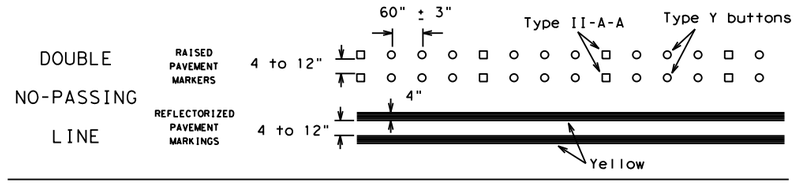
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

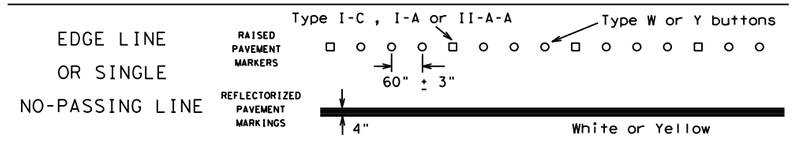
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

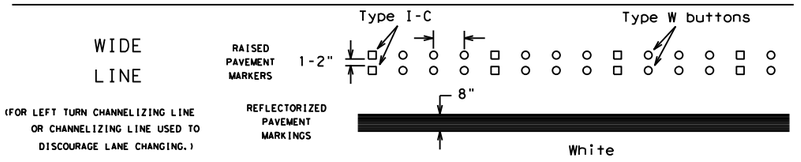


EDGE LINE OR SINGLE NO-PASSING LINE



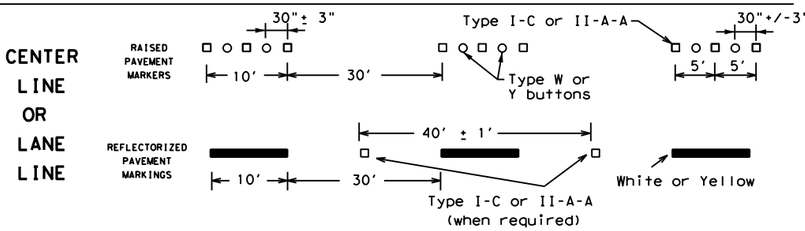
WIDE LINE

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

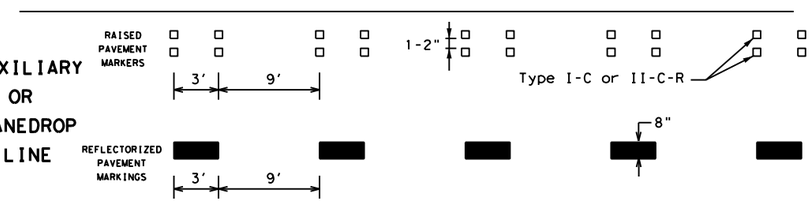


BROKEN LINES

CENTER LINE OR LANE LINE

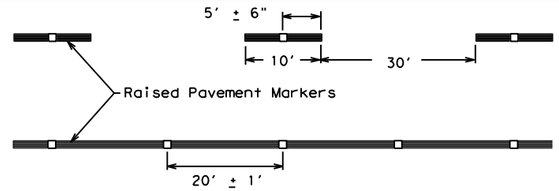


AUXILIARY OR LANEDROP LINE



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	1609	01	029, etc.	FM 1630
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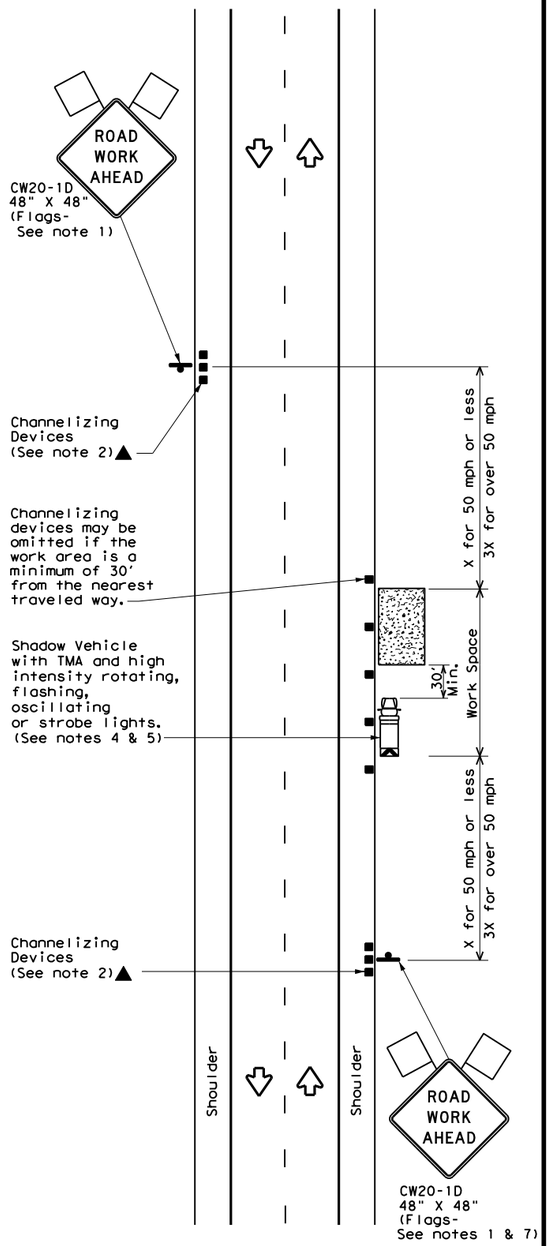
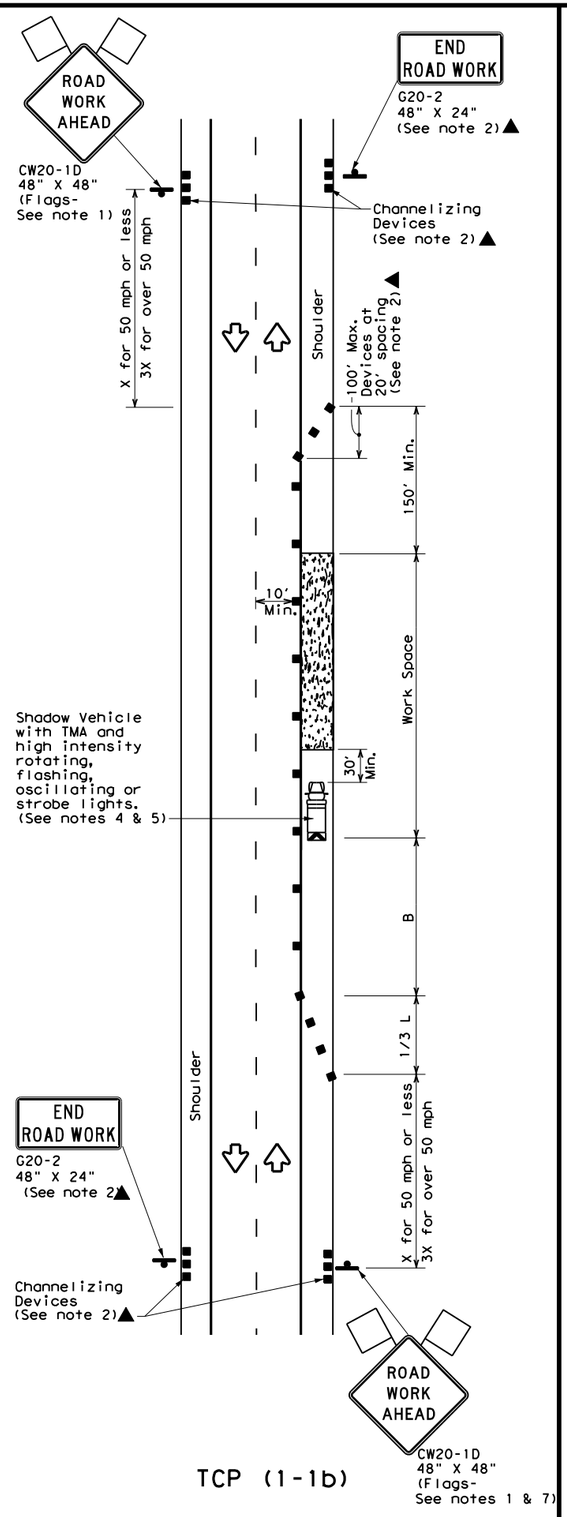
	WFS	COOKE		30



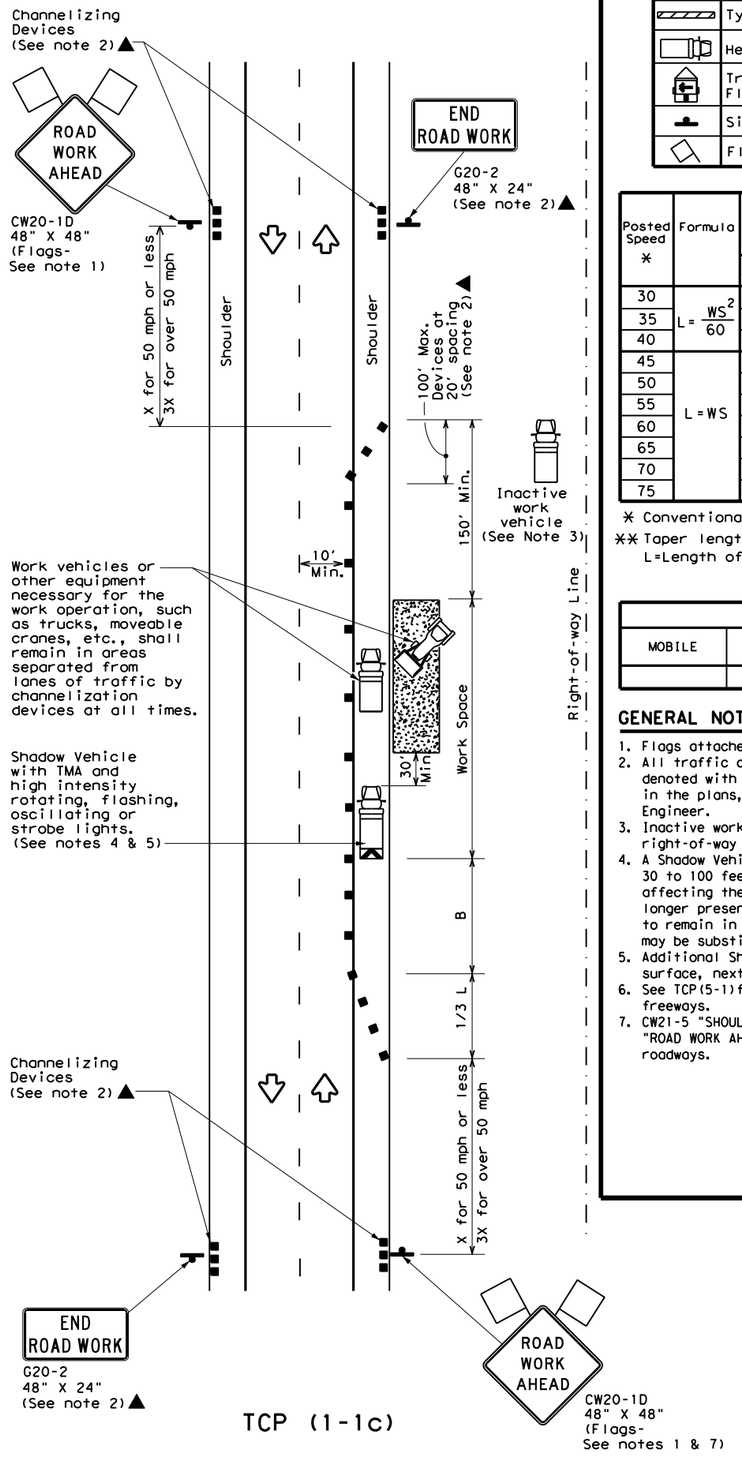
TCP (1-1a)

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	1609	01	029, etc.	FM 1630
8-95 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	WFS	COOKE		31

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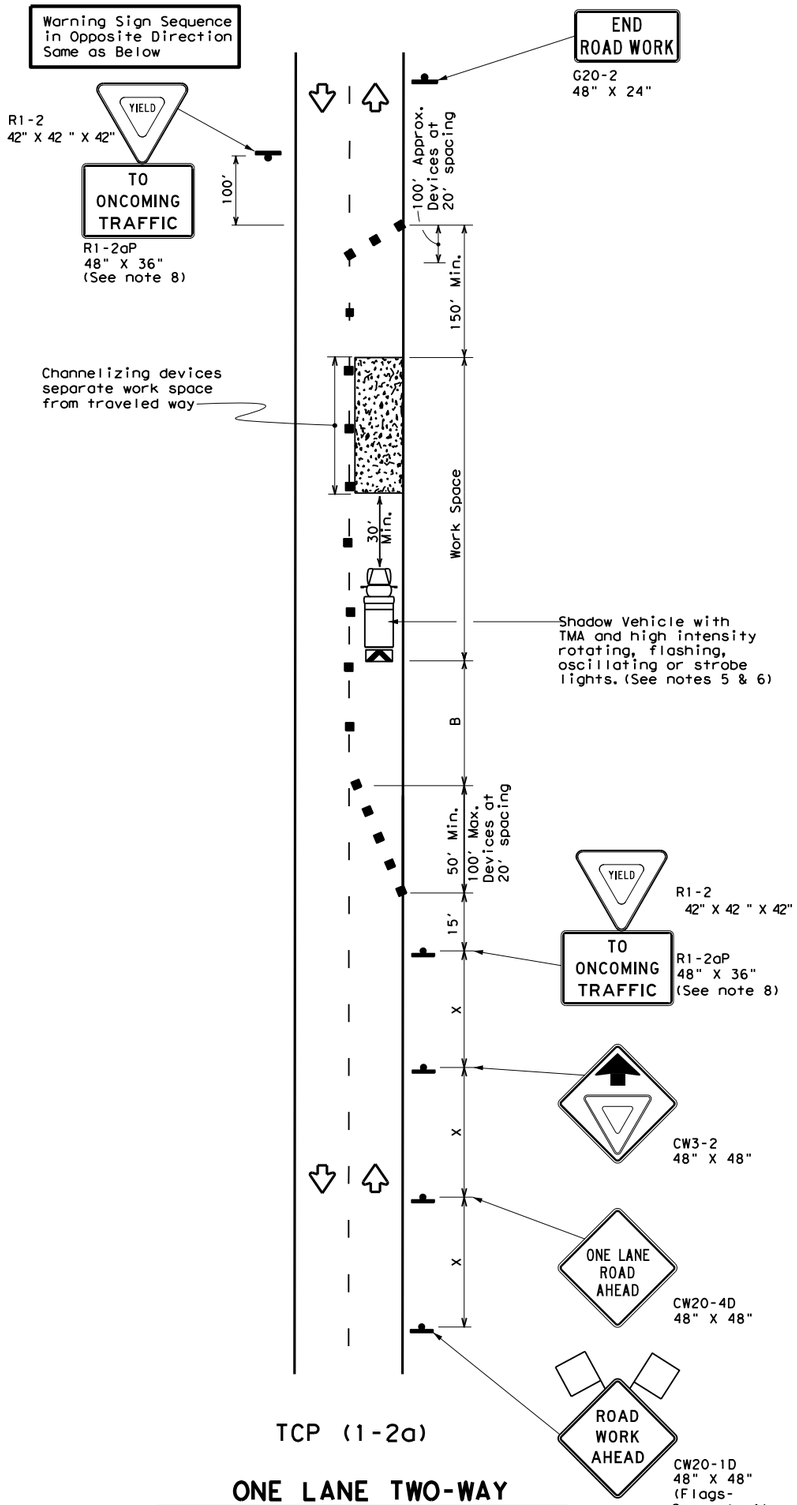
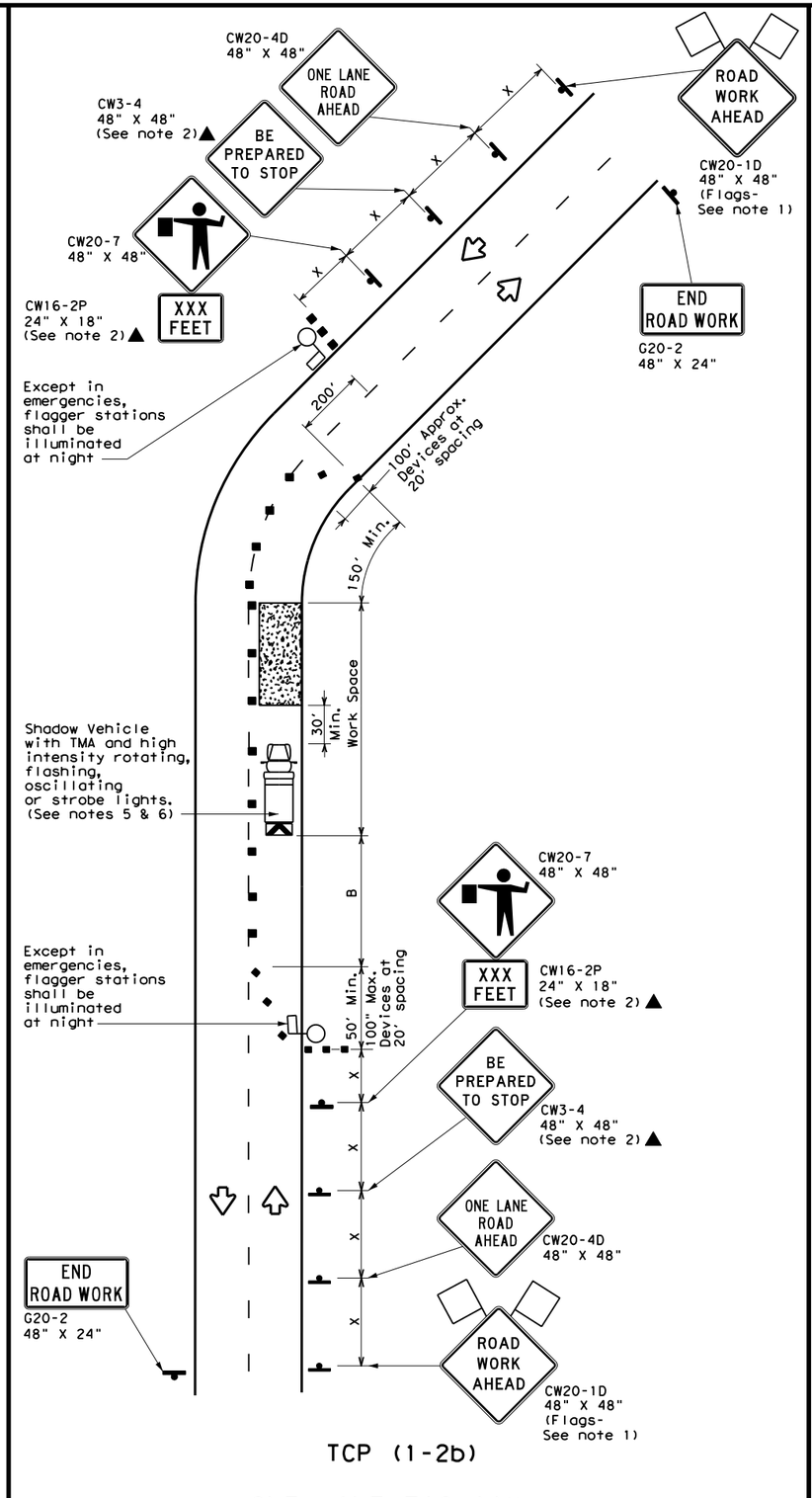


TCP (1-2a)

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			
	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"	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
	✓	✓		

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

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		32

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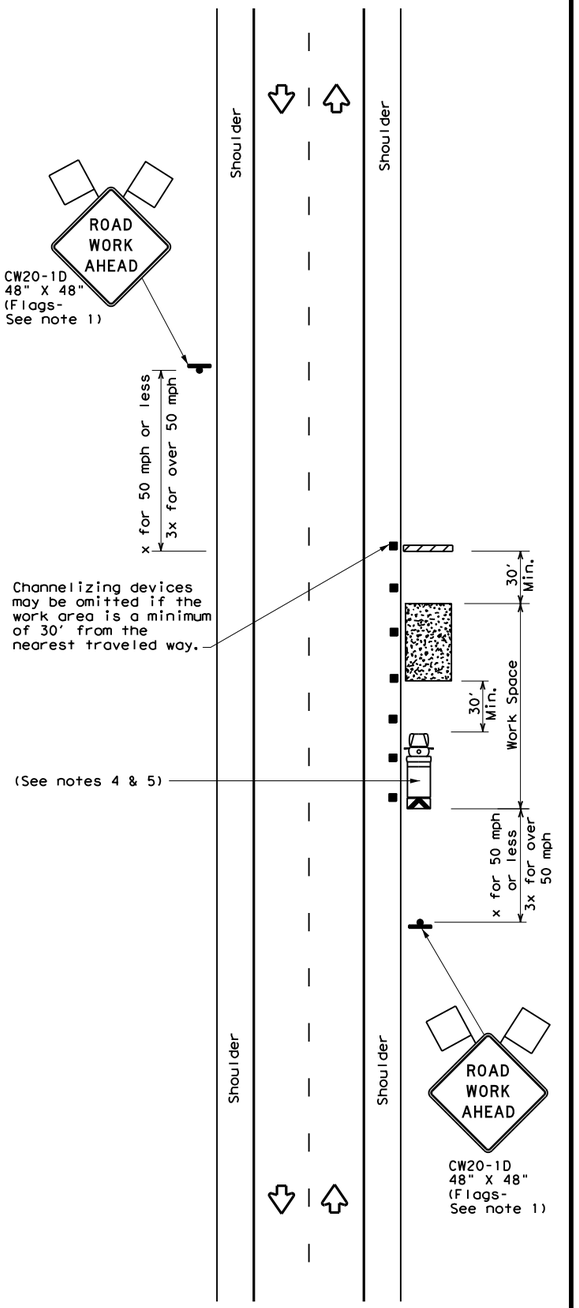
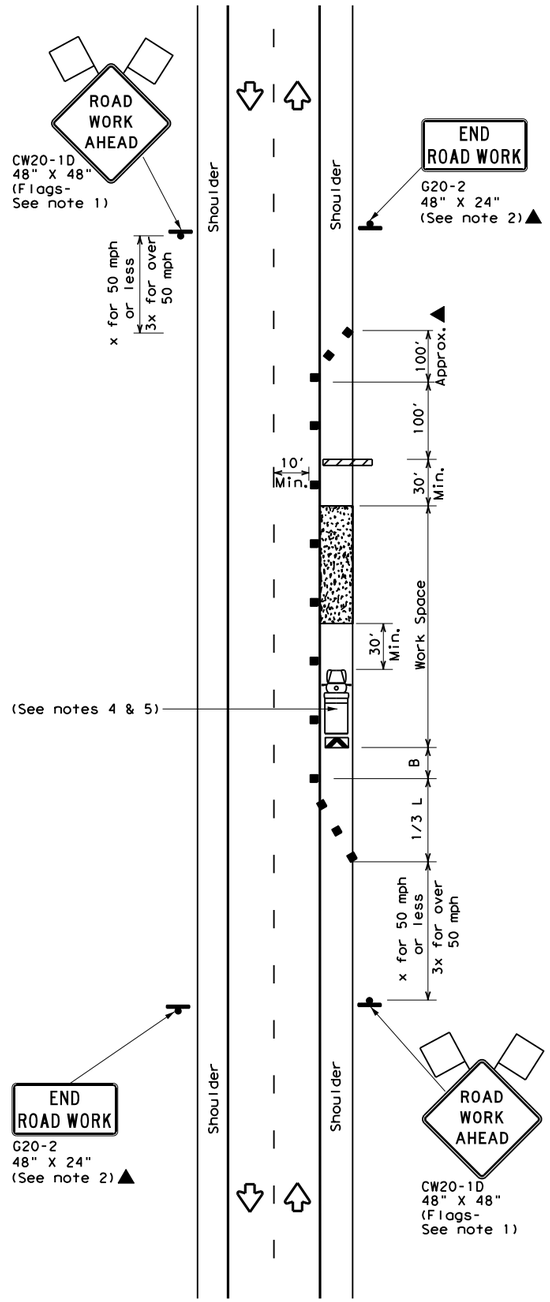


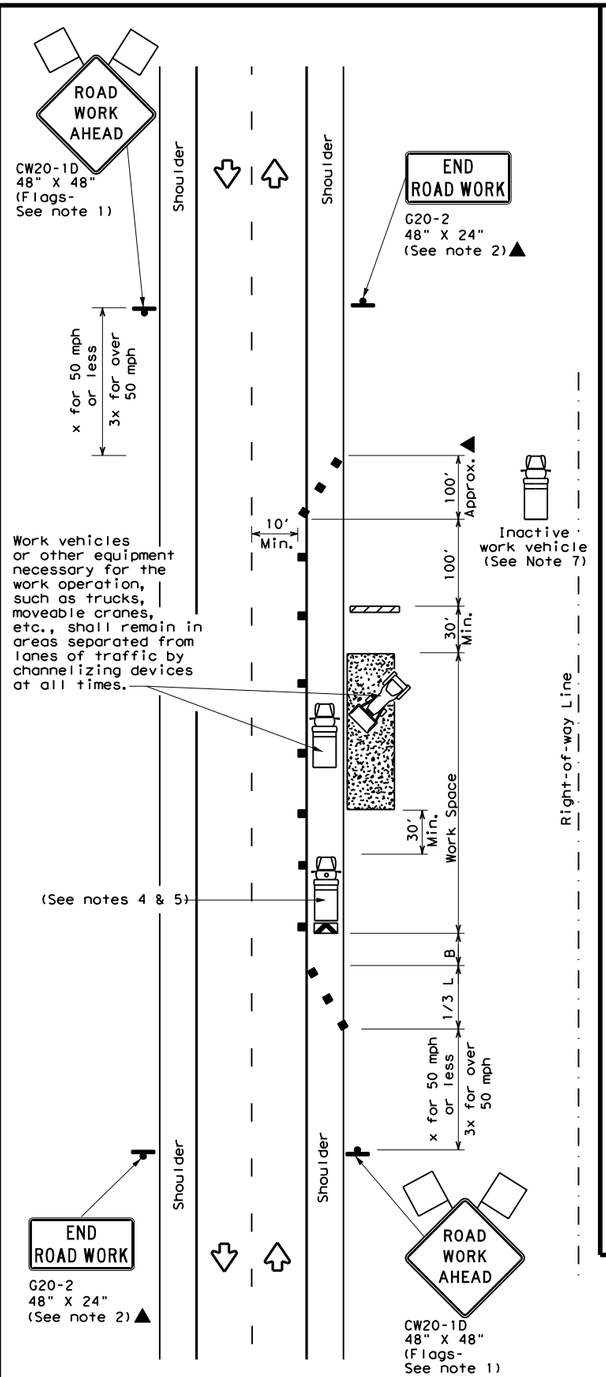
TCP (2-1a)

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 CW21-1D "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	1609	01	029, etc.	FM 1630
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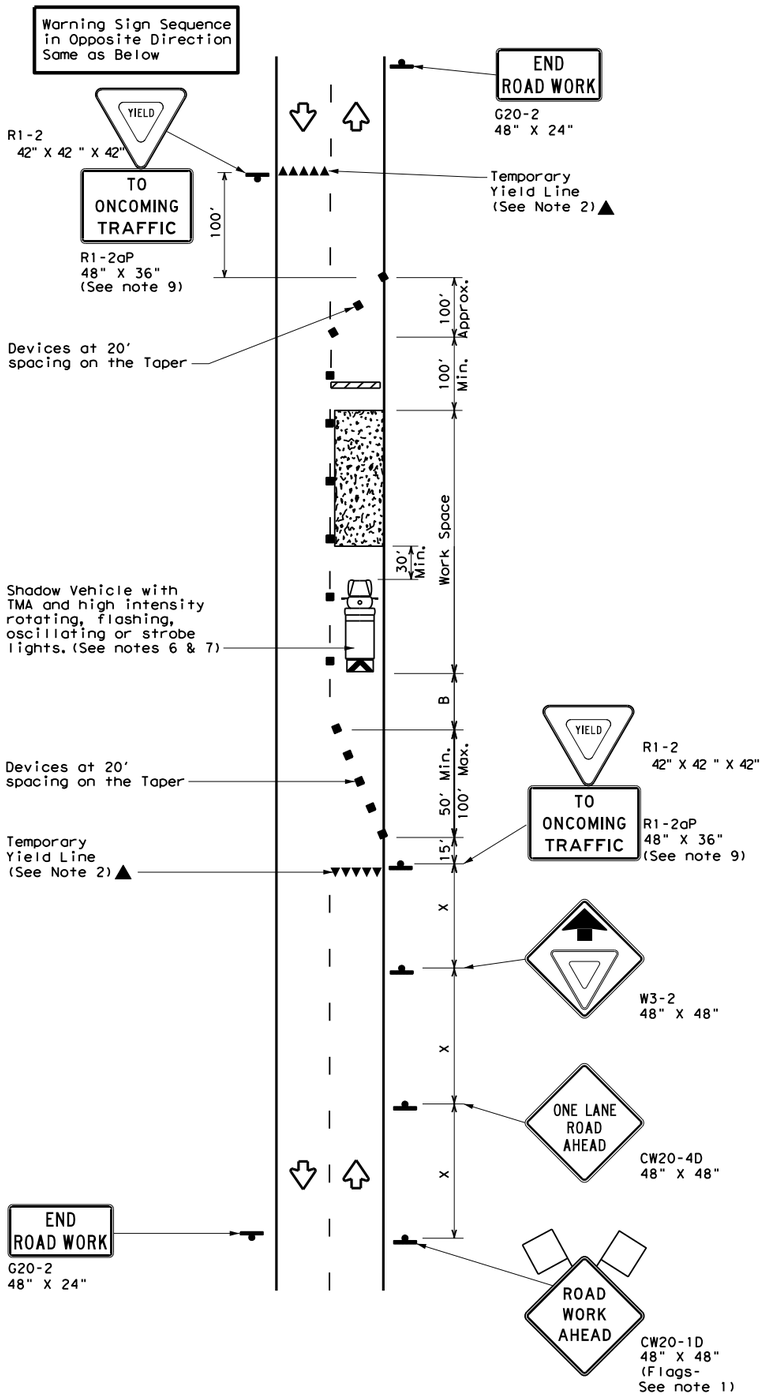
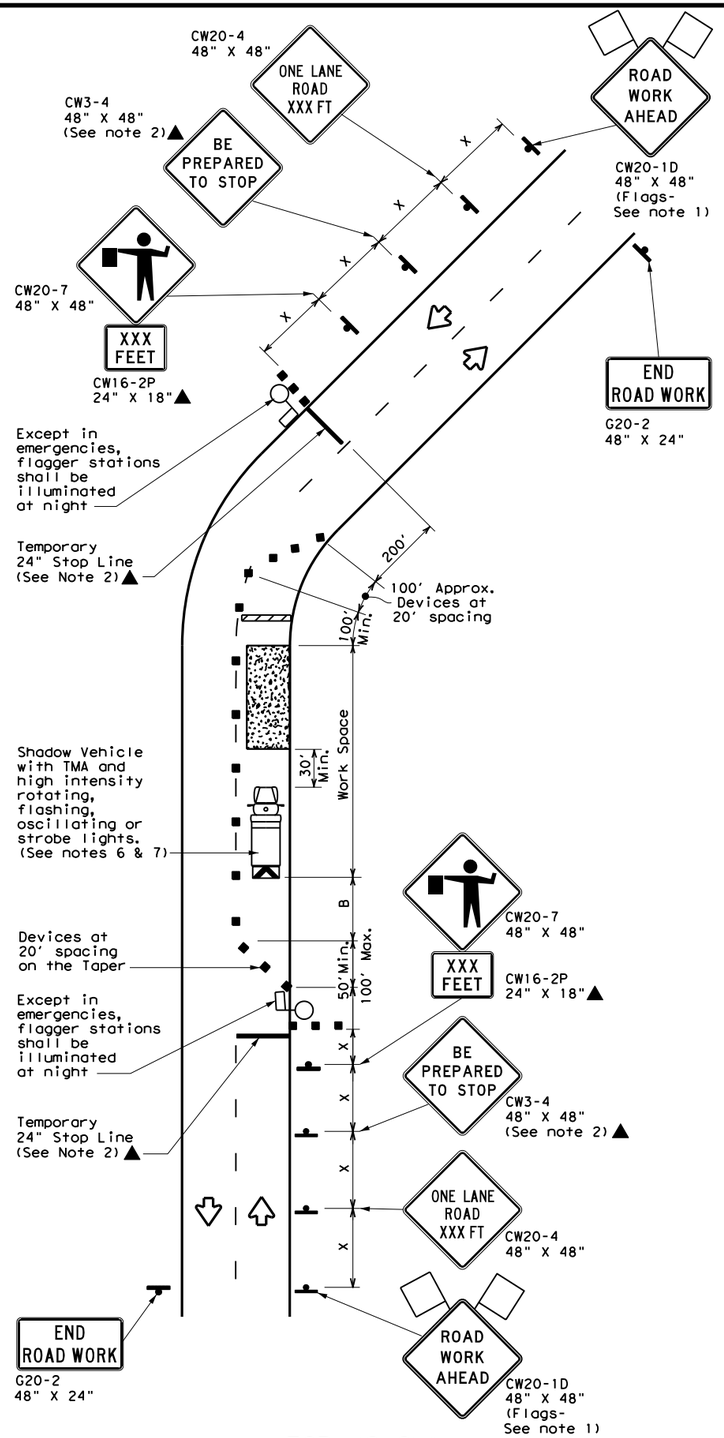
8-95 2-12	WFS	COOKE		33
1-97 2-18				



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	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"	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
	✓	✓	✓	

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 with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
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

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	1609	01	029, etc.	FM 1630
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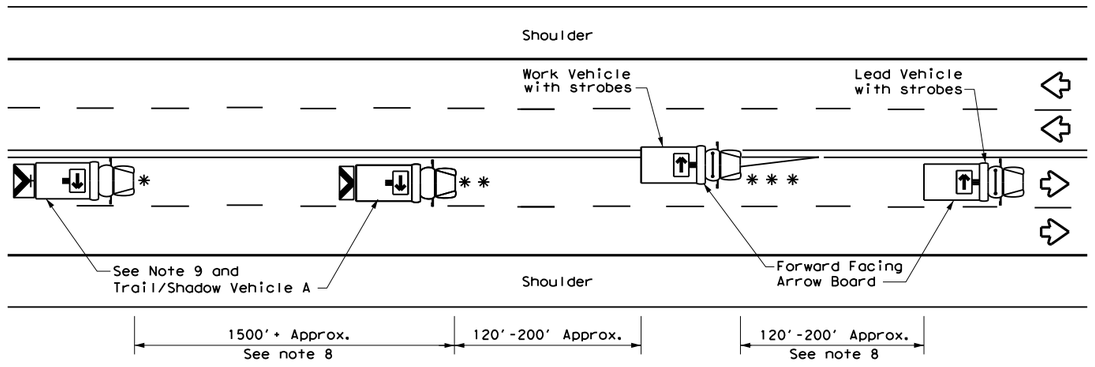
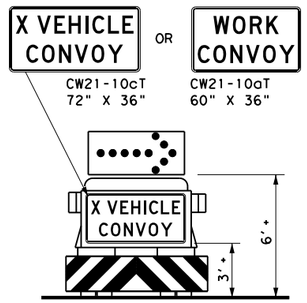


TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

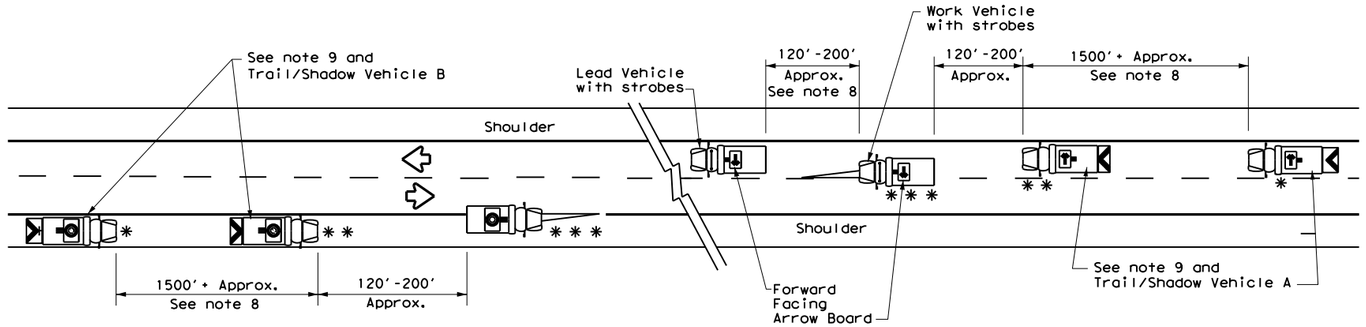
with RIGHT Directional display Flashing Arrow Board

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

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

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.

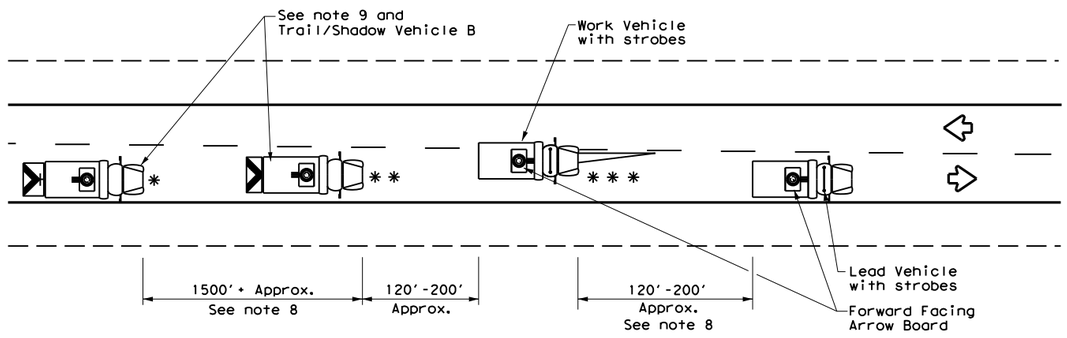


WORK ON SHOULDER

WORK ON TRAVEL LANE

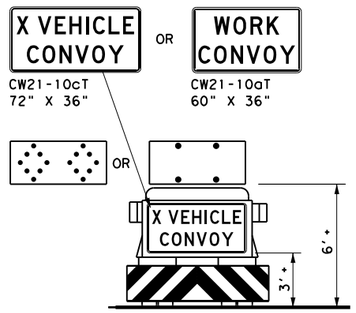
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



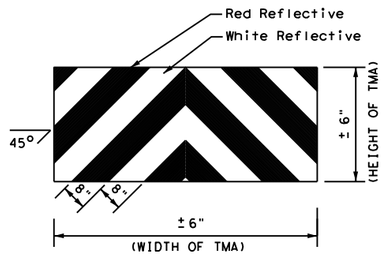
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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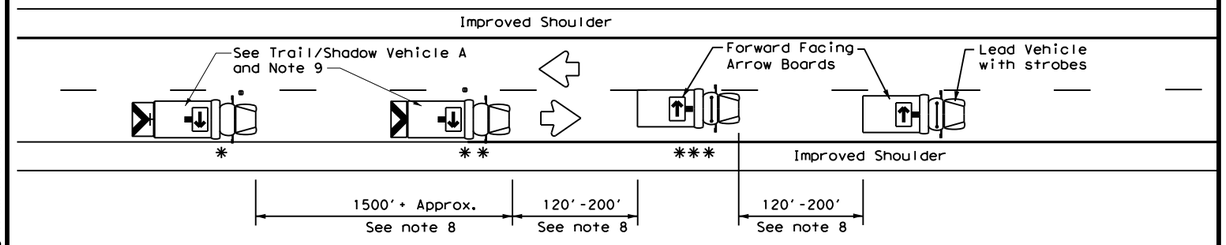
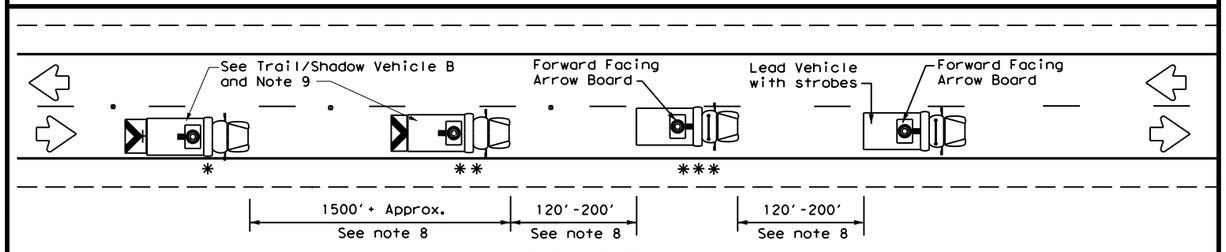


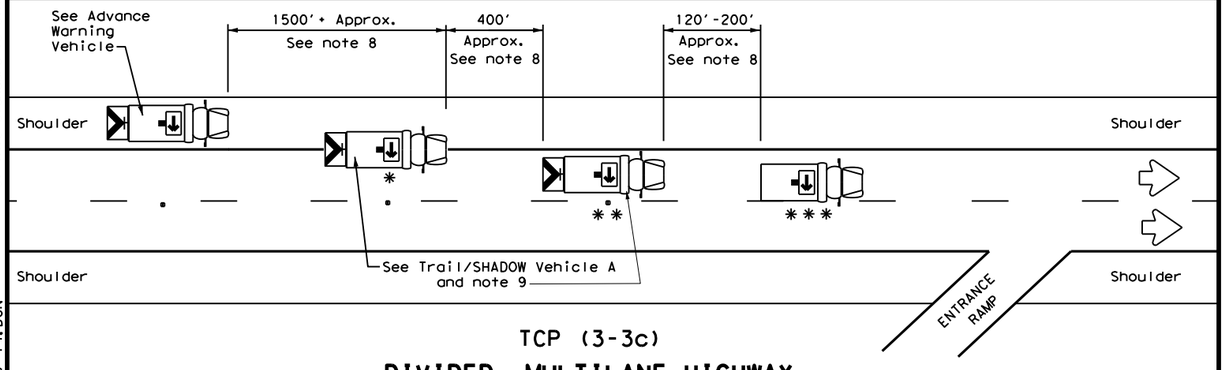
TCP (3-3a)

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



TCP (3-3b)

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

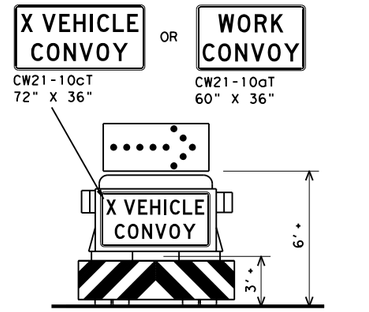


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

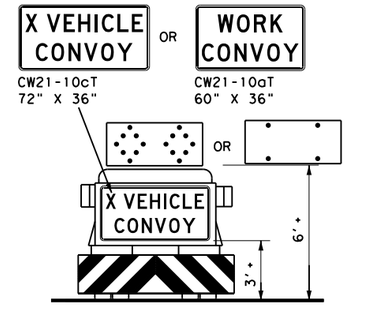
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



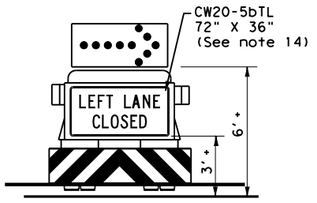
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

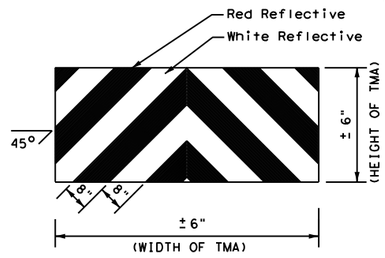


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

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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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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8-95 7-13	WFS	COOKE		36
1-97 7-14				

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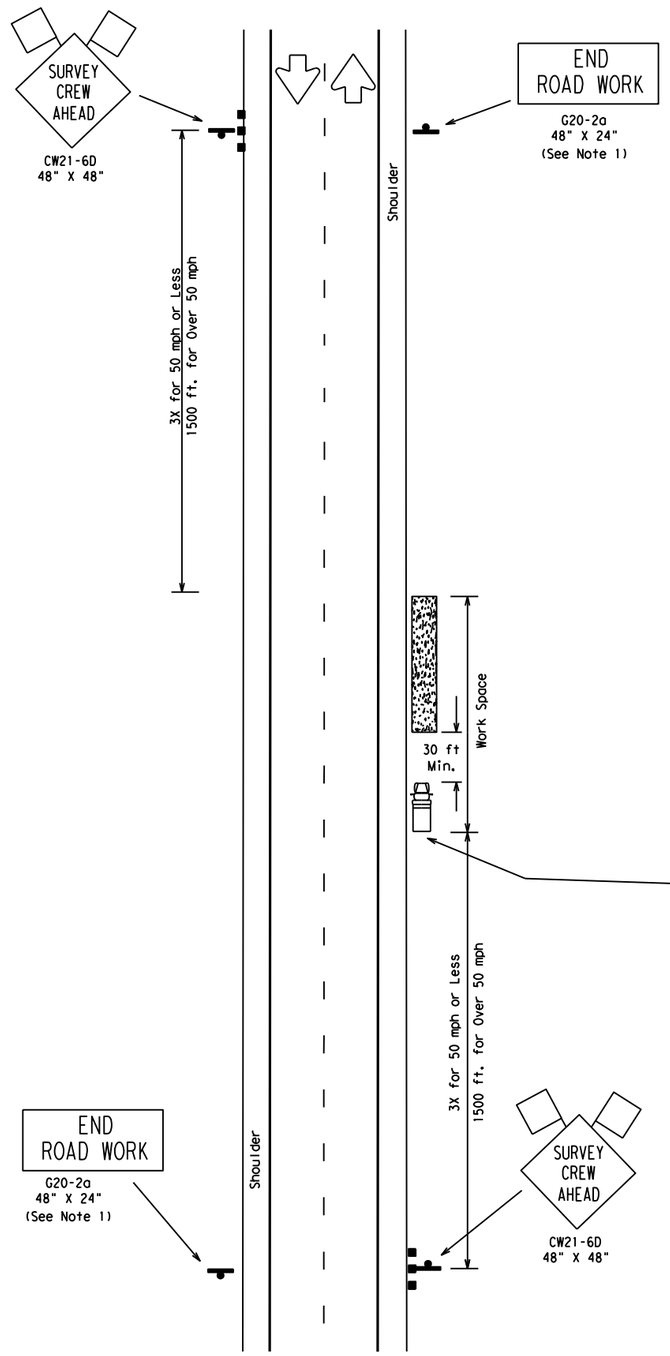
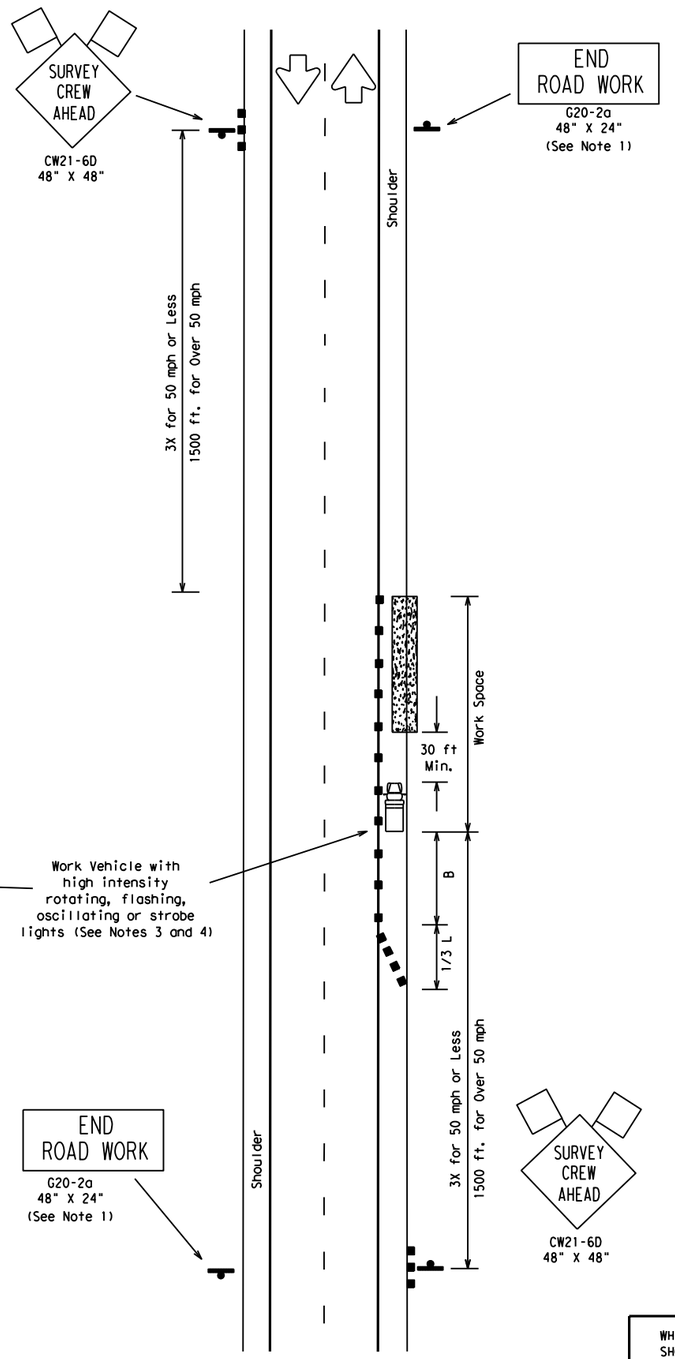


TCP (S-1a)
WORK OFF SHOULDER OR PAVED SURFACE



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

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

REVISIONS
8-08

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	37

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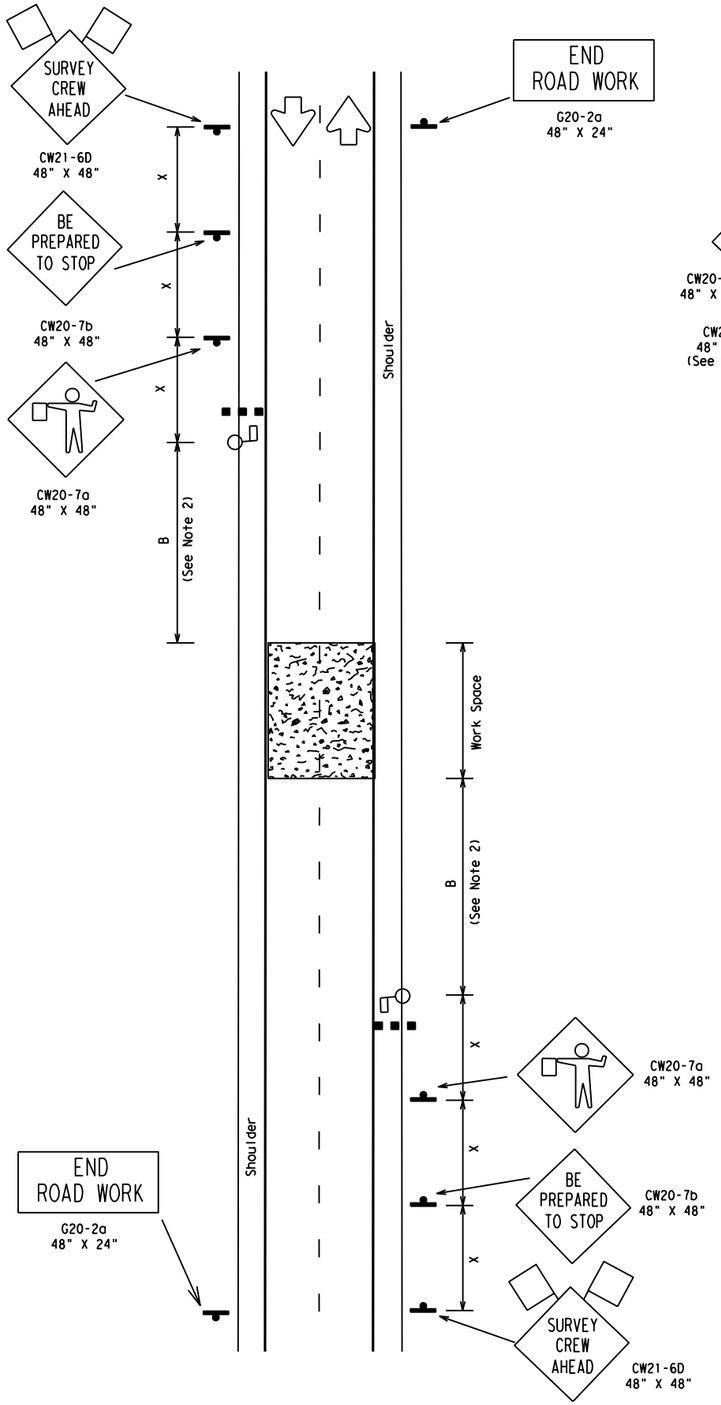
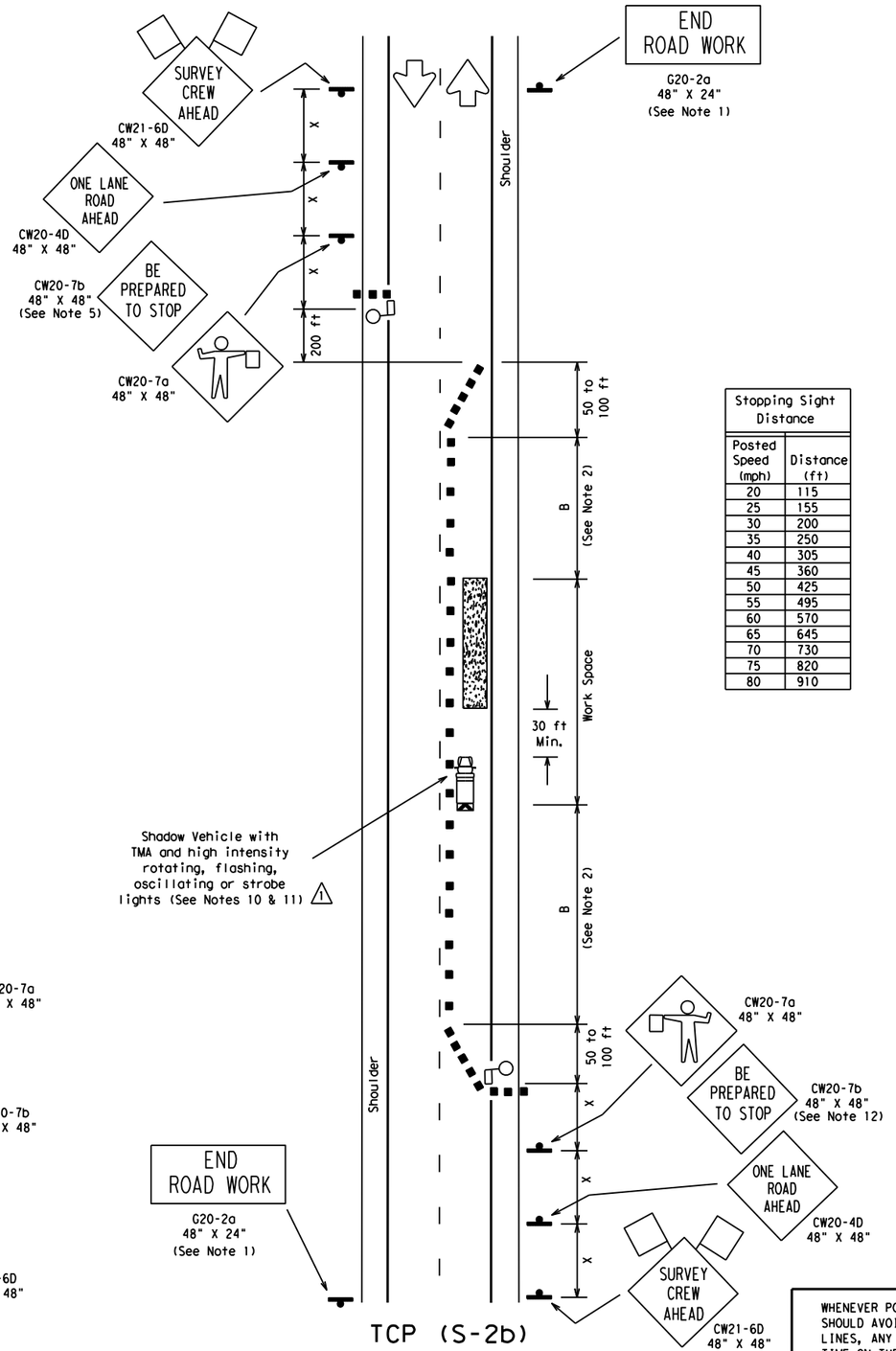


TCP (S-2a)
ROAD CLOSED FOR LESS THAN 20 MINUTES -
OFF PEAK TRAFFIC HOURS
WITH OR WITHOUT SHOULDERS



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

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
8-08	CONT	SECT	JOB	HIGHWAY
	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		38

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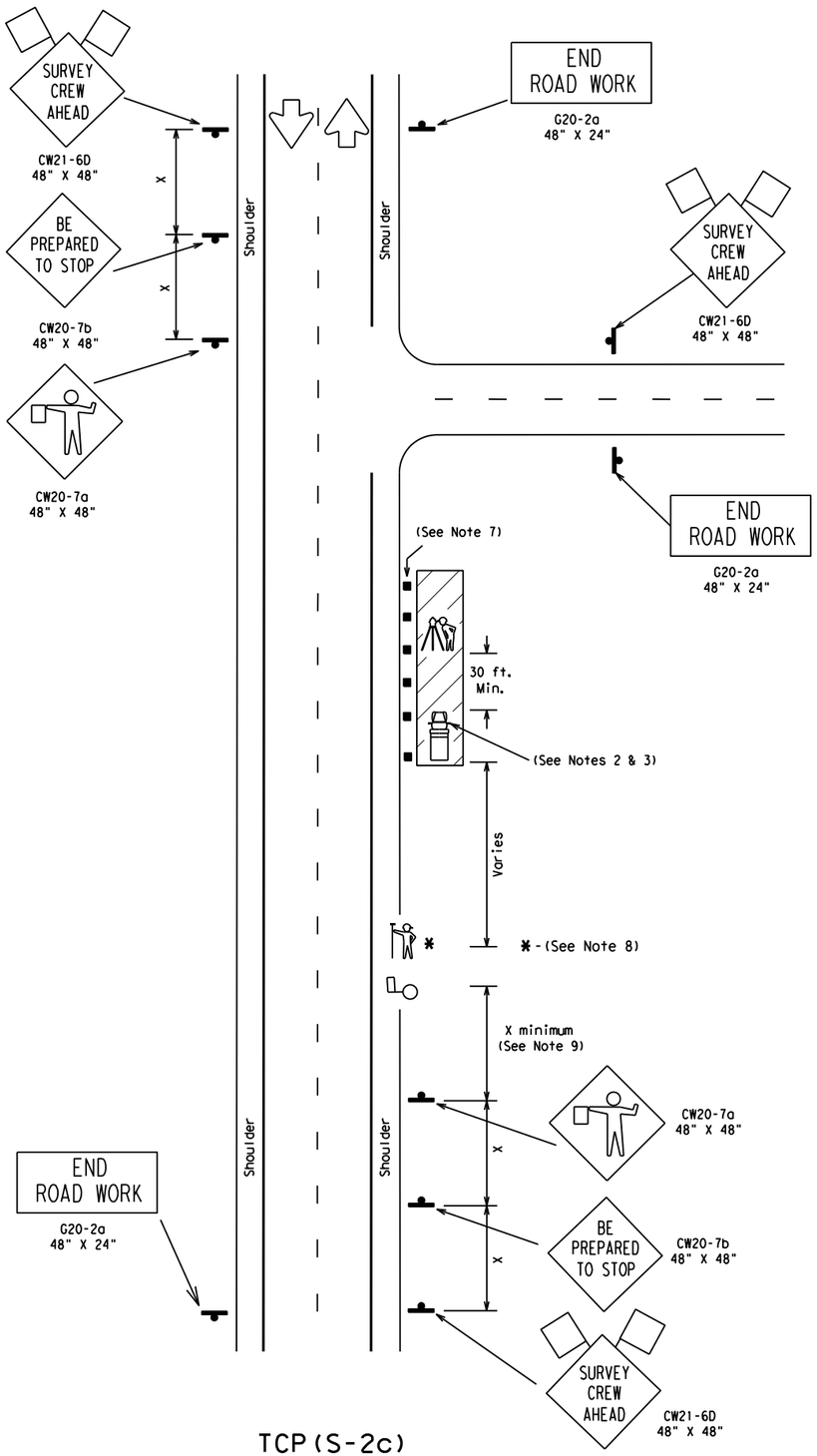

TCP(S-2c)

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
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	39

212A

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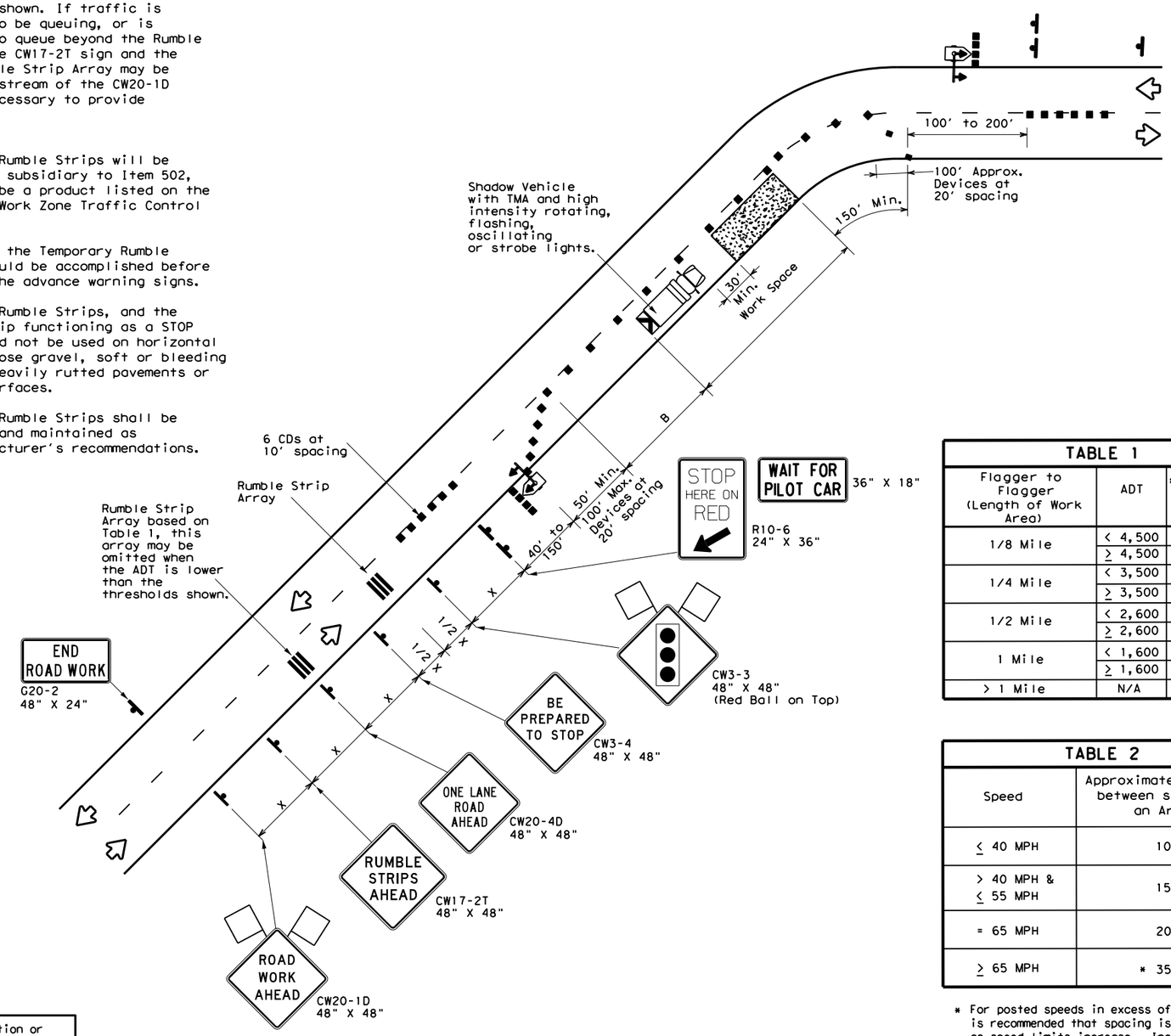
RUMBLE STRIP GENERAL NOTES

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.

04/27/2023

Texas Department of Transportation
Wichita Falls District

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

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		40

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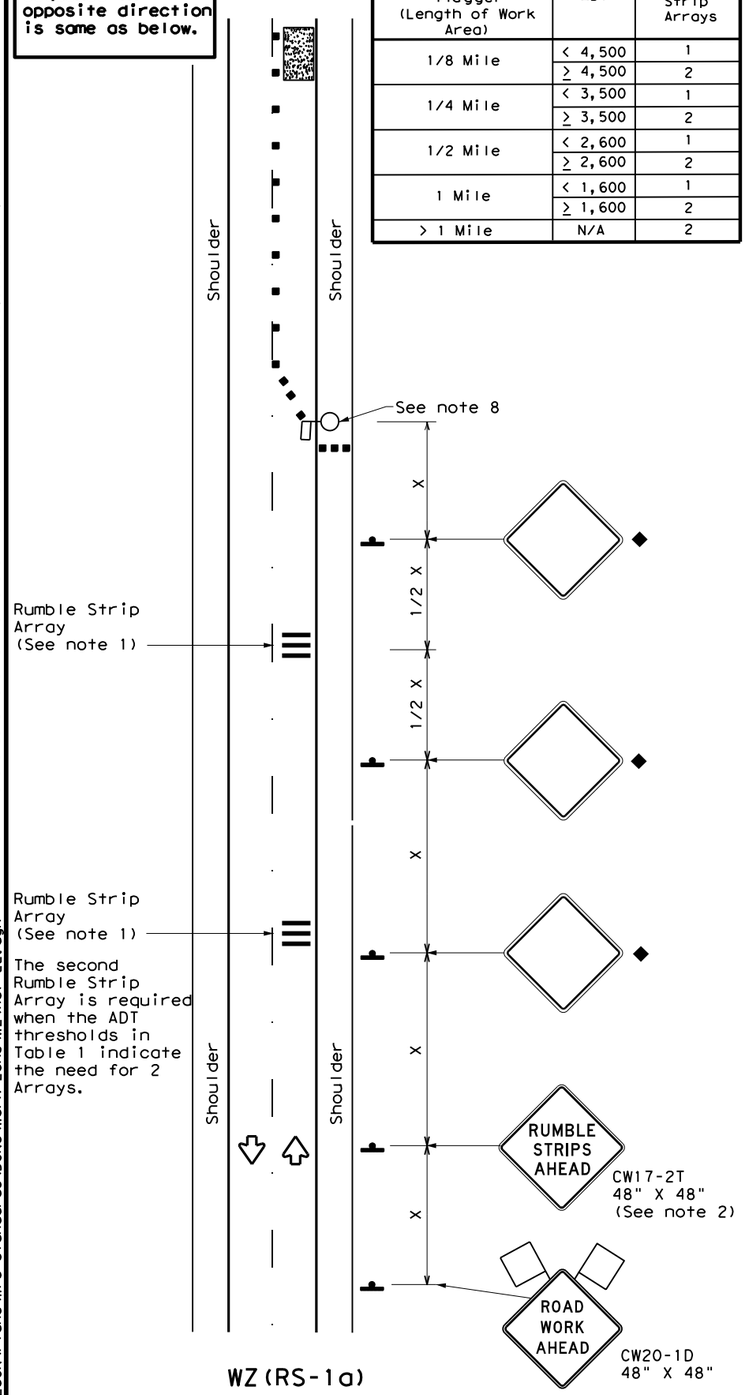
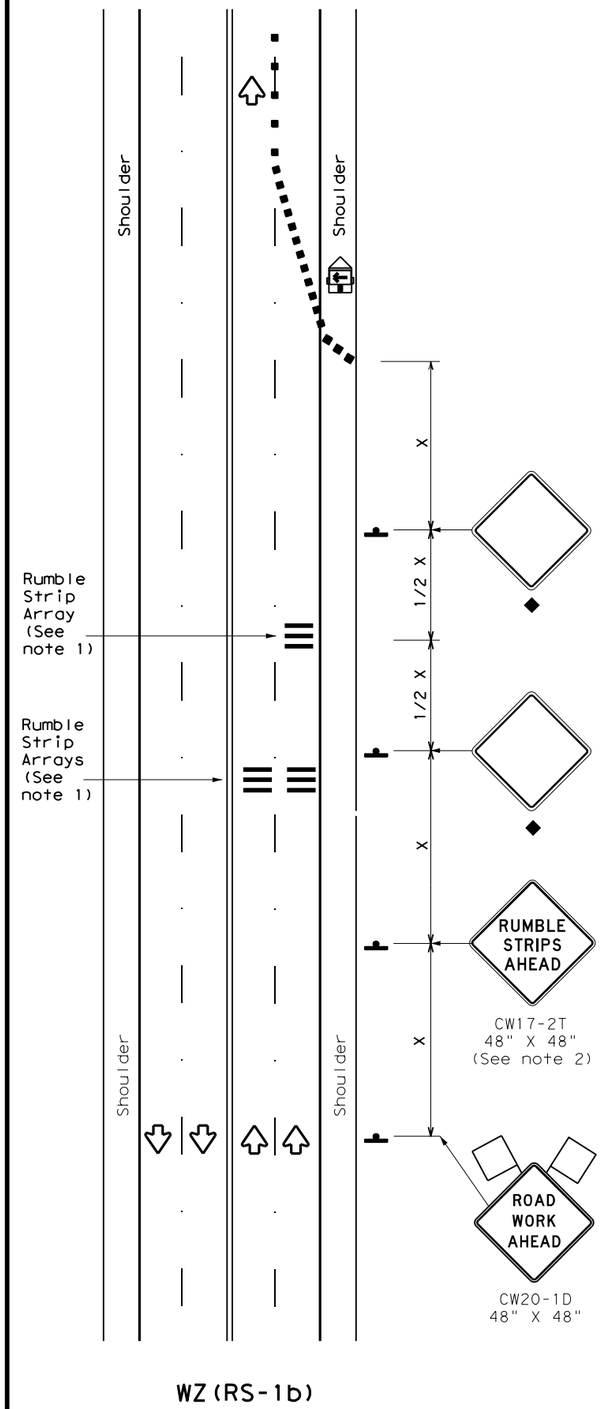
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

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			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel	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
	✓	✓		

◆ 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	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		41

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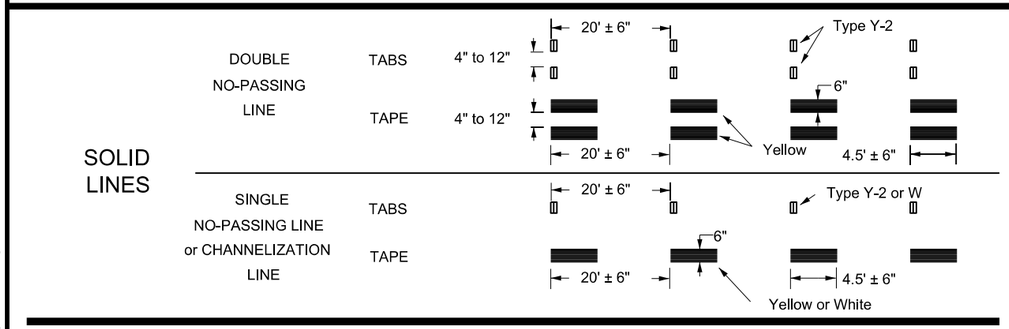
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



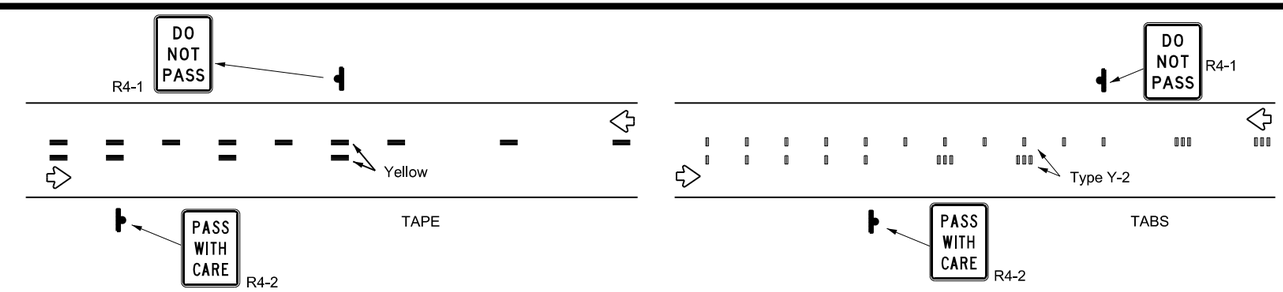
NOTES:

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.

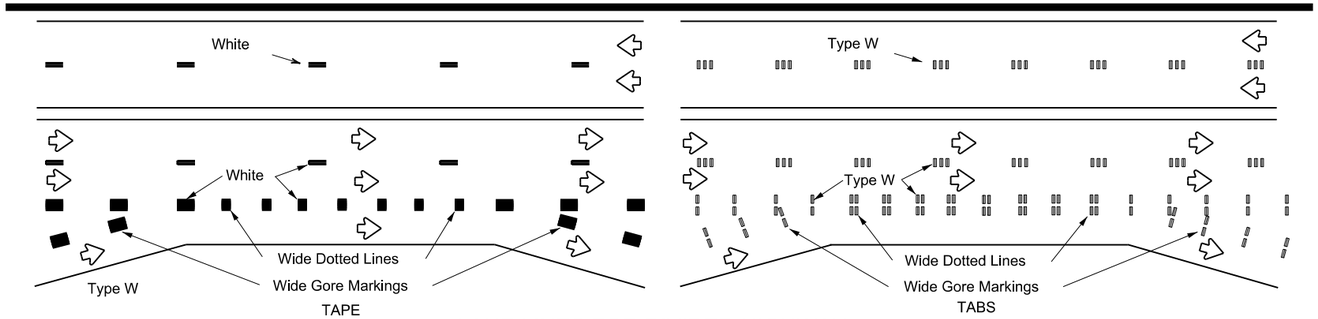
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

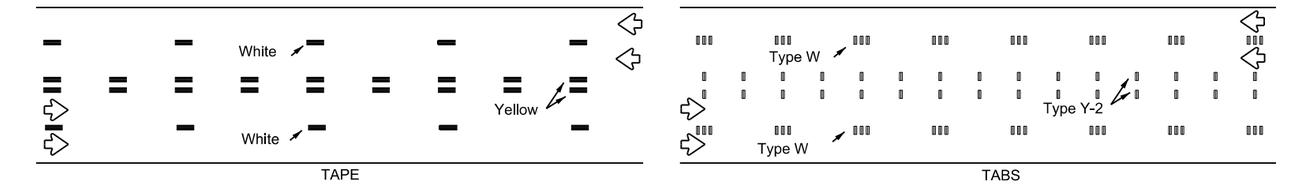
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



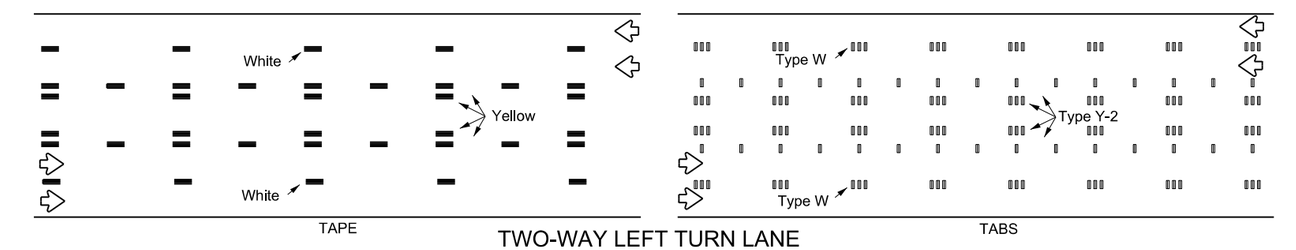
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



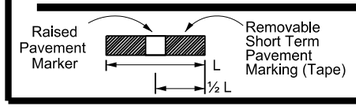
LANE LINES FOR DIVIDED HIGHWAY



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

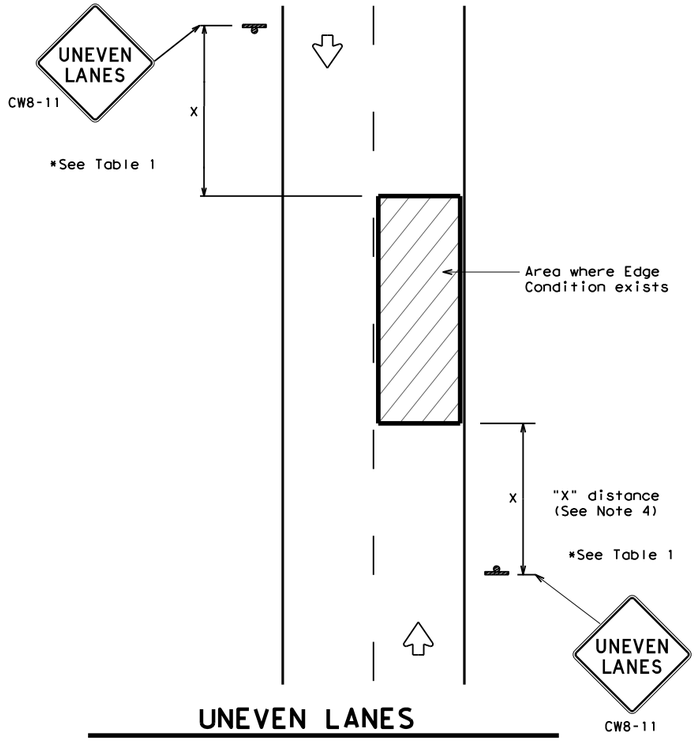
Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

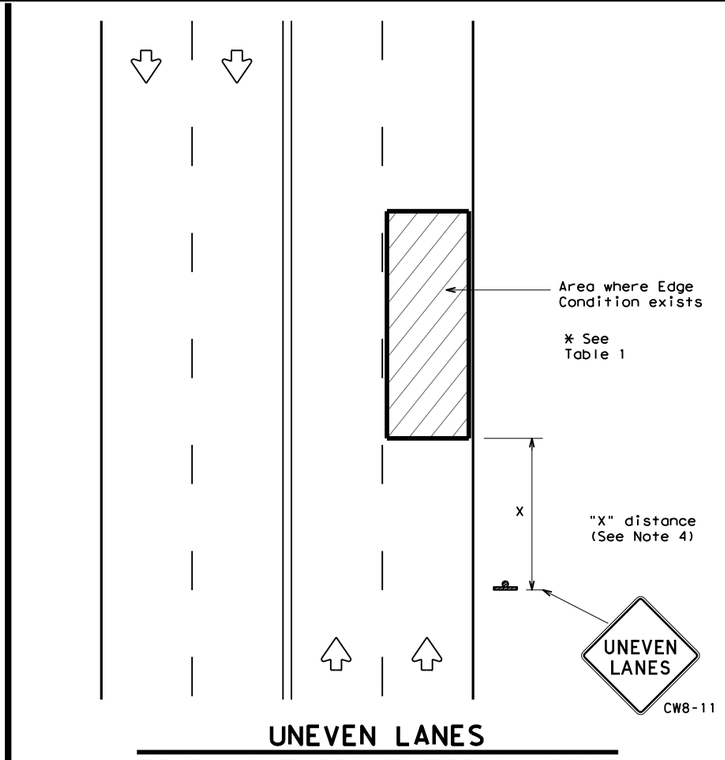
WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	WFS	COOKE		42

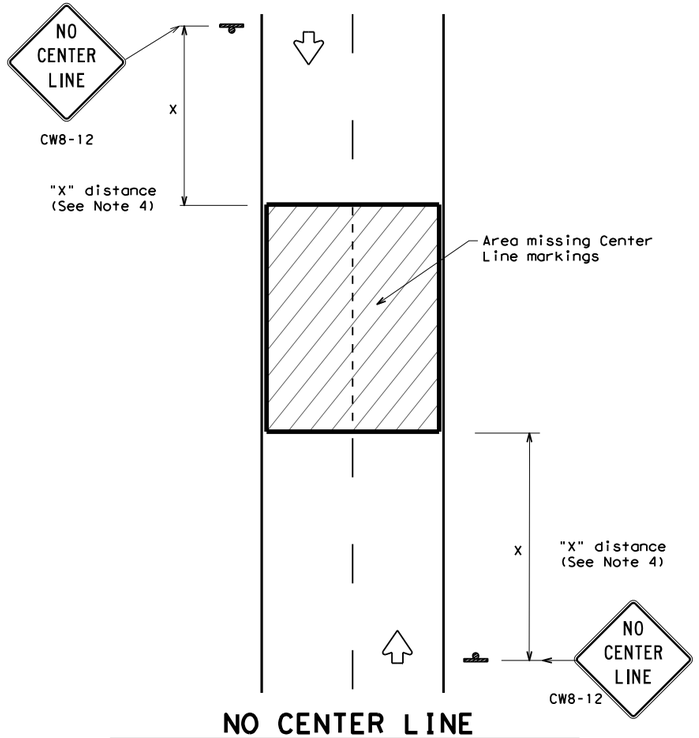
111



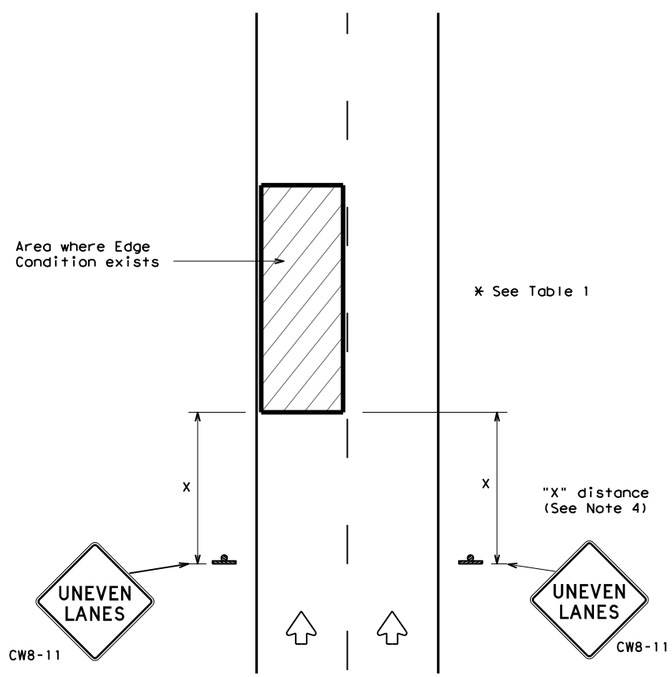
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

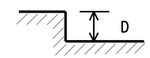
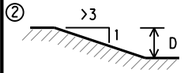
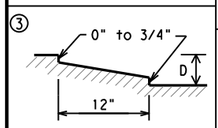
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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	1609	01	029, etc.	FM 1630
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	WFS	COOKE		43

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DATE: 4/26/2023 4:09:31 PM
FILE: T:\WFSDESGN\Plans\WFS Standards\DGNs\Work Zone\WZ(UL)-13.dgn

FM 1630 ALIGNMENT DATA

Chain CL contains:
CL1 CL3 CL5 CL7 CL9 CUR CL_11 CL14 CUR CL_16 CL19 CL21 CUR CL_23 CL26 CUR CL_28 CL31 CL33 CL35 CL37 CL39 CL41 CL43 CL45 CL47 CL49 CUR CL_51 CL54 CL56 CL58 CL60 CUR CL_62 CL64

Beginning chain CL description
Feature: Road_Centerline

Point CL1 N 7,253,810.0549 E 2,277,050.0902 Sta 123+66.99

Course from CL1 to CL3 N 75° 42' 59.49" E Dist 3,735.9437

Point CL3 N 7,254,731.7852 E 2,280,670.5444 Sta 161+02.93

Course from CL3 to CL5 N 75° 36' 59.49" E Dist 1,975.0000

Point CL5 N 7,255,222.3960 E 2,282,583.6378 Sta 180+77.93

Course from CL5 to CL7 N 75° 46' 44.49" E Dist 1,650.0000

Point CL7 N 7,255,627.7387 E 2,284,183.0743 Sta 197+27.93

Course from CL7 to CL9 N 75° 31' 44.49" E Dist 650.0000

Point CL9 N 7,255,790.1669 E 2,284,812.4526 Sta 203+77.93

Course from CL9 to PC CL_11 N 75° 46' 44.49" E Dist 1,534.0507

Curve Data

Curve CL_11
P.I. Station = 227+19.23 N 7,256,365.3356 E 2,287,082.0032
Delta = 31° 56' 54.23" (RT)
Degree = 2° 01' 54.35"
Tangent = 807.2478
Length = 1,572.4453
Radius = 2,820.0000
External = 113.2659
Long Chord = 1,552.1531
Mid. Ord. = 108.8923
P.C. Station = 219+11.98 N 7,256,167.0253 E 2,286,299.4931
P.T. Station = 234+84.43 N 7,256,119.5375 E 2,287,850.9195
C.C. N 7,253,433.4428 E 2,286,992.2607
Back = N 75° 46' 44.49" E
Ahead = S 72° 16' 21.28" E
Chord Bear = S 88° 14' 48.40" E

Course from PT CL_11 to CL14 S 72° 16' 21.28" E Dist 140.0000

Point CL14 N 7,256,076.9091 E 2,287,984.2717 Sta 236+24.43

Course from CL14 to PC CL_16 S 72° 26' 21.28" E Dist 225.3037

Curve Data

Curve CL_16
P.I. Station = 241+04.19 N 7,255,932.1563 E 2,288,441.6770
Delta = 18° 38' 45.22" (LT)
Degree = 3° 41' 47.41"
Tangent = 254.4597
Length = 504.4200
Radius = 1,550.0000
External = 20.7481
Long Chord = 502.1971
Mid. Ord. = 20.4741
P.C. Station = 238+49.73 N 7,256,008.9311 E 2,288,199.0758
P.T. Station = 243+54.15 N 7,255,936.9753 E 2,288,696.0911
C.C. N 7,257,486.6973 E 2,288,666.7370
Back = S 72° 26' 21.28" E
Ahead = N 88° 54' 53.50" E
Chord Bear = S 81° 45' 43.89" E

Course from PT CL_16 to CL19 N 88° 54' 53.50" E Dist 400.0000

Point CL19 N 7,255,944.5506 E 2,289,096.0194 Sta 247+54.15

Course from CL19 to CL21 N 89° 09' 53.50" E Dist 650.0000

Point CL21 N 7,255,954.0246 E 2,289,745.9503 Sta 254+04.15

Course from CL21 to PC CL_23 N 89° 24' 53.50" E Dist 678.8493

Curve Data

Curve CL_23
P.I. Station = 266+84.81 N 7,255,967.1032 E 2,291,026.5357
Delta = 45° 56' 05.76" (LT)
Degree = 4° 02' 05.69"
Tangent = 601.8029
Length = 1,138.4365
Radius = 1,420.0000
External = 122.2603
Long Chord = 1,108.1918
Mid. Ord. = 112.5683
P.C. Station = 260+83.00 N 7,255,960.9573 E 2,290,424.7642
P.T. Station = 272+21.44 N 7,256,403.7807 E 2,291,440.6366
C.C. N 7,257,380.8833 E 2,290,410.2626
Back = N 89° 24' 53.50" E
Ahead = N 43° 28' 47.74" E
Chord Bear = N 66° 26' 50.62" E

Course from PT CL_23 to CL26 N 43° 28' 47.74" E Dist 2,200.0000

Point CL26 N 7,258,000.1348 E 2,292,954.4574 Sta 294+21.44

Course from CL26 to PC CL_28 N 43° 18' 47.74" E Dist 402.0081

Curve Data

Curve CL_28
P.I. Station = 304+26.59 N 7,258,731.4934 E 2,293,643.9746
Delta = 46° 01' 34.55" (RT)
Degree = 4° 02' 05.69"
Tangent = 603.1384
Length = 1,140.7000
Radius = 1,420.0000
External = 122.7819
Long Chord = 1,110.2755
Mid. Ord. = 113.0103
P.C. Station = 298+23.45 N 7,258,292.6415 E 2,293,230.2297
P.T. Station = 309+64.15 N 7,258,738.4460 E 2,294,247.0729
C.C. N 7,257,318.5403 E 2,294,263.4416
Back = N 43° 18' 47.74" E
Ahead = N 89° 20' 22.29" E
Chord Bear = N 66° 19' 35.01" E

Course from PT CL_28 to CL31 N 89° 20' 22.29" E Dist 200.0000

Point CL31 N 7,258,740.7514 E 2,294,447.0596 Sta 311+64.15

Course from CL31 to CL33 N 89° 35' 22.29" E Dist 600.0000

Point CL33 N 7,258,745.0499 E 2,295,047.0442 Sta 317+64.15

Course from CL33 to CL35 N 89° 20' 22.29" E Dist 200.0000

Point CL35 N 7,258,747.3553 E 2,295,247.0309 Sta 319+64.15

Course from CL35 to CL37 N 89° 05' 22.29" E Dist 1,400.0000

Point CL37 N 7,258,769.6015 E 2,296,646.8542 Sta 333+64.15

Course from CL37 to CL39 N 89° 10' 22.29" E Dist 451.2354

Point CL39 N 7,258,776.1155 E 2,297,098.0426 Sta 338+15.38

Course from CL39 to CL41 N 89° 25' 22.29" E Dist 200.0000

Point CL41 N 7,258,778.1301 E 2,297,298.0324 Sta 340+15.38

Course from CL41 to CL43 N 89° 40' 22.29" E Dist 700.0000

Point CL43 N 7,258,782.1268 E 2,297,998.0210 Sta 347+15.38

Course from CL43 to CL45 N 89° 25' 22.29" E Dist 150.0000

Point CL45 N 7,258,783.6378 E 2,298,148.0134 Sta 348+65.38

Course from CL45 to CL47 N 89° 17' 22.29" E Dist 2,650.0000

Point CL47 N 7,258,816.4973 E 2,300,797.8097 Sta 375+15.38

Course from CL47 to CL49 N 89° 22' 22.29" E Dist 500.0000

Point CL49 N 7,258,821.9701 E 2,301,297.7797 Sta 380+15.38

Course from CL49 to PC CL_51 N 89° 07' 22.29" E Dist 439.9990

Curve Data

Curve CL_51
P.I. Station = 387+55.42 N 7,258,833.2989 E 2,302,037.7320
Delta = 2° 17' 30.59" (LT)
Degree = 0° 22' 55.10"
Tangent = 300.0400
Length = 600.0000
Radius = 15,000.0000
External = 3.0005
Long Chord = 599.9600
Mid. Ord. = 2.9999
P.C. Station = 384+55.38 N 7,258,828.7058 E 2,301,737.7272
P.T. Station = 390+55.38 N 7,258,849.8854 E 2,302,337.3132
C.C. N 7,273,826.9480 E 2,301,508.1007
Back = N 89° 07' 22.29" E
Ahead = N 86° 49' 51.69" E
Chord Bear = N 87° 58' 36.99" E

Course from PT CL_51 to CL54 N 87° 04' 51.69" E Dist 400.0000

Point CL54 N 7,258,870.2548 E 2,302,736.7943 Sta 394+55.38

Course from CL54 to CL56 N 87° 19' 51.69" E Dist 200.0000

Point CL56 N 7,258,879.5679 E 2,302,936.5773 Sta 396+55.38

Course from CL56 to CL58 N 87° 24' 51.69" E Dist 1,250.0000

Point CL58 N 7,258,935.9587 E 2,304,185.3047 Sta 409+05.38

Course from CL58 to CL60 N 87° 12' 51.69" E Dist 500.0000

Point CL60 N 7,258,960.2584 E 2,304,684.7139 Sta 414+05.38

Course from CL60 to PC CL_62 N 87° 22' 51.69" E Dist 575.0000

Curve Data

Curve CL_62
P.I. Station = 422+30.41 N 7,258,997.9569 E 2,305,508.8753
Delta = 1° 54' 35.49" (RT)
Degree = 0° 22' 55.10"
Tangent = 250.0232
Length = 500.0000
Radius = 15,000.0000
External = 2.0836
Long Chord = 499.9769
Mid. Ord. = 2.0833
P.C. Station = 419+80.38 N 7,258,986.5324 E 2,305,259.1133
P.T. Station = 424+80.38 N 7,259,001.0512 E 2,305,758.8793
C.C. N 7,244,002.2000 E 2,305,944.5203
Back = N 87° 22' 51.69" E
Ahead = N 89° 17' 27.19" E
Chord Bear = N 88° 20' 09.44" E

Course from PT CL_62 to CL64 N 89° 12' 27.19" E Dist 283.9805

Point CL64 N 7,259,004.9788 E 2,306,042.8326 Sta 427+64.36

Ending chain CL description

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
ALIGNMENT DATA

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SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		44

DATE: 4/26/2023 4:09:32 PM
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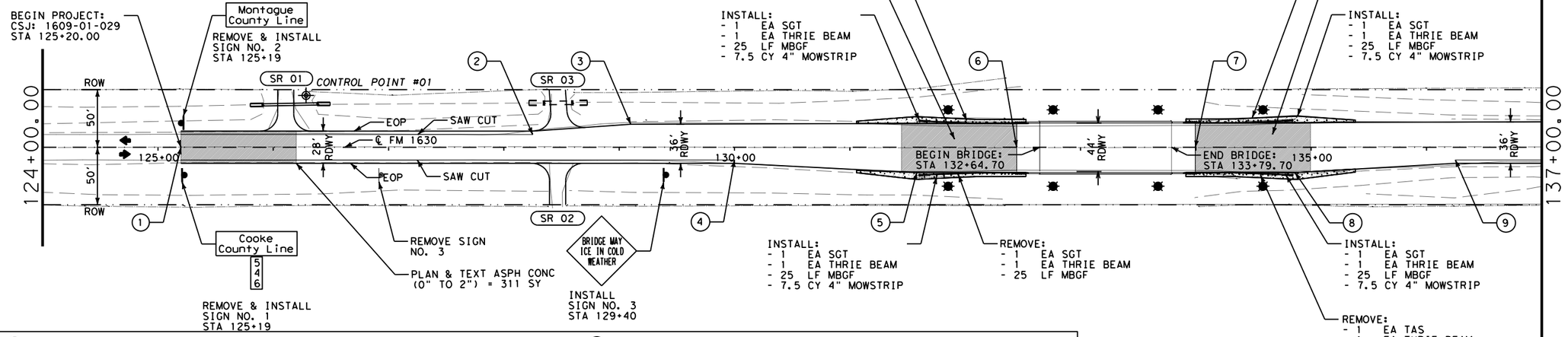
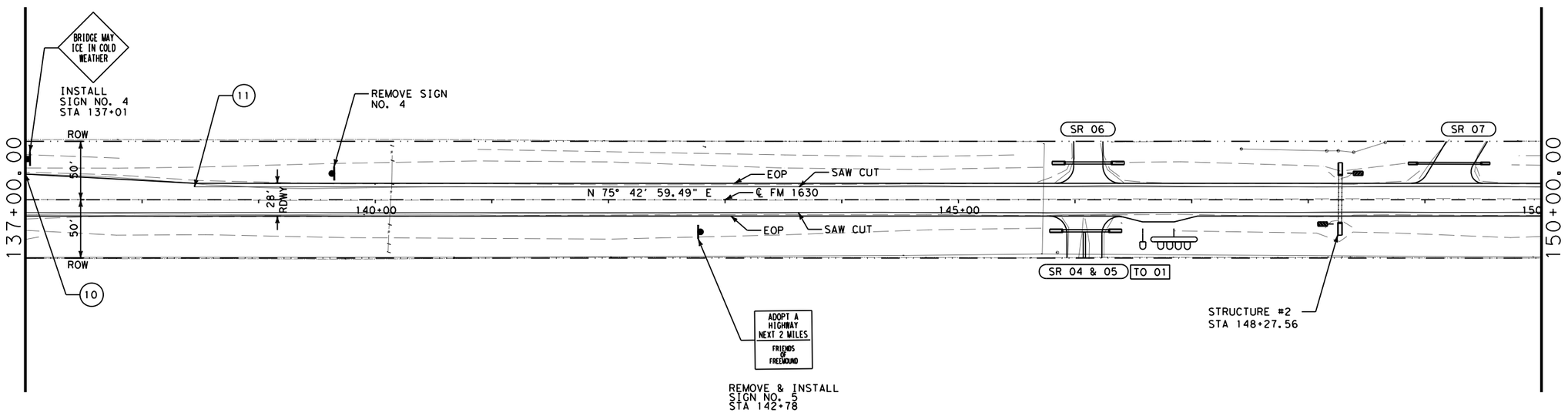
LEGEND

SIGN		SR ##	SIDEROAD NO.
SINGLE MAILBOX		TO ##	TURNOUT NO.
DOUBLE MAILBOX			0" TO 2" PLAN & TEXT
MULTIPLE MAILBOX			
OBJECT MARKER(TY 2)			
BIDIRECTIONAL DELINEATOR			



Control Point	NORTHING	EASTING	ELEVATION	STA	OFFSET
CP 01	7253918.143	2277292.448	884.506	126+28.523	44.952' LT

(1) BEGIN WIDENING, OVERLAY, STRIPING, & RUMBLE STRIPS LT & RT OF CL STA 125+20.00
(2) END WIDENING LT OF CL STA 128+25.00
(2) BEGIN TRANSITION FROM 14' LT OF CL TO 22' LT OF CL STA 128+25.00
(3) END TRANSITION 22' LT OF CL STA 129+10.00
(4) END WIDENING RT OF CL STA 130+00.00
(4) BEGIN TRANSITION FROM 14' RT OF CL TO 22' RT OF CL STA 130+00.00
(5) END TRANSITION 22' RT OF CL STA 131+58.00
(6) END OVERLAY STA 132+44.70
(7) BEGIN OVERLAY STA 133+99.70
(8) BEGIN TRANSTITION FROM 22' RT OF CL TO 14' RT OF CL STA 134+86.00
(9) END TRANSTION 14' RT OF CL STA 136+25.00
(9) BEGIN WIDENING RT OF CL STA 136+25.00
(10) BEGIN TRANSITION FROM 22' LT OF CL TO 14' RT OF CL STA 137+00.00
(11) END TRANSTION 14' RT OF CL STA 138+45.00
(11) BEGIN WIDENING LT OF CL STA 138+45.00



BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
Bryson Lawrence, P.E.

04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		45

DATE: 4/26/2023 4:09:37 PM
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LEGEND

	SIGN	SR ##	SIDEROAD NO.
	SINGLE MAILBOX	TO ##	TURNOUT NO.
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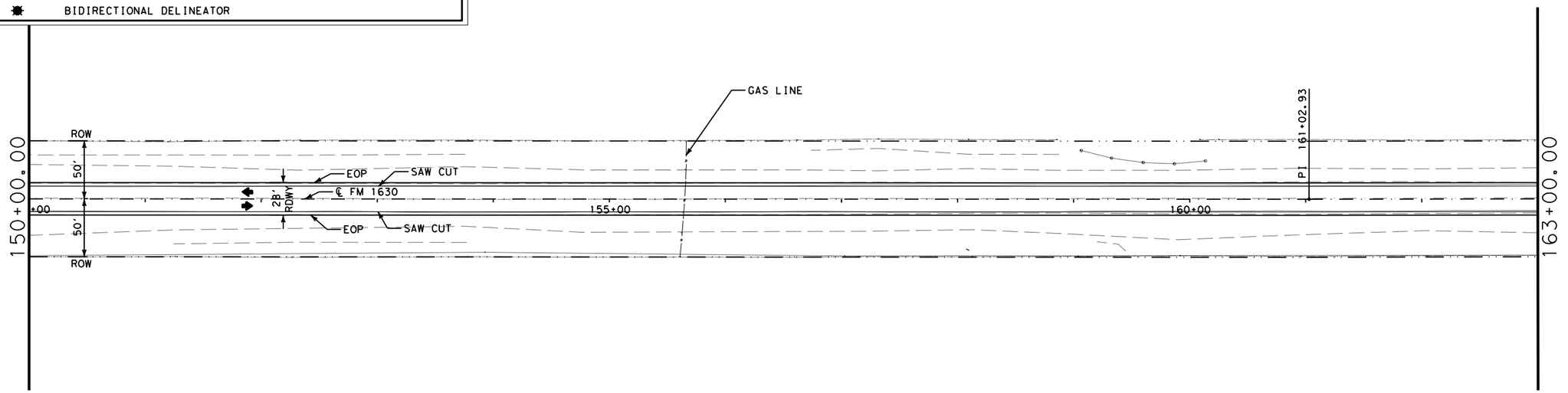
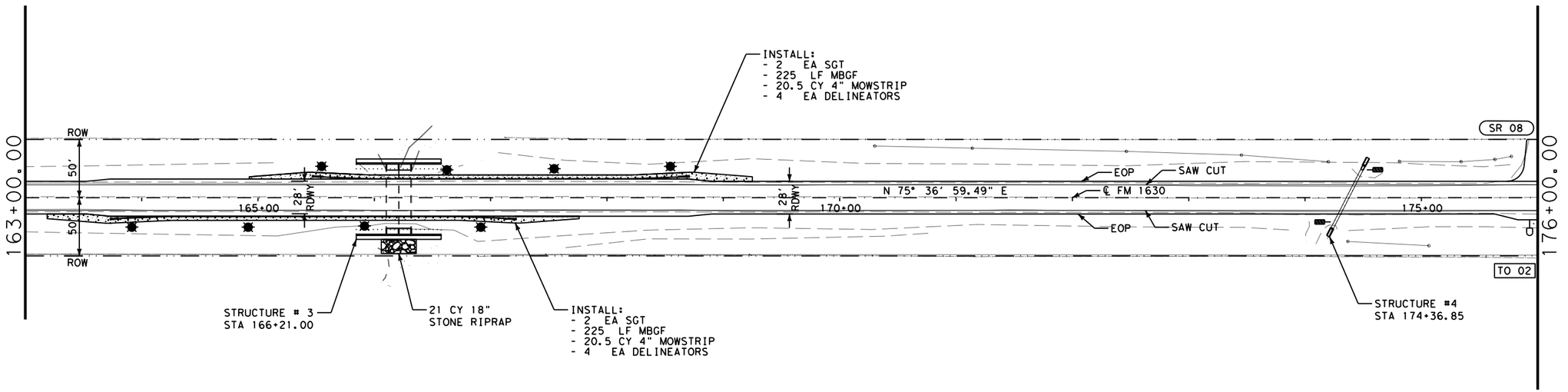
	MULTIPLE MAILBOX		
	OBJECT MARKER(TY 2)		
	BIDIRECTIONAL DELINEATOR		





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Bryson Lawrence, P.E.

04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		46

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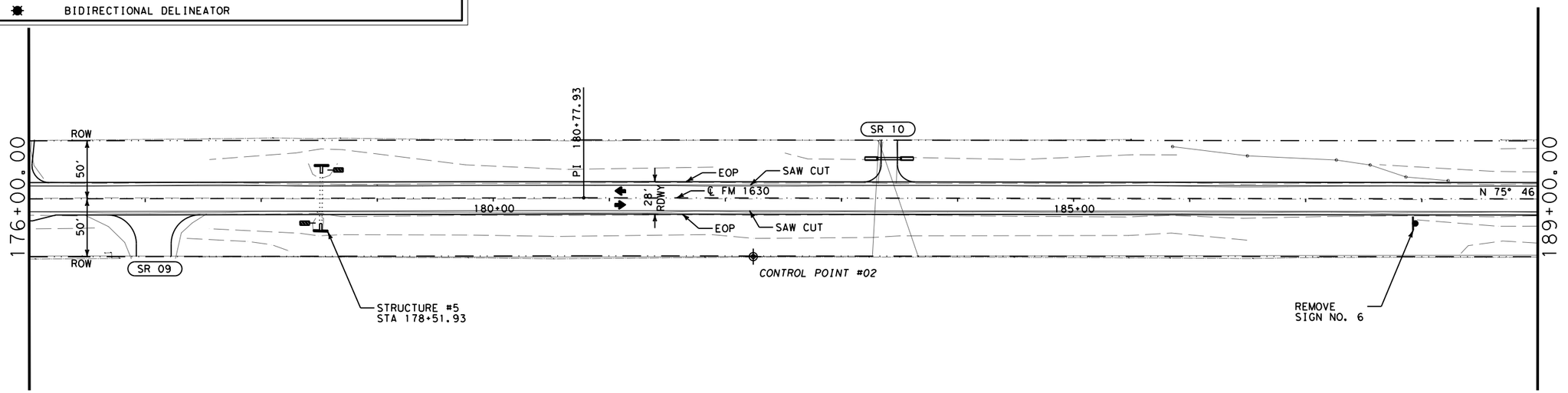
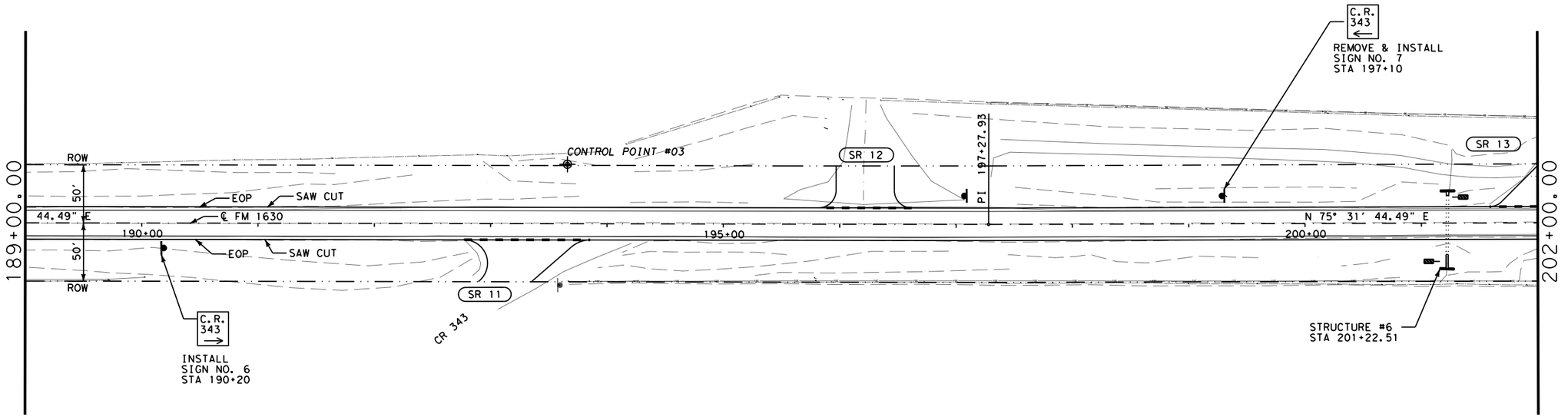
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\3. Roadway\PLAN LAYOUT.dgn

LEGEND

	SIGN	SR ##	SIDEROAD NO.
	SINGLE MAILBOX	TO ##	TURNOUT NO.
	DOUBLE MAILBOX		0" TO 2" PLAN & TEXT
	MULTIPLE MAILBOX		
	OBJECT MARKER(TY 2)		
	BIDIRECTIONAL DELINEATOR		



Control Point	NORTHING	EASTING	ELEVATION	STA	OFFSET
CP 02	7255209.37	2282737.703	963.552	182+24.075	50.478' RT
CP 03	7255588.334	2283819.613	1039.491	193+65.930	51.091' LT



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Bryson Lawrence, P.E.

04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		47

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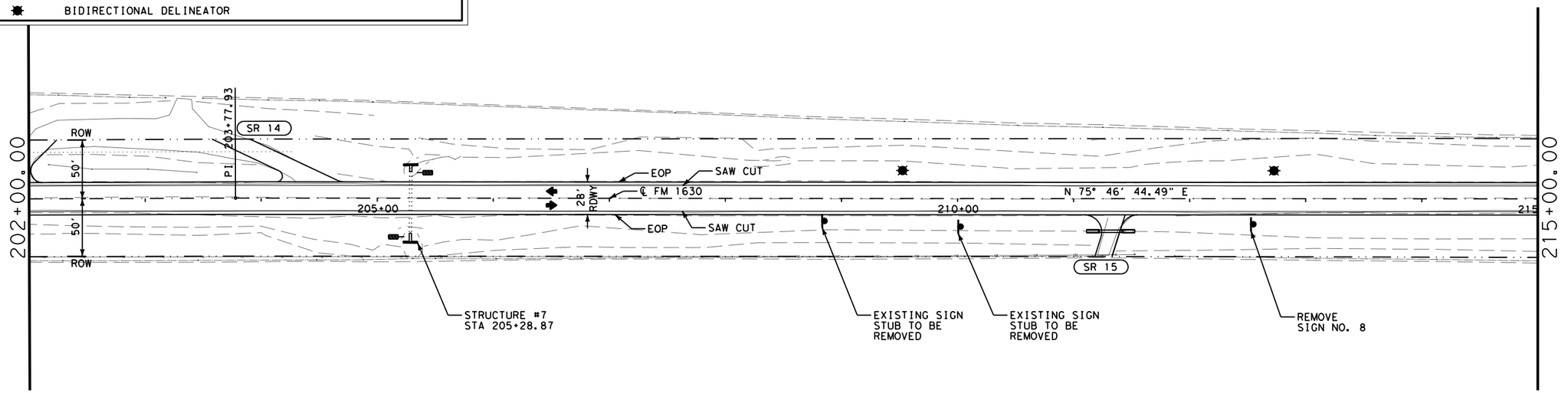
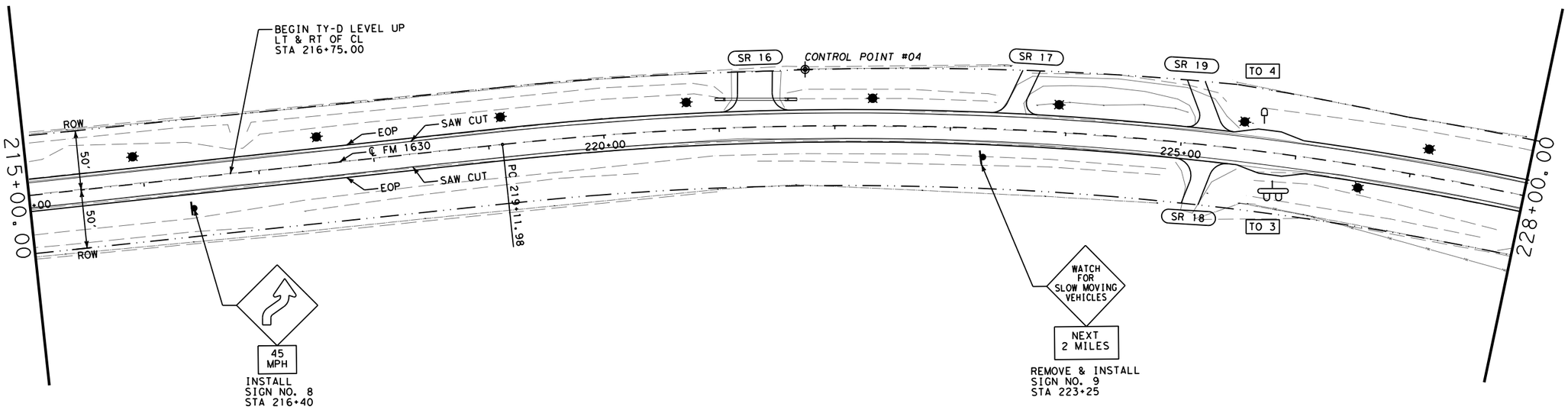
LEGEND

SIGN		SR ##	SIDEROAD NO.
SINGLE MAILBOX		TO ##	TURNOUT NO.
DOUBLE MAILBOX			0" TO 2" PLAN & TEXT
MULTIPLE MAILBOX			
OBJECT MARKER(TY 2)			
BIDIRECTIONAL DELINEATOR			



Control Point	NORTHING	EASTING	ELEVATION	STA	OFFSET
CP 04	7256268.061	2286549.56	1095.313	221+75.028	48.979 'LT



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FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		48

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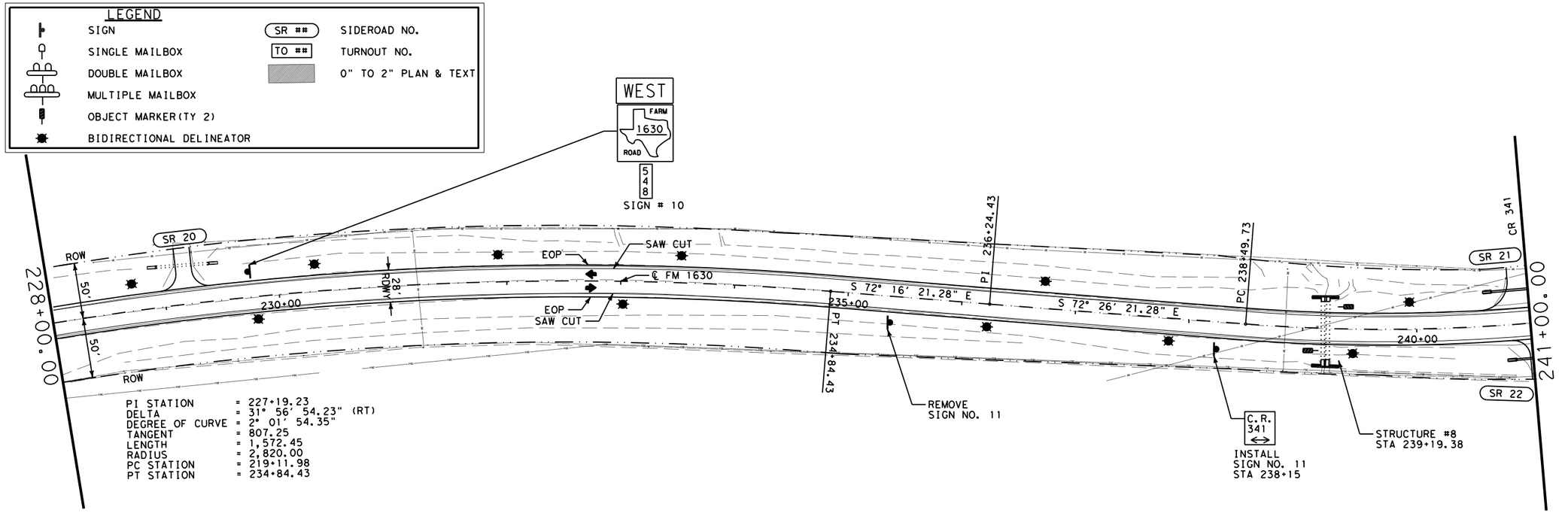

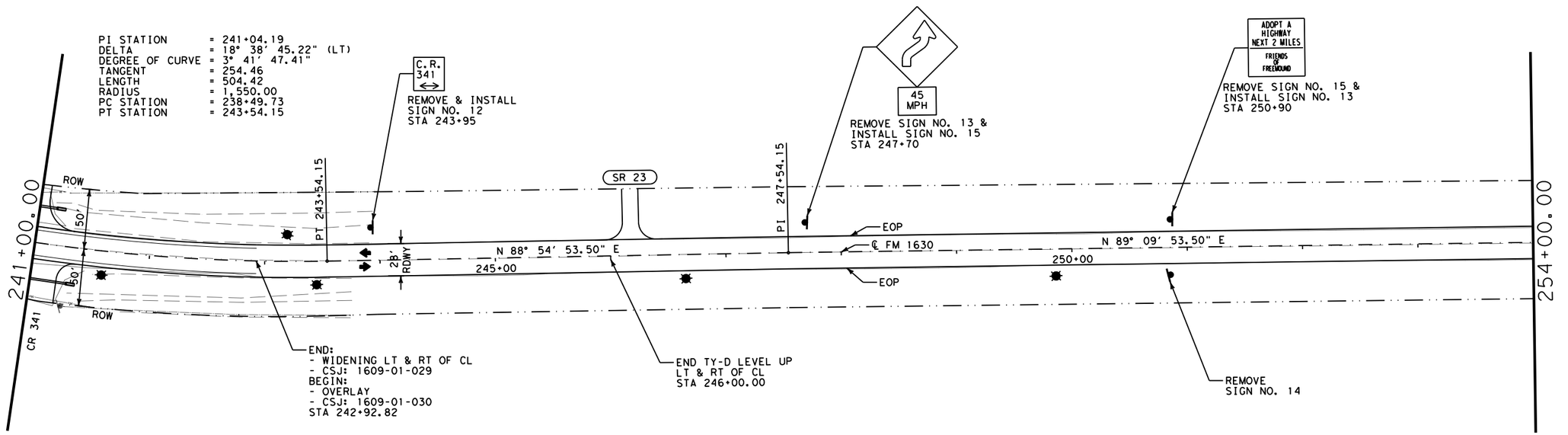

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Bryson Lawrence, P.E.

04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

Texas Department of Transportation®

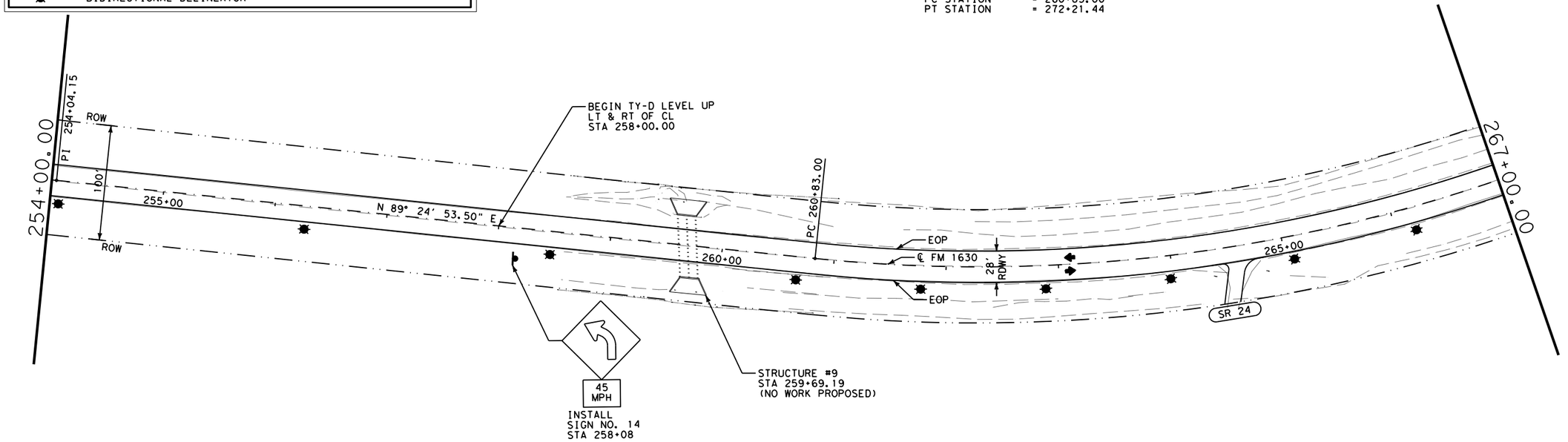
SHEET 5 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		49

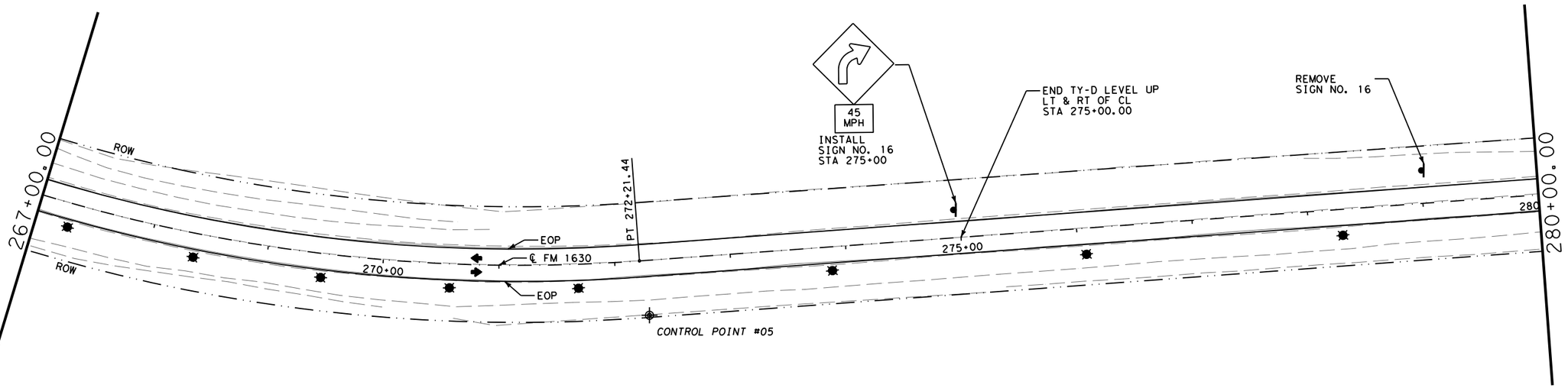
LEGEND

	SIGN	SR ##	SIDEROAD NO.
	SINGLE MAILBOX	TO ##	TURNOUT NO.
	DOUBLE MAILBOX		0" TO 2" PLAN & TEXT
	MULTIPLE MAILBOX		
	OBJECT MARKER(TY 2)		
	BIDIRECTIONAL DELINEATOR		

PI STATION = 266+84.81
DELTA = 45° 56' 05.76" (LT)
DEGREE OF CURVE = 4° 02' 05.69"
TANGENT = 601.80
LENGTH = 1,138.44
RADIUS = 1,420.00
PC STATION = 260+83.00
PT STATION = 272+21.44



Control Point	NORTHING	EASTING	ELEVATION	STA	OFFSET
CP 05	7256374.865	2291478.656	1092.975	272+26.619	47.484' RT



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04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		50

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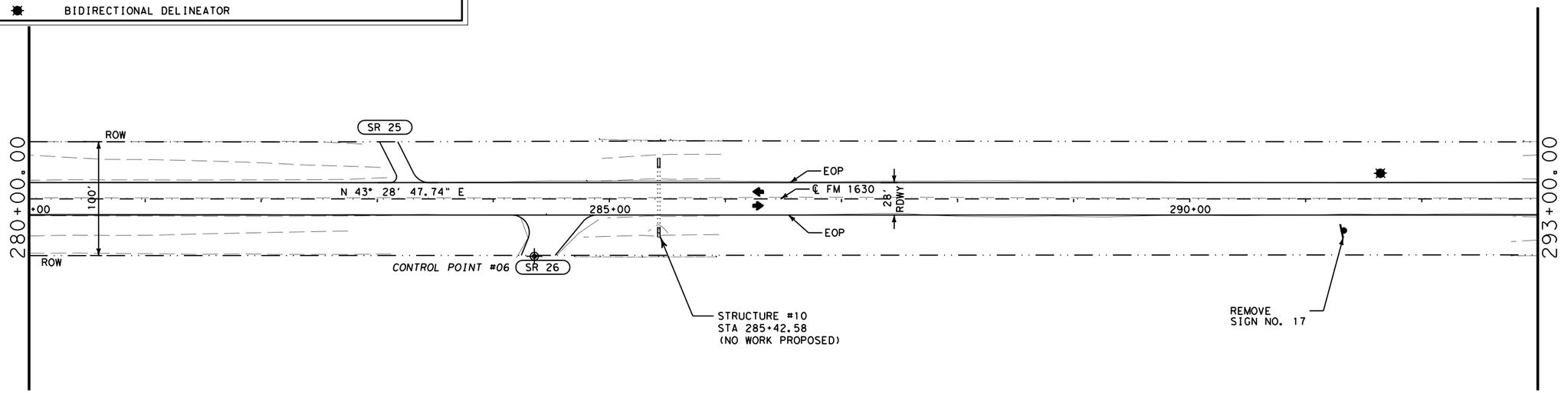
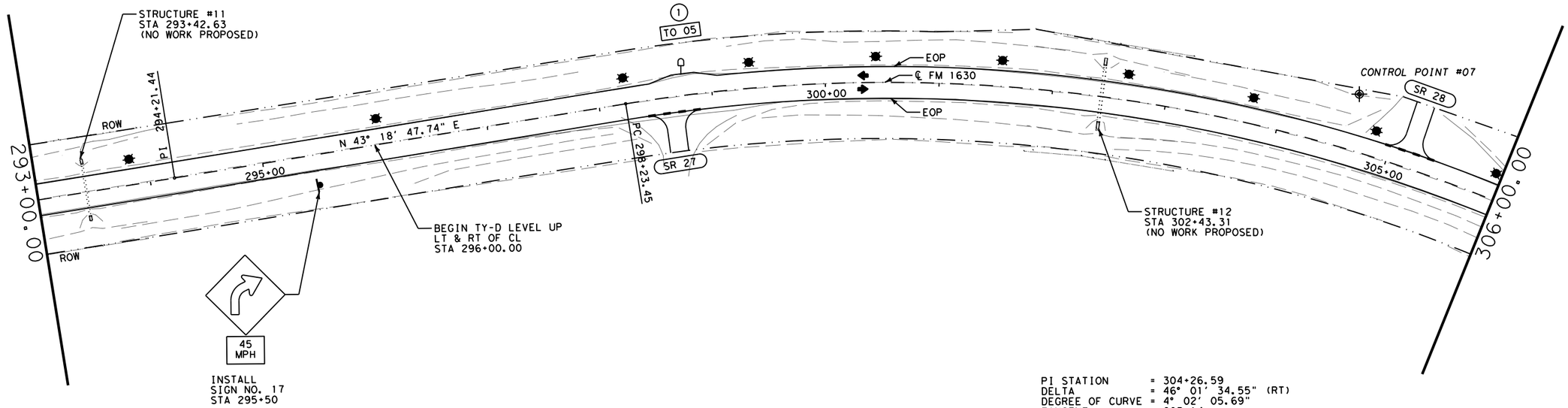
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\3. Roadway\PLAN LAYOUT.dgn

LEGEND

	SIGN	SR ##	SIDEROAD NO.
	SINGLE MAILBOX	TO ##	TURNOUT NO.
	DOUBLE MAILBOX		0" TO 2" PLAN & TEXT
	MULTIPLE MAILBOX		
	OBJECT MARKER(TY 2)		
	BIDIRECTIONAL DELINEATOR		



Control Point	NORTHING	EASTING	ELEVATION	STA	OFFSET
CP 06	7257250.619	2292311.947	1104.667	284+35.467	49.526' RT
CP 07	7258690.595	2293737.729	1105.782	304+60.934	49.322' LT



PI STATION = 304+26.59
DELTA = 46° 01' 34.55" (RT)
DEGREE OF CURVE = 4° 02' 05.69"
TANGENT = 603.14
LENGTH = 1,140.70
RADIUS = 1,420.00
PC STATION = 298+23.45
PT STATION = 309+64.15

① TURNOUT NUMBER 05 WILL BE PAID FOR UNDER ITEM 3077

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FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		51

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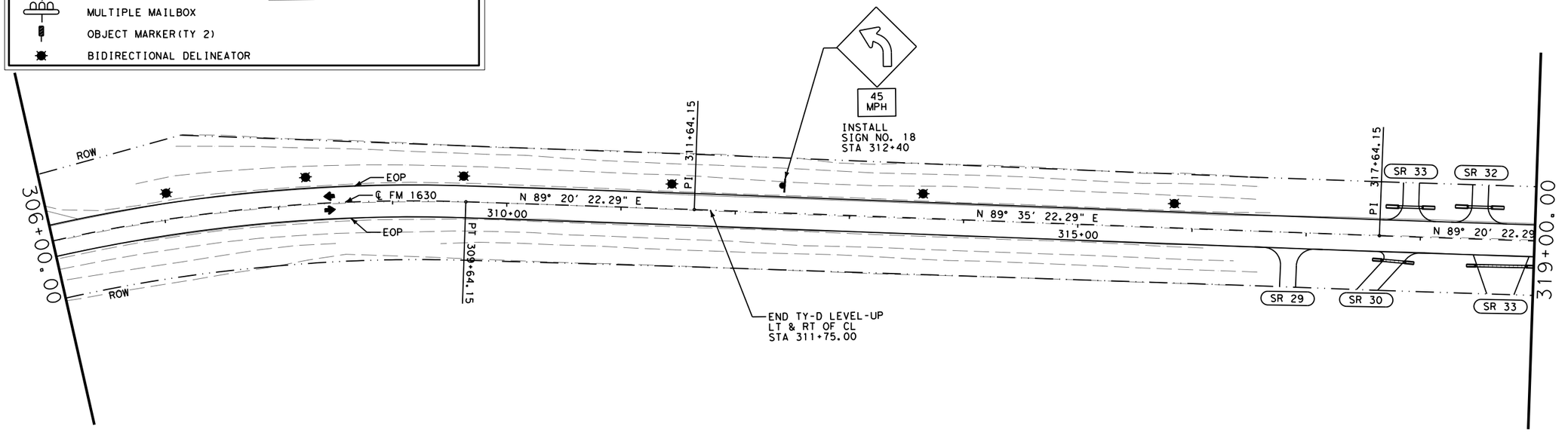
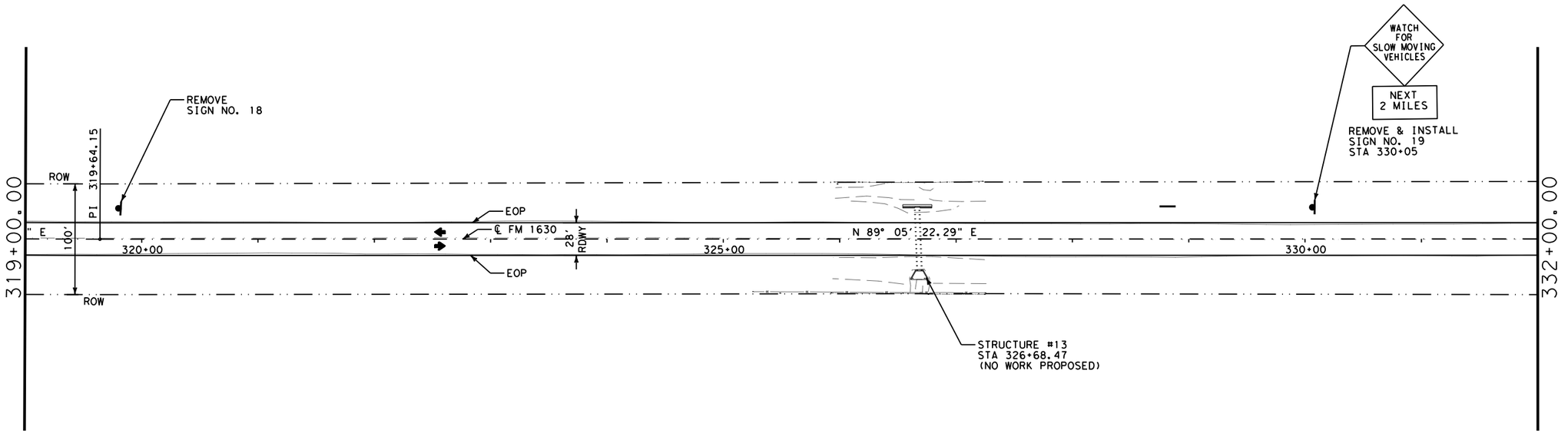
LEGEND

SIGN		SR ##	SIDEROAD NO.
SINGLE MAILBOX		TO ##	TURNOUT NO.
DOUBLE MAILBOX			0" TO 2" PLAN & TEXT
MULTIPLE MAILBOX			
OBJECT MARKER(TY 2)			
BIDIRECTIONAL DELINEATOR			





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04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		52

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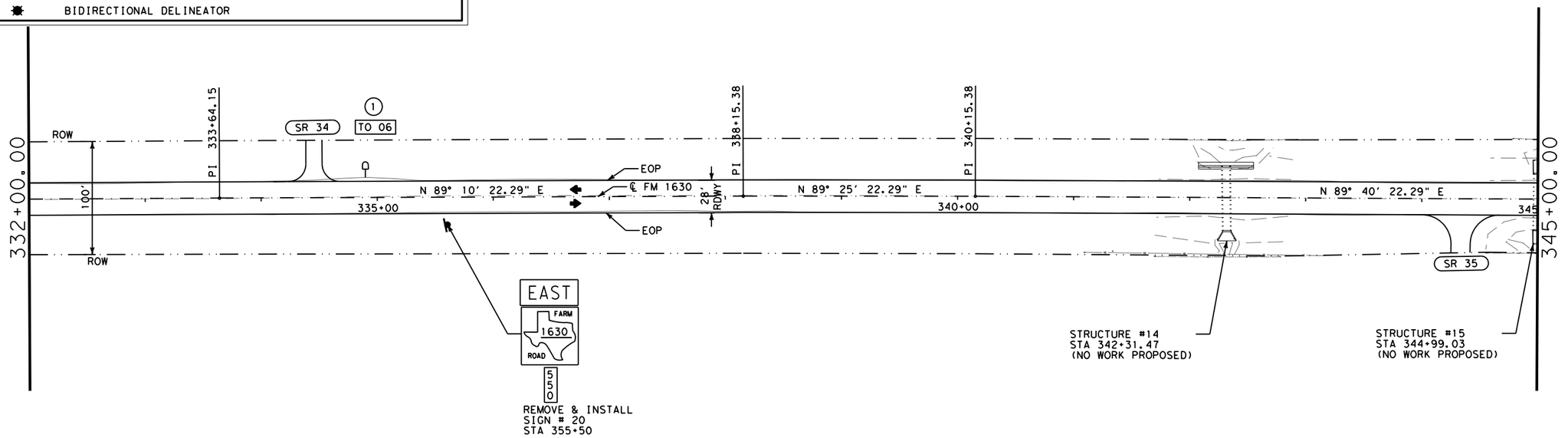
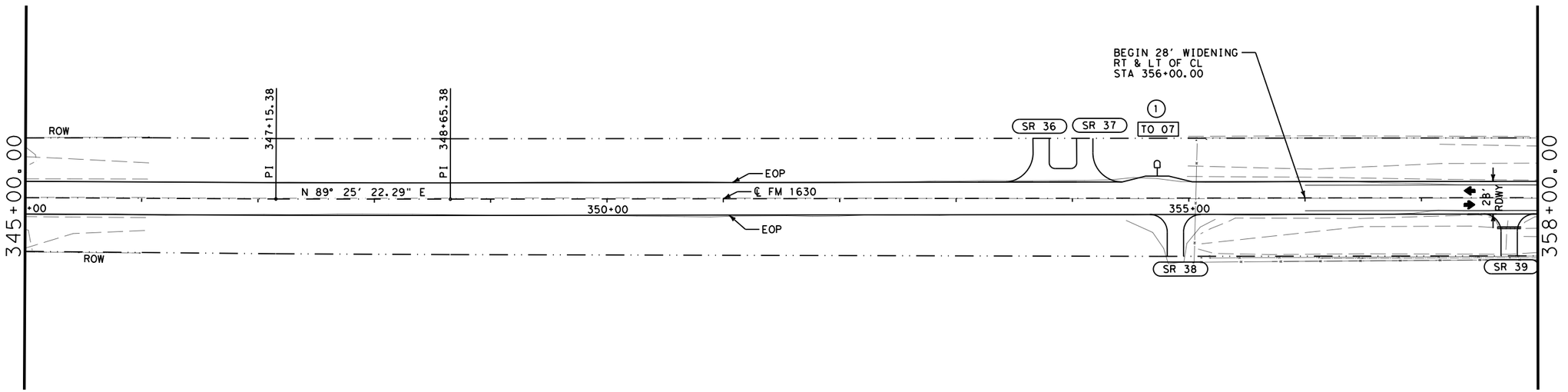
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\3. Roadway\PLAN LAYOUT.dgn

LEGEND

SIGN		SR ##	SIDEROAD NO.
SINGLE MAILBOX		TO ##	TURNOUT NO.
DOUBLE MAILBOX			0" TO 2" PLAN & TEXT
MULTIPLE MAILBOX			
OBJECT MARKER(TY 2)			
BIDIRECTIONAL DELINEATOR			



1 TURNOUT NUMBER 06 WILL BE PAID FOR UNDER ITEM 3077



1 TURNOUT NUMBER 07 WILL BE PAID FOR UNDER ITEM 3077

DATE: 4/26/2023 4:09:49 PM
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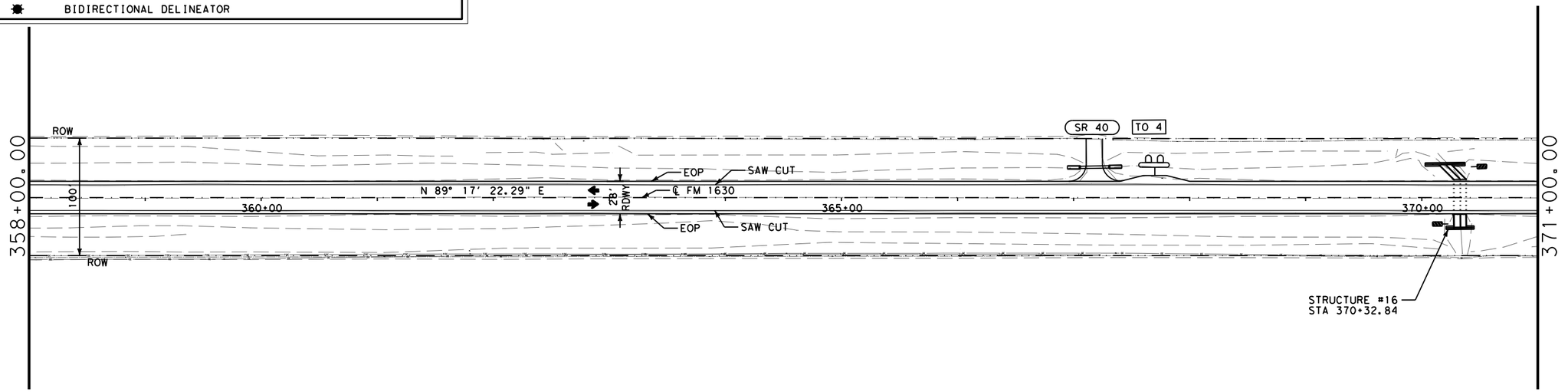
FM 1630
PLAN LAYOUT

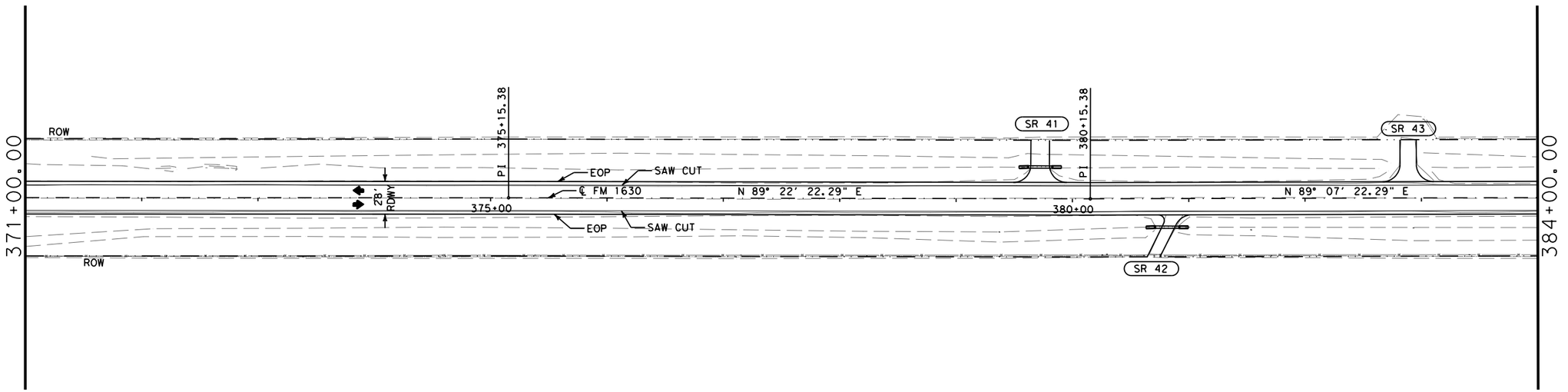
0 50 100
SCALE IN FEET

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		53

LEGEND

SIGN		SR ##	SIDEROAD NO.
SINGLE MAILBOX		TO ##	TURNOUT NO.
DOUBLE MAILBOX			0" TO 2" PLAN & TEXT
MULTIPLE MAILBOX			
OBJECT MARKER(TY 2)			
BIDIRECTIONAL DELINEATOR			





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Bryson Lawrence, P.E.

04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 10 OF 12

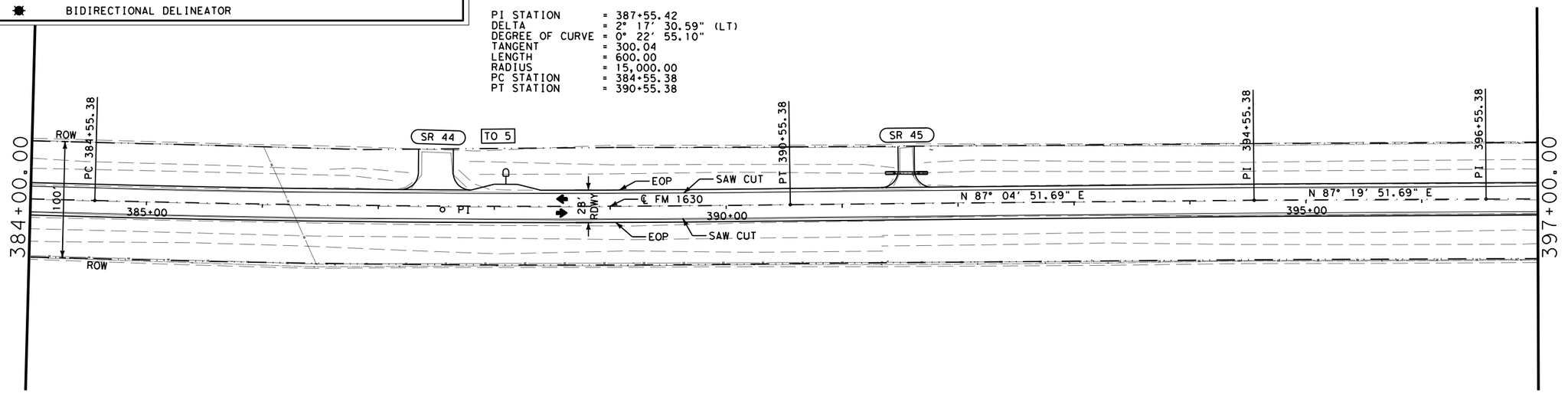
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		54

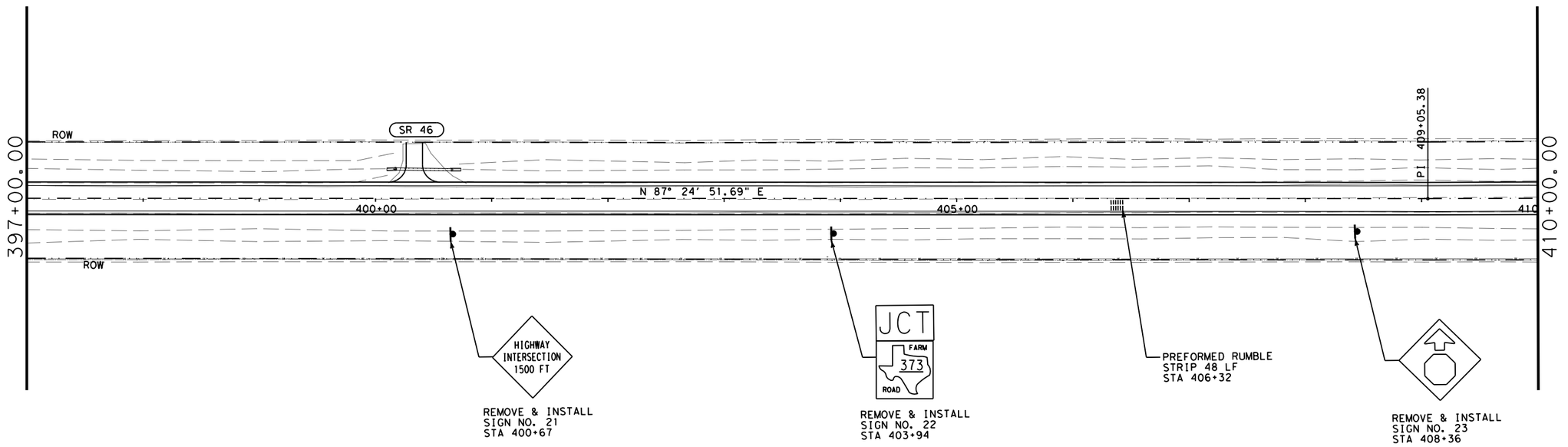
DATE: 4/26/2023 4:09:50 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\3. Roadway\PLAN LAYOUT.dgn

LEGEND

	SIGN	SR ##	SIDEROAD NO.
	SINGLE MAILBOX	TO ##	TURNOUT NO.
	DOUBLE MAILBOX		0" TO 2" PLAN & TEXT
	MULTIPLE MAILBOX		
	OBJECT MARKER(TY 2)		
	BIDIRECTIONAL DELINEATOR		

PI STATION = 387+55.42
DELTA = 2° 17' 30.59" (LT)
DEGREE OF CURVE = 0° 22' 55.10"
TANGENT = 300.04
LENGTH = 600.00
RADIUS = 15,000.00
PC STATION = 384+55.38
PT STATION = 390+55.38





REMOVE & INSTALL
SIGN NO. 21
STA 400+67

REMOVE & INSTALL
SIGN NO. 22
STA 403+94

REMOVE & INSTALL
SIGN NO. 23
STA 408+36

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FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

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SHEET 11 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		55

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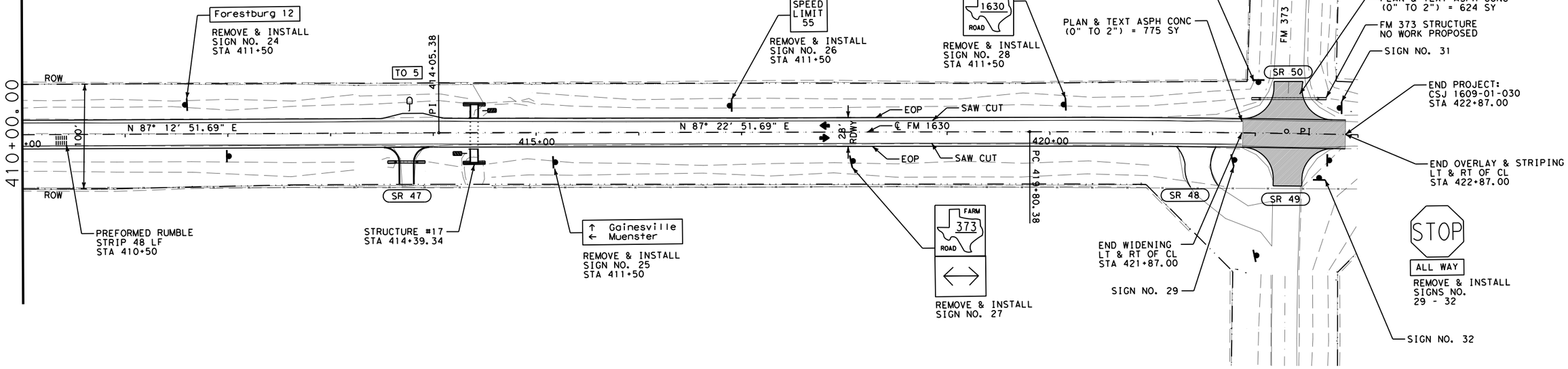
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\3. Roadway\PLAN LAYOUT.dgn

LEGEND

SIGN		SR ##	SIDEROAD NO.
SINGLE MAILBOX		TO ##	TURNOUT NO.
DOUBLE MAILBOX			0" TO 2" PLAN & TEXT
MULTIPLE MAILBOX			
OBJECT MARKER(TY 2)			
BIDIRECTIONAL DELINEATOR			

PI STATION = 422+30.41
DELTA = 1° 54' 35.49" (RT)
DEGREE OF CURVE = 0° 22' 55.10"
TANGENT = 250.02
LENGTH = 500.00
RADIUS = 15,000.00
PC STATION = 419+80.38
PT STATION = 424+80.38



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Bryson Lawrence, P.E.

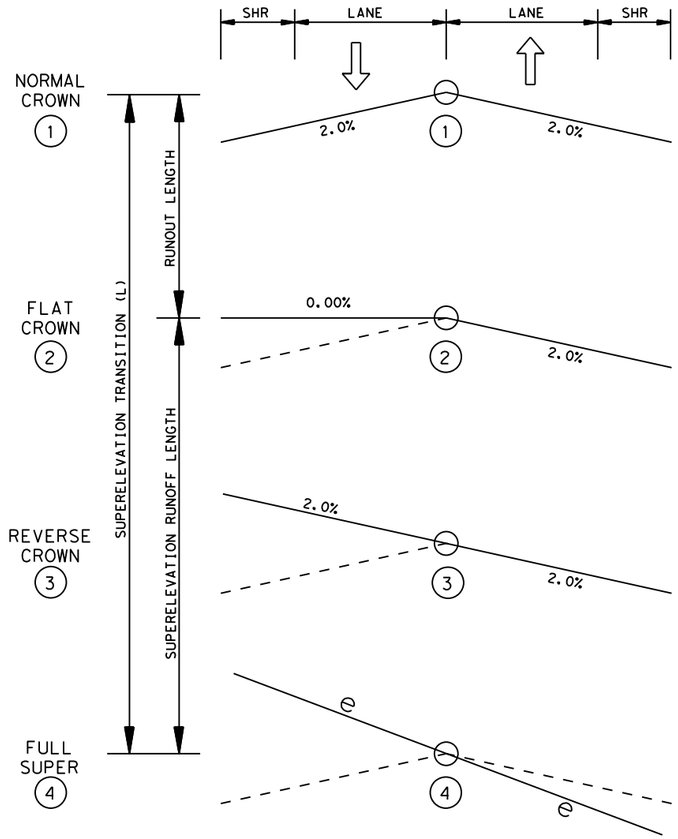
04/27/2023

FM 1630
PLAN LAYOUT

0 50 100
SCALE IN FEET

SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		56



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%.

FM 1630 SUPERELEVATION DATA

PC STATION	PT STATION	RADIUS (FT)	DESIGN SPEED	PROPOSED SUPERELEVATION RATE (%)	CALCULATED TRANSITION LENGTH Lc† (FT)	BEGIN TRANSITION LEFT LANE	BEGIN TRANSITION RIGHT LANE	BEGIN FULL SUPER	END FULL SUPER	END TRANSITION LEFT LANE	END TRANSITION RIGHT LANE
219+11.98	234+84.43	2820	50	3.6	123	218+26.00	219+14.00	219+49.00	234+48.00	235+71.00	234+83.00
238+49.73	243+54.15	1550	50	5	154	238+30.00	237+42.00	238+96.00	243+08.00	243+74.00	244+62.00
260+83.00	272+21.44	1420	50	5.2	158	260+60.00	259+72.00	261+30.00	271+74.00	272+44.00	273+32.00
298+23.45	309+64.15	1420	50	5.2	158	297+13.00	298+01.00	298+71.00	309+17.00	310+75.00	309+87.00
384+55.38	390+55.38	15000	50	NC	-	-	-	-	-	-	-
419+80.38	424+80.38	15000	50	NC	-	-	-	-	-	-	-

NOTES:

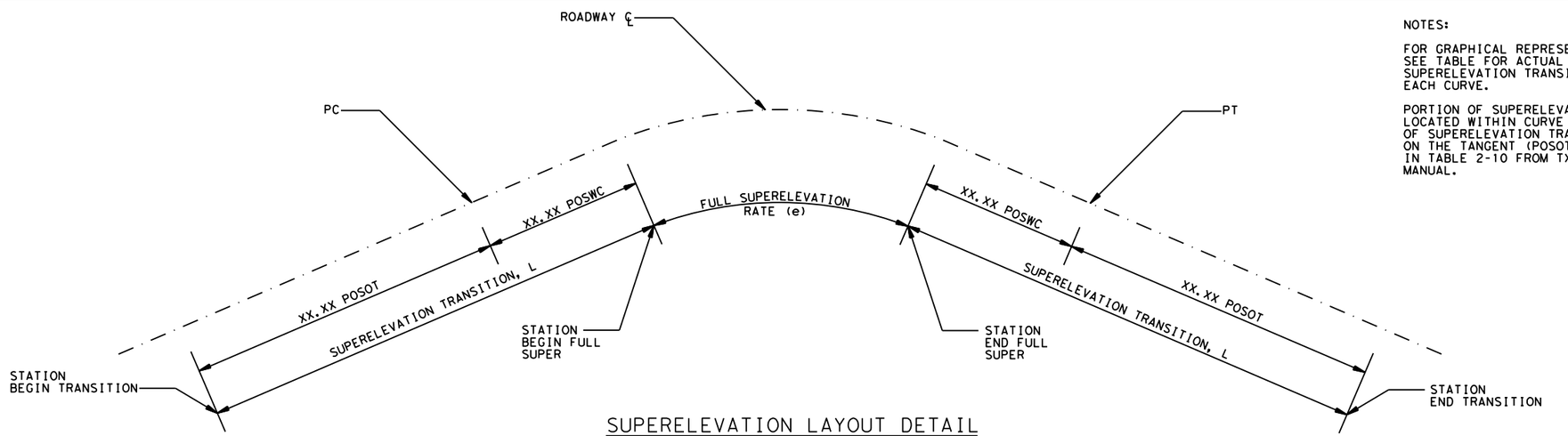
REFER TO ROADWAY DESIGN MANUAL (RDM) OR AASHTO A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS FOR DETAILS NOT SHOWN.

Emax IS BASED ON A VALUE OF 6 PERCENT.

MULTILANE ADJUSTMENT FACTOR USED FOR MORE THAN ONE LANE BEING ROTATED. SEE TABLE 2-9 RDM.

PORTION OF SUPERELEVATION TRANSITION LOCATED ON THE TANGENT IS BASED ON TABLE 2-10 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 2-10 FROM TXDOT ROADWAY DESIGN MANUAL.

NOT TO SCALE

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FM 1630 SUPERELEVATION DETAILS

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CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		57

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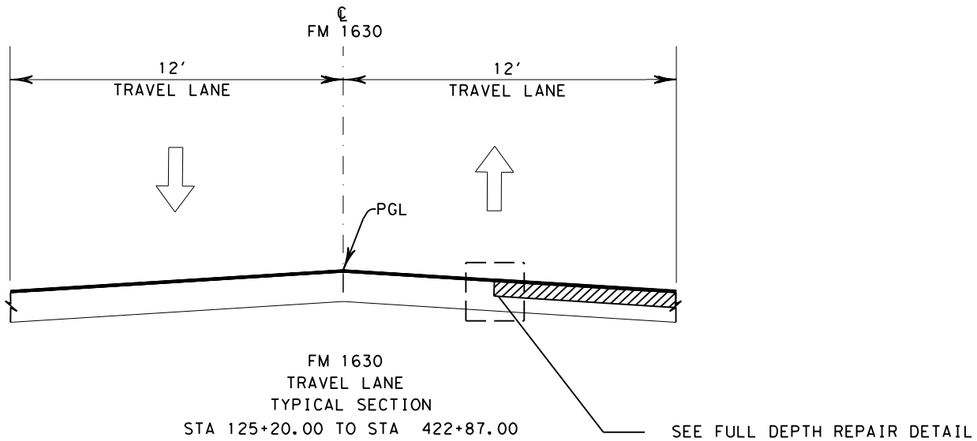
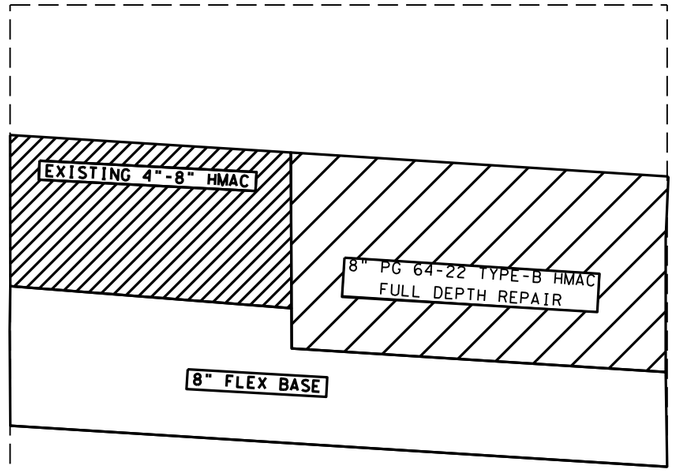
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\3. Roadway\SUPERELEVATION DETAILS.dgn



FM 1630
TRAVEL LANE
TYPICAL SECTION
STA 125+20.00 TO STA 422+87.00



FULL DEPTH REPAIR DETAIL

NOT TO SCALE

NOTES:

PLACEMENT OF NEW HMA TY-B PG70-22 (8" DEPTH) TO MATCH DEPTH OF EXISTING PAVEMENT. WIDTH OF ALL PAVEMENT REPAIRS SHALL BE 6' FOR HALF LANE OR 12' FOR FULL LANE.

PAVEMENT REPAIR LOCATIONS SHALL BE MARKED AND VERIFIED WITH THE ENGINEER PRIOR TO BEGINNING ANY WORK.

STATE OF TEXAS
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FM 1630
FLEXIBLE PAVEMENT REPAIR DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		58

DATE: 4/26/2023 4:09:57 PM
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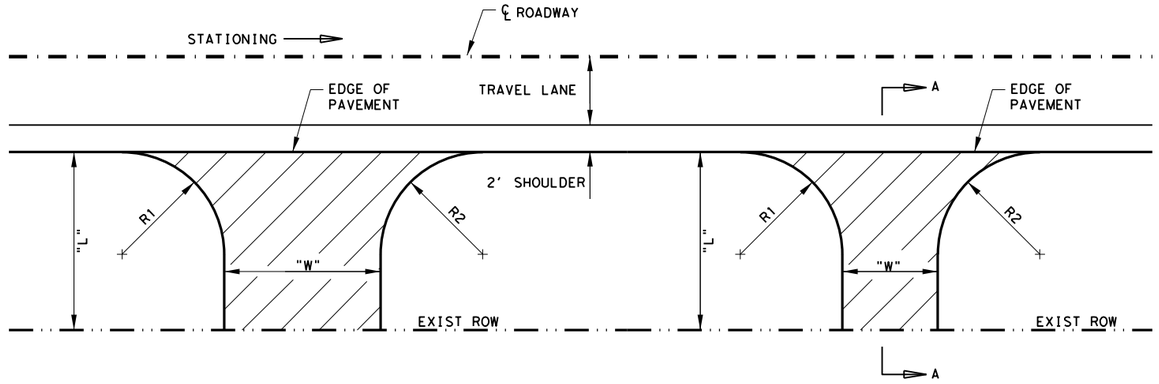
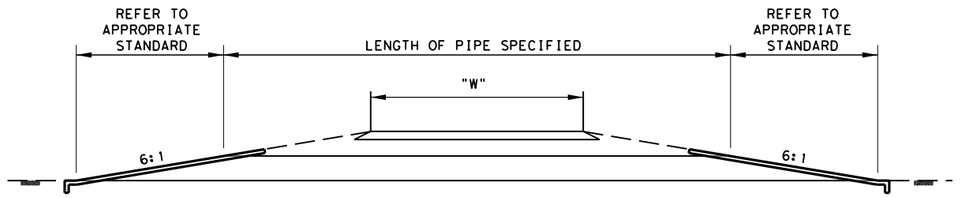
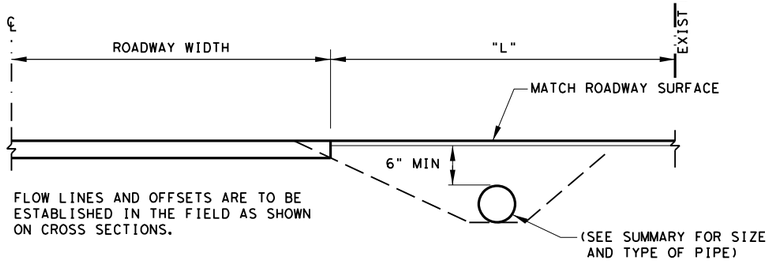


PLAN OF TYPICAL COUNTY ROAD OR FM ROAD INTERSECTION

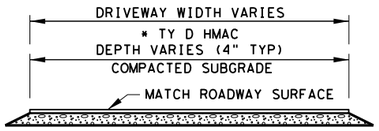
PLAN OF TYPICAL PRIVATE DRIVEWAY



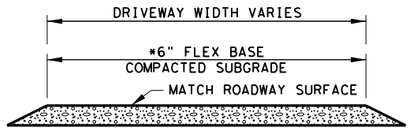
DETAIL SHOWING MEASUREMENT OF SIDEROAD PIPE



SECTION A-A SIDEROAD W/ PIPE



ACP SIDEROAD TYPICAL SECTION



BASE SIDEROAD TYPICAL SECTION

DATE: 4/26/2023 4:09:58 PM
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STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630 SIDEROAD DETAILS

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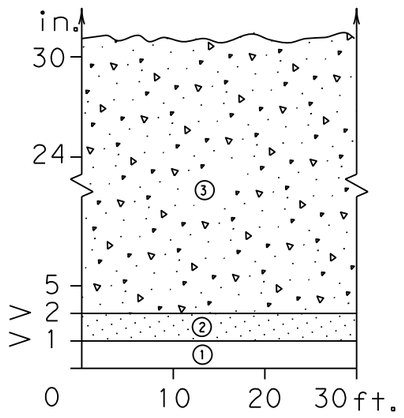
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		59

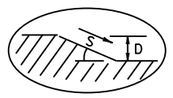
DATE: 4/26/2023 4:09:59 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\1. General\TREATMENT FOR VARIOUS EDGE CONDITIONS.dgn

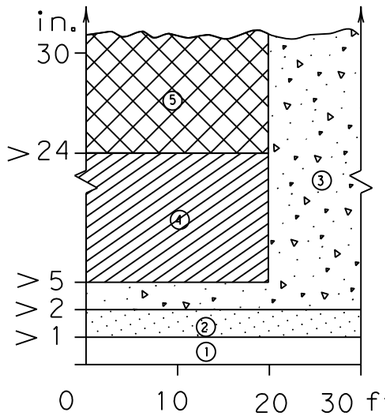
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

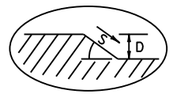


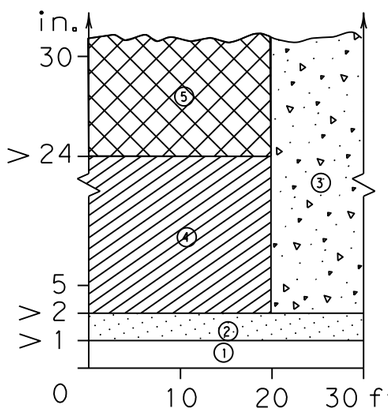
Edge Condition I
S = (3:1) (or flatter)



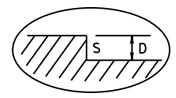


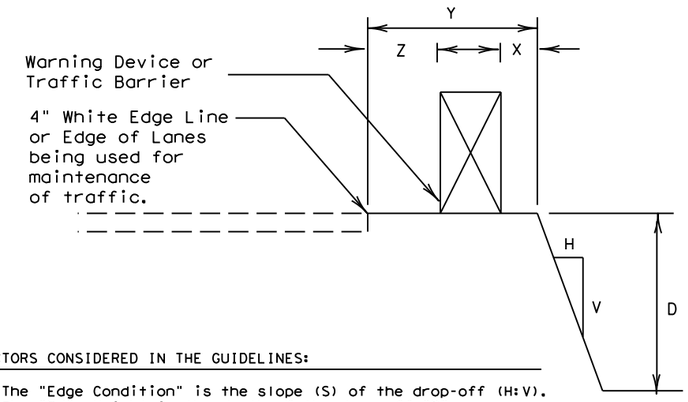
Edge Condition II
S = ((2.99):1) to (1:1)





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:

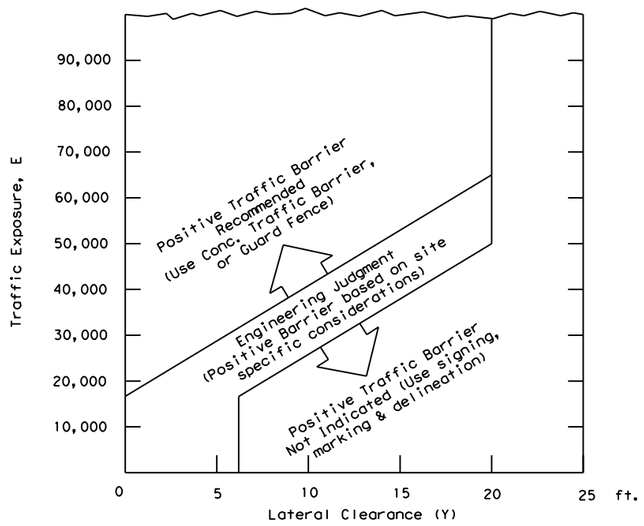
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

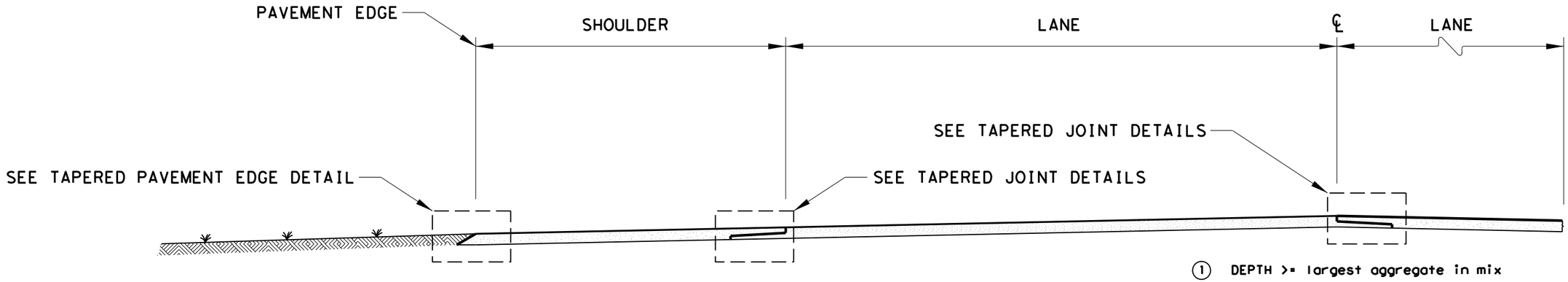
Bryson Lawrence, P.E.

04/27/2023

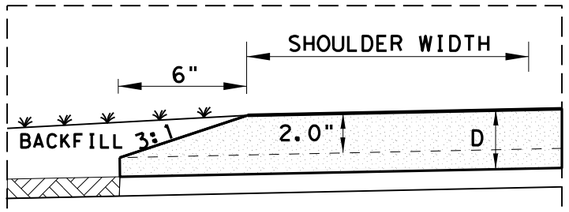
Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

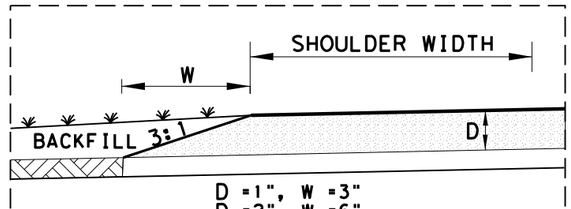
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
03-01	CONT	SECT	JOB	HIGHWAY
08-01 correct typos	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		60



① DEPTH >= largest aggregate in mix

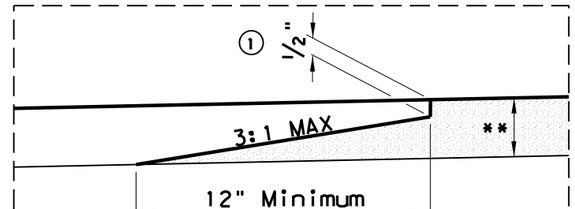


TAPERED PAVEMENT EDGE DETAIL"SAFETY EDGE" WHEN D IS > 2.0"

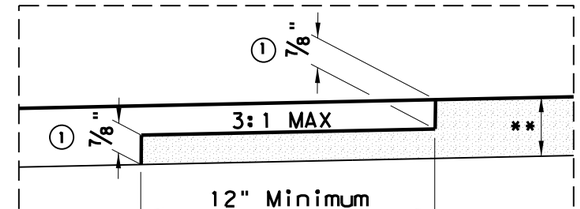


D =1", W =3"
D =2", W =6"

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.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
HOT MIX LONGITUDINAL JOINT DETAILS

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SHEET 1 OF 1

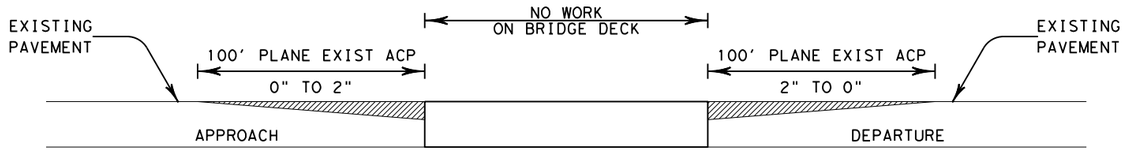
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		61

DATE: 4/26/2023 4:10:01 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\1. General\HOT MIX LONGITUDINAL JOINT DETAIL.dgn

NOTES:

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

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



BRIDGE PLANING & OVERLAY ①
DETAIL

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
PLANING DETAIL

NOT TO SCALE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		62

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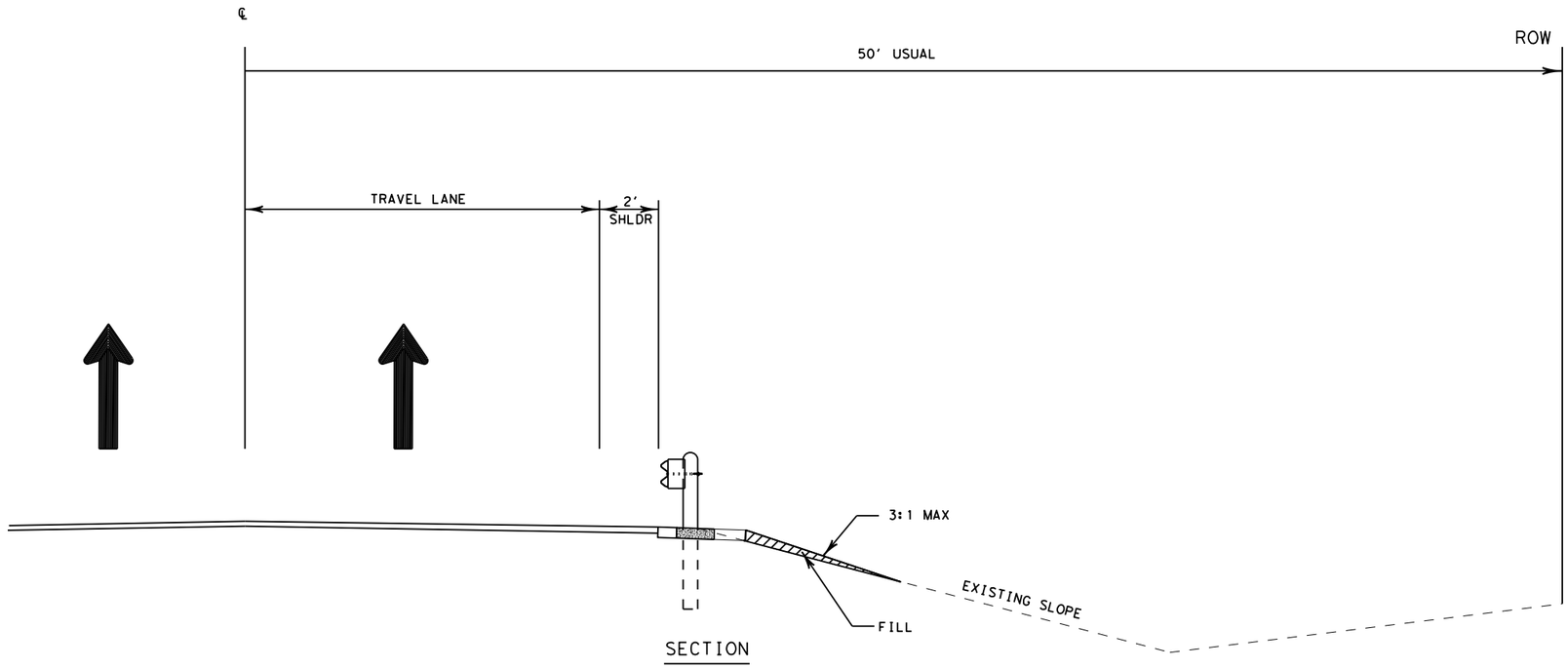

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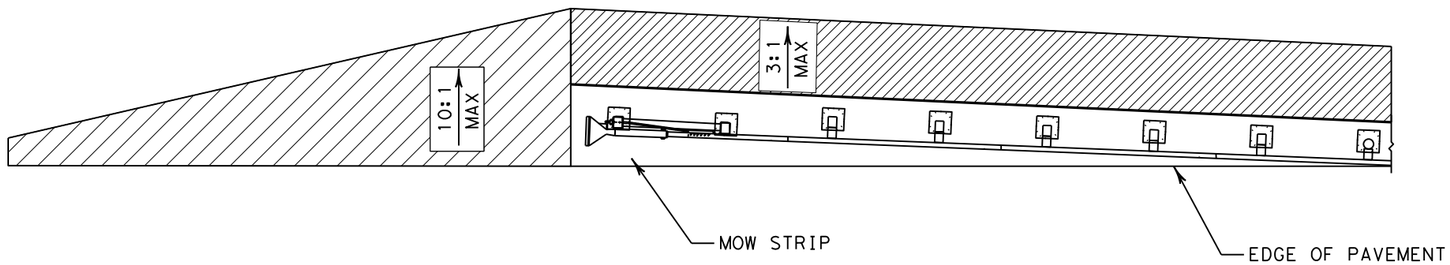

PLAN

NOTES:

1. THE MATERIAL USED SHALL BE STABLE SOIL CAPABLE OF SUSTAINING VEGETATION.
2. MATERIAL MUST BE APPROVED BY THE ENGINEER BEFORE CONSTRUCTION BEGINS.
3. COMPLETE ALL EMBANKMENT WORK PRIOR TO PLACEMENT OF PROPOSED MBGF AND SGT.
4. SEE GF(31)MS-19 FOR DETAILS NOT SHOWN.

NOT TO SCALE

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
EMBANKMENT DETAIL

Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		63

DATE: 4/26/2023 4:10:03 PM
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LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	PHASE IA	10 OF 12	STRUCTURE #16	370+32 ROCL	TL-3	UNI	EMBANK	N/A	STEEL BACKUP TO CTB	2'- 0"	2'- 8"	50'	X						X		X	
2	PHASE IA	10 OF 12	STRUCTURE #16	370+32 ROCL	TL-3	UNI	EMBANK	N/A	STEEL BACKUP TO CTB	2'- 0"	2'- 8"	50'	X						X		X	
3	PHASE IB	10 OF 12	STRUCTURE #16	370+32 ROCL	TL-3	UNI	EMBANK	N/A	STEEL BACKUP TO CTB	2'- 0"	2'- 8"	50'		X	X	1			X		X	
4	PHASE IB	10 OF 12	STRUCTURE #16	370+32 ROCL	TL-3	UNI	EMBANK	N/A	STEEL BACKUP TO CTB	2'- 0"	2'- 8"	50'		X	X	2			X		X	
												TOTALS	1	1	2							

LEGEND:

L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

CRASH CUSHION SUMMARY SHEET

REVISIONS

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

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	64

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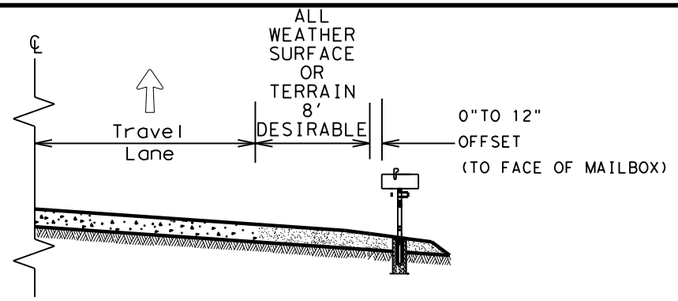
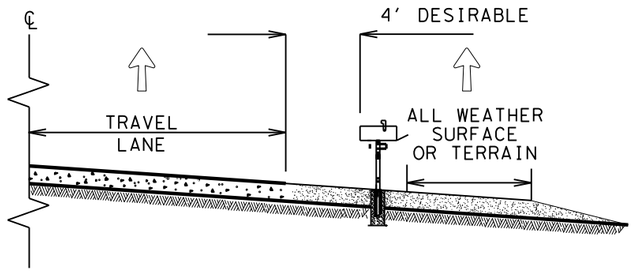
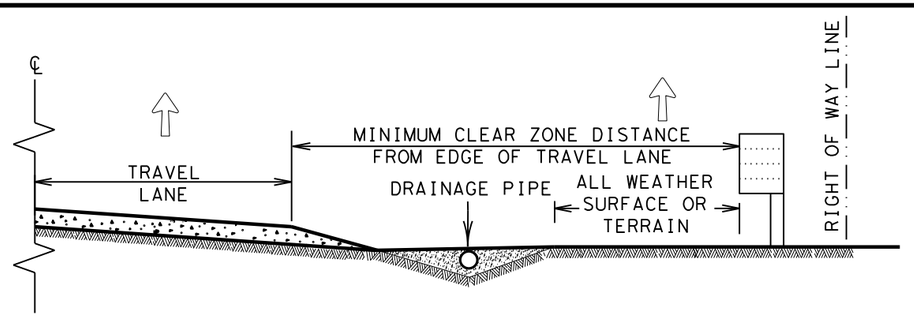


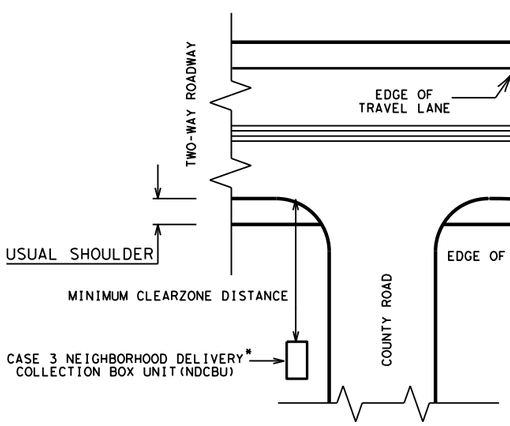
CASE 1. OFF TRAVEL WAY DELIVERY

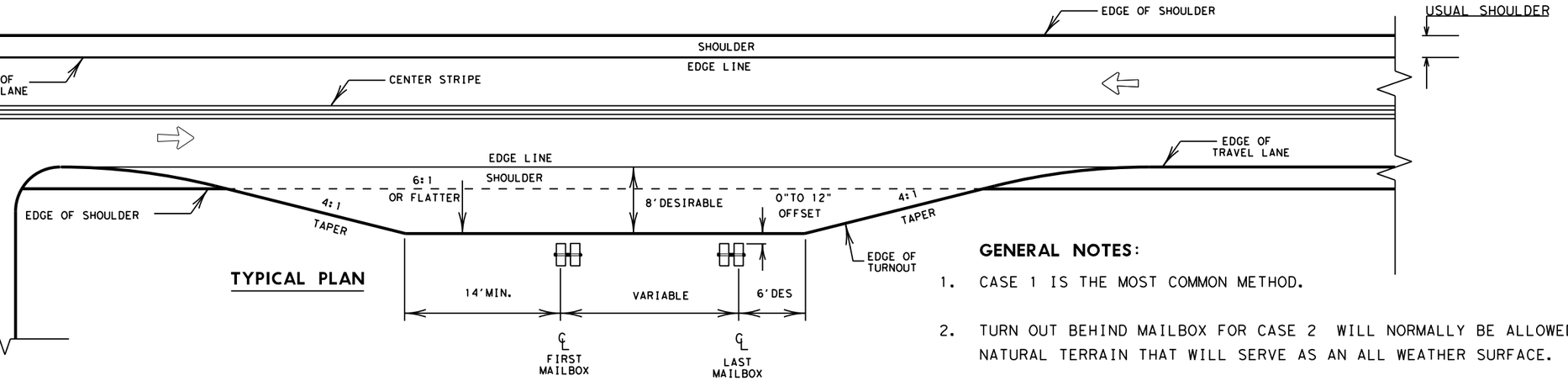


CASE 2. BACK SIDE DELIVERY

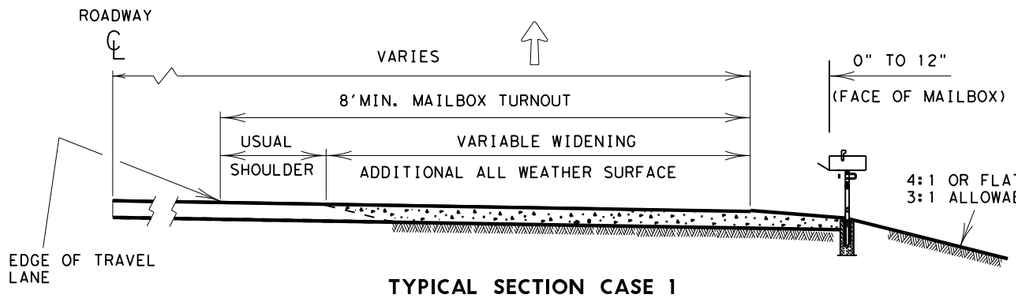


CASE 3. DELIVERY NEAR RIGHT OF WAY LINE





TYPICAL PLAN



TYPICAL SECTION CASE 1

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. WHEN 3 OR MORE MULTI-RACKS ARE ANTICIPATED, THE USE OF AN NDCBU IS RECOMMENDED. ONLY RURAL PATRONS LOCATED ON STATE MAINTAINED HIGHWAYS MAY HAVE A MAILBOX OR NDCBU SLOT ON TXDOT RIGHT OF WAY.

* NDCBU MAY BE INSTALLED ON COUNTY ROAD ROW WITH APPROVAL OF COUNTY.

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

Texas Department of Transportation | *Maintenance Division Standard*

Guideline

MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS

MBP(1)-22

FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
© TxDOT OCTOBER 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 12/2012 5/2014	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		65

DATE: 4/26/2023 4:10:06 PM
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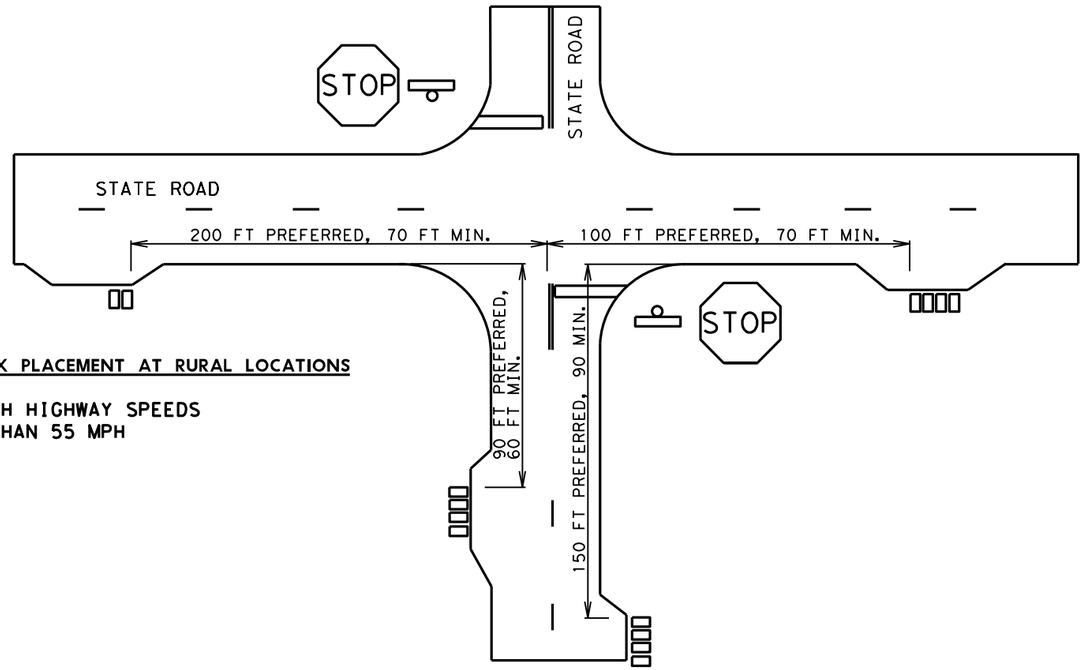
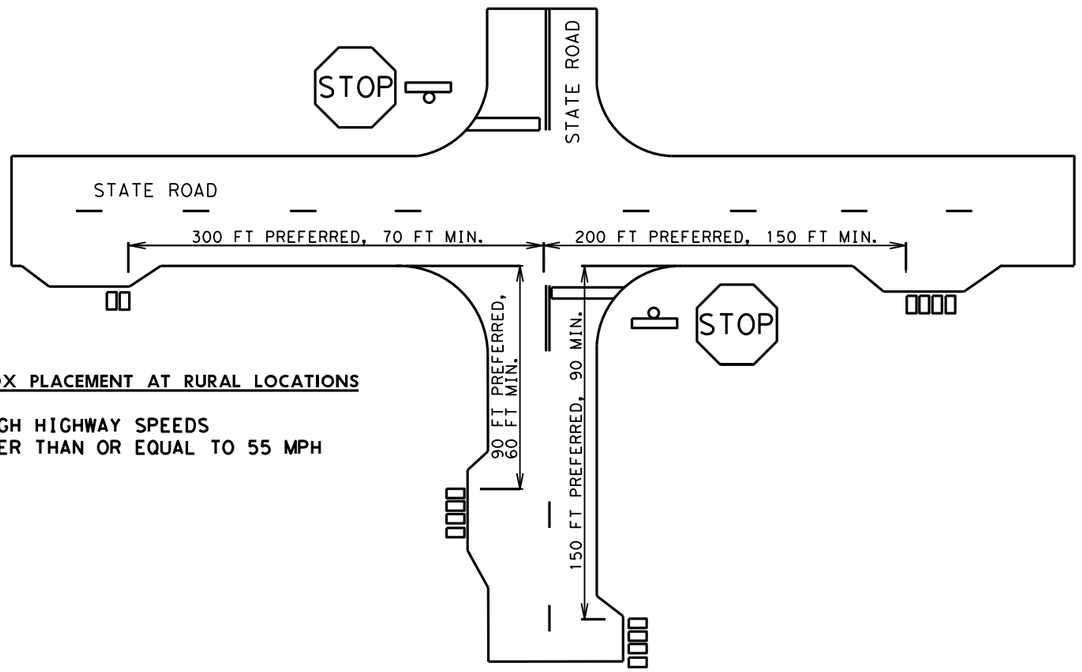


MAILBOX PLACEMENT AT RURAL LOCATIONS

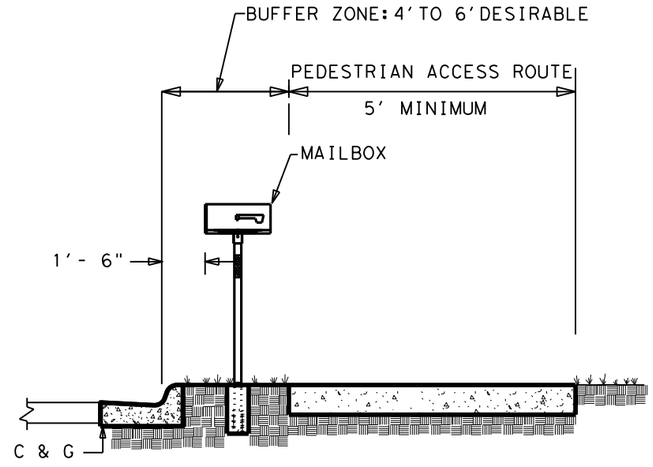
THROUGH HIGHWAY SPEEDS
LESS THAN 55 MPH



MAILBOX PLACEMENT AT RURAL LOCATIONS

THROUGH HIGHWAY SPEEDS
GREATER THAN OR EQUAL TO 55 MPH

CURB AND GUTTER MAILBOX INSTALLATION



NOTES:
1. A NON-TRAVERSABLE SURFACE MUST BE INSTALLED NEAR THE MAILBOX (NATURAL VEGETATION OR OTHER) IN THE BUFFER ZONE. ALTERNATIVELY, A BASE WITH A MINIMUM HEIGHT OF 2.5 INCHES MAY BE INSTALLED SO THAT THE EDGE OF THE MAILBOX DOES NOT EXTEND OUT MORE THAN 4 INCHES HORIZONTALLY BEYOND THE BASE.

2. THE SIDEWALK WIDTH MAY BE REDUCED TO 4 FOOT FOR SHORT DISTANCES AROUND THE MAILBOX IF NEEDED.

3. MAINTAIN A MINIMUM OF 5 FEET BETWEEN OBSTRUCTIONS IN THE PEDESTRIAN ACCESS ROUTE.

Texas Department of Transportation | Maintenance Division Standard

MAILBOX PLACEMENT CURBS & INTERSECTIONS

MBP(2)-22

FILE: MBP-22.DGN	DN: VS	CK:	DW: VS	CK:
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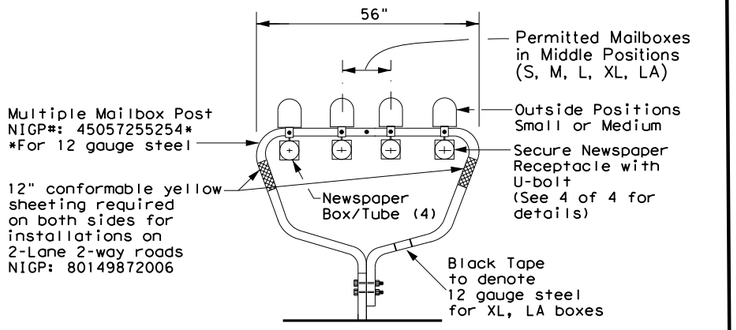
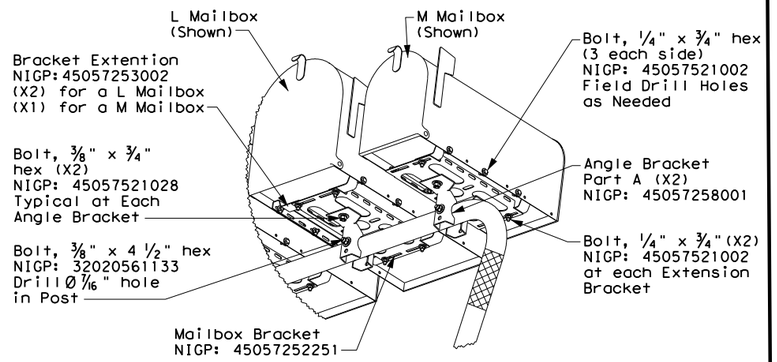
REVISIONS 12/2012 5/2014	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		66

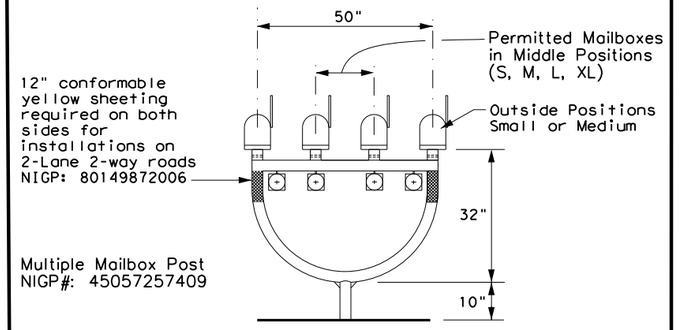
DATE:
FILE:

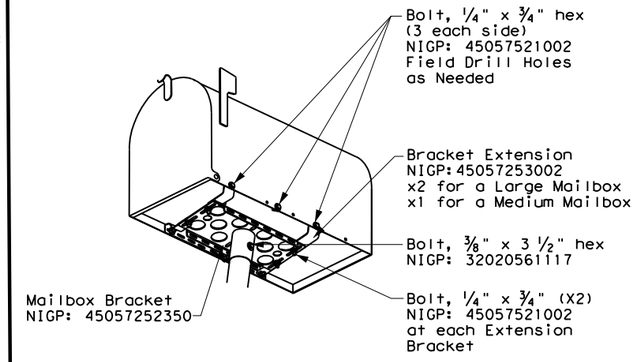
TYPE 1 - MULTIPLE





TYPE 4 - MULTIPLE





MAILBOX SIZES

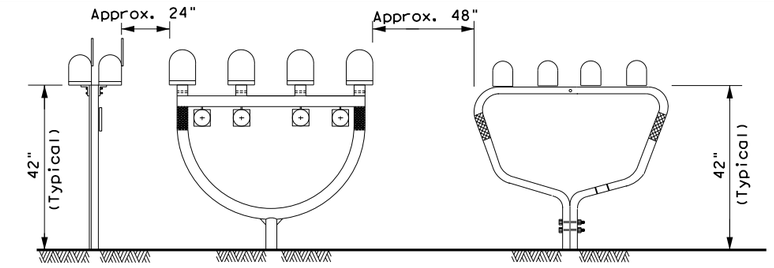
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 1/2"	6"	7"	6 LBS
MEDIUM	22 1/2" *	8" *	11 1/2" *	8 LBS
LARGE	23 1/2"	11 1/2"	13 1/2"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 1/2"	15"	23 LBS

* 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.

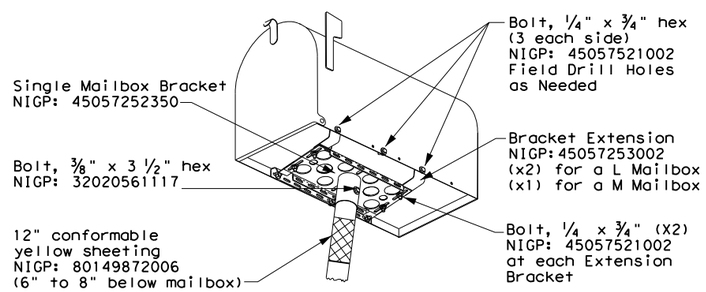
TYPICAL INSTALLATION MEASUREMENTS

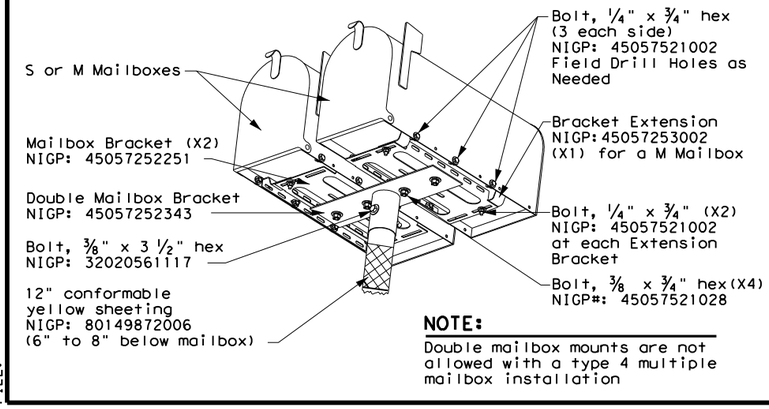


NOTE:

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

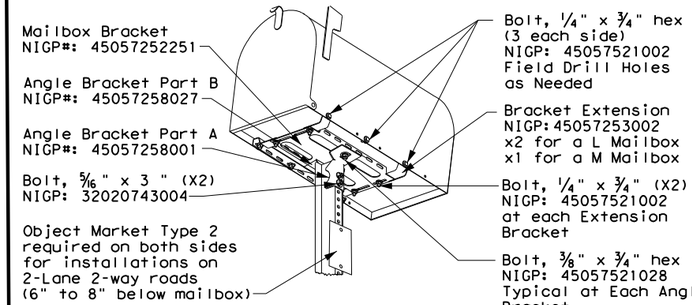


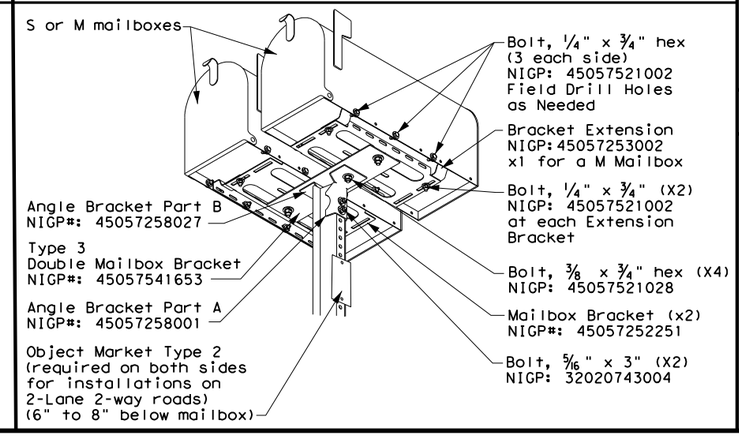


NOTE:

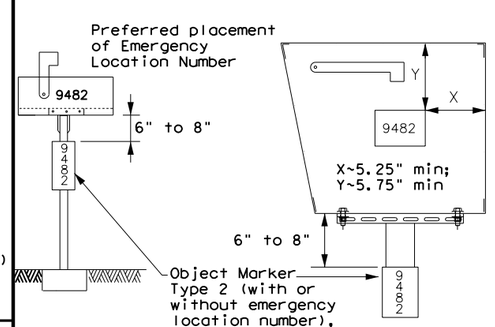
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

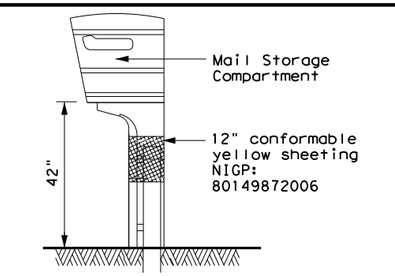


NOTES:

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
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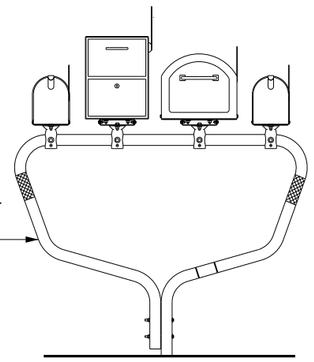
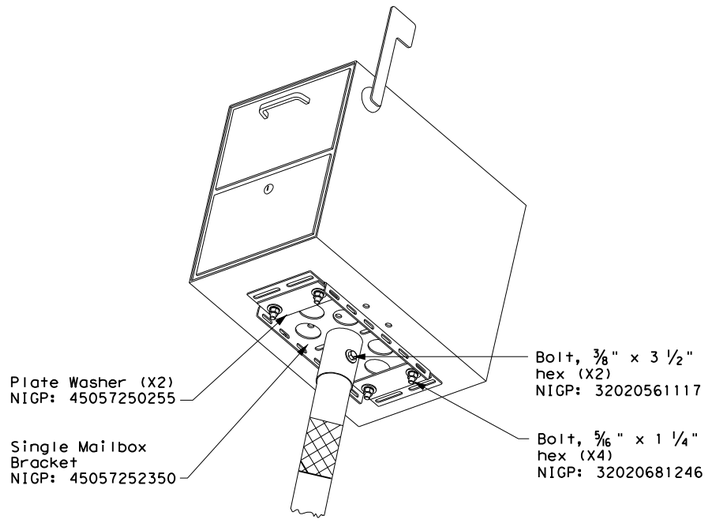
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		67

DATE:
FILE:

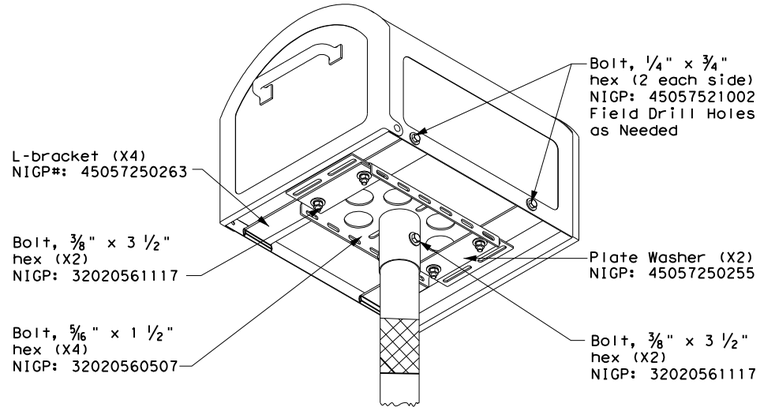
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

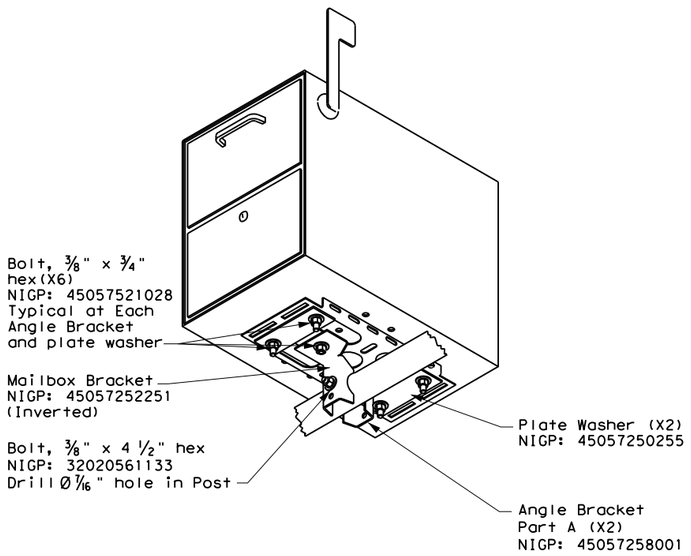


TYPE 2/4 - SINGLE XL MAILBOX

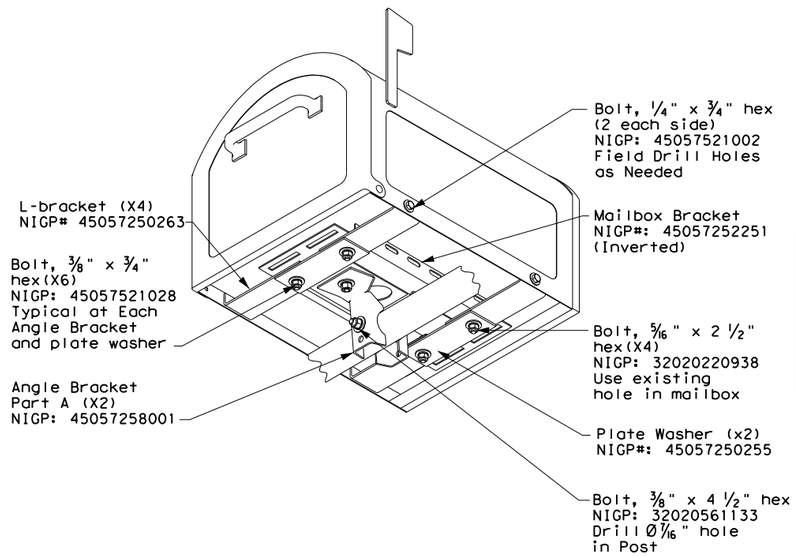


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

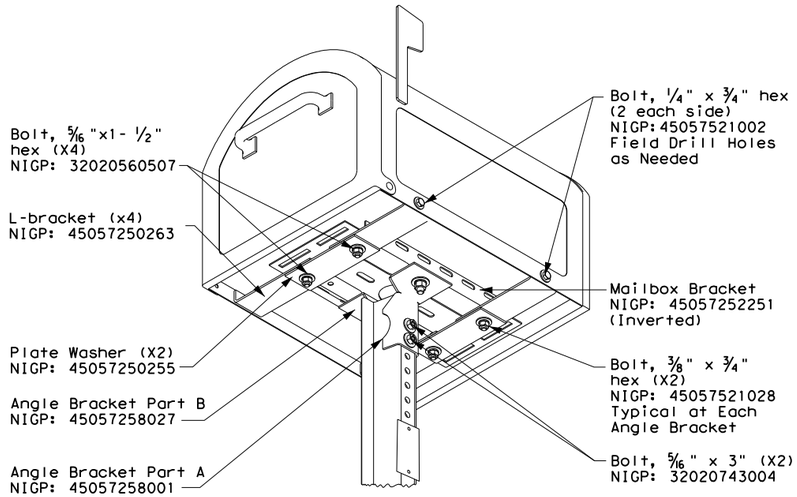
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



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

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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	WFS	COOKE		68

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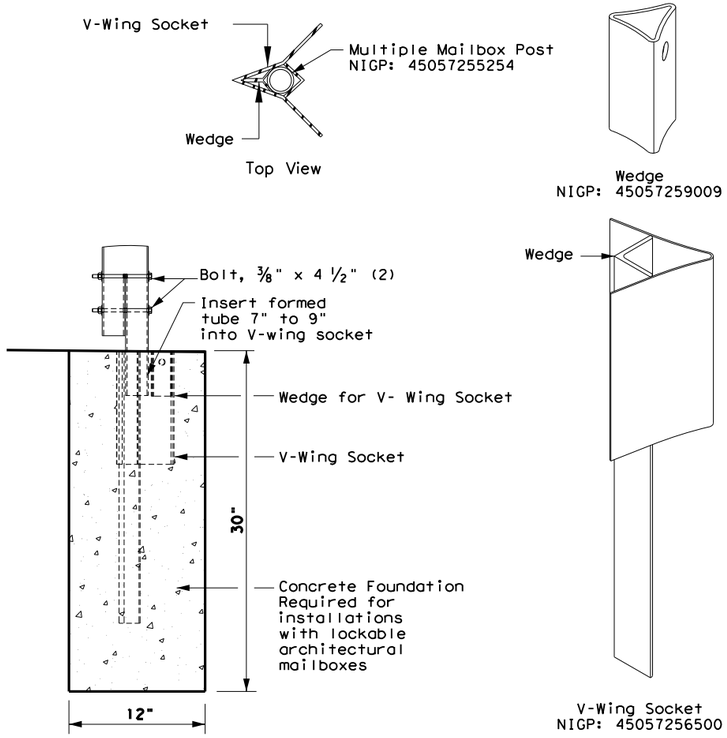
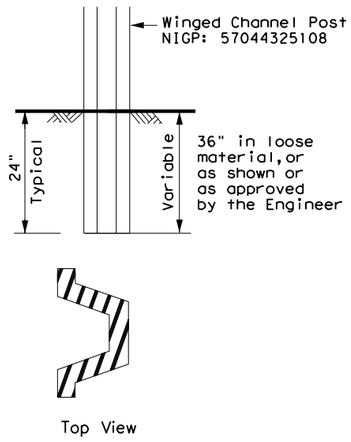
FILE:

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



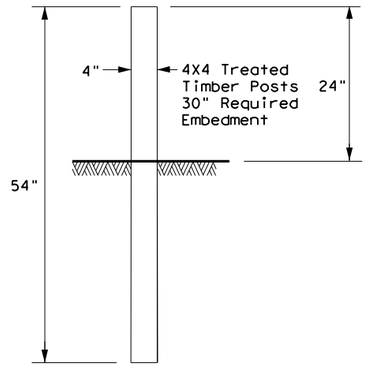
TYPE 3 - SUPPORT/FOUNDATION



NOTES:

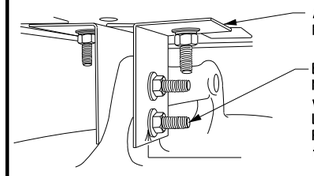
1. Attach Object Marker (OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



Molded Plastic Mailboxes shall be installed on 4"x4" treated timber posts only. The use of steel pipe or structural tubing in place of timber post is prohibited.

TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

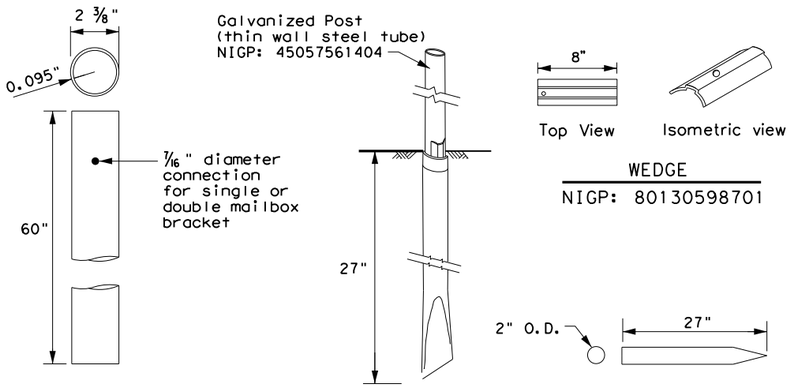
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

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

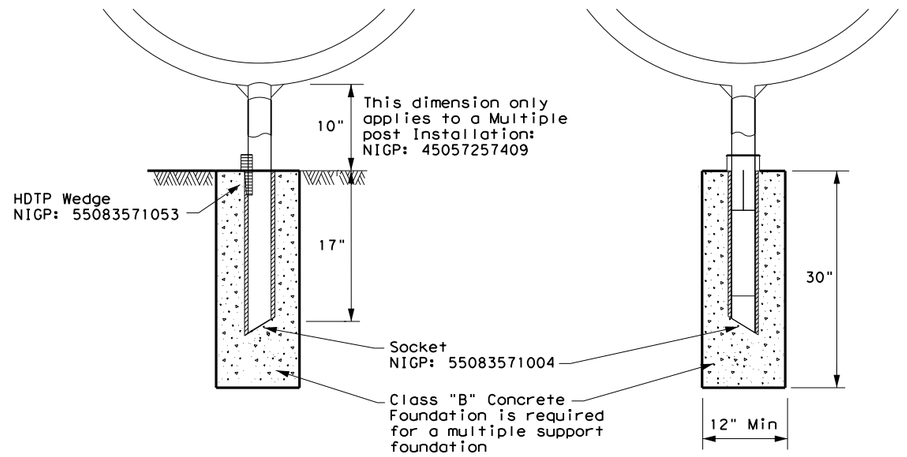


MAILBOX POST

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	COOKE		69

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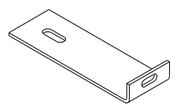
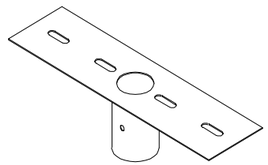
DATE:
FILE:

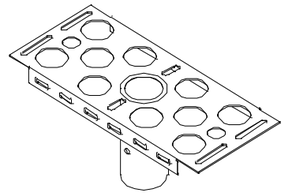
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: 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



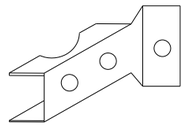
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



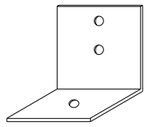
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



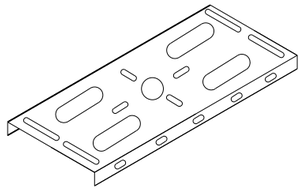
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



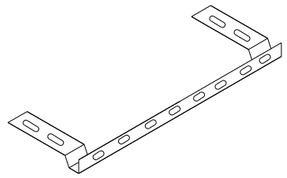
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



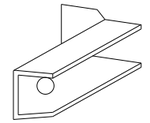
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



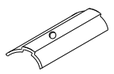
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



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



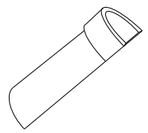
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



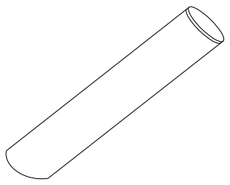
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

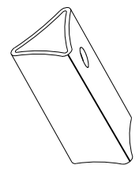


NIGP: 55083571053
Type 4 Mailbox Wedge

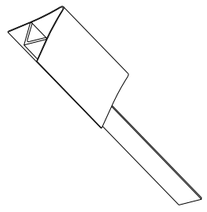


NIGP: 55083571004
Type 4 Mailbox Socket

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
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REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		70

DATE: 4/26/2023
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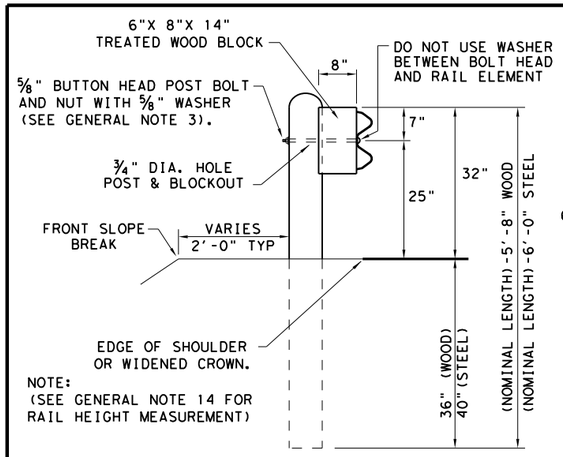
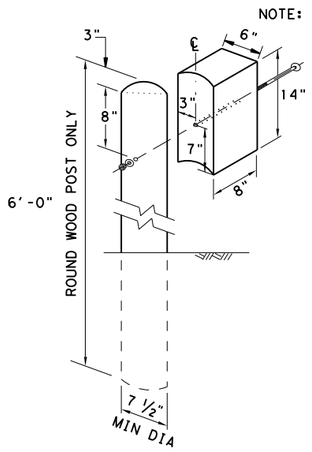
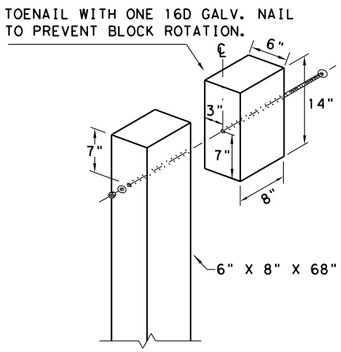


TYPICAL POST PLACEMENT

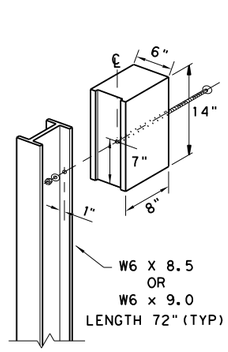


WOOD BLOCK TO ROUND WOOD POST

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

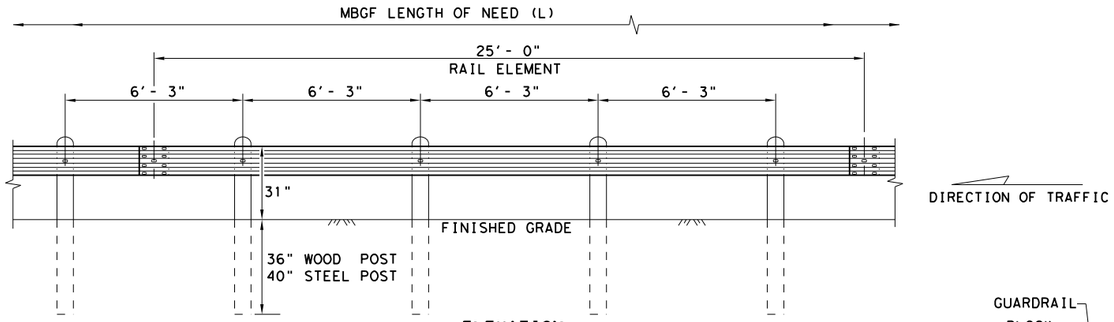


WOOD BLOCK TO RECTANGULAR WOOD POST



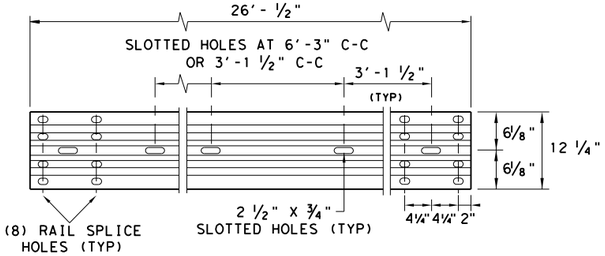
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



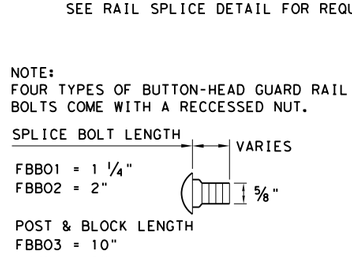
ELEVATION
MID-SPAN RAIL SPLICE

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



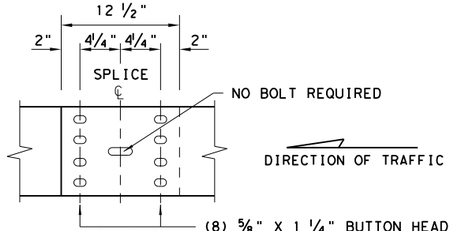
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



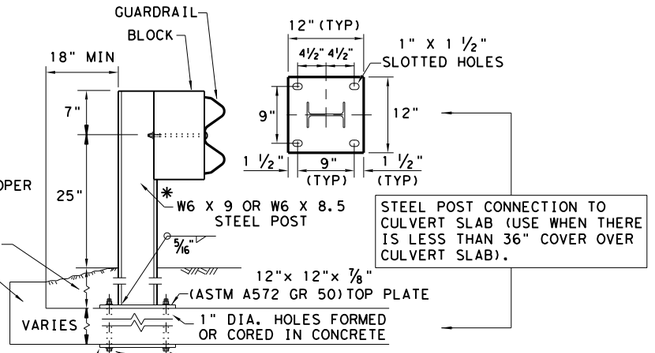
BUTTON HEAD BOLT

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.

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

LOW FILL CULVERT POST

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.

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" 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 ¼" MIN. BEYOND NUT.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" 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 ⅝" 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.

Texas Department of Transportation — Design Division Standard

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

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	WFS	COOKE		71

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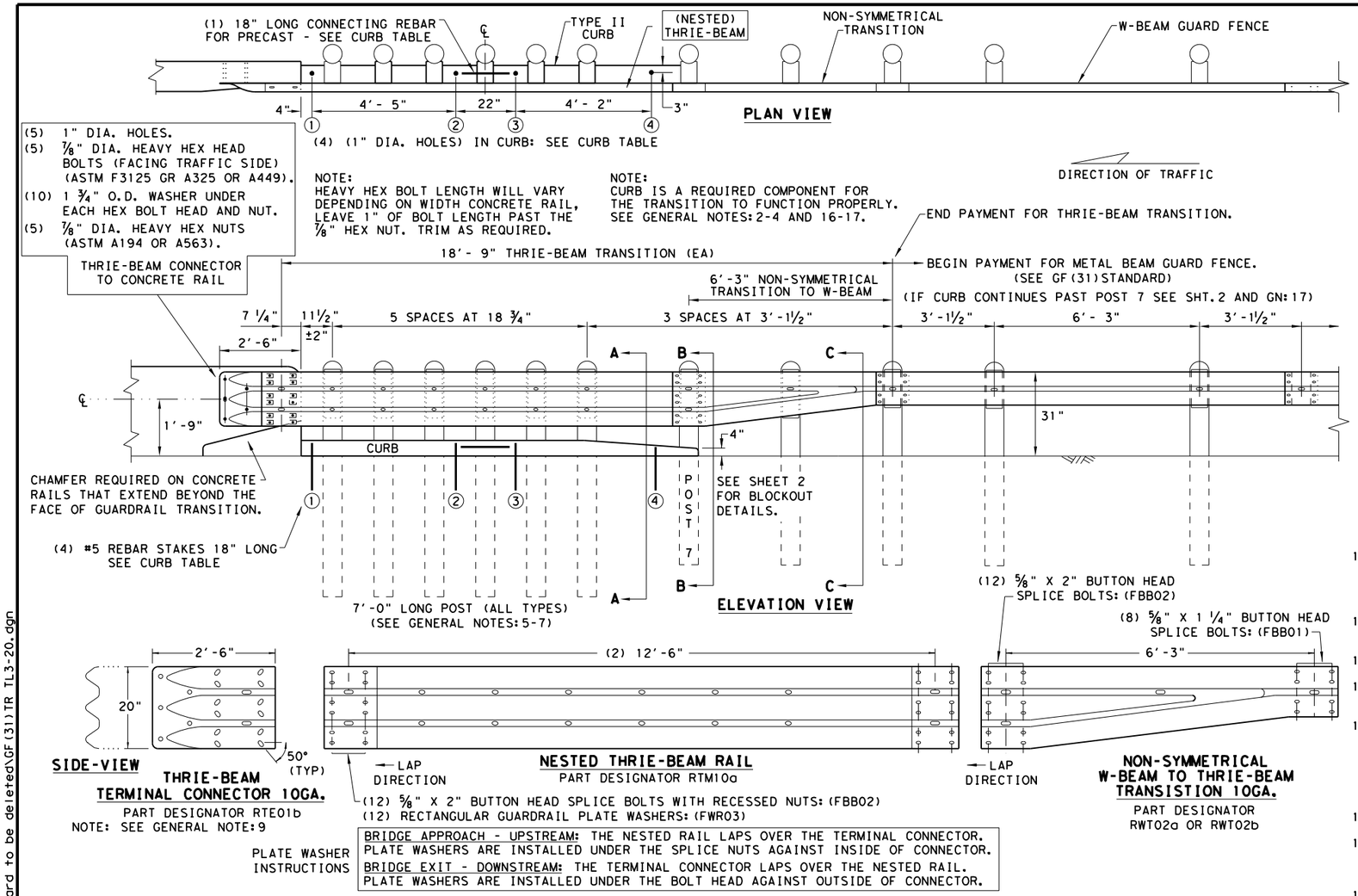


GENERAL NOTES

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.

THRIE-BEAM TERMINAL - CURB TABLE

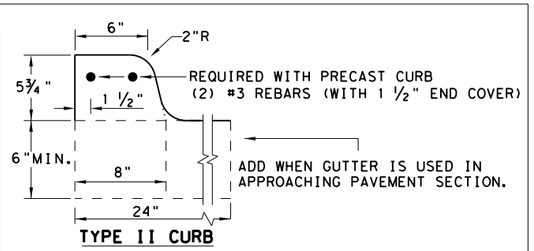
PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

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.

* 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

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

TYPE II CURB DETAILS

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: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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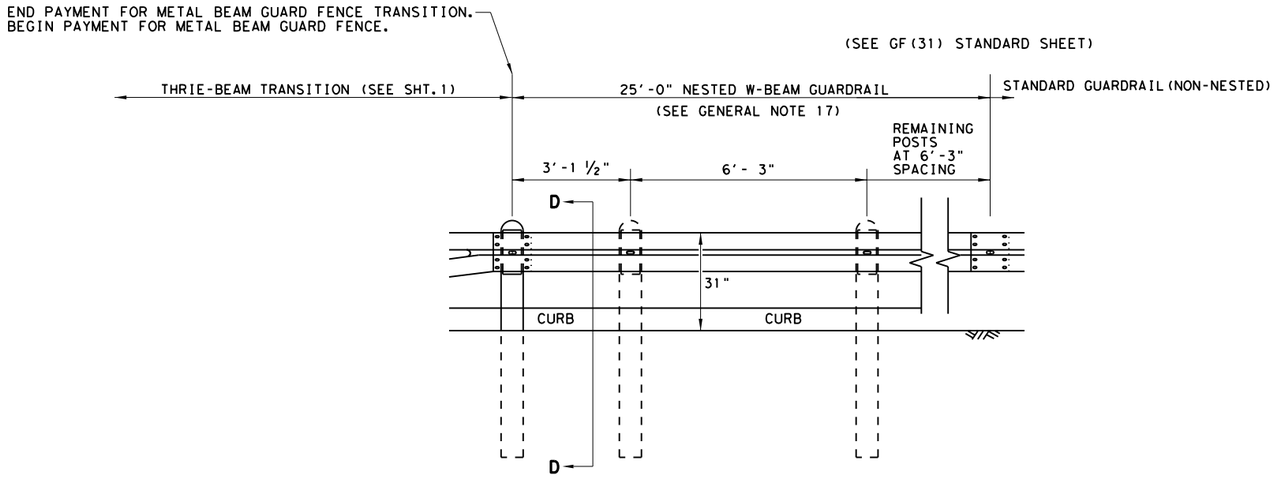
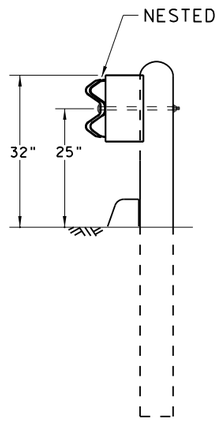
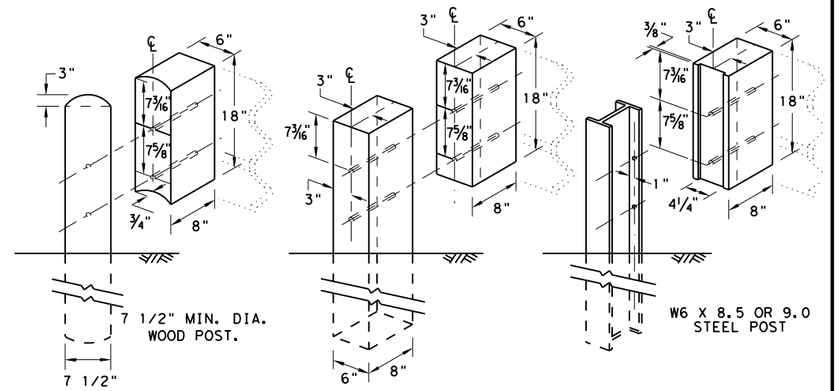
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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

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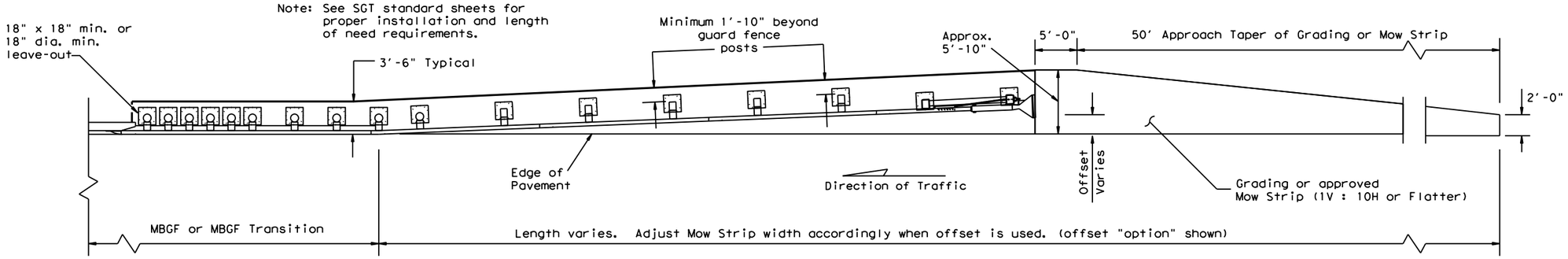
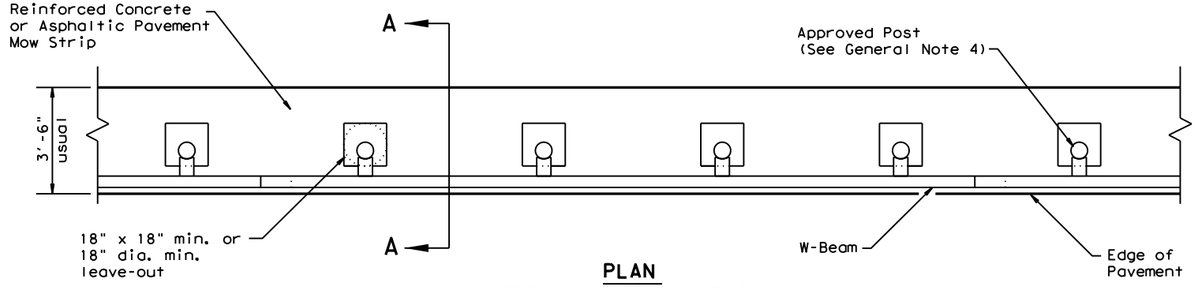
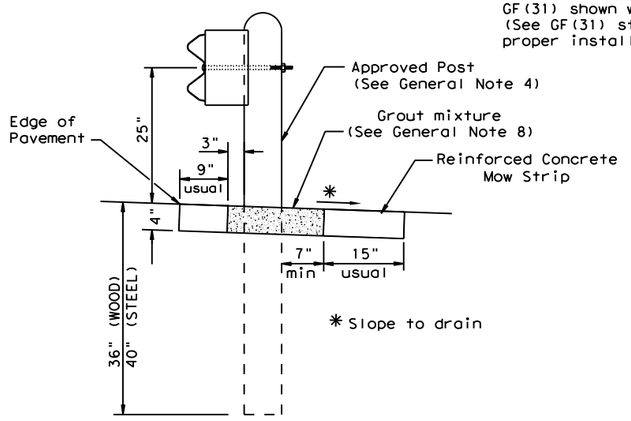


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



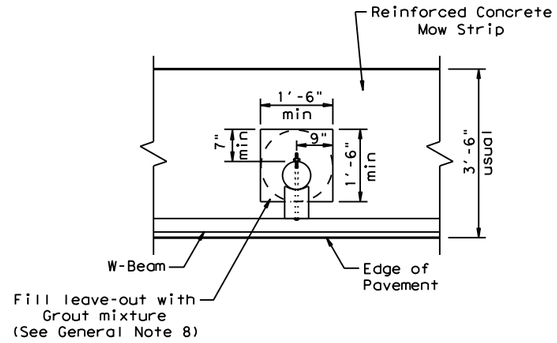
PLAN

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



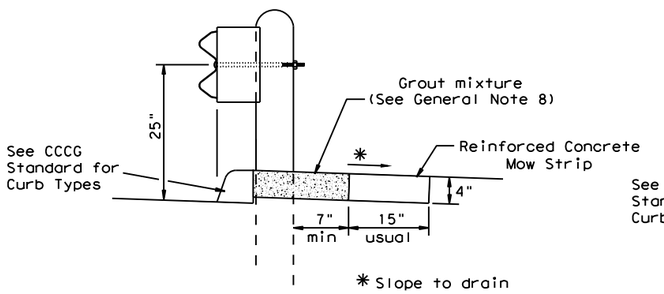
SECTION A-A

Typical



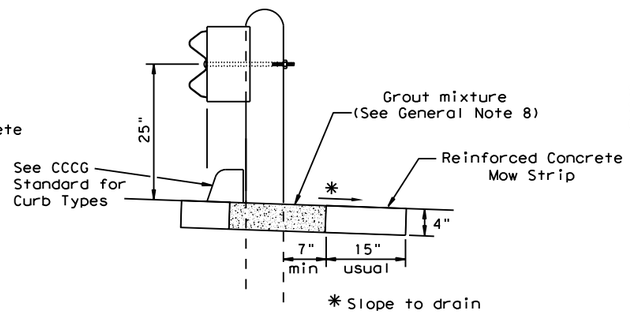
MOW STRIP DETAIL

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



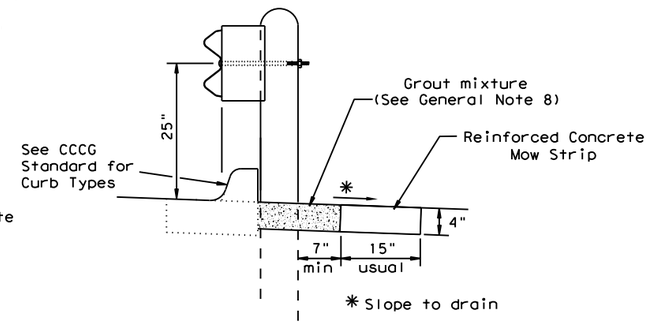
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

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 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

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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©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
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	WFS	COOKE		74	

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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)

TRAFFIC FLOW

PLAN VIEW

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'-1 ½" 6'-3" 6'-3"

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

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

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

POST 40" DEPTH (TYP 1-8)

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

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

6'-1⅜"

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

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'- 1 ⅜" 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

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 17"- ½" HEIGHT

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

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

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 ⅞")
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

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	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		75

DATE: 4/26/2023
FILE: I:\WFSDESGN\Plans\WFS Standards\DGNs\Barrier\MBGF\SGT(11S)31-18.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

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

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

PLAN VIEW

MBGF
RAIL 2

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 ⅝"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 ⅜"

RAIL
HEIGHT
31"

ARROWS

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

ITEM (13) RAIL 4 | ITEM (13) RAIL 3 | ITEM (13) RAIL 2 | ITEM (13) RAIL 1

DETAIL (D)

CABLES

FINISHED
GRADE

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 | POST 8 | POST 7 | POST 6 | POST 5 | POST 4 | POST 3 | POST 2 | POST 1
ITEM (4)
I-BEAM
W6 X 9
NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

SOIL
ANCHOR POST
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 ⅝"
2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)
ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

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.

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

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	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

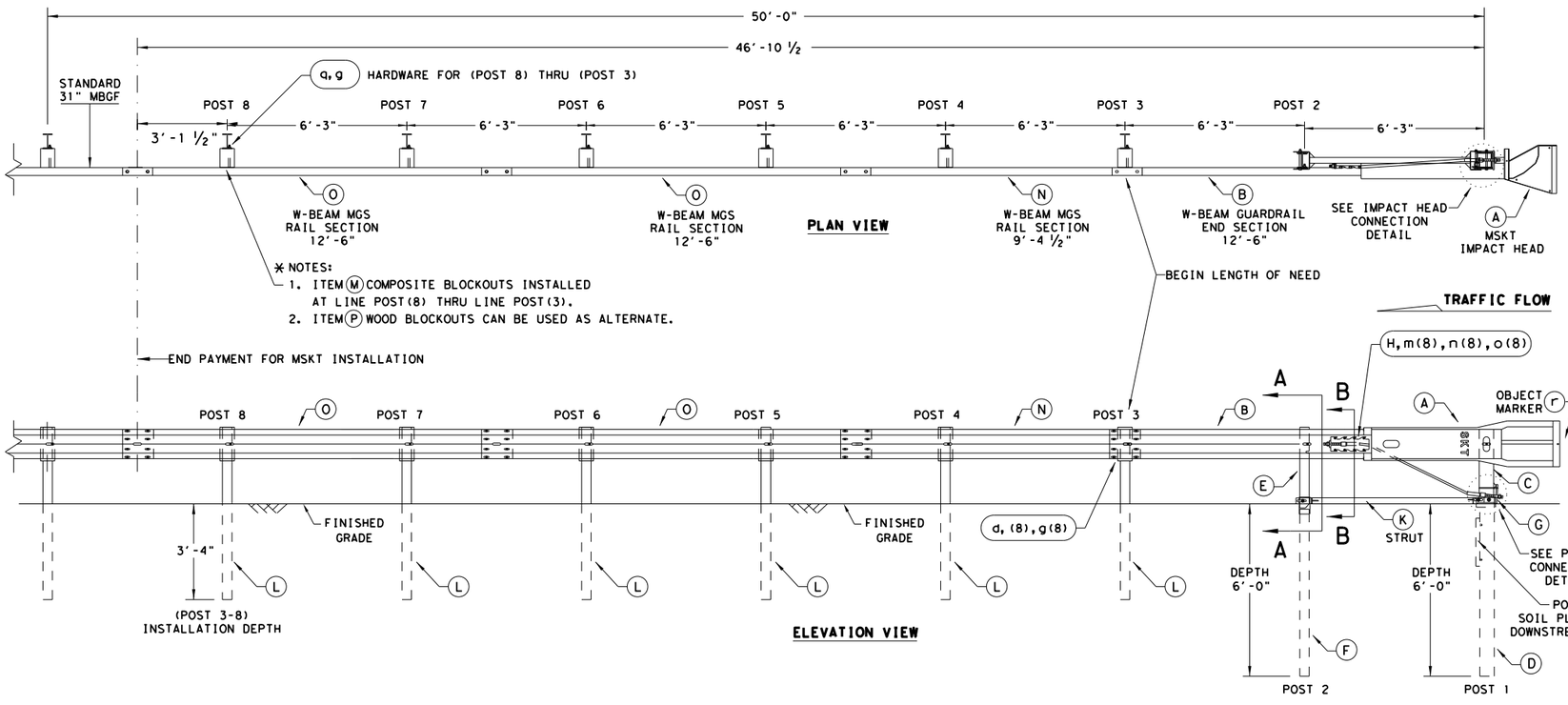
Texas Department of Transportation

Design Division Standard

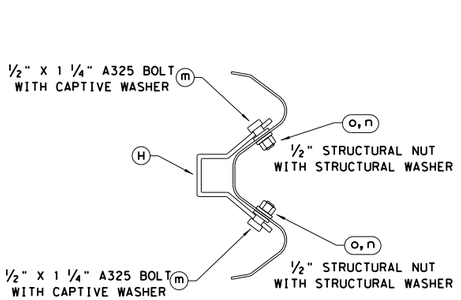
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

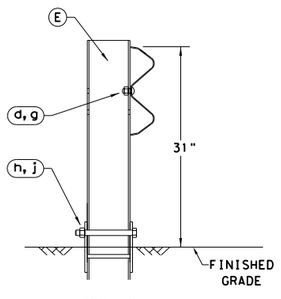
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		76

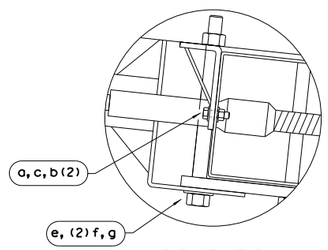
DATE: 4/26/2023
FILE: T:\WFSDESGN\Plans\WFS Standards\DGNs\Barrier\MBGF\SGT(12S)31-18.dgn

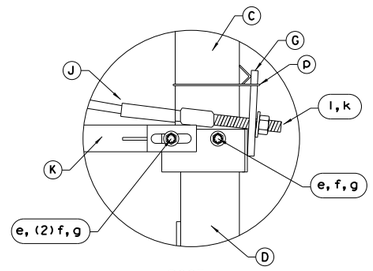


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









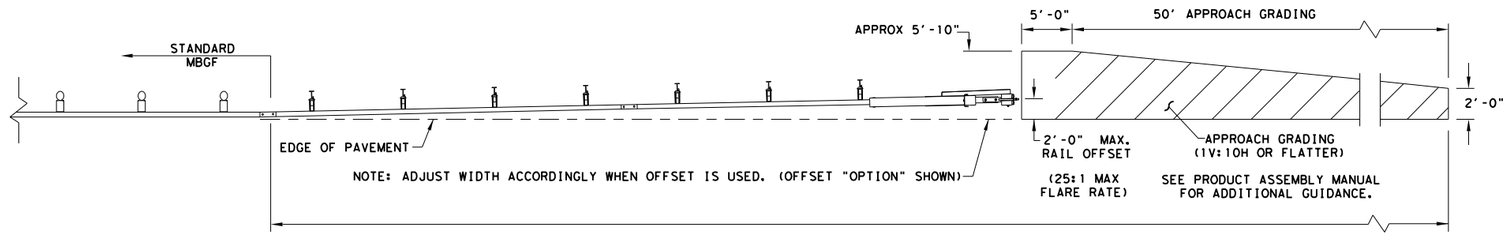
GENERAL NOTES

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 9/16" 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



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

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	1609	01	029, etc.	FM 1630	
	DIST	COUNTY		SHEET NO.	
	WFS	COOKE		77	

DATE: 4/26/2023 4:10:19 PM
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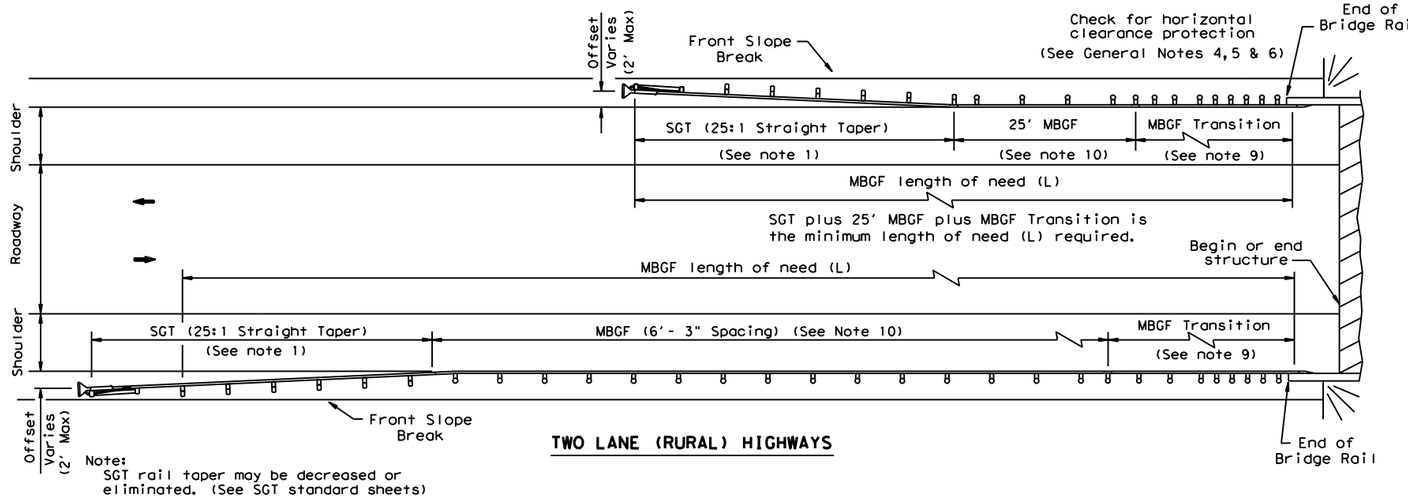
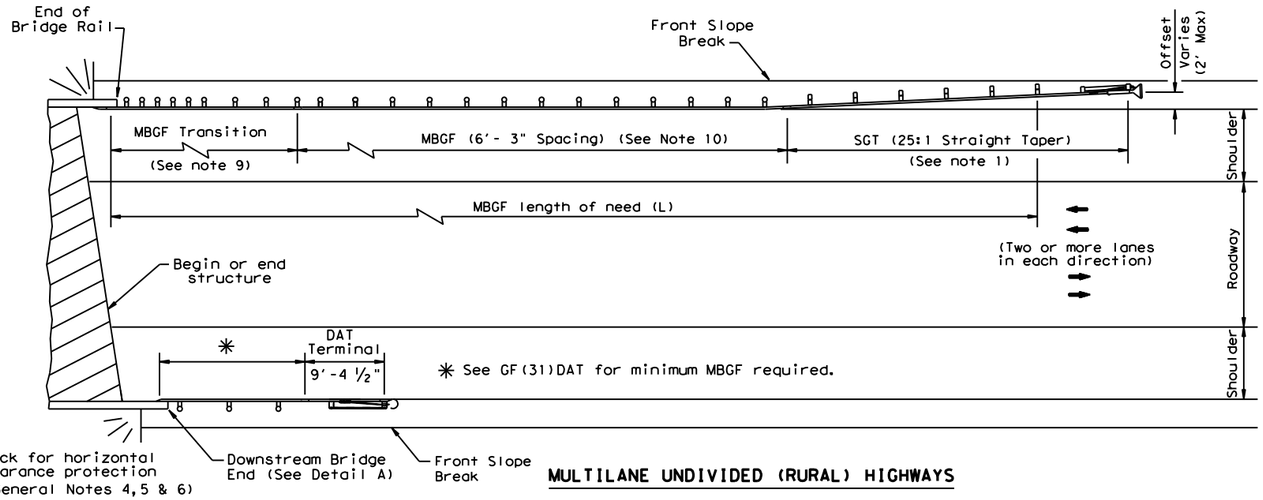
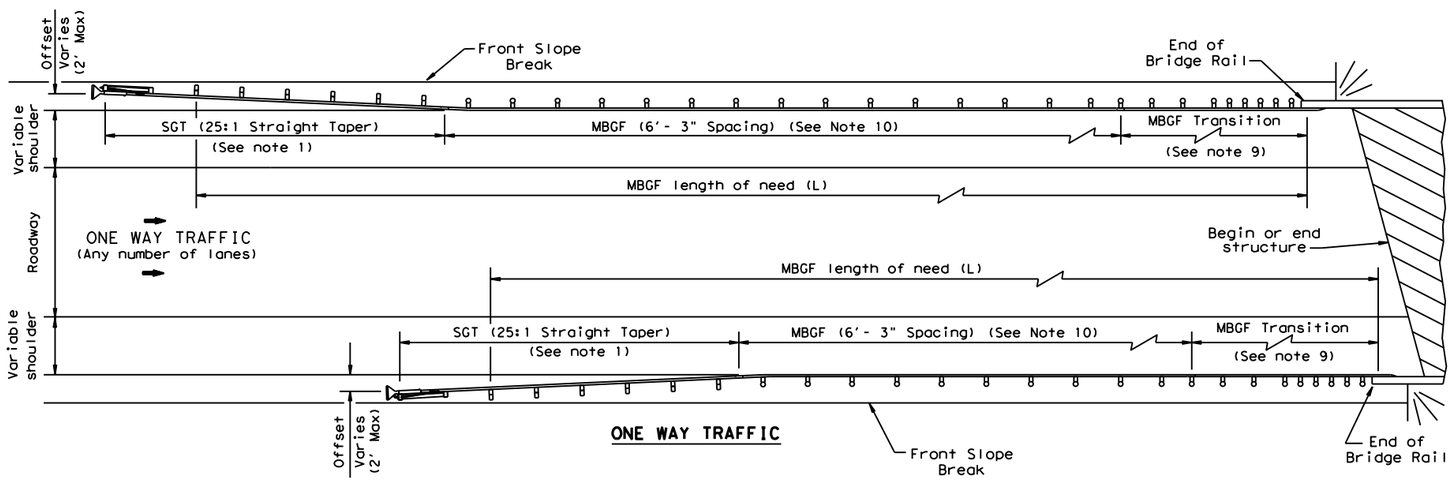


TWO LANE (RURAL) HIGHWAYS

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



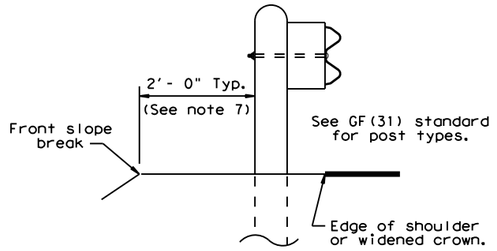
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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

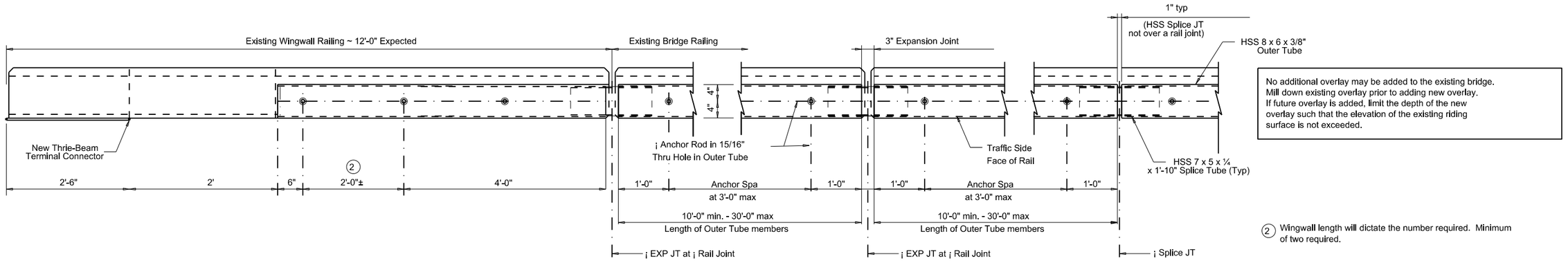
BRIDGE END DETAILS

(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	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		78

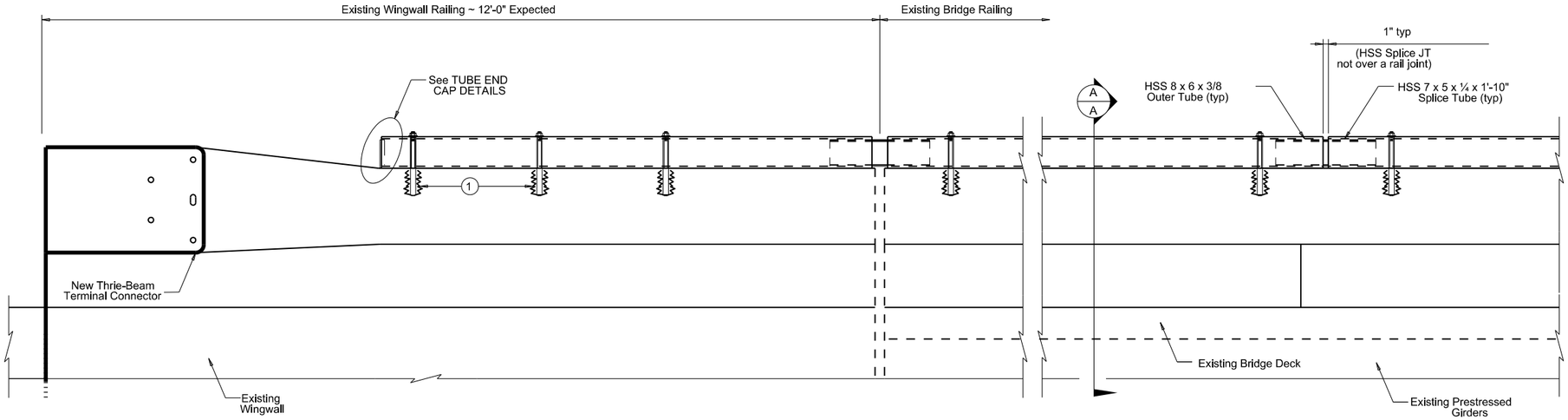
DATE: DATE TIME
FILE: DOCUMENT NAME



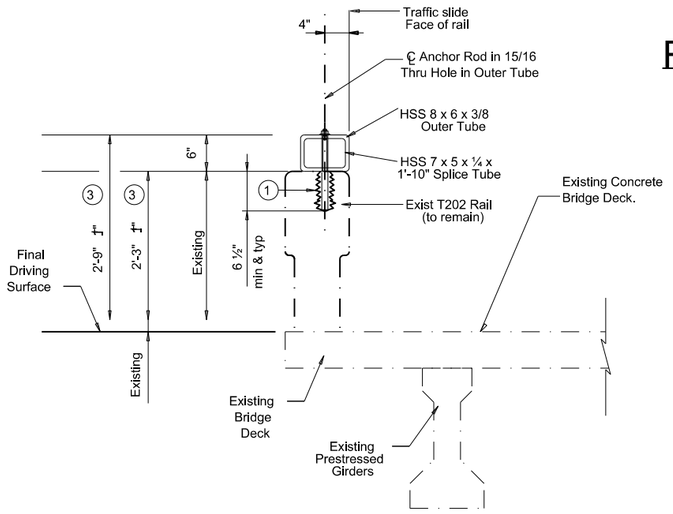
RAIL PLAN

No additional overlay may be added to the existing bridge. Mill down existing overlay prior to adding new overlay. If future overlay is added, limit the depth of the new overlay such that the elevation of the existing riding surface is not exceeded.

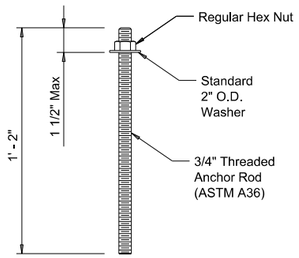
(2) Wingwall length will dictate the number required. Minimum of two required.



RAIL TRAFFIC SIDE ELEVATION

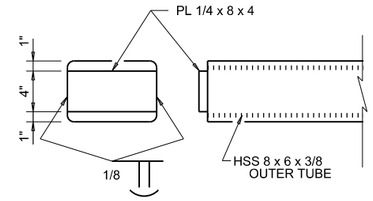


SECTION A-A



ANCHOR RODS (1)

Anchor bolts must be 3/4" Dia. ASTM-A-36 threaded rods with one regular hex nut and one standard 2" O.D. washer each. Embed threaded rods 6 1/2" Min into concrete rail using a Type III, Class C epoxy adhesive anchor system capable of obtaining an ultimate load of 30 kips in tension per threaded rod Anchor installation, including hole size, drilling, and clean-out must be in accordance with the manufacturer's instructions.



TUBE END CAP DETAILS

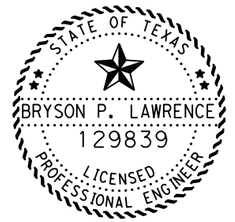
GENERAL NOTES:

HSS structural steel shall be ASTM A500 Gr B and end cap structural steel shall be ASTM A36. Structural steel shall conform to Item 441, "Steel Structures", and shall be free from burrs sharp edges, and weld splatter. Exposed edges and corners shall be ground to 1/16" flat or radius.

All steel components shall be galvanized in accordance with Item 445, "Galvanizing". Anchor bolts, rods, and nuts shall have Class 2A and 2B fit tolerances. The nuts shall be tapped after galvanizing. Nuts shall be installed to snug tight. Burr threads after installation to prevent back turn of the nut.

Contractor shall verify all dimensions in the field prior to commencement of work. Shop drawing will not be required for this rail.

Materials, fabrication, and installation for HSS members, splices, bolts, and epoxy anchorage system are included in price bid for Item 442-6008, "Structural Steel (Miscellaneous Bridge)", Nominal Weight of steel 32.58 lb/ft, @ 258 lf, Quantity = 8405.04 Lbs.



Bryson Lawrence, P.E.

04/27/2023

NBI#: 03-049-0-1609-01-004

Texas Department of Transportation

Bridge Division Standard

BRIDGE RAIL RETROFIT

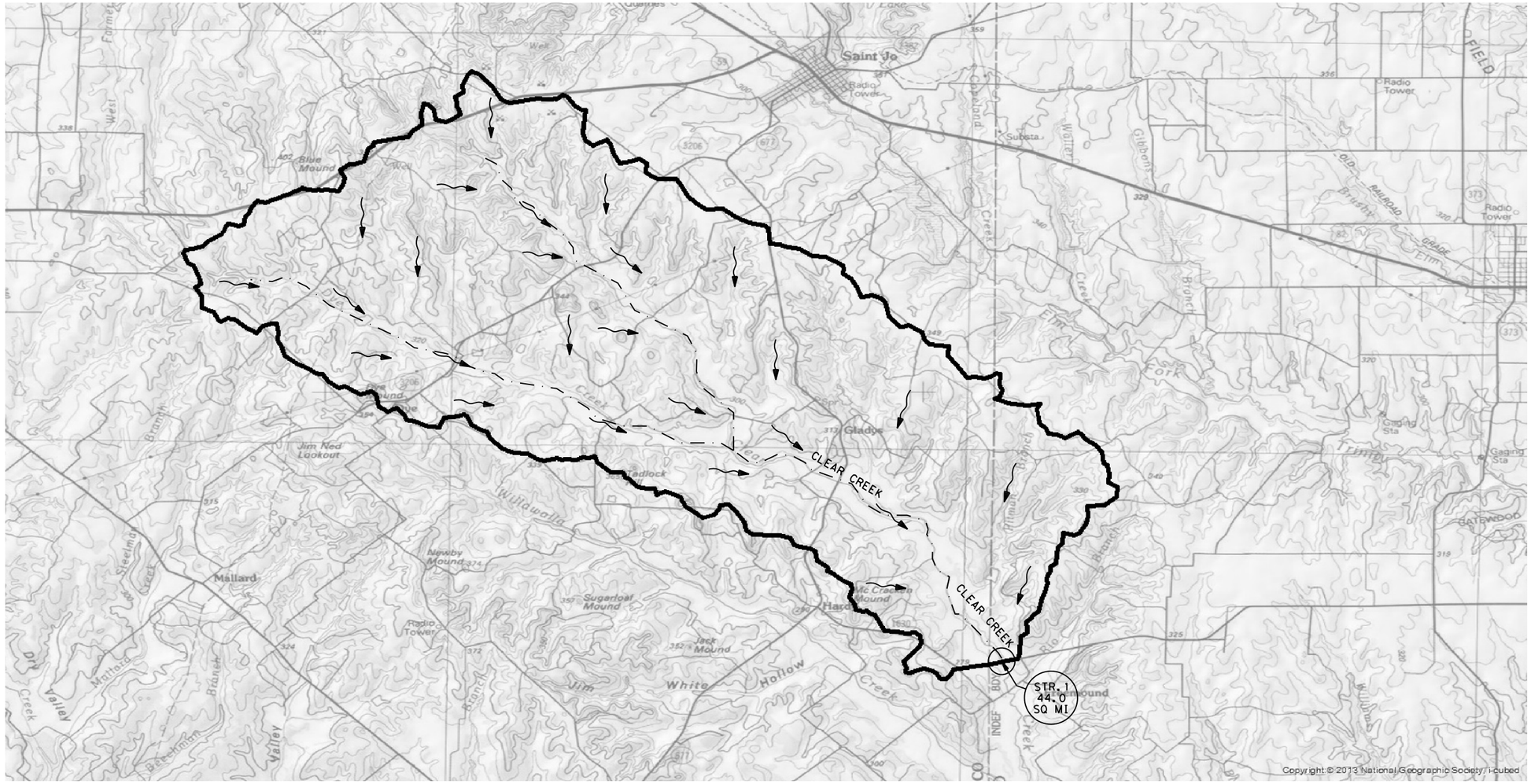
FM 1630 AT CLEAR CREEK

SHEET 1 OF 1

FILE: rlstd026-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		79

LEGEND

- STR. # ACRES — LOCATION # DRAINAGE AREA (ACRES)
- STR. #SQ MI — LOCATION # DRAINAGE AREA (SQUARE MILES)
- STRUCTURE LOCATION
- FLOW DIRECTION



STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
DRAINAGE AREA MAP

0 50 100
SCALE IN FEET

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SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		80

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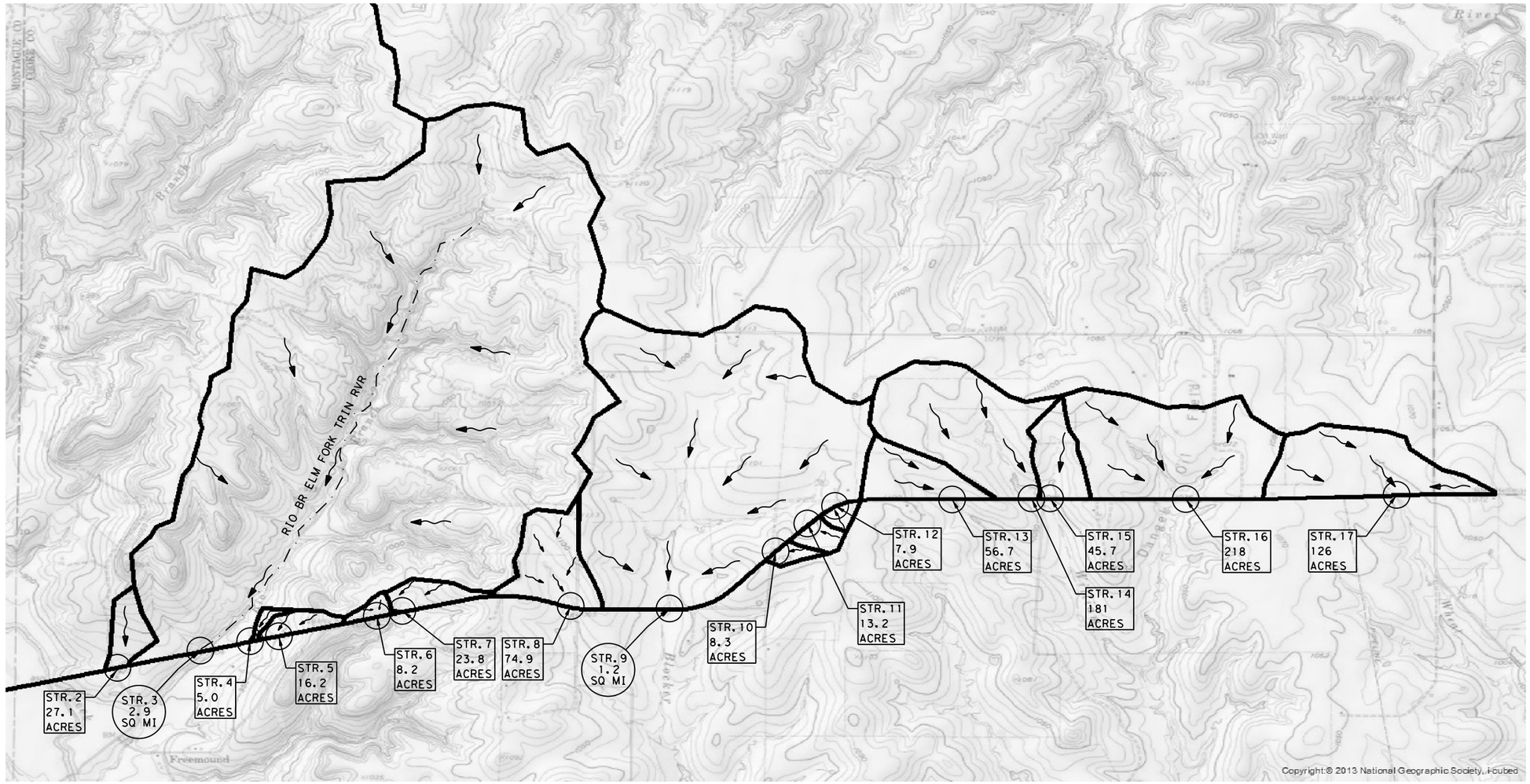
LEGEND

- STR. # ACRES — LOCATION # DRAINAGE AREA (ACRES)
- STR. #SQ MI — LOCATION # DRAINAGE AREA (SQUARE MILES)
- STRUCTURE LOCATION
- FLOW DIRECTION



STATE OF TEXAS
BRYSON P. LAWRENCE
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LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
DRAINAGE AREA MAP

0 50 100
SCALE IN FEET

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SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		81

DATE: 4/26/2023 4:10:35 PM
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HYDROLOGIC DATA - RATIONAL METHOD (DA < 200 ACRES)

ROADWAY: FM 1630 CSJ: 1609-01-029, ETC.

STRUCTURE	DESIGN FREQ	AREA acres	C	tc min.	2 YR I in / hr	2 YR Q cfs	5 YR I in / hr	5 YR Q cfs	10 YR I in / hr	10 YR Q cfs	25 YR I in / hr	25 YR Q cfs	50 YR I in / hr	50 YR Q cfs	100 YR I in / hr	100 YR Q cfs	REMARKS OVERTOPPING FREQUENCY (year)
2	10	27.1	0.33	33	2.37	21	3.07	27	3.61	32	4.34	39	5.50	49	6.90	62	OVERTOPPING AT 100 YEAR FLOOD
4	10	5.0	0.33	27	2.67	4	3.45	6	4.05	7	4.86	8	5.49	9	6.14	10	NO OVERTOPPING OCCURS
5	10	16.2	0.33	29	2.56	14	3.31	18	3.89	21	4.67	25	5.28	28	5.91	32	NO OVERTOPPING OCCURS
6	10	8.2	0.33	23	2.91	8	3.76	10	4.41	12	5.29	14	5.98	16	6.67	18	NO OVERTOPPING OCCURS
7	10	23.8	0.33	33	2.37	19	3.07	24	3.61	28	4.34	34	5.50	43	6.90	54	OVERTOPPING AT 50 YEAR FLOOD
8	5	74.9	0.33	39	2.14	53	2.77	68	3.27	81	3.93	97	4.45	110	4.99	123	OVERTOPPING AT 10 YEAR FLOOD
17	10	126.0	0.33	39	2.14	89	2.77	115	3.27	136	3.93	163	4.45	185	4.99	207	OVERTOPPING AT 25 YEAR FLOOD

HYDROLOGIC DATA - NRCS/HYDROGRAPH METHOD (HEC-HMS 4.7) (DA > 200 ACRES)

ROADWAY: FM 1630 CSJ: 1609-01-029, ETC.

STRUCTURE	DESIGN FREQ	AREA (SQ MI)	AREA (ACRES)	Tc (MIN)	SOIL CURVE NO.	2 Year (50%) RAINFALL (INCHES)	2 Year (50%) Q (CFS)	5 Year (20%) RAINFALL (INCHES)	5 Year (20%) Q (CFS)	10 Year (10%) RAINFALL (INCHES)	10 Year (10%) Q (CFS)	25 Year (4%) RAINFALL (INCHES)	25 Year (4%) Q (CFS)	50 Year (2%) RAINFALL (INCHES)	50 Year (2%) Q (CFS)	100 Year (1%) RAINFALL (INCHES)	100 Year (1%) Q (CFS)	REMARKS OVERTOPPING FREQUENCY (year)
3	10	2.93	1877	106	70	3.84	110.9	4.88	215.7	5.8	320.4	7.12	486.5	8.19	626.8	9.35	780.1	NO OVERTOPPING OCCURS
16	5	0.34	218	44	73	3.87	102.1	4.91	199.9	5.84	296.5	7.16	439.9	8.24	563.3	9.4	699.6	OVERTOPPING AT 10 YEAR FLOOD

HYDRAULIC DATA (HY-8) (FHWA'S VERSION 7.60)

ROADWAY: FM 1201 CSJ: 1356-01-029

STRUCTURE		DESCRIPTION	ALLOWABLE ELEVATION	LENGTH	CULV SLOPE	CULV MANNING	D.S. CHANNEL SLOPE	D.S. CHANNEL MANNING	DESIGN FREQ YEAR (SEE HYDROLOGIC DATA FOR DESIGN YEAR ANALYZED) Q	HEADWATER ELEVATION	TAILWATER DEPTH	NORMAL DEPTH	VELOCITY TAILWATER	VELOCITY OUTLET	FREQ YEAR = 100 Q	HEADWATER ELEVATION	TAILWATER DEPTH	NORMAL DEPTH	VELOCITY TAILWATER	VELOCITY OUTLET
				(FT)	(%)	"n"	(%)	"n"	(CFS)	(FT)	(FT)	(FT)	(FT/S)	(FT/S)	(CFS)	(FT)	(FT)	(FT)	(FT/S)	(FT/S)
2	EXIST	30" RCP	923.94	40.00	0.700	0.012	0.042	0.030	39	923.29	0.71	1.75	22.87	8.68	62	924.02	0.88	2.06	25.75	9.29
	PROP	30" RCP		40.00	0.700	0.012				923.97	0.79	2.05	24.25	9.26		924.18	0.88	2.13	25.75	9.40
3	EXIST	2 - 10' X 9' CBC	907.96	51.00	2.360	0.012	0.024	0.045	780.1	897.55	3.99	1.73	9.80	15.72	780	897.55	3.99	1.73	9.80	15.72
	PROP	2 - 10' X 9' CBC		60.00	2.360	0.012				898.70	3.99	1.56	9.80	17.28		898.70	3.99	1.56	9.80	17.28
4	EXIST	24" RCP	922.72	56.00	0.600	0.012	0.017	0.030	10	919.48	0.38	1.01	15.08	6.24	10	919.48	0.38	1.01	15.08	6.24
	PROP	24" RCP		60.00	0.600	0.012				919.48	0.38	1.01	15.08	6.24		919.48	0.38	1.01	15.08	6.24
5	EXIST	24" RCP	940.23	44.00	1.800	0.012	0.025	0.030	32	939.72	0.51	1.59	30.80	11.32	32	939.72	0.51	1.59	30.80	11.32
	PROP	24" RCP		56.00	1.800	0.012				939.83	0.51	1.59	30.80	11.44		939.83	0.51	1.59	30.80	11.44
6	EXIST	24" RCP	1031.39	51.00	6.000	0.012	0.033	0.030	18	1027.73	0.28	0.75	40.82	14.28	18	1027.73	0.28	0.75	40.82	14.28
	PROP	24" RCP		67.00	6.000	0.012				1027.78	0.28	0.80	40.82	13.78		1027.78	0.28	0.80	40.82	13.78
7	EXIST	24" RCP	1033.43	53.00	4.400	0.012	0.030	0.030	34	1031.48	0.42	1.18	43.45	15.00	54	1033.50	0.53	1.37	49.13	16.05
	PROP	24" RCP		67.00	4.400	0.012				1031.74	0.42	1.23	43.45	14.97		1033.68	0.53	1.42	49.13	15.73
8	EXIST	2 - 36" RCP	1063.89	51.00	2.300	0.012	0.016	0.030	68	1062.61	0.69	1.70	41.04	13.60	123	1064.06	0.91	1.94	47.77	14.56
	PROP	2 - 36" RCP		55.00	2.300	0.012				1062.71	0.69	1.70	41.04	13.75		1064.22	0.91	1.95	47.77	14.72
16	EXIST	2 - 5' X 3' CBC	1037.65	30.00	0.800	0.012	0.025	0.030	296.5	1037.64	3.01	2.39	10.93	11.14	700	1038.41	4.38	2.39	13.57	9.90
	PROP	2 - 5' X 3' CBC		60.00	0.800	0.012				1037.68	3.01	2.36	10.93	9.75		1038.43	4.38	2.32	13.57	9.52
17	EXIST	7' X 3' CBC	1046.84	30.00	2.500	0.012	0.017	0.030	136	1045.63	0.66	1.11	47.88	12.37	207	1046.94	0.82	1.39	54.03	13.33
	PROP	7' X 3' CBC		58.00	2.500	0.012				1046.28	0.66	1.11	47.88	13.74		1047.17	0.82	1.28	54.03	14.39

10% CULVERT EXTENSION RULES

- EXTENSIONS ARE NOT GREATER THAN 10% OF THE EXISTING CULVERT'S LENGTH.
- THE MODIFICATIONS TO THE CROSSING STRUCTURE ARE MINOR
- ROADWAY HAS LOW ADT.
- THERE ARE NO CHANGES IN THE ROADWAY PROFILE.
- THERE ARE NO ADVERSE IMPACTS TO PROPERTIES DUE TO BACKWATER OR EROSION OUTLET VELOCITIES.
- THE PERFORMANCE HISTORY OF THE CROSSING ARE ADEQUATE.
- THE STRUCTURE IS NOT WITHIN A ZONE AE FLOODPLAIN.

NRCS METHOD:

1. LAG TIME = 0.4 X TIME OF CONCENTRATION (Tc) FOR DEVELOPED AREAS.
   LAG TIME = 0.6 X TIME OF CONCENTRATION (Tc) FOR TRADITIONAL LAG TIME.
   LAG TIME = 0.7 X TIME OF CONCENTRATION (Tc) FOR UNDEVELOPED AREAS.
2. COMPOSITE CURVE NUMBERS WERE CALCULATED USING NRCS CN LOSS MODEL AND ACCOUNTED FOR DIFFERING LAND USE AND HYDROLOGIC SOIL GROUPS FOUND WITHIN THE RESPECTIVE WATERSHED BY USING THE WEB SOIL SURVEY.
3. STORMS WERE MODELED AS 24-HOUR DURATION EVENTS USING SCS TYPE II TEMPORAL DISTRIBUTION WITH NO AREAL REDUCTION FACTOR.
4. ANALYZED USING HEC-HMS IN ACCORDANCE WITH TXDOT HYDRAULIC MANUAL UPDATED SEPTEMBER 2019.

RATIONAL METHOD:

1. RAINFALL INTENSITIES WERE CALCULATED USING THE TXDOT EBDLKUP-2019.XLSM SPREADSHEET TOOL "RAINFALL INTENSITY-DURATION FREQUENCY COEFFICIENTS FOR TEXAS, WHICH IS BASED ON NOAA ATLAS 14 PRECIPITATION FREQUENCY ATLAS OF THE UNITED STATES, VOLUME 11, VERSION 2.0: TEXAS (PERICA ET AL. 2018). METHODOLOGY: ANNUAL MAXIMUM SERIES (AMS).

GENERAL NOTES:

1. THERE HAS BEEN NO HISTORY OF ANY FLOODING OR OVERTOPPING OF THE ROADWAY FOR ALL STRUCTURES LISTED PER AREA ENGINEER MIKE HALLUM AND MAINTENANCE SUPERVISOR ROGER KRAHL.
2. THESE CALCULATIONS WERE PERFORMED TO VERIFY THAT THE MODIFICATIONS DO NOT SIGNIFICANTLY IMPACT HYDRAULIC PERFORMANCE.
3. RESULTS ARE BASED ON UNOBSTRUCTED FLOW.
4. CULVERTS SHOWN WITH LESS THAN 10% CHANGE IN LENGTH, HAVE HISTORICALLY PROVEN ADEQUATE HYDRAULICALLY WITH NO LOCAL ISSUES RELATED TO FLOODING OR ROADWAY OVERTOPPING.
5. NO WORK IS TO BE PERFORMED ON THE FOLLOWING STRUCTURES: 1, 9, 10, 11, 12, 13, 14, & 15

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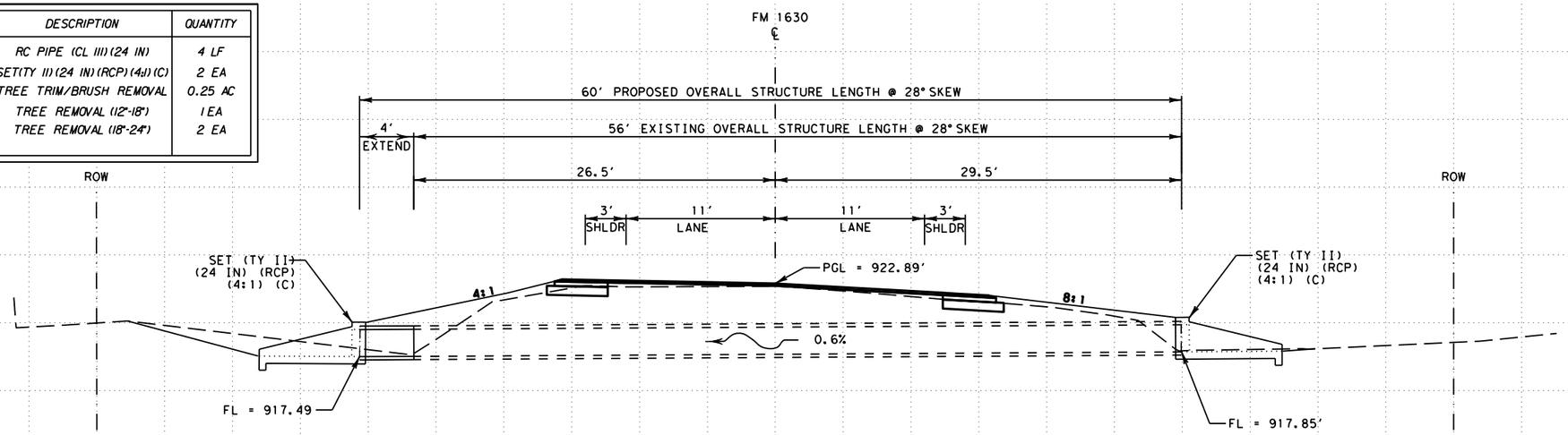
FM 1630
HYDRAULIC DATA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		82

DATE: 4/26/2023 4:10:40 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\FM 1630 HYDRAULIC DATA.dgn

ITEM	DESCRIPTION	QUANTITY
464-6005	RC PIPE (CL III) (24 IN)	4 LF
467-6390	SET(TY II) (24 IN) (RCP) (4:1) (C)	2 EA
752-6004	TREE TRIM/BRUSH REMOVAL	0.25 AC
752-6006	TREE REMOVAL (12"-18")	1 EA
752-6007	TREE REMOVAL (18"-24")	2 EA



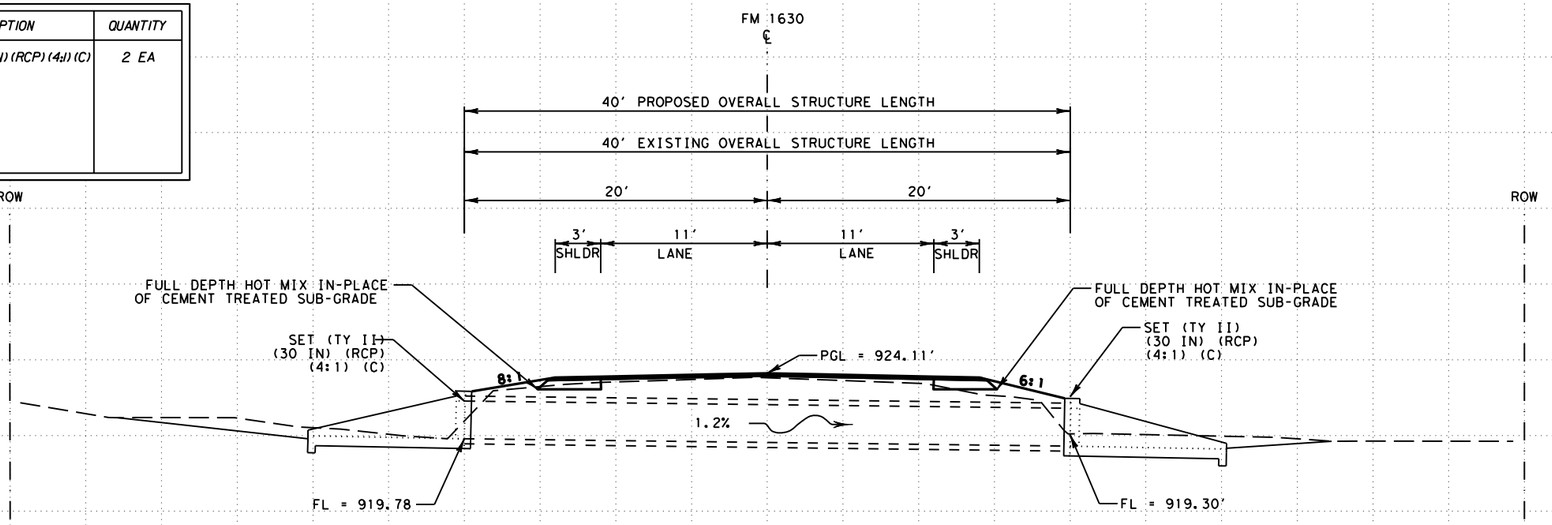
STRUCTURE #4 ~STA. 174+36.85

EXISTING 1 - 24" - 56' RCP @ 28° SKEW

PROPOSED UPSTREAM: ADD PSET-SC(4:1)

PROPOSED DOWNSTREAM: EXTEND 4' ADD PSET-SC(4:1)

ITEM	DESCRIPTION	QUANTITY
467-6419	SET(TY II) (30 IN) (RCP) (4:1) (C)	2 EA



STRUCTURE #2 ~STA. 148+27.56

EXISTING 1 - 30"- 40' RCP

PROPOSED UPSTREAM: ADD PSET-SC(4:1)

PROPOSED DOWNSTREAM: ADD PSET-SC(4:1)

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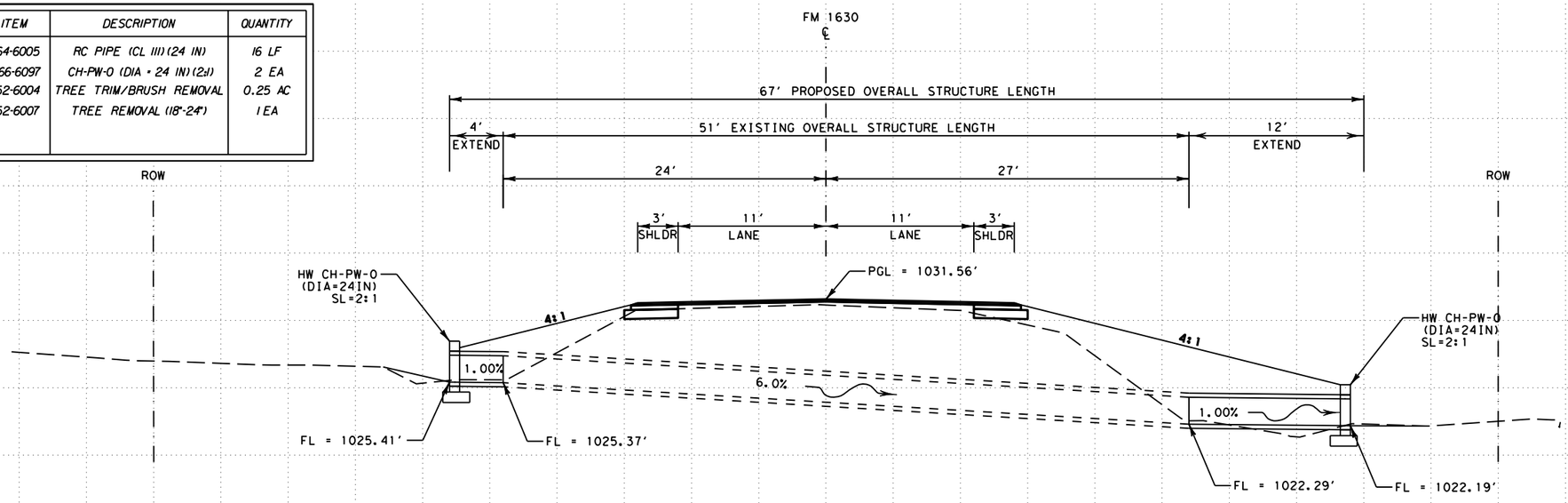
FM 1630
CULVERT PROFILES

SHEET 1 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		83

DATE: 4/26/2023 4:10:42 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\CULVERT PROFILES.dgn

ITEM	DESCRIPTION	QUANTITY
464-6005	RC PIPE (CL III)(24 IN)	16 LF
466-6097	CH-PW-0 (DIA = 24 IN)(2:1)	2 EA
752-6004	TREE TRIM/BRUSH REMOVAL	0.25 AC
752-6007	TREE REMOVAL (18"-24")	1 EA



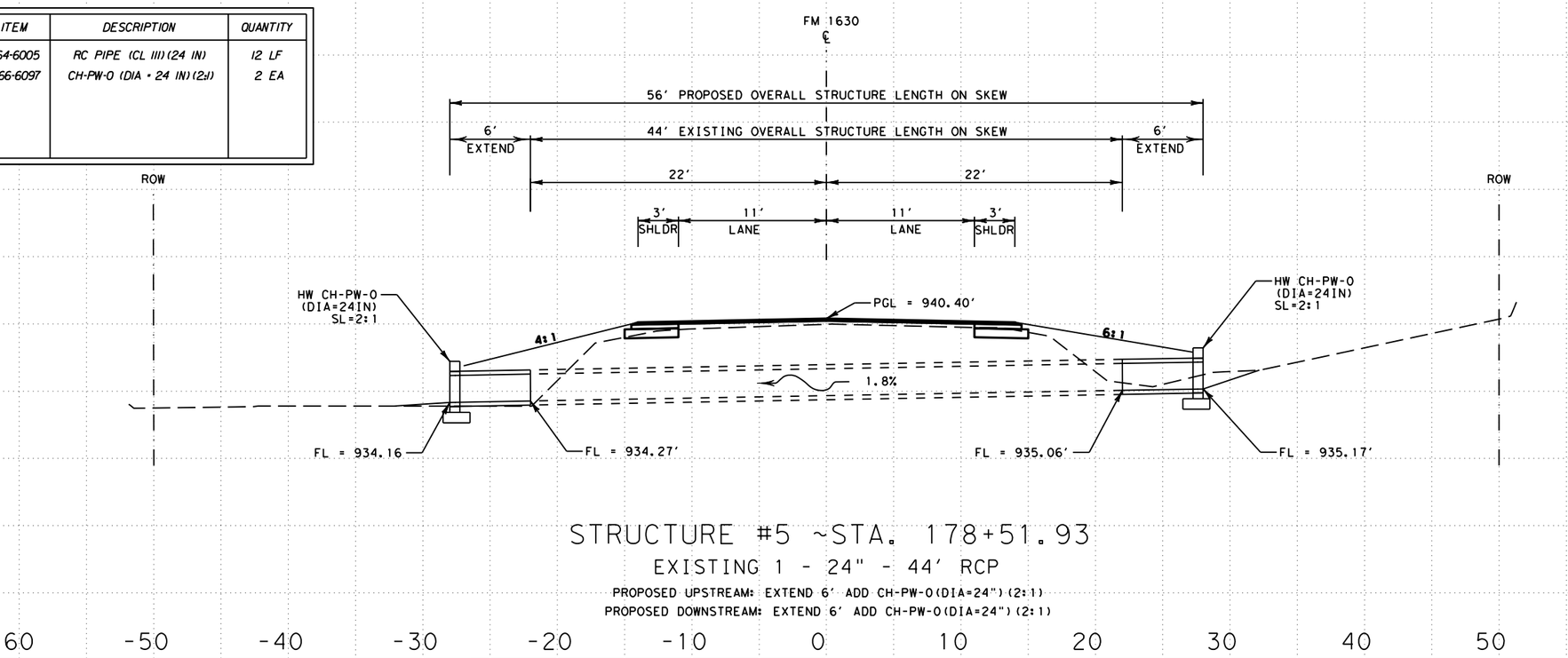
STRUCTURE #6 ~STA. 201+22.51

EXISTING 1 - 24" - 51' RCP

PROPOSED UPSTREAM: EXTEND 4' ADD CH-PW-0(DIA=24")(2:1)

PROPOSED DOWNSTREAM: EXTEND 12' ADD CH-PW-0(DIA=24")(2:1)

ITEM	DESCRIPTION	QUANTITY
464-6005	RC PIPE (CL III)(24 IN)	12 LF
466-6097	CH-PW-0 (DIA = 24 IN)(2:1)	2 EA



STRUCTURE #5 ~STA. 178+51.93

EXISTING 1 - 24" - 44' RCP

PROPOSED UPSTREAM: EXTEND 6' ADD CH-PW-0(DIA=24")(2:1)

PROPOSED DOWNSTREAM: EXTEND 6' ADD CH-PW-0(DIA=24")(2:1)

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CULVERT PROFILES

SHEET 2 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		84

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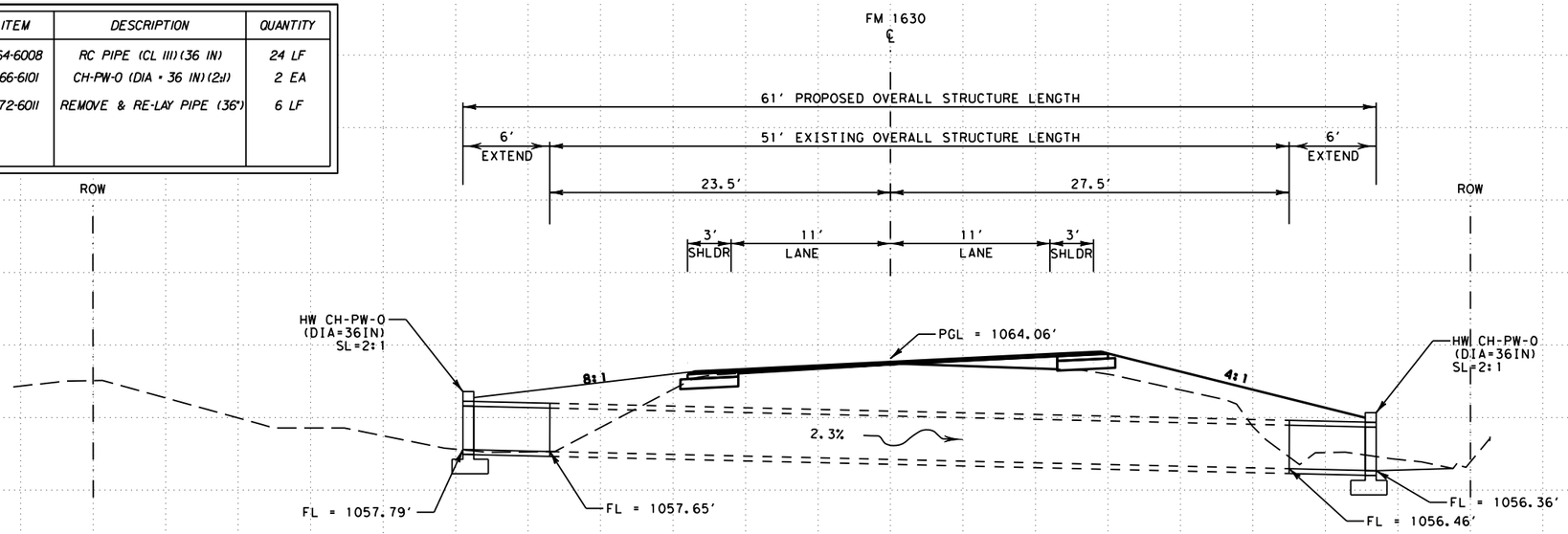
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\CULVERT PROFILES.dgn

ITEM	DESCRIPTION	QUANTITY
464-6008	RC PIPE (CL III)(36 IN)	24 LF
466-6101	CH-PW-0 (DIA = 36 IN)(2:1)	2 EA
472-6011	REMOVE & RE-LAY PIPE (36")	6 LF



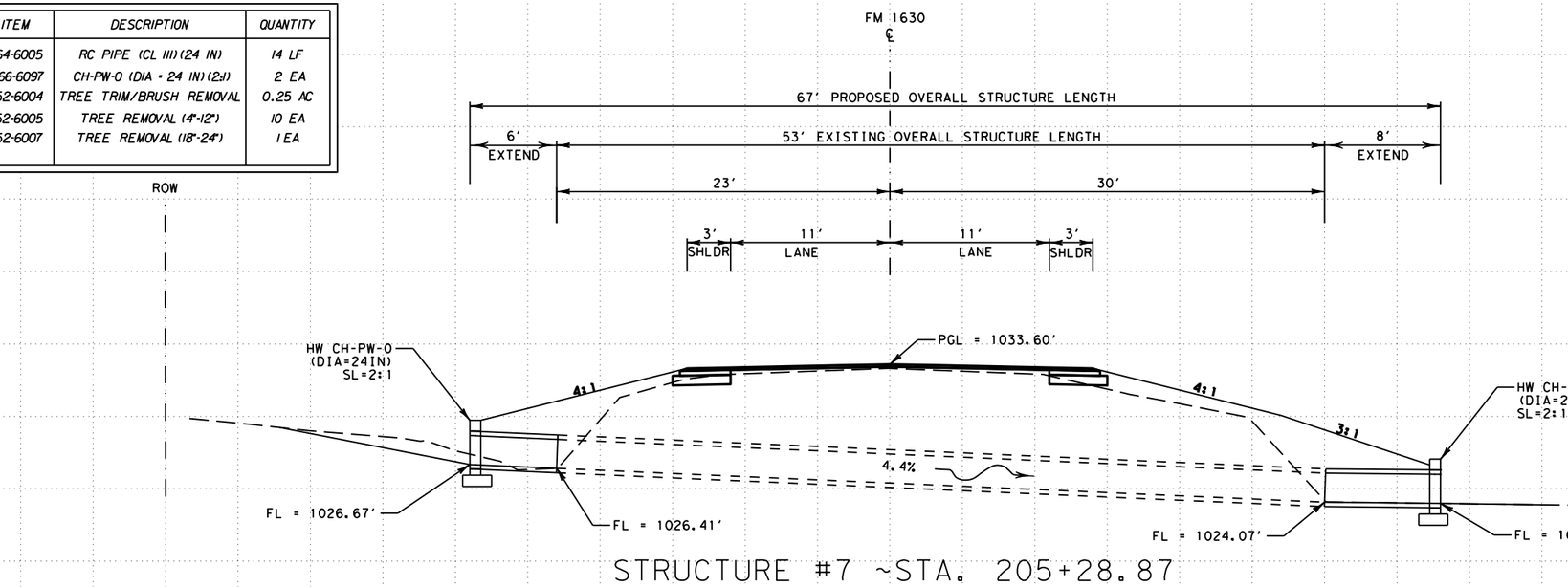
STRUCTURE #8 ~STA. 239+19.38

EXISTING 2 - 36" - 51' RCP

PROPOSED UPSTREAM: EXTEND 6' ADD CH-PW-0(DIA=36")(2:1)

PROPOSED DOWNSTREAM: EXTEND 6' ADD CH-PW-0(DIA=36")(2:1)

ITEM	DESCRIPTION	QUANTITY
464-6005	RC PIPE (CL III)(24 IN)	14 LF
466-6097	CH-PW-0 (DIA = 24 IN)(2:1)	2 EA
752-6004	TREE TRIM/BRUSH REMOVAL	0.25 AC
752-6005	TREE REMOVAL (4"-12")	10 EA
752-6007	TREE REMOVAL (18"-24")	1 EA



STRUCTURE #7 ~STA. 205+28.87

EXISTING 1 - 24" - 53' RCP

PROPOSED UPSTREAM: EXTEND 6' ADD CH-PW-0(DIA=24")(2:1)

PROPOSED DOWNSTREAM: EXTEND 8' ADD CH-PW-0(DIA=24")(2:1)

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SHEET 3 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		85

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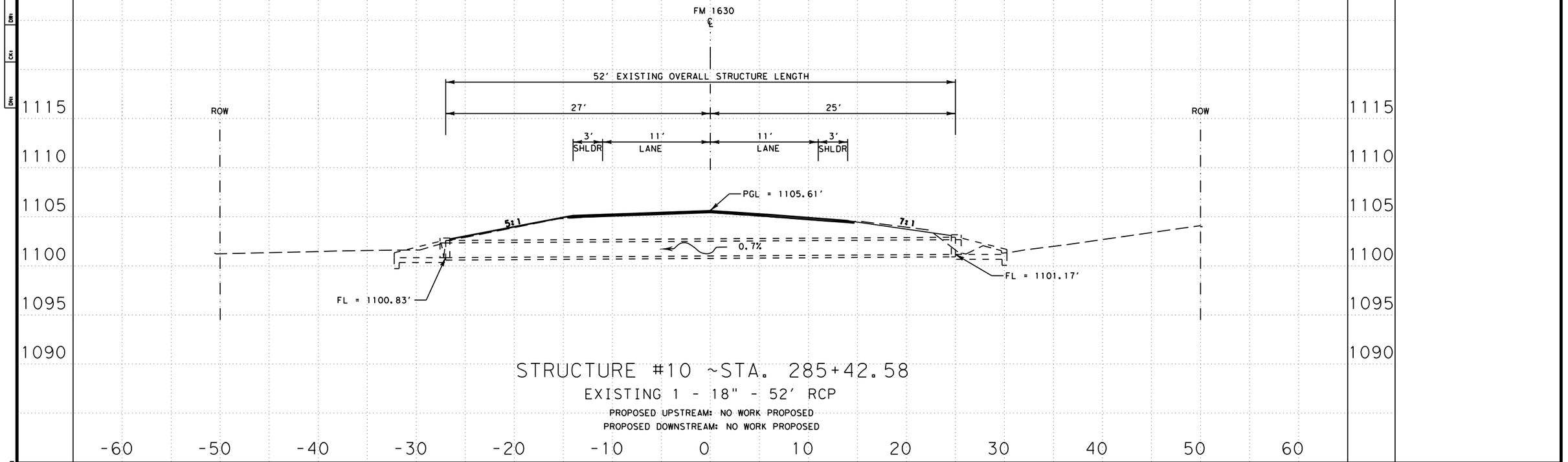
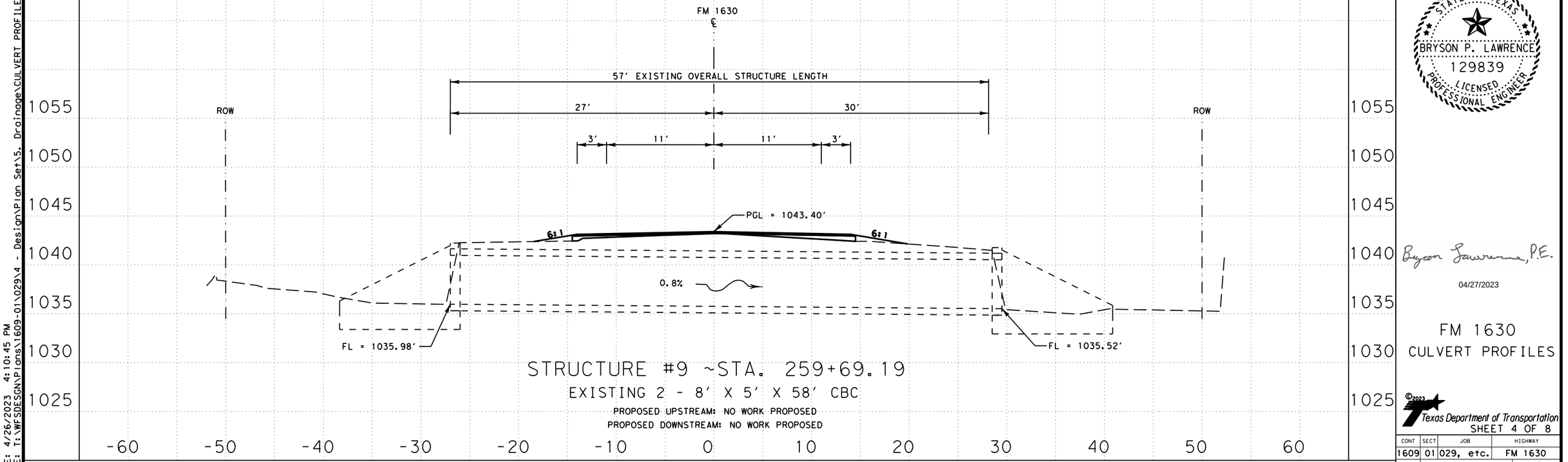


STRUCTURE #10 ~STA. 285+42.58

EXISTING 1 - 18" - 52' RCP

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: NO WORK PROPOSED



STRUCTURE #9 ~STA. 259+69.19

EXISTING 2 - 8' X 5' X 58' CBC

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: NO WORK PROPOSED

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SHEET 4 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		86

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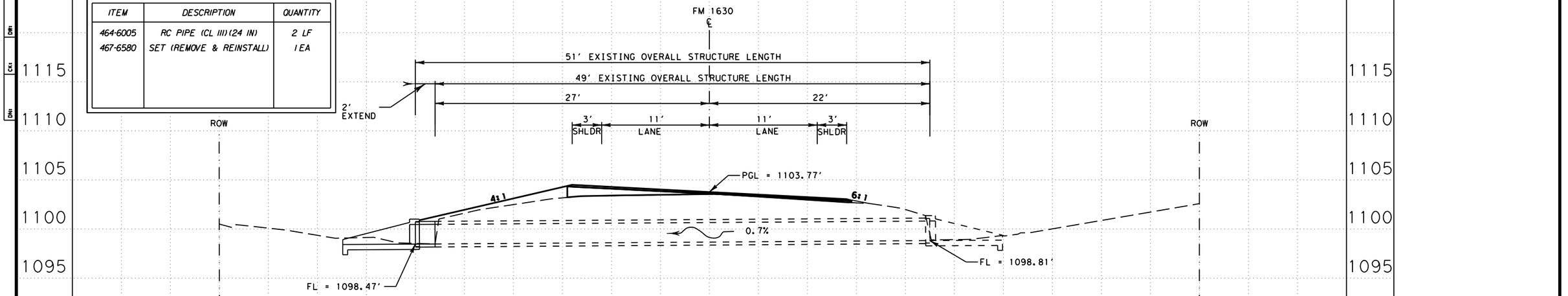
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\CULVERT PROFILES.dgn

ITEM	DESCRIPTION	QUANTITY
464-6005	RC PIPE (CL III)(24 IN)	2 LF
467-6580	SET (REMOVE & REINSTALL)	1 EA

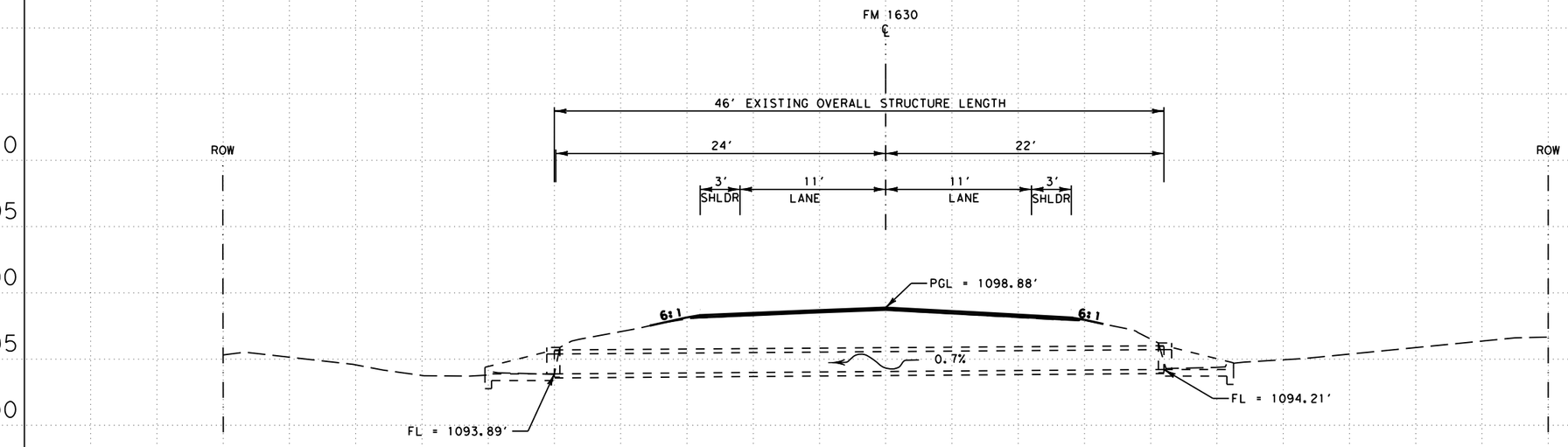


STRUCTURE #12 ~STA. 302+43.31

EXISTING 1 - 24"- 49' RCP

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: EXTEND 2' ADD PSET-SC(4:1)



STRUCTURE #11 ~STA. 293+42.63

EXISTING 1 - 18" X 46' RCP

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: NO WORK PROPOSED

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SHEET 5 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		87

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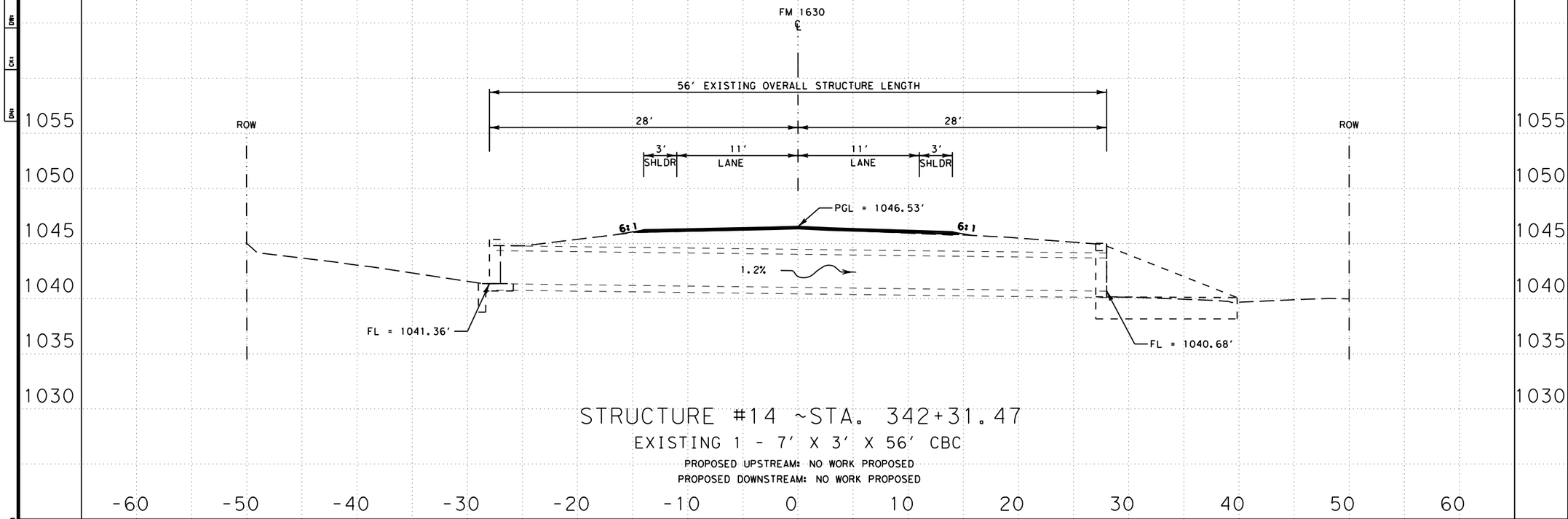
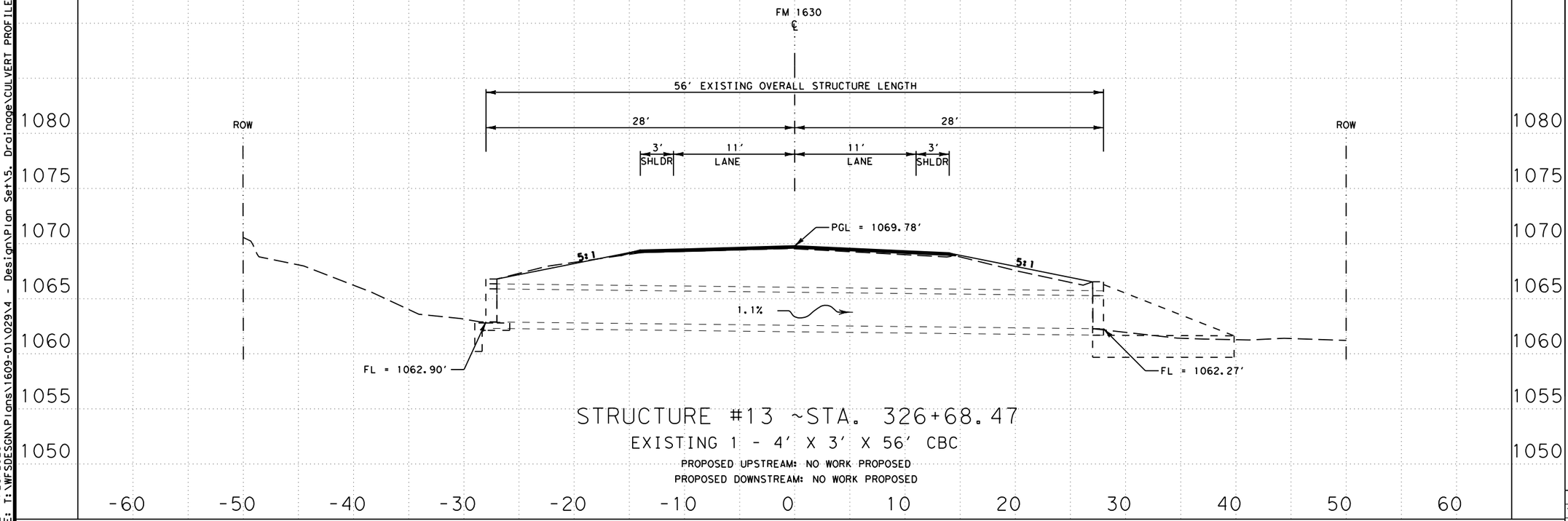


STRUCTURE #14 ~STA. 342+31.47

EXISTING 1 - 7' X 3' X 56' CBC

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: NO WORK PROPOSED



STRUCTURE #13 ~STA. 326+68.47

EXISTING 1 - 4' X 3' X 56' CBC

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: NO WORK PROPOSED

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SHEET 6 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		88

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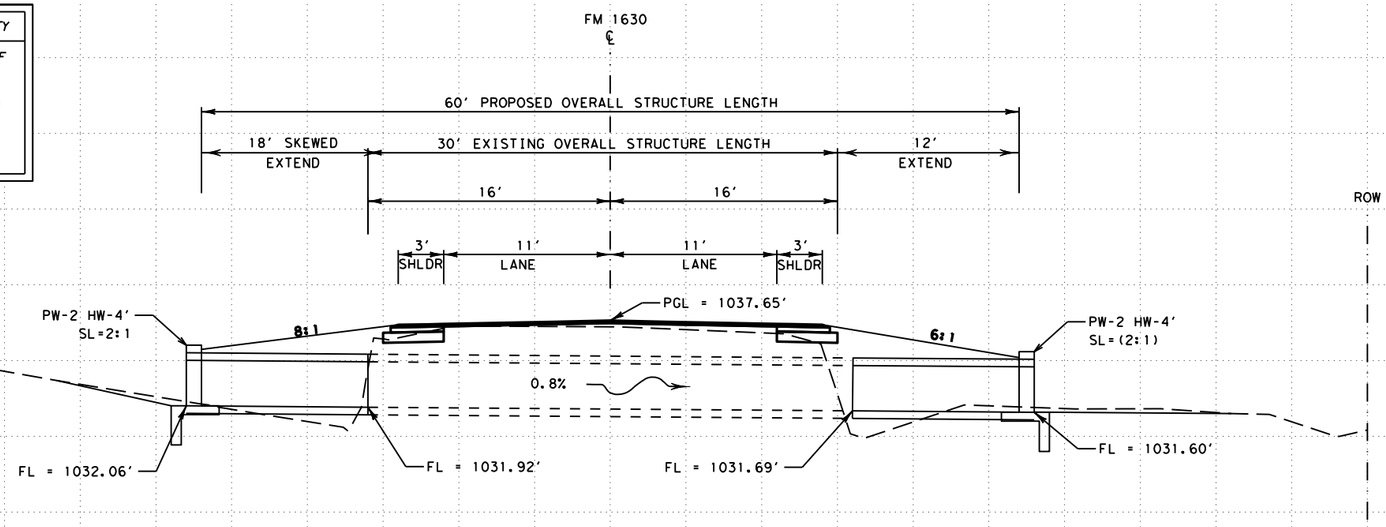
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\CULVERT PROFILES.dgn

ITEM	DESCRIPTION	QUANTITY
403-6001	TEMPORARY SPL SHORING	500 SF
464-6051	CON BOX (5' X 3') (EXTEND)	60 LF
466-6179	WINGWALL (PW-2) (HW-4)	2 EA



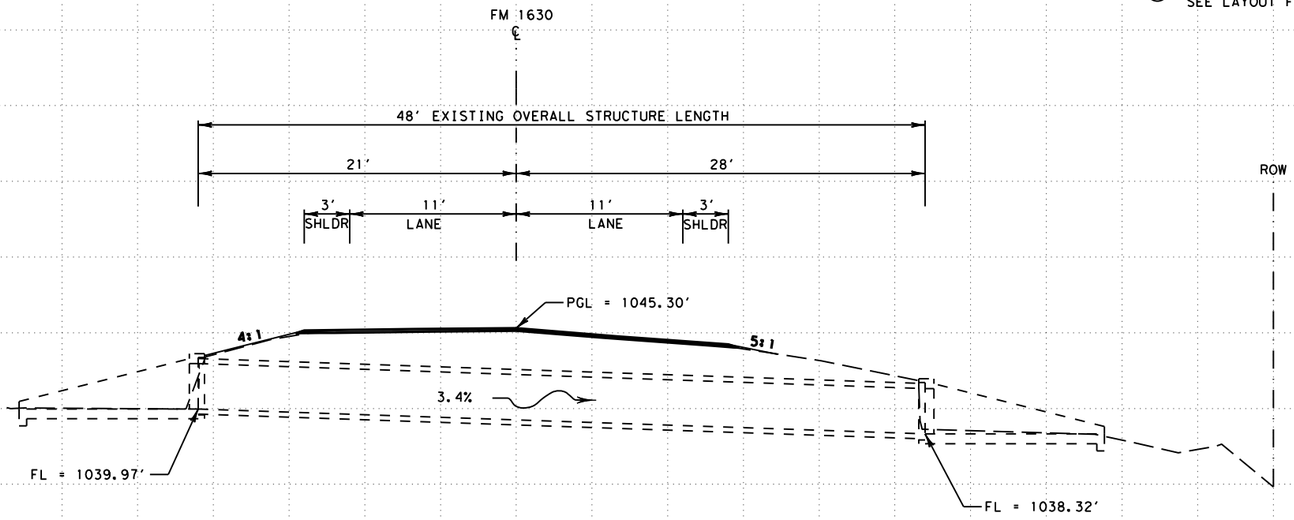
STRUCTURE #16 ~STA. 370+32.84

EXISTING 2 - 5' X 3' X 60' CBC

PROPOSED UPSTREAM: REMOVE FW EXTEND 18' AT 45° SKEW ADD PW-2(HW-4')

PROPOSED DOWNSTREAM: REMOVE FW EXTEND 12' ADD PW-2(HW-4')

① MBGF TO BE UPGRADED. SEE LAYOUT FOR ADDITIONAL DETAIL.



STRUCTURE #15 ~STA. 344+99.03

EXISTING 1 - 36" X 56' RCP

PROPOSED UPSTREAM: NO WORK PROPOSED

PROPOSED DOWNSTREAM: NO WORK PROPOSED

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SHEET 7 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		89

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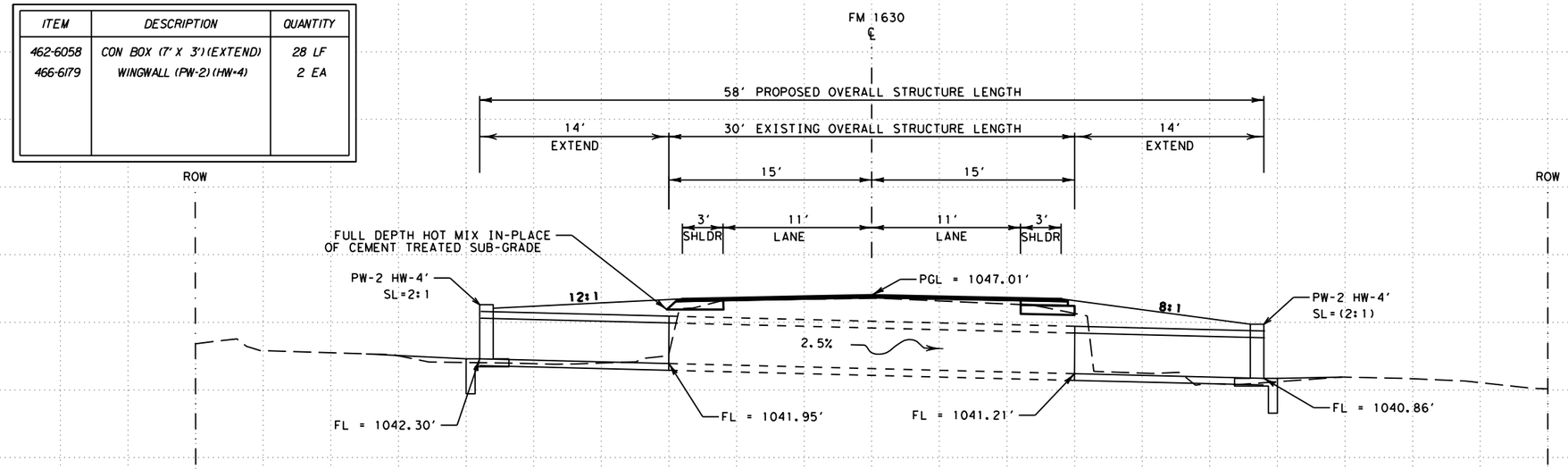
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\CULVERT PROFILES.dgn

ITEM	DESCRIPTION	QUANTITY
462-6058	CON BOX (7' X 3')(EXTEND)	28 LF
466-6179	WINGWALL (PW-2)(HW-4)	2 EA



STRUCTURE #17 ~STA. 414+39.34

EXISTING 1 - 7' X 3' X 30' CBC

PROPOSED UPSTREAM: REMOVE FW EXTEND 14' ADD PW-2(HW-4')

PROPOSED DOWNSTREAM: REMOVE FW EXTEND 14' ADD PW-2(HW-4')

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SHEET 8 OF 8

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		90

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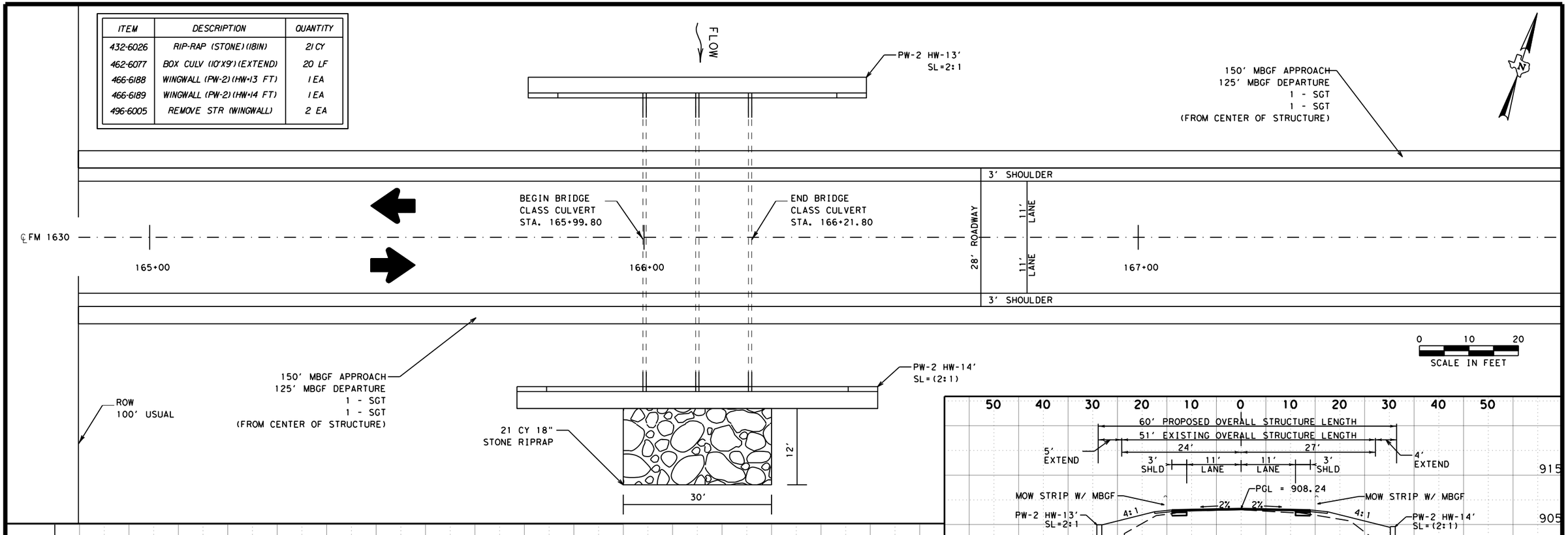
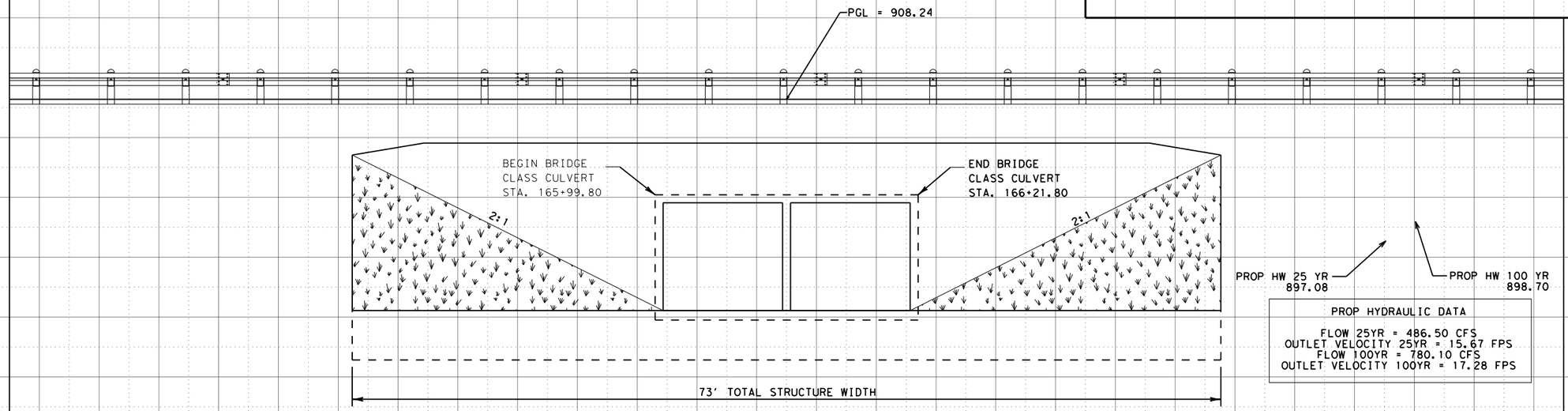
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\CULVERT PROFILES.dgn

ITEM	DESCRIPTION	QUANTITY
432-6026	RIP-RAP (STONE) (18IN)	21 CY
462-6077	BOX CULV (10'X9') (EXTEND)	20 LF
466-6188	WINGWALL (PW-2) (HW=13 FT)	1 EA
466-6189	WINGWALL (PW-2) (HW=14 FT)	1 EA
496-6005	REMOVE STR (WINGWALL)	2 EA





STRUCTURE #3~STA. 166+10.80

EXISTING 2 ~ 10'X 9' X 51' CBC WITH FW(2:1)

PROPOSED UPSTREAM: EXTEND 5' WITH PW-2(HW-13') AND MBGF
PROPOSED DOWNSTREAM: EXTEND 4' WITH PW-2 14' AND MBGF

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BRIDGE CLASS CULVERT PLAN & PROFILE

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SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		91

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DATE: 4/26/2023 4:10:51 PM

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard	Applicable Wingwall or End Treatment Standard	Skew Angle (0°, 15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B 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) (2) (C.Y.)	Class "C" Conc (Wingwall) (3) (C.Y.)	Total Wingwall Area (S.F.)
STRUCTURE #3 STA 166+10.80 (Lt)	2 ~ 10' X 9'	7.5'	MC-10-10	PW-2	0	2:1	9"	8"	3.000	12.750	N/A	N/A	23.500	22.000	N/A	0.0	2.4	46.3	593
STRUCTURE #3 STA 166+10.80 (Rt)	2 ~ 10' X 9'	7.5'	MC-10-10	PW-2	0	2:1	9"	8"	3.000	12.750	N/A	N/A	23.500	22.000	N/A	0.0	2.4	46.3	593
STRUCTURE #16 STA 370+32.84 (Lt)	2 ~ 5' X 3'	2'	MC-5-20	PW-2	45	2:1	8"	7"	0.500	4.167	N/A	N/A	8.957	16.617	N/A	0.0	0.2	6.0	69
STRUCTURE #16 STA 370+32.84 (Rt)	2 ~ 5' X 3'	2'	MC-5-20	PW-2	0	2:1	8"	7"	0.500	4.167	N/A	N/A	6.333	11.750	N/A	0.0	0.2	4.2	47
STRUCTURE #17 STA 414+39.34 (Lt)	1 ~ 7' X 3'	1.5'	SCC-7	PW-2	0	2:1	8"	7"	0.500	4.167	N/A	N/A	6.333	8.167	N/A	0.0	0.2	4.0	47
STRUCTURE #17 STA 414+39.34 (Rt)	1 ~ 7' X 3'	2'	SCC-7	PW-2	0	2:1	8"	7"	0.500	4.167	N/A	N/A	6.333	8.167	N/A	0.0	0.2	4.0	47

(1) The wall heights shown will be rounded to the nearest Foot for bidding purposes.

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

(3) Concrete volume shown is total of wing, footing, culvert toewall (if any), anchor toewall (if any) and wingwall toewall. Riprap apron, culvert and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor shall have 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 shall be the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

NOTES:

Skew Angle = 0° for SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standards.
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 shall 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.

U = Box Culvert Wall Thickness. Dimension can be found on the applicable Box Culvert Standard.

C = Curb Height.

See applicable wing or end treatment standards 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 S.F. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

SPECIAL NOTE:

This sheet is a supplement to the Box Culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the Box Culvert Wingwalls and Safety End Treatments.

An Excel 97 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet shall be signed, sealed, and dated by a licensed Professional Engineer.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		92

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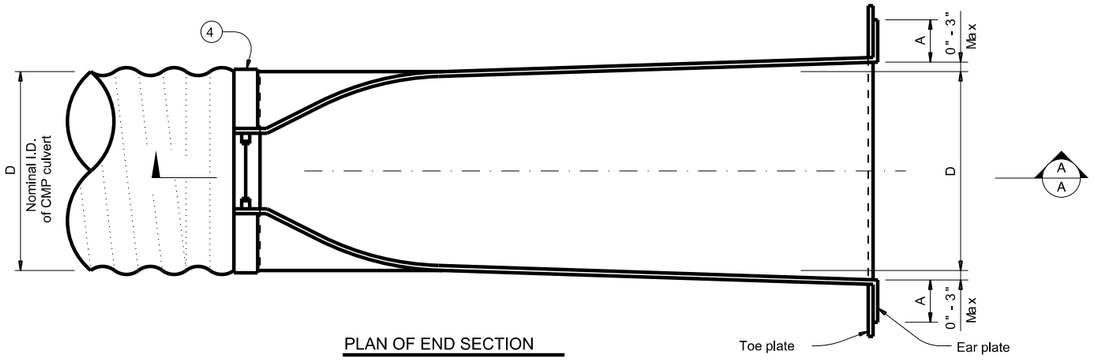
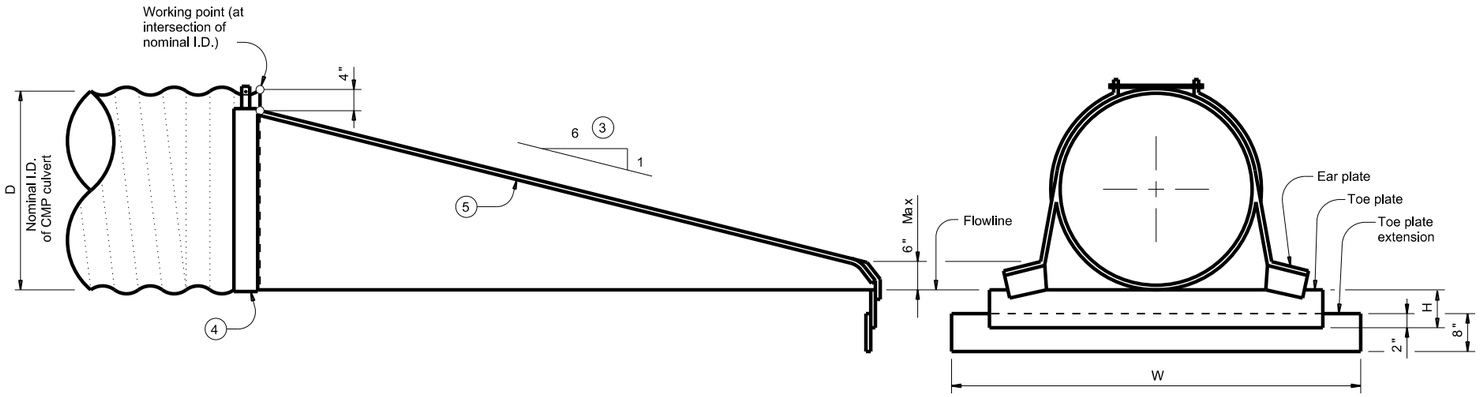


PLAN OF END SECTION



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.

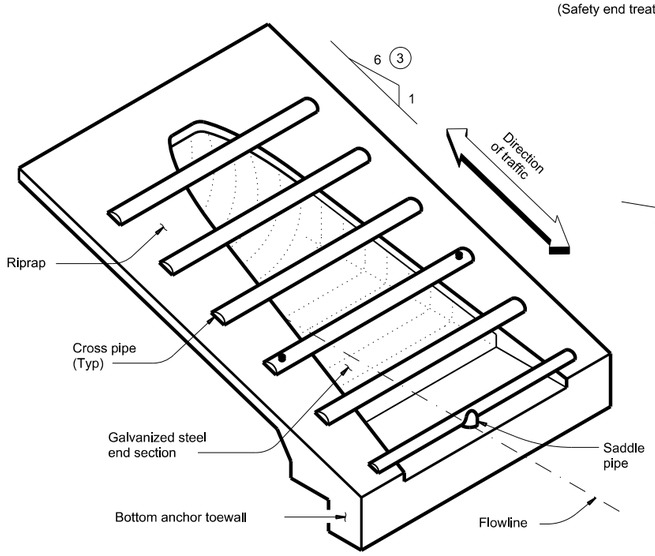
Alternate styles of end sections, including those with pre-attached cross pipes, may be supplied. Alternate styles must meet all of the following: design values shown in tables for cross pipe size; spacing of cross pipes and location of first cross pipe; H, A, W, and gage for end section; and material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

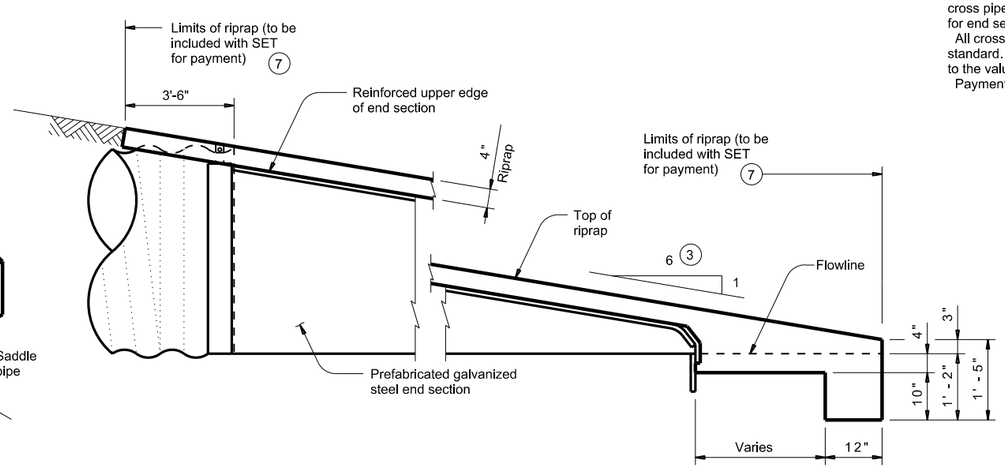
Payment for riprap and toewall is included in price bid for each safety end treatment.

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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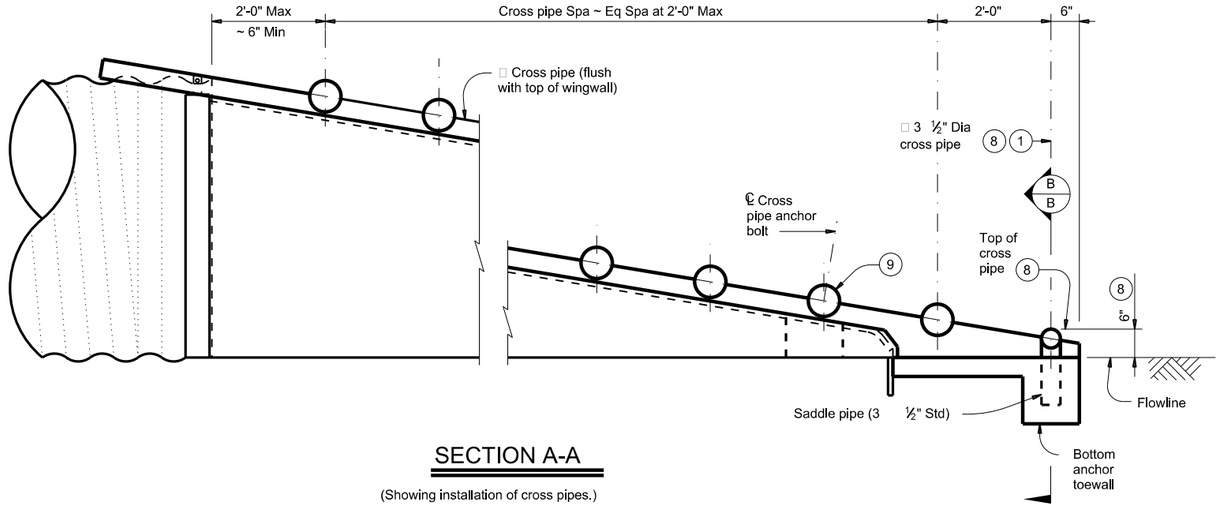
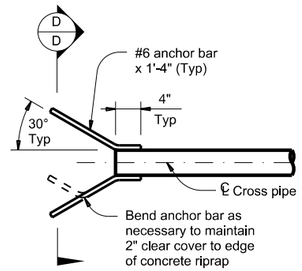
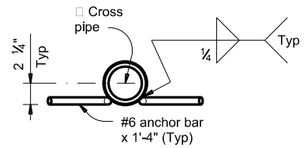


SECTION A-A

(Showing installation of cross pipes.)



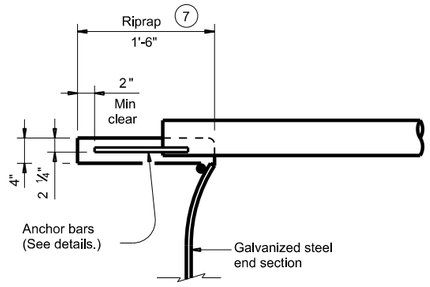
PART PLAN

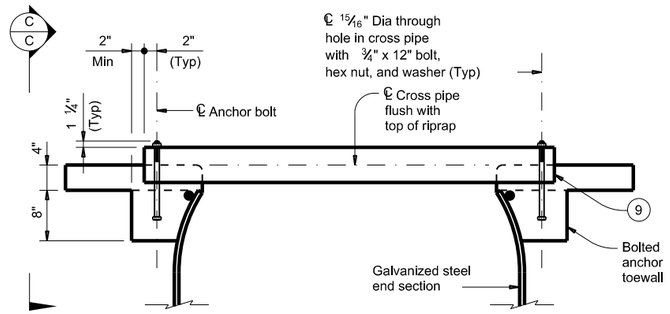


SECTION D-D

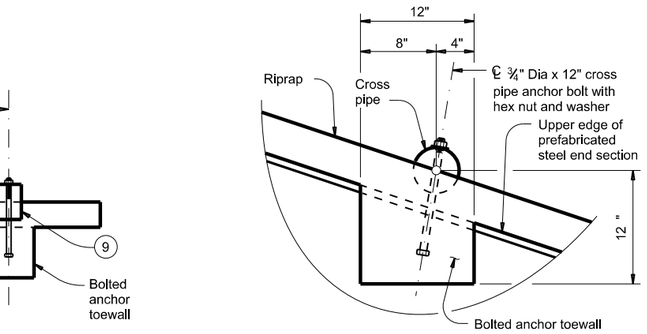
ANCHOR BAR DETAILS

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



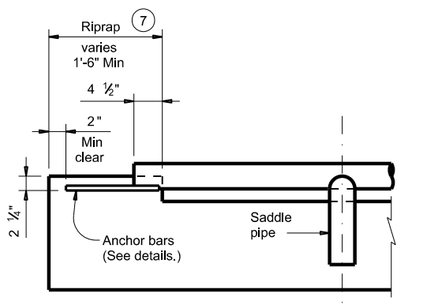


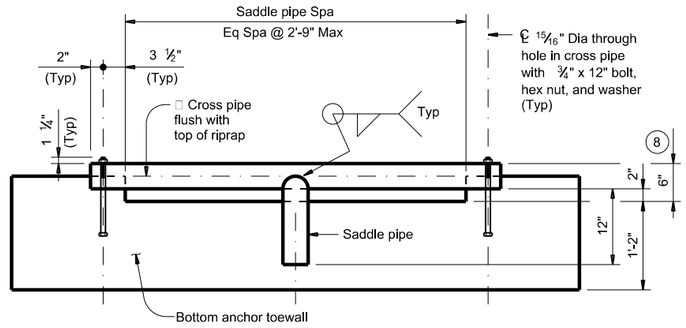
SECTION THROUGH INSTALLATION OF TYPICAL FULL CROSS PIPE



SECTION C-C

(Showing bolted anchor details.)





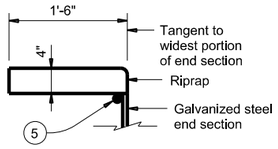
SECTION THROUGH INSTALLATION OF 3 ½" FIRST CROSS PIPE

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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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
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	WFS	COOKE		94

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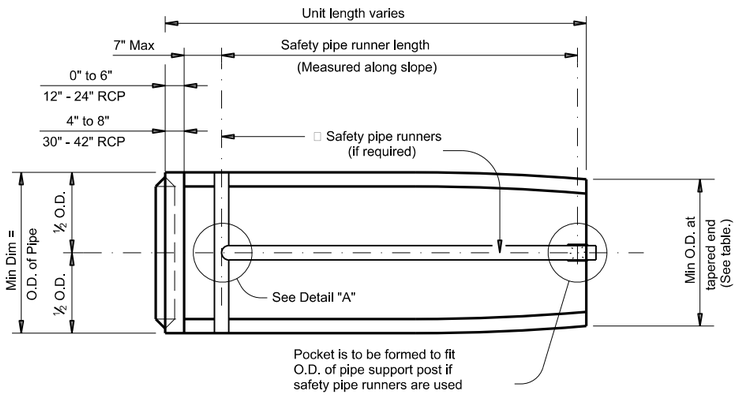
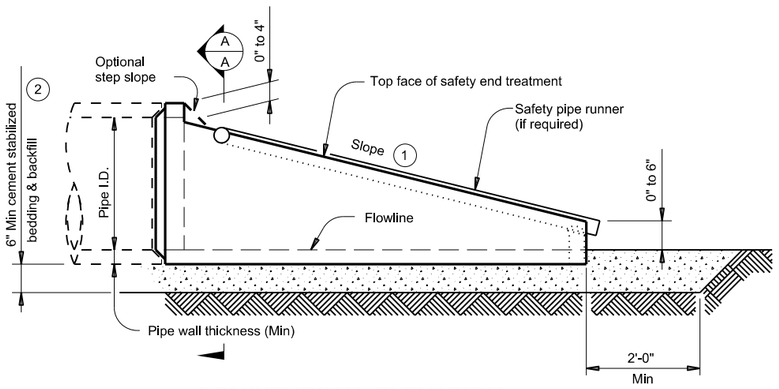


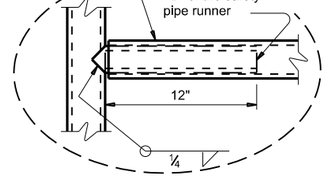
PLAN VIEW

(Showing spigot end connection.)

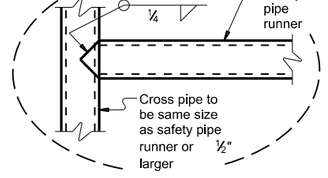


LONGITUDINAL ELEVATION

(Showing spigot end connection.)

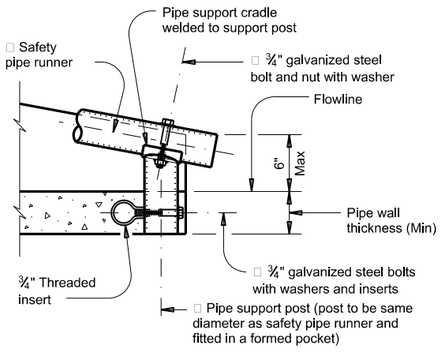


OPTION A



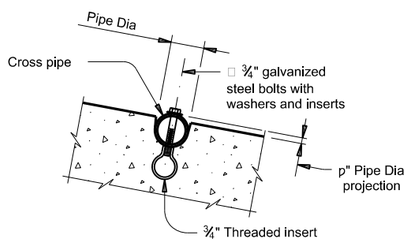
OPTION B

DETAIL A



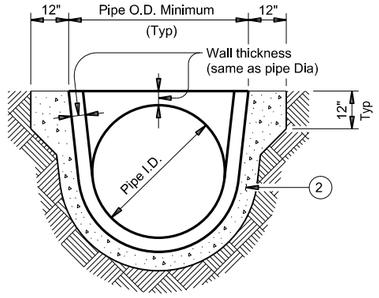
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

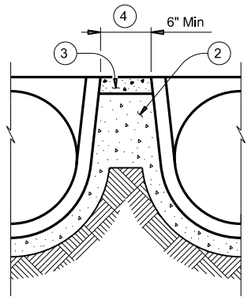


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(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

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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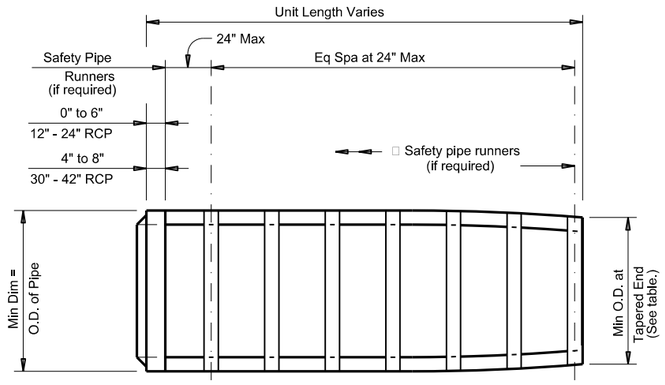
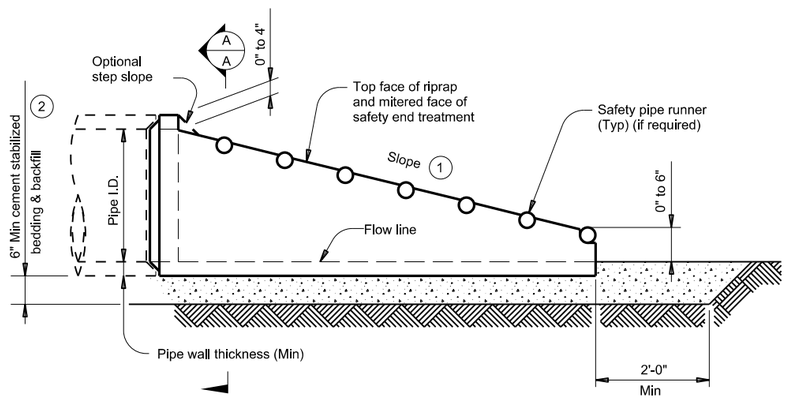
	WFS	COOKE		95



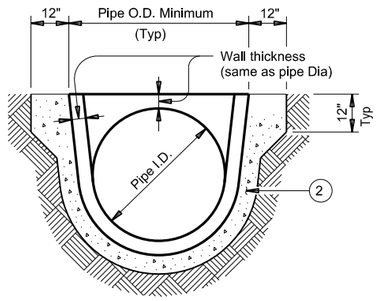
PLAN VIEW - 12" THRU 24"

(Showing spigot end connection.)

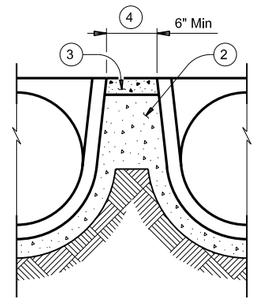


LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)

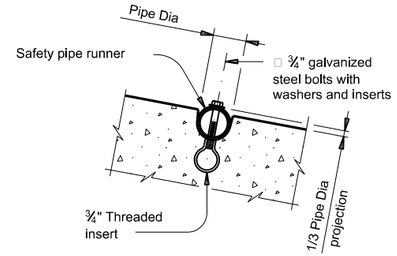


SECTION A-A



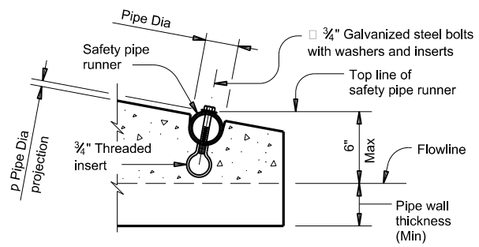
MULTIPLE PIPE INSTALLATION

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.

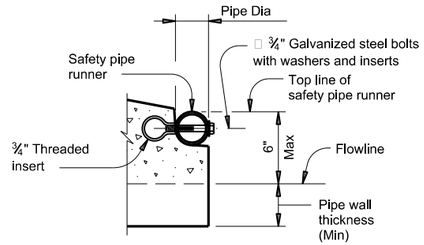


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(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	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		96

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DATE: 4/26/2023 4:10:58 PM
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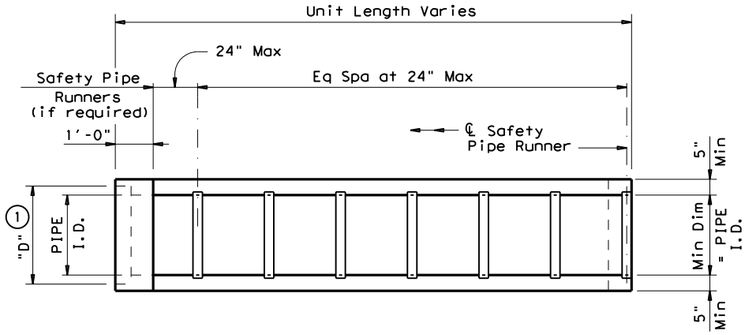
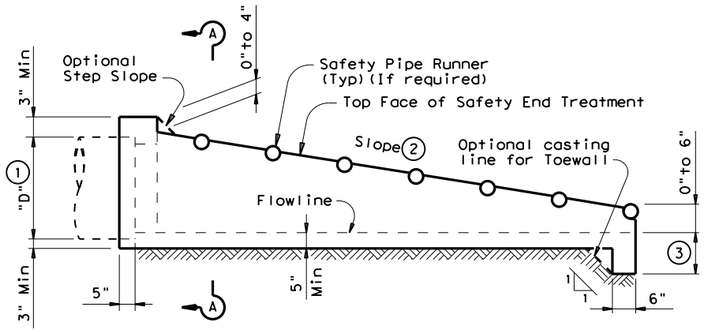


PLAN



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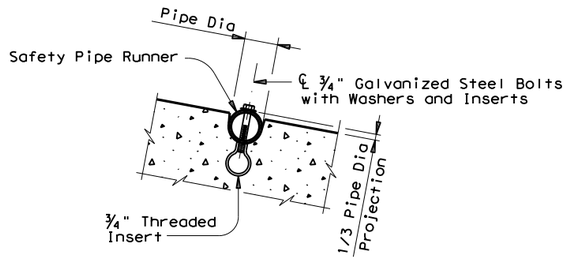
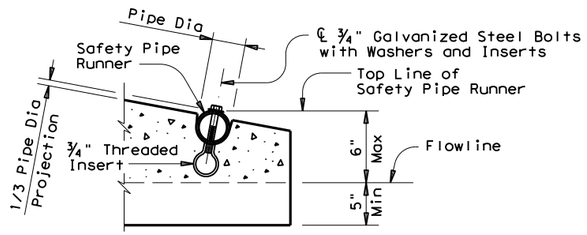
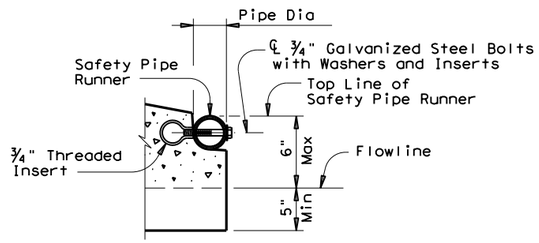


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



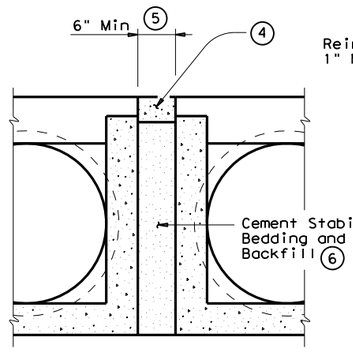
OPTION A



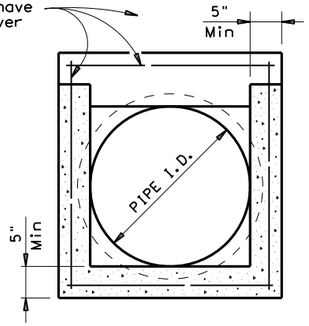
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

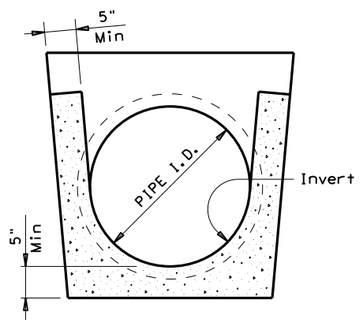
(If required)



MULTIPLE PIPE INSTALLATION

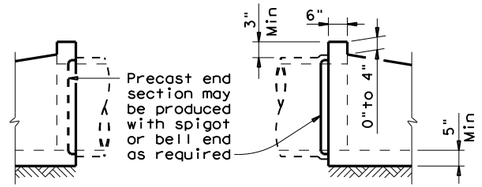


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT

(Showing joint between RCP and Precast Safety End Treatment)

PIPE I.D.	PIPE WALL "B" THICKNESS	"D" (1)	MAXIMUM SLOPE	MINIMUM LENGTH OF UNIT	PIPE RUNNERS REQUIRED		REQUIRED PIPE RUNNER SIZES		
					SINGLE PIPE	MULTIPLE PIPE	NOMINAL DIA.	O.D.	I.D.
12"	2"	17"	6:1	4'-9"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	20 ½"	6:1	6'-5"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	24"	6:1	8'-0"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
24"	3"	31"	6:1	11'-3"	No	Yes, for >2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	38 ½"	6:1	14'-8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	45 ½"	6:1	17'-11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	52 ½"	6:1	21'-2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on ASTM C-76, Class III, Wall "B" thickness. If any other wall thickness is used, dimension "D" must be adjusted accordingly.

(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) The top 4" of void between Precast End Treatments shall be filled with concrete Riprap and shall be considered subsidiary to Safety End Treatment.

(5) Clear distance between pipes shall be adjusted to provide for the minimum distance between safety end treatments.

(6) Cement stabilized bedding and backfill shall be in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill shall be considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill shall be as directed by Engineer.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe 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 of this product shall conform to requirements of Item "Safety End Treatment" except as noted below :

A. Minimum reinforcing shall be #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6 x 6 - W12 x W12 or 5 x 5 - W10 x W10 welded wire reinforcement (WWR).

B. Concrete for precast (steel formed) sections shall be Class "C" with a minimum compressive strength of 3600 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 cost 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.

Pipe Runners shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

All steel components except reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

Texas Department of Transportation

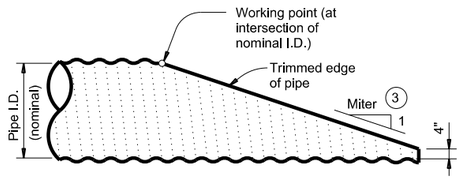
Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

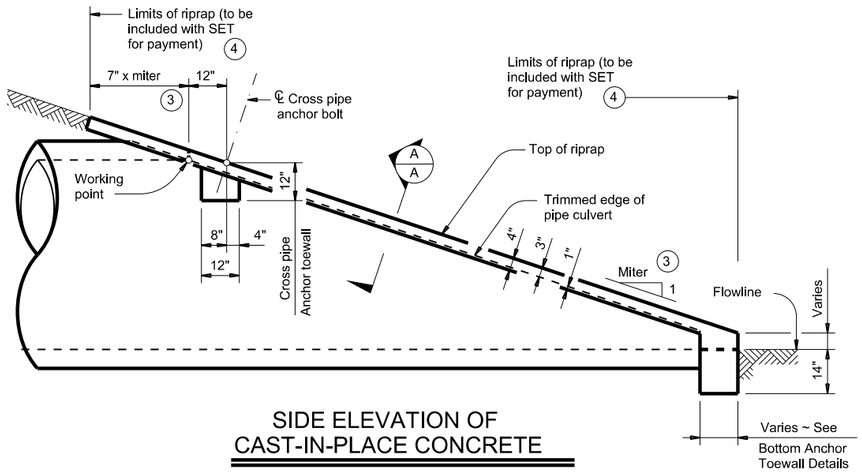
FILE: psetspss.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
11-10: Add note for synthetic fibers.	DIST	COUNTY		SHEET NO.
	WFS	COOKE		97



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.

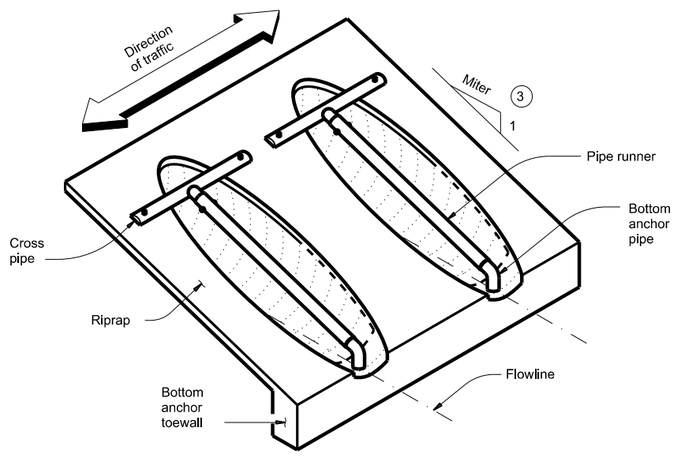
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(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

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©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		98

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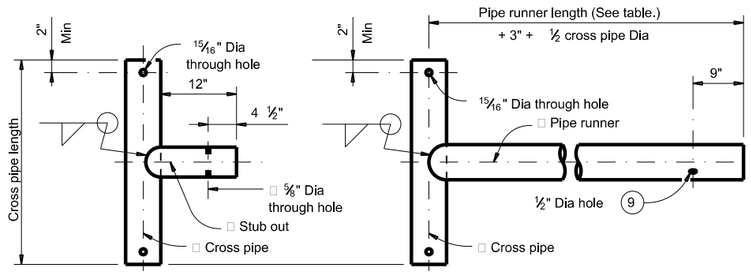
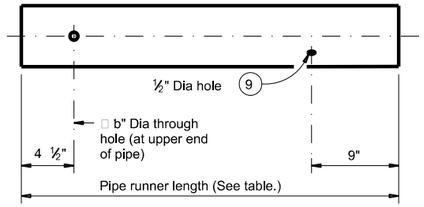


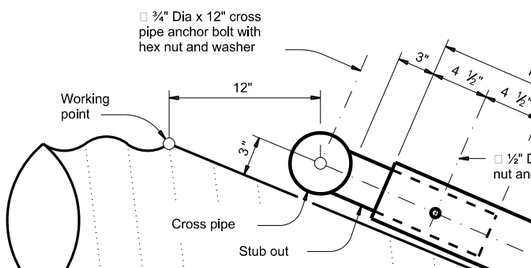
OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS



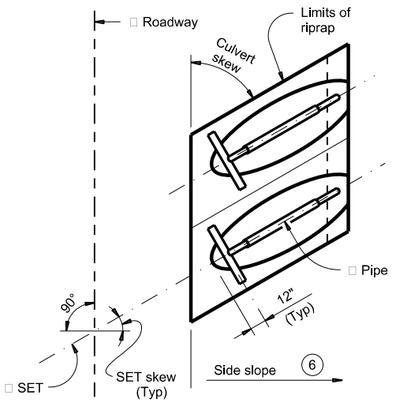
NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

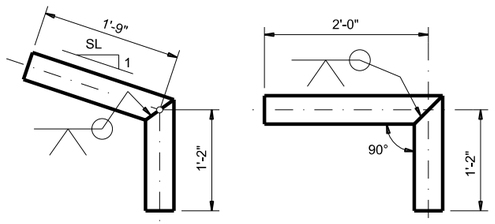


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

(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)

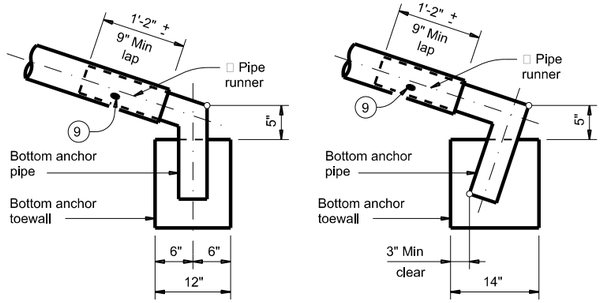


PLAN OF SKEWED INSTALLATION



OPTION B1 OPTION B2

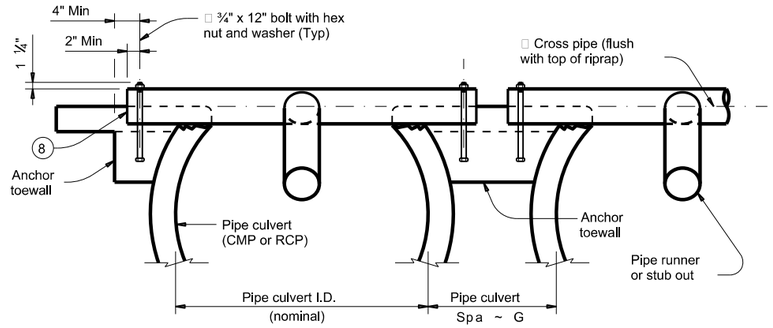
BOTTOM ANCHOR PIPE DETAILS (10)



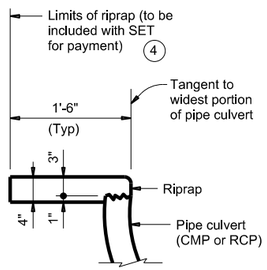
OPTION B1 OPTION B2

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 ½" 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".

SHEET 2 OF 2

Texas Department of Transportation

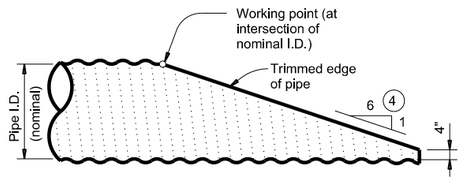
Bridge Division Standard

SAFETY END TREATMENT

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

SETP-CD

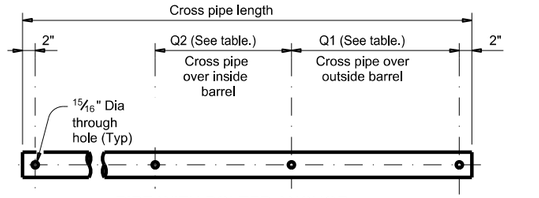
FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		99



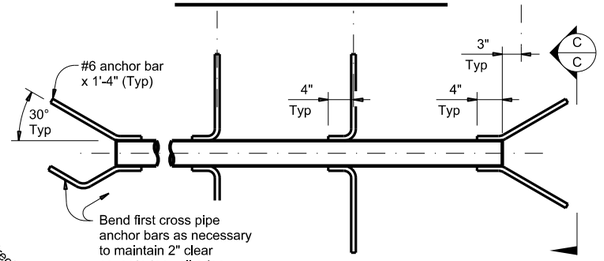
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

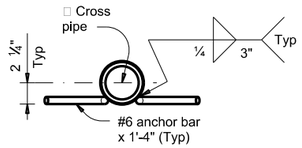
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



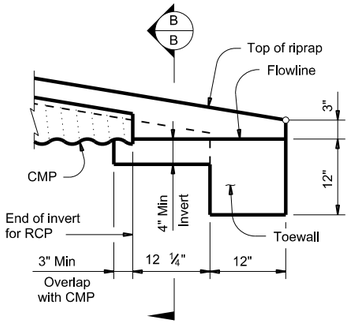
PIPE WITH BOLTED ANCHOR



PIPE WITH ANCHOR BARS

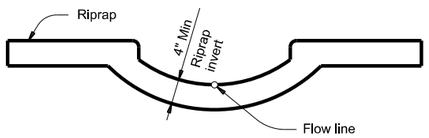


SECTION C-C



DETAIL "A"

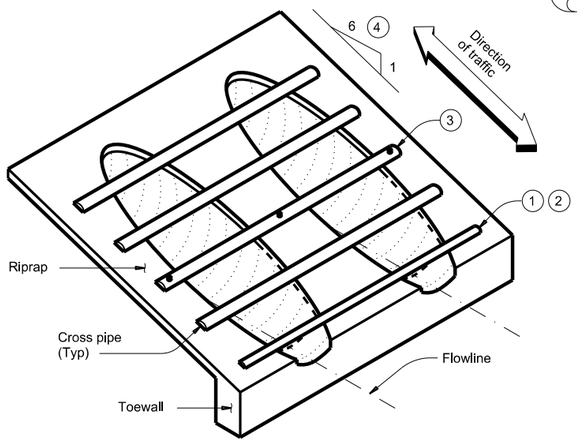
(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE DETAILS



ISOMETRIC VIEW OF TYPICAL INSTALLATION

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 ½" 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.

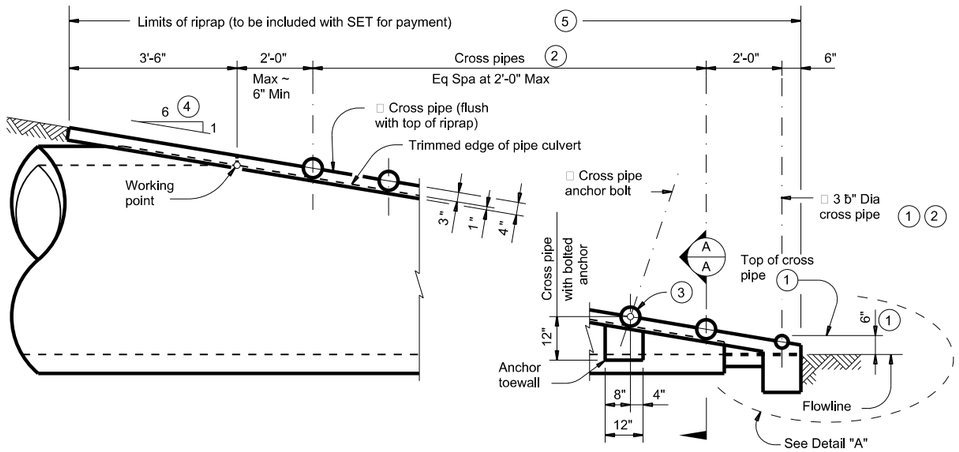
GENERAL NOTES:

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.

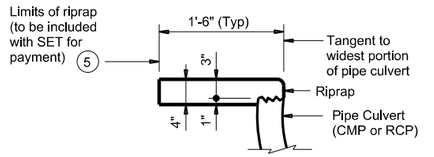
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

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

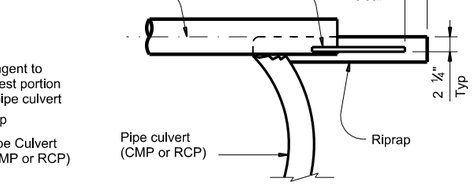


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

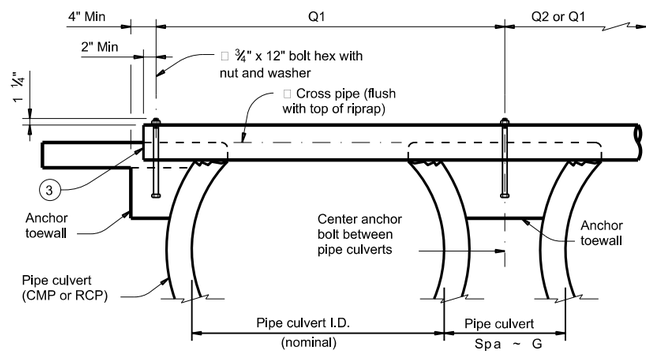
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT

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

SETP-PD

FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		100

DATE: 4/26/2023 4:11:01 PM
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DATE: 4/26/2023 4:11:03 PM
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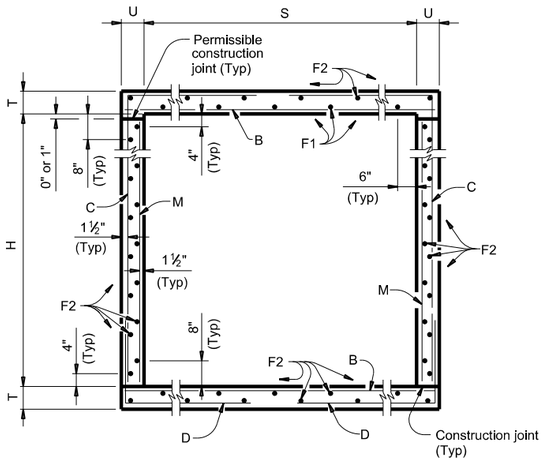
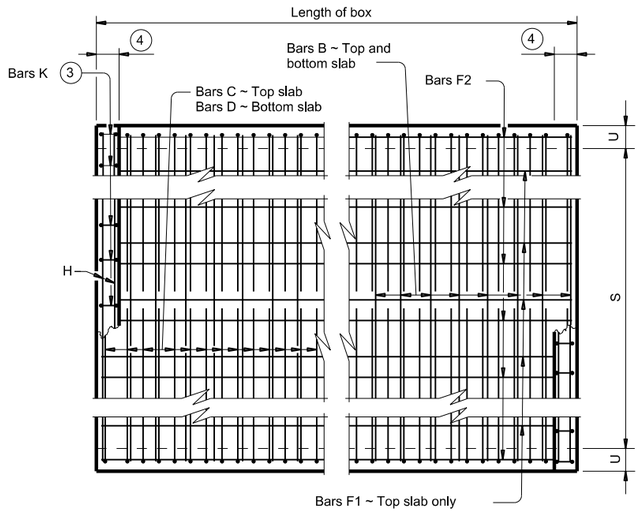
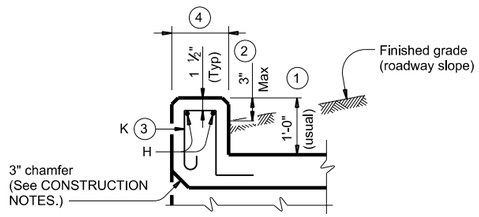


TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   · For structures without bridge rail, construct curbs no more than 3" above finished grade.
   · For structures with bridge rail, construct curbs flush with finished grade.
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

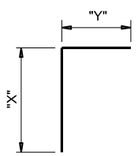
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
· culverts with overlay,
· culverts with 1-to-2 course surface treatment, or
· culverts with the top slab as the final riding surface.
Provide bar laps, where required, as follows:
· Uncoated or galvanized ~ #4 = 1'-8" Min
· Uncoated or galvanized ~ #5 = 2'-1" Min
· Uncoated or galvanized ~ #6 = 2'-6" Min

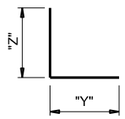
GENERAL NOTES:

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

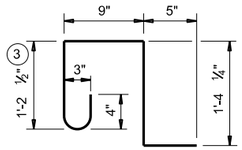
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

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

SCC-7

FILE: scc07sta-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	WFS	COOKE		101

SECTION DIMENSIONS				(5) FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
7' - 0"	3' - 0"	8"	7"	16'	108	#6	9"	7' - 11"	1,284	162	#5	6"	7' - 11"	1,338	3' - 6"	4' - 5"	162	#5	6"	7' - 1"	1,197	4' - 5"	2' - 8"	108	9"	3' - 0"	216	5	39' - 9"	133	31	39' - 9"	823	7' - 11"	21	18	50	0.533	124.8	0.6	71	21.9	5,062
7' - 0"	3' - 0"	9"	7"	20'	108	#6	9"	7' - 11"	1,284	162	#5	6"	8' - 0"	1,352	3' - 7"	4' - 5"	162	#5	6"	7' - 2"	1,211	4' - 5"	2' - 9"	108	9"	3' - 0"	216	5	39' - 9"	133	31	39' - 9"	823	7' - 11"	21	18	50	0.583	125.5	0.6	71	23.9	5,090
7' - 0"	3' - 0"	10"	8"	23'	108	#6	9"	8' - 1"	1,311	162	#5	6"	8' - 2"	1,380	3' - 8"	4' - 6"	162	#5	6"	7' - 4"	1,239	4' - 6"	2' - 10"	82	12"	3' - 0"	164	5	39' - 9"	133	31	39' - 9"	823	8' - 1"	22	20	56	0.663	126.3	0.6	78	27.1	5,128
7' - 0"	3' - 0"	11"	8"	30'	108	#6	9"	8' - 1"	1,311	162	#5	6"	8' - 3"	1,394	3' - 9"	4' - 6"	162	#5	6"	7' - 5"	1,253	4' - 6"	2' - 11"	82	12"	3' - 0"	164	5	39' - 9"	133	31	39' - 9"	823	8' - 1"	22	20	56	0.714	127.0	0.6	78	29.2	5,156
7' - 0"	4' - 0"	8"	7"	16'	108	#6	9"	7' - 11"	1,284	162	#5	6"	8' - 11"	1,507	4' - 6"	4' - 5"	162	#5	6"	7' - 1"	1,197	4' - 5"	2' - 8"	108	9"	4' - 0"	289	5	39' - 9"	133	31	39' - 9"	823	7' - 11"	21	18	50	0.576	130.8	0.6	71	23.6	5,304
7' - 0"	4' - 0"	9"	7"	20'	108	#6	9"	7' - 11"	1,284	162	#5	6"	9' - 0"	1,521	4' - 7"	4' - 5"	162	#5	6"	7' - 2"	1,211	4' - 5"	2' - 9"	108	9"	4' - 0"	289	5	39' - 9"	133	31	39' - 9"	823	7' - 11"	21	18	50	0.627	131.5	0.6	71	25.7	5,332
7' - 0"	4' - 0"	10"	8"	23'	108	#6	9"	8' - 1"	1,311	162	#5	6"	9' - 2"	1,549	4' - 8"	4' - 6"	162	#5	6"	7' - 4"	1,239	4' - 6"	2' - 10"	82	12"	4' - 0"	219	5	39' - 9"	133	31	39' - 9"	823	8' - 1"	22	20	56	0.712	131.9	0.6	78	29.1	5,352
7' - 0"	4' - 0"	11"	8"	30'	162	#6	6"	8' - 1"	1,967	162	#5	6"	9' - 3"	1,563	4' - 9"	4' - 6"	162	#5	6"	7' - 5"	1,253	4' - 6"	2' - 11"	82	12"	4' - 0"	219	5	39' - 9"	133	31	39' - 9"	823	8' - 1"	22	20	56	0.763	149.0	0.6	78	31.1	6,036
7' - 0"	5' - 0"	8"	7"	16'	108	#6	9"	7' - 11"	1,284	162	#5	6"	9' - 11"	1,676	5' - 6"	4' - 5"	162	#5	6"	7' - 1"	1,197	4' - 5"	2' - 8"	108	9"	5' - 0"	361	5	39' - 9"	133	35	39' - 9"	929	7' - 11"	21	18	50	0.619	139.5	0.6	71	25.4	5,651
7' - 0"	5' - 0"	9"	7"	20'	108	#6	9"	7' - 11"	1,284	162	#5	6"	10' - 0"	1,690	5' - 7"	4' - 5"	162	#5	6"	7' - 2"	1,211	4' - 5"	2' - 9"	108	9"	5' - 0"	361	5	39' - 9"	133	35	39' - 9"	929	7' - 11"	21	18	50	0.670	140.2	0.6	71	27.4	5,679
7' - 0"	5' - 0"	10"	8"	23'	108	#6	9"	8' - 1"	1,311	162	#5	6"	10' - 2"	1,718	5' - 8"	4' - 6"	162	#5	6"	7' - 4"	1,239	4' - 6"	2' - 10"	82	12"	5' - 0"	274	5	39' - 9"	133	35	39' - 9"	929	8' - 1"	22	20	56	0.761	140.1	0.6	78	31.1	5,682
7' - 0"	5' - 0"	11"	8"	30'	162	#6	6"	8' - 1"	1,967	162	#5	6"	10' - 3"	1,732	5' - 9"	4' - 6"	162	#5	6"	7' - 5"	1,253	4' - 6"	2' - 11"	82	12"	5' - 0"	274	5	39' - 9"	133	35	39' - 9"	929	8' - 1"	22	20	56	0.813	157.2	0.6	78	33.1	6,366
7' - 0"	6' - 0"	8"	7"	16'	108	#6	9"	7' - 11"	1,284	162	#5	6"	10' - 11"	1,845	6' - 6"	4' - 5"	162	#5	6"	7' - 1"	1,197	4' - 5"	2' - 8"	108	9"	6' - 0"	433	5	39' - 9"	133	39	39' - 9"	1,036	7' - 11"	21	18	50	0.663	148.2	0.6	71	27.1	5,999
7' - 0"	6' - 0"	9"	7"	20'	108	#6	9"	7' - 11"	1,284	162	#5	6"	11' - 0"	1,859	6' - 7"	4' - 5"	162	#5	6"	7' - 2"	1,211	4' - 5"	2' - 9"	108	9"	6' - 0"	433	5	39' - 9"	133	39	39' - 9"	1,036	7' - 11"	21	18	50	0.713	148.9	0.6	71	29.1	6,027
7' - 0"	6' - 0"	10"	8"	23'	108	#6	9"	8' - 1"	1,311	162	#5	6"	11' - 2"	1,887	6' - 8"	4' - 6"	162	#5	6"	7' - 4"	1,239	4' - 6"	2' - 10"	82	12"	6' - 0"	329	5	39' - 9"	133	39	39' - 9"	1,036	8' - 1"	22	20	56	0.811	148.4	0.6	78	33.1	6,013
7' - 0"	6' - 0"	11"	8"	30'	162	#6	6"	8' - 1"	1,967	162	#5	6"	11' - 3"	1,901	6' - 9"	4' - 6"	162	#5	6"	7' - 5"	1,253	4' - 6"	2' - 11"	82	12"	6' - 0"	329	5	39' - 9"	133	39	39' - 9"	1,036	8' - 1"	22	20	56	0.862	165.5	0.6	78	35.1	6,697
7' - 0"	7' - 0"	8"	7"	16'	108	#6	9"	7' - 11"	1,284	162	#5	6"	11' - 11"	2,014	7' - 6"	4' - 5"	162	#5	6"	7' - 1"	1,197	4' - 5"	2' - 8"	108	9"	7' - 0"	505	5	39' - 9"	133	39	39' - 9"	1,036	7' - 11"	21	18	50	0.706	154.2	0.6	71	28.8	6,240
7' - 0"	7' - 0"	9"	7"	20'	108	#6	9"	7' - 11"	1,284	162	#5	6"	12' - 0"	2,028	7' - 7"	4' - 5"	162	#5	6"	7' - 2"	1,211	4' - 5"	2' - 9"	108	9"	7' - 0"	505	5	39' - 9"	133	39	39' - 9"	1,036	7' - 11"	21	18	50	0.756	154.9	0.6	71	30.8	6,268
7' - 0"	7' - 0"	10"	8"	23'	108	#6	9"	8' - 1"	1,311	162	#5	6"	12' - 2"	2,056	7' - 8"	4' - 6"	162	#5	6"	7' - 4"	1,239	4' - 6"	2' - 10"	108	9"	7' - 0"	505	5	39' - 9"	133	39	39' - 9"	1,036	8' - 1"	22	20	56	0.860	157.0	0.6	78	35.0	6,358
7' - 0"	7' - 0"	11"	8"	30'	162	#6	6"	8' - 1"	1,967	162	#5	6"	12' - 3"	2,070	7' - 9"	4' - 6"	162	#5	6"	7' - 5"	1,253	4' - 6"	2' - 11"	108	9"	7' - 0"	505	5	39' - 9"	133	39	39' - 9"	1,036	8' - 1"	22	20	56	0.912	174.1	0.6	78	37.1	7,042

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

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

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

SCC-7

FILE: scc07ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	WFS	COOKE		102

DATE: 4/26/2023 4:11:05 PM
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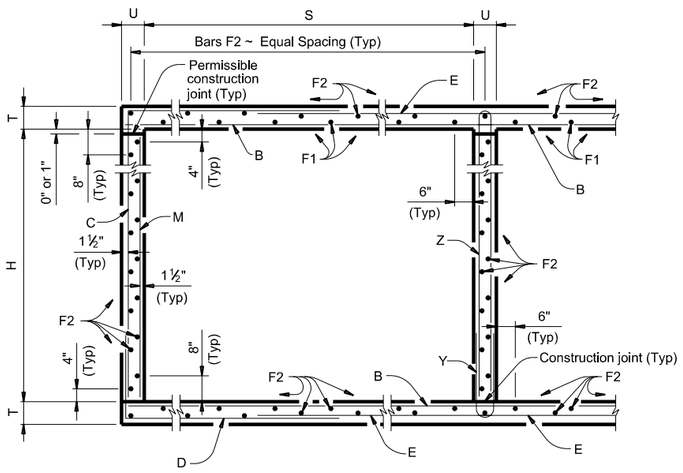

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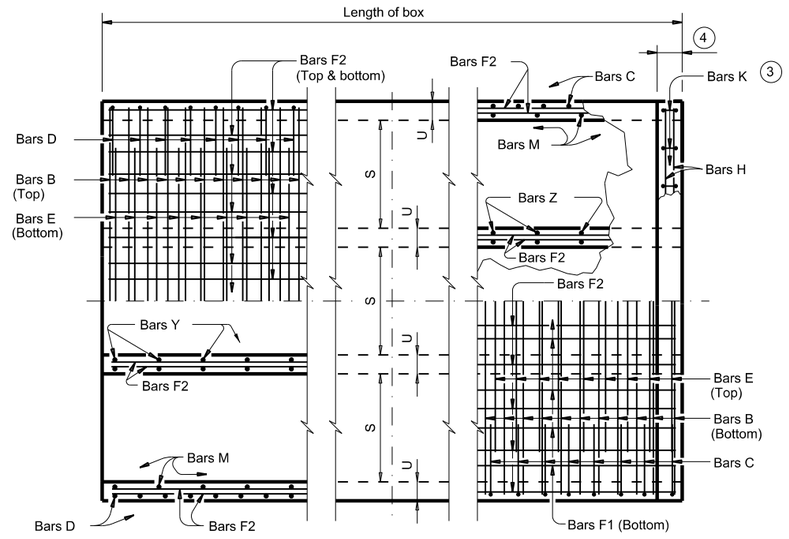
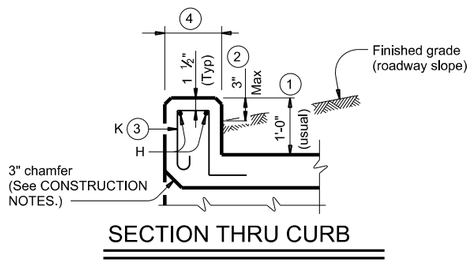


BOTTOM SLAB

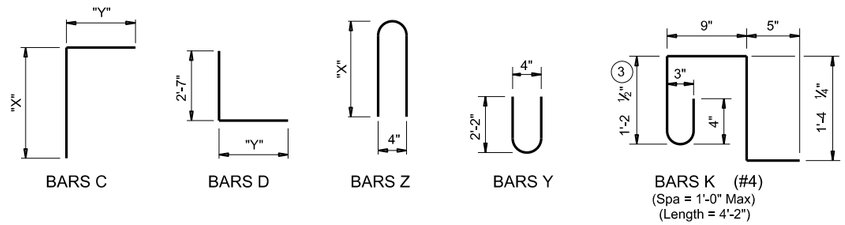
TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-6 ½"	3'-8 ½"
3'-0"	3'-6 ½"	3'-8 ½"
4'-0"	4'-6 ½"	3'-8 ½"
5'-0"	5'-6 ½"	3'-8 ½"



BARS C | BARS D | BARS Z | BARS Y | BARS K (#4) (Spa = 1'-0" Max) (Length = 4'-2")

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   · For structures without bridge rail, construct curbs no more than 3" above finished grade.
   · For structures with bridge rail, construct curbs flush with finished grade.
   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
· culverts with overlay,
· culverts with 1-to-2 course surface treatment, or
· culverts with the top slab as the final riding surface.
Provide bar laps, where required, as follows:
· Uncoated or galvanized ~ #4 = 1'-8" Min
· Uncoated or galvanized ~ #5 = 2'-1" Min
· Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

5'-0" SPAN

0' TO 20' FILL

MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		103

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																		QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C		Bars D		No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y		Bars Z		Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
													Length	Wt	Length	Wt																					Length	Wt	Length	Wt										
2	5' - 0"	2' - 0"	8"	7"	108	#5	9"	11' - 6"	1,295	108	#5	9"	6' - 3"	704	6' - 4"	713	108	#5	9"	8' - 8"	976	8	18"	39' - 9"	212	38	18"	39' - 9"	1,009	108	9"	2' - 0"	144	54	9"	4' - 7"	165	5' - 3"	189	11' - 6"	31	26	72	0.710	135.2	0.9	103	29.3	5,510
3	5' - 0"	2' - 0"	8"	7"	108	#5	9"	17' - 1"	1,924	108	#5	9"	6' - 3"	704	6' - 4"	713	108	#5	9"	14' - 3"	1,605	12	18"	39' - 9"	319	54	18"	39' - 9"	1,434	108	9"	2' - 0"	144	108	9"	4' - 7"	331	5' - 3"	379	17' - 1"	46	38	106	1.029	188.8	1.3	152	42.4	7,705
4	5' - 0"	2' - 0"	8"	7"	108	#5	9"	22' - 8"	2,553	108	#5	9"	6' - 3"	704	6' - 4"	713	108	#5	9"	19' - 10"	2,234	16	18"	39' - 9"	425	70	18"	39' - 9"	1,859	108	9"	2' - 0"	144	162	9"	4' - 7"	496	5' - 3"	568	22' - 8"	61	48	134	1.348	242.4	1.7	195	55.6	9,891
5	5' - 0"	2' - 0"	8"	7"	108	#5	9"	28' - 3"	3,182	108	#5	9"	6' - 3"	704	6' - 4"	713	108	#5	9"	25' - 5"	2,863	20	18"	39' - 9"	531	86	18"	39' - 9"	2,284	108	9"	2' - 0"	144	216	9"	4' - 7"	661	5' - 3"	758	28' - 3"	75	60	167	1.667	296.0	2.1	242	68.8	12,082
6	5' - 0"	2' - 0"	8"	7"	108	#5	9"	33' - 10"	3,811	108	#5	9"	6' - 3"	704	6' - 4"	713	108	#5	9"	31' - 0"	3,492	24	18"	39' - 9"	637	102	18"	39' - 9"	2,708	108	9"	2' - 0"	144	270	9"	4' - 7"	827	5' - 3"	947	33' - 10"	90	70	195	1.986	349.6	2.5	285	82.0	14,268
2	5' - 0"	3' - 0"	8"	7"	108	#6	9"	11' - 6"	1,865	108	#5	9"	7' - 3"	817	6' - 4"	713	108	#5	9"	8' - 8"	976	8	18"	39' - 9"	212	44	18"	39' - 9"	1,168	108	9"	3' - 0"	216	54	9"	4' - 7"	165	7' - 3"	262	11' - 6"	31	26	72	0.775	159.9	0.9	103	31.9	6,497
3	5' - 0"	3' - 0"	8"	7"	108	#6	9"	17' - 1"	2,771	108	#5	9"	7' - 3"	817	6' - 4"	713	108	#5	9"	14' - 3"	1,605	12	18"	39' - 9"	319	62	18"	39' - 9"	1,646	108	9"	3' - 0"	216	108	9"	4' - 7"	331	7' - 3"	523	17' - 1"	46	38	106	1.115	223.5	1.3	152	45.9	9,093
4	5' - 0"	3' - 0"	8"	7"	108	#6	9"	22' - 8"	3,677	108	#5	9"	7' - 3"	817	6' - 4"	713	108	#5	9"	19' - 10"	2,234	16	18"	39' - 9"	425	80	18"	39' - 9"	2,124	108	9"	3' - 0"	216	162	9"	4' - 7"	496	7' - 3"	785	22' - 8"	61	48	134	1.456	287.2	1.7	195	59.9	11,682
5	5' - 0"	3' - 0"	8"	7"	108	#6	9"	28' - 3"	4,583	108	#5	9"	7' - 3"	817	6' - 4"	713	108	#5	9"	25' - 5"	2,863	20	18"	39' - 9"	531	98	18"	39' - 9"	2,602	108	9"	3' - 0"	216	216	9"	4' - 7"	661	7' - 3"	1,046	28' - 3"	75	60	167	1.796	350.8	2.1	242	73.9	14,274
6	5' - 0"	3' - 0"	8"	7"	108	#6	9"	33' - 10"	5,488	108	#5	9"	7' - 3"	817	6' - 4"	713	108	#5	9"	31' - 0"	3,492	24	18"	39' - 9"	637	116	18"	39' - 9"	3,080	108	9"	3' - 0"	216	270	9"	4' - 7"	827	7' - 3"	1,308	33' - 10"	90	70	195	2.137	414.5	2.5	285	88.0	16,863
2	5' - 0"	4' - 0"	8"	7"	108	#6	9"	11' - 6"	1,865	108	#5	9"	8' - 3"	929	6' - 4"	713	108	#5	9"	8' - 8"	976	8	18"	39' - 9"	212	44	18"	39' - 9"	1,168	108	9"	4' - 0"	289	54	9"	4' - 7"	165	9' - 3"	334	11' - 6"	31	26	72	0.840	166.3	0.9	103	34.5	6,754
3	5' - 0"	4' - 0"	8"	7"	108	#6	9"	17' - 1"	2,771	108	#5	9"	8' - 3"	929	6' - 4"	713	108	#5	9"	14' - 3"	1,605	12	18"	39' - 9"	319	62	18"	39' - 9"	1,646	108	9"	4' - 0"	289	108	9"	4' - 7"	331	9' - 3"	667	17' - 1"	46	38	106	1.202	231.8	1.3	152	49.4	9,422
4	5' - 0"	4' - 0"	8"	7"	108	#6	9"	22' - 8"	3,677	108	#5	9"	8' - 3"	929	6' - 4"	713	108	#5	9"	19' - 10"	2,234	16	18"	39' - 9"	425	80	18"	39' - 9"	2,124	108	9"	4' - 0"	289	162	9"	4' - 7"	496	9' - 3"	1,001	22' - 8"	61	48	134	1.564	297.2	1.7	195	64.3	12,083
5	5' - 0"	4' - 0"	8"	7"	108	#6	9"	28' - 3"	4,583	108	#5	9"	8' - 3"	929	6' - 4"	713	108	#5	9"	25' - 5"	2,863	20	18"	39' - 9"	531	98	18"	39' - 9"	2,602	108	9"	4' - 0"	289	216	9"	4' - 7"	661	9' - 3"	1,335	28' - 3"	75	60	167	1.926	362.7	2.1	242	79.1	14,748
6	5' - 0"	4' - 0"	8"	7"	108	#6	9"	33' - 10"	5,488	108	#5	9"	8' - 3"	929	6' - 4"	713	108	#5	9"	31' - 0"	3,492	24	18"	39' - 9"	637	116	18"	39' - 9"	3,080	108	9"	4' - 0"	289	270	9"	4' - 7"	827	9' - 3"	1,668	33' - 10"	90	70	195	2.288	428.1	2.5	285	94.0	17,408
2	5' - 0"	5' - 0"	8"	7"	108	#6	9"	11' - 6"	1,865	108	#5	9"	9' - 3"	1,042	6' - 4"	713	108	#5	9"	8' - 8"	976	8	18"	39' - 9"	212	50	18"	39' - 9"	1,328	108	9"	5' - 0"	361	54	9"	4' - 7"	165	11' - 3"	406	11' - 6"	31	26	72	0.904	176.7	0.9	103	37.0	7,171
3	5' - 0"	5' - 0"	8"	7"	108	#6	9"	17' - 1"	2,771	108	#5	9"	9' - 3"	1,042	6' - 4"	713	108	#5	9"	14' - 3"	1,605	12	18"	39' - 9"	319	70	18"	39' - 9"	1,859	108	9"	5' - 0"	361	108	9"	4' - 7"	331	11' - 3"	812	17' - 1"	46	38	106	1.288	245.3	1.3	152	52.8	9,965
4	5' - 0"	5' - 0"	8"	7"	108	#6	9"	22' - 8"	3,677	108	#5	9"	9' - 3"	1,042	6' - 4"	713	108	#5	9"	19' - 10"	2,234	16	18"	39' - 9"	425	90	18"	39' - 9"	2,390	108	9"	5' - 0"	361	162	9"	4' - 7"	496	11' - 3"	1,217	22' - 8"	61	48	134	1.672	313.9	1.7	195	68.6	12,750
5	5' - 0"	5' - 0"	8"	7"	108	#6	9"	28' - 3"	4,583	108	#5	9"	9' - 3"	1,042	6' - 4"	713	108	#5	9"	25' - 5"	2,863	20	18"	39' - 9"	531	110	18"	39' - 9"	2,921	108	9"	5' - 0"	361	216	9"	4' - 7"	661	11' - 3"	1,623	28' - 3"	75	60	167	2.056	382.5	2.1	242	84.3	15,540
6	5' - 0"	5' - 0"	8"	7"	108	#6	9"	33' - 10"	5,488	108	#5	9"	9' - 3"	1,042	6' - 4"	713	108	#5	9"	31' - 0"	3,492	24	18"	39' - 9"	637	130	18"	39' - 9"	3,452	108	9"	5' - 0"	361	270	9"	4' - 7"	827	11' - 3"	2,029	33' - 10"	90	70	195	2.439	451.0	2.5	285	100.1	18,326

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

5'-0" SPAN

0' TO 20' FILL

MC-5-20

FILE: mc520ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		104

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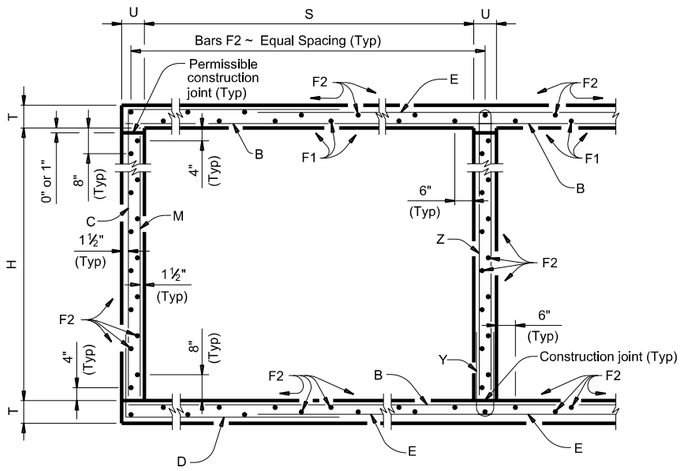

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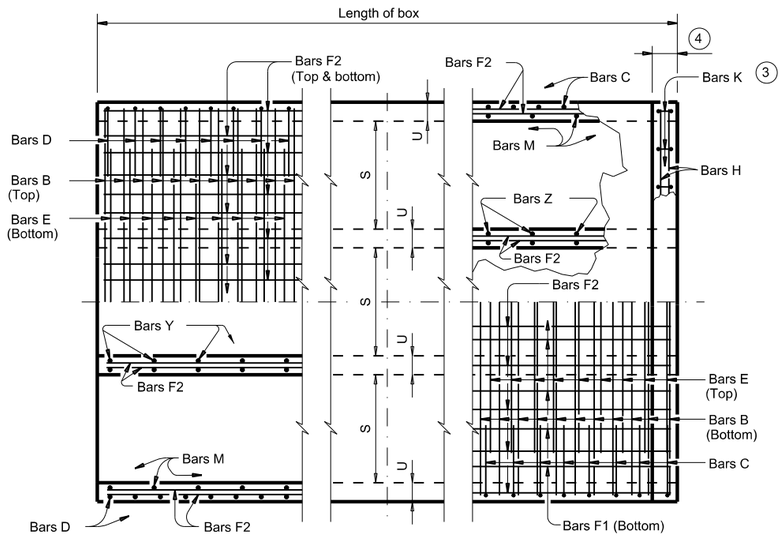
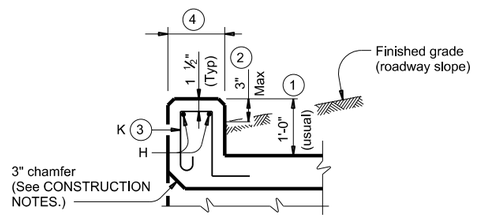


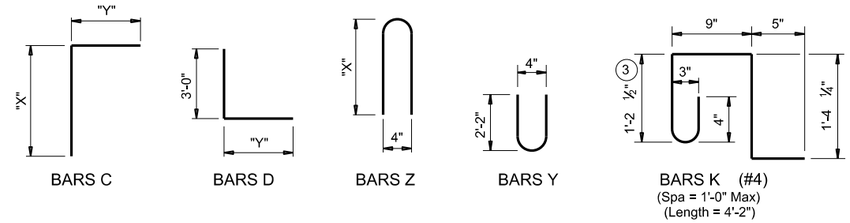
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
4'-0"	4'-6 ½"	5'-9"
5'-0"	5'-6 ½"	5'-9"
6'-0"	6'-6 ½"	5'-9"
7'-0"	7'-6 ½"	5'-9"
8'-0"	8'-6 ½"	5'-9"
9'-0"	9'-6 ½"	5'-9"
10'-0"	10'-6 ½"	5'-9"



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

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

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

CONSTRUCTION NOTES:

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

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
· culverts with overlay,
· culverts with 1-to-2 course surface treatment, or
· culverts with the top slab as the final riding surface.
Provide bar laps, where required, as follows:
· Uncoated or galvanized ~ #4 = 1'-8" Min
· Uncoated or galvanized ~ #5 = 2'-1" Min
· Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

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

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		105

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NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																														QUANTITIES					
					Bars B (5)					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4 (5)		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	10' - 0"	4' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	66	18"	39' - 9"	1,752	108	9"	4' - 0"	289	54	9"	4' - 7"	165	9' - 3"	334	21' - 6"	57	46	128	1.333	374.6	1.6	185	54.9	15,168
3	10' - 0"	4' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	95	18"	39' - 9"	2,523	108	9"	4' - 0"	289	108	9"	4' - 7"	331	9' - 3"	667	32' - 1"	86	68	189	1.942	539.8	2.4	275	80.1	21,865
4	10' - 0"	4' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	124	18"	39' - 9"	3,293	108	9"	4' - 0"	289	162	9"	4' - 7"	496	9' - 3"	1,001	42' - 8"	114	88	245	2.551	704.9	3.2	359	105.2	28,553
5	10' - 0"	4' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	153	18"	39' - 9"	4,063	108	9"	4' - 0"	289	216	9"	4' - 7"	661	9' - 3"	1,335	53' - 3"	142	110	306	3.160	870.0	3.9	448	130.3	35,248
6	10' - 0"	4' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	10' - 4"	1,676	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	182	18"	39' - 9"	4,833	108	9"	4' - 0"	289	270	9"	4' - 7"	827	9' - 3"	1,668	65' - 6"	175	130	362	3.770	1,050.3	4.7	537	155.5	42,550
2	10' - 0"	5' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	72	18"	39' - 9"	1,912	108	9"	5' - 0"	361	54	9"	4' - 7"	165	11' - 3"	406	21' - 6"	57	46	128	1.398	386.2	1.6	185	57.5	15,634
3	10' - 0"	5' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	103	18"	39' - 9"	2,735	108	9"	5' - 0"	361	108	9"	4' - 7"	331	11' - 3"	812	32' - 1"	86	68	189	2.029	554.5	2.4	275	83.5	22,456
4	10' - 0"	5' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	134	18"	39' - 9"	3,558	108	9"	5' - 0"	361	162	9"	4' - 7"	496	11' - 3"	1,217	42' - 8"	114	88	245	2.659	722.7	3.2	359	109.5	29,268
5	10' - 0"	5' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	165	18"	39' - 9"	4,381	108	9"	5' - 0"	361	216	9"	4' - 7"	661	11' - 3"	1,623	53' - 3"	142	110	306	3.290	891.0	3.9	448	135.5	36,088
6	10' - 0"	5' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	11' - 4"	1,838	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	196	18"	39' - 9"	5,204	108	9"	5' - 0"	361	270	9"	4' - 7"	827	11' - 3"	2,029	65' - 6"	175	130	362	3.921	1,074.5	4.7	537	161.6	43,516
2	10' - 0"	6' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	78	18"	39' - 9"	2,071	108	9"	6' - 0"	433	54	9"	4' - 7"	165	13' - 3"	478	21' - 6"	57	46	128	1.463	397.9	1.6	185	60.1	16,100
3	10' - 0"	6' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	111	18"	39' - 9"	2,947	108	9"	6' - 0"	433	108	9"	4' - 7"	331	13' - 3"	956	32' - 1"	86	68	189	2.115	569.3	2.4	275	87.0	23,047
4	10' - 0"	6' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	144	18"	39' - 9"	3,824	108	9"	6' - 0"	433	162	9"	4' - 7"	496	13' - 3"	1,434	42' - 8"	114	88	245	2.767	740.7	3.2	359	113.8	29,986
5	10' - 0"	6' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	177	18"	39' - 9"	4,700	108	9"	6' - 0"	433	216	9"	4' - 7"	661	13' - 3"	1,912	53' - 3"	142	110	306	3.420	912.1	3.9	448	140.7	36,931
6	10' - 0"	6' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	12' - 4"	2,001	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	210	18"	39' - 9"	5,576	108	9"	6' - 0"	433	270	9"	4' - 7"	827	13' - 3"	2,390	65' - 6"	175	130	362	4.072	1,098.7	4.7	537	167.6	44,484
2	10' - 0"	7' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	78	18"	39' - 9"	2,071	108	9"	7' - 0"	505	54	9"	4' - 7"	165	15' - 3"	550	21' - 6"	57	46	128	1.528	405.5	1.6	185	62.7	16,406
3	10' - 0"	7' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	111	18"	39' - 9"	2,947	108	9"	7' - 0"	505	108	9"	4' - 7"	331	15' - 3"	1,100	32' - 1"	86	68	189	2.202	578.8	2.4	275	90.5	23,425
4	10' - 0"	7' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	144	18"	39' - 9"	3,824	108	9"	7' - 0"	505	162	9"	4' - 7"	496	15' - 3"	1,650	42' - 8"	114	88	245	2.876	751.9	3.2	359	118.2	30,436
5	10' - 0"	7' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	177	18"	39' - 9"	4,700	108	9"	7' - 0"	505	216	9"	4' - 7"	661	15' - 3"	2,200	53' - 3"	142	110	306	3.549	925.1	3.9	448	145.9	37,453
6	10' - 0"	7' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	13' - 4"	2,163	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	210	18"	39' - 9"	5,576	108	9"	7' - 0"	505	270	9"	4' - 7"	827	15' - 3"	2,750	65' - 6"	175	130	362	4.223	1,113.5	4.7	537	173.7	45,078
2	10' - 0"	8' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	84	18"	39' - 9"	2,230	108	9"	8' - 0"	577	54	9"	4' - 7"	165	17' - 3"	622	21' - 6"	57	46	128	1.593	417.2	1.6	185	65.3	16,871
3	10' - 0"	8' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	119	18"	39' - 9"	3,160	108	9"	8' - 0"	577	108	9"	4' - 7"	331	17' - 3"	1,244	32' - 1"	86	68	189	2.288	593.5	2.4	275	93.9	24,016
4	10' - 0"	8' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	154	18"	39' - 9"	4,089	108	9"	8' - 0"	577	162	9"	4' - 7"	496	17' - 3"	1,867	42' - 8"	114	88	245	2.984	769.8	3.2	359	122.5	31,152
5	10' - 0"	8' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	189	18"	39' - 9"	5,019	108	9"	8' - 0"	577	216	9"	4' - 7"	661	17' - 3"	2,489	53' - 3"	142	110	306	3.679	946.2	3.9	448	151.1	38,295
6	10' - 0"	8' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	108	#6	9"	14' - 4"	2,325	8' - 10"	1,433	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	224	18"	39' - 9"	5,948	108	9"	8' - 0"	577	270	9"	4' - 7"	827	17' - 3"	3,111	65' - 6"	175	130	362	4.374	1,137.7	4.7	537	179.7	46,045
2	10' - 0"	9' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	90	18"	39' - 9"	2,390	108	9"	9' - 0"	649	54	9"	4' - 7"	165	19' - 3"	694	21' - 6"	57	46	128	1.657	477.8	1.6	185	67.9	19,297
3	10' - 0"	9' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	127	18"	39' - 9"	3,372	108	9"	9' - 0"	649	108	9"	4' - 7"	331	19' - 3"	1,389	32' - 1"	86	68	189	2.374	657.3	2.4	275	97.3	26,567
4	10' - 0"	9' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	164	18"	39' - 9"	4,355	108	9"	9' - 0"	649	162	9"	4' - 7"	496	19' - 3"	2,083	42' - 8"	114	88	245	3.092	836.7	3.2	359	126.8	33,828
5	10' - 0"	9' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	201	18"	39' - 9"	5,337	108	9"	9' - 0"	649	216	9"	4' - 7"	661	19' - 3"	2,778	53' - 3"	142	110	306	3.809	1,016.2	3.9	448	156.3	41,096
6	10' - 0"	9' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	162	#6	6"	15' - 4"	3,731	8' - 10"	2,149	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	238	18"	39' - 9"	6,320	108	9"	9' - 0"	649	270	9"	4' - 7"	827	19' - 3"	3,472	65' - 6"	175	130	362	4.526	1,210.9	4.7	537	185.8	48,972
2	10' - 0"	10' - 0"	8"	7"	162	#6	6"	21' - 6"	5,231	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	15' - 4"	3,731	14	18"	39' - 9"	372	90	18"	39' - 9"	2,390	108	9"	10' - 0"	721	54	9"	4' - 7"	165	21' - 3"	767	21' - 6"	57	46	128	1.722	487.5	1.6	185	70.5	19,685
3	10' - 0"	10' - 0"	8"	7"	162	#6	6"	32' - 1"	7,807	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	25' - 11"	6,306	21	18"	39' - 9"	558	127	18"	39' - 9"	3,372	108	9"	10' - 0"	721	108	9"	4' - 7"	331	21' - 3"	1,533	32' - 1"	86	68	189	2.461	668.8	2.4	275	100.8	27,026
4	10' - 0"	10' - 0"	8"	7"	162	#6	6"	42' - 8"	10,382	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	36' - 6"	8,881	28	18"	39' - 9"	743	164	18"	39' - 9"	4,355	108	9"	10' - 0"	721	162	9"	4' - 7"	496	21' - 3"	2,300	42' - 8"	114	88	245	3.200	850.0	3.2	359	131.2	34,360
5	10' - 0"	10' - 0"	8"	7"	162	#6	6"	53' - 3"	12,957	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	47' - 1"	11,457	35	18"	39' - 9"	929	201	18"	39' - 9"	5,337	108	9"	10' - 0"	721	216	9"	4' - 7"	661	21' - 3"	3,066	53' - 3"	142	110	306	3.938	1,031.3	3.9	448	161.5	41,699
6	10' - 0"	10' - 0"	8"	7"	162	#6	6"	66' - 4"	16,140	162	#6	6"	16' - 4"	3,974	8' - 10"	2,149	162	#6	6"	57' - 8"	14,032	42	18"	39' - 9"	1,115	238	18"	39' - 9"	6,320	108	9"	10' - 0"	721	270	9"	4' - 7"	827	21' - 3"	3,833	65' - 6"	175	130	362	4.677	1,227.8	4.7	537	191.8	49,648

(5) Bar lengths over 60' include one bar lap; refer to MATERIAL NOTES for minimum lap lengths.

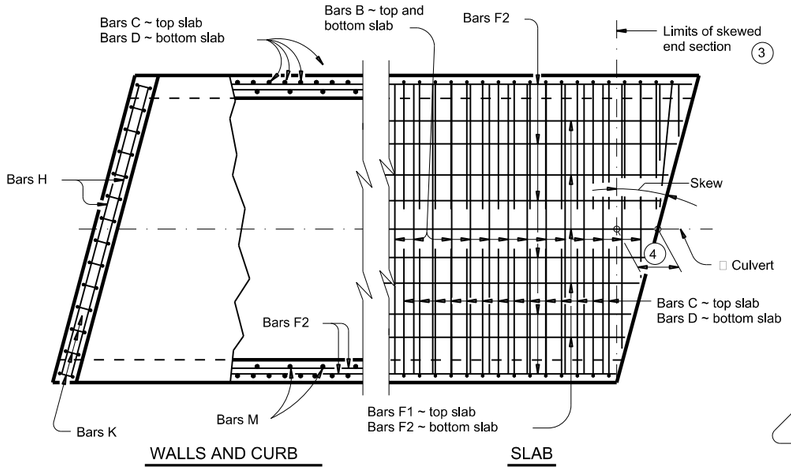
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

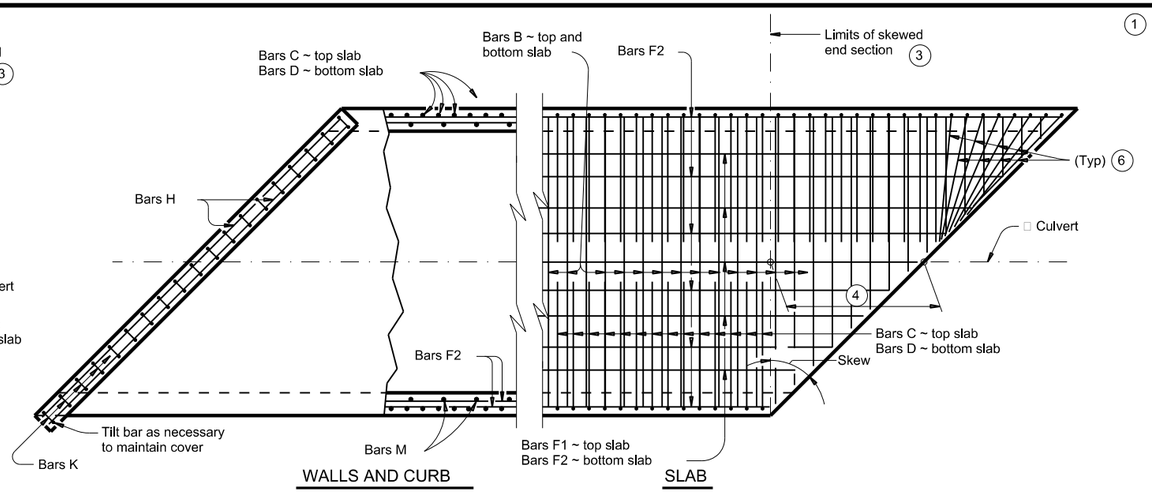
MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

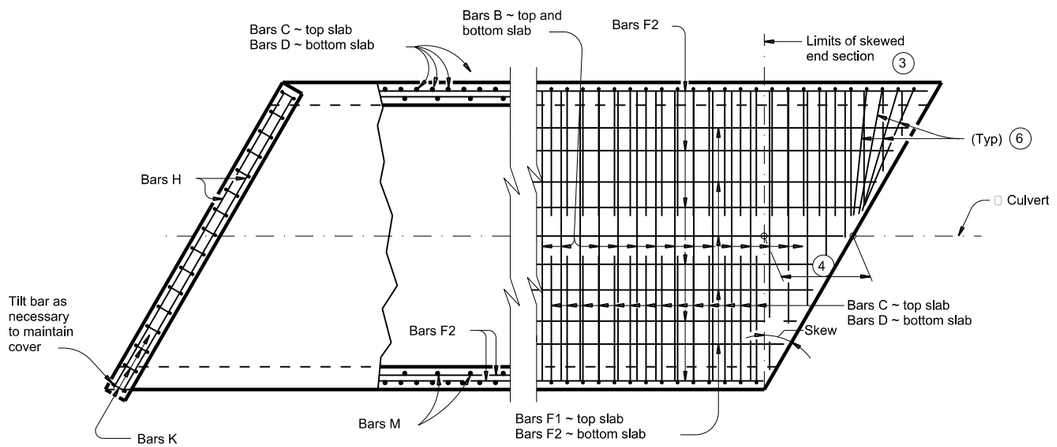
FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		106



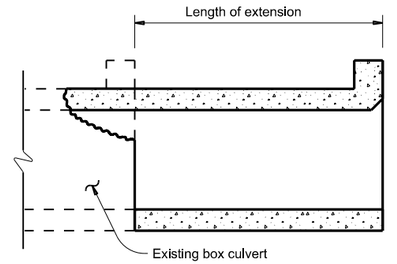
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



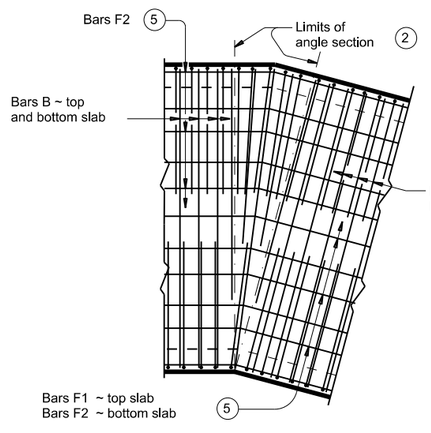
PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



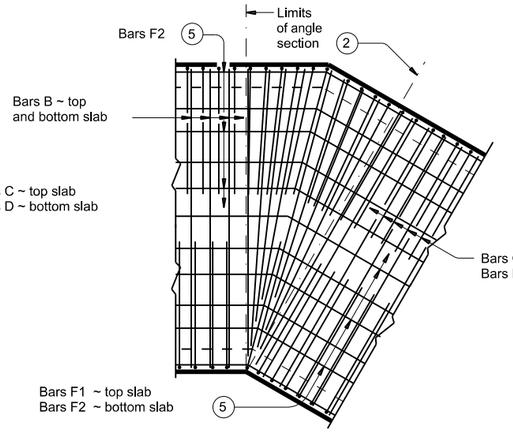
PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



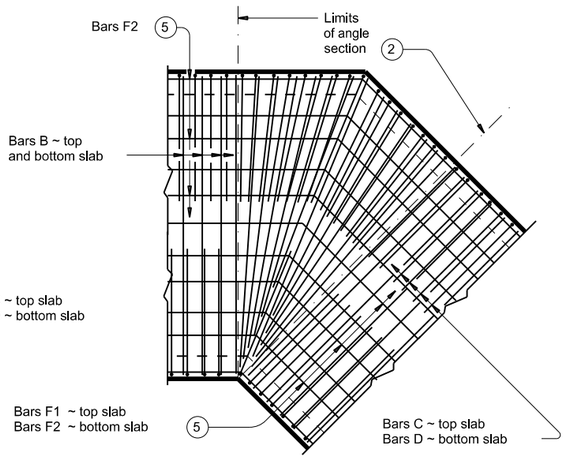
LENGTHENING DETAIL (1)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, C, D , E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 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. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B vary in the skewed end sections.

(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, and D parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B shown on the Single Box Culverts Cast-In-Place (SCC) standards sheets to accommodate the skew.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions:
provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for details of straight sections of culvert.

For skewed sections and angle sections, refer to Single Box Culverts Cast-in-Place (SCC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.

For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the culvert Single Box Culverts Cast-In-Place (SCC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation — Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

SCC-MD

FILE: sccmdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		107

DATE: 4/26/2023 4:11:10 PM
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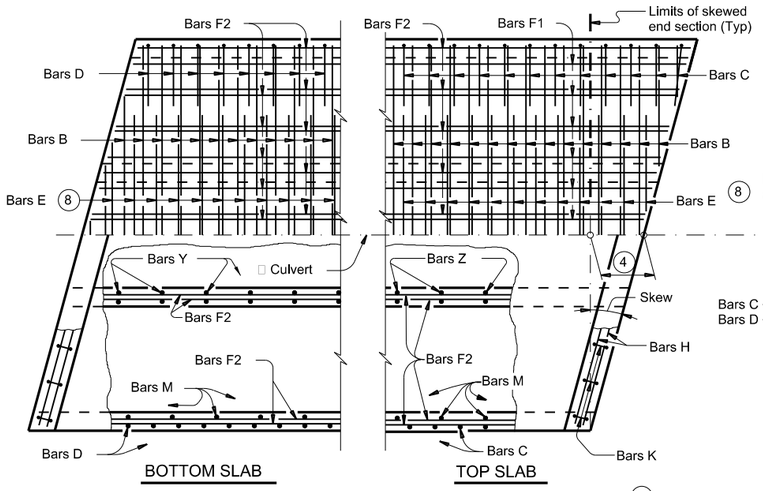
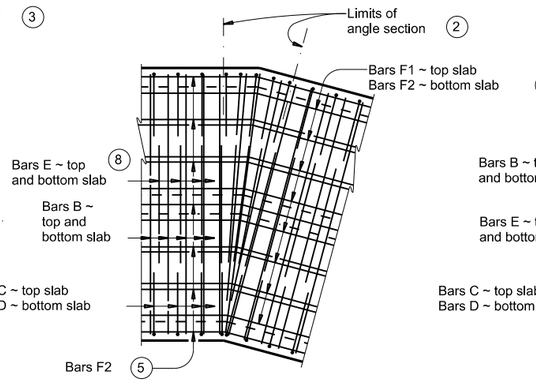
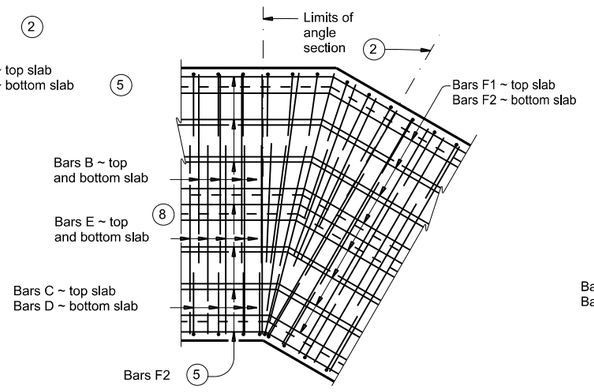


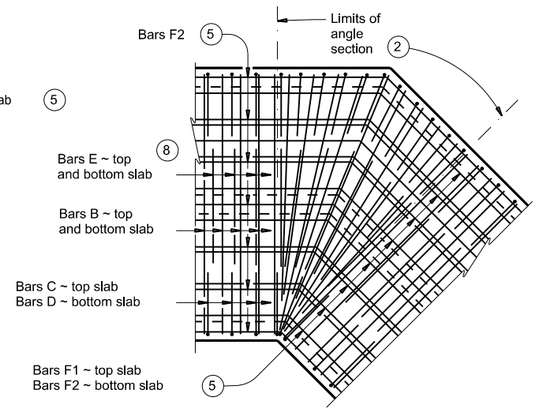
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



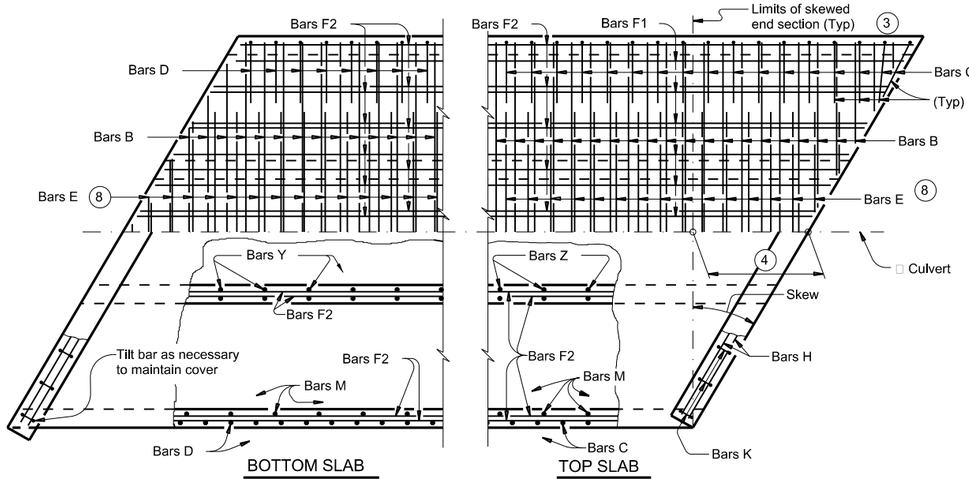
PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



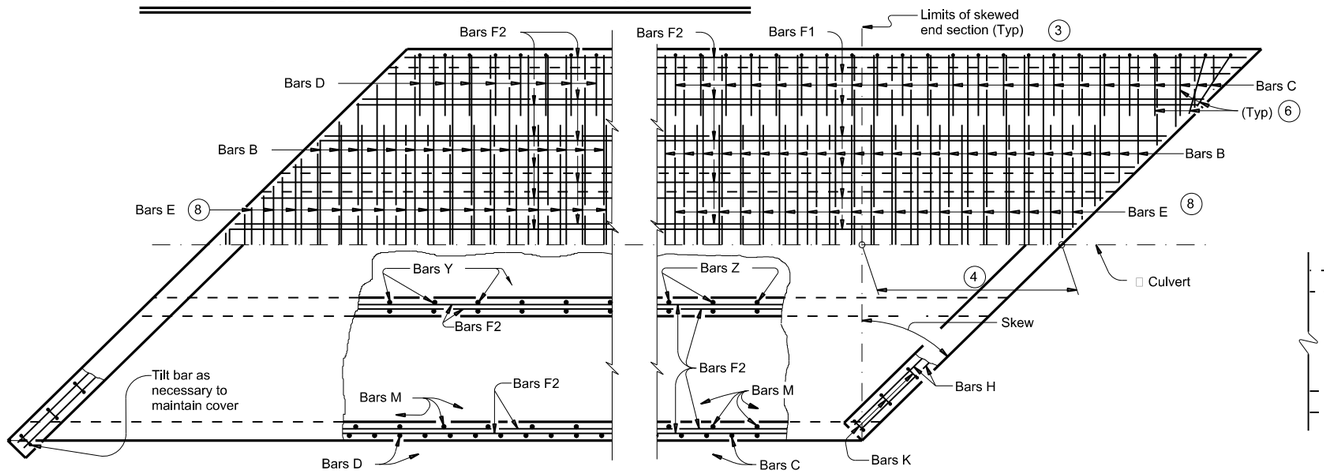
PLAN OF ANGLE SECTION ~ OVER 15° TO 30°



PLAN OF ANGLE SECTION ~ OVER 30° TO 45°



PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 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. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B and Bars E will vary in the skewed end sections.

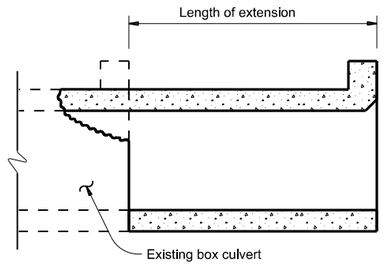
(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

(8) Extend Bars E as shown on the MC standard sheet for direct traffic culverts.



LENGTHENING DETAIL (1)

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

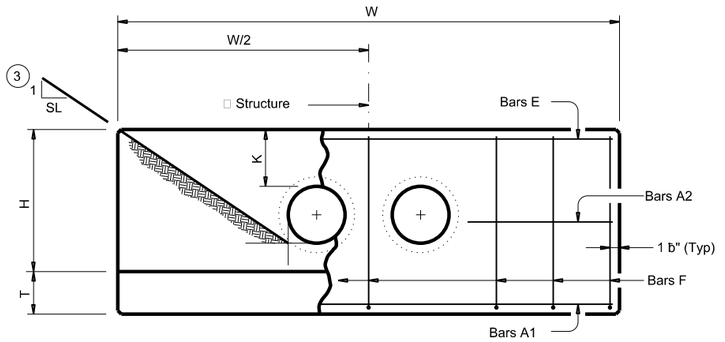
MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		108

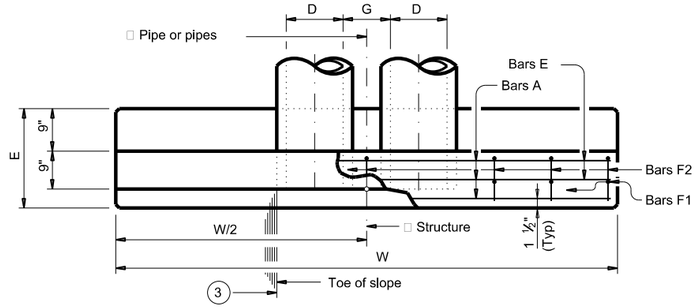
DATE: 4/26/2023 4:11:11 PM
FILE: T:\WFSDESIGN\Plans\1609-01\029v4 - Design\Plan Set\Standard to be delivered\MC-MD-20.dgn

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

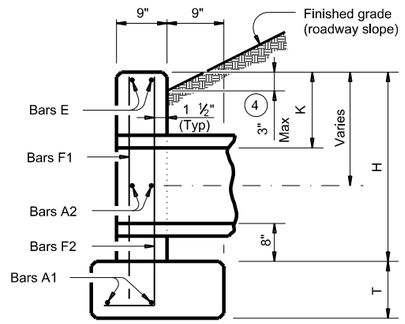
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' - 0"	122	1.1	1' - 9"	15	0.2
	15"	10' - 3"	136	1.3	2' - 2"	16	0.2
	18"	11' - 6"	163	1.5	2' - 8"	19	0.3
	21"	12' - 9"	200	1.8	3' - 1"	31	0.4
	24"	14' - 0"	217	2.1	3' - 7"	34	0.4
	27"	15' - 3"	254	2.4	3' - 11"	37	0.5
	30"	16' - 6"	272	2.7	4' - 4"	40	0.6
	33"	17' - 9"	314	3.1	4' - 8"	43	0.6
	36"	19' - 0"	371	3.9	5' - 1"	46	0.8
	42"	21' - 6"	442	4.9	5' - 10"	52	1.0
	48"	25' - 0"	569	6.4	6' - 7"	59	1.3
	54"	27' - 6"	701	7.5	7' - 6"	82	1.6
	60"	30' - 0"	794	8.8	8' - 3"	90	1.8
	66"	32' - 6"	894	10.2	8' - 9"	96	2.0
	72"	35' - 0"	1,055	11.7	9' - 4"	103	2.3
3:1	12"	13' - 0"	175	1.6	1' - 9"	14	0.2
	15"	14' - 9"	193	1.9	2' - 2"	17	0.2
	18"	16' - 6"	228	2.2	2' - 8"	19	0.3
	21"	18' - 3"	299	2.6	3' - 1"	31	0.4
	24"	20' - 0"	323	3.0	3' - 7"	33	0.4
	27"	21' - 9"	371	3.5	3' - 11"	37	0.5
	30"	23' - 6"	415	4.0	4' - 4"	40	0.5
	33"	25' - 3"	469	4.6	4' - 8"	43	0.6
	36"	27' - 0"	556	5.7	5' - 1"	46	0.8
	42"	30' - 6"	675	7.1	5' - 10"	52	1.0
	48"	35' - 6"	837	9.2	6' - 7"	59	1.3
	54"	39' - 0"	1,015	11.0	7' - 6"	84	1.6
	60"	42' - 6"	1,171	12.9	8' - 3"	91	1.8
	66"	46' - 0"	1,298	14.9	8' - 9"	98	2.0
	72"	49' - 6"	1,561	17.1	9' - 4"	103	2.3
4:1	12"	17' - 0"	229	2.0	1' - 9"	15	0.2
	15"	19' - 3"	266	2.4	2' - 2"	17	0.2
	18"	21' - 6"	308	2.9	2' - 8"	19	0.3
	21"	23' - 9"	382	3.5	3' - 1"	31	0.3
	24"	26' - 0"	430	3.9	3' - 7"	34	0.4
	27"	28' - 3"	486	4.7	3' - 11"	37	0.5
	30"	30' - 6"	539	5.2	4' - 4"	40	0.6
	33"	32' - 9"	603	6.0	4' - 8"	42	0.6
	36"	35' - 0"	738	7.5	5' - 1"	47	0.8
	42"	39' - 6"	881	9.3	5' - 10"	52	1.0
	48"	46' - 0"	1,102	12.1	6' - 7"	61	1.3
	54"	50' - 6"	1,364	14.4	7' - 6"	84	1.6
	60"	55' - 0"	1,547	16.9	8' - 3"	91	1.8
	66"	59' - 6"	1,741	19.5	8' - 9"	98	2.0
	72"	64' - 0"	2,077	22.4	9' - 4"	102	2.3
6:1	12"	25' - 0"	336	3.0	1' - 9"	14	0.2
	15"	28' - 3"	384	3.6	2' - 2"	17	0.2
	18"	31' - 6"	452	4.2	2' - 8"	19	0.3
	21"	34' - 9"	581	5.1	3' - 1"	31	0.4
	24"	38' - 0"	644	5.8	3' - 7"	34	0.4
	27"	41' - 3"	737	6.9	3' - 11"	37	0.5
	30"	44' - 6"	807	7.7	4' - 4"	39	0.6
	33"	47' - 9"	912	8.9	4' - 8"	44	0.6
	36"	51' - 0"	1,108	11.0	5' - 1"	48	0.8
	42"	57' - 6"	1,318	13.7	5' - 10"	54	1.0
	48"	67' - 0"	1,682	17.9	6' - 7"	59	1.3
	54"	73' - 6"	2,072	21.3	7' - 6"	83	1.6
	60"	80' - 0"	2,351	24.9	8' - 3"	89	1.8
	66"	86' - 6"	2,643	28.9	8' - 9"	96	2.0
	72"	93' - 0"	3,121	33.1	9' - 4"	101	2.3



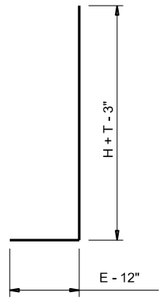
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

1. Total quantities include one 3'-1" lap for bars over 60' in length.
2. Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
3. Indicated slope is perpendicular to centerline pipe or pipes.
4. For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
5. Dimensions shown are usual and maximum.
6. Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' - 9"	1' - 0"	2' - 8"	0' - 9"	1' - 9"
15"	0' - 11"	1' - 0"	2' - 11"	0' - 9"	1' - 9"
18"	1' - 2"	1' - 0"	3' - 2"	0' - 9"	1' - 9"
21"	1' - 4"	1' - 0"	3' - 5"	0' - 9"	2' - 0"
24"	1' - 7"	1' - 0"	3' - 8"	0' - 9"	2' - 0"
27"	1' - 8"	1' - 0"	3' - 11"	0' - 9"	2' - 3"
30"	1' - 10"	1' - 0"	4' - 2"	0' - 9"	2' - 3"
33"	1' - 11"	1' - 0"	4' - 5"	0' - 9"	2' - 6"
36"	2' - 1"	1' - 0"	4' - 8"	1' - 0"	2' - 6"
42"	2' - 4"	1' - 0"	5' - 2"	1' - 0"	2' - 9"
48"	2' - 7"	1' - 3"	5' - 11"	1' - 0"	3' - 0"
54"	3' - 0"	1' - 3"	6' - 5"	1' - 0"	3' - 3"
60"	3' - 3"	1' - 3"	6' - 11"	1' - 0"	3' - 6"
66"	3' - 3"	1' - 3"	7' - 5"	1' - 0"	3' - 9"
72"	3' - 4"	1' - 3"	7' - 11"	1' - 0"	4' - 0"

TABLE OF REINFORCING STEEL (6)

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' - 6"	~
E	#5	~	2
F	#5	1' - 0"	~

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

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		109

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DATE: 4/26/2023 4:11:14 PM
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TABLE OF DIMENSIONS & REINFORCING STEEL
(Wings for One Structure End)

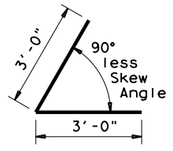
Dimensions					Variable Reinforcing				Estimated ④ Quantities per ft of wing (2~Wings)		Estimated Quantities per ft of Toewall (1~Toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'- 2"	1'- 2"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'- 2"	1'- 2"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'- 9"	1'- 7"	1'- 2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'- 9"	1'- 7"	1'- 2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'- 4"	2'- 0"	1'- 4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'- 4"	2'- 0"	1'- 4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'- 0"	2'- 3"	1'- 9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'- 0"	2'- 3"	1'- 9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'- 6"	2'- 8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'- 6"	2'- 8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'- 0"	2'-10"	2'- 2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'- 5"	3'- 0"	2'- 5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'- 2"	3'- 6"	2'- 8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'- 8"	3'- 9"	2'-11"	1'- 0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'- 2"	4'- 0"	3'- 2"	1'- 2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'- 5"	3'- 5"	1'- 4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'- 6"	4'-10"	3'- 8"	1'- 6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'- 0"	3'-11"	1'- 7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING (2~Wings)

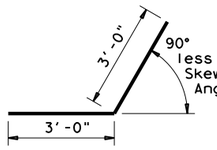
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

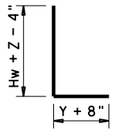
Bar	Size	No	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



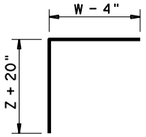
BARS D1



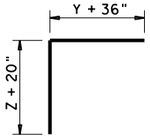
BARS D2



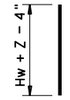
BARS J1



BARS J2



BARS J3



BARS V

WING DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)

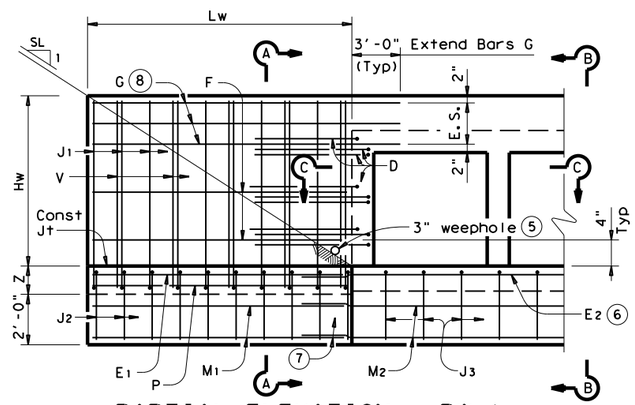
Hw = H + T + C
Lw = (Hw) (SL) ÷ Cosine θ for Ty PW-1
= (Hw - 1') (SL) ÷ Cosine θ for Ty PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ Cosine θ for Ty PW-2 and Hw < 4'

For Cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ Cosine θ

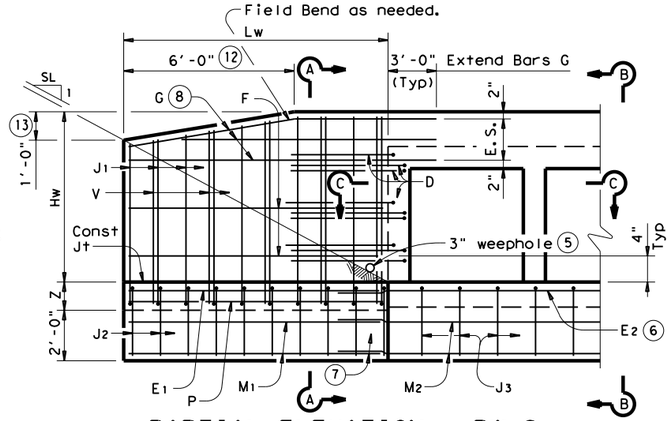
For Precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ Cosine θ
Total Wingwall Area (Two Wings ~ SF)
= (2)(Hw)(Lw) for Ty PW-1
= (2)(Hw)(Lw) - 6 SF for Ty PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Ty PW-2 and Hw < 4'

Hw = Height of Wingwall
Lw = Length of Wingwall
Ltw = Culvert Toewall Length
N = Number of Culvert Spans
SL:1 = Channel Slope ratio. (Horizontal: 1 Vertical, Usual value is 2:1)
θ = Culvert Skew

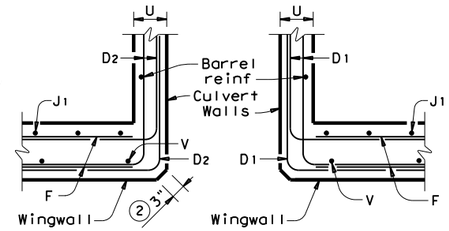
See applicable box culvert standard for S, H, T and U values.



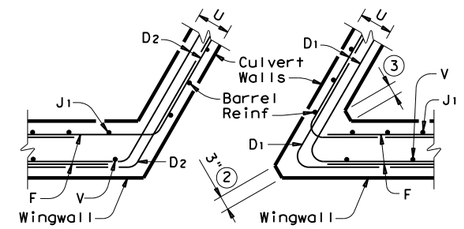
PARTIAL ELEVATION - PW-1



PARTIAL ELEVATION - PW-2



SECTION C-C



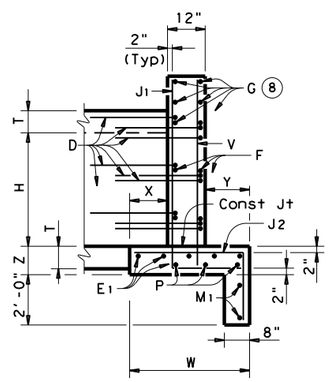
SECTION C-C

1. Skew Angle = 0°
2. At discharge end, chamfer may be ¾".
3. For 15° Skew ~ 1"
   For 30° Skew ~ 2"
   For 45° Skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Bars G equally spaced at 8" maximum, place as shown. Provide at least two pair Bars G per wing.
9. 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, curbs cannot project more than 3" above finished grade.
    - For structures with bridge rail, build curbs flush with finished grade.

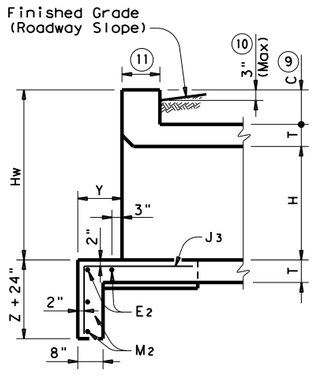
    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-0" typical when RAC standard is referenced elsewhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Provide Class "C" Concrete (f'c = 3,600 psi Min) and Grade 60 reinforcing steel.
Provide 1 ¼" Min clear cover to reinforcing steel.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See BCS sheet for wingwall type and additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

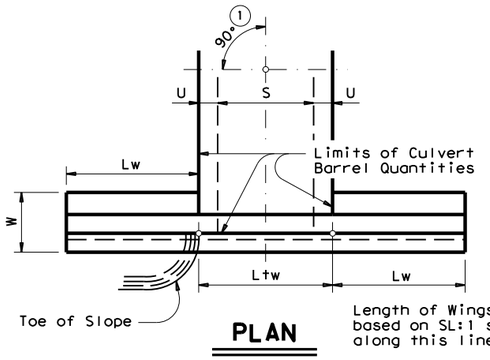
DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.



SECTION A-A
(Showing Wing Reinf)

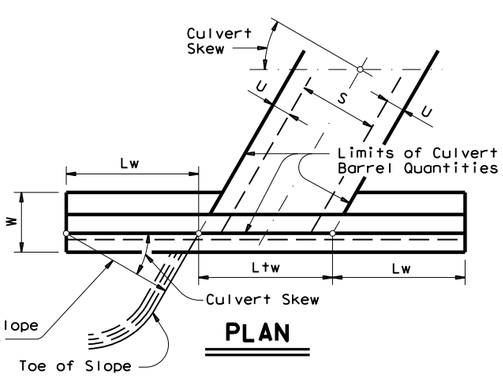


SECTION B-B
(Showing Wing Reinf)



PLAN

DETAILS FOR
NON-SKEWED BOX CULVERTS



PLAN

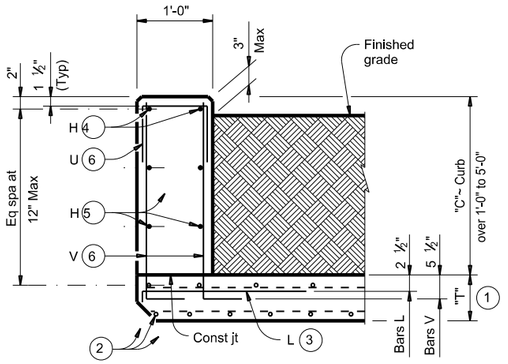
DETAILS FOR
SKEWED BOX CULVERTS
(Showing 30° Skew)

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

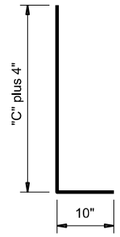
PW

FILE: pwstde01.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
11-10: Reinforcing Quantities. 01-12: PW-1 & PW-2.	DIST	COUNTY		SHEET NO.
	WFS	COOKE		110



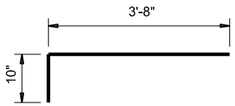
TYPICAL SECTION

Used for curbs over 1'-0" to 5'-0"



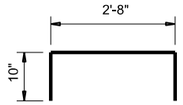
BARS V (#5) 6

Spaced at 12" Max



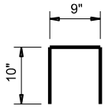
BARS L (#5) 3

Spaced at 12" Max



OPTIONAL BARS L (#5) 3 7

Spaced at 12" Max



BARS U (#4) 6

Spaced at 12" Max

1. "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.
2. Adjust normal culvert slab bars as necessary to clear obstructions.
3. Place bars L as shown. Tilt hook as necessary to maintain cover.
4. Place normal culvert curb bars H(#4) as shown. Adjust as necessary to clear obstructions.
5. Additional bars H(#4) as required to maintain 12" Max spacing.
6. Replace normal culvert curb bars K with one bar U and two bars V as shown spaced at 12" Max. Adjust length of bars V as necessary to maintain clear cover.
7. Optional bars L are to be used only for precast box culverts with 3'-0" closure pour.
8. Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The value in table can be interpolated for intermediate values of curb height, "C". Quantity includes bars K (when applicable).

TABLE OF ESTIMATED CURB QUANTITIES (8)

Curb Height "C"	Conc (CY/LF)	Reinf Steel (Lb/LF)
1'-0"	0.037	10.4
1'-6"	0.056	14.5
2'-0"	0.074	15.6
2'-6"	0.093	18.0
3'-0"	0.111	19.0
3'-6"	0.130	21.3
4'-0"	0.148	22.4
4'-6"	0.167	24.8
5'-0"	0.185	25.9

CONSTRUCTION NOTES:

Adjust reinforcing steel as necessary to provide 1 ¼" cover.

For vehicle safety, top of the curb must not project more than 3" above the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class "C" concrete (f'c = 3,600 psi) minimum for curbs.

Provide bar laps, where required, as follows:

· Uncoated or galvanized ~ #4 = 1'-8" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

These extended curb details have sufficient strength to allow for future retrofit of Type T631 or T631LS railing. These details are suitable for use with PR11, PR22 and PR3 type rails. These details are not suitable for the mounting of other rail types. For new construction using T631 or T631LS railing, use the T631-CM standard.

This Curb is considered as part of the Box Culvert for payment.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

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Texas Department of Transportation

Bridge Division Standard

EXTENDED CURB DETAILS

FOR BOX CULVERTS WITH CURBS OVER 1'-0" TO 5'-0" TALL

ECD

FILE: ecdstde1-20.dgn	DN: GAF	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		111

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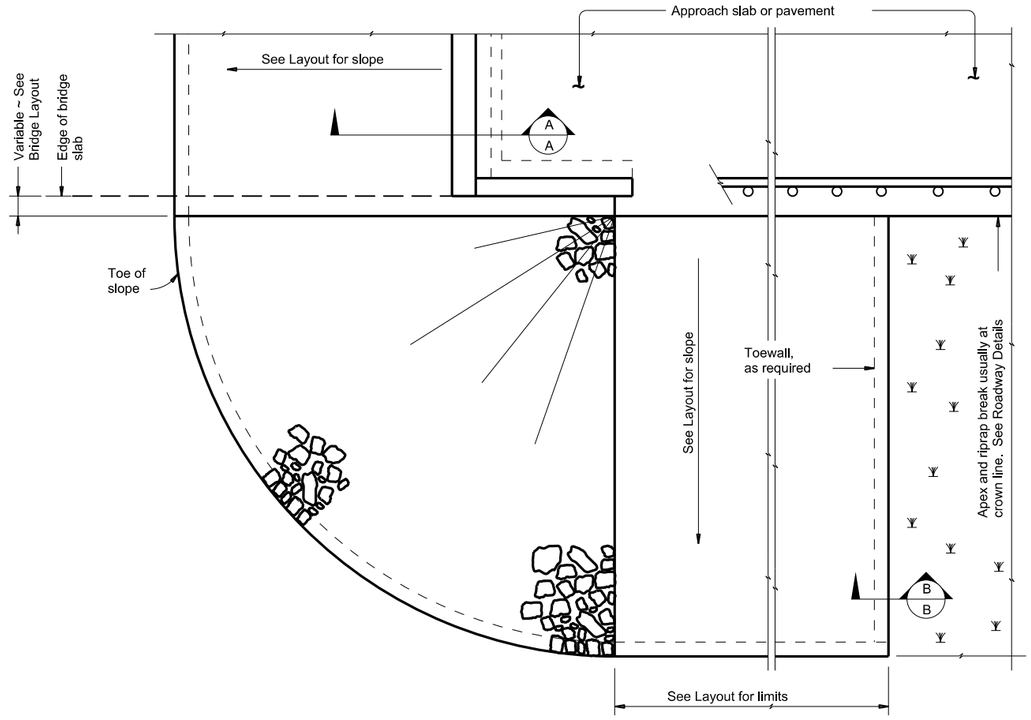
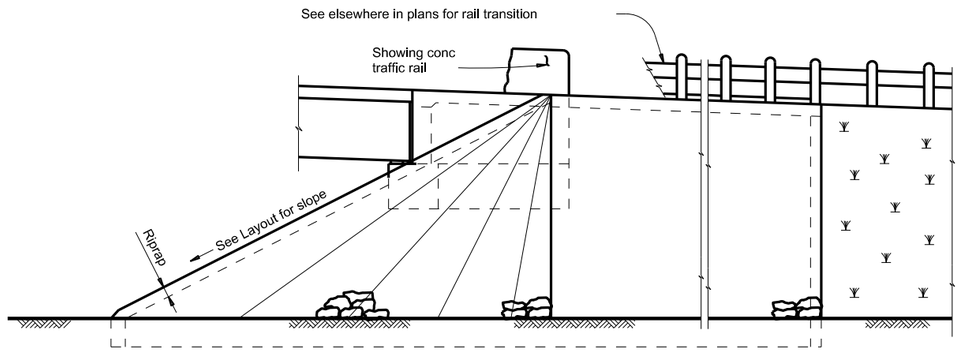
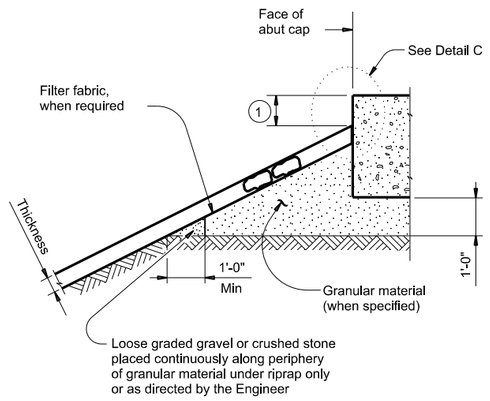


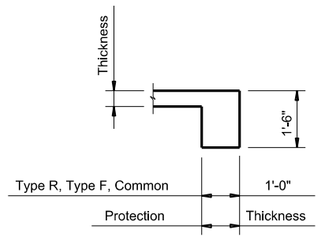
PLAN



ELEVATION

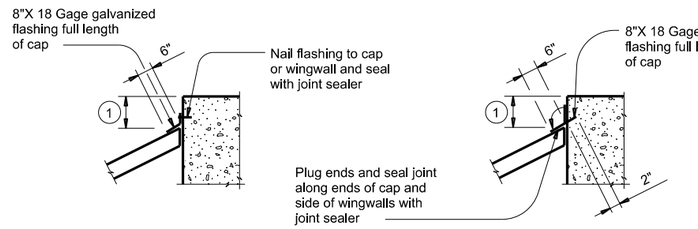


SECTION A-A AT CAP



SECTION B-B

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



CAP OPTION A

CAP OPTION B

DETAIL C

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

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

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		112

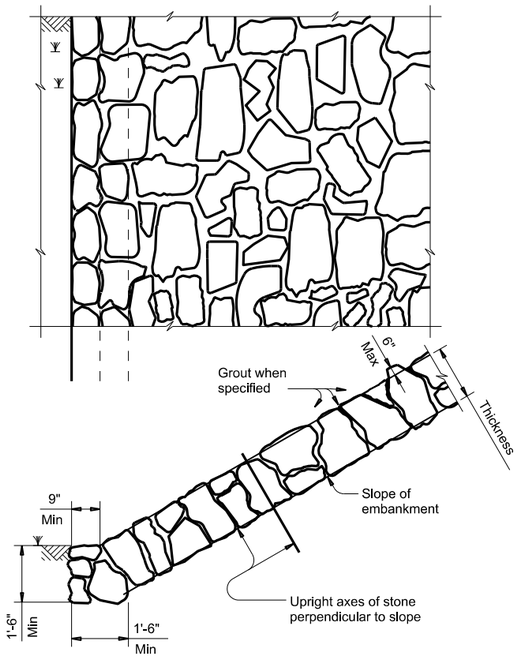


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

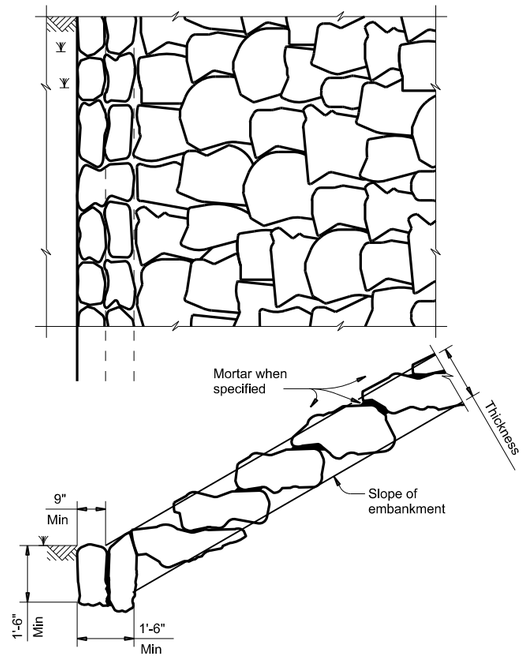


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

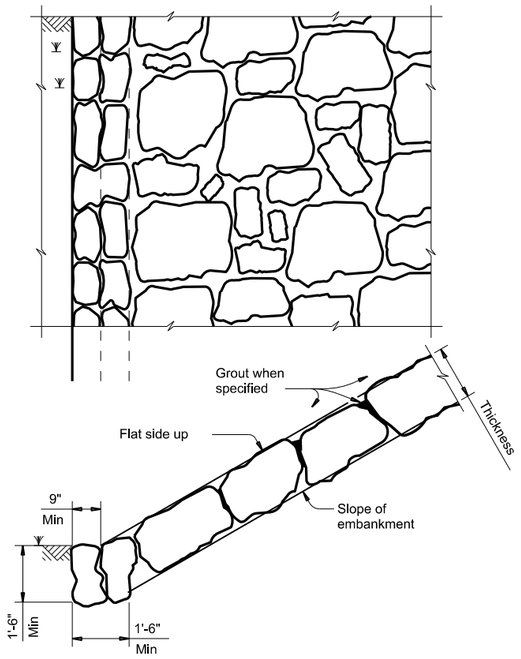


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

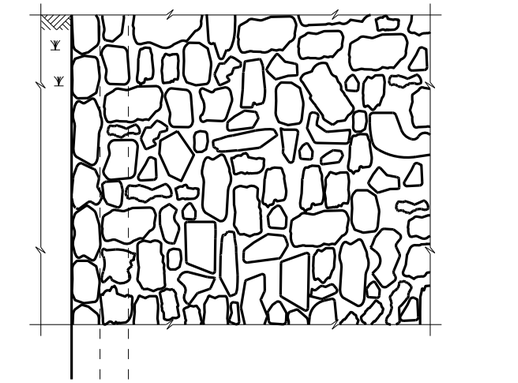


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

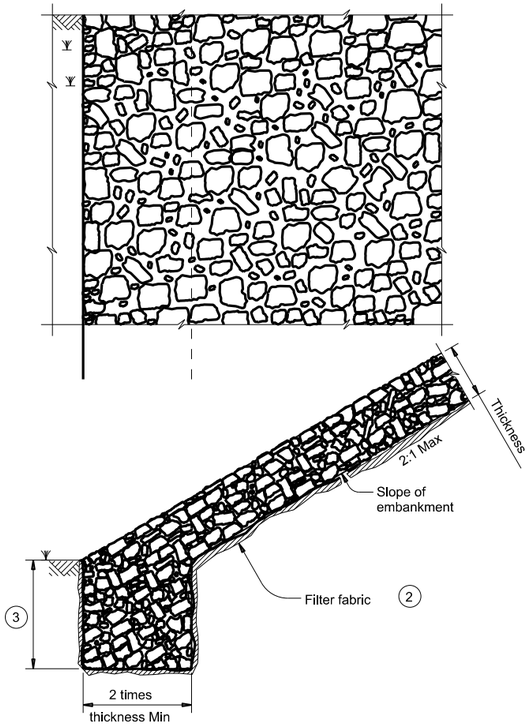


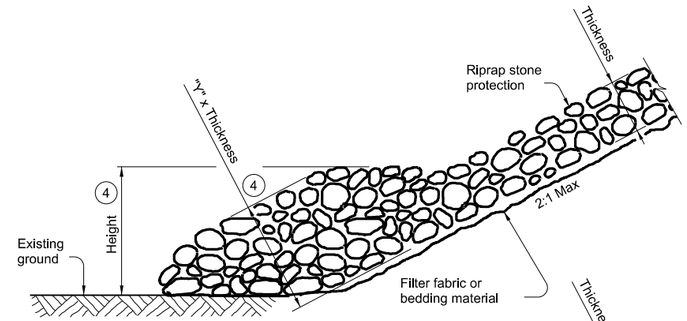
FIGURE 5 ~ PROTECTION STONE RIPRAP 5

2 Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

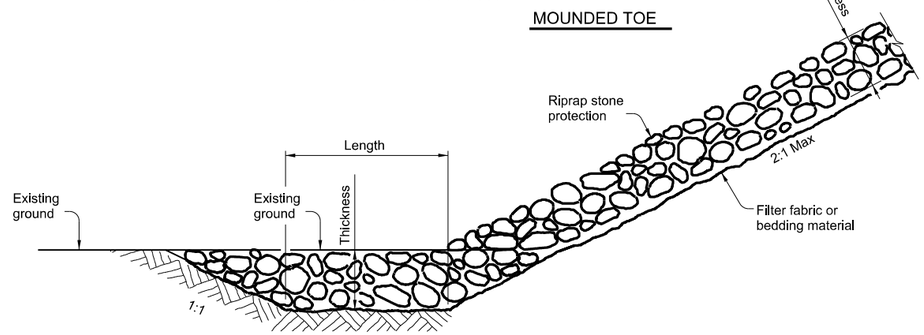
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

4 "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

5 List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS 5

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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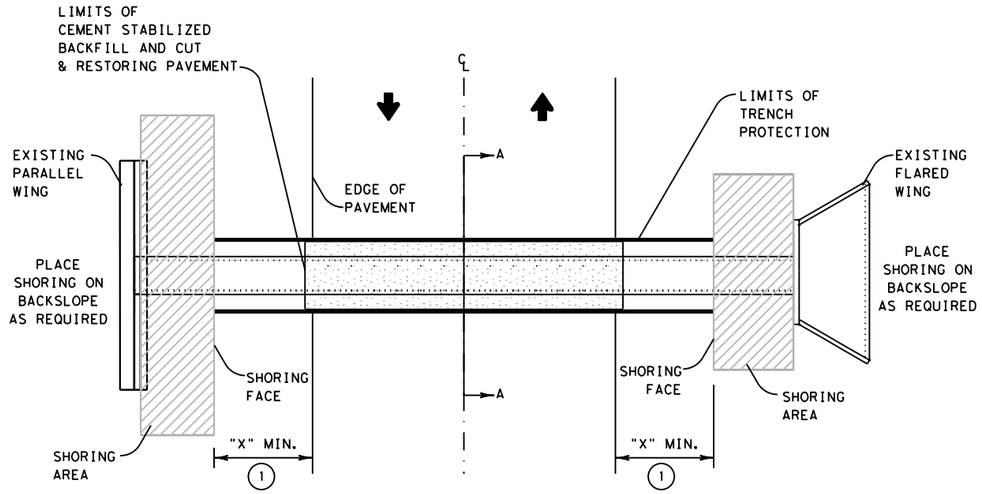
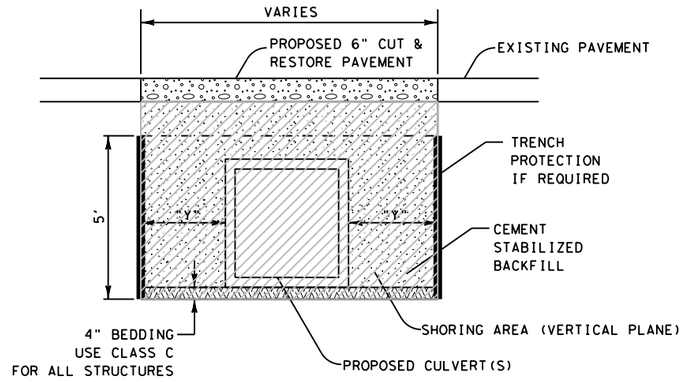


PLAN VIEW
TYPICAL SECTION



SECTION A-A
SHORING AND CUT & RESTORING PAVEMENT DETAIL

SURFACE AREA IN A VERTICAL PLANE TO BE MEASURED AND PAID IF GREATER THAN FIVE FEET. THIS SHALL INCLUDE INGRESS/EGRESS AREAS.

CEMENT STABILIZED BACKFILL

SL:1 = SLOPE RATIO (HORIZONTAL : 1 VERTICAL) SEE REQUIREMENTS BASED ON SOIL TYPE

(1) ADEQUATE PHYSICAL BARRIER PROTECTION SHALL BE PROVIDED AT ALL EXCAVATIONS IN ACCORDANCE WITH WORKSHEET FOR EDGE CONDITION TREATMENT TYPES AND BC(10)-14. THIS SHALL BE AS DIRECTED BY THE ENGINEER.

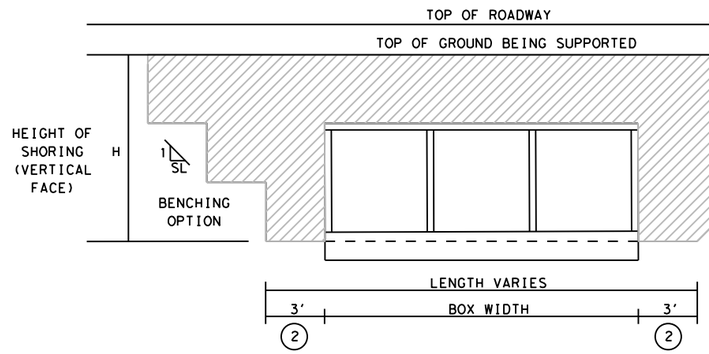
EMBANKMENT FRONT SLOPE SHALL BE A 3:1 OR FLATTER FROM EDGE OF PAVEMENT TO SHORING FACE. SEE EDGE CONDITION TREATMENT TYPES FOR REQUIRED DEVICES.

MINIMUM "X" OFFSET DISTANCE SHALL BE SPECIFIED IN SHORING PLAN SUBMITTED BY THE CONTRACTOR AND BASED ON SPECIFIC STRUCTURE LOCATION. THIS OFFSET WILL BE BASED ON SOIL TYPES, STABILITY, SLOPE ANALYSIS, AND SURCHARGE LOADING, BUT IN NO CASE SHALL IT BE LESS THAN 5 FEET.

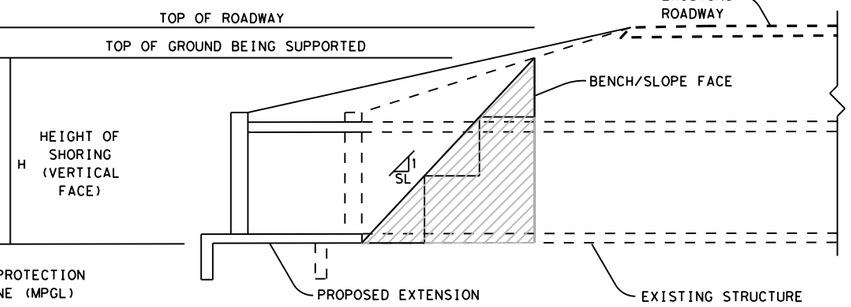
(2) DISTANCE IS MEASURED FROM END OF BOX OR END TREATMENT PLUS 3 FEET IF SHORING PLACEMENT IS REQUIRED.

"Y" ~ DIMENSION AS SPECIFIED BY ITEM 400 BUT NO LESS THAN ONE FOOT.

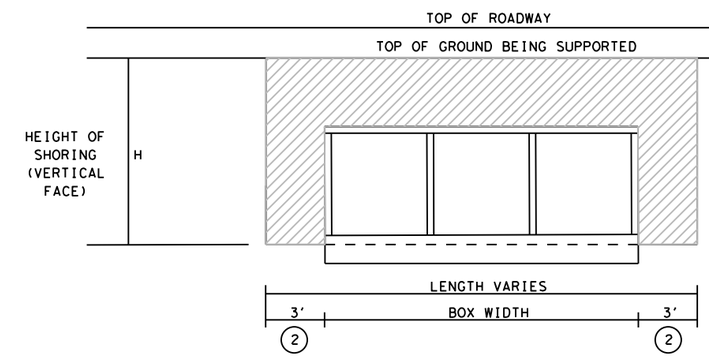
DETAILS AND NOTES SHOWN ARE GENERIC ILLUSTRATIONS AND DO NOT COVER ALL POSSIBLE SCENARIOS THAT MAY BE ENCOUNTERED ON A PROJECT. THE DETAILS ARE NOT A SUBSTITUTE FOR THE REQUIRED SPECIFIC ENGINEERED PLAN THAT IS TO BE SUBMITTED FOR APPROVAL AT EACH LOCATION THAT REQUIRES TEMPORARY SPECIAL SHORING. ALL ENGINEERED PLAN REQUIREMENTS SHALL COMPLY WITH OSHA STANDARDS 29 CFR PART 1926, SUBPART P.



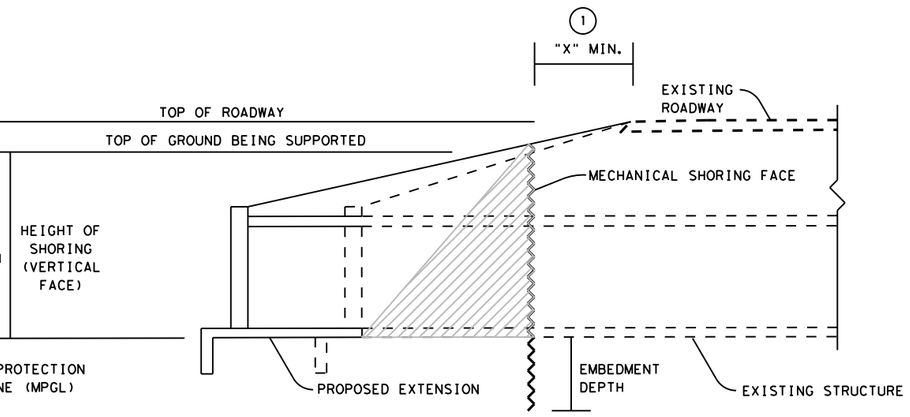
PROFILE VIEW
SLOPING/BENCHING



CROSS SECTION VIEW
SLOPING/BENCHING



PROFILE VIEW
MECHANICAL SHORING



CROSS SECTION VIEW
MECHANICAL SHORING

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129839
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04/27/2023

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TEMPORARY SHORING DETAILS

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SHEET 1 OF 6

CONT	SECT	JOB	HIGHWAY
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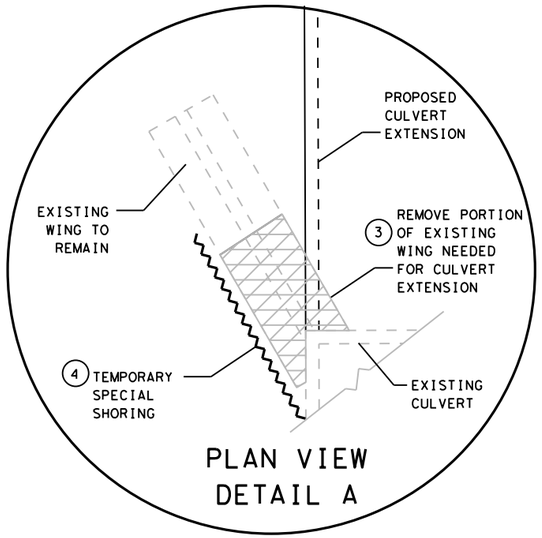
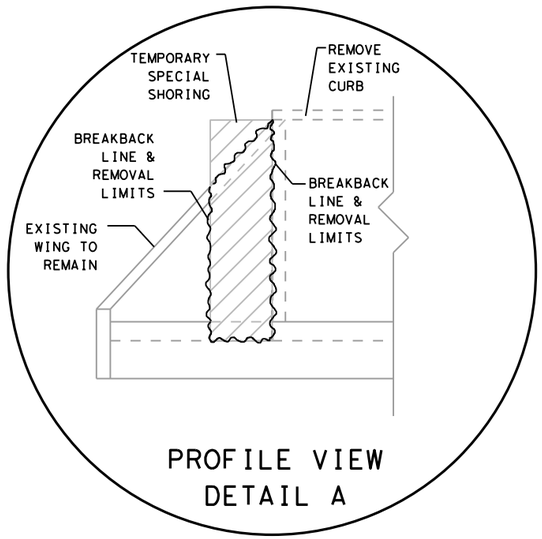
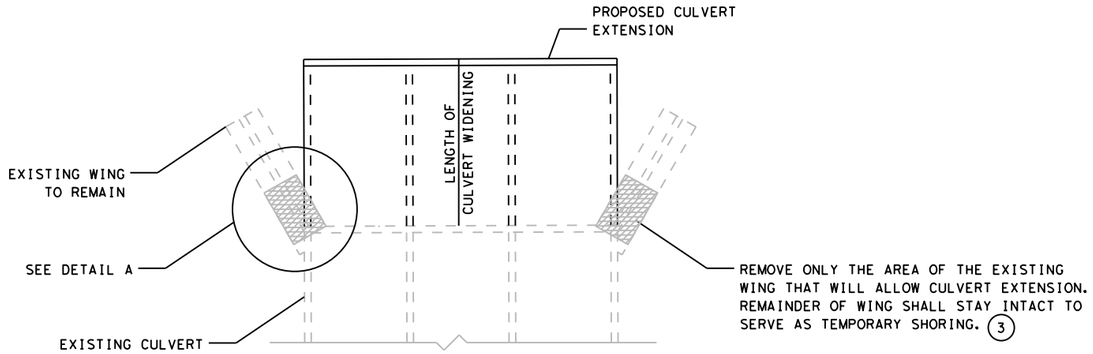


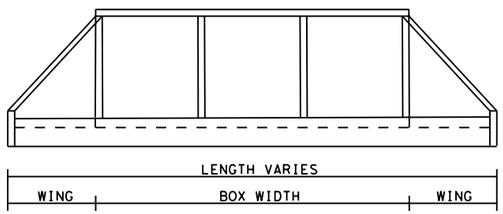
PLAN VIEW
DETAIL A



PROFILE VIEW
DETAIL A



PLAN VIEW
BOX CULVERT EXTENSION WITH
PARTIAL SECTION OF FLARED WINGS REMAINING IN PLACE



PROFILE VIEW
EXISTING BOX CULVERT WITH FLARED WINGS

SURFACE AREA IN A VERTICAL PLANE TO BE MEASURED AND PAID IF GREATER THAN FIVE FEET.

REMOVAL AREA

(3) AREA AND EXTENT OF REMOVAL SHOWN MAY VARY. REMAINDER OF EXISTING WING MAY REMAIN IN PLACE IF PROPER BACKFILL AND A MINIMUM FILL HEIGHT CAN BE ACHIEVED. IN SOME CASES THE EXISTING WING MAY HAVE TO BE FULLY REMOVED. THE ENGINEER SHALL APPROVE BREAKBACK LINES AND AREA TO REMAIN OR TO BE REMOVED PRIOR TO BEGINNING WORK. PAYMENT FOR ALL WORK SHALL BE SUBSIDIARY TO SHORING ITEMS.

(4) PLACE SHORING FOR PROTECTION IN AREA WHERE EXISTING WING WAS REMOVED AS DESIGNED BY ENGINEERED PLAN SUBMITTED BY CONTRACTOR.

DETAILS AND NOTES SHOWN ARE GENERIC ILLUSTRATIONS AND DO NOT COVER ALL POSSIBLE SCENARIOS THAT MAY BE ENCOUNTERED ON A PROJECT. THE DETAILS ARE NOT A SUBSTITUTE FOR THE REQUIRED SPECIFIC ENGINEERED PLAN THAT IS TO BE SUBMITTED FOR APPROVAL AT EACH LOCATION THAT REQUIRES TEMPORARY SPECIAL SHORING. ALL ENGINEERED PLAN REQUIREMENTS SHALL COMPLY WITH OSHA STANDARDS 29 CFR PART 1926, SUBPART P.

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TEMPORARY SHORING DETAILS

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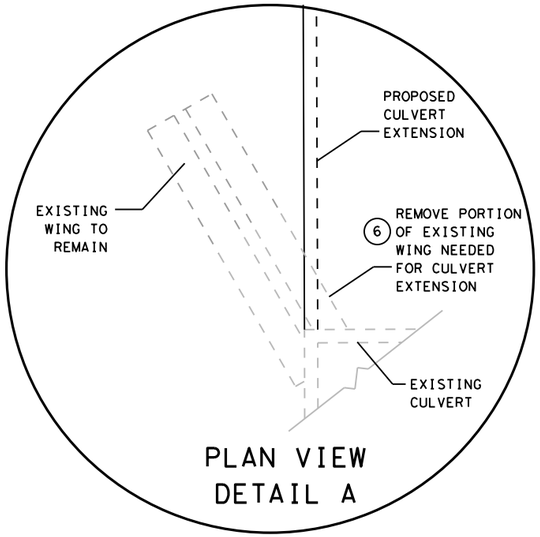
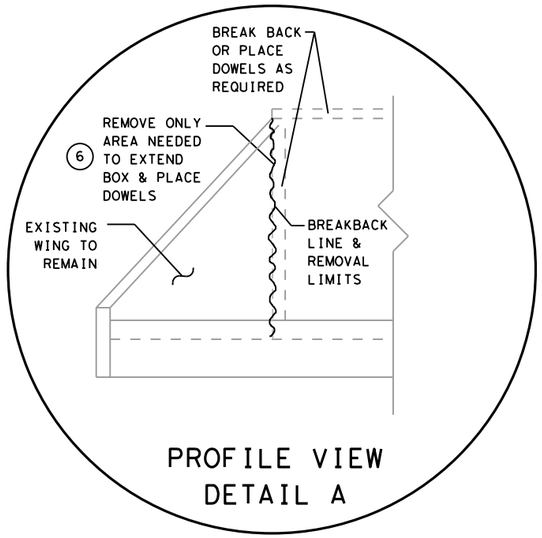
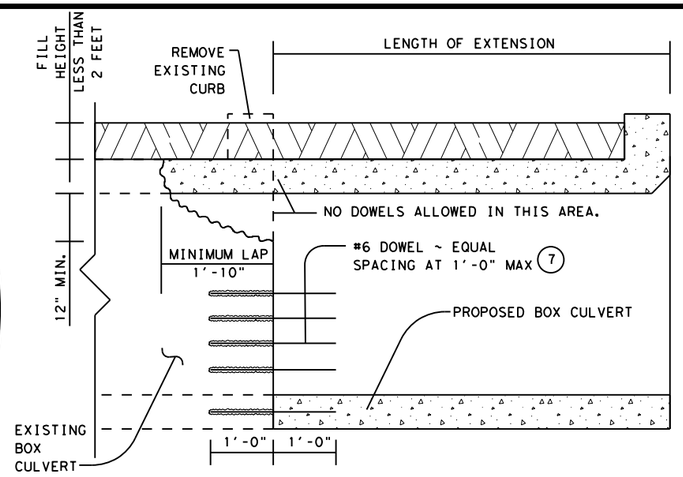


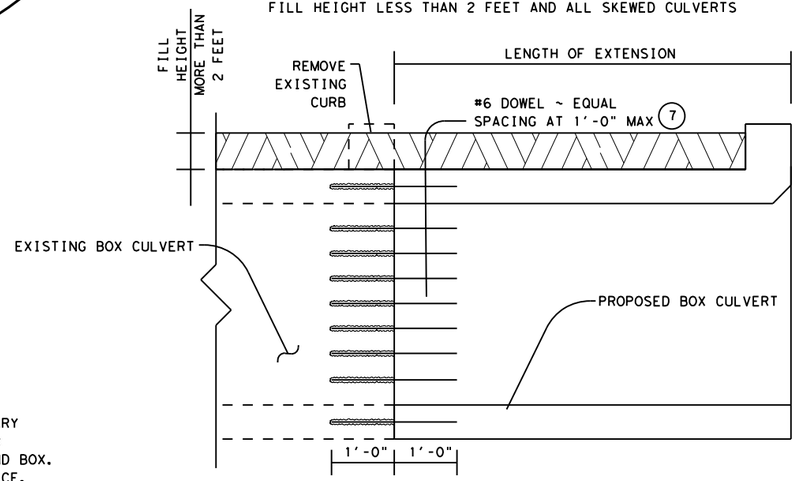
PLAN VIEW
DETAIL A



PROFILE VIEW
DETAIL A

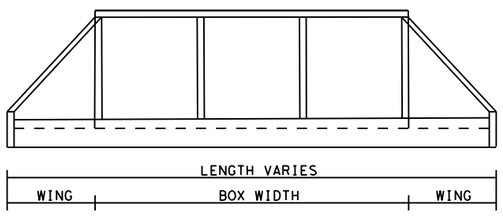


LENGTHENING DETAIL TYPICAL 7
FILL HEIGHT LESS THAN 2 FEET AND ALL SKEWED CULVERTS

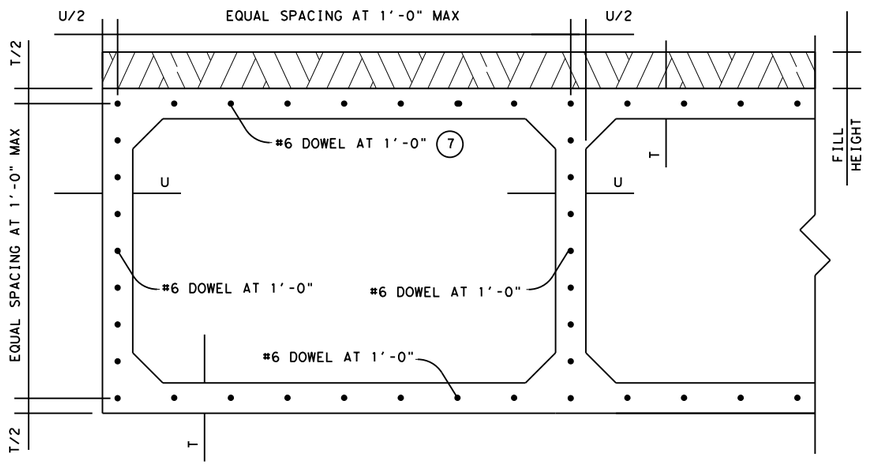


LENGTHENING DETAIL TYPICAL 7
FILL HEIGHT MORE THAN 2 FEET AND NOT A SKEWED CULVERT

PLAN VIEW
BOX CULVERT EXTENSION WITH
FLARED WINGS REMAINING IN PLACE



PROFILE VIEW
EXISTING BOX CULVERT WITH FLARED WINGS



LENGTHENING DETAIL TYPICAL SECTION 7
NOTE: ONLY SHOWING DOWELS OTHER REINFORCING NOT SHOWN FOR CLARITY.

6 REMAINDER OF EXISTING WING MAY REMAIN IN PLACE IF PROPER BACKFILL AND A MINIMUM FILL HEIGHT CAN BE ACHIEVED. ENGINEER SHALL APPROVE BREAKBACK LINES AND AREA TO REMAIN OR TO BE REMOVED PRIOR TO BEGINNING WORK.

7 FOR BOX CULVERTS WITH LESS THAN 2'-0" OF FILL, BREAK BACK THE TOP SLAB TO PROVIDE A 1'-10" MINIMUM LAP OF THE EXISTING LONGITUDINAL BARS WITH THE LONGITUDINAL BARS IN THE EXTENSION. DOWELS ARE NOT ALLOWED FOR BOX CULVERTS WITH LESS THAN 2'-0" OF FILL.

FOR BOX CULVERTS WITH MORE THAN 2'-0" OF FILL, BREAK BACK THE TOP SLAB TO PROVIDE A 1'-10" MINIMUM LAP OF THE EXISTING LONGITUDINAL BARS WITH THE LONGITUDINAL BARS IN THE EXTENSION. ALTERNATIVELY, IF THE BOX IS NON-SKEWED, EMBED #6 ANCHOR BARS WITH A TYPE III, C, D, E, OR F ANCHOR ADHESIVE INTO THE EXISTING WALLS, TOP, AND BOTTOM SLAB AT 1'-0" CENTER-TO-CENTER SPACING. MINIMUM EMBEDMENT DEPTH IS 12".

CORE AND GROUT #6 DOWEL 1'-0" INTO EXISTING STRUCTURE AS SHOWN IN ACCORDANCE WITH ITEM 420.4.7.10, "CONCRETE STRUCTURES" ~ INSTALLATION OF DOWELS AND ANCHOR BOLTS."

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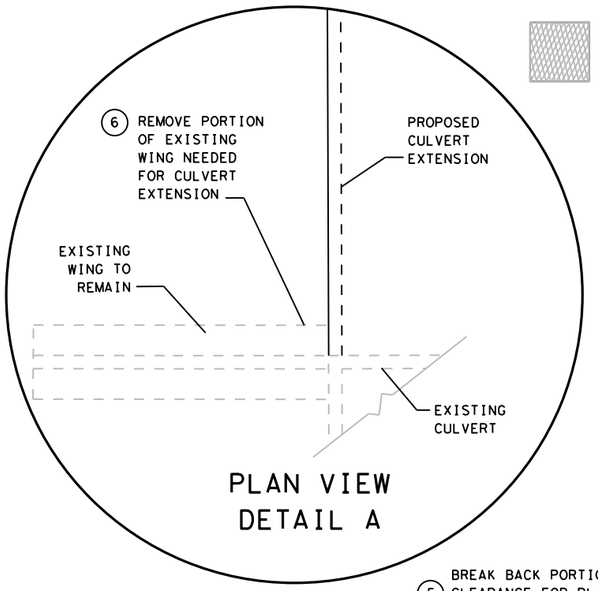
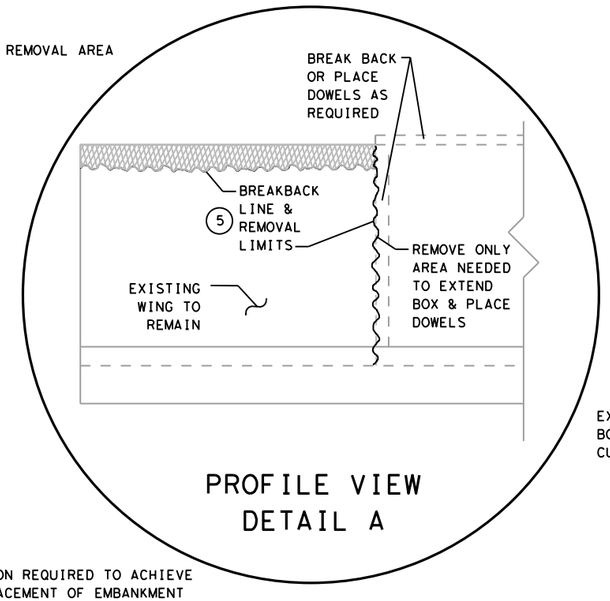
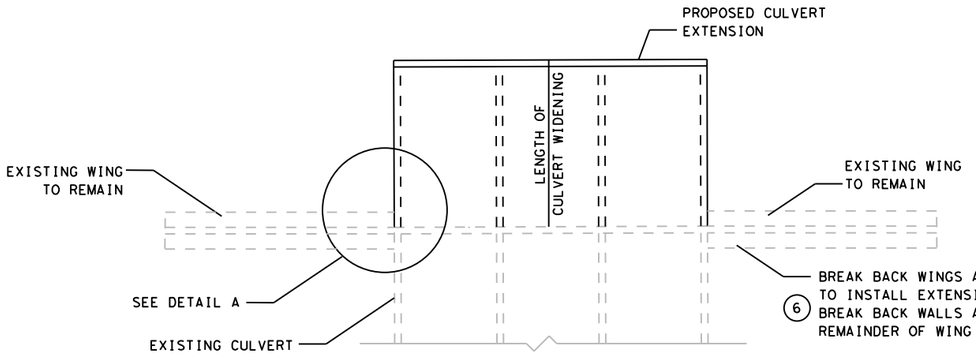


PLAN VIEW
DETAIL A

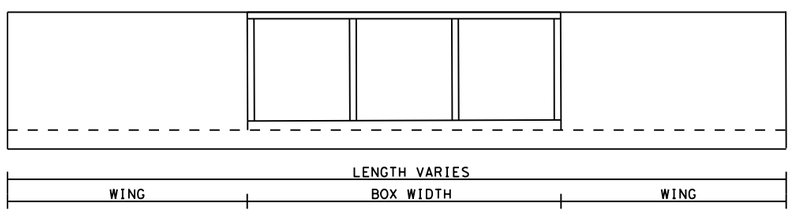


PROFILE VIEW
DETAIL A

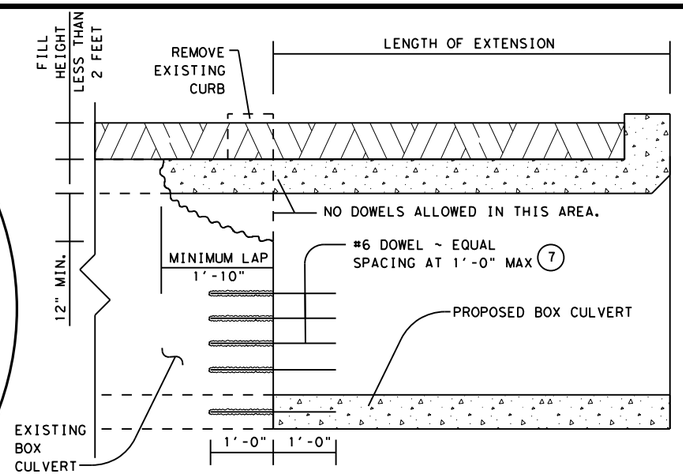
5 BREAK BACK PORTION REQUIRED TO ACHIEVE CLEARANCE FOR PLACEMENT OF EMBANKMENT FOR FRONT SLOPE AS REQUIRED BY TYPICAL.



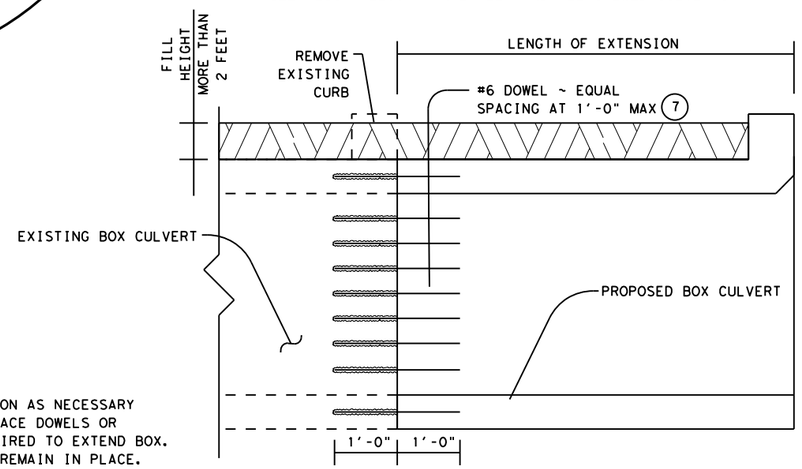
PLAN VIEW
BOX CULVERT EXTENSION WITH
PARTIAL SECTION OF PARALLEL
WINGS REMAINING IN PLACE



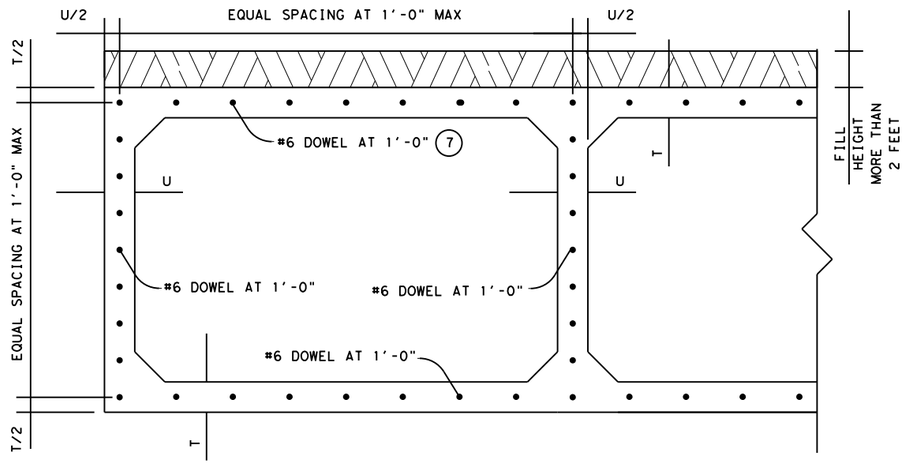
PROFILE VIEW
EXISTING BOX CULVERT WITH PARALLEL WINGS



LENGTHENING DETAIL TYPICAL 7
FILL HEIGHT LESS THAN 2 FEET AND ALL SKEWED CULVERTS



LENGTHENING DETAIL TYPICAL 7
FILL HEIGHT MORE THAN 2 FEET AND NOT A SKEWED CULVERT



LENGTHENING DETAIL TYPICAL SECTION 7
NOTE: ONLY SHOWING DOWELS OTHER REINFORCING NOT SHOWN FOR CLARITY.

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FOR BOX CULVERTS WITH MORE THAN 2'-0" OF FILL, BREAK BACK THE TOP SLAB TO PROVIDE A 1'-10" MINIMUM LAP OF THE EXISTING LONGITUDINAL BARS WITH THE LONGITUDINAL BARS IN THE EXTENSION. ALTERNATIVELY, IF THE BOX IS NON-SKEWED, EMBED #6 ANCHOR BARS WITH A TYPE III, C, D, E, OR F ANCHOR ADHESIVE INTO THE EXISTING WALLS, TOP, AND BOTTOM SLAB AT 1'-0" CENTER-TO-CENTER SPACING. MINIMUM EMBEDMENT DEPTH IS 12".

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TEMPORARY SHORING AND TRENCH PROTECTION GENERAL NOTES:

THE SHORING PLAN SHALL ADDRESS VERY CLEARLY WITH RESPECT TO THE PROPOSED CONTRACTORS SEQUENCE OF WORK AND METHODS FOR SHORING FOR THE DURATION OF THE PROJECT EXPOSURE.

THE SHORING PLAN SHALL NOT BE A GENERIC PLAN BUT VERY SPECIFIC IN REGARDS TO EACH LOCATION THAT REQUIRES SHORING WITH ALL RELEVANT MATERIALS TO BE USED WITH SPECIFICATIONS DETAILING THOSE MATERIALS ALONG WITH ANY MANUFACTURERS SPECIFICATIONS OF MATERIALS BEING USED.

BENCHING, SLOPING, MECHANICAL SHORING INSTALLED OUTSIDE LIMITS SHOWN WILL NOT BE PAID FOR UNLESS APPROVED IN WRITING BY THE ENGINEER.

SUBSTITUTION OF BENCHING/SLOPING FOR MECHANICAL SHORING WILL NOT BE PERMITTED UNLESS APPROVED IN WRITING BY THE ENGINEER.

SUBSITUTION OF MECHANICAL SHORING FOR BENCHING/SLOPING WILL NOT BE PERMITTED UNLESS APPROVED IN WRITING BY THE ENGINEER.

DETAILED SHORING PLAN WILL BE CONSIDERED PREREQUISITE TO SUBSTITUTION OF ORIGINAL SHORING PROPOSED IN PLAN.

SUBMIT SOIL CLASSIFICATION AND IDENTIFICATION TESTING THAT IS PERFORMED FOR EACH STRUCTURE TO THE ENGINEER PRIOR TO COMMENCING WORK.

CALCULATIONS THAT ARE SUBMITTED SHALL INCLUDE A GLOBAL STABILITY ANALYSIS TO ENSURE IMPLEMENTATION OF THE SHORING DOES NOT CREATE A HAZARD TO THE ROADWAY. ALL DESIGN CALCULATIONS SHALL CLEARLY INDICATE DESIGN ASSUMPTIONS, SOIL PARAMETERS, SURCHARGE LOADING AND GEOMETRY USED FOR ANALYSIS AND ALL OTHER INFORMATION DEEMED PERTINENT. TYPICAL SECTIONS SHOULD BE SUBMITTED TO VERIFY THE MODELS AND METHODS PROPOSED FOR USE BY THE CONTRACTOR ACCOUNT FOR SURCHARGE LOADING.

SUBMIT COMPETENT PERSONS NAME THAT WILL BE ON SITE WHILE SHORING SYSTEMS ARE IN USE. THAT PERSON SHALL BE RESPONSIBLE FOR MAKING SURE THAT ALL ELEMENTS OF THE PLAN ARE ADHERED TO AND SHALL NOTIFY THE ENGINEER IF CONDITIONS ENCOUNTERED ARE DIFFERENT THAN ANTICIPATED AND SHOWN ON THE SUBMITTED AND APPROVED PLAN.

SHORING MUST BE PROPERLY INSTALLED PRIOR TO EXCAVATION. LOCATION OF SHORING SHOWN IS DIAGRAMMATIC AND NOT THE MEANS AND METHOD OF DOING THE WORK.

EVALUATION OF THE EXISTING WINGWALL TO REMAIN SHALL BE PERFORMED TO ENSURE STABILITY OF THE WALL ONCE DETACHED FROM EXISTING CULVERT WALL. SUBMIT THIS EVALUATION FOR APPROVAL PRIOR TO PERFORMING ANY REMOVAL.

SHORING ITEM WILL BE MEASURED BY THE SQUARE FOOT OF SURFACE AREA OF A VERTICAL PLANE AT THE FACE OF THE SHORING BETWEEN THE TOP OF THE GROUND BEING SUPPORTED AND THE MINIMUM PROTECTION GRADE LINE SHOWN.

SHORING PROJECTING ABOVE THE LEVEL OF THE GROUND BEING SUPPORTED AND CAUSED BY THE CONTRACTORS OPERATIONS WILL NOT BE MEASURED FOR PAYMENT. SHORING THAT PROJECTS ABOVE THE LEVEL OF THE GROUND AND PRESENTS A HAZARD TO THE TRAVELING PUBLIC SHALL BE PROTECTED BY MEANS AND METHODS APPROVED BY THE ENGINEER AND AT THE EXPENSE OF THE CONTRACTOR PERFORMING THE WORK AND SUBSIDAIRY TO ITEM 403.

TRENCH PROTECTION WILL BE MEASURED BY THE LINEAR FOOT OF PROTECTION IN PLACE.

TRENCHES OR EXCAVATIONS LESS THAN FIVE FEET IN DEPTH SHALL ALSO BE EFFECTIVELY PROTECTED WHEN EXAMINATION OF GROUND INDICATES HAZARDOUS GROUND MOVEMENT MAY BE EXPECTED.

WHERE TRENCH PROTECTION IS SHOWN IN THE ROADWAY AREA NO BENCHING OR SLOPING WILL BE ALLOWED.

DETAILS AND NOTES SHOWN ARE GENERIC ILLUSTRATIONS AND DO NOT COVER ALL POSSIBLE SCENARIOS THAT MY BE ENCOUNTERED ON A PROJECT. THE DETAILS ARE NOT A SUBSTITUTE FOR THE REQUIRED SPECIFIC ENGINEERED PLAN THAT IS TO BE SUBMITTED FOR APPROVAL AT EACH LOCATION THAT REQUIRES TEMPORARY SPECIAL SHORING. ALL ENGINEERED PLAN REQUIREMENTS FOR THOSE LOCATIONS SHALL COMPLY WITH OSHA STANDARDS 29 CFR PART 1926, SUBPART P AND AASHTO STANDARDS SPECIFICATIONS FOR HIGHWAY BRIDGES OR AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS AND AREMA MANUAL FOR RAILWAY ENGINEERING FOR RAILROAD LOADING.

SEE ITEM 402 TRENCH PROTECTION AND ITEM 403 TEMPORARY SPECIAL SHORING FOR ADDITIONAL REQUIREMENTS NOT STATED.

REQUIREMENTS BEFORE BEGINNING SHORING WORK OPERATIONS:

1. SUBMIT DETAILS AND DESIGN CALCULATIONS BEARING THE SEAL OF A LICENSED PROFESSIONAL ENGINEER FOR APPROVAL THAT COMPLIES WITH OSHA STANDARDS AND INTERPRETATIONS, 29 CFR 1926, SUBPART P, EXCAVATIONS. DESIGN STRUCTURAL SYSTEMS TO COMPLY WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES OR AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
2. SUBMIT PROPOSED SEQUENCE OF WORK AND METHOD FOR SHORING IF DIFFERENT THAN PROPOSED IN THE SUBMITTED ENGINEERED PLAN.
3. RECEIVE APPROVAL FOR SUBSTITUTE SHORING AS SHOWN IN THE SUBMITTED ENGINEERED PLAN.
4. SUBMIT COMPETENT PERSONS NAME THAT WILL BE ON SITE.
5. SUBMIT SOIL CLASSIFICATION AND IDENTIFICATION TEST FOR EACH SPECIFIC STRUCTURE LOCATION.
6. PROCEED WITH WORK ONLY AFTER APPROVAL IS GIVEN BY THE ENGINEER.

MAXIMUM ALLOWABLE SLOPES PER 29 CFR 1926.652		
SOIL TYPE	SLOPE (H:V)	ANGLE (DEGREES)
STABLE ROCK	VERTICAL	90
TYPE A	3/4 : 1	53
TYPE B	1 : 1	45
TYPE C	1 ½ : 1	34

MAXIMUM ALLOWABLE DEPTH OF CUT/TRENCH VARIES. SEE APPROVED ENGINEERED PLAN FOR SPECIFICS. SLOPES SHALL BE FLATTENED WHEN AN EXCAVATION HAS WATER CONDITIONS, SILTY MATERIALS, LOOSE BOULDERS, AND AREAS WHERE EROSION, DEEP FROST ACTION, SLIDE PLANES APPEAR, LOADING IMPOSED BY STRUCTURES, SURCHARGE LOADING FROM EQUIPMENT, OVERLYING MATERIAL LOADING, OR STORED MATERIAL; AND VIBRATION FROM EQUIPMENT, BLASTING, TRAFFIC OR OTHER SOURCES ARE PRESENT.

CUT AND RESTORING PAVEMENT GENERAL NOTES:

LIMITS OF CEMENT STABILIZED BACKFILL AND CUT & RESTORE PAVEMENT SHALL EXTEND 6" BEYOND EXISTING EDGE OF PAVEMENT ON EACH SIDE OF THE ROADWAY.

SEE QUANTITY SUMMARY FOR TEMPORARY SPECIAL SHORING AND TRENCH PROTECTION QUANTITIES AT APPLICABLE STRUCTURES.

TEMPORARY SPECIAL SHORING SHALL BE PLACED ON VERTICAL PLANE PARALLEL TO THE ROADWAY AS SHOWN ON SECTION A-A AND AS DESIGNED BY SUBMITTED ENGINEERED PLAN.

ON MULTI-BARREL STRUCTURES, ACCOUNT FOR ADDITIONAL BARREL WIDTHS AND BARREL SPACING. SEE CULVERT DATA SHEET FOR PROPOSED WORK AND APPLICABLE STANDARDS FOR STRUCTURE DIMENSIONS.

PLACE CEMENT STABILIZED BACKFILL AT DEPTH TO ALLOW A MINIMUM DEPTH OF 6" OF HOTMIX PLACEMENT.

HOT MIX TYPE TO BE APPROVED BY THE ENGINEER.

LENGTHENING AND SPECIAL NOTES FOR DOWEL OPERATIONS:

THE BREAK BACK LINES, AS SHOWN OR AS LOCATED AND APPROVED BY THE ENGINEER, SHALL BE SAW CUT(SCORED) 1" DEEP AND NORMAL TO THE CONCRETE SURFACE AS TO PROVIDE A CLEAN FIT UP OF NEW CONSTRUCTION. AFTER SCORING, REMOVE DAMAGED PORTIONS OF THE EXISTING STRUCTURE AND REPAIR AREAS TO A NEAT CONDITION MATCHING THE ORIGINAL PROFILE.

CARE SHALL BE TAKEN IN BREAKING BACK THE CONCRETE SO THAT EXISTING REINFORCING CAN BE RE-USED IF NEEDED. EXPOSED REINFORCING WHICH REMAINS FIRMLY ANCHORED TO THE CONCRETE SHALL BE CLEANED AND INCORPORATED INTO THE NEW CONSTRUCTION.

THE ROUGHENED, EXPOSED CONCRETE SURFACES SHALL BE CLEANED OF ALL LOOSE DEBRIS PRIOR TO THE PLACEMENT OF NEW CONCRETE.

UNLESS OTHERWISE APPROVED BY THE ENGINEER, USE ONLY HAND TOOLS OR POWER-DRIVEN CHIPPING HAMMERS (15-LB CLASS MAXIMUM) TO REMOVE CONCRETE ADJACENT TO EXTENSION AREA TO AVOID DAMAGING SURROUNDING CONCRETE.

HOLES SHALL BE DRILLED WITH A NON-IMPACT, ROTARY CORE DRILL AND CLEANED PER TXDOT SPECIFICATION REQUIREMENTS AND ADHESIVE MANUFACTURER'S INSTRUCTIONS. NO IMPACT HAMMER DRILLS WILL BE ALLOWED. NOTE THAT A SPECIAL DRILL BIT (TO CUT THROUGH EXISTING REINFORCING) MAY BE REQUIRED. ANCHORS SHALL BE INSTALLED PER ADHESIVE MANUFACTURER'S INSTRUCTIONS. SEE ITEM 420 "CONCRETE STRUCTURES SECTION 420.4.7.10 INSTALLATION OF DOWELS AND ANCHOR BOLTS IN ADDITION TO ITEM 450 RAILING FOR ALL INSTALLATION REQUIREMENTS.

ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, N_{ba}, OF 26.4 KIPS. SUBMIT SIGNED AND SEALED CALCULATIONS OR THE MANUFACTURERS PUBLISHED LITERATURE SHOWING THE PROPOSED ANCHOR ADHESIVE'S ABILITY TO DEVELOP THIS LOAD TO THE ENGINEER FOR APPROVAL PRIOR TO USE. ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH ITEM 450,"RAILING." TEST ADHESIVE ANCHORS IN ACCORDANCE WITH ITEM 450.3.3, "TESTS." TEST 3 ANCHORS PER 100 ANCHORS INSTALLED. BREAK BACK WINGS AND APRON AS NECESSARY TO INSTALL THE EXTENSION. CLEAN AND EXTEND THE EXPOSED WINGWALL AND APRON REINFORCING INTO THE EXTENSION. WHEN LENGTHENING EXISTING BOX CULVERTS WITH DIMENSIONS DIFFERENT THAN CURRENT STANDARD DIMENSIONS, FORM HORIZONTAL AND VERTICAL TRANSITIONS AS DIRECTED BY THE ENGINEER. MATCH BOTTOM SLABS TO MAINTAIN AN UNINTERRUPTED FLOW LINE. FIELD BEND EXISTING AND NEW REINFORCING INTO TRANSITIONS AND MAINTAIN SPECIFIED COVER REQUIREMENTS.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630

TEMPORARY SHORING DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		118

DATE: 4/26/2023 4:11:22 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\Temporary Special Shoring Detail Final.dgn

SUMMARY OF TEMPORARY SPECIAL SHORING & TRENCH PROTECTION

STRUCTURE #	STATION	STRUCTURE TYPE	DESCRIPTION OF STRUCTURE	LEFT/RIGHT	EXISTING END TREATMENT TYPE	TYPE OF SHORING		TRENCH PROTECTION (LF)	RETAIN EXISTING PARALLEL WING (YES/NO)	RETAIN EXISTING FLARED WING (YES/NO)	REMARKS
						BENCH OR SLOPING (SF)	MECHANICAL (SF)				
STR #3	166+21.00	CBC	2 - 10 X 9	BOTH	FW	1050	1050			NO	
STR #16	370+32.84	CBC	2 - 5 X 3	BOTH	FW	500	500			NO	
PROJECT TOTALS						1550	1550	0			

NOTE:
EVALUATION OF THE EXISTING WINGWALL TO REMAIN SHALL BE PERFORMED TO ENSURE STABILITY OF THE WALL ONCE DETACHED FROM EXISTING CULVERT WALL. SUBMIT THIS EVALUATION FOR APPROVAL PRIOR TO PERFORMING ANY REMOVAL.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630

TEMPORARY SHORING DETAILS

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		119

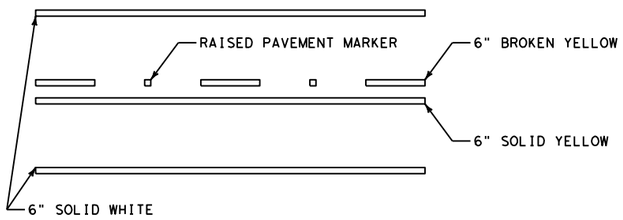
DATE: 4/26/2023 4:11:23 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\5. Drainage\Temporary Special Shoring Detail Final.dgn

NOTES:

REFER TO APPLICABLE STANDARDS FOR PLACEMENT AND SPACING OF PAVEMENT MARKINGS

STRIPING CONVENTION

SOLID YELLOW RT OF CL



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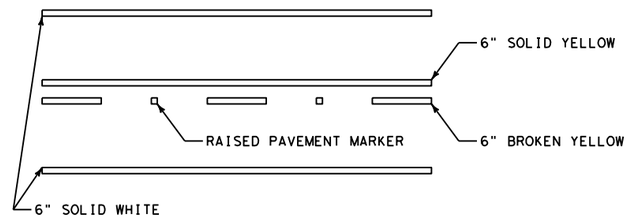
SOLID YELLOW LT OF CL



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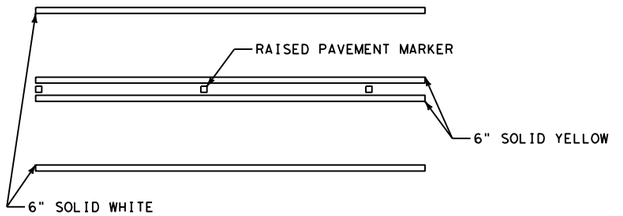
DOUBLE SOLID YELLOW
(NO PASSING)



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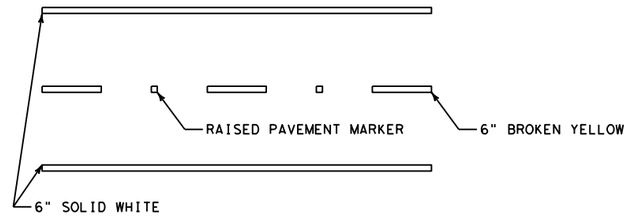
BROKEN YELLOW
(PASSING PERMITTED)



STA INCREASE →

STRIPING LAYOUT

LOCATION			DOUBLE SOLID	BROKEN/ SOLID RIGHT	BROKEN/ SOLID LEFT	BROKEN
STA	TO	STA				
125+15.00	TO	127+26.20			X	
127+26.20	TO	157+41.08	X			
157+41.08	TO	167+97.08			X	
167+97.08	TO	195+47.96	X			
195+47.96	TO	209+20.76			X	
209+20.76	TO	210+26.36				X
210+26.36	TO	222+14.36		X		
222+14.36	TO	247+01.24	X			
247+01.24	TO	258+94.52			X	
258+94.52	TO	262+90.52	X			
262+90.52	TO	272+93.72			X	
272+93.72	TO	357+78.68	X			
357+78.68	TO	368+39.96			X	
368+39.96	TO	371+56.76				X
371+56.76	TO	381+59.96		X		
381+59.96	TO	404+88.44	X			
404+88.44	TO	415+97.24			X	
415+97.24	TO	422+57.24	X			
422+57.24	TO	423+68.12				
423+68.12	TO	422+78.36	X			

N.T.S.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
PAVEMENT MARKING LAYOUT

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SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		120

DATE: 4/26/2023 4:11:24 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\8. Traffic\PAVEMENT MARKING LAYOUT.dgn

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
45	1	I-2dT	COUNTY LINE (COOKE)	54 x 24	x		10BWG	1	SA	T		
		D10-7a	<3 DIGIT VERTICAL NUMBER> (546)	3 x 10								
45	2	I-2dT	COUNTY LINE (MONTAGUE)	78 x 24	x		10BWG	1	SA	T		
45	3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	x		10BWG	1	SA	P		
45	4	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36 x 36	x		10BWG	1	SA	P		
45	5	D14-4T	ADOPT A HWY NEXT (2) MILES (FRIENDS OF FREEMOUND)	48 x 48	x		10BWG	1	SA	U		
47	6	D20-1TR	COUNTY ROAD (343) RIGHT ARROW	24 x 24	x		10BWG	1	SA	P		
47	7	D20-1TL	COUNTY ROAD (343) LEFT ARROW	24 x 24	x		10BWG	1	SA	P		
48	8	W1-4R	SYMBOL - REVERSE CURVE RIGHT	36 x 36	x		10BWG	1	SA	P		
	9	W11-15c	WATCH FOR SLOW MOVING VEHICLES	36 x 36	x		10BWG	1	SA	P		
49	10	M3-4	WEST <AUXILIARY SIGN>	24 x 12	x		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (1630)	24 x 24								
		D10-7a	<3 DIGIT VERTICAL NUMBER> (548)	3 x 10								
49	11	D20-2T	COUNTY ROAD (341)	24 x 24	x		10BWG	1	SA	P		
49	12	D20-2T	COUNTY ROAD (341)	24 x 24	x		10BWG	1	SA	P		
49	13	D14-4T	ADOPT A HWY NEXT (2) MILES (FRIENDS OF FREEMOUND)	48 x 48	x		10BWG	1	SA	U		
49	14	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	x		10BWG	1	SA	P		
		W13-1P	(45) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
50	16	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	x		10BWG	1	SA	P		
		W13-1P	(45) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
51	17	W1-2R	SYMBOL - HORIZ CURVE RIGHT	36 x 36	x		10BWG	1	SA	P		
		W13-1P	(45) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
52	18	W1-2L	SYMBOL - HORIZ CURVE LEFT	36 x 36	x		10BWG	1	SA	P		
		W13-1P	(45) MPH <ADVISORY SPEED PLAQUE>	18 x 18								
52	19	W11-15c	WATCH FOR SLOW MOVING VEHICLES	36 x 36	x		10BWG	1	SA	P		
		W7-3aP	NEXT (2) MILES <PLAQUE>	24 x 18								
53	20	M3-2	EAST <AUXILIARY SIGN>	24 x 12	x		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (1630)	24 x 24								
		D10-7a	<3 DIGIT VERTICAL NUMBER> (550)	3 x 10								
55	21	W2-1aT	HIGHWAY INTERSECTION AHEAD	48 x 48	x		10BWG	1	SA	T		
55	22	M2-1	JCT <AUXILIARY SIGN>	21 x 15	x		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (373)	24 x 24								
55	23	W3-1	SYMBOL - STOP AHEAD	30 x 30	x		10BWG	1	SA	T		
56	24	D2-1	(DESTINATION) (DISTANCE) <1 LINE>	90 x 18	x		10BWG	1	SA	T		
			Forestburg 12									

DATE: DATE TIME
FILE: DOCUMENT NAME

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).

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	1609	01	029, etc.	FM 1630
4-16	DIST	COUNTY		SHEET NO.
8-16	WFS	COOKE		121

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"	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
56	25	D1-2	(DESTINATION - 2 LINE)	96 x 36	x		S80	1	SA	U		
			(UP ARROW) Gainesville									
			(LEFT ARROW) Muenster									
56	26	R2-1	SPEED LIMIT (55)	30 x 36	x		10BWG	1	SA	P		
56	27	M1-6F	<FM SHIELD> FARM ROAD (373)	24 x 24	x		10BWG	1	SA	P		
		M6-4	<ARROW - DUAL LEFT & RIGHT> <AUX. SIGN>	21 x 15								
56	28	M3-4	WEST <AUXILIARY SIGN>	24 x 12	x		10BWG	1	SA	P		
		M1-6F	<FM SHIELD> FARM ROAD (1630)	24 x 24								

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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NOTE:

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

DATE: DATE TIME
FILE: DOCUMENT NAME

SHEET 2 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

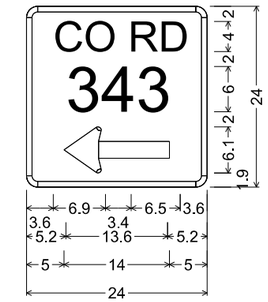
FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
4-16	DIST	COUNTY		SHEET NO.
8-16	WFS	COOKE		122

18

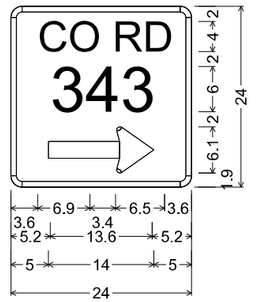
D1-2 8in UP-LT;

1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 10.0" X 7.1" 90'; "Gainesville", ClearviewHwy-3-W;

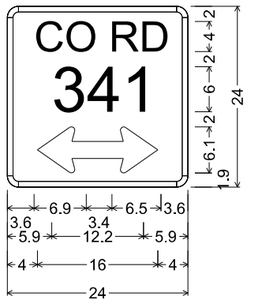
1.9" Radius, 0.8" Border, White on, Green;
Standard Arrow Custom 12.0" X 7.1" 180'; "Muenster", ClearviewHwy-3-W;



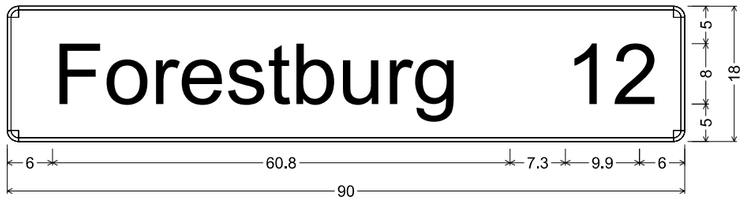
D20-1TL_24x24;
1.5" Radius, 0.8" Border, White on, Green;
"CO RD", ClearviewHwy-3-W;
"343", ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 180';



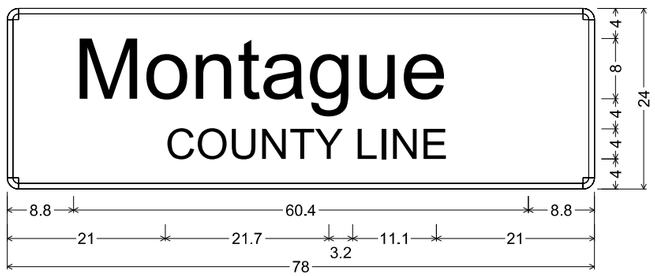
D20-1TR_24x24;
1.5" Radius, 0.8" Border, White on, Green;
"CO RD", ClearviewHwy-3-W;
"343", ClearviewHwy-3-W;
Standard Arrow Custom 14.0" X 6.1" 0';



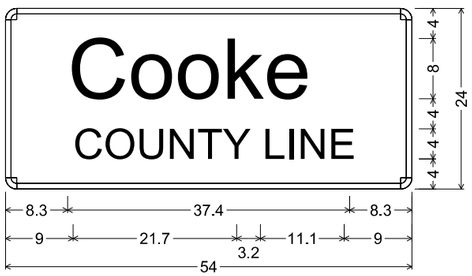
D20-2T_24x24;
1.5" Radius, 0.8" Border, White on, Green;
"CO RD", ClearviewHwy-3-W;
"341", ClearviewHwy-3-W;



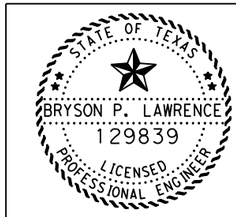
D2-1 8in;
1.5" Radius, 0.5" Border, White on, Green;
"Forestburg", ClearviewHwy-3-W; "12", ClearviewHwy-3-W;



I-2dT 8in;
1.5" Radius, 0.8" Border, White on, Green;
"Montague", ClearviewHwy-5-W-R; "COUNTY LINE", ClearviewHwy-3-W;



I-2dT 8in;
1.5" Radius, 0.8" Border, White on, Green;
"Cooke", ClearviewHwy-5-W-R;
"COUNTY LINE", ClearviewHwy-3-W;



Bryson Lawrence, P.E.

04/27/2023

SMALL SIGN DETAILS

Texas Department of Transportation®

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		110

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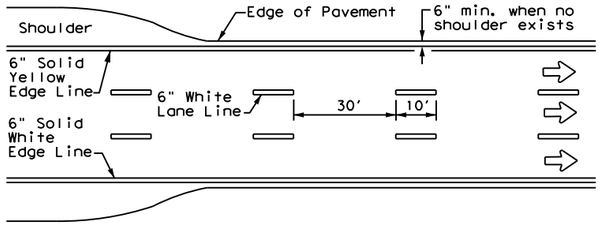
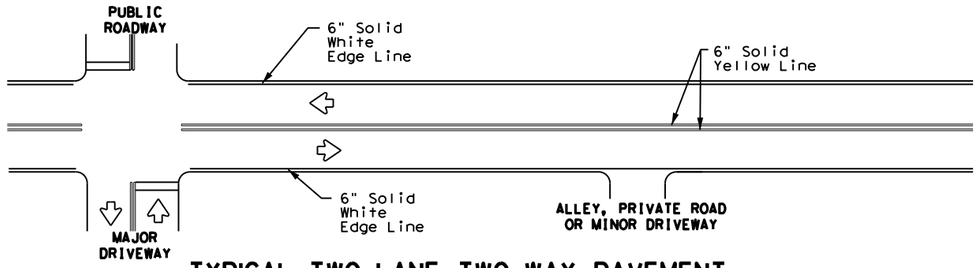
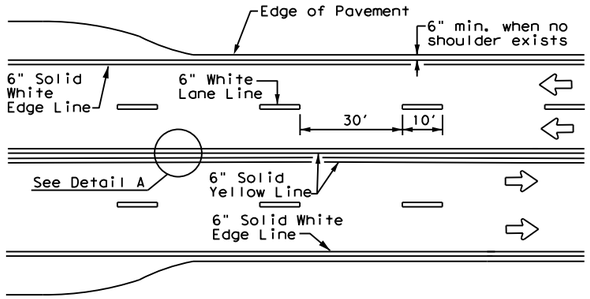
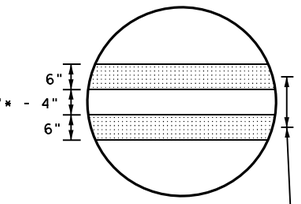


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





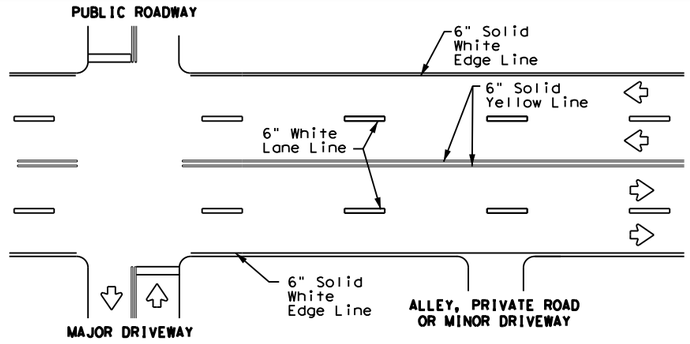
DETAIL "A"

9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)

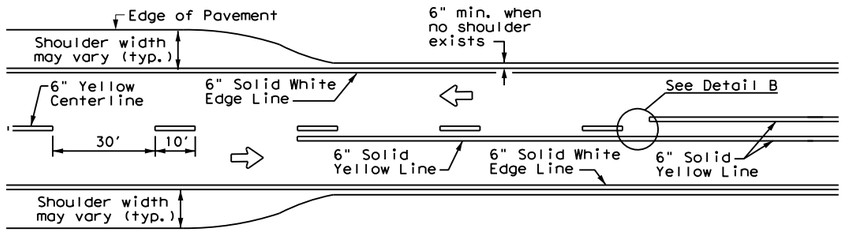
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

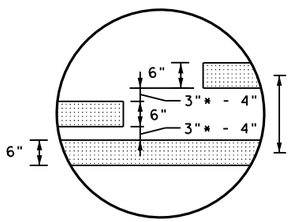
** 8" minimum for restripe projects when approved by the Engineer.



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

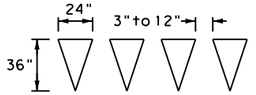


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



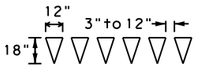
DETAIL "B"

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

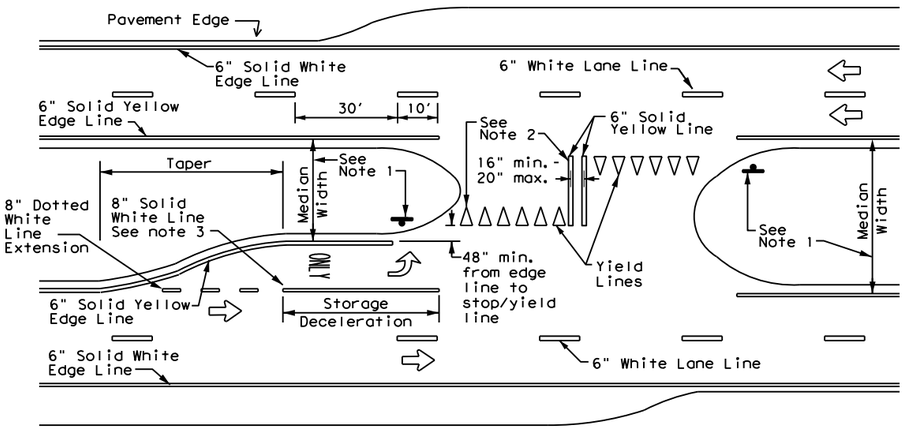


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

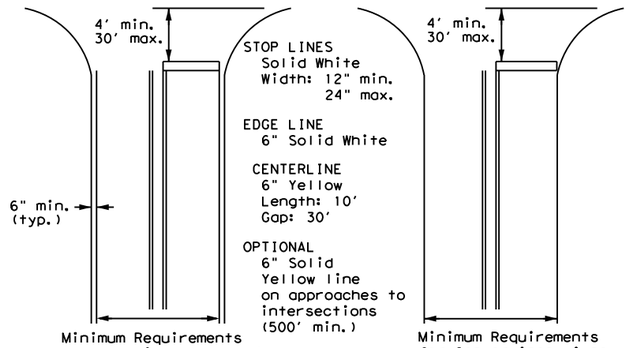
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

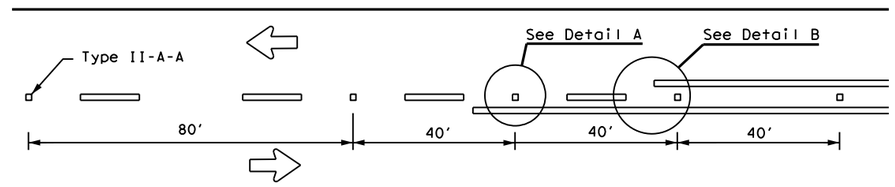
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

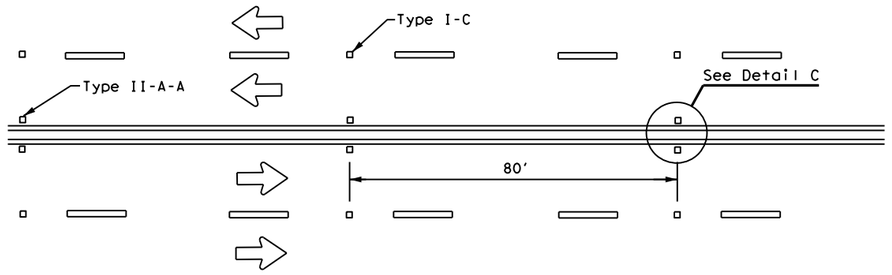
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	1609	01	029, etc.	FM 1630
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	WFS	COOKE		124

22A

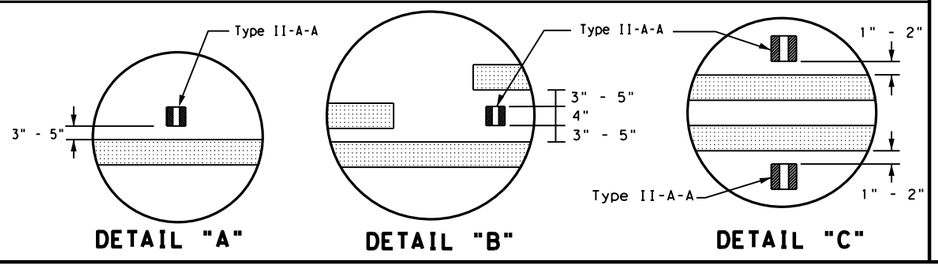
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

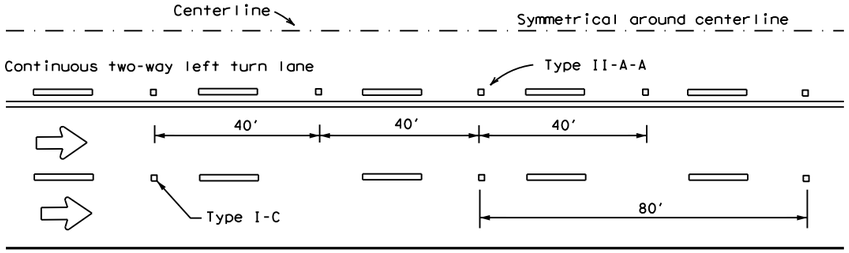


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

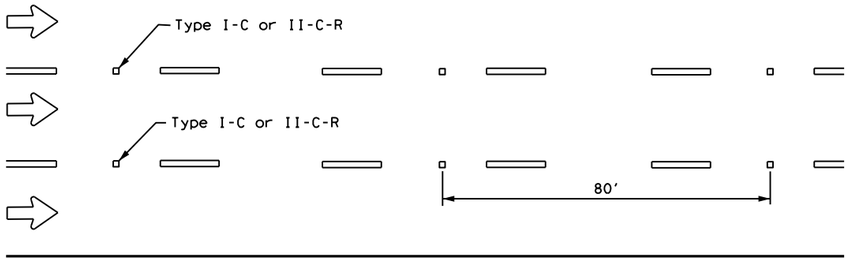


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





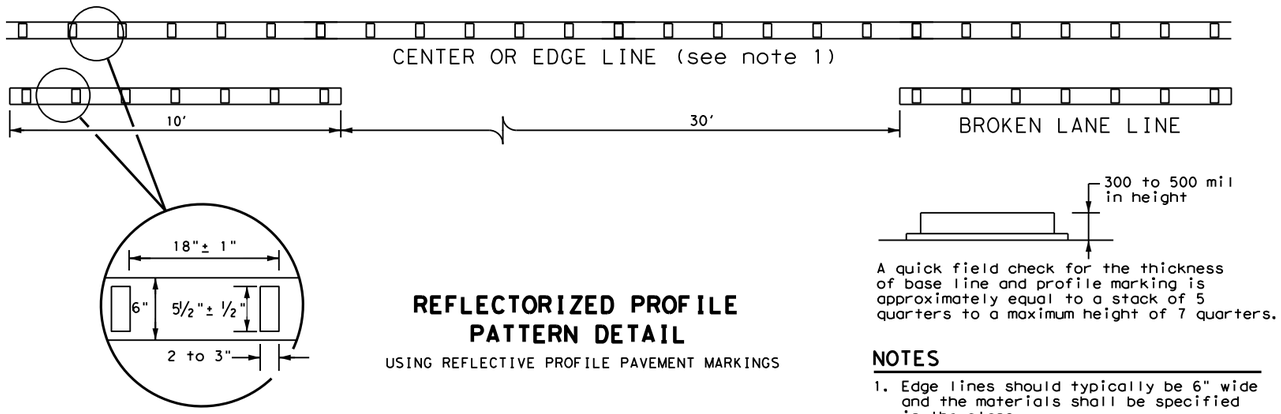
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

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

NOTES

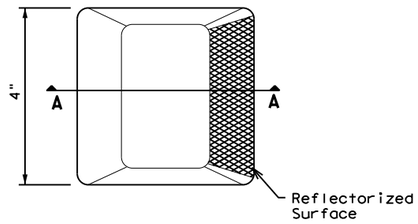
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

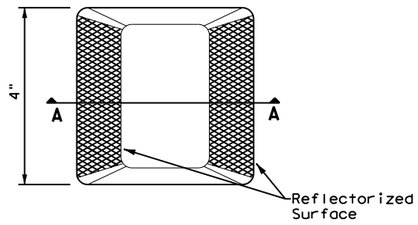
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians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

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

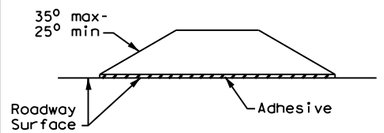
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

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
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		125

22B

DATE: 4/26/2023 4:11:29 PM
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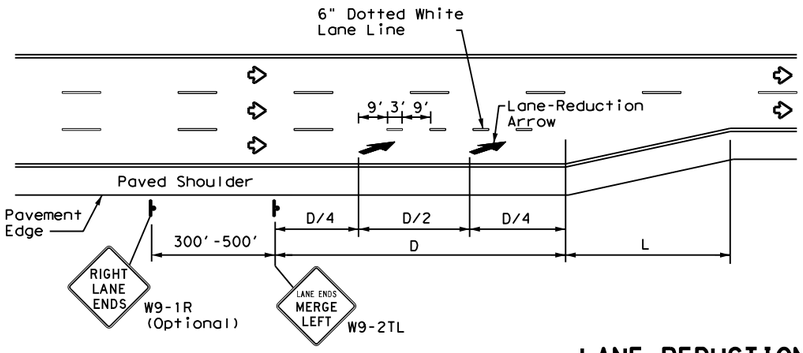
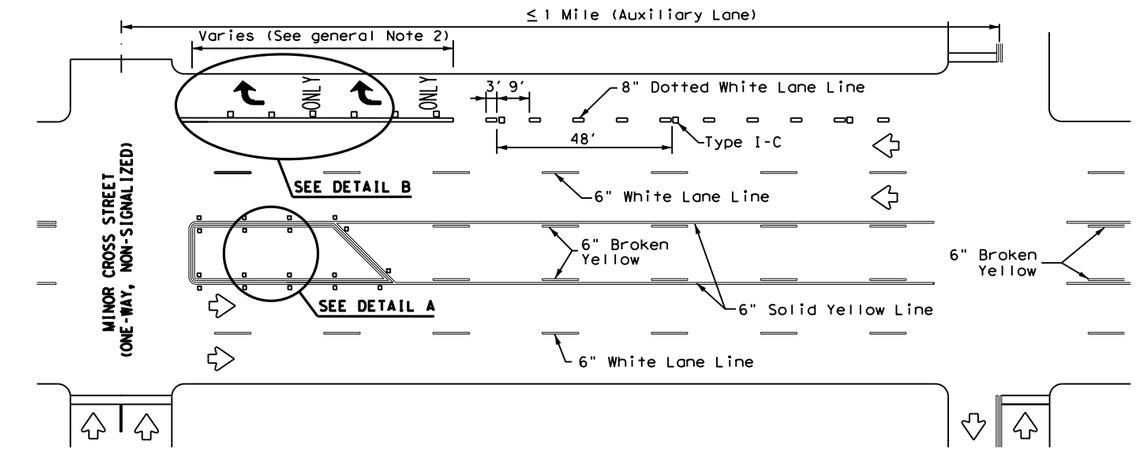


LANE REDUCTION

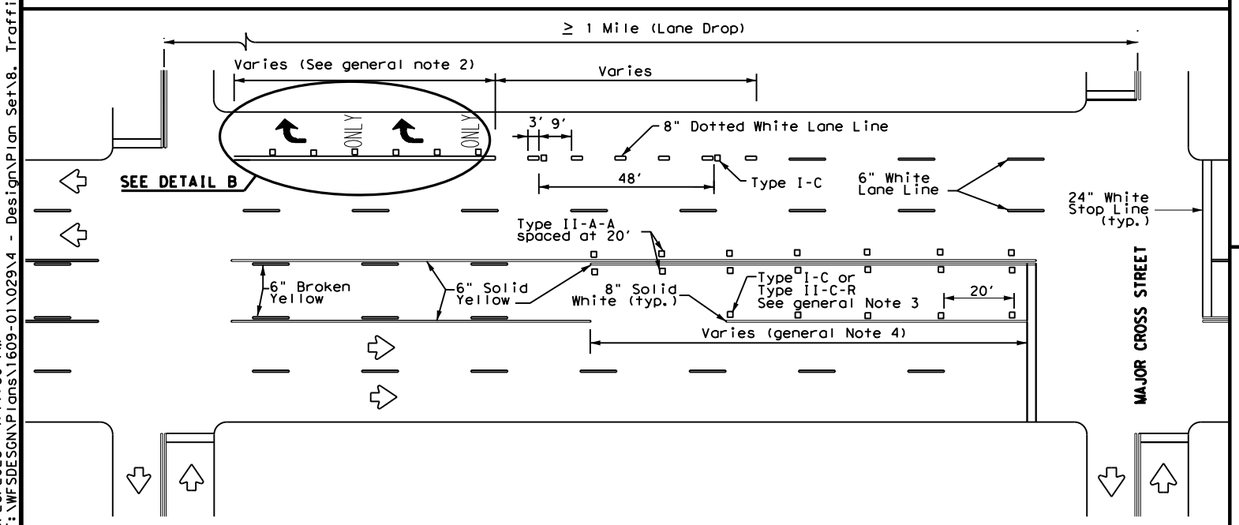
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

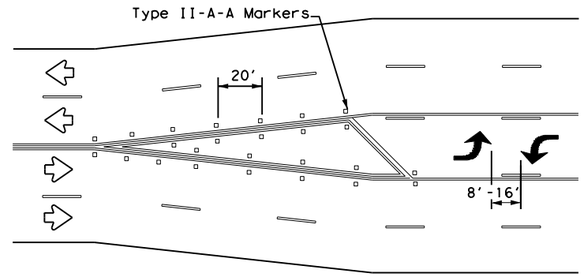
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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



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



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

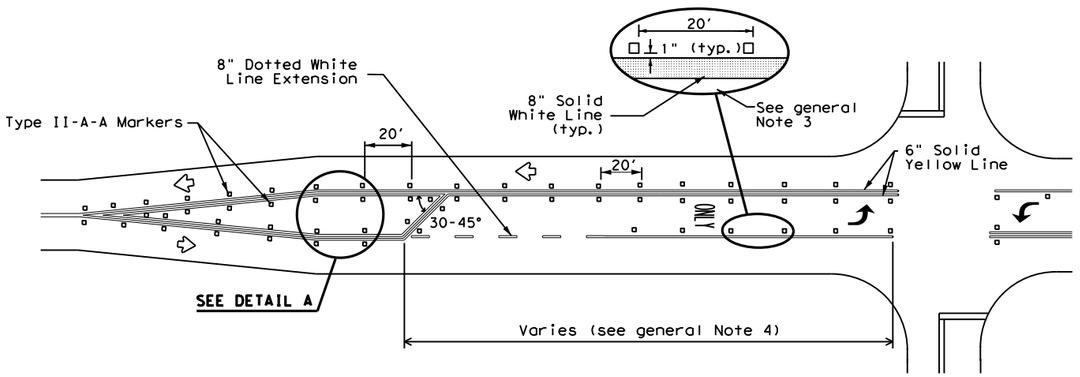
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

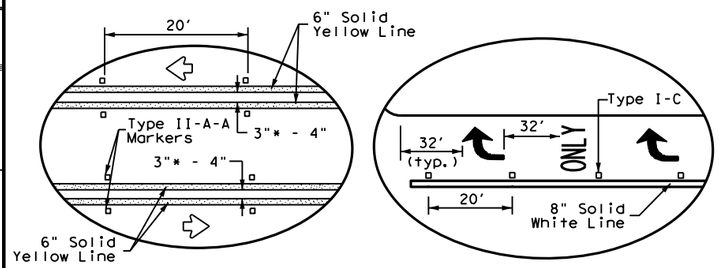
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

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

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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

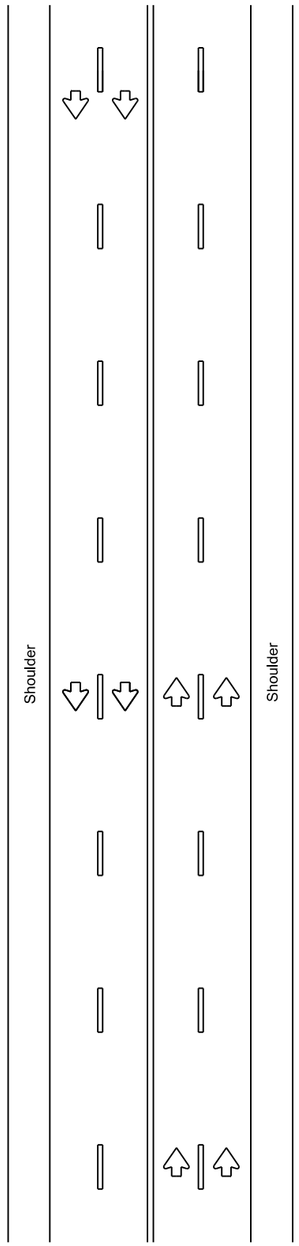
Texas Department of Transportation — Traffic Safety Division Standard

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

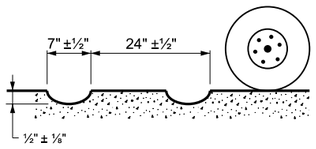
FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20	1609	01	029, etc.	FM 1630
5-00 2-10 12-22	DIST	COUNTY		SHEET NO.
8-00 2-12	WFS	COOKE		126

22C

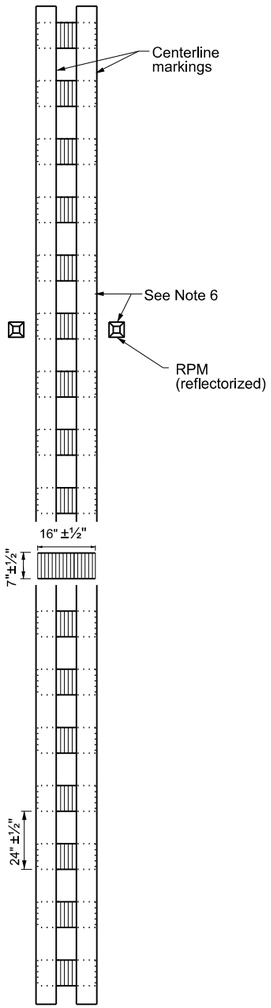
CENTERLINE RUMBLE STRIPS



MULTILANE UNDIVIDED HIGHWAY WITH SHOULDER

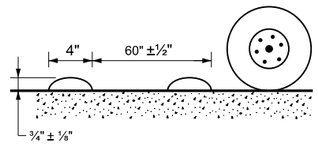


PROFILE VIEW

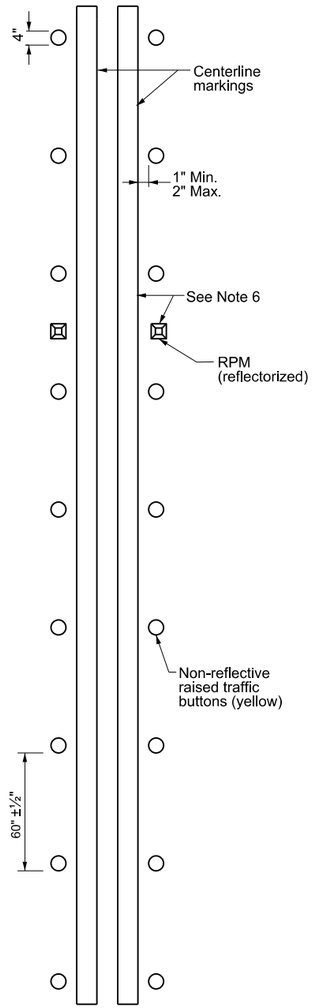


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

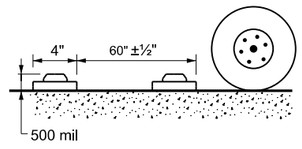


PROFILE VIEW

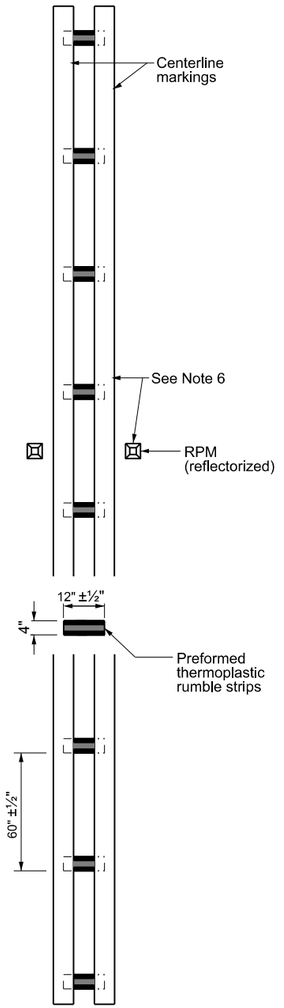


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

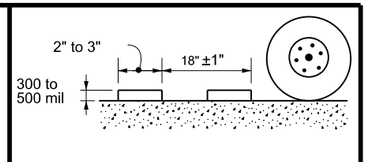


PROFILE VIEW

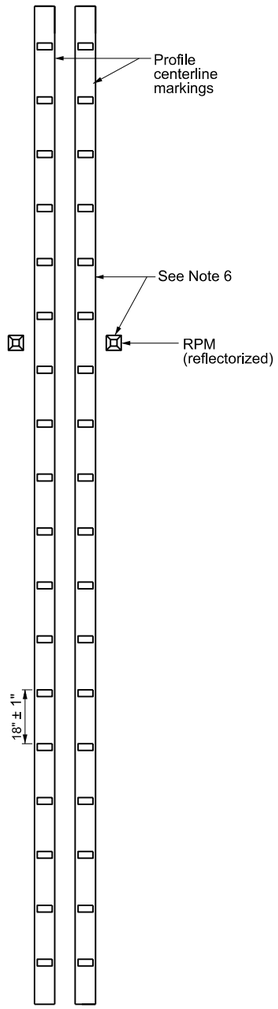


PLAN VIEW
OPTION 3

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).

DATE: 4/26/2023 4:11:31 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\8. Traffic\RS(3)-23.dgn

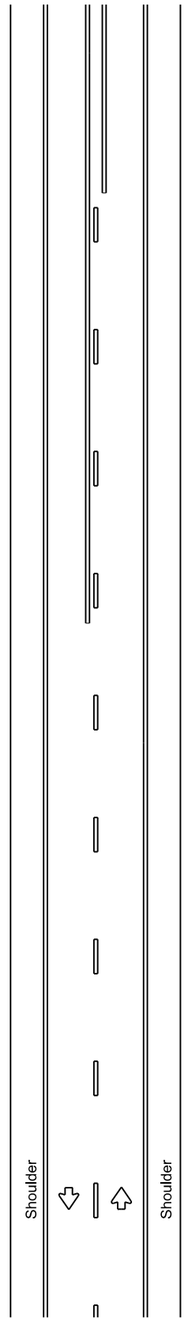
Texas Department of Transportation

Traffic Safety Division Standard

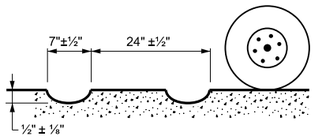
CENTERLINE RUMBLE STRIPS ON MULTILANE UNDIVIDED HIGHWAYS RS(3)-23

FILE: rs(3)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
10-13	DIST	COUNTY		SHEET NO.
1-23	WFS	COOKE		127

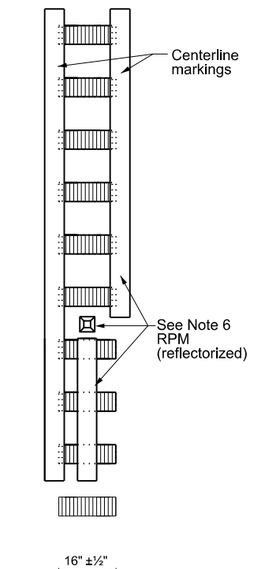
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

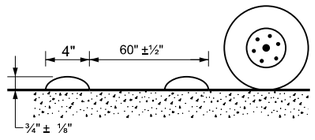


PROFILE VIEW

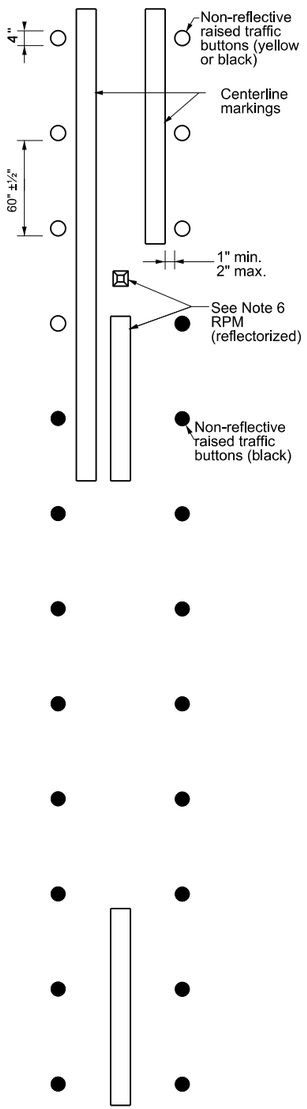


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

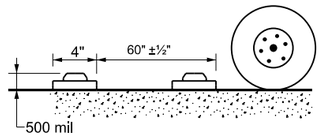


PROFILE VIEW

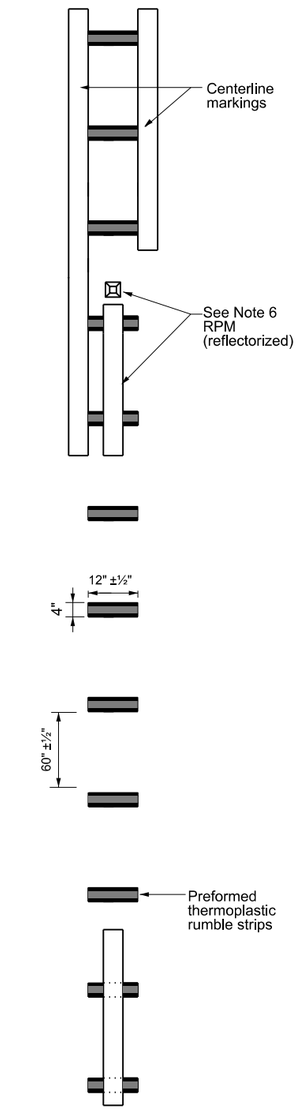


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

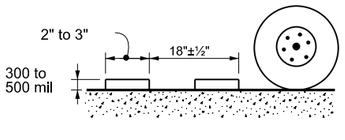


PROFILE VIEW

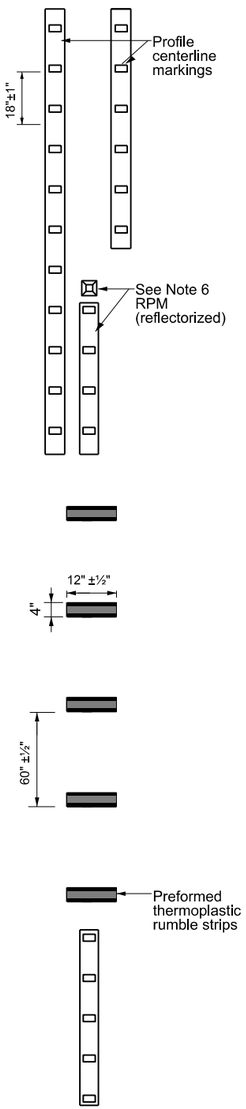


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS 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).

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	1609	01	029, etc.	FM 1630
10-13	DIST	COUNTY		SHEET NO.
1-23	WFS	COOKE		128

DATE: 4/26/2023 4:11:33 PM
FILE: T:\WFSDESIGN\Plans\1609-01\029\v4 - Design\Plan Set\8. Traffic\RS(4)-23.dgn

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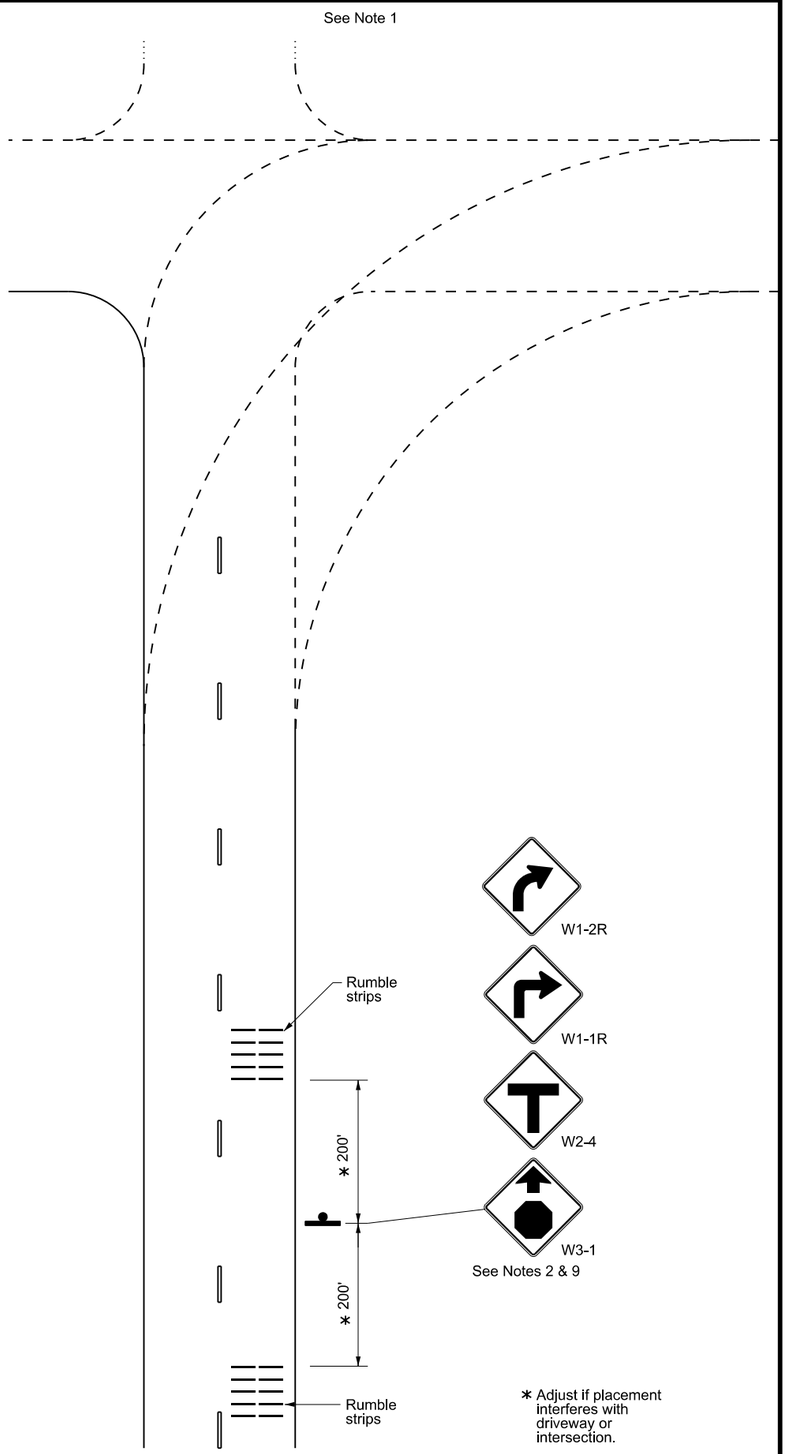
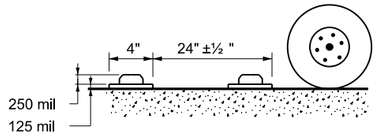
FILE: T:\WFSDESIGN\Plans\1609-01\0204 - Design\Plan Set\8_Traffic\RS(5)-23.dgn

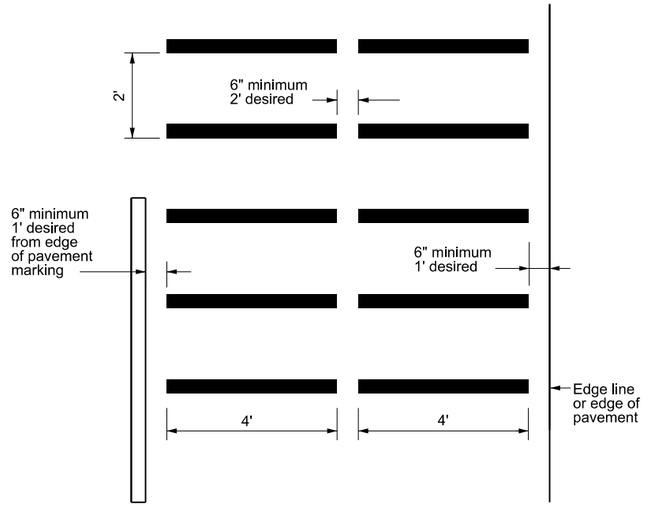
RUMBLE STRIP TYPICAL APPLICATION





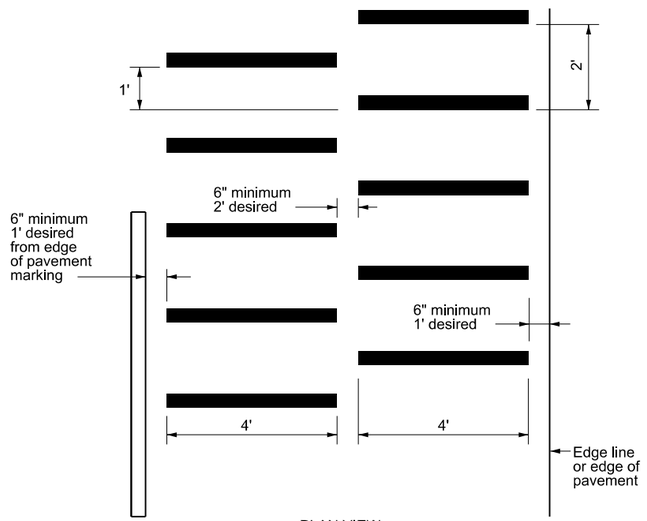
PROFILE VIEW

RUMBLE STRIP STANDARD PATTERN



PLAN VIEW

RUMBLE STRIP ALTERNATIVE PATTERN



PLAN VIEW

GENERAL NOTES

1. Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or stop-controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.
2. When used, the rumble strips shall be placed 200 feet upstream and downstream of the warning sign.
3. The use of rumble strips should not be widespread or indiscriminate.
4. Preformed black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.
5. Please reference the TxDOT Material Producers List for approved rumble strips (transverse): http://www.txdot.gov/
6. Consideration should be given to noise levels when in-lane or transverse rumble strips are to be installed near residential areas, schools, churches, etc.
7. The RUMBLE STRIPS AHEAD (W17-2T) sign may be used in advance of in-lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the Guidelines for Advance Placement of Warning Signs table of the Texas Manual on Uniform Traffic Control Devices.

W17-2T

8. Consideration shall be given to bicyclists. See RS(6).
9. Other signs can be used as conditions warrant.

Texas Department of Transportation

Traffic Safety Division Standard

TRANSVERSE OR IN-LANE RUMBLE STRIPS

RS(5)-23

FILE: rs(5)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-06 1-12, 2-10, 10-13	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		129

94

DATE: 4/26/2023 4:11:35 PM
FILE: T:\WFSDESGN\Plans\WFS Standards\DGNs\Pavement Markings\D&OM(1)-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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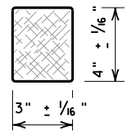
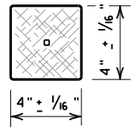
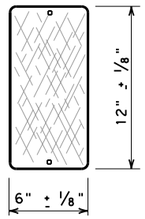
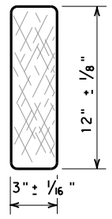
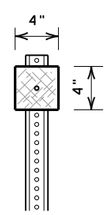
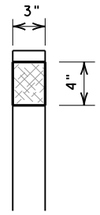
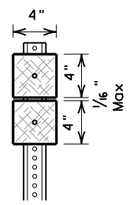
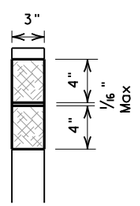
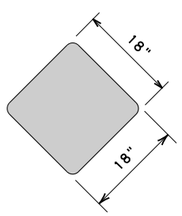
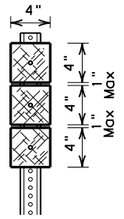
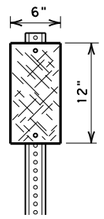
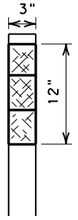
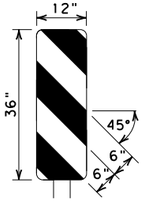
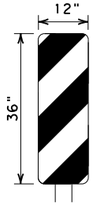
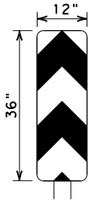
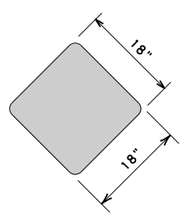
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

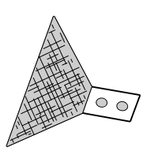
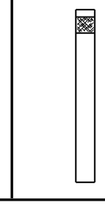
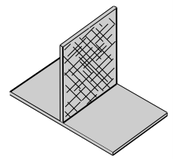
DELINEATORS

	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

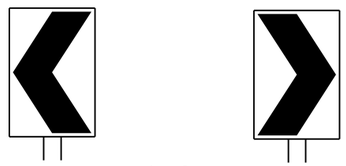
OBJECT MARKERS

	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_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

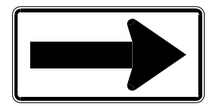
BARRIER REFLECTORS (BRF)

	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"	

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

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

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

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
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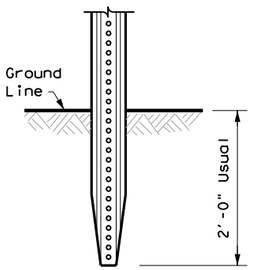
REVISIONS	1609	01	029, etc.	FM 1630
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WFS	COOKE		130

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

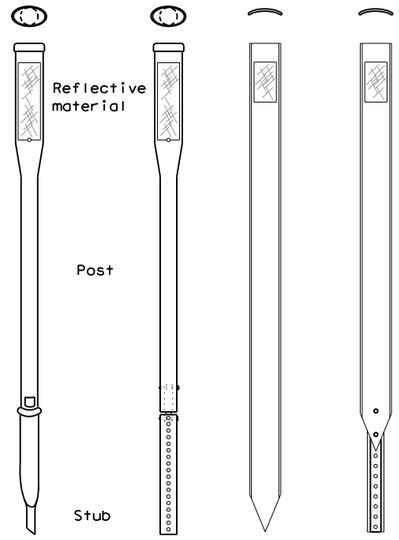


NOTES

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.

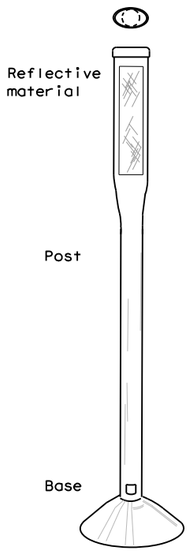
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



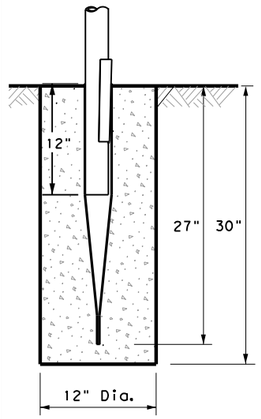
SURFACE MOUNT

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.

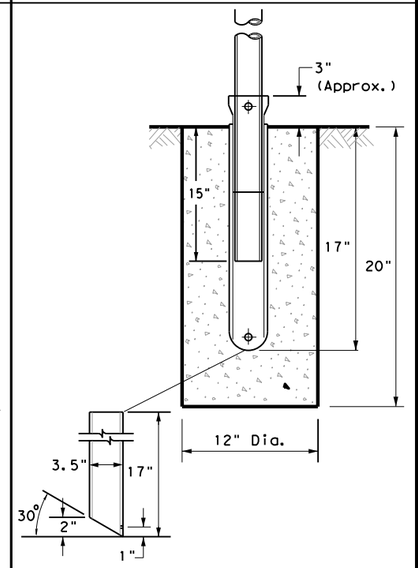
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

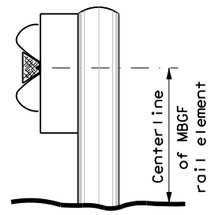
NOTE

1. Install per manufacturer's recommendations.

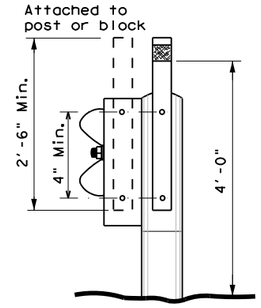
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

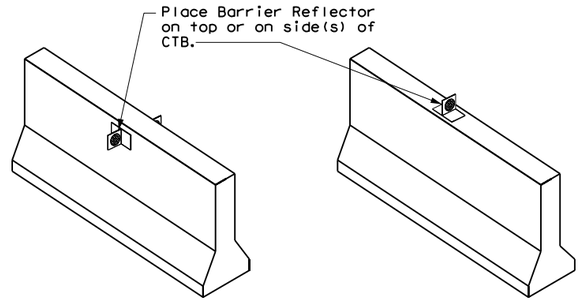
GF1



GF2



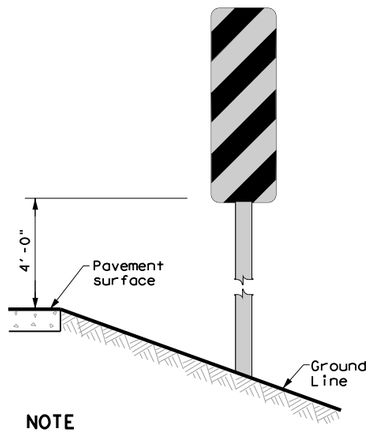
CONCRETE TRAFFIC BARRIER (CTB)



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.

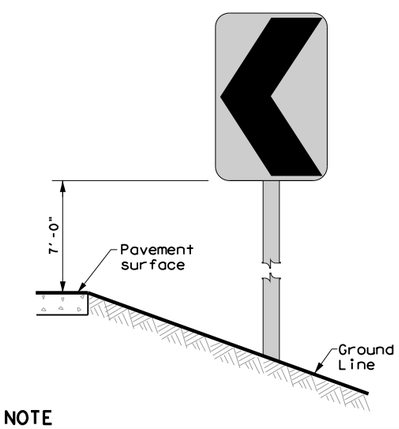
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

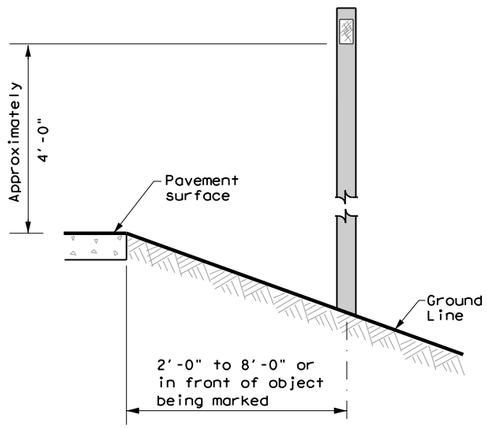
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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
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REVISIONS	1609	01	029, etc.	FM 1630
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WFS	COOKE		131

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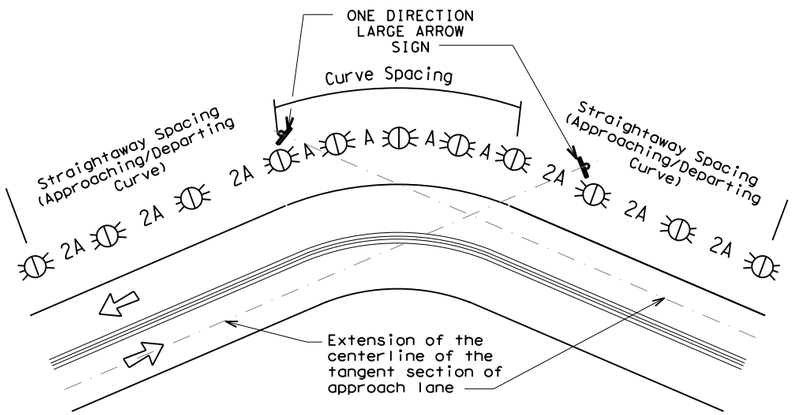
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

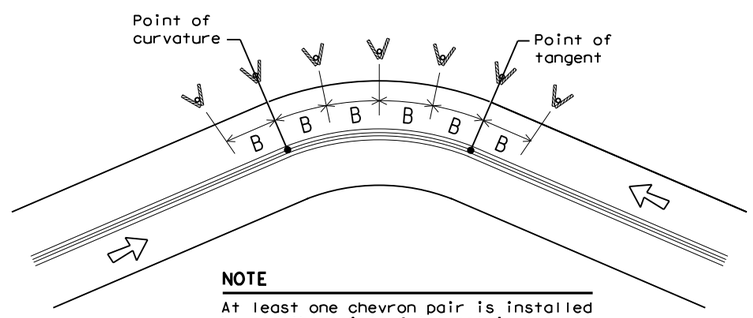
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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
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3-15 8-15		DIST	COUNTY		SHEET NO.
8-15 7-20		WFS	COOKE		132

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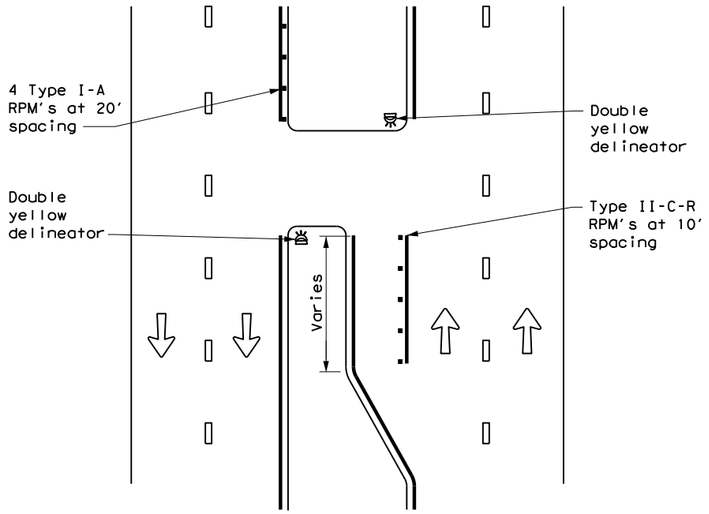
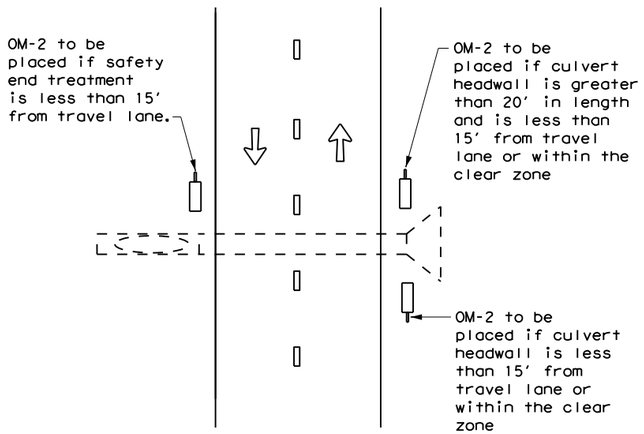
CROSSOVERS



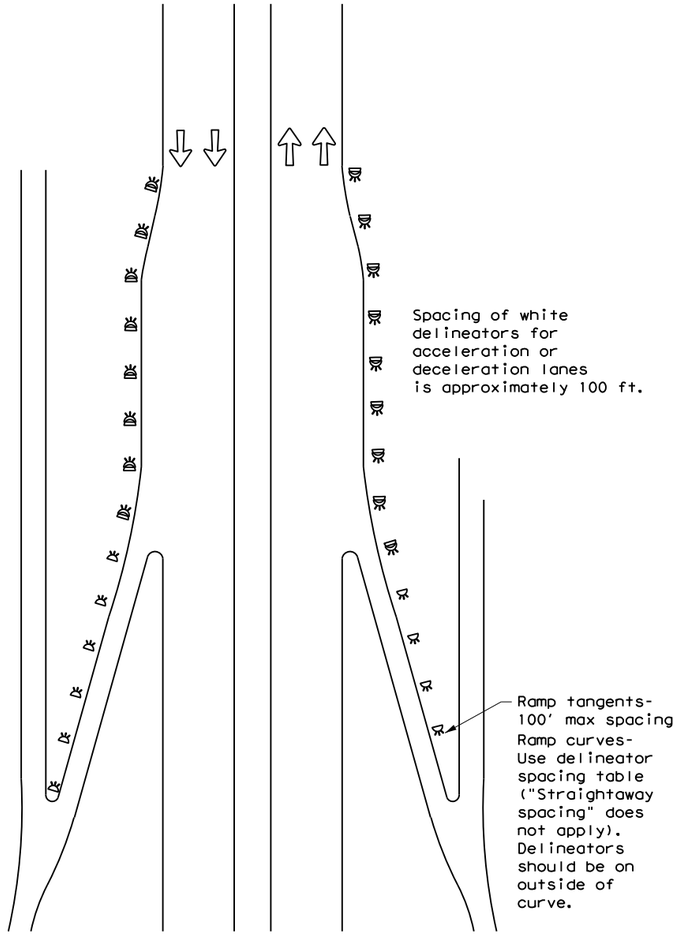
DETAIL 1

FOR CULVERTS WITHOUT MBGF



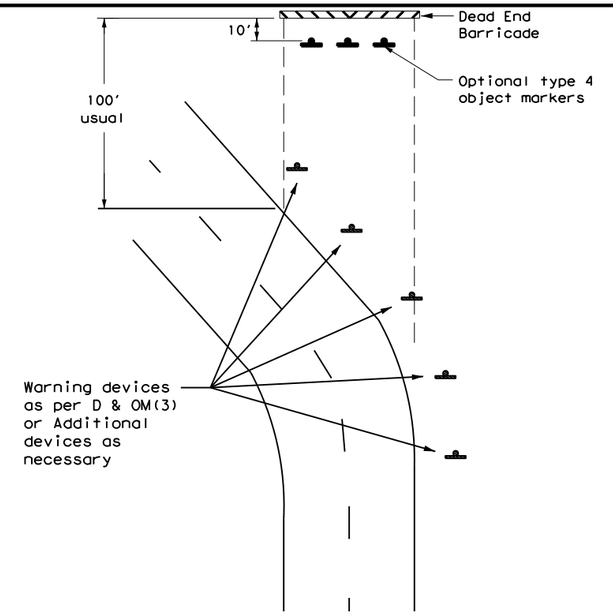
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



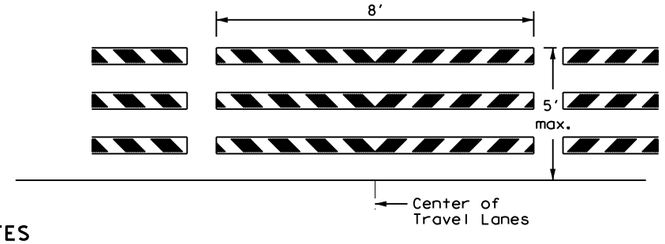
DETAIL 3

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
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3-15	DIST	COUNTY		SHEET NO.
7-20	WFS	COOKE		133

20D

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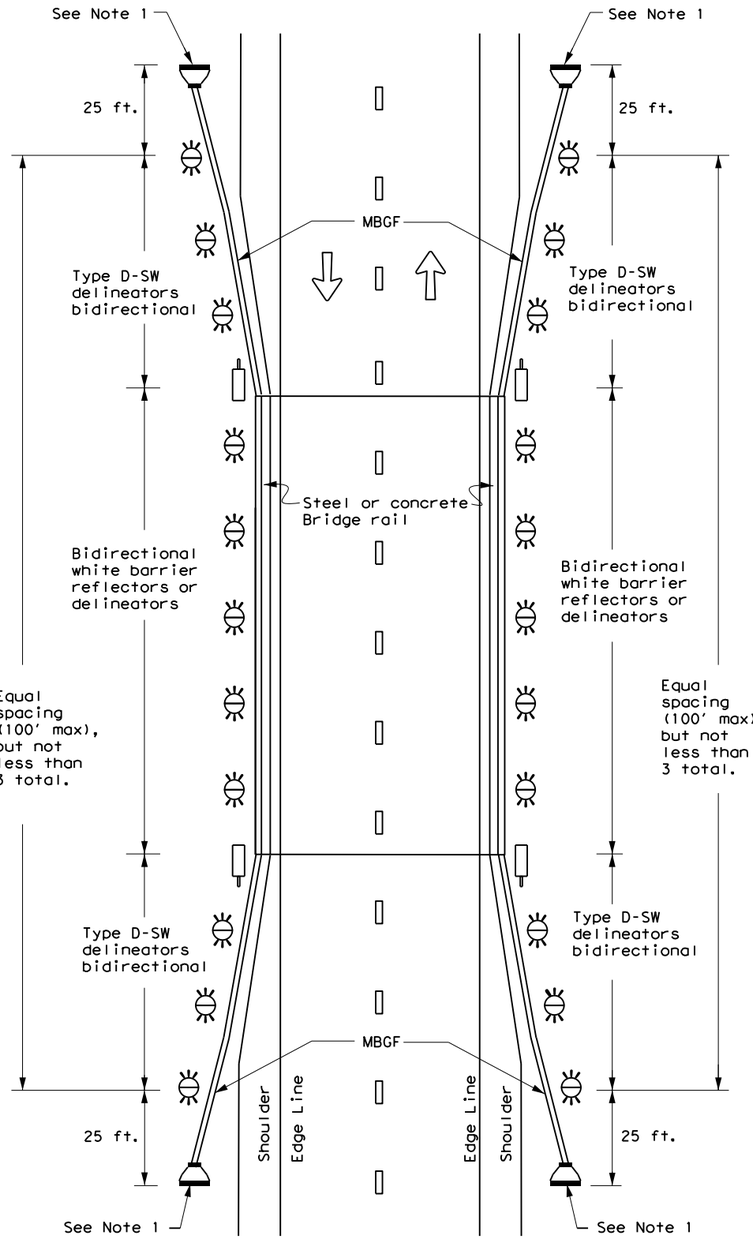
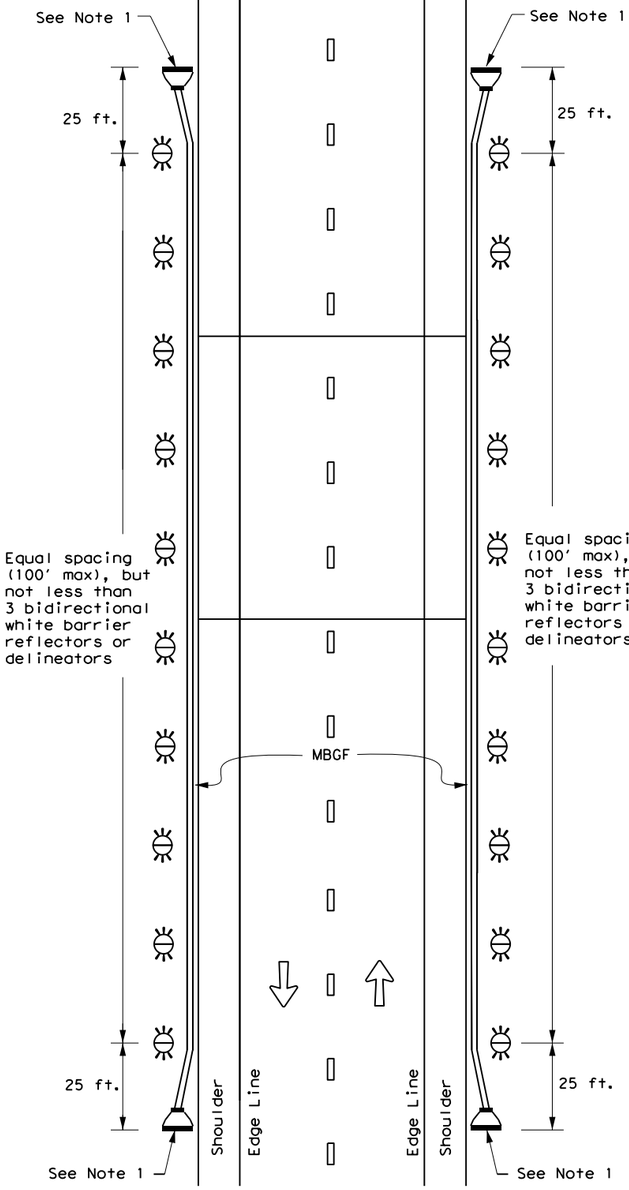
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

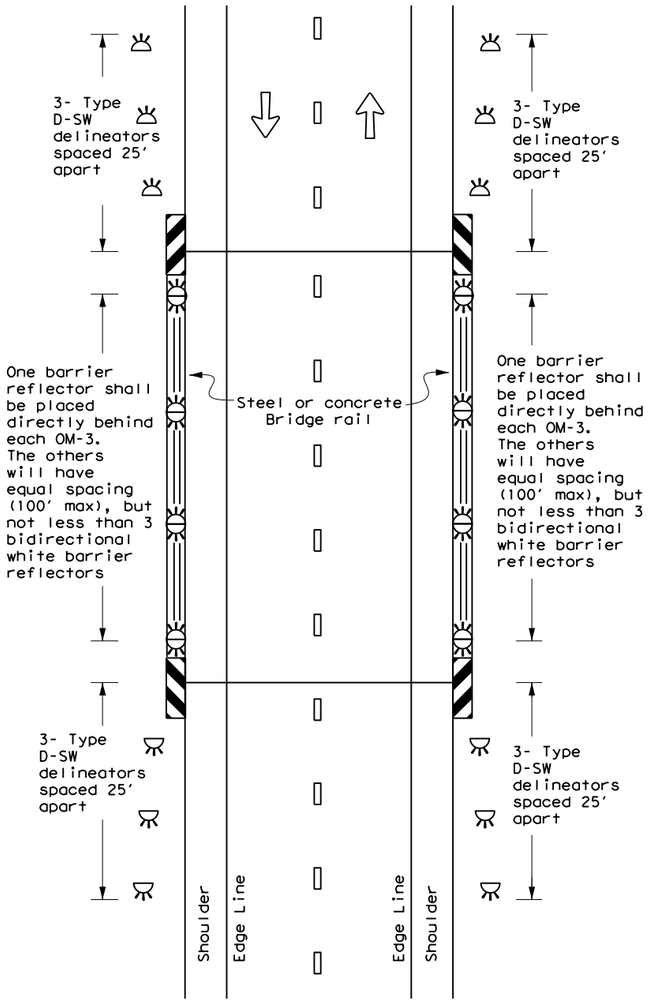
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

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	WFS	COOKE		134

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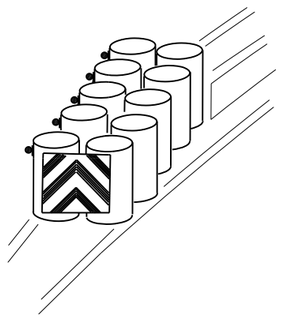
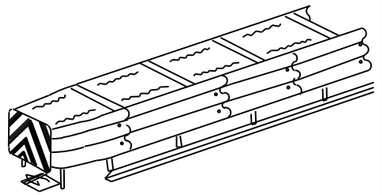
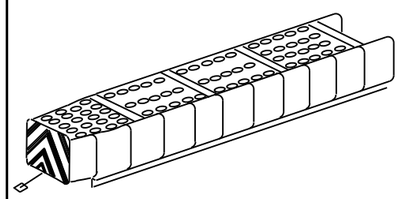
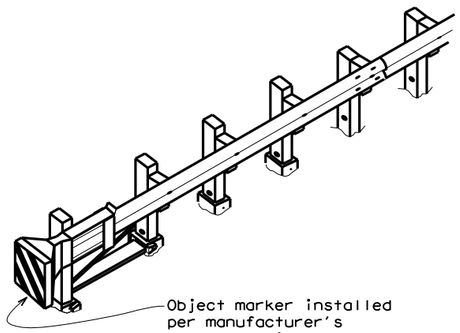
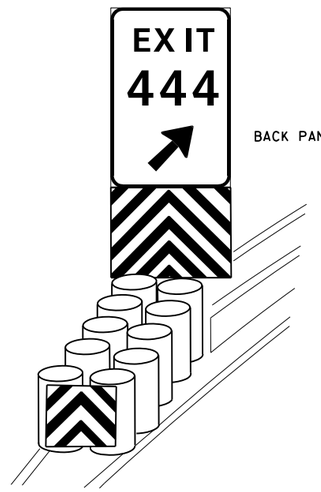
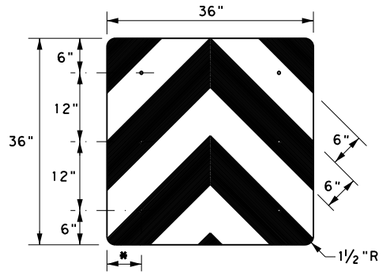


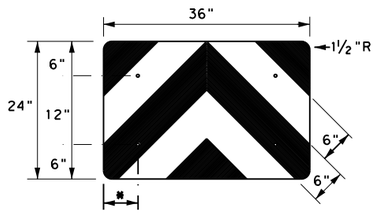




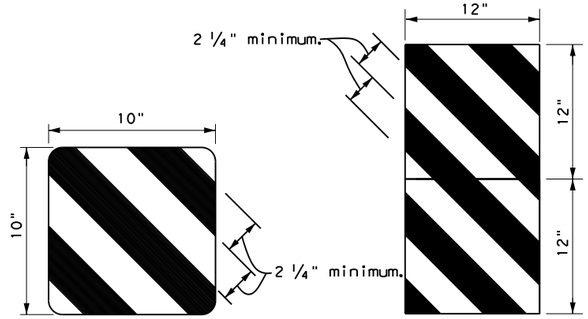




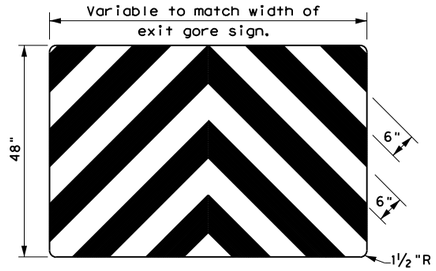


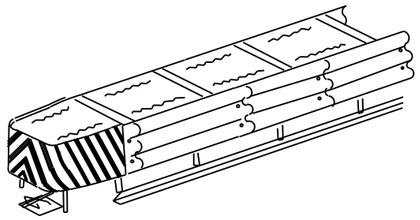


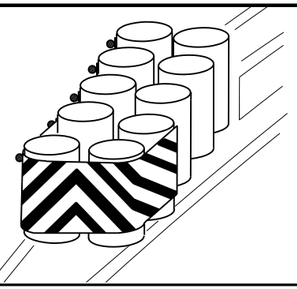
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

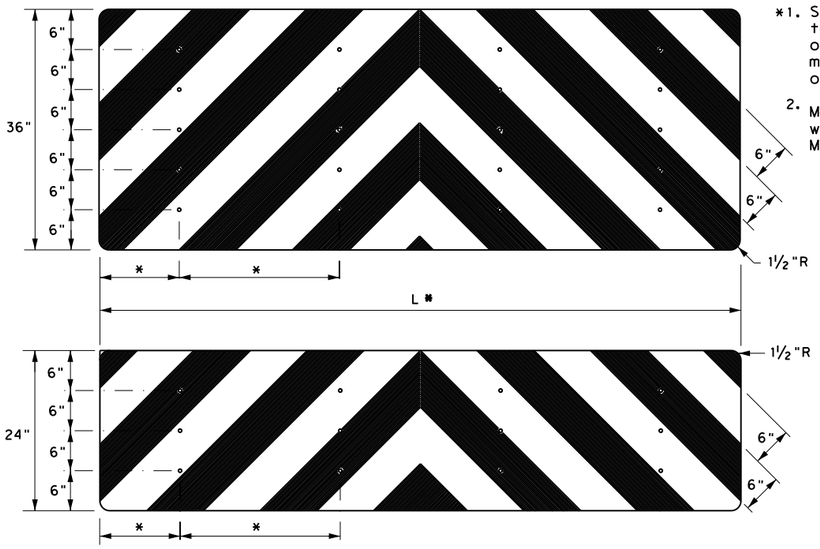


OBJECT MARKERS SMALLER THAN 3 FT^2









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	1609	01	029, etc.	FM 1630
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	WFS	COOKE		135
4-98 7-20				

20G

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)

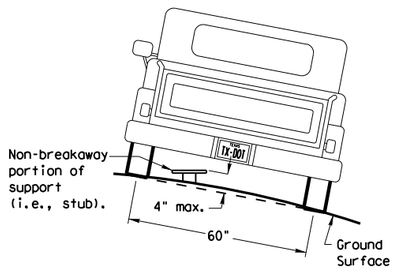
Anchor Type

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-1))

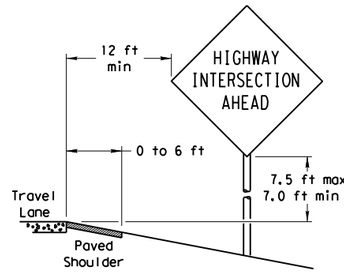
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

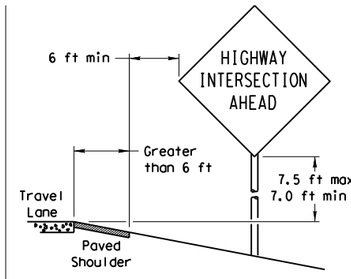
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

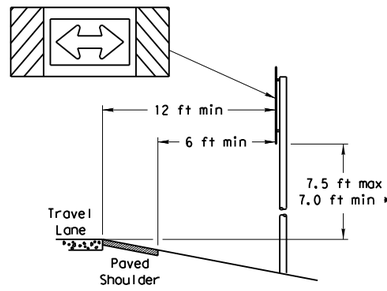
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



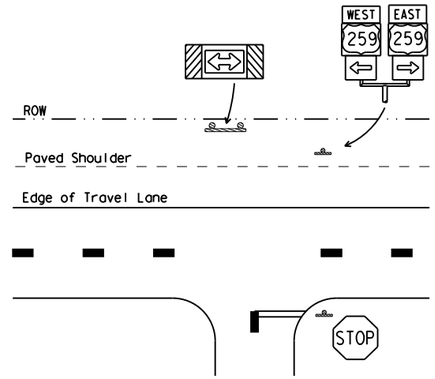
GREATER THAN 6 FT. WIDE

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

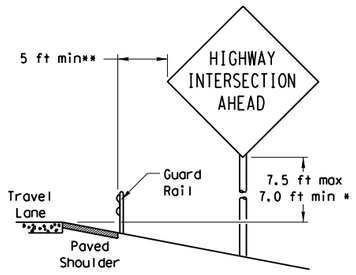
T-INTERSECTION



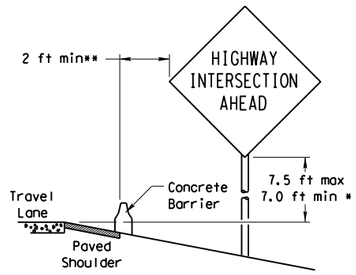
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



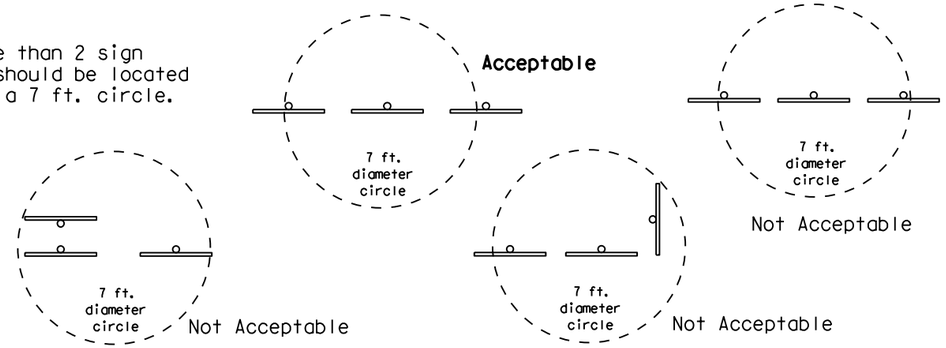
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

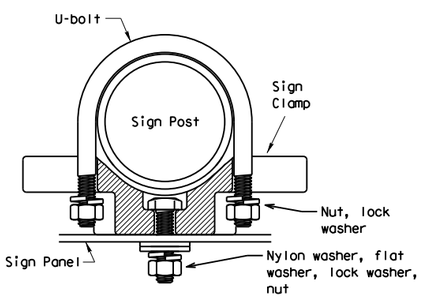
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

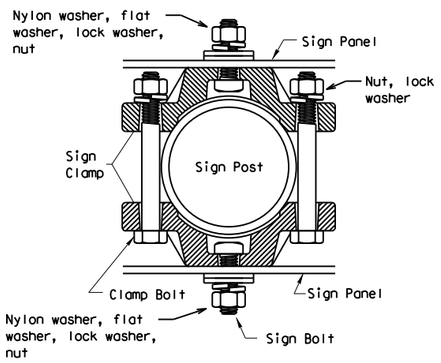


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

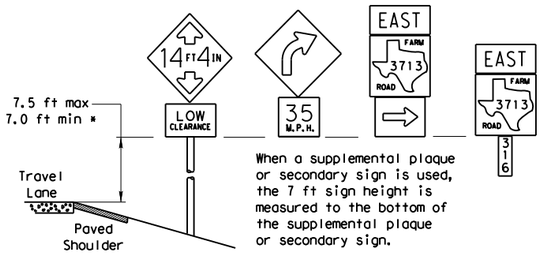
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



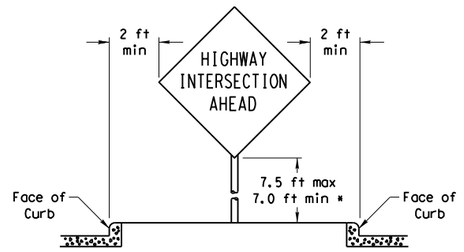
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



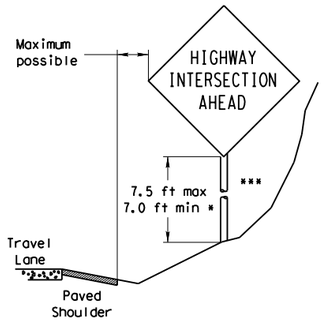
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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.

* 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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

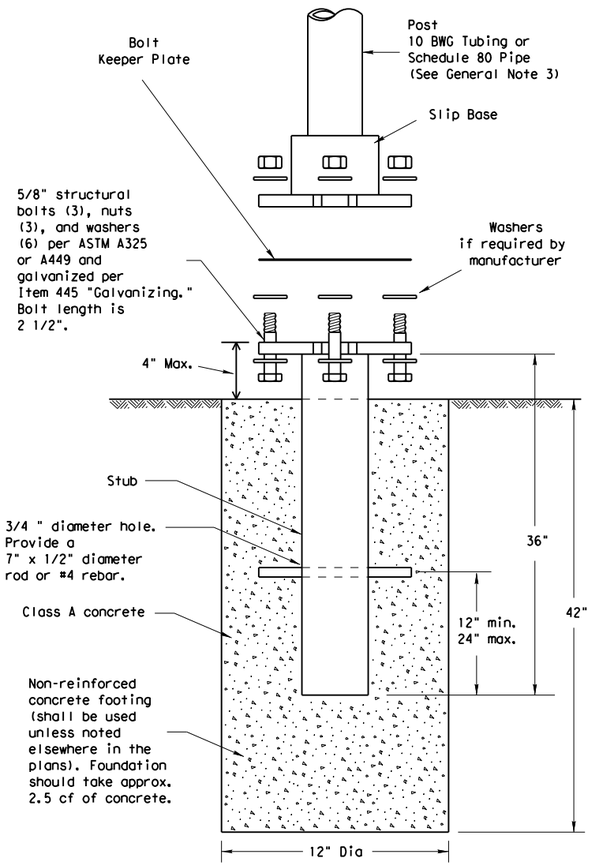
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	136

DATE: 4/26/2023 4:11:41 PM
FILE: T:\WFSDESGN\Plans\WFS Standards\DGNs\Signs Delineators\SMD(GEN)-08.dgn

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.

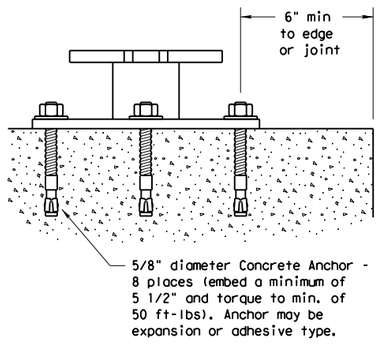
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	137

DATE: 4/26/2023 4:11:42 PM
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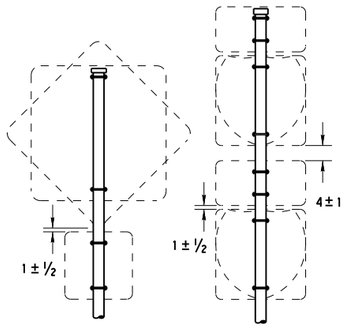
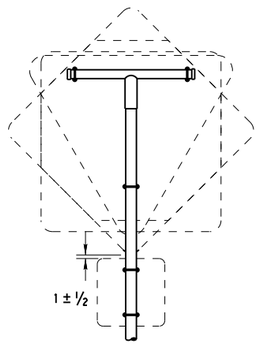


SM RD SGN ASSM TY XXXXX(1)XX(P)



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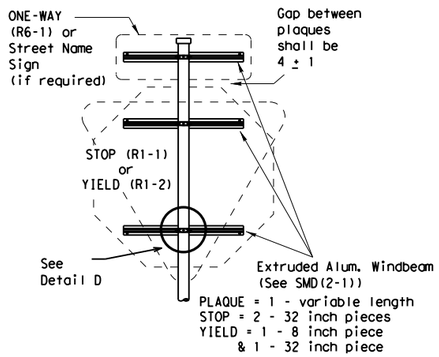

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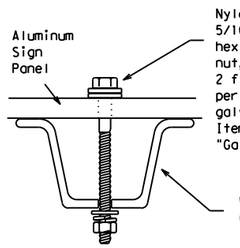
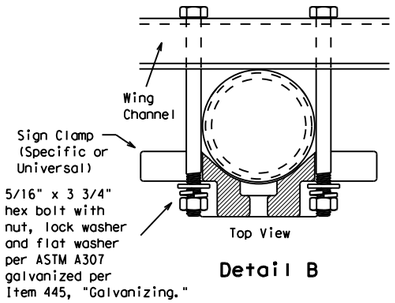
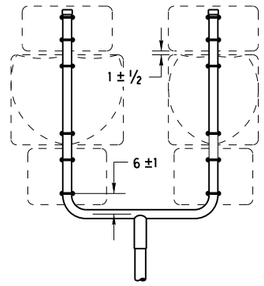


Detail A



Detail B



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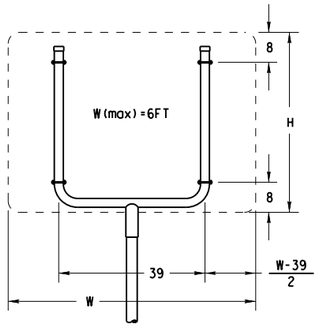

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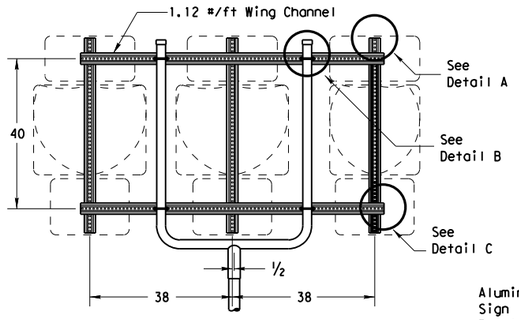
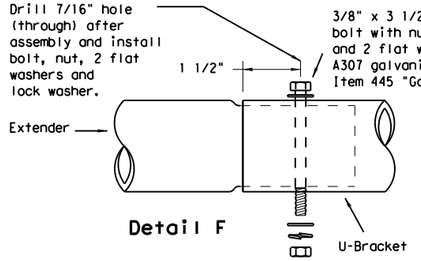
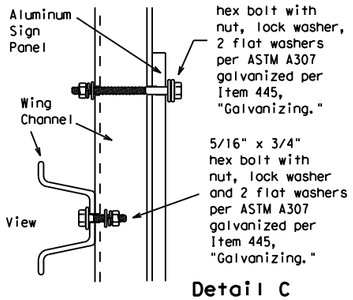


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

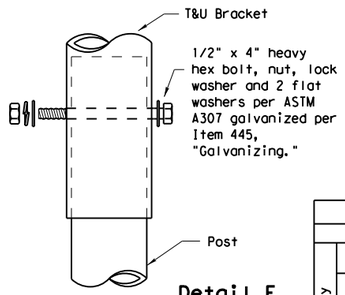


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



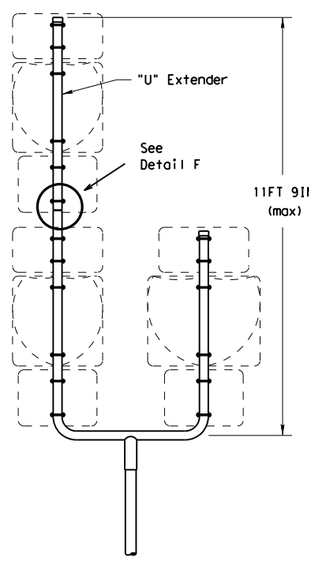
Detail E

GENERAL NOTES:

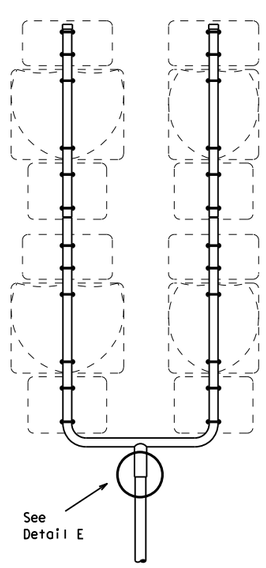
1.

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

2. 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.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. 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.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. 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.
7. 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.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. 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."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. 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.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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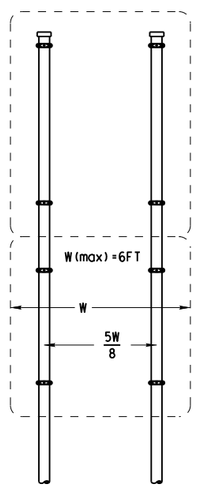
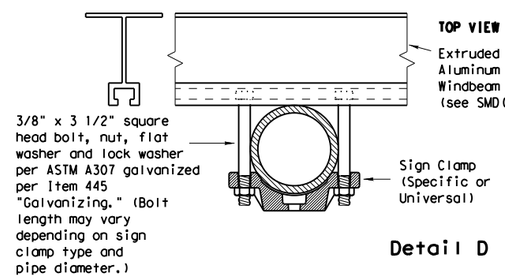
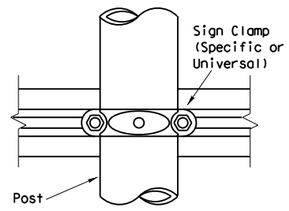


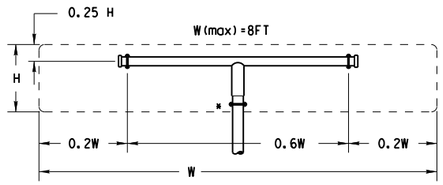
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



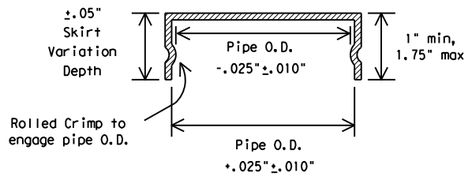
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



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.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	138

9-08 REVISIONS

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DATE: 4/26/2023 4:11:44 PM
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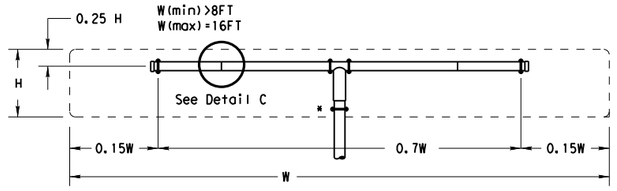
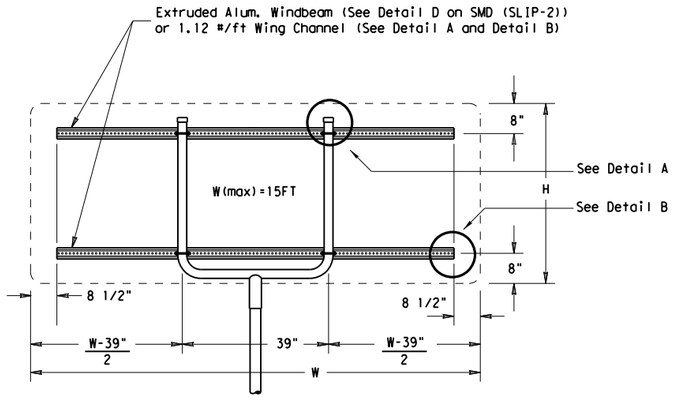


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



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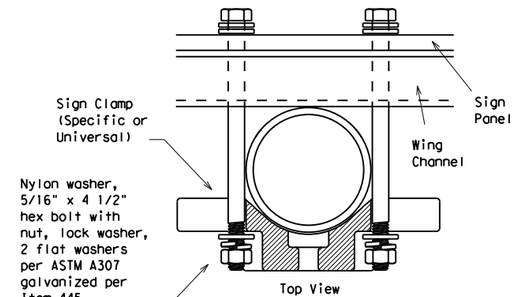
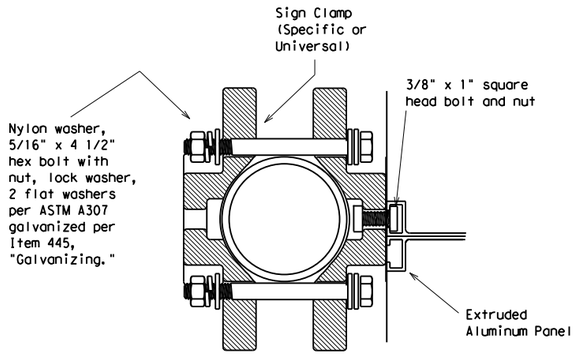
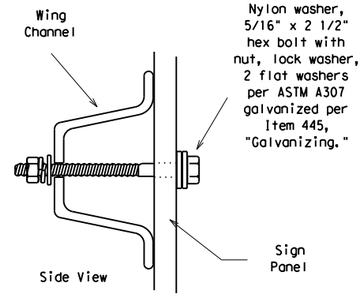


Top View

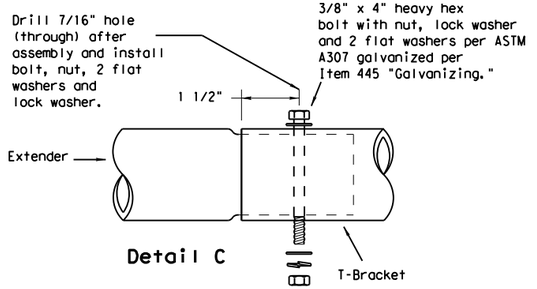
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

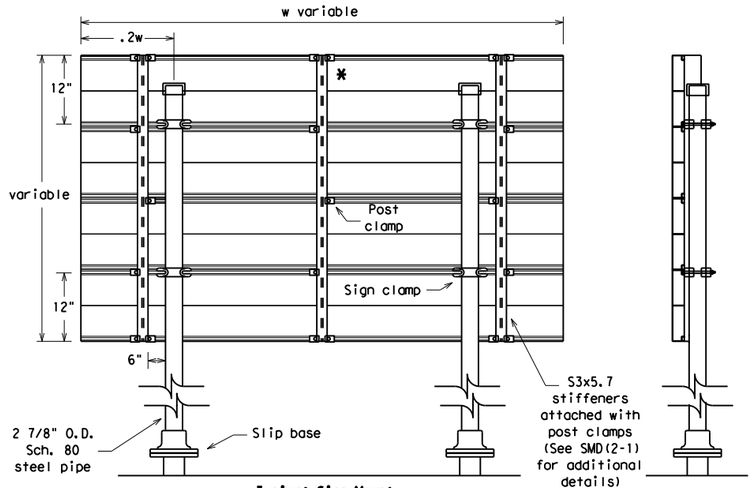


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

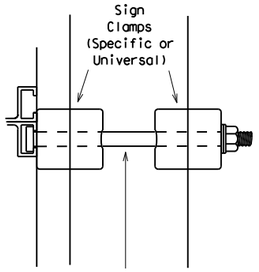


Typical Sign Mount

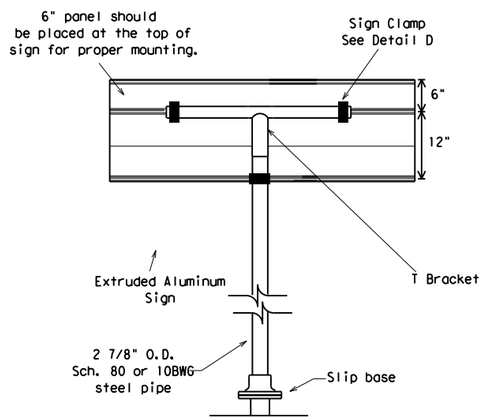
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

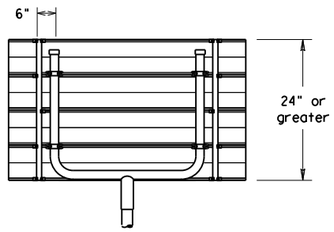
See Detail E
for clamp installation



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

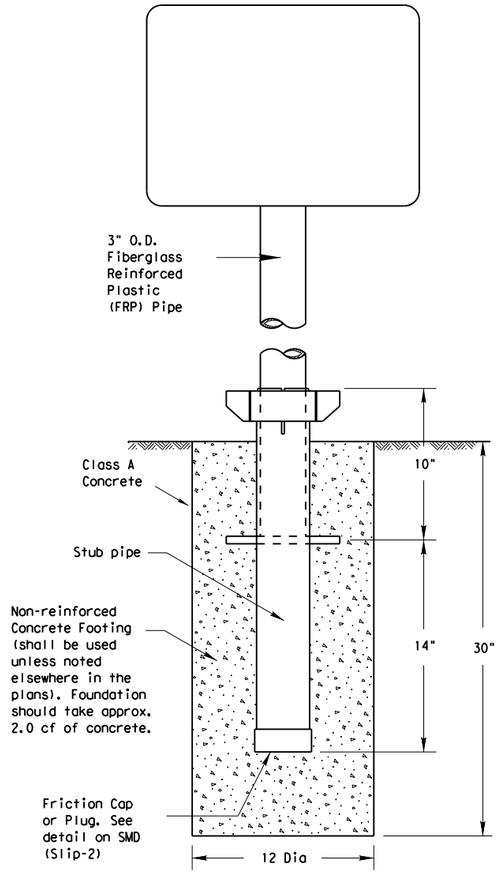
REVISIONS
9-08

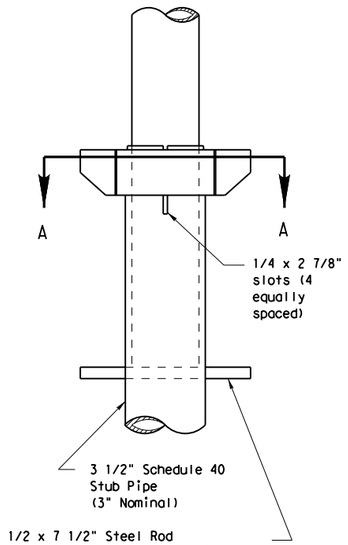
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

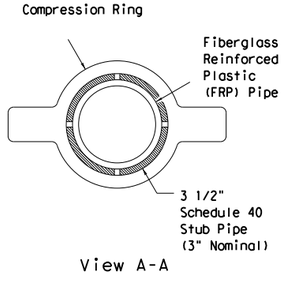
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	139

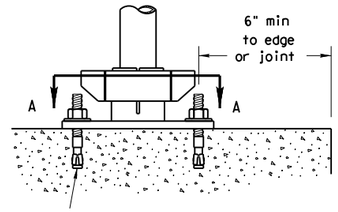
Universal Anchor System with Fiberglass Reinforced Plastic (FRP) Post







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



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.

BOLT-DOWN DETAILS

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

GENERAL NOTES:

1. FRP sign supports for a single type sign support may be used for signs up to and including 16 square feet. Dual post installation may be used for signs up to and including 32 square feet.
2. All nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing."
3. See the Traffic Operations Division website for detailed drawings of sign clamps. The website address is: http://www.txdot.gov/publications/traffic.htm

FRP POST REQUIREMENTS

1. Materials shall conform to the requirements of Departmental Material Specification DMS-4410 and will be furnished in a yellow or gray color as specified elsewhere in the plans.
2. Thickness of FRP sign support is 0.125" + 0.031", - 0.0".
3. FRP sign supports are prequalified by the Traffic Operations Division. Prequalification procedures are obtained by writing:
   Texas Department of Transportation
   Traffic Operations Division
   125 East 11th Street
   Austin, Texas 78701-2483

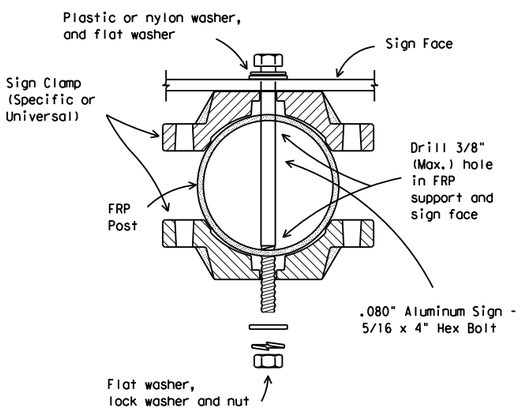
UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURES

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. Concrete shall be Class A.
3. Insert base post in foundation hole to depths shown and fill hole with concrete. Cut base post from bottom and ensure a minimum of 18" embedment if installed in solid rock.
4. Level and plumb the base post with coupler using a torpedo level and let concrete set a minimum of 4 days, unless otherwise directed by Engineer. Bottom of base post slots shall be above the concrete footing.
5. Attach sign to FRP post.
6. Insert sign post into base post. Lower until the post comes to rest on the steel rod.
7. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
8. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

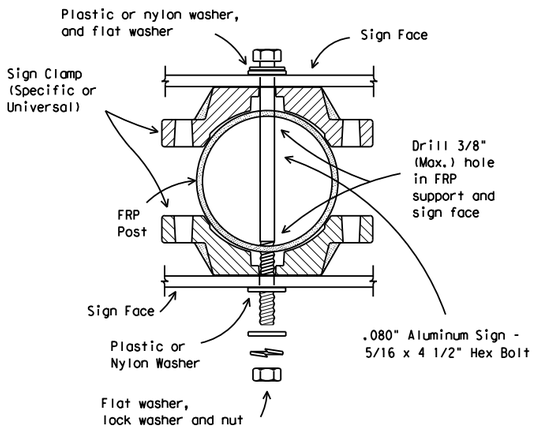
BOLT DOWN SIGN SUPPORT

1. Position base plate with coupler on existing concrete.
2. Drill holes into concrete and insert the 5/8" diameter bolts with wedge anchors, and tighten nuts.
3. Attach sign to FRP post.
4. Insert bottom of sign post into pipe stub.
5. Use hammer to ensure the coupler is firmly seated. Top of coupler should be level with top of base post in most instances.
6. Check sign to ensure there is no twist. If loose, increase the tightening of coupler.

Typical Sign Mounting Detail for FRP Support with Single Sign



Typical Sign Mounting Detail for FRP Support with Back-to-Back Signs



Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS UNIVERSAL ANCHOR SYSTEM WITH FRP POST

SMD(FRP)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630

DIST	COUNTY	SHEET NO.
WFS	COOKE	140

DATE: 4/26/2023 4:11:45 PM
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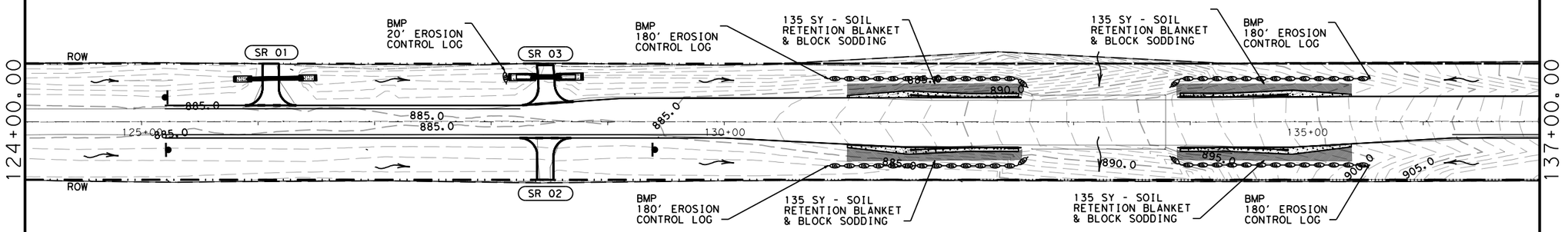
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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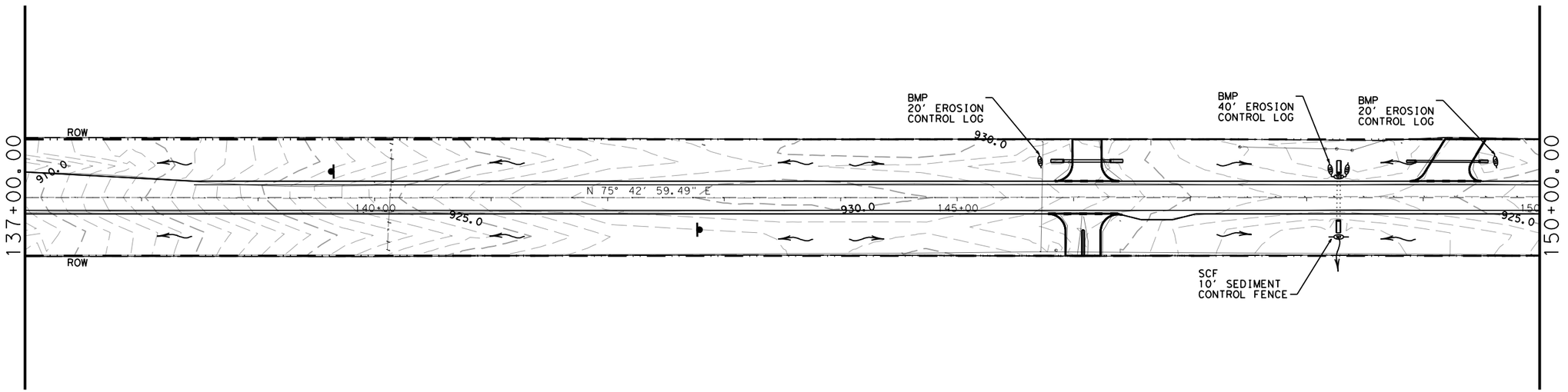

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

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129839
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Bryson Lawrence, P.E.

04/27/2023

FM 1630
SW3P LAYOUT

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SHEET 1 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		141

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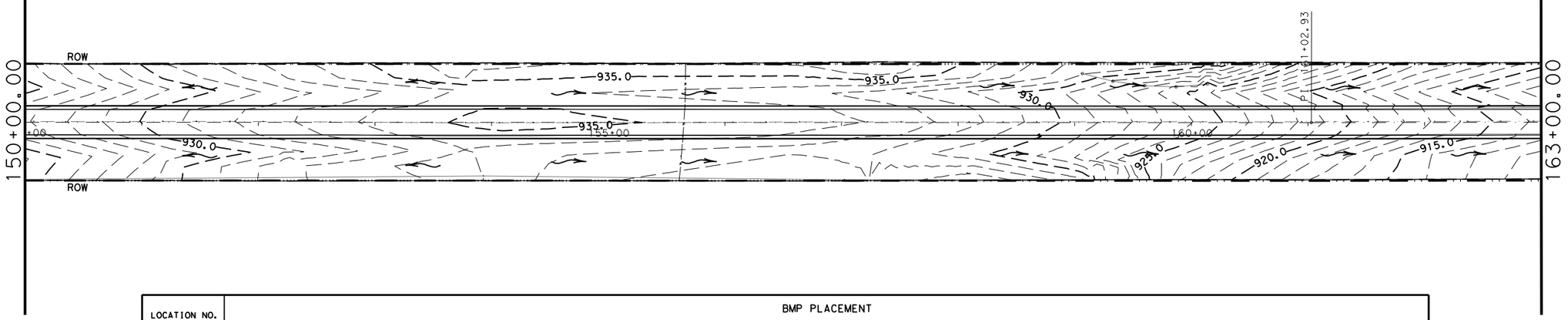
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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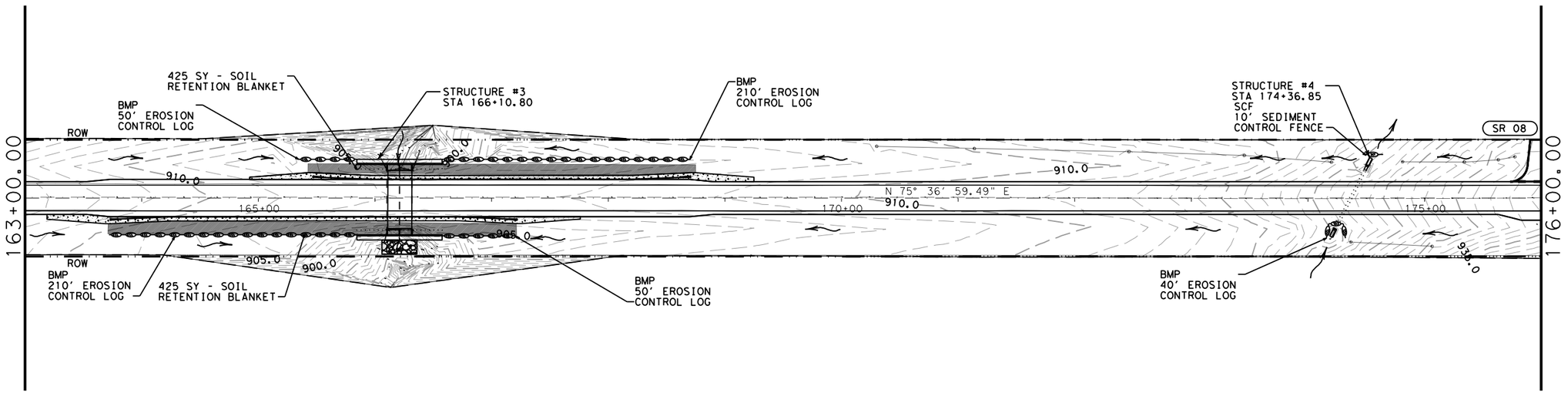

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FM 1630
SW3P LAYOUT

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SHEET 2 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		142

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LEGEND

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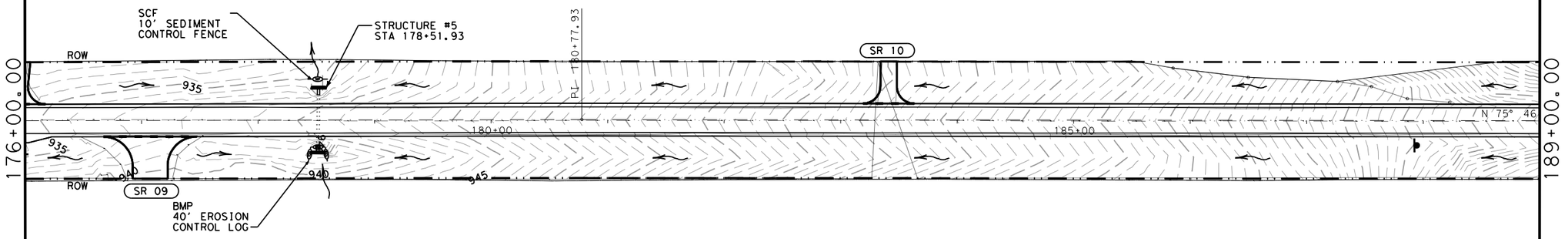
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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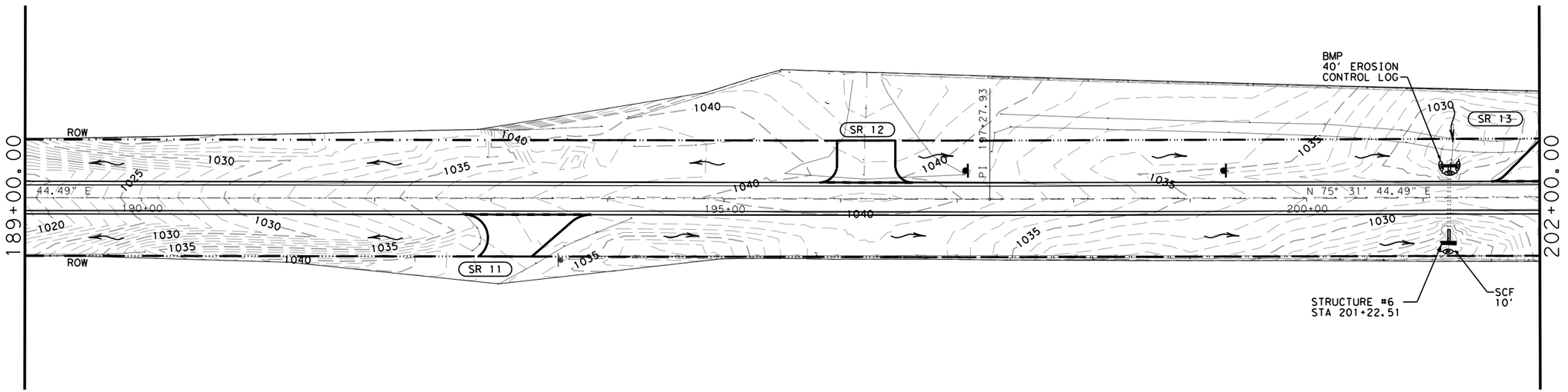

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FM 1630
SW3P LAYOUT

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SHEET 3 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		143

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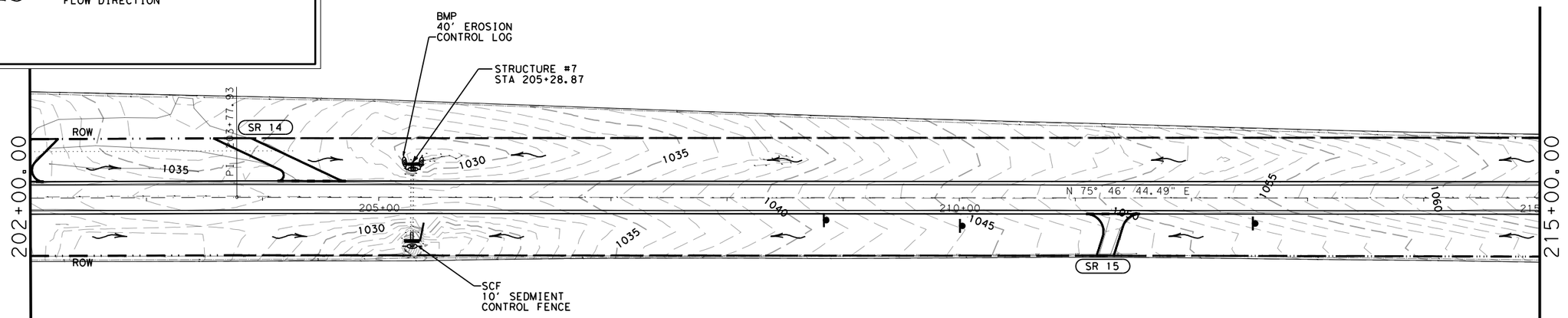
LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



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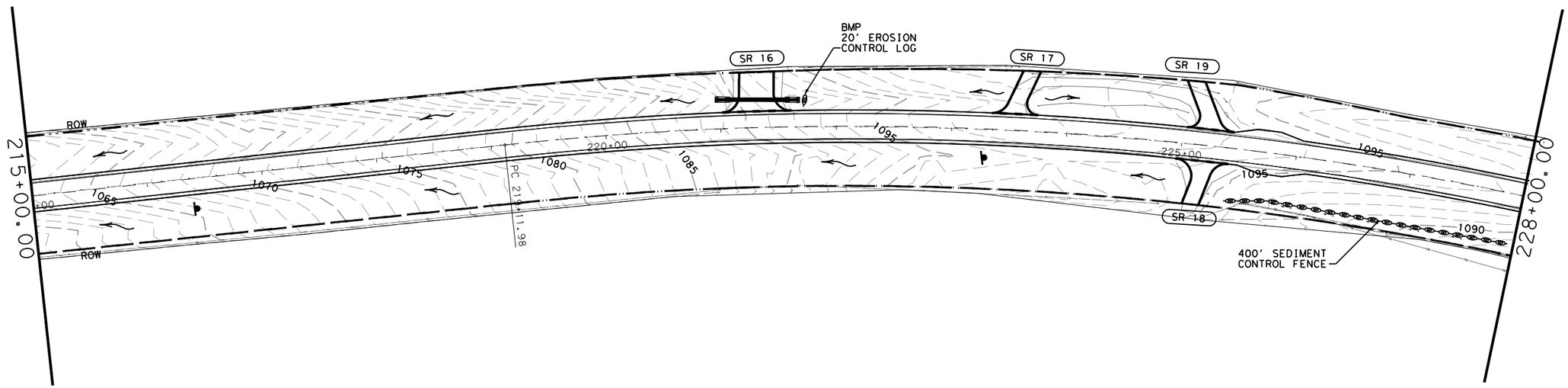

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

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04/27/2023

FM 1630
SW3P LAYOUT

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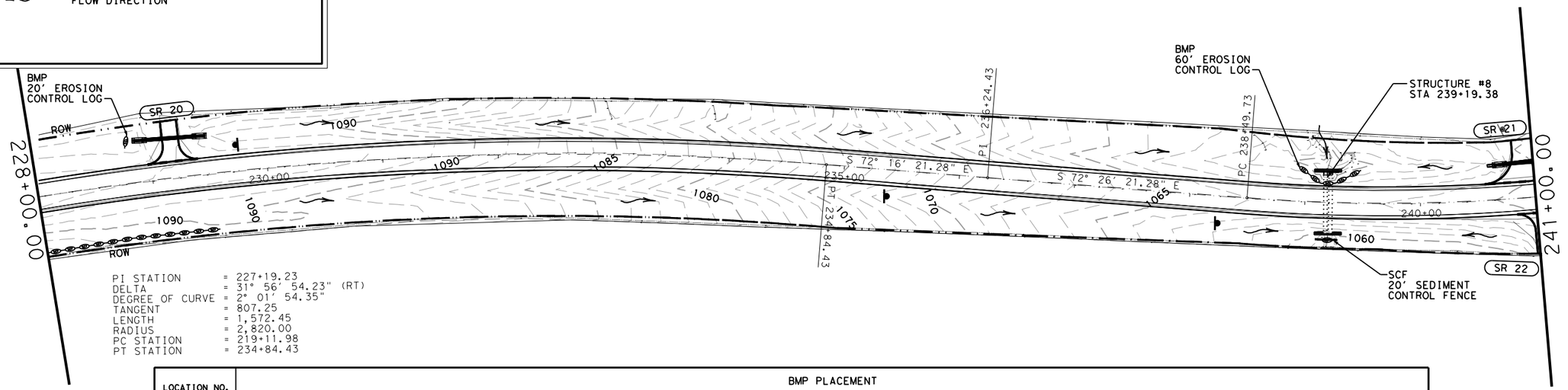
SHEET 4 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		144

DATE: 4/26/2023 4:11:58 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION



PI STATION = 227+19.23
DELTA = 31° 56' 54.23" (RT)
DEGREE OF CURVE = 2° 01' 54.35"
TANGENT = 807.25
LENGTH = 1,572.45
RADIUS = 2,820.00
PC STATION = 219+11.98
PT STATION = 234+84.43

LOCATION NO.	BMP PLACEMENT					
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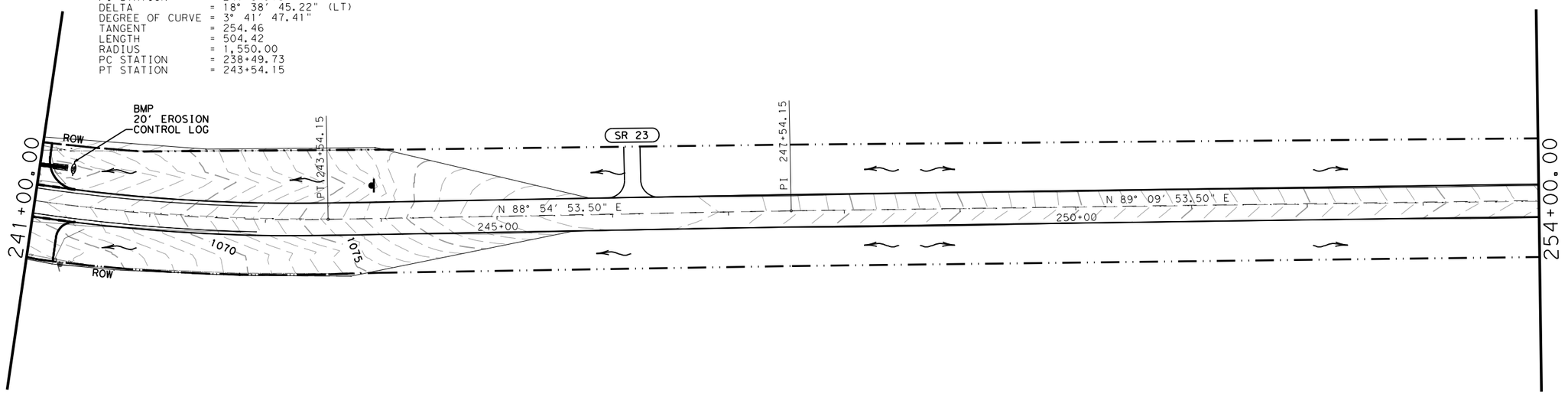
PI STATION = 241+04.19
DELTA = 18° 38' 45.22" (LT)
DEGREE OF CURVE = 3° 41' 47.41"
TANGENT = 254.46
LENGTH = 504.42
RADIUS = 1,550.00
PC STATION = 238+49.73
PT STATION = 243+54.15



NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
SW3P LAYOUT

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SHEET 5 OF 12

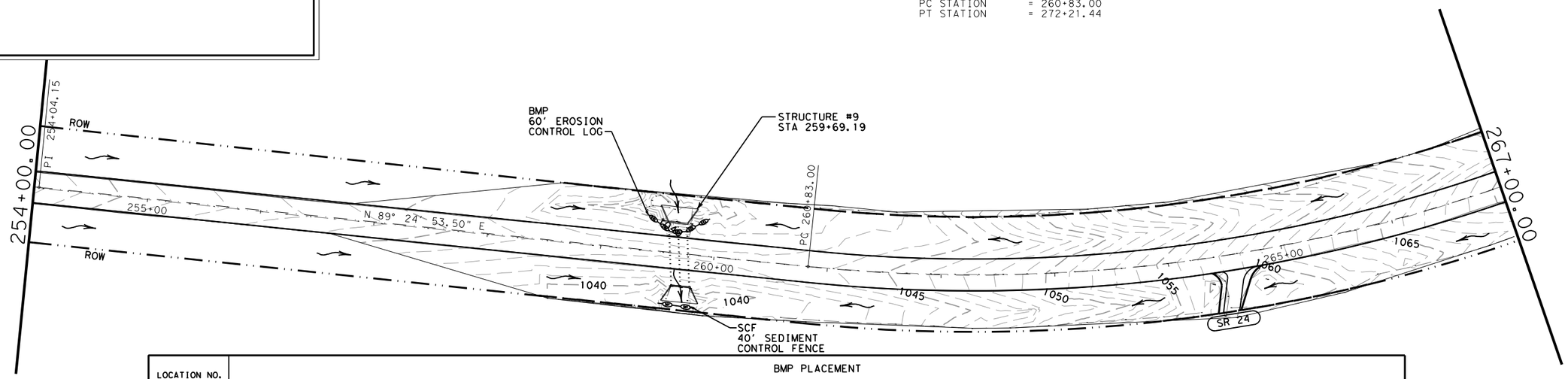
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		145

DATE: 4/26/2023 4:12:00 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION

PI STATION = 266+84.81
DELTA = 45° 56' 05.76" (LT)
DEGREE OF CURVE = 4° 02' 05.69"
TANGENT = 601.80
LENGTH = 1,138.44
RADIUS = 1,420.00
PC STATION = 260+83.00
PT STATION = 272+21.44



LOCATION NO.	BMP PLACEMENT					
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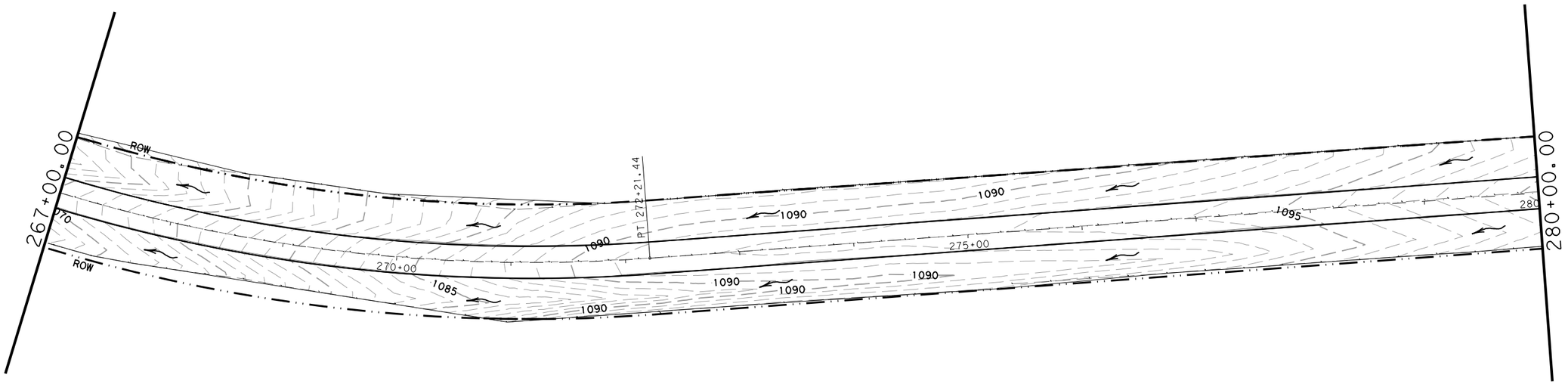

NOTES:

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STATE OF TEXAS
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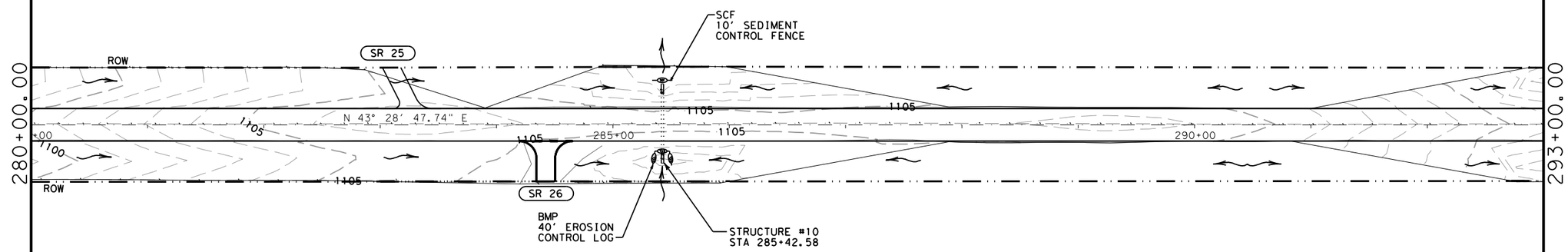
SHEET 6 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		146

DATE: 4/26/2023 4:12:03 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.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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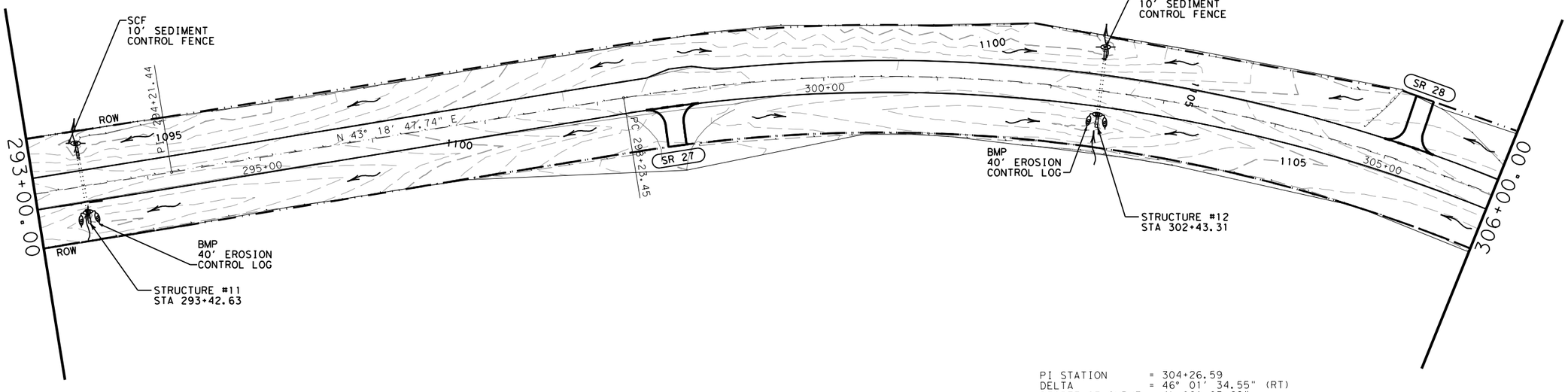

PI STATION = 304+26.59
DELTA = 46° 01' 34.55" (RT)
DEGREE OF CURVE = 4° 02' 05.69"
TANGENT = 603.14
LENGTH = 1,140.70
RADIUS = 1,420.00
PC STATION = 298+23.45
PT STATION = 309+64.15

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

STATE OF TEXAS
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Bryson Lawrence, P.E.

04/27/2023

FM 1630
SW3P LAYOUT

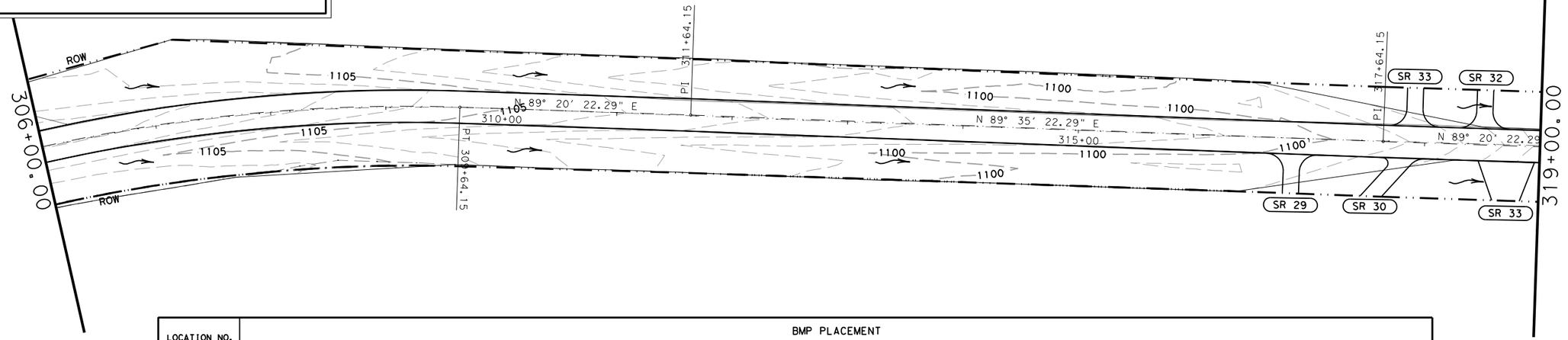
SHEET 7 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		147

DATE: 4/26/2023 4:12:05 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.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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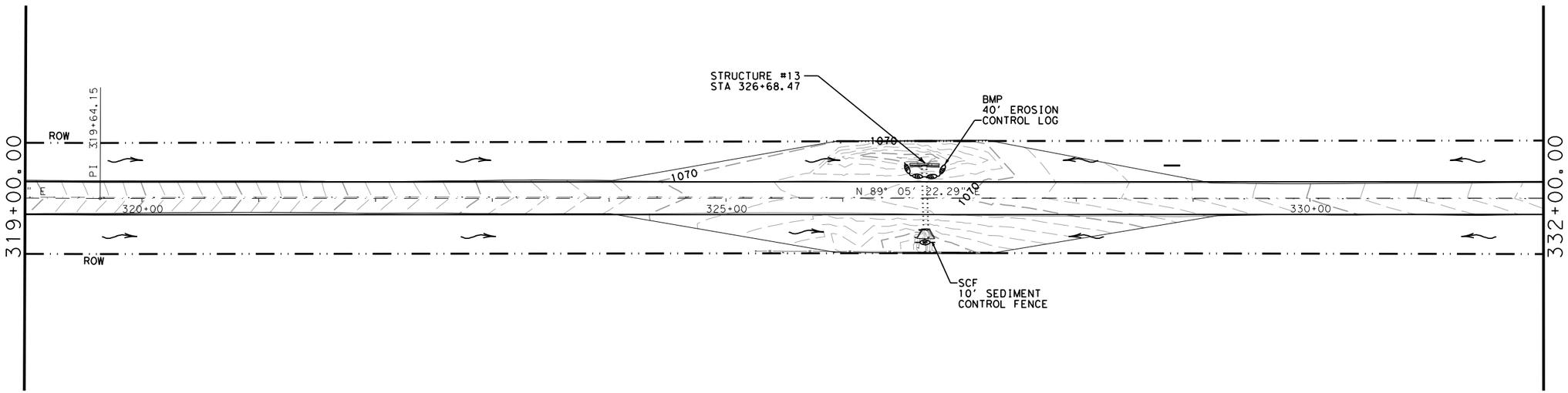

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

STATE OF TEXAS
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04/27/2023

FM 1630
SW3P LAYOUT

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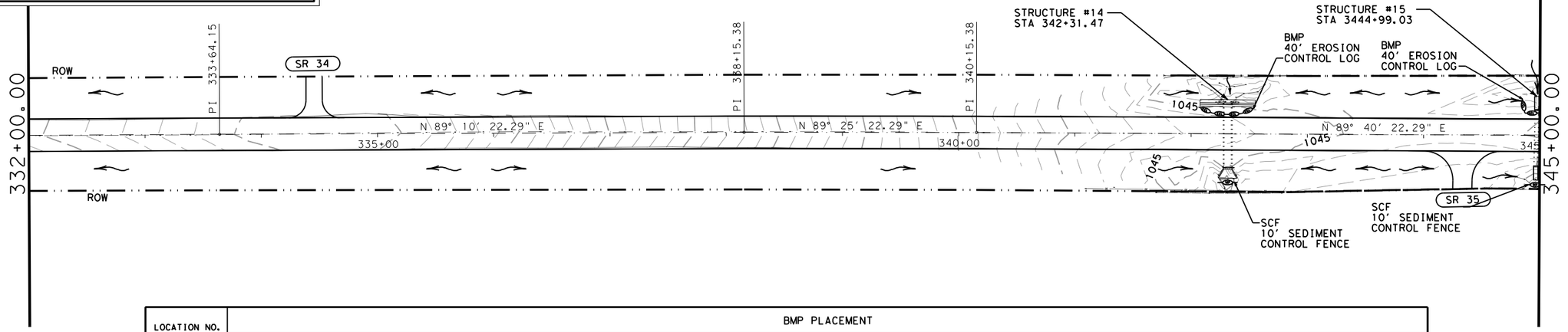
SHEET 8 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		148

DATE: 4/26/2023 4:12:07 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.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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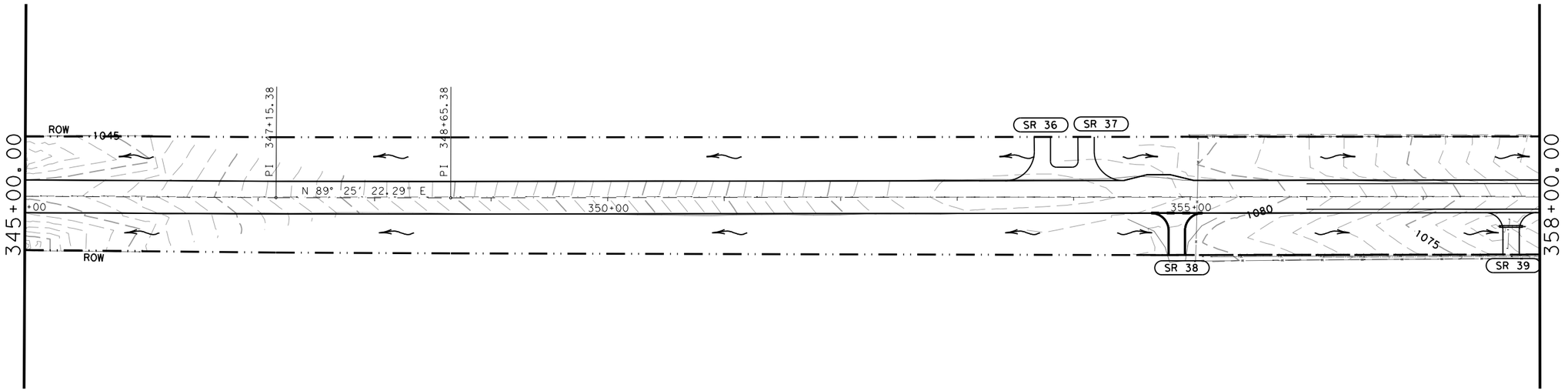

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

STATE OF TEXAS
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04/27/2023

FM 1630
SW3P LAYOUT

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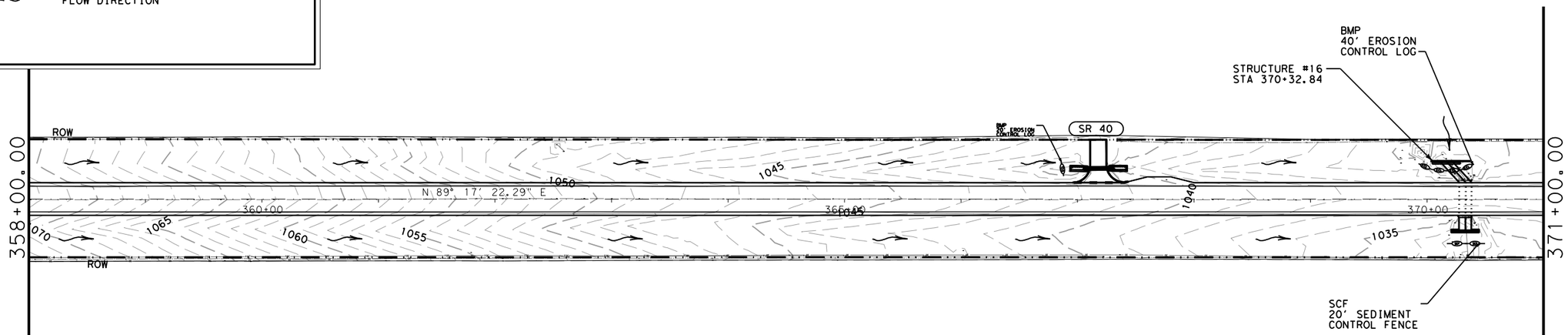
SHEET 9 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		149

DATE: 4/26/2023 4:12:10 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.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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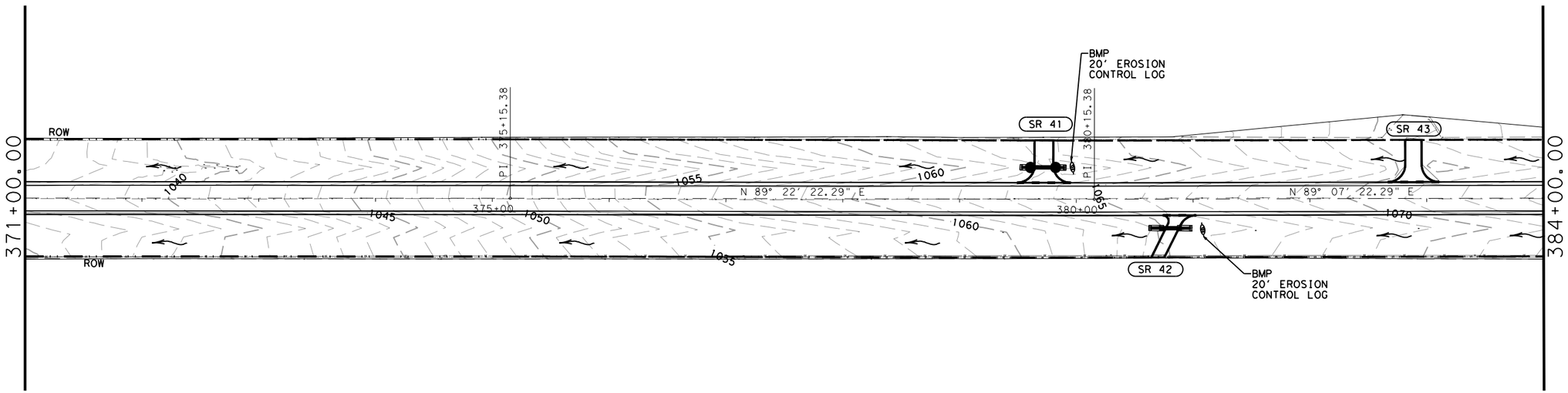

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Bryson Lawrence, P.E.

04/27/2023

FM 1630
SW3P LAYOUT

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SHEET 10 OF 12

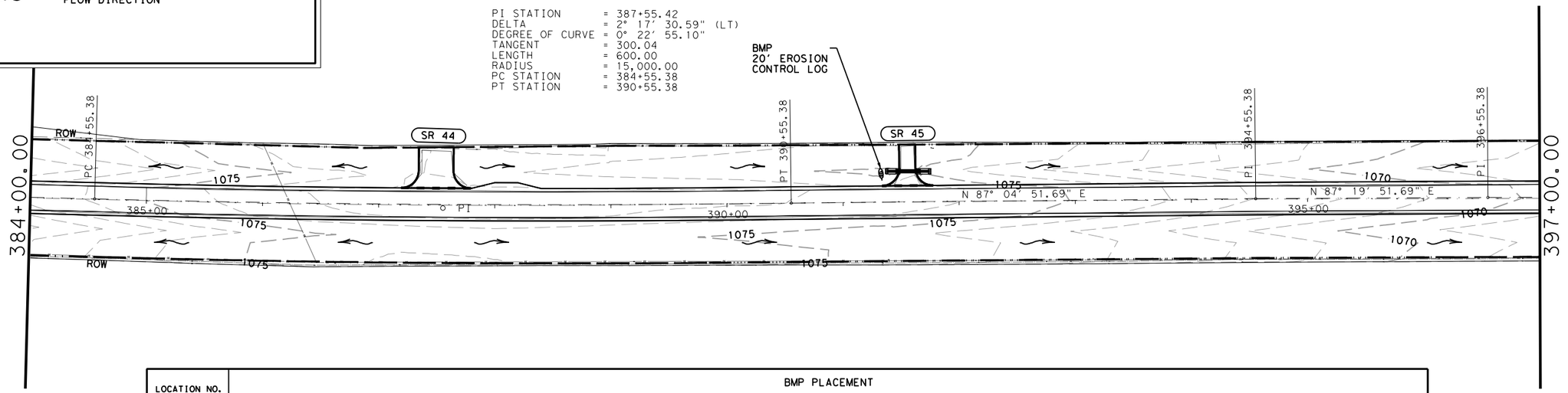
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		150

DATE: 4/26/2023 4:12:12 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION

PI STATION = 387+55.42
DELTA = 2° 17' 30.59" (LT)
DEGREE OF CURVE = 0° 22' 55.10"
TANGENT = 300.04
LENGTH = 600.00
RADIUS = 15,000.00
PC STATION = 384+55.38
PT STATION = 390+55.38



LOCATION NO.	BMP PLACEMENT					
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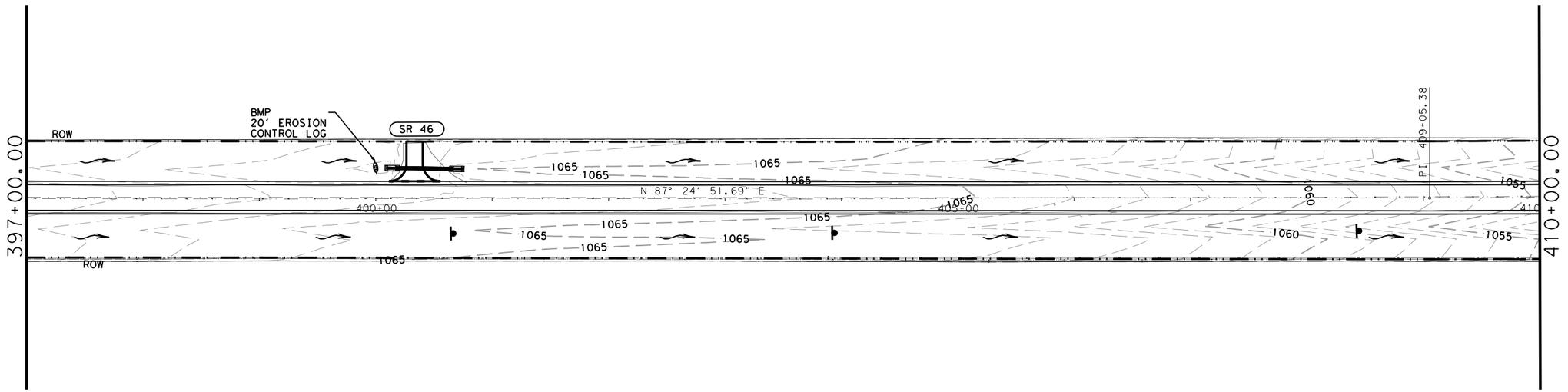

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630
SW3P LAYOUT

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SHEET 11 OF 12

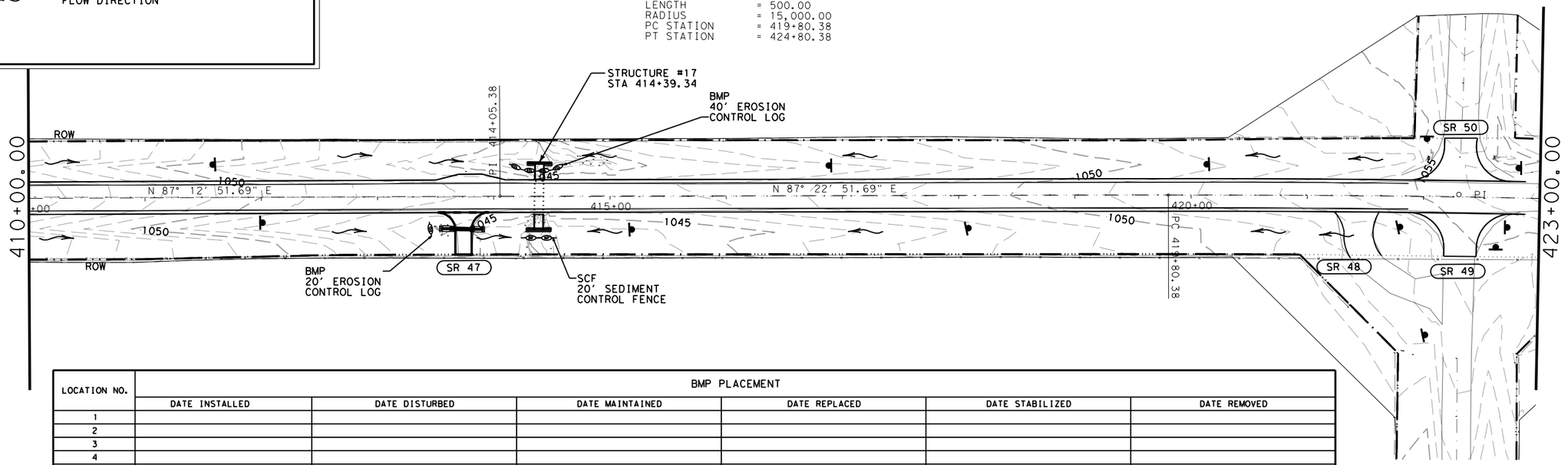
CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		151

DATE: 4/26/2023 4:12:14 PM
FILE: T:\WFSDESGN\Plans\1609-01\029V4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.dgn

LEGEND

- SCF — SEDIMENT CONTROL FENCE
- ECL — EROSION CONTROL LOGS
- RFD2 — ROCK FILTER DAM(TY 2)
- FLOW DIRECTION

PI STATION = 422+30.41
DELTA = 1° 54′ 35.49" (RT)
DEGREE OF CURVE = 0° 22′ 55.10"
TANGENT = 250.02
LENGTH = 500.00
RADIUS = 15,000.00
PC STATION = 419+80.38
PT STATION = 424+80.38



LOCATION NO.	BMP PLACEMENT					
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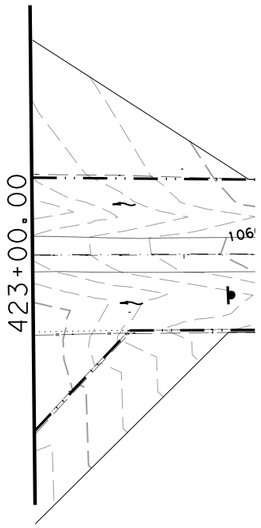

NOTES:

CONTRACTOR SHALL LIST INSTALL DATES AND REMOVE DATES ON BMP PLACEMENT LIST BELOW.

427+64.36 Ext. 835.64

STATE OF TEXAS
BRYSON P. LAWRENCE
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Bryson Lawrence, P.E.

04/27/2023

FM 1630
SW3P LAYOUT

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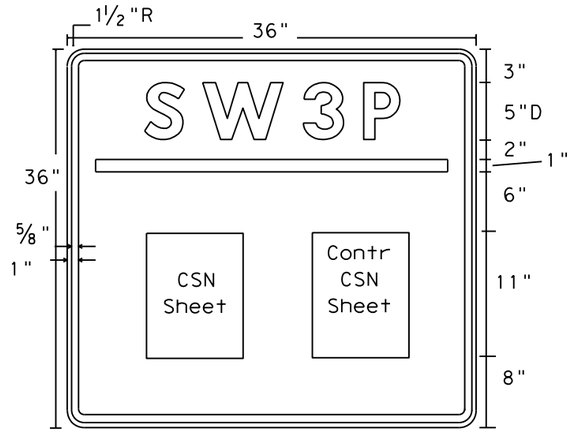
SHEET 12 OF 12

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		152

DATE: 4/26/2023 4:12:17 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\9. Environmental\SW3P LAYOUT1.dgn



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.

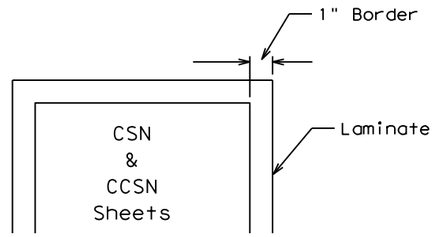
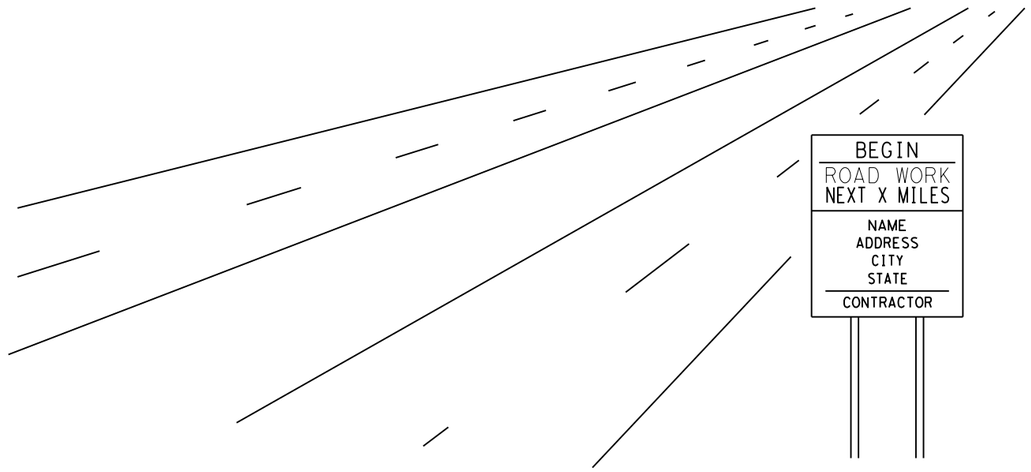
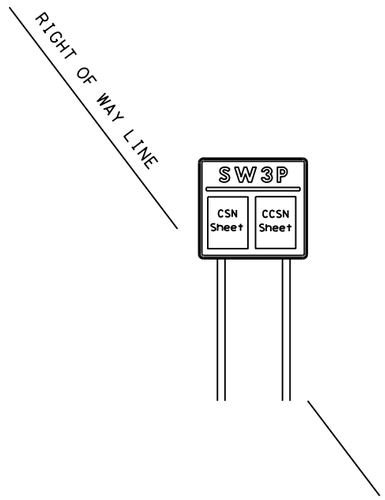


Figure 1





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

FM 1630

SW3P SIGN

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT 2023	DISTRICT	FEDERAL AID PROJECT		HIGHWAY
REVISION DATE: 5/12/17	WFS	SEE TITLE SHEET		FM 1630
	COUNTY	CONTROL	SECT	JOB / SHEET
	COOKE	1609	01	029, etc. / 153

LEVELS DISPLAYED
PATH:

DATE: 4/26/2023 4:12:19 PM
FILE: T:\WFSDESGN\Plans\1609-01\029\4 - Design\Plan Set\9. Environmental\EPIC.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1. None

2.

☐ No Action Required ☑ Required Action

Action No.

5 ACRES OR MORE:

1. The project disturbs five or more acres of surface area. The total disturbed acreage is the combined acreage to be disturbed on the project and the contractors PSL.
2. The Department will post a large site notice, file a notice of intent (NOI), notice of change (NOC), if applicable, and a notice of termination (NOT) along with other requirements per TPDES GP TXR 150000 as the entity having operational control over plans and specifications for work shown on the plans in the right of way.
3. The Contractor shall file a NOI, NOC, if applicable, and a NOT and post a large site notice along with other requirements as the entity of having day-to-day operational control of the work shown on the plans in the right of way.

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

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

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

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

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

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☐ No Action Required ☑ Required Action

Action No.

1. Work outside the right of way is prohibited without coordinating with the Area Engineer.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☑ Required Action

Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable.

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

☐ No Action Required ☑ Required Action

Action No.

1. Bird BMPs:

Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structures that would be affected by the proposed project, and complete any bridge work/demolition and/or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided.

2. Bat BMPs:

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. Bats should only be handled after communication with TPWD.

3. Mammal SGCN

Contractor will be advised of the potential occurrence of the swamp rabbit, long-tailed weasel, eastern spotted skunk, and mountain lion, to avoid harming the species if encountered, and to avoid unnecessary impacts to dens. Minimize impacts to water crossings/drainages, marshes, and drainage ditches.

4. Terrestial Reptile BMPs:

When erosion control blankets are used utilize products that contain no netting or contain loosely woven, natural fiber netting is preferred. Plastic netting should be avoided to the extent practicable. 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.

5. Amphibian and Aquatic Reptile BMPs:

Contractors will be advised of potential occurrence of the Woodhouse's Toad and the Strecker's chorus frog in the project area, and to avoid harming them if encountered.

Where work is directly adjacent to the water, minimize impacts to shoreline where feasible.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

☐ Yes ☑ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☐ Yes ☐ No

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

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

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

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

☐ No Action Required ☑ Required Action

Action No.

1. If sheen or other contamination is visible in the waters of the U.S. or on the project site, work shall cease and the site cleaned up immediately in accordance with local, state and federal regulations.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☑ Required Action

Action No.

1. 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) shall 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

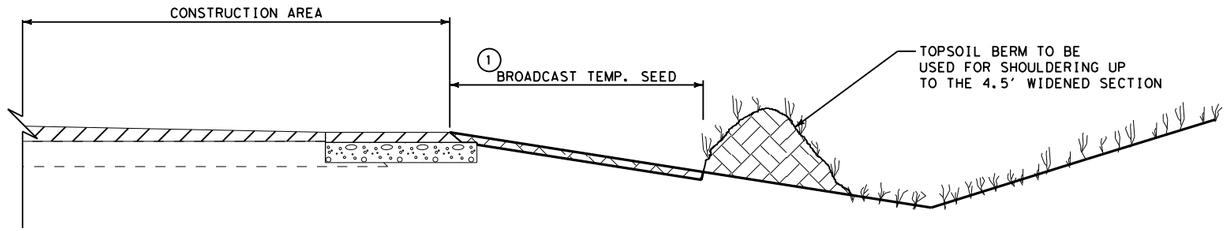
EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	1609	01	029, etc.	FM 1630
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	WFS	COOKE		154
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

NOTES:

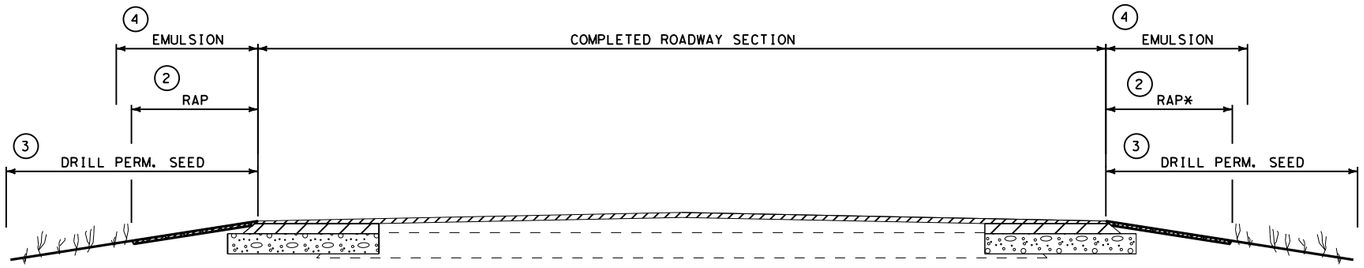
1. BROADCAST TEMPORARY SEED ESTIMATED @ 15' ONCE THE NATIVE TOP SOIL BERM HAS BEEN SHOULDERED UP TO THE WIDENED SECTION. REFER TO THE WFS-TA-VES PLAN SHEET FOR SEEDING MIXTURES.
2. REFER TO THE BMP #16 FOR THE LOCATION OF THE RECYCLED ASPHALT PAVEMENT. PLACEMENT DISTANCE IS TO BE A MINIMUM OF 4' OR AS NEEDED TO ACHIEVE SMOOTH TIE IN TO EXISTING FRONT SLOPE. REFER TO BMP#15 ON WFS-TA-BMP PLAN SHEET.
3. DRILL 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.



PROPOSED TEMPORARY SEEDING TYPICAL

CSJ 1609-01-029
STA. 125+20.00 TO STA. 132+92.94
STA. 134+07.94 TO STA. 242+92.82
CSJ 1609-01-030
STA. 356+00.00 TO STA. 422+87.00



PROPOSED PERMANENT SEEDING TYPICAL

CSJ 1609-01-029
STA. 125+20.00 TO STA. 132+92.94
STA. 134+07.94 TO STA. 242+92.82
CSJ 1609-01-030
STA. 356+00.00 TO STA. 422+87.00

N.T.S.

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

FM 1630 VEGETATIVE ESTABLISHMENT DETAIL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
1609	01	029, etc.	FM 1630
DIST	COUNTY		SHEET NO.
WFS	COOKE		155

DATE: 4/26/2023 4:12:21 PM
FILE: I:\WFSDESIGN\Plans\1609-01\029\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):
1609-01-029

1.2 PROJECT LIMITS:
From: MONTAGUE COUNTY LINE

To: CR 341, ETC.

1.3 PROJECT COORDINATES:
BEGIN: (Lat) (N): 33.565134 ,(Long) (W): -97.486562

END: (Lat) (N): 33.578496 ,(Long) (W): -97.393287

1.4 TOTAL PROJECT AREA (Acres): 67.98

1.5 TOTAL AREA TO BE DISTURBED (Acres): 8.945

1.6 NATURE OF CONSTRUCTION ACTIVITY:

1.7 MAJOR SOIL TYPES:

Soil Type	Description
SLIDELL-SAN SABA	18.9%
MALOTEERE-ALEDO	18.1%
SANGER CLAY	16.4%
CLAY AND CLAY LOAM	29.0%
MISCELANEOUS	7.9%

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:

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

1.10 POTENTIAL POLLUTANTS AND SOURCES:

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

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

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- X Submit NOI/CSN to local MS4
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- X Complete and submit Notice of Termination to TCEQ
- X 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)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			156
STATE	STATE DIST.	COUNTY	
TEXAS	WFS	COOKE	
CONT.	SECT.	JOB	HIGHWAY NO.
1609	01	029, etc.	FM 1630

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

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

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

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

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

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

T / P

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ 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:

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

2.8 INSPECTIONS:

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

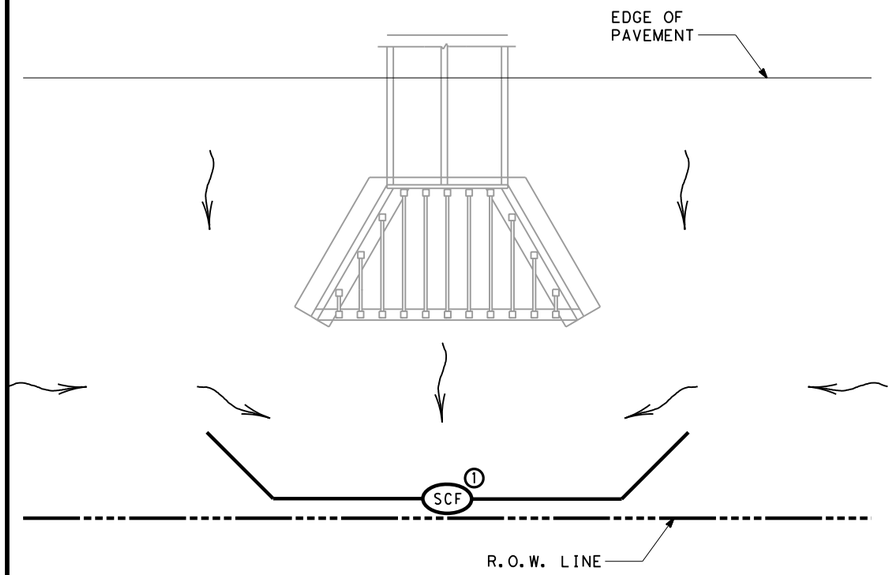
2.9 MAINTENANCE:

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)

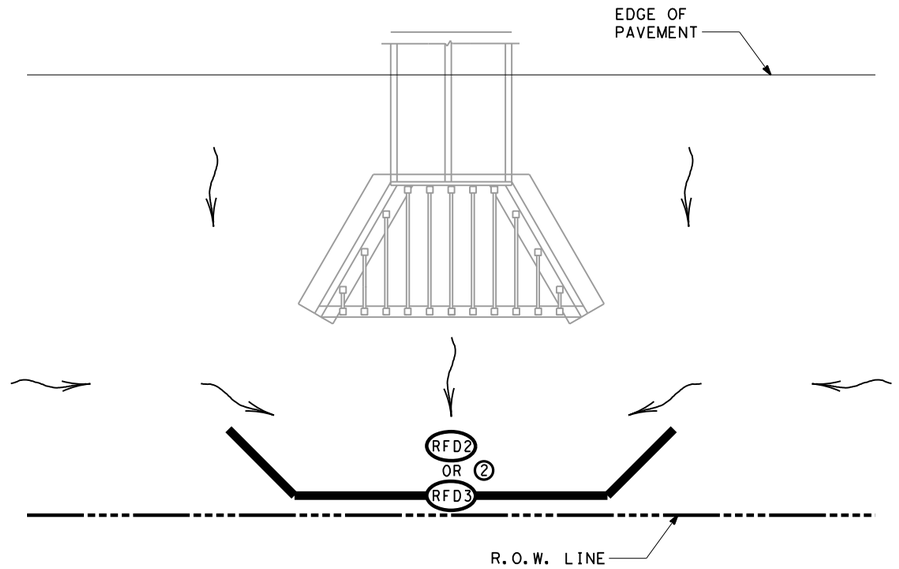
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			157
STATE	STATE DIST.	COUNTY	
TEXAS	WFS	COOKE	
CONT.	SECT.	JOB	HIGHWAY NO.
1609	01	029, etc.	FM 1630



BEST MANAGEMENT PRACTICE (BMP) #1

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



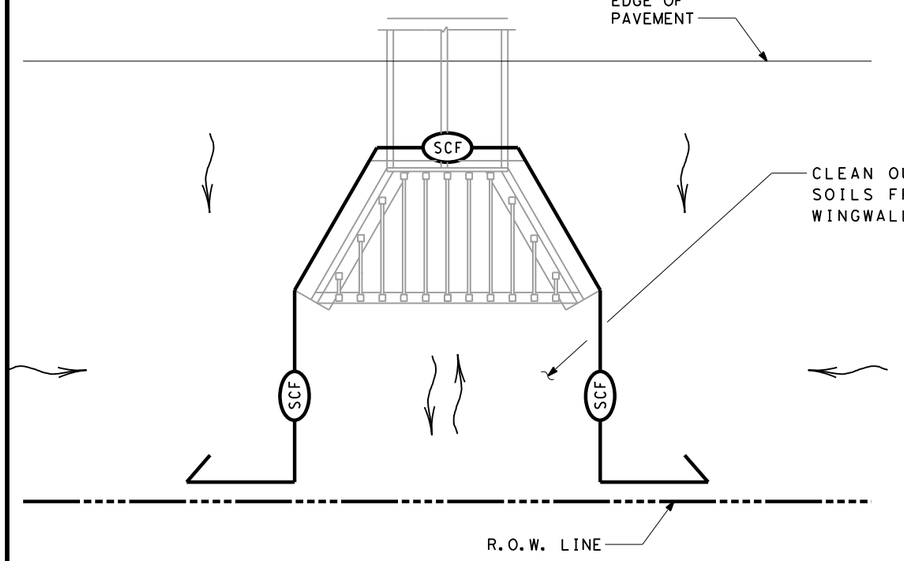
BEST MANAGEMENT PRACTICE (BMP) #2

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

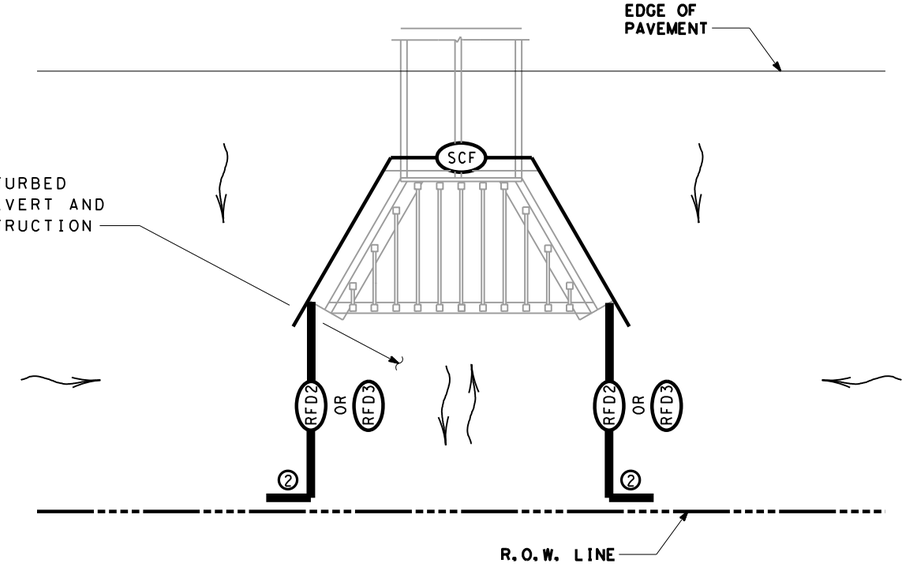
NOTES:

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.



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

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

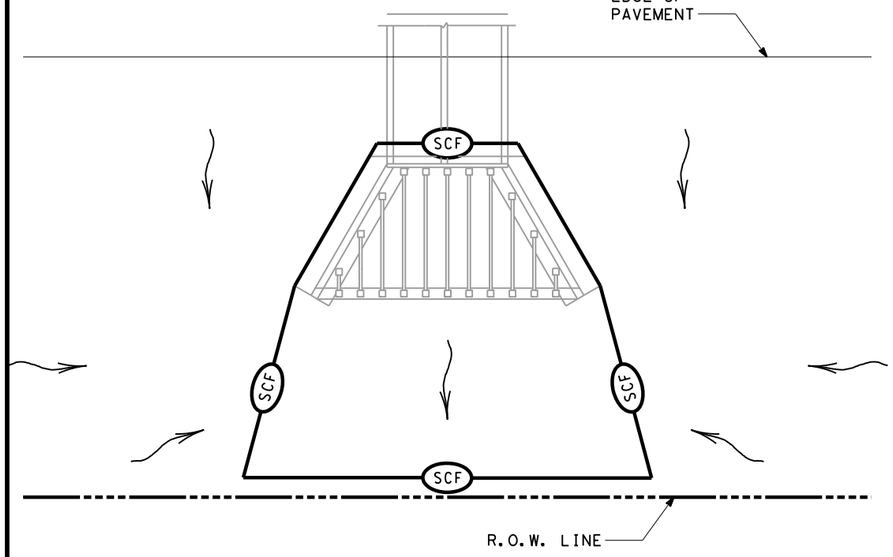
SCALE = NTS SHEET 1 OF 5

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

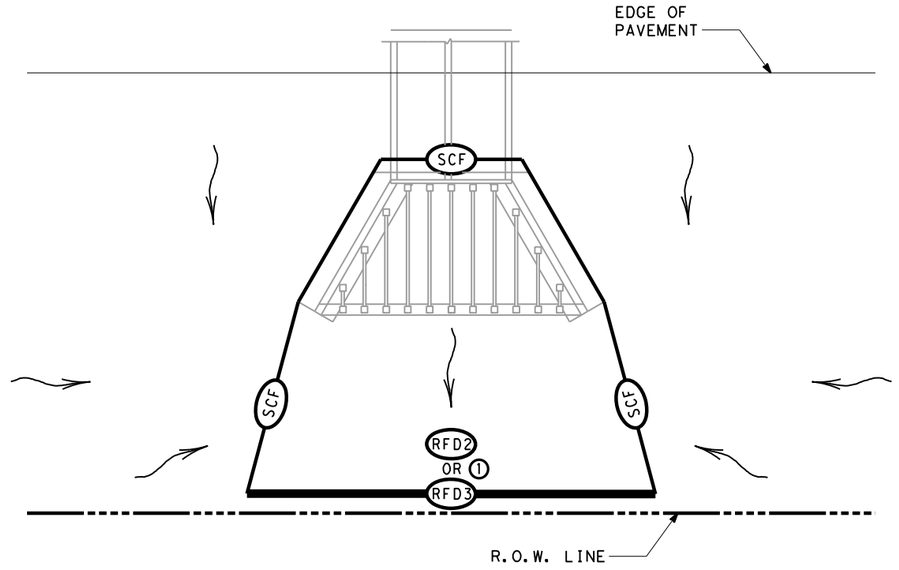
WFS-TA-BMP

FILE: BMPLAYOUTS.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
© TxDOT 2009	CONT	SECT	JOB	HIGHWAY	
REVISIONS JULY 2019	1609	01	029, etc.	FM 1630	
	DIST	COUNTY		SHEET NO.	
	WFS	COOKE		158	



BEST MANAGEMENT PRACTICE (BMP) #5

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



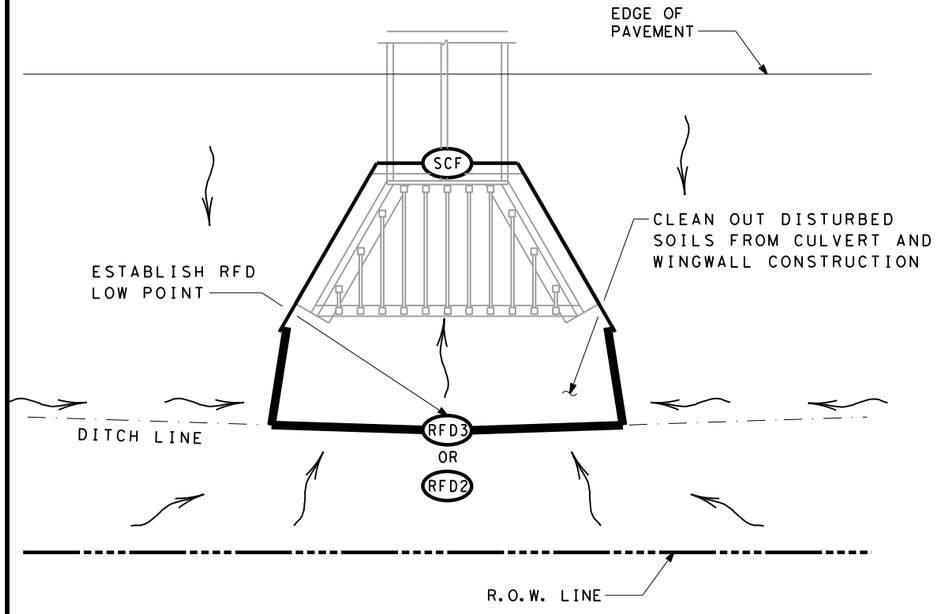
BEST MANAGEMENT PRACTICE (BMP) #6

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

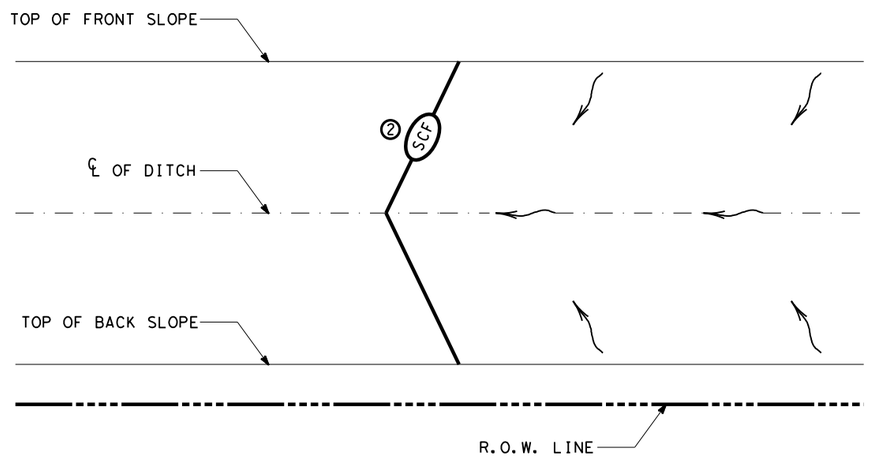
NOTES:

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
BRYSON P. LAWRENCE
129839
LICENSED
PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

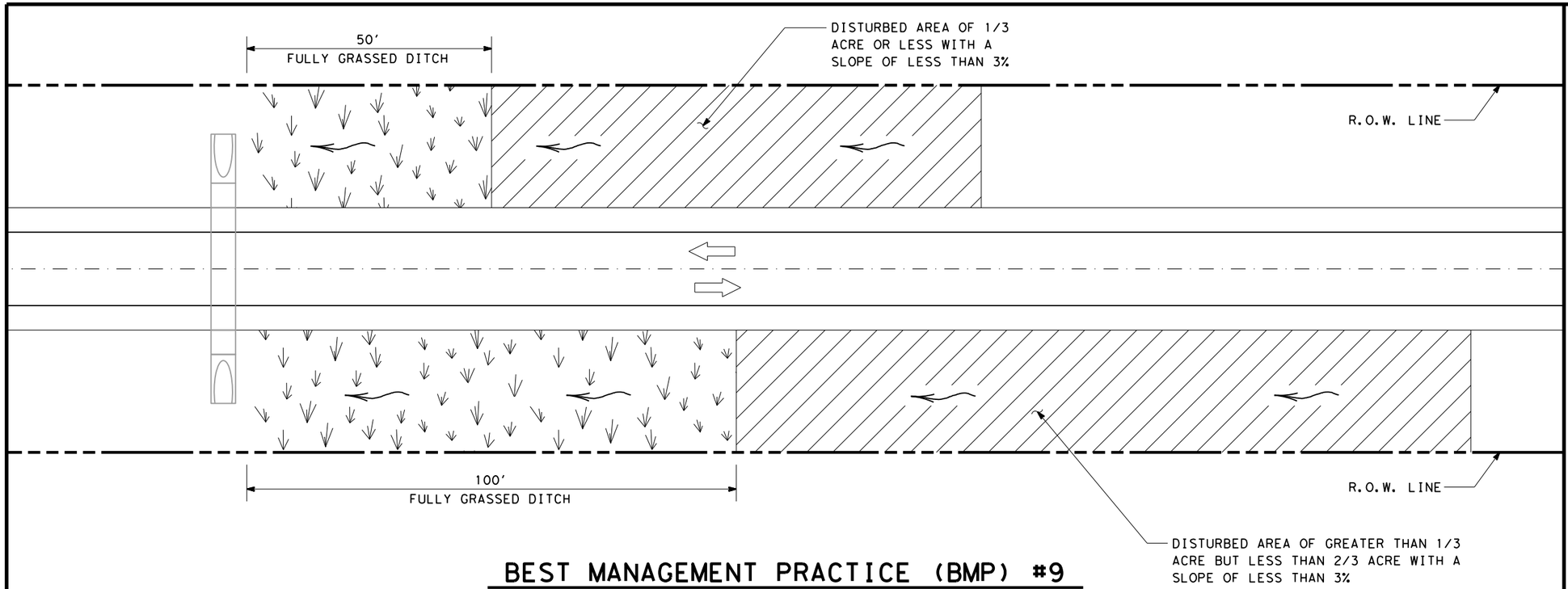
SCALE = NTS SHEET 2 OF 5

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

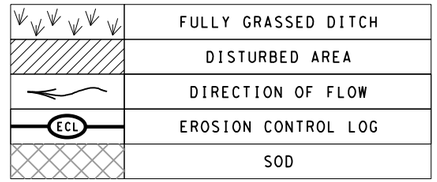
WFS-TA-BMP

FILE: BMPLAYOUTS.dgn		DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT		
©TxDOT 2009		CONT	SECT	JOB		HIGHWAY	
REVISIONS		1609	01	029, etc.		FM 1630	
JULY 2019		DIST	COUNTY			SHEET NO.	
		WFS	COOKE			159	



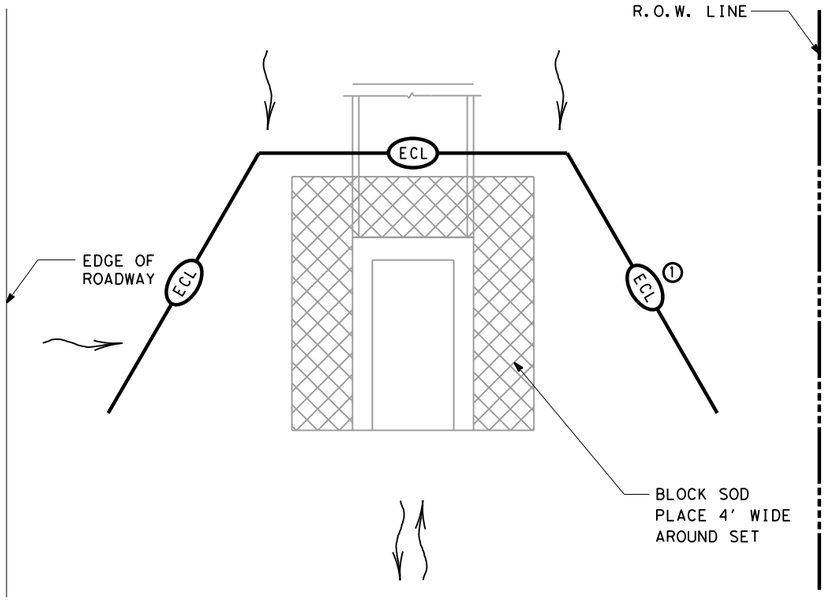
BEST MANAGEMENT PRACTICE (BMP) #9

USE OF VEGETATIVE BUFFERS IN PLACE OF TEMPORARY SEDIMENT CONTROLS SUCH AS SILT FENCE AND ROCK FILTER DAMS



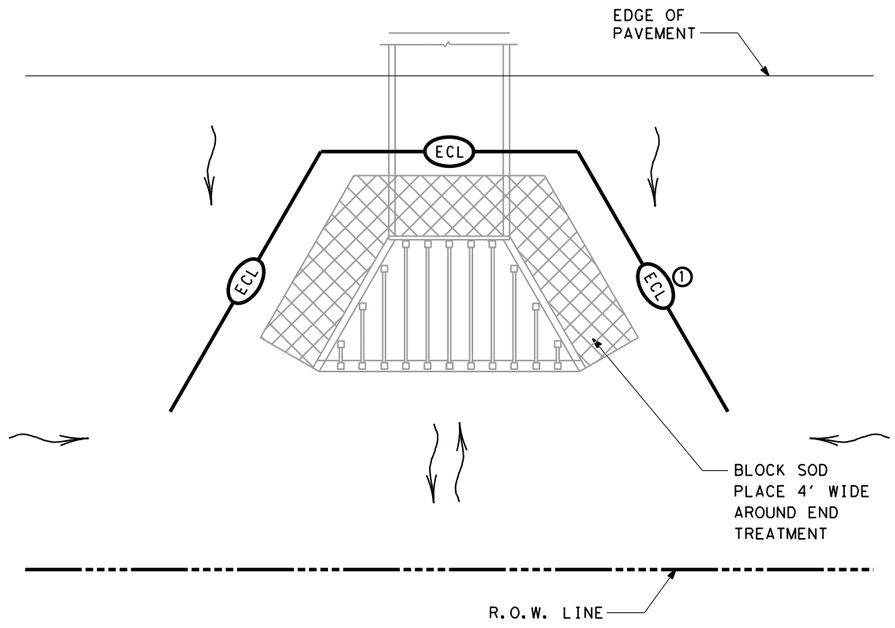
NOTES:

1. SEDIMENT CONTROL FENCE, OR OTHER DEVICES CAN BE SUBSTITUTED AS DIRECTED BY THE ENGINEER.



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

STATE OF TEXAS
BRYSON P. LAWRENCE
129839
LICENSED PROFESSIONAL ENGINEER

Bryson Lawrence, P.E.

04/27/2023

SCALE = NTS SHEET 3 OF 5

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

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REVISIONS		1609	01	029, etc.		FM 1630	
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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:

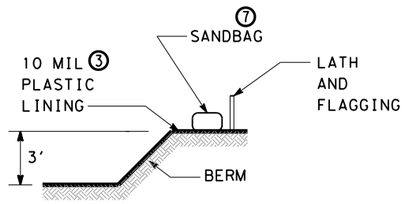
A. THE ALPHABETS AND LATERAL SPACING BETWEEN LETTERS AND NUMERALS SHALL CONFORM WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", (TMUTCD) LATEST EDITION, AND THE "COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST". LATERAL SPACING OF TEXT SHALL PROVIDE A BALANCED APPEARANCE. 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.

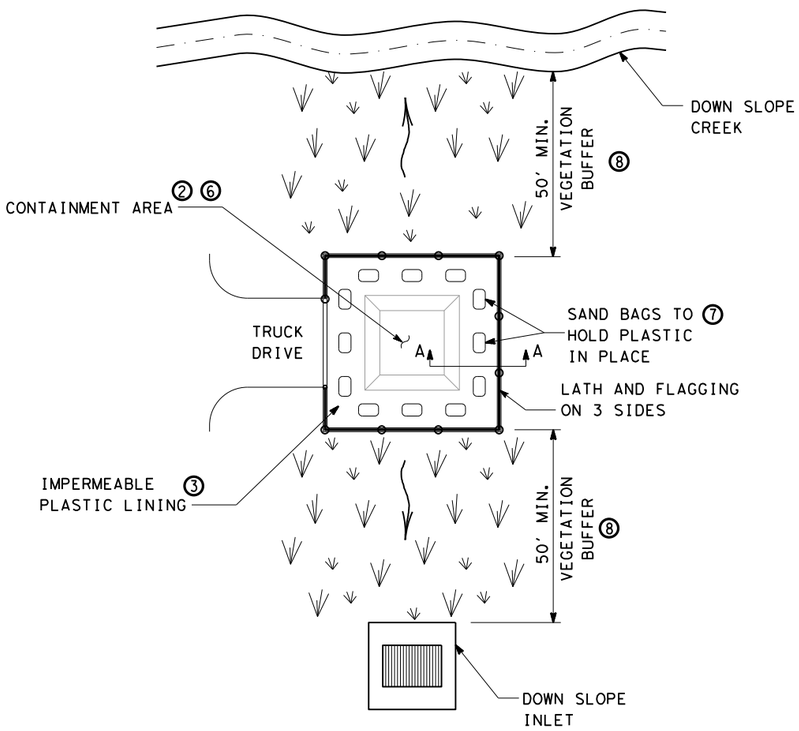
C. FINAL SIGN LOCATION SHALL BE AS APPROVED BY THE ENGINEER. IF THE SIGN CANNOT BE PLACED OUTSIDE THE CLEAR ZONE, IT MUST ADHERE TO THE TMUTCD. IF PLACED OUTSIDE THE CLEAR ZONE, SIGN MAY BE PLACED PERPENDICULAR OR PARALLEL TO ROW LINE.

D. SIGN DIMENSION IS 42" WIDE X 24" TALL WITH 5" BLACK LETTERS.

CONCRETE WASHOUT SIGN DETAIL (10)

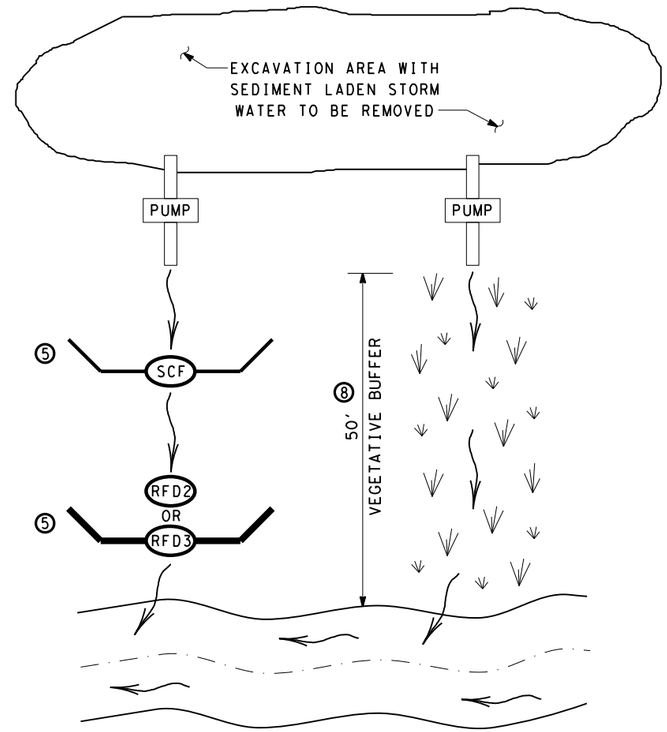


SECTION A-A



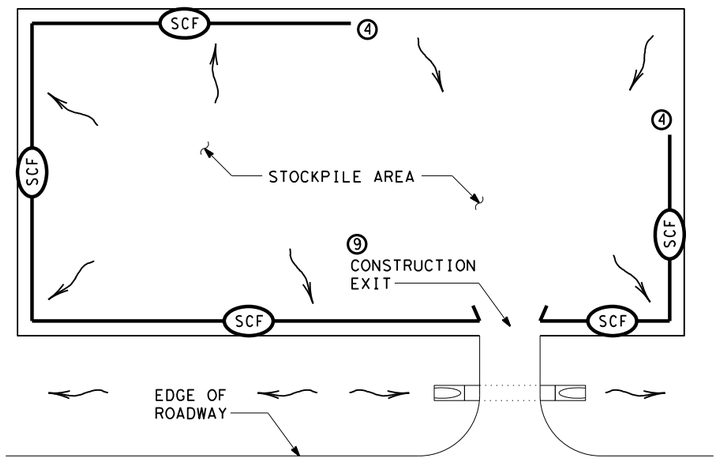
BEST MANAGEMENT PRACTICE (BMP) #12

CONCRETE TRUCK WASHOUT AREA (10)



BEST MANAGEMENT PRACTICE (BMP) #13

PUMPED STORM WATER SEDIMENT CONTROLS (1)



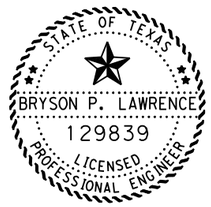
BEST MANAGEMENT PRACTICE (BMP) #14

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.



Bryson Lawrence, P.E.

04/27/2023

SCALE = NTS SHEET 4 OF 5

Texas Department of Transportation
Wichita Falls District

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

WFS-TA-BMP

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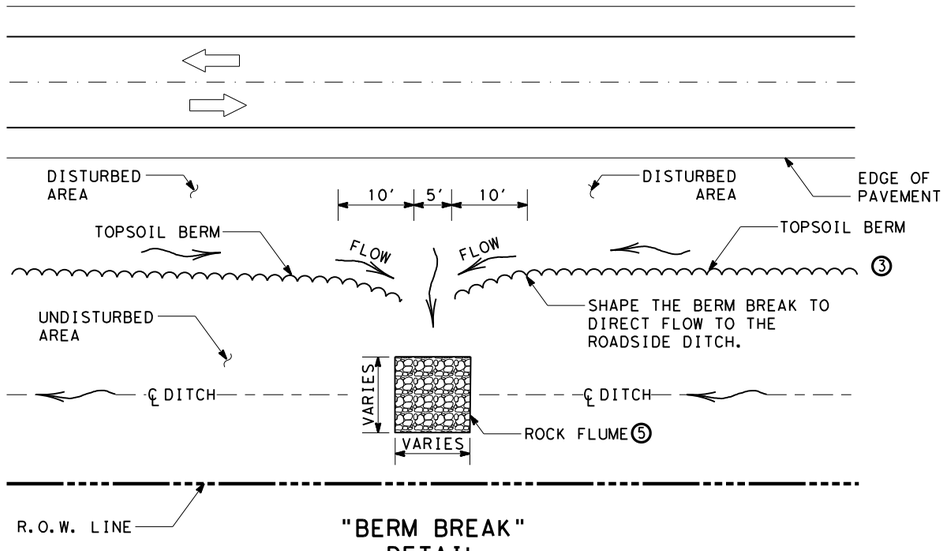
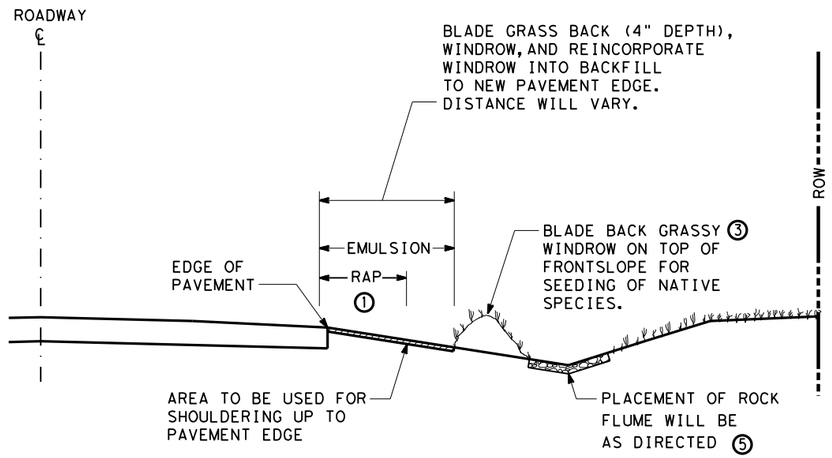


"BERM BREAK" DETAIL PLAN VIEW ②

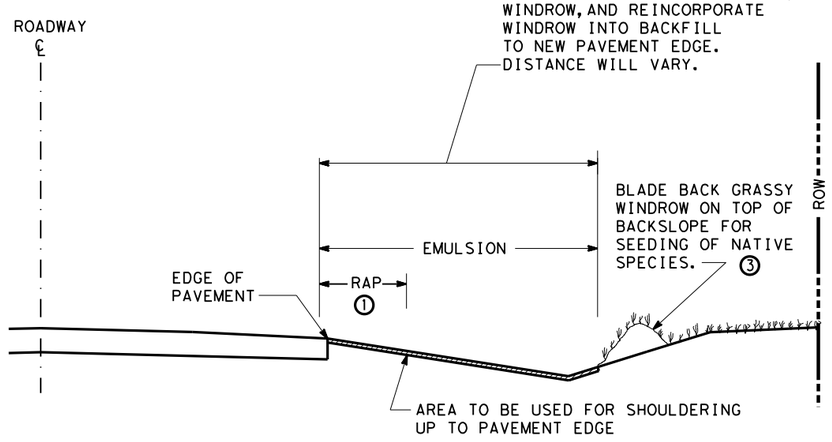


TYPICAL DITCH SECTION
SHOWING BERM/WINDROW OF TOPSOIL

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:

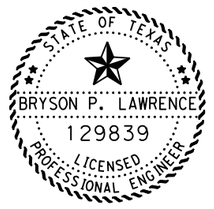
1. AS DIRECTED PLACE RAP ADJACENT TO EDGE OF PAVEMENT AS A BACKFILL MATERIAL. PLACEMENT DISTANCE IS TO BE A MINIMUM OF 4' OR AS NEEDED TO ACHIEVE SMOOTH TIE IN TO EXISTING FRONT SLOPE.

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).



Bryson Lawrence, P.E.

04/27/2023

SCALE = NTS SHEET 5 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		1609	01	029, etc.	FM 1630		
		DIST	COUNTY		SHEET NO.		
		WFS	COOKE		162		

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.

04/27/2023

SCALE = NTS SHEET 1 OF 2

Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATION FOR VEGETATION ESTABLISHMENT SHEET

WFS-TA-VES

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REVISIONS JULY 2019	1609	01	029, etc.	FM 1630
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	WFS	COOKE		163

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.

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Texas Department of Transportation
Wichita Falls District Standard

TYPICAL APPLICATION FOR VEGETATION ESTABLISHMENT SHEET

WFS-TA-VES

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	DIST	COUNTY		SHEET NO.
	WFS	COOKE		164

DATE 4/26/2023
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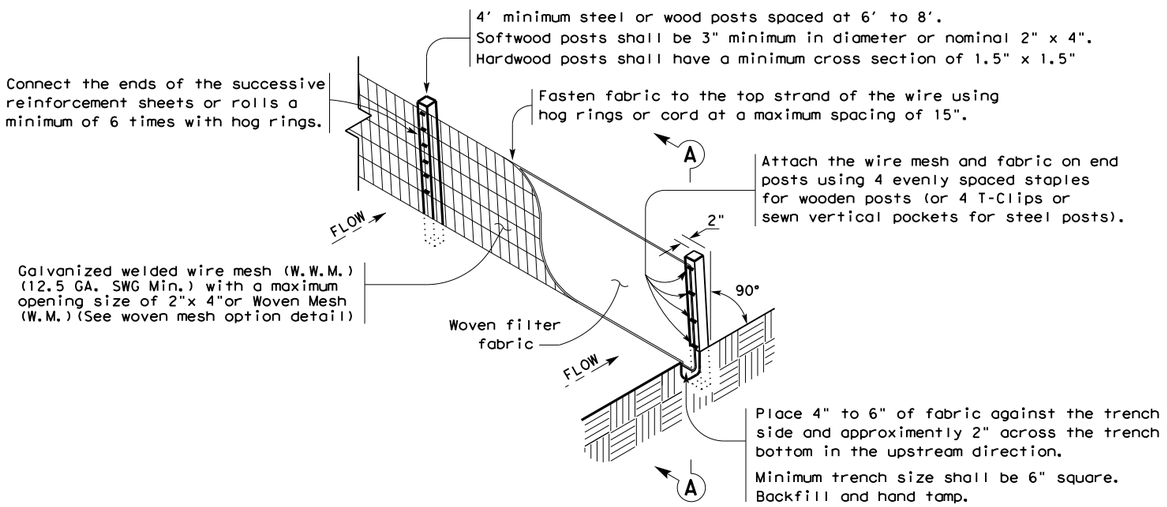
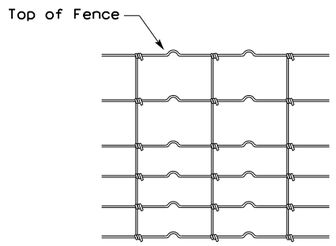
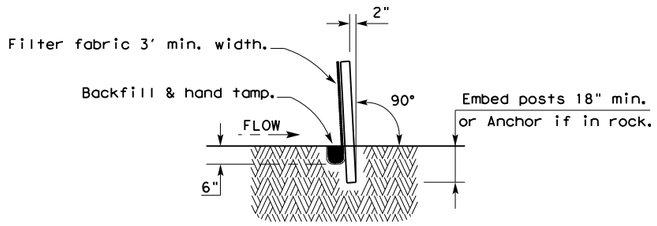


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

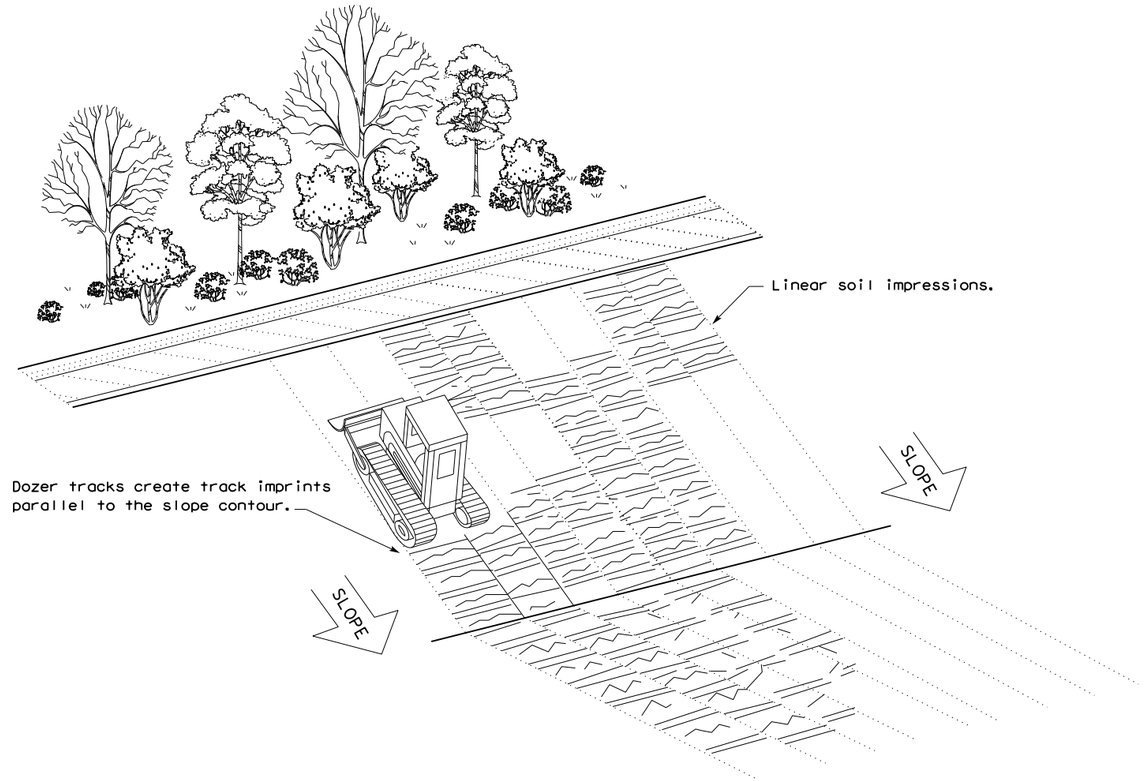
LEGEND

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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REVISIONS	1609	01	029, etc.	FM 1630
	DIST	COUNTY		SHEET NO.
	WFS	COOKE		165

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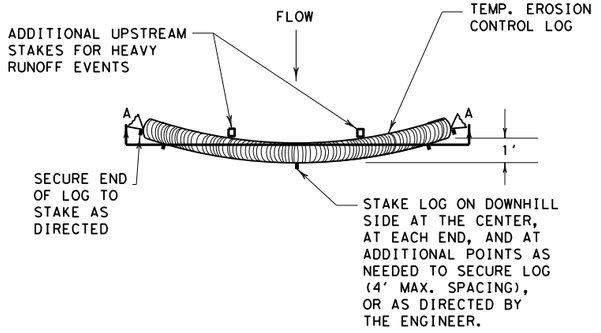
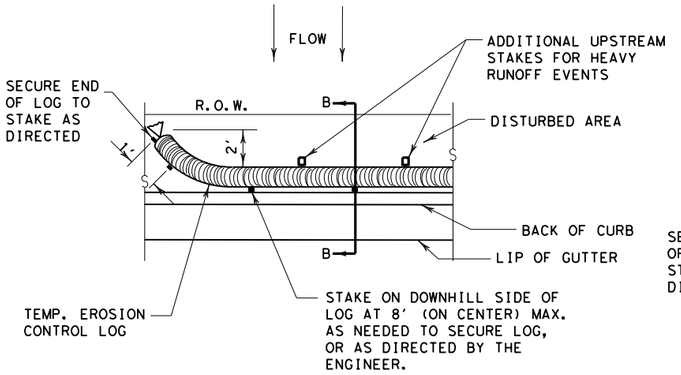
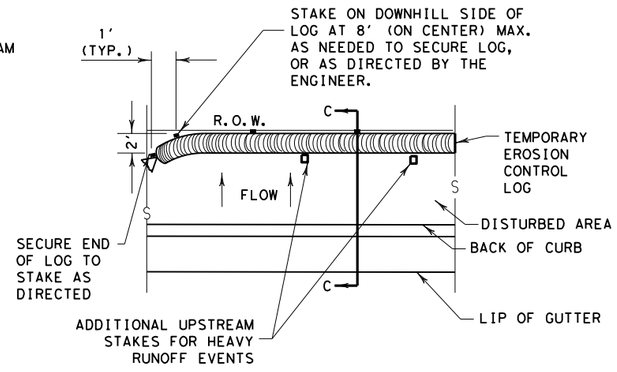


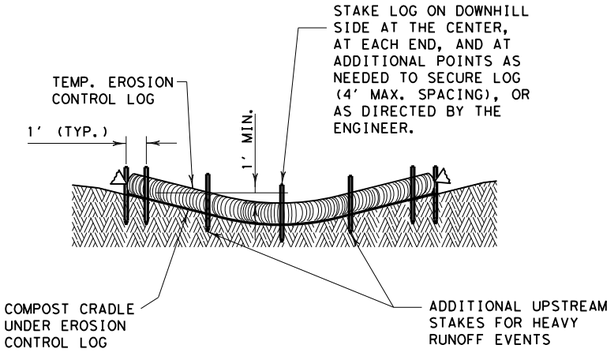
PLAN VIEW



PLAN VIEW



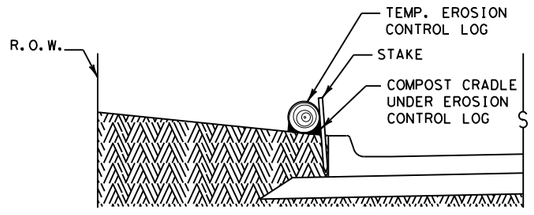
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

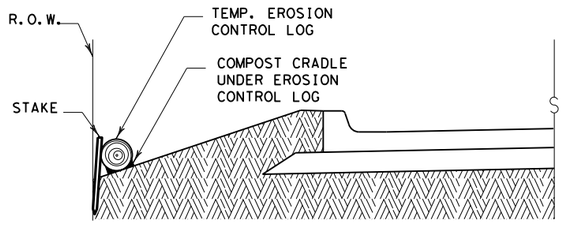
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

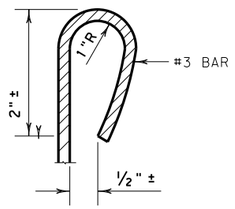
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

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.

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

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.

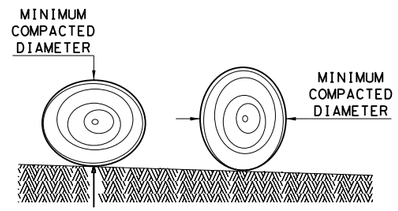
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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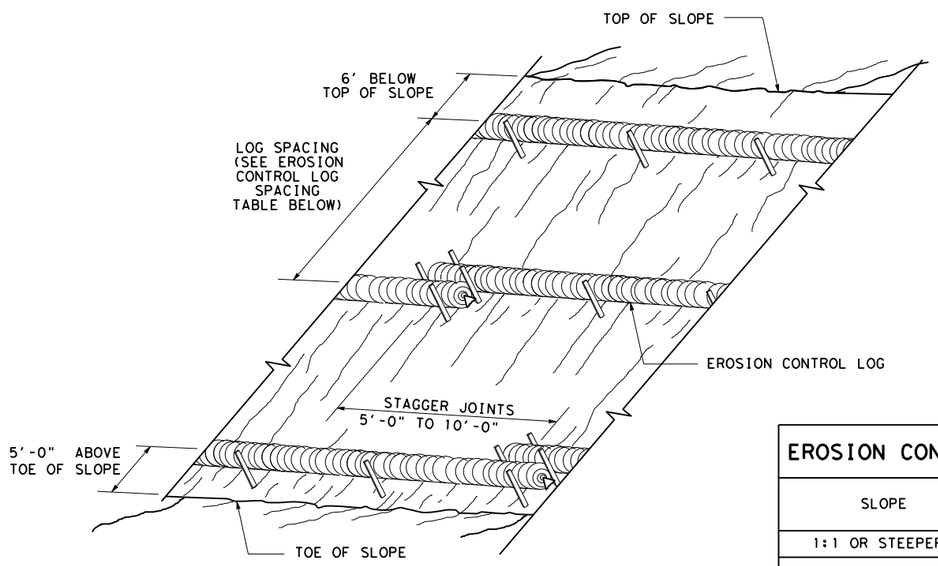
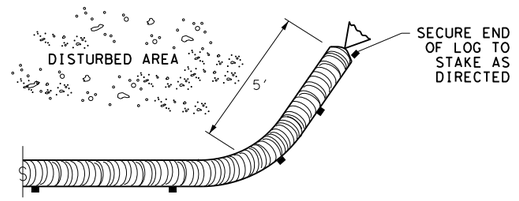


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

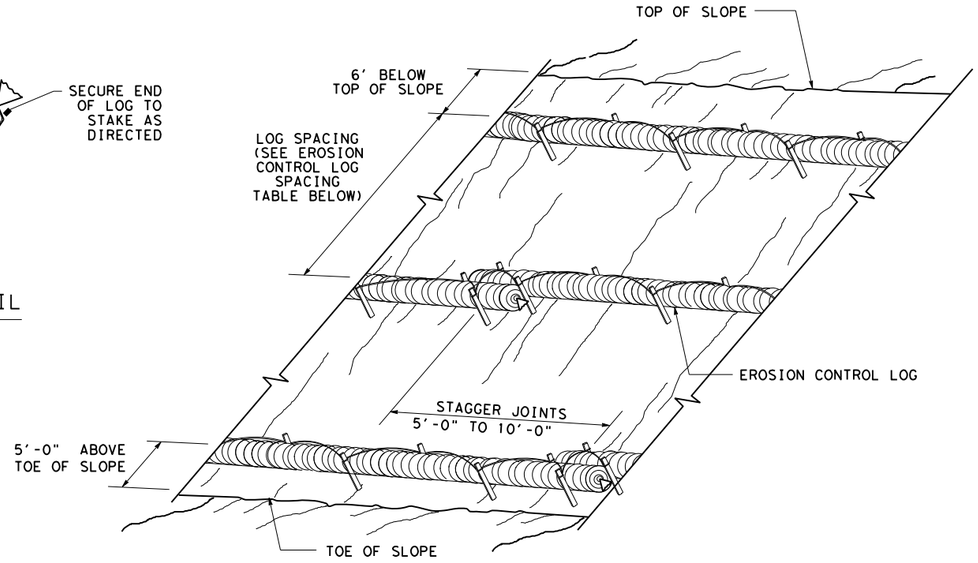
CL-SST



END SECTION RAP DETAIL

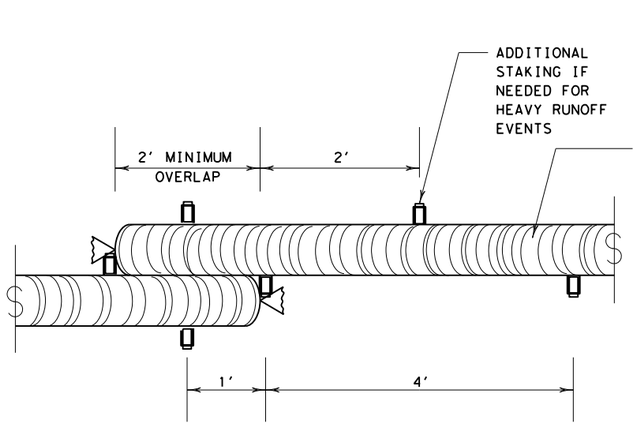
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

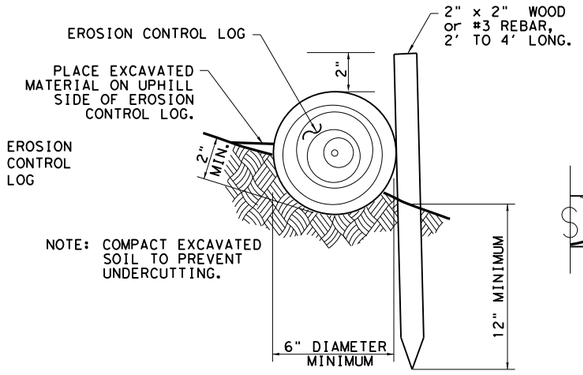
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

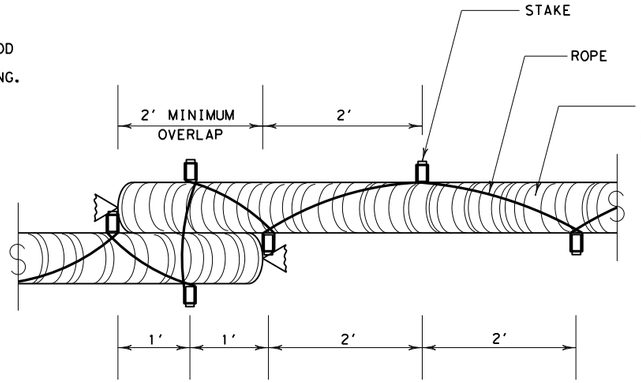


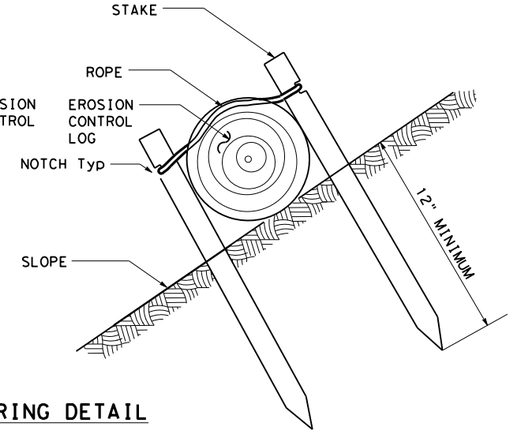


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

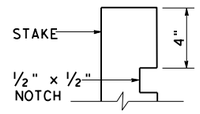
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





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
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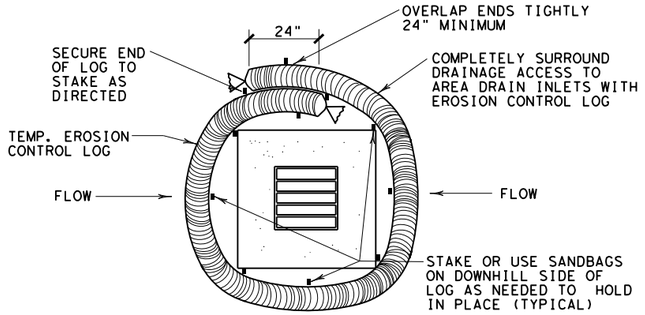
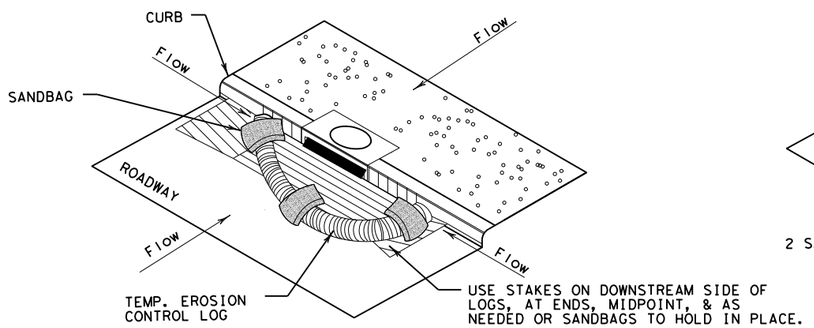


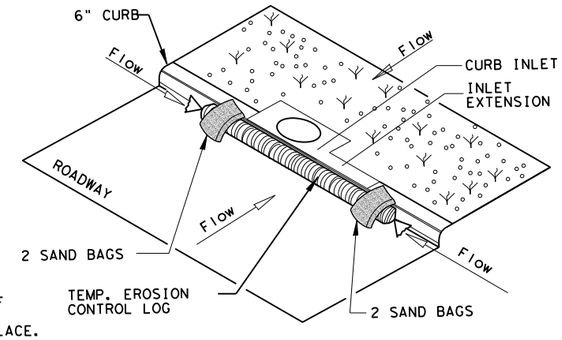
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

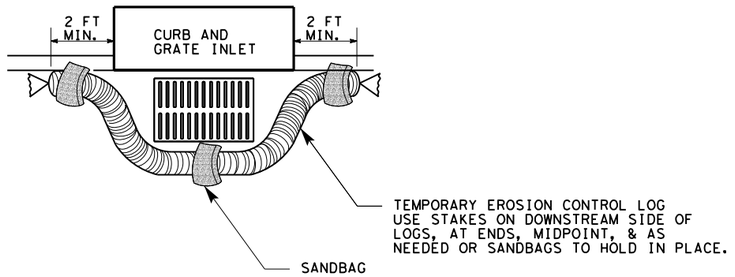
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

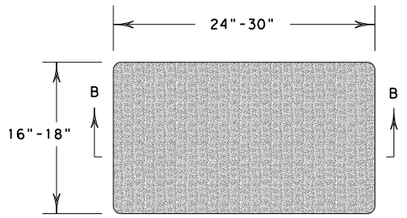
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

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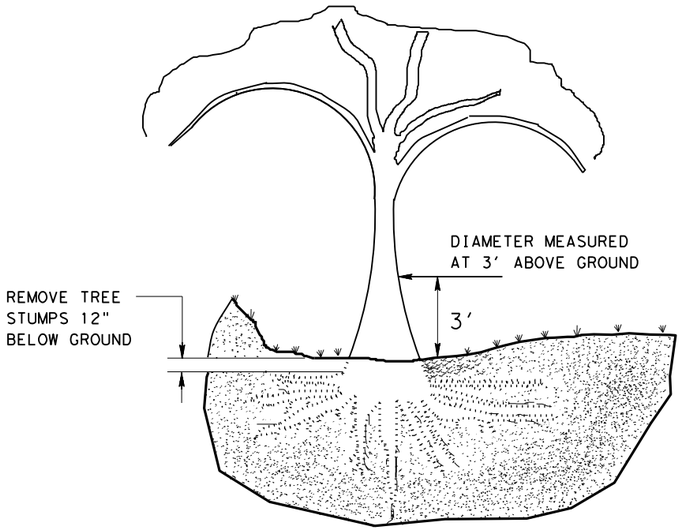
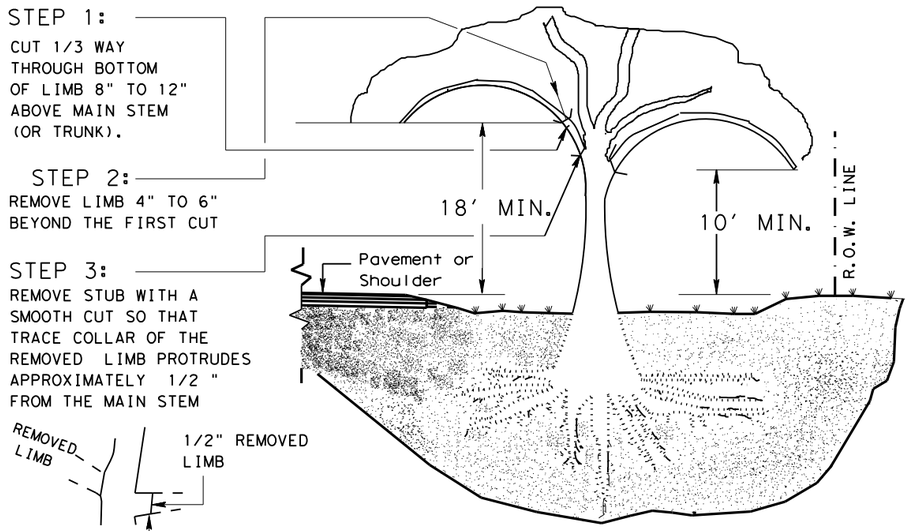
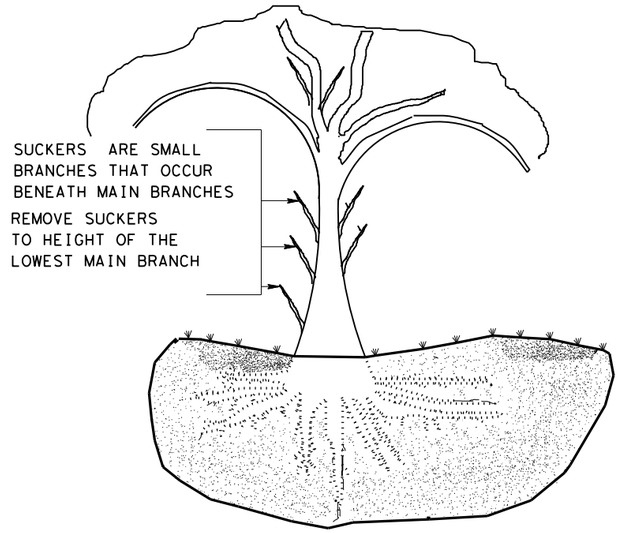


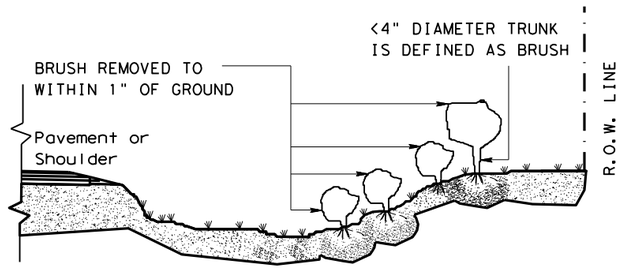
TREE REMOVAL



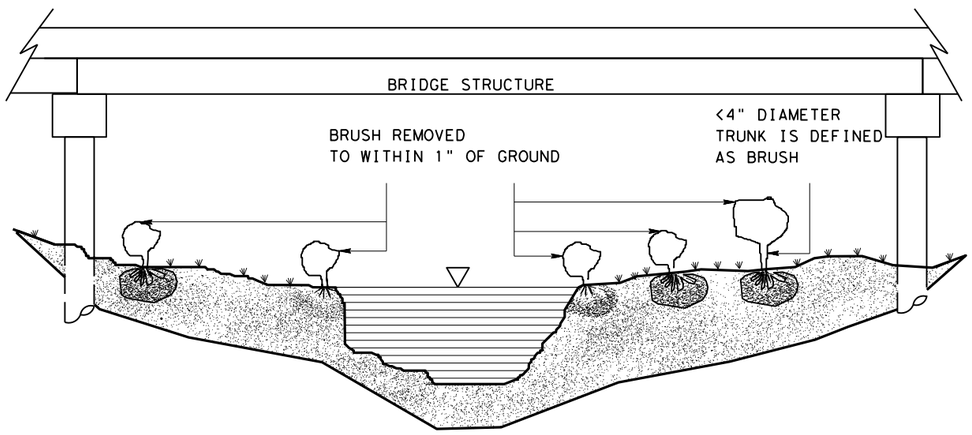
TREE TRIMMING



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.**

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TREE AND BRUSH REMOVAL

TRB-15(1)

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Revised table 1 to 2014 Specification	DIST	COUNTY		SHEET NO.
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