INDEX OF SHEETS

FED. RD DIV. No.	PROJECT No.		SHEET No.
6	C 418-2-35		1
STATE	STATE DIST.	COUNTY	
TEXAS	WACO	HILL	
CONTROL	SECTION	JOB	HIGHWAY No.
0418	02	035	SH 171

STATE OF TEXAS
TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
PROJECT C 418-2-35
CSJ: 0418-02-035

HILL COUNTY
SH 171

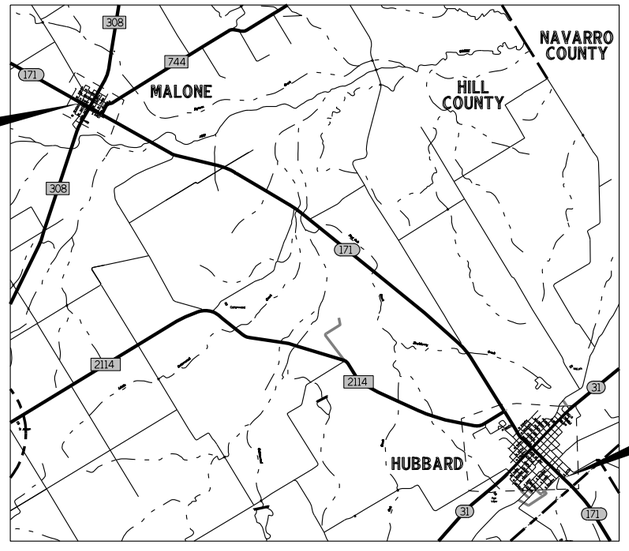
DESIGN SPEED (HUBBARD): 30 MPH
DESIGN SPEED: 50 MPH

ADT (2020): 2,545
ADT (2040): 3,563

CSJ	ROADWAY LENGTH (FT)	ROADWAY LENGTH (MI)	BRIDGE LENGTH (FT)	BRIDGE LENGTH (MI)	TOTAL LENGTH (FT)	TOTAL LENGTH (MI)
0418-02-035	42,825.70	8.111	1,160.00	0.220	43,985.70	8.331

LIMITS: N MAPLE ST (MALONE) TO SE FIFTH ST (HUBBARD)

FOR THE CONSTRUCTION OF OVERLAY
CONSISTING OF MILL AND OVERLAY.



BEGIN PROJECT
CSJ: 0418-02-035
SH 171
STA 645+70.56
REF MRKR: 354+1.442

END PROJECT
CSJ: 0418-02-035
SH 171
STA 1085+56.26
REF MRKR: 362+1.558

VICINITY MAP
SCALE: 1" = 10,667'

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

SUBMITTED FOR LETTING:
ATKINS (DESIGN CONSULTANT)

Thomas T. Le — 10/31/2023

THOMAS T. LE, P.E. — DATE
PROJECT MANAGER

ATKINS
TBPE REG. # F-474

17304 PRESTON RD, SUITE 1300
DALLAS, TEXAS 75252

APPROVED FOR LETTING: 11/3/2023

DocuSigned by:
Stanley Swiatek
B69BD796DD564C9...
DISTRICT ENGINEER

RECOMMENDED FOR LETTING: 11/2/2023

DocuSigned by:
Josh Voiles
AC8604F84EC2483...
AREA ENGINEER

RECOMMENDED FOR LETTING: 11/3/2023

DocuSigned by:
Victor Vashel, P.E.
9AD8C743F95E4E3...
DIRECTOR OF TRANSPORTATION
PLANNING & DEVELOPMENT

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION
NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS,
SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000-008).

Texas Department of Transportation

INDEX OF SHEETS

* THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

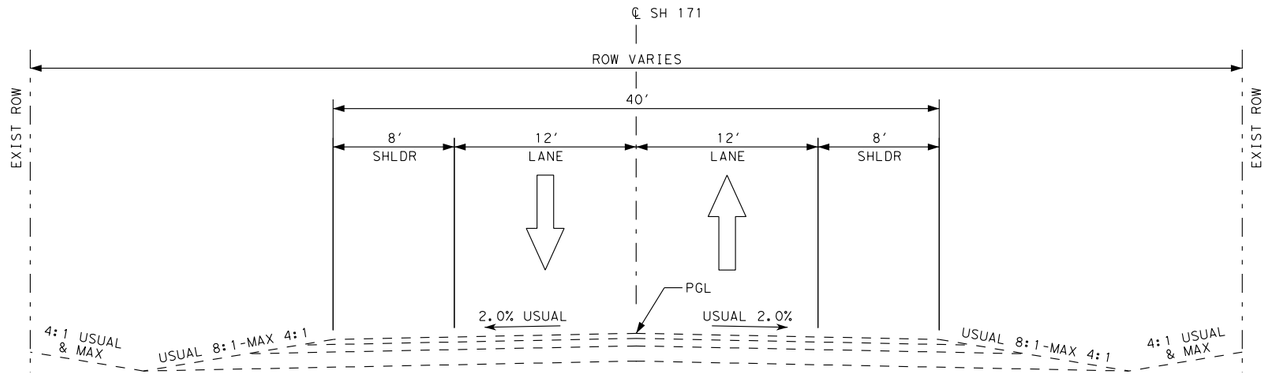
Texas Department of Transportation
Waco District

SH 171

INDEX OF SHEETS

SCALE: N.T.S.

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	2



SH 171

EXISTING TYPICAL SECTION

STA 645+95.56 TO STA 695+98.50
STA 695+98.50 TO STA 696+98.50 (TRANSITION FROM 20′ TO 16′ RT)
STA 711+41.50 TO STA 814+23.36
STA 814+23.36 TO STA 815+65.00 (TRANSITION FROM 20′ TO 22′ RT)
STA 827+18.00 TO STA 833+66.00
STA 833+66.00 TO STA 834+66.00 (TRANSITION FROM 20′ TO 22′ RT)
STA 844+19.00 TO STA 1034+00.00

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
6/29/2023

ATKINS
TBPE REG. # F-474

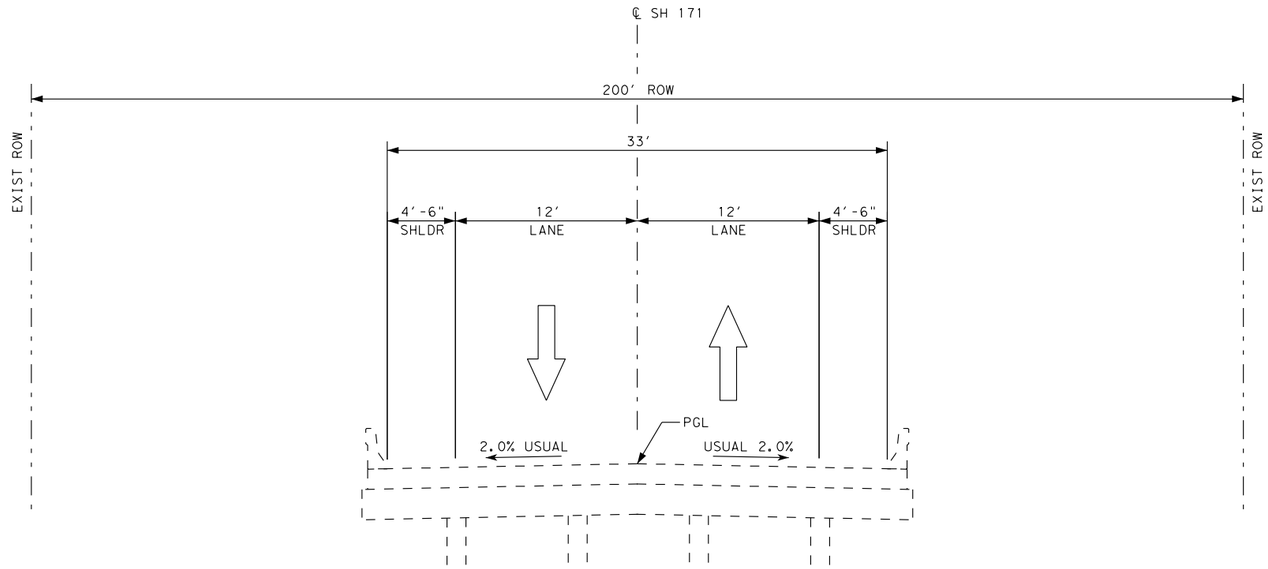
Texas Department of Transportation
Waco District

SH 171

TYPICAL SECTIONS

SCALE: N.T.S SHEET 1 OF 12

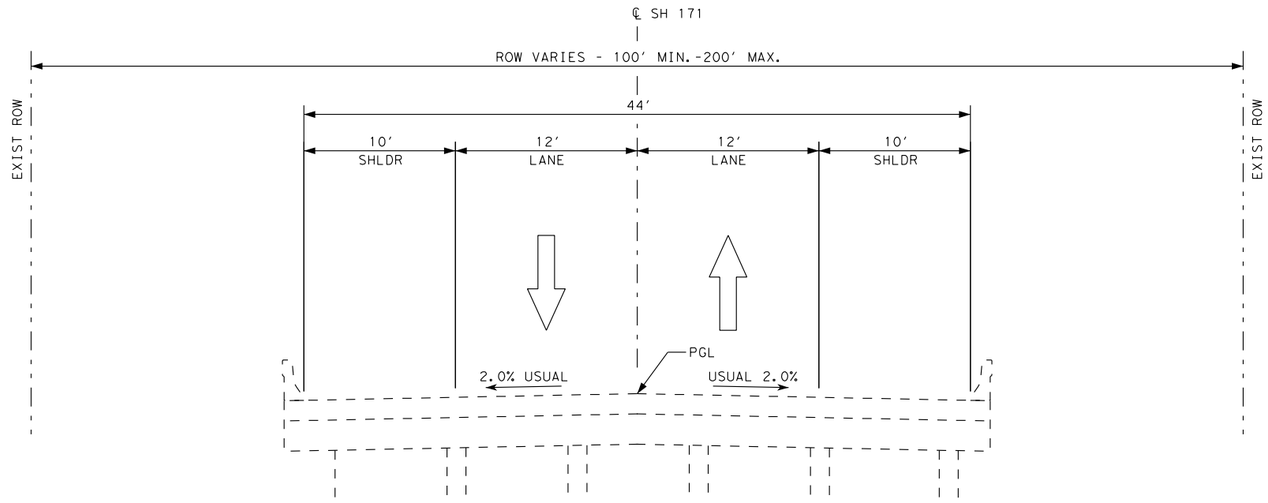
DESIGNED: AES	FED. RD DIV. NO.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	3



SH 171

EXISTING BRIDGE TYPICAL SECTION

STA 699+60.00 TO STA 707+80.00 (ASH CREEK)



SH 171

EXISTING BRIDGE TYPICAL SECTION

STA 817+50.00 TO STA 818+50.00 (LITTLE COTTONWOOD CREEK)
STA 821+05.00 TO STA 823+05.00 (POST OAK CREEK BRANCH)
STA 837+15.00 TO STA 837+95.00 (POST OAK CREEK)

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
6/29/2023

Thomas T. Le

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

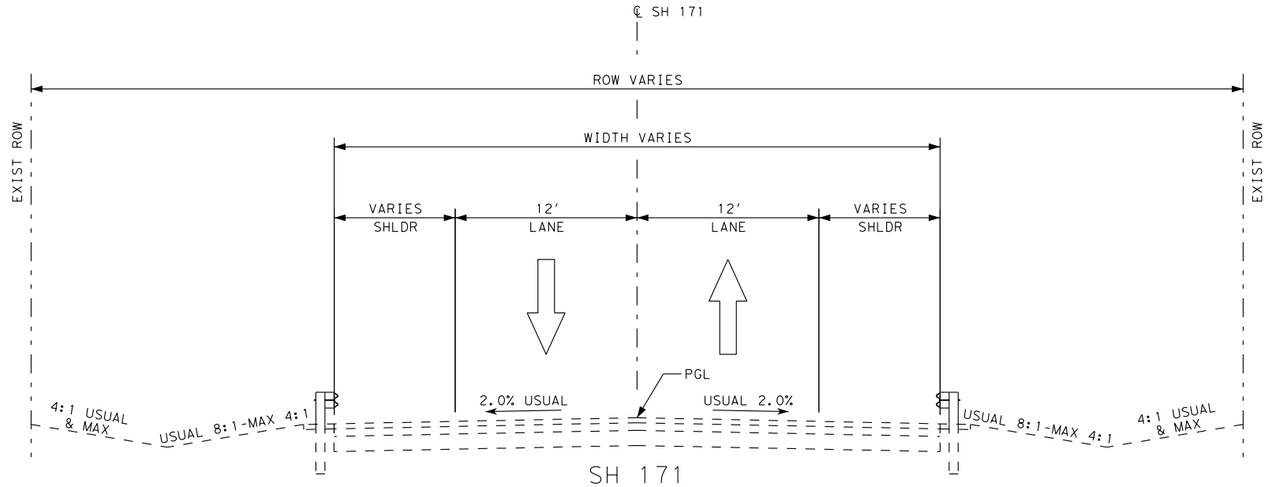
SH 171

TYPICAL SECTIONS

SCALE: N.T.S

SHEET 2 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	4



SH 171

EXISTING TYPICAL SECTION

STA 696+98.50 TO STA 698+00.00
STA 698+00.00 TO STA 698+25.00 (TRANSITION FROM 20′ TO 16′ LT)
STA 698+25.00 TO STA 699+60.00
STA 707+80.00 TO STA 709+15.00
STA 709+15.00 TO STA 709+40.00 (TRANSITION FROM 16′ TO 20′ RT)
STA 709+40.00 TO STA 710+41.50
STA 710+41.50 TO STA 711+41.50 (TRANSITION FROM 16′ TO 20′ LT)
STA 815+65.00 TO STA 815+69.93
STA 815+69.93 TO STA 816+69.56 (TRANSITION FROM 20′ TO 22′ LT)
STA 816+69.56 TO STA 817+50.00
STA 818+50.00 TO STA 821+05.00
STA 823+05.00 TO STA 824+18.10
STA 824+18.10 TO STA 825+18.10 (TRANSITION FROM 22′ TO 20′ RT)
STA 825+18.10 TO STA 826+18.00
STA 826+18.00 TO STA 827+18.00 (TRANSITION FROM 22′ TO 20′ LT)
STA 834+66.00 TO STA 835+34.08
STA 835+34.08 TO STA 836+34.08 (TRANSITION FROM 20′ TO 22′ LT)
STA 836+34.08 TO STA 837+15.00
STA 837+95.00 TO STA 838+75.55
STA 838+75.55 TO STA 839+75.55 (TRANSITION FROM 22′ TO 20′ RT)
STA 839+75.55 TO STA 843+19.00
STA 843+19.00 TO STA 844+19.00 (TRANSITION FROM 22′ TO 20′ LT)

6/29/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

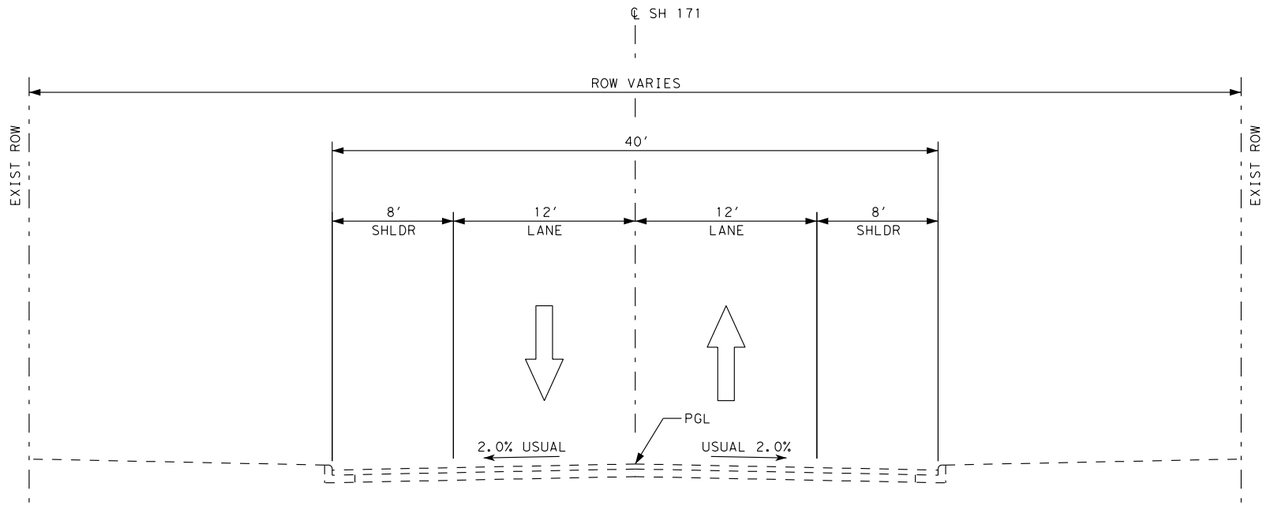
SH 171

TYPICAL SECTIONS

SCALE: N.T.S

SHEET 3 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	5



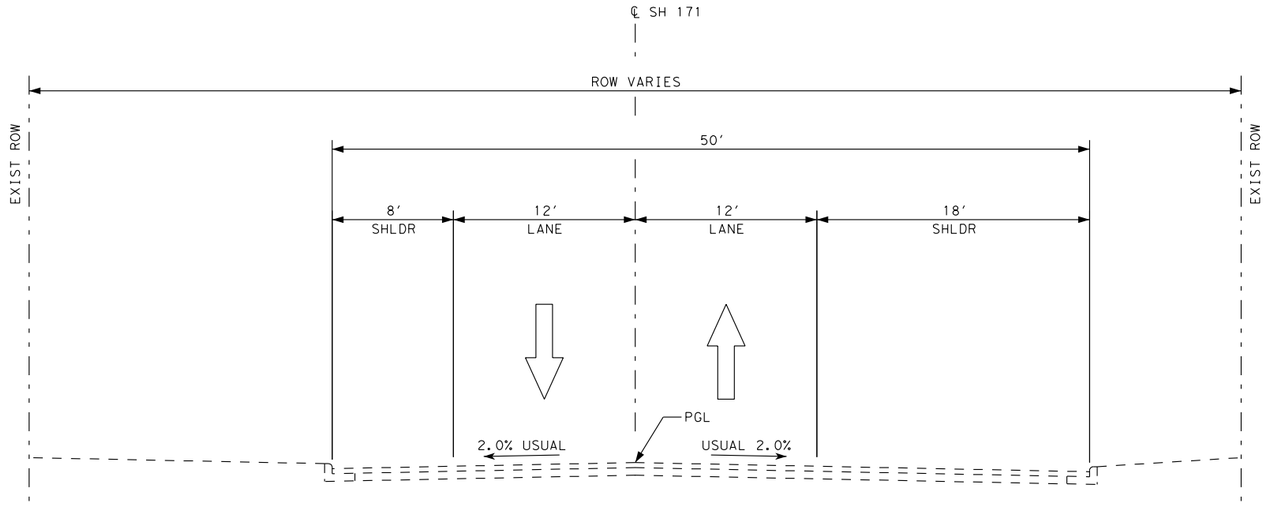
SH 171

EXISTING TYPICAL SECTION

STA 1034+00.00 TO STA 1039+51.85

STA 1039+51.85 TO STA 1040+46.55 (TRANSITION FROM 20′ TO 30′ RT)

STA 1068+27.05 TO STA 1085+56.26



SH 171

EXISTING TYPICAL SECTION

STA 1040+46.55 TO STA 1043+96.30

STA 1043+96.30 (TRANSITION FROM 20′ TO 28′ LT)

6/29/2023

ATKINS

TBPE REG. # F-474

Texas Department of Transportation

Waco District

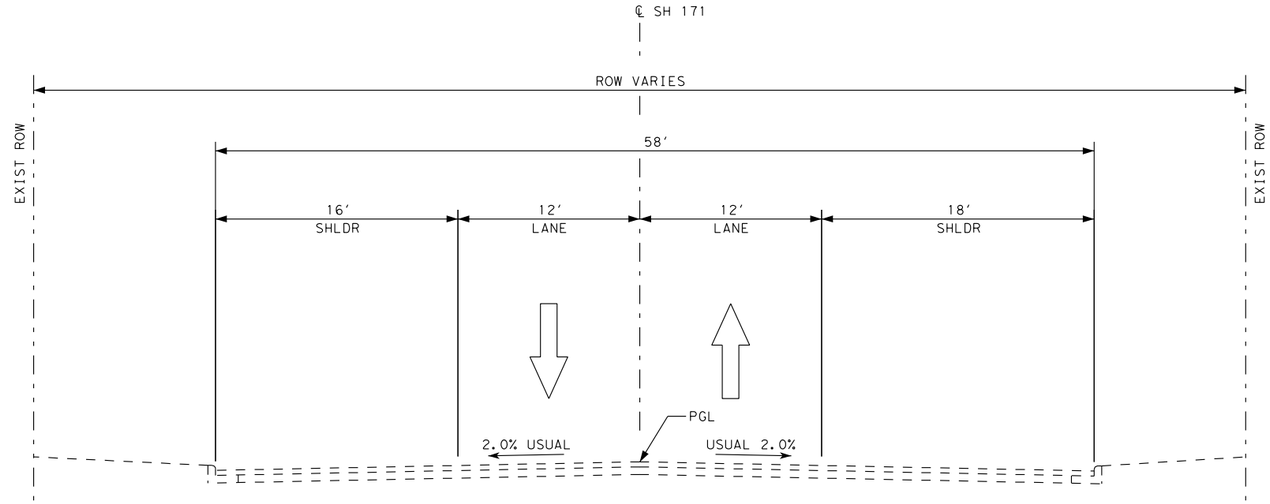
SH 171

TYPICAL SECTIONS

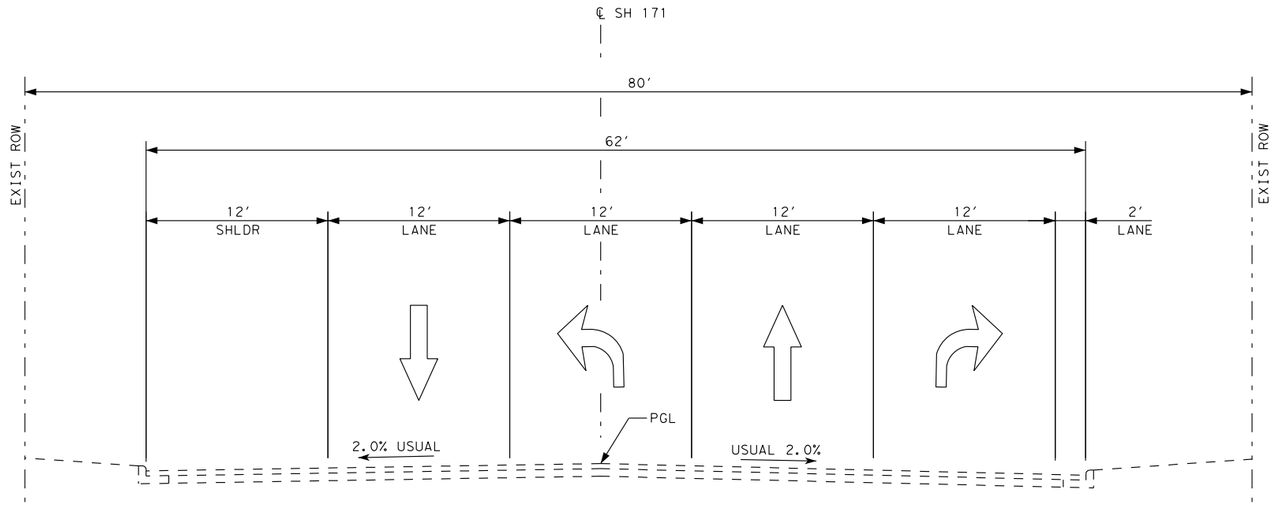
SCALE: N.T.S

SHEET 4 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	6



SH 171
EXISTING TYPICAL SECTION
STA 1043+96.30 TO STA 1051+49.59
STA 1051+49.59 TO 1053+21.00 (TRANSITION FROM 28′ TO 32′ LT)



SH 171
EXISTING TYPICAL SECTION
STA 1053+21.00 TO STA 1055+08.11

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
6/29/2023

ATKINS
TBPE REG. # F-474

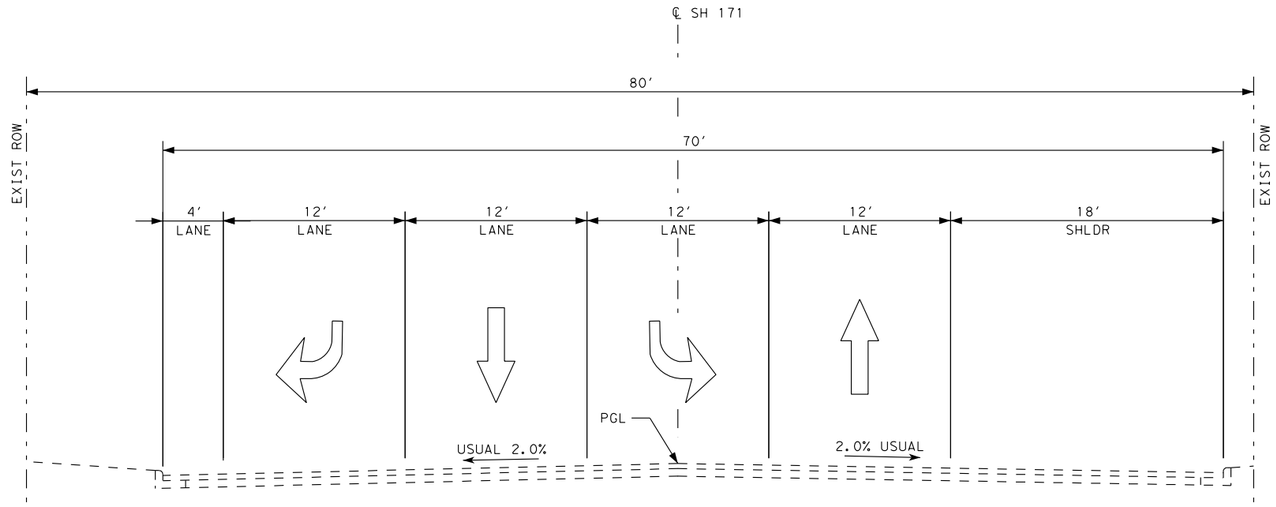
Texas Department of Transportation
Waco District

SH 171
TYPICAL SECTIONS

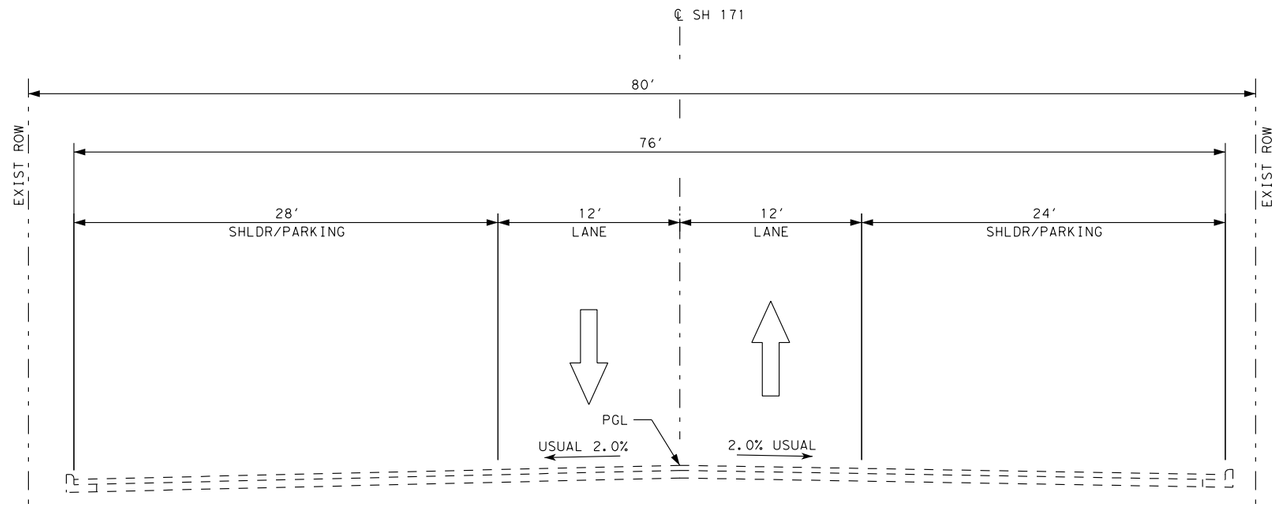
SCALE: N.T.S

SHEET 5 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	7



SH 171
EXISTING TYPICAL SECTION
STA 1055+08.11 TO STA 1056+87.00



SH 171
EXISTING TYPICAL SECTION
STA 1056+87.00 TO STA 1066+18.73
STA 1066+18.73 TO STA 1066+78.16 (TRANSITION FROM 38′ TO 34′ RT)

6/29/2023

ATKINS
TBPE REG. # F-474

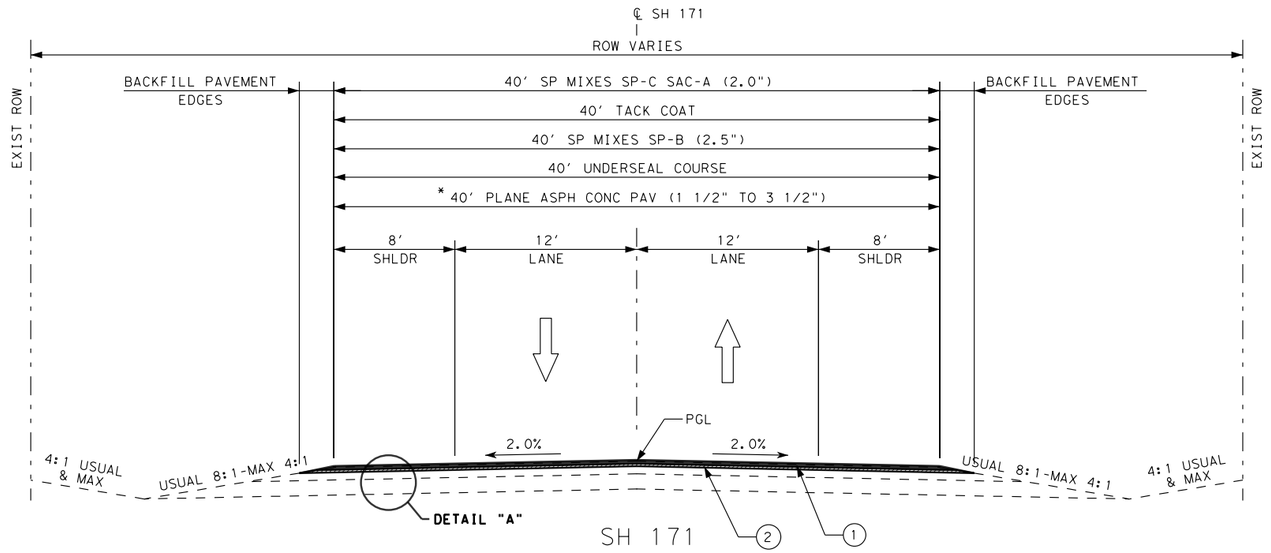
Texas Department of Transportation
Waco District

SH 171
TYPICAL SECTIONS

SCALE: N.T.S

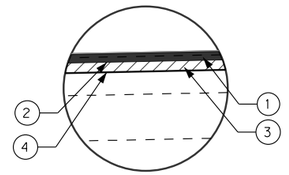
SHEET 6 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	8



SH 171
PROPOSED TYPICAL SECTION

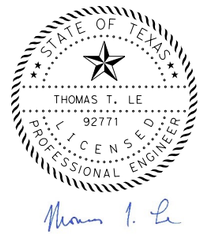
STA 645+95.56 TO STA 695+98.50
STA 695+98.50 TO STA 696+98.50 (TRANSITION FROM 20' TO 16' RT)
STA 711+41.50 TO STA 814+23.36
STA 814+23.36 TO STA 815+65.00 (TRANSITION FROM 20' TO 22' RT)
STA 827+18.00 TO STA 833+66.00
STA 833+66.00 TO STA 834+66.00 (TRANSITION FROM 20' TO 22' RT)
STA 844+19.00 TO STA 1034+00.00



DETAIL "A"

① 2.0" SP MIXES SP-C SAC-A
② TACK COAT
③ 2.5" SP MIXES SP-B
④ UNDERSEAL COURSE

* ITEM 354 - PLANE ASPH CONC PAV (1 1/2" TO 3 1/2") USED TO ESTABLISH 2% FINAL CROWN.



11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

TYPICAL SECTIONS

SCALE: N.T.S

SHEET 7 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
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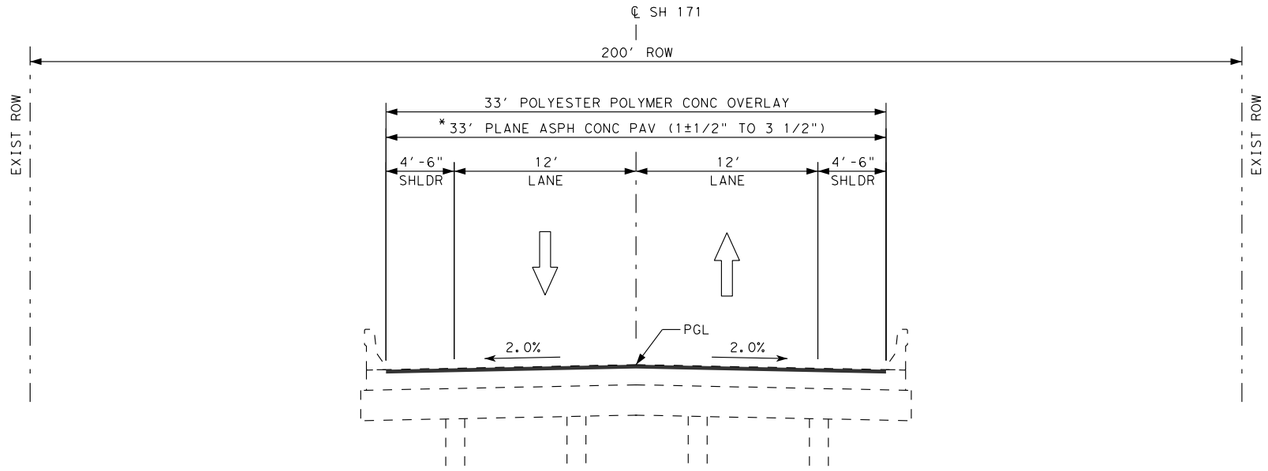
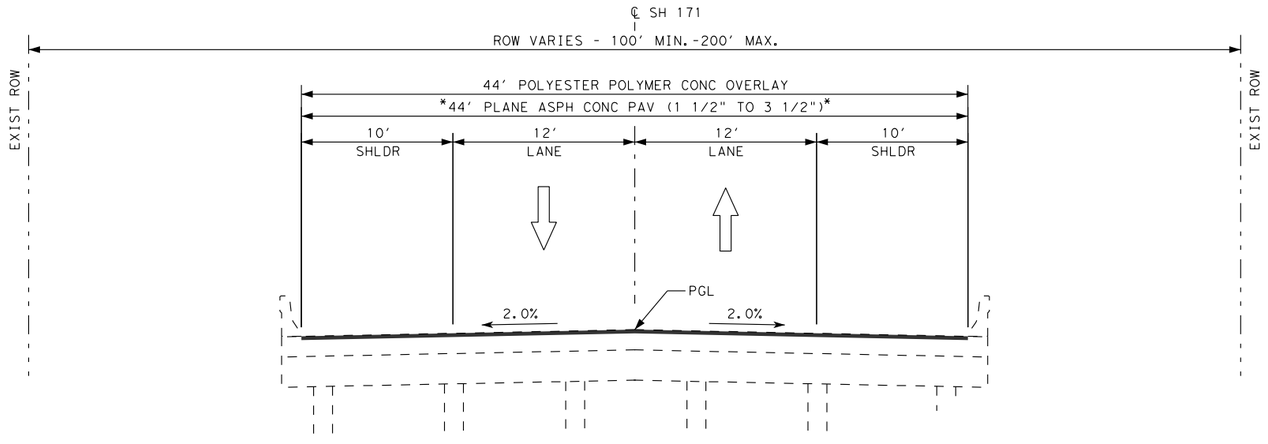


SH 171

PROPOSED BRIDGE TYPICAL SECTION

STA 699+60.00 TO STA 707+60.00 (ASH CREEK)

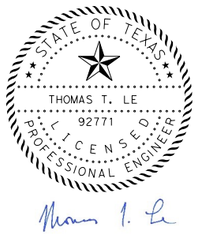
* ITEM 354 - PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")
USED TO ESTABLISH 2% FINAL CROWN.
PLANE EXISTING ASPHALT CONCRETE PAVEMENT
DOWN TO EXISTING DECK.



SH 171

PROPOSED BRIDGE TYPICAL SECTION

STA 817+50.00 TO STA 818+50.00 (LITTLE COTTONWOOD CREEK)
STA 821+25.00 TO STA 823+05.00 (COTTONWOOD CREEK)
STA 837+15.00 TO STA 837+95.00 (POST OAK CREEK)



11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

TYPICAL SECTIONS

SCALE: N.T.S

SHEET 8 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
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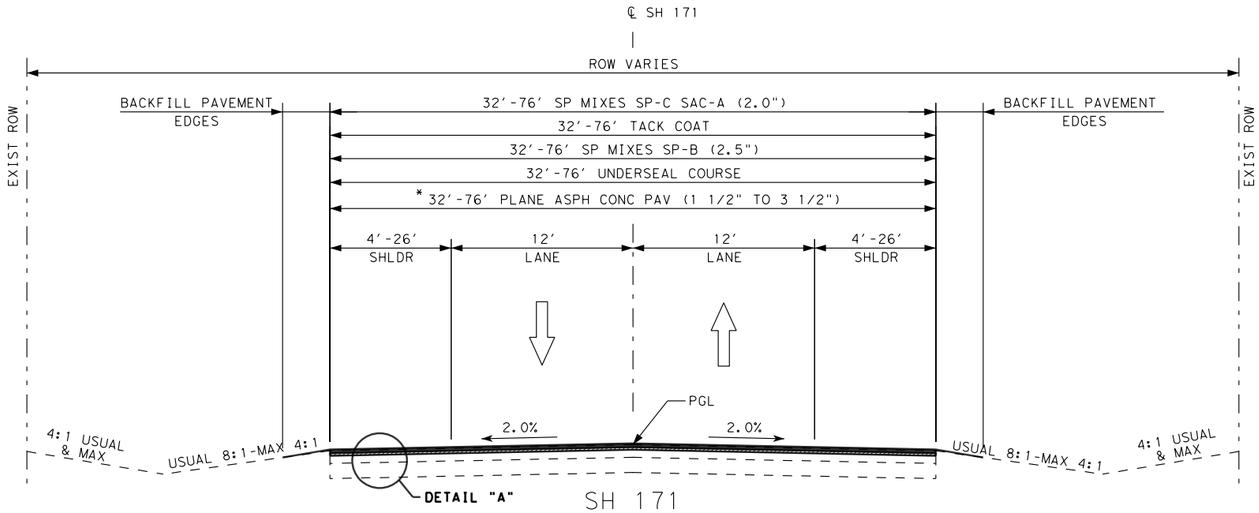
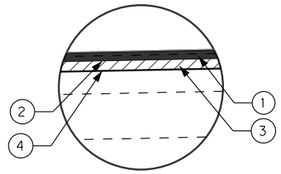


SH 171

PROPOSED TYPICAL SECTION

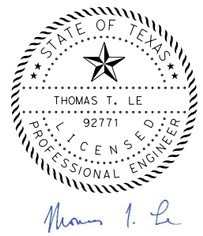
STA 696+98.50 TO STA 698+00.00
STA 698+00.00 TO STA 698+25.00 (TRANSITION FROM 20' TO 16' LT)
STA 698+25.00 TO STA 699+60.00
STA 707+60.00 TO STA 709+15.00
STA 709+15.00 TO STA 709+40.00 (TRANSITION FROM 16' TO 20' RT)
STA 709+40.00 TO STA 710+41.50
STA 710+41.50 TO STA 711+41.50 (TRANSITION FROM 16' TO 20' LT)
STA 815+65.00 TO STA 815+69.93
STA 815+69.93 TO STA 816+69.56 (TRANSITION FROM 20' TO 22' LT)
STA 816+69.56 TO STA 817+50.00
STA 818+50.00 TO STA 821+25.00
STA 823+05.00 TO STA 824+18.10
STA 824+18.10 TO STA 825+18.10 (TRANSITION FROM 22' TO 20' RT)
STA 825+18.10 TO STA 826+18.00
STA 826+18.00 TO STA 827+18.00 (TRANSITION FROM 22' TO 20' LT)
STA 834+66.00 TO STA 835+34.08
STA 835+34.08 TO STA 836+34.08 (TRANSITION FROM 20' TO 22' LT)
STA 836+34.08 TO STA 837+15.00
STA 837+95.00 TO STA 838+75.55
STA 838+75.55 TO STA 839+75.55 (TRANSITION FROM 22' TO 20' RT)
STA 839+75.55 TO STA 843+19.00
STA 843+19.00 TO STA 844+19.00 (TRANSITION FROM 22' TO 20' LT)



DETAIL "A"

① 2.0" SP MIXES SP-C SAC-A
② TACK COAT
③ 2.5" SP MIXES SP-B
④ UNDERSEAL COURSE

* ITEM 354 - PLANE ASPH CONC PAV (1 1/2" TO USED TO ESTABLISH 2% FINAL CROWN.



11/3/2023

ATKINS TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

TYPICAL SECTIONS

SCALE: N.T.S SHEET 9 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	11

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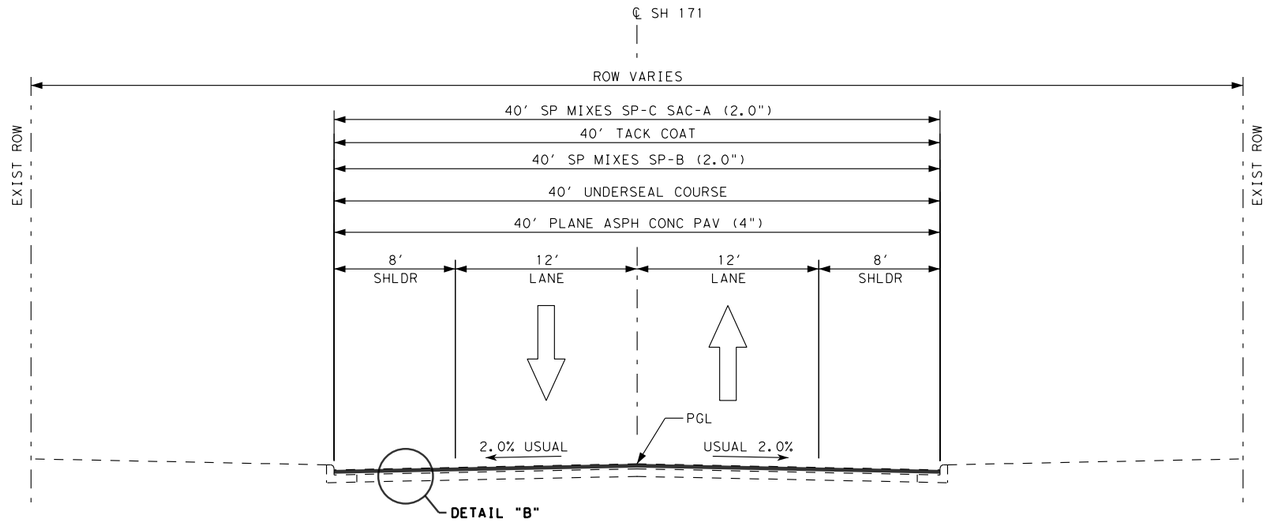


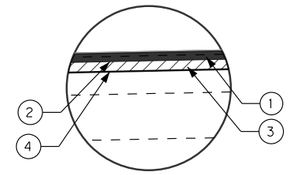
SH 171

PROPOSED TYPICAL SECTION

STA 1034+00.00 TO STA 1039+51.85

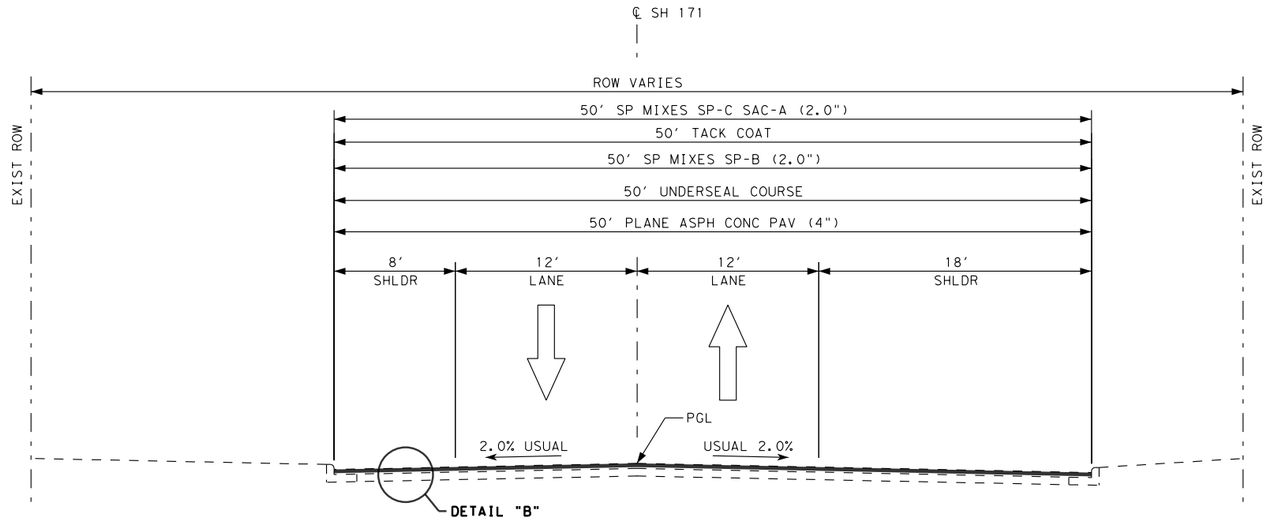
STA 1039+51.85 TO STA 1040+46.55 (TRANSITION FROM 20' TO 30' RT)

STA 1068+27.05 TO STA 1085+56.26



DETAIL "B"

① 2.0" SP MIXES SP-C SAC-A
② TACK COAT
③ 2.0" SP MIXES SP-B
④ UNDERSEAL COURSE



SH 171

PROPOSED TYPICAL SECTION

STA 1040+46.55 TO STA 1043+96.30

STA 1043+96.30 (TRANSITION FROM 20' TO 28' LT)

11/3/2023

ATKINS

TBPE REG. # F-474

Texas Department of Transportation

Waco District

SH 171

TYPICAL SECTIONS

SCALE: N.T.S

SHEET 10 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMC	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	12

PLOT DRIVER: RD_11x17_PDF.plt
PEN TABLE: SH171_WACO.tbl
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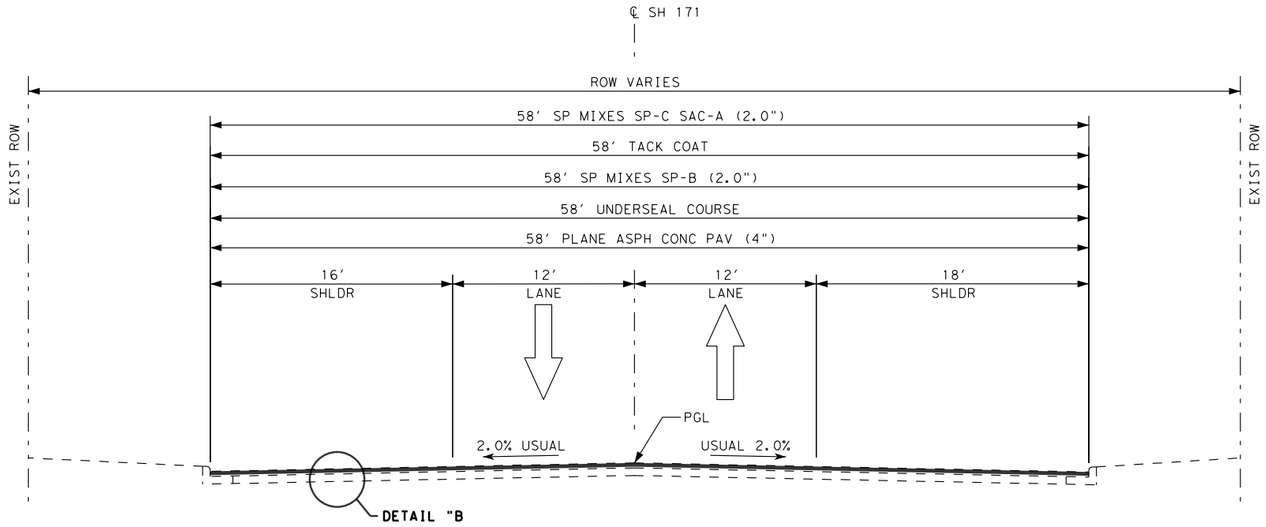
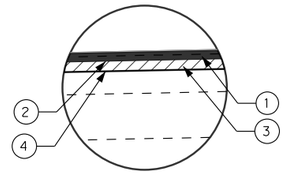


SH 171

PROPOSED TYPICAL SECTION

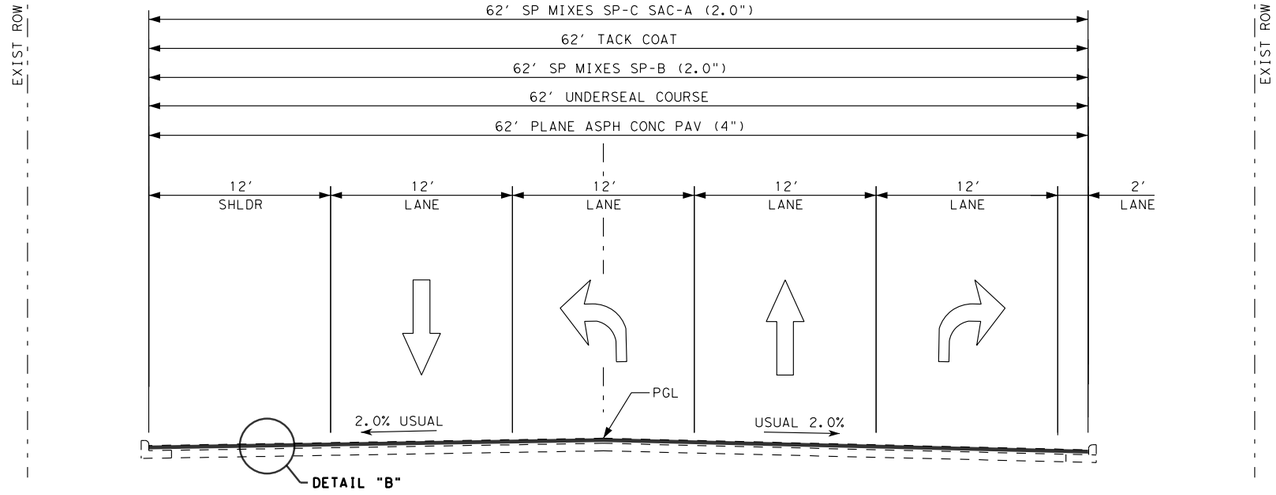
STA 1043+96.30 TO STA 1051+49.59

STA 1051+49.59 TO 1053+21.00 (TRANSITION FROM 28′ TO 32′ LT)



DETAIL "B"

① 2.0" SP MIXES SP-C SAC-A
② TACK COAT
③ 2.0" SP MIXES SP-B
④ UNDERSEAL COURSE



SH 171

PROPOSED TYPICAL SECTION

STA 1053+21.00 TO STA 1055+08.11

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

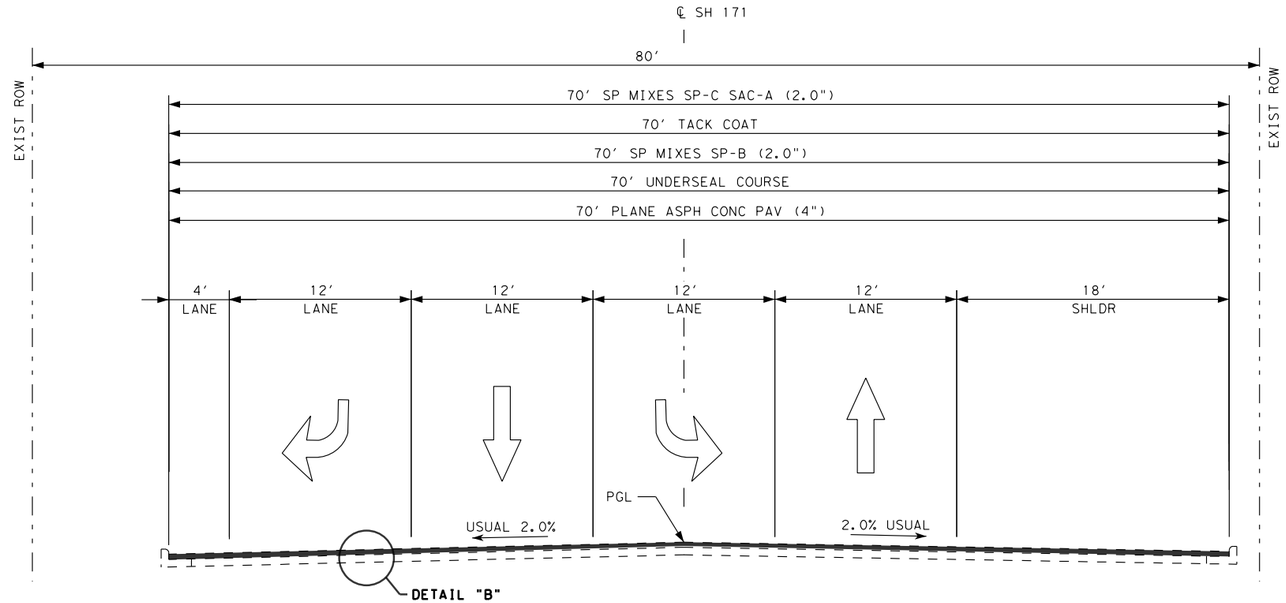
SH 171

TYPICAL SECTIONS

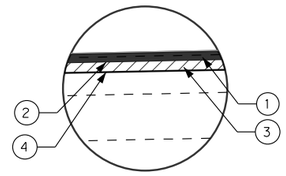
SCALE: N.T.S

SHEET 11 OF 12

DESIGNED: AES	FED. RD DIV. NO.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	13

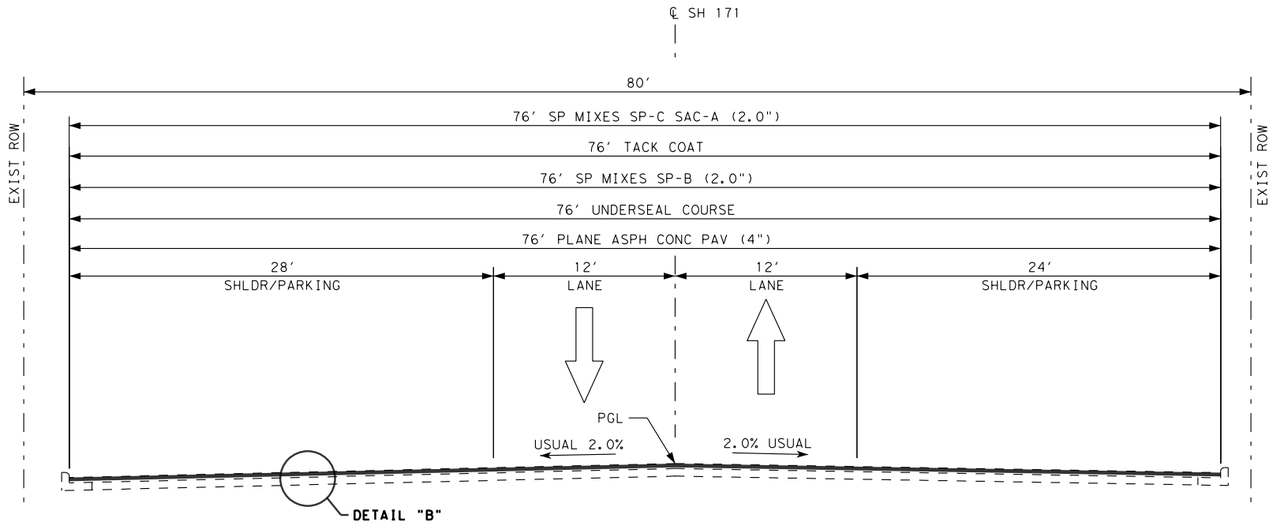


SH 171
PROPOSED TYPICAL SECTION
STA 1055+08.11 TO STA 1056+87.00



DETAIL "B"

① 2.0" SP MIXES SP-C SAC-A
② TACK COAT
③ 2.0" SP MIXES SP-B
④ UNDERSEAL COURSE



SH 171
PROPOSED TYPICAL SECTION
STA 1056+87.00 TO STA 1066+18.73
STA 1066+18.73 TO STA 1066+78.16 (TRANSITION FROM 38′ TO 34′ RT)
STA 1066+18.73 TO STA 1066+78.16 (TRANSITION FROM 38′ TO 36′ LT)
STA 1067+61.93 (TRANSITION FROM 34′ TO 20′ RT)
STA 1068+11.05 TO STA 1068+27.05 (TRANSITION FROM 36′ TO 20′ LT)

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

TYPICAL SECTIONS

SCALE: N.T.S

SHEET 12 OF 12

DESIGNED: AES	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	14

DATE: 11/3/2023 TIME: 7:03:57 AM

PLOT DRIVER: RD_11x17_PDF.plt
PEN TABLE: SH171_WACO.tbl
FILE: ...\GEN\SH171_S_TYP_12.dgn

BASIS OF ESTIMATE TABLES

Table 1: Basis of Estimate for Asphalt Pavements

Item	Description	Rate	Basis	Quantities
3077	**SUPERPAVE MIXTURES**			
	TY-B PG 64-22	110 LB / SY / IN @ 2.5 IN	173,743 SY	23,890 TON
	TY-B PG 64-22	110 LB / SY / IN @ 2.0 IN	31,940 SY	3,513 TON
	TY-C PG 70-22	110 LB / SY / IN @2.0 IN	206,499 SY	22,715 TON
*ALL HOT MIX ITEMS	TACK COAT	0.1 GAL/SY/LIFT OF HMAC	206,499 SY	20,650 GAL

***Tack Rate for all interlayer tack use**

Table 2: Basis of Estimate for Interlayer Material

Item	Description	Rate	Basis	Quantities
3085	**UNDERSEAL COURSE**	0.25 GAL / SY	205,684 SY	51,421 GAL
	FOR CONTRACTORS INFORMATION			
	SPRAY APPLIED MEMBRANE	0.20 GAL / SY	205,684 SY	41,137 GAL
	TRAIL	0.20 GAL / SY	205,684 SY	41,137 GAL
	ASPH (AC-15P, AC-20XP, AC10-2TR, AC-12-5TR)	0.25 GAL / SY	205,684 SY	51,421 GAL
	AGGR (TY-PD GR-5 OR TY-PL GR-5) (SAC-B)	1 CY / 150 SY	205,684 SY	1371 CY

GENERAL

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

The disturbed area for this project, as shown on the plans is 0.675 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The Contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the Engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

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

Bill Compton - Wacoprebid@txdot.gov, 254-867-2770, 100 S. Loop Dr., Waco, TX
Carmen Chau - Wacoprebid@txdot.gov, 254-867-2794, 100 S. Loop Dr., Waco, TX

Or Via phone or in person to the following individual(s):
Area Engineer's: Josh Voiles, P.E. (254) 582-5432
Assistant Area Engineer's: Anel Rivera-Rosada, P.E. (254) 582-5432

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

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

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

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

Paper copies of cross-sections may be produced by using the provided .pdf file located on the above FTP Website at the bidders' expense and at copying companies. This data is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the enclosed data with appropriate plans, specifications and estimate for the project(s).

GENERAL NOTES

ITEM 5: CONTROL OF THE WORK

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

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

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

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

ITEM 6: CONTROL OF MATERIALS

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

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

No significant traffic generator events identified.

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

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

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

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

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

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

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

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

- Roadway Closures,
- Support of phase construction traffic switches,
- nighttime work, or
- other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce.

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

Law Enforcement Personnel will be paid when use is approved by the Engineer. The Contractor retains the right to have law enforcement personnel on sight at their own cost and discretion when note approved by the Engineer.

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

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

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

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

ITEM 8: PROSECUTION AND PROGRESS

This Project will be a Standard Workweek in accordance with Article 8.3.1.4.

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

For this project, provide a Bar Chart progress schedule.

ITEM 134: BACKFILLING PAVEMENT EDGES

Start backfilling pavement edges within 7 days of starting the surface course.

Use Type “A” or “B” material to backfill pavement edges as shown in plans. Type “A” or “B” material will consist of suitable material that when compacted will support the pavement edge. Rap is considered suitable Type “A” or “B” material.

RAP Generated from the project will be used as the edge backfill material

Emulsion will be placed at a 50/50 solution of water to emulsion over disturbed edge backfill area. Emulsion rate=0.15 Gal/SY residual. This work, materials and equipment will be subsidiary to Item 134.

ITEM 320: EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT

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

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

ITEM 351: FLEXIBLE PAVEMENT STRUCTURE REPAIR

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

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

ITEM 354: PLANING AND TEXTURING PAVEMENT

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

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

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

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

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

ITEM 451: RETROFIT RAILING

Refinish the outside face of the concrete slabs and curbs on the underpasses where railing is removed in such a manner as to leave a neat surface. Grind existing anchor bolts flush with the concrete. Paint the ends of the anchor bolts with two coats of zinc dust-zinc rich oxide paint as described under Item 450, "Railing". This work will not be paid for directly, but will be subsidiary to Item 451, "Retrofit Railing".

ITEM 466: HEADWALLS AND WINGWALLS

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

ITEM 500: MOBILIZATION

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

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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

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

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

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

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

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

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

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

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

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

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

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

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

ITEM 504: FIELD OFFICE

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

ITEM 506: TEMPROARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS

The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7

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

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

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

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

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

Adequate construction exits will be planned, constructed, and maintained by the Contractor per Item 506, “Temporary Erosion, Sedimentation, and Environmental Controls”.

ITEM 540: METAL BEAM GUARD FENCE

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

Wooden block out will not be allowed.

ITEMS 542 & 544: REMOVING METAL BEAM GUARD FENCE & GUARDRAIL END TREATMENTS

W-Beam elements, steel posts and composite material block-outs will become the property of the Contractor.

ITEM 544: GUARDRAIL END TREATMENTS

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

ITEM 585: RIDE QUALITY FOR PAVEMENT SURFACES

Use Surface Test Type A on all intersections and driveways.

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

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

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

ITEM 658: DELINEATOR AND OBJECT MARKER ASSEMBLIES

All flexible and GF2 delineators will have a tubular body.

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

ITEM 662: WORK ZONE PAVEMENT MARKINGS

Paint and beads may be used for non-removable pavement markings.

ITEM 666: RETROREFLECTORIZED PAVEMENT MARKINGS

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

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

ITEM 668: PREFABRICATED PAVEMENT MARKINGS

Use Type C prefabricated pavement markings.

ITEM 672: RAISED PAVEMENT MARKERS

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

ITEM 3077: SUPERPAVE MIXTURES

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

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

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

Superpave gradations will be required to be below the reference zones shown in **Table 9** on surface mixes.

Maximum stripping of 0% is required.

ITEM 3096: ASPHLATS, OILS, AND EMULSIONS

Latex additives or modifiers will not be allowed on this project.

ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN

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

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

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

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

ITEM 6185: TRUCK MOUNTED ATTENUATORS

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

TCP 1 Series	Scenario	Required TMA
(1-4)-18		1

TCP 2 Series	Scenario	Required TMA
(2-4)-18 / (2-5)-18 / (2-6)-18	All	1

TCP 3 Series	Scenario			Required TMA
(3-1)-13	All			2
(3-2)-13	All			3
(3-3)-14	A	B	D	2
	C			3
(3-4)-13	All			1, unless working inside a twltl, then 2.

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

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

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

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

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

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0418-02-035 **DISTRICT** Waco **COUNTY** Hill
HIGHWAY SH 171

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0418-02-035**			
		PROJECT ID		**A00129757**			
		COUNTY		**Hill**			
		HIGHWAY		**SH 171**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	2.000		2.000	
	132-6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	CY	520.000		520.000	
	134-6004	BACKFILL (TY A OR B)	STA	460.000		460.000	
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	SY	354.000		354.000	
	354-6057	PLANE ASPH CONC PAV (4")	SY	31,940.000		31,940.000	
	354-6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	SY	173,743.000		173,743.000	
	400-6005	CEM STABIL BKFL	CY	56.000		56.000	
	420-6066	CL C CONC (RAIL FOUNDATION)	CY	16.000		16.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	87.000		87.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	375.000		375.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	1,353.000		1,353.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)	LF	660.000		660.000	
	451-6073	RETROFIT RAIL (CONC PARAPET)	LF	96.000		96.000	
	466-6174	WINGWALL (PW - 1) (HW=13 FT)	EA	1.000		1.000	
	466-6175	WINGWALL (PW - 1) (HW=14 FT)	EA	1.000		1.000	
	496-6005	REMOV STR (WINGWALL)	EA	2.000		2.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	10.000		10.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	100.000		100.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	100.000		100.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	70,790.000		70,790.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	35,395.000		35,395.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	4,297.500		4,297.500	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	16.000		16.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	22.000		22.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	50.000		50.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	3,237.500		3,237.500	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	16.000		16.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	22.000		22.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	42.000		42.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	36.000		36.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	107.000		107.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	4.000		4.000	
	662-6010	WK ZN PAV MRK NON-REMOV (W)8"(DOT)	LF	120.000		120.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	278.000		278.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	181.000		181.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	169,792.000		169,792.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0418-02-035 **DISTRICT** Waco **COUNTY** Hill
HIGHWAY SH 171

			CONTROL SECTION JOB		**0418-02-035**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00129757**		
			COUNTY		**Hill**		
			HIGHWAY		**SH 171**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	94.000		94.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	4,245.000		4,245.000	
	666-6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	120.000		120.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	420.000		420.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	259.000		259.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	87,613.000		87,613.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	7,750.000		7,750.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	37,619.000		37,619.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	5.000		5.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	5.000		5.000	
	672-6007	REFL PAV MRKR TY I-C	EA	24.000		24.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	934.000		934.000	
	3077-6001	SP MIXES SP-B PG64-22	TON	27,403.000		27,403.000	
	3077-6022	SP MIXES SP-C SAC-A PG70-22	TON	22,715.000		22,715.000	
	3077-6075	TACK COAT	GAL	20,650.000		20,650.000	
	3085-6001	UNDERSEAL COURSE	GAL	51,421.000		51,421.000	
	4106-6007	POLYESTER POLYMER CONC OVERLAY (1")	SY	1,738.000		1,738.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	180.000		180.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	180.000		180.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	1,440.000		1,440.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	

WORK ZONE PAVEMENT MARKERS SUMMARY

BEGINNING STATION	ENDING STATION	662 6010	662 6012	662 6016	662 6034	662 6109	662 6111
		WK ZN PAV MRK NON-REMOV (W)8"(DOT)	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y-2
		LF	LF	LF	LF	EA	EA
SH 171							
645+95.56	669+00.00				7,920		198
669+00.00	693+00.00				9,600		240
693+00.00	717+00.00				9,600		240
717+00.00	741+00.00				9,324		233
741+00.00	765+00.00				9,080		227
765+00.00	789+00.00				9,600		240
789+00.00	813+00.00				9,600		240
813+00.00	837+00.00				8,936		223
837+00.00	861+00.00				9,600		240
861+00.00	885+00.00				9,600		240
885+00.00	909+00.00				9,600		240
909+00.00	933+00.00				9,600		240
933+00.00	957+00.00				9,600		240
957+00.00	981+00.00				9148		229
981+00.00	1005+00.00				9600		240
1005+00.00	1029+00.00				9000		225
1029+00.00	1053+00.00	25		54	8920	16	223
1053+00.00	1077+00.00	95	278	127	8548	78	214
1077+00.00	1085+56.26				2916		73
PROJECT TOTAL		120	278	181	169,792	94	4,245

PORTABLE CHANGEABLE MESSAGE SIGN SUMMARY

LOCATION	60016001	60016002	6185 6002	6185 6003
	PORTABLE CHANGEABLE MESSAGE SIGN	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	DAY	EA	DAY	HR
SH 171				
VARIOUS LOCATIONS	180	2	180	1440
PROJECT TOTAL	180	2	180	1,440

TRAFFIC CONTROL SUMMARY

LOCATION	510 6003	512 6001	512 6025	512 6037	545 6003	545 6004	545 6019
	ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST) (SGL SLOPE) (TY 1)	PORT CTB (MOVE) (SGL SLP) (TY 1)	PORT CTB (STKPL) (SGL SLP) (TY 1)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (STKPL)	CRASH CUSH ATTEN (INSTL) (S)(N) (TL3)
	MO	LF	LF	LF	EA	EA	EA
SH 171							
VARIOUS LOCATIONS	1	390	390	390	2	2	2
PROJECT TOTAL	1	390	390	390	2	2	0

ROADWAY SUMMARY

LOCATION	BEGINNING STATION	ENDING STATION	AREA	134 6004	3516004 [1]	354 6057	354 6154	3077 6001	3077 6022	3077 6075	3085 6001
				BACKFILL (TY A OR B)	FLEXIBLE PAVEMENT STRUCTURE REPAIR (8")	PLANE ASPH CONC PAV (4")	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	SP MIXES SP-B PG64-22	SP MIXES SP-C SAC-A PG70-22	TACK COAT	UNDERSEAL COURSE
				STA	SY	SY	SY	TON	TON	GAL	GAL
SH 171											
PLAN SHEET 1 OF 19	645+95.56	669+00.00	11269	23			11269	1549	1240	1127	2817
PLAN SHEET 2 OF 19	669+00.00	693+00.00	10667	24			10667	1467	1174	1067	2667
PLAN SHEET 3 OF 19	693+00.00	717+00.00	9536	24			9536	1311	1049	954	2384
PLAN SHEET 4 OF 19	717+00.00	741+00.00	10684	24			10684	1469	1176	1068	2671
PLAN SHEET 5 OF 19	741+00.00	765+00.00	10696	24			10696	1471	1177	1070	2674
PLAN SHEET 6 OF 19	765+00.00	789+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 7 OF 19	789+00.00	813+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 8 OF 19	813+00.00	837+00.00	11208	24			11208	1541	1233	1120	2802
PLAN SHEET 9 OF 19	837+00.00	861+00.00	10866	24			10866	1494	1195	1086	2717
PLAN SHEET 10 OF 19	861+00.00	885+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 11 OF 19	885+00.00	909+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 12 OF 19	909+00.00	933+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 13 OF 19	933+00.00	957+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 14 OF 19	957+00.00	981+00.00	10688	24			10688	1470	1176	1068	2672
PLAN SHEET 15 OF 19	981+00.00	1005+00.00	10667	24			10667	1467	1173	1067	2667
PLAN SHEET 16 OF 19	1005+00.00	1029+00.00	11140	24			11140	1532	1225	1114	2785
PLAN SHEET 17 OF 19	1029+00.00	1053+00.00	13043	24		10723	2320	1498	1435	1304	3260
PLAN SHEET 18 OF 19	1053+00.00	1077+00.00	17366	24		17366		1909	1910	1736	4341
PLAN SHEET 19 OF 19	1077+00.00	1085+56.26	3851	9		3851		423	424	385	962
TURNOUTS (ACP)			815						90	82	
TURNOUTS (RAP)			679	20							
PROJECT LIMITS					2500						
PROJECT TOTAL			207,178	460	354	31,940	173,743	27,403	22,715	20,650	51,421

[1] TO BE USED IN VARIOUS LOCATIONS

METAL BEAM GUARD FENCE SUMMARY

LOCATION	132 6019	420 6066	432 6045	450 6023	540 6002	540 6006	542 6001	542 6004	544 6001	544 6003	658 6014	658 6062
	EMBANKMENT (VEHICLE) (ORD COMP) (TY B)	CL C CONC (RAIL FOUNDATION)	RIPRAP (MOW STRIP) (4 IN)	RAIL (TY SSTR)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL DEL ASSM (D-SW) SZ 1(BRF) GF2(BI)
	CY	CY	CY	LF	LF	EA	LF	EA	EA	EA	EA	EA
SH 171												
MBGF LOCATION #1	30		20		137.5	2	75	2	2	2		6
MBGF LOCATION #2	30		20		137.5	2	75	2	2	2		6
MBGF LOCATION #3	50		33		250		150		4	2		7
MBGF LOCATION #4	50		48		587.5		650		4	4		11
MBGF LOCATION #5	30		18		150		200		2	2		4
MBGF LOCATION #6	35		30		175	4	175	4	4	4		12
MBGF LOCATION #7	35		30		175	4	137.5	4	4	4		12
MBGF LOCATION #8	50		49		500	4	475	4	4	4		15
MBGF LOCATION #9	50		39		225		225		6	6		10
MBGF LOCATION #10	50		32		275		300		4	4		8
MBGF LOCATION #11	30		17		100		125		2	2		3
MBGF LOCATION #12	50	24	38	120	325	4	450		4	4	6	9
MBGF LOCATION #13	30		17		125		200		2	2		4
PROJECT TOTAL	520	24	391	120	3,162.5	20	3,237.5	16	44	42	6	107

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

SUMMARY OF QUANTITIES

SCALE: N.T.S.

SHEET 1 OF 3

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.	HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET	SH 171

DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	17

DRIVEWAY SUMMARY

LOCATION	DRWY NO.	STA	LT/RT	WIDTH	LENGTH	DRIVEWAY AREA	[1] TURNOUTS (ACP)	[2] TURNOUTS (RAP)
				FT	FT	SY	SY	SY
1 OF 19	1	646+57	RT	96	2	21.33	22	
1 OF 19	2	646+60	LT	34	2	7.56	8	
1 OF 19	3	647+61	RT	34	2	7.56	8	
1 OF 19	4	648+08	LT	24	2	5.33	6	
1 OF 19	5	650+47	LT	90	2	20.00	20	
1 OF 19	6	650+54	RT	200	2	44.44	45	
1 OF 19	7	653+40	RT	100	2	22.22	23	
1 OF 19	8	653+77	LT	200	2	44.44	45	
1 OF 19	9	654+49	RT	40	2	8.89	9	
1 OF 19	10	656+49	RT	125	2	27.78	28	
1 OF 19	11	657+76	LT	100	2	22.22	23	
1 OF 19	12	657+87	RT	110	2	24.44	25	
1 OF 19	13	658+91	RT	34	2	7.56	8	
1 OF 19	14	659+81	RT	44	2	9.78	10	
1 OF 19	15	660+10	LT	64	2	14.22	15	
1 OF 19	16	660+68	LT	30	2	6.67	7	
1 OF 19	17	661+26	LT	30	2	6.67	7	
1 OF 19	18	662+09	RT	30	5	16.67		17
1 OF 19	19	662+98	RT	50	5	27.78		28
1 OF 19	20	664+91	RT	60	5	33.33		34
1 OF 19	21	666+54	RT	50	2	11.11	12	
2 OF 19	22	691+79	RT	22	5	12.22		13
4 OF 19	23	722+46	LT	22	5	12.22		13
4 OF 19	24	733+02	LT	42	2	9.33	10	
4 OF 19	25	735+02	RT	22	2	4.89	5	
4 OF 19	26	739+64	LT	50	2	11.11	12	
4 OF 19	27	740+95	LT	22	2	4.89	5	
6 OF 19	28	767+77	RT	22	5	12.22		13
6 OF 19	29	768+95	RT	22	5	12.22		13
6 OF 19	30	769+28	LT	16	5	8.89		9
6 OF 19	31	770+32	RT	22	5	12.22		13
6 OF 19	32	776+27	RT	16	5	8.89		9
6 OF 19	33	779+19	RT	22	2	4.89	5	
6 OF 19	34	783+50	RT	48	2	10.67	11	
7 OF 19	35	793+05	LT	16	5	8.89		9
8 OF 19	36	813+75	LT	28	2	6.22	7	
10 OF 19	37	865+07	LT	22	2	4.89	5	
10 OF 19	38	877+46	RT	48	5	26.67		27
11 OF 19	39	885+46	RT	36	2	8.00	8	
11 OF 19	40	893+21	RT	30	2	6.67	7	
11 OF 19	41	895+33	LT	55	2	12.22	13	
12 OF 19	42	914+69	RT	30	5	16.67		17
12 OF 19	43	914+81	LT	30	2	6.67	7	
12 OF 19	44	918+01	LT	30	2	6.67	7	
12 OF 19	45	921+82	RT	22	2	4.89	5	
13 OF 19	46	935+43	RT	22	5	12.22		13
13 OF 19	47	939+63	LT	24	2	5.33	6	
13 OF 19	48	946+39	RT	22	2	4.89	5	
13 OF 19	49	946+64	LT	22	2	4.89	5	
13 OF 19	50	947+16	RT	28	2	6.22	7	
13 OF 19	51	947+45	LT	22	2	4.89	5	
13 OF 19	52	948+42	RT	22	5	12.22		13
13 OF 19	53	948+76	LT	22	2	4.89	5	
13 OF 19	54	949+69	LT	22	5	12.22		13
13 OF 19	55	953+50	RT	30	5	16.67		17
14 OF 19	56	958+04	RT	22	5	12.22		13
14 OF 19	56	972+18	LT	36	2	8.00	8	
14 OF 19	56	976+48	RT	40	5	22.22		23
15 OF 19	57	983+88	LT	24	5	13.33		14
15 OF 19	58	990+56	RT	50	5	27.78		28

[1] PAID FOR UNDER ITEM 3077.

[2] PAID FOR UNDER ITEM 134.

DRIVEWAY SUMMARY

LOCATION	DRWY NO.	STA	LT/RT	WIDTH	LENGTH	DRIVEWAY AREA	[1] TURNOUTS (ACP)	[2] TURNOUTS (RAP)
				FT	FT	SY	SY	SY
16 OF 19	59	1008+15	RT	20	2	4.44	5	
16 OF 19	59	1008+76	RT	60	5	33.33		34
16 OF 19	60	1012+87	RT	32	5	17.78		18
16 OF 19	61	1013+21	LT	30	2	6.67	7	
16 OF 19	62	1014+92	LT	24	2	5.33	6	
16 OF 19	63	1015+66	RT	18	2	4.00	4	
16 OF 19	64	1016+03	LT	24	2	5.33	6	
16 OF 19	65	1016+81	RT	18	2	4.00	4	
16 OF 19	66	1018+28	LT	24	2	5.33	6	
16 OF 19	67	1019+50	RT	36	2	8.00	8	
16 OF 19	68	1023+69	LT	36	5	20.00		20
16 OF 19	69	1025+19	RT	40	2	8.89	9	
16 OF 19	70	1028+07	RT	24	2	5.33	6	
16 OF 19	71	1028+86	RT	22	2	4.89	5	
16 OF 19	72	1028+99	LT	22	2	4.89	5	
17 OF 19	73	1030+17	RT	22	2	4.89	5	
17 OF 19	74	1031+76	RT	22	2	4.89	5	
17 OF 19	75	1032+10	RT	26	2	5.78	6	
17 OF 19	76	1035+53	RT	12	2	2.67	3	
17 OF 19	77	1037+07	RT	14	2	3.11	4	
17 OF 19	78	1037+97	LT	13	5	7.22		8
17 OF 19	78	1038+10	LT	13	5	7.22		8
17 OF 19	79	1038+64	RT	14	5	7.78		8
17 OF 19	80	1039+46	LT	22	2	4.89	5	
17 OF 19	81	1040+90	LT	12	2	2.67	3	
17 OF 19	82	1041+14	RT	14	5	7.78		8
17 OF 19	83	1042+03	LT	14	2	3.11	4	
17 OF 19	84	1042+53	RT	14	2	3.11	4	
17 OF 19	84	1042+67	RT	14	2	3.11	4	
17 OF 19	85	1044+96	LT	14	2	3.11	4	
17 OF 19	86	1045+44	RT	16	2	3.56	4	
17 OF 19	87	1045+88	LT	34	5	18.89		19
17 OF 19	88	1046+52	RT	136	2	30.22	31	
17 OF 19	89	1046+64	LT	80	5	44.44		45
17 OF 19	90	1048+70	RT	14	5	7.78		8
17 OF 19	91	1049+35	LT	16	5	8.89		9
17 OF 19	92	1050+91	RT	32	2	7.11	8	
18 OF 19	93	1053+59	LT	44	2	9.78	10	
18 OF 19	94	1054+24	RT	82	2	18.22	19	
18 OF 19	95	1055+79	RT	42	2	9.33	10	
18 OF 19	96	1056+18	LT	14	2	3.11	4	
18 OF 19	95	1056+36	RT	42	2	9.33	10	
18 OF 19	97	1056+77	LT	14	2	3.11	4	
18 OF 19	97	1057+05	RT	12	2	2.67	3	
18 OF 19	97	1057+22	LT	10	2	2.22	3	
18 OF 19	97	1057+62	LT	10	2	2.22	3	
18 OF 19	98	1058+13	RT	71	2	15.78	16	
18 OF 19	99	1060+67	LT	22	2	4.89	5	
18 OF 19	100	1061+60	LT	22	2	4.89	5	
18 OF 19	101	1064+12	RT	22	2	4.89	5	
18 OF 19	102	1064+46	LT	58	2	12.89	13	
18 OF 19	103	1065+75	RT	22	2	4.89	5	
18 OF 19	104	1067+47	LT	106	2	23.56	24	
18 OF 19	105	1067+89	RT	54	2	12.00	12	
18 OF 19	106	1070+57	RT	72	2	16.00	16	
18 OF 19	107	1071+93	LT	14	5	7.78		8
18 OF 19	108	1072+03	RT	18	5	10.00		10
18 OF 19	108	1074+53	LT	22	5	12.22		13
18 OF 19	109	1075+61	RT	24	5	13.33		14
18 OF 19	109	1076+64	RT	18	2	4.00	4	
19 OF 19	110	1078+34	RT	60	2	13.33	14	
19 OF 19	111	1079+77	LT	180	5	100.00		100
						TOTAL	815	679

NOTES:

INFORMATION PROVIDED ON THESE TABLES ARE FOR CONTRACTORS INFORMATION ONLY.

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

SUMMARY OF QUANTITIES

SCALE: N.T.S. SHEET 2 OF 3

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	18

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BRIDGE SUMMARY

LOCATION	400 6005 CEM STABIL BKFL	420 6066 CL C CONC (RAIL FOUNDATION)	429 6009 CONC STR REPAIR (STANDARD)	438 6002 CLEANING AND SEALING EXIST JOINTS (CL3)	438 6004 CLEANING AND SEALING EXIST JOINTS (CL7)	451 6073 RETROFIT RAIL (CONC PARAPET)	658 6014 INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	4106 6007 POLYESTER POLYMER CONC OVERLAY (1")
	CY	CY	SF	LF	LF	LF	EA	SY
SH 171								
STR #028 ASH CREEK BRIDGE		4		1353		24	18	
STR #030 LITTLE COTTONWOOD CREEK BRIDGE		4	22		176	24	6	483
STR #031 COTTONWOOD CREEK BRIDGE	68	4	43		352	24	6	869
STR #032 POST OAK CREEK BRIDGE	56	4	22		132	24	6	386
PROJECT TOTAL	124	16	87	1,353	660	96	36	1,738

PAVEMENT MARKERS SUMMARY

LOCATION	BEGINNING STATION	ENDING STATION	533 6001 RUMBLE STRIPS (SHOULDER)	533 6002 RUMBLE STRIPS (CENTERLINE)	666 6030 REFL PAV MRK TY I (W) 8"(DOT) (100MIL)	666 6036 REFL PAV MRK TY I (W) 8"(SLD) (100MIL)	666 6048 REFL PAV MRK TY I (W) 24"(SLD) (100MIL)	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 6077 PREFAB PAV MRK TY C (W) (ARROW)	668 6085 PREFAB PAV MRK TY C (W) (WORD)	672 6007 REFL PAV MRKR TY I-C	672 6009 REFL PAV MRKR TY II-A-A
			LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA
SH 171														
PLAN SHEET 1 OF 19	645+95.56	669+00.00	1,296	648			45	4,293	162	3,102				47
PLAN SHEET 2 OF 19	669+00.00	693+00.00	4,800	2,400				4,800	600					30
PLAN SHEET 3 OF 19	693+00.00	717+00.00	4,800	2,400				4,800	600	823				40
PLAN SHEET 4 OF 19	717+00.00	741+00.00	4,731	2,366				4,731	204	3,848				58
PLAN SHEET 5 OF 19	741+00.00	765+00.00	4,641	2,321				4,641	478	2,627				57
PLAN SHEET 6 OF 19	765+00.00	789+00.00	4,800	2,400				4,800	600	950				42
PLAN SHEET 7 OF 19	789+00.00	813+00.00	4,800	2,400				4,800	450	2,500				54
PLAN SHEET 8 OF 19	813+00.00	837+00.00	4,635	2,318				4,635	559	1,066				41
PLAN SHEET 9 OF 19	837+00.00	861+00.00	4800	2,400				4800	600					30
PLAN SHEET 10 OF 19	861+00.00	885+00.00	4800	2,400				4800	600					30
PLAN SHEET 11 OF 19	885+00.00	909+00.00	4800	2,400				4800	600	700				39
PLAN SHEET 12 OF 19	909+00.00	933+00.00	4800	2,400				4800	600	1450				51
PLAN SHEET 13 OF 19	933+00.00	957+00.00	4800	2,400				4800	500	2020				50
PLAN SHEET 14 OF 19	957+00.00	981+00.00	4687	2,344				4687		4574				57
PLAN SHEET 15 OF 19	981+00.00	1005+00.00	4800	2,400				4800	393	3130				59
PLAN SHEET 16 OF 19	1005+00.00	1029+00.00	2800	1,400			30	4695	325	3262				57
PLAN SHEET 17 OF 19	1029+00.00	1053+00.00			25		54	4303	114	4004			2	78
PLAN SHEET 18 OF 19	1053+00.00	1077+00.00			95	420	130	6043	183	3306	5	5	22	102
PLAN SHEET 19 OF 19	1077+00.00	1085+56.26						1585	182	257				12
PROJECT TOTAL			70,790	35,395	120	420	259	87,613	7,750	37,619	5	5	24	934

DRAINAGE SUMMARY

LOCATION	CULVERT STATION	100 6002 PREPARING ROW	403 6001 TEMPORARY SPL SHORING	432 6020 RIPRAP (STONE TY F) (GROUT) (6 IN)	466 6145 WINGWALL (FW - 0) (HW=13 FT)	466 6146 WINGWALL (FW - 0) (HW=14 FT)	496 6005 REMOV STR (WINGWALL)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)	658 6099 INSTL OM ASSM (OM-2Z) (WFLX) GND
		STA	SF	CY	EA	EA	EA	LF	LF	EA
CULVERT 1	973+76.00	2	750	34	1	1	2	100	100	4
PROJECT TOTAL		2	750	34	1	1	2	100	100	4

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

SUMMARY OF QUANTITIES

SCALE: N.T.S. SHEET 3 OF 3

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	19

DATE: 11/9/2023 TIME: 1:01:53 PM

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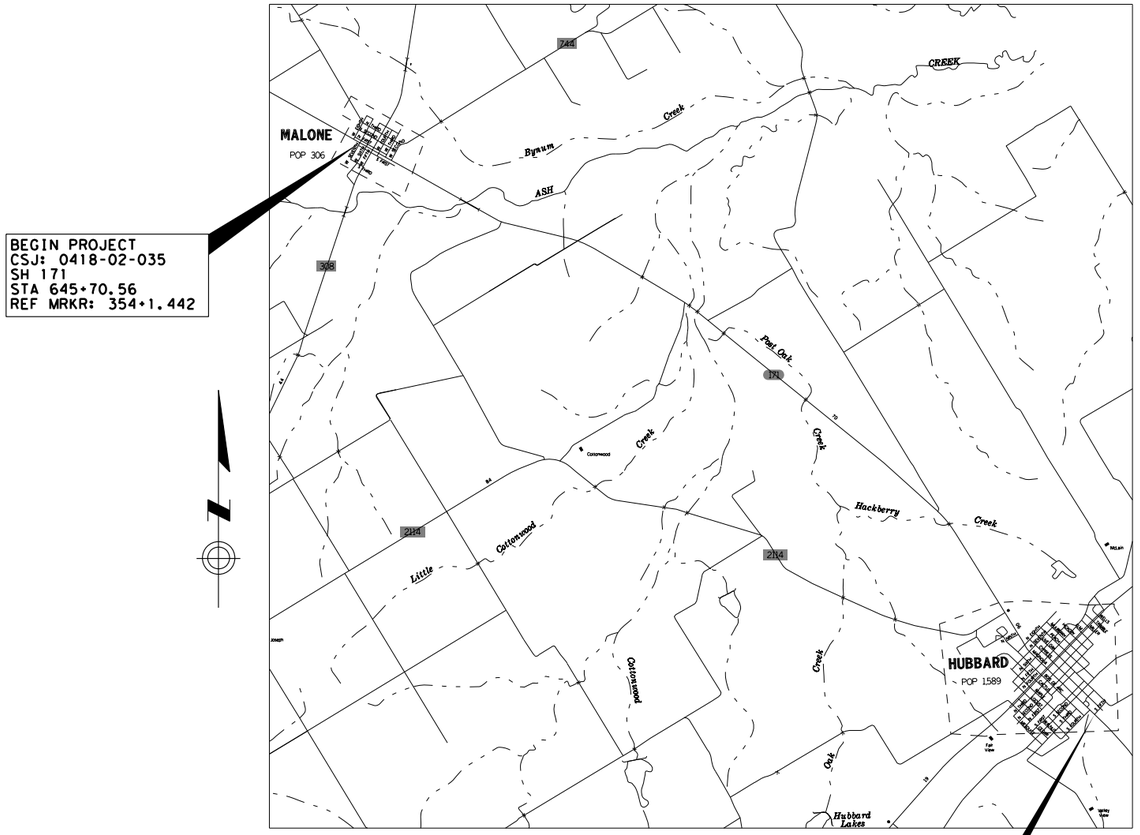


SCALE: 1" = 3,500'

VICINITY MAP

1. SIGNS R20-3T, G20-10T, G20-9TP, R20-5T, R20-5aTP, G20-5T, G20-6T, G20-2 AND G20-2bT WILL BE REQUIRED AT PROJECT LIMITS.
2. CW20-1D AND G20-2 WILL BE REQUIRED AT ALL CROSSROADS.
3. G20-1aT WILL BE REQUIRED AT ALL MAJOR CROSSROADS.

SIGNAGE LEGEND

G20-5T	48X24	BEGIN ROAD WORK NEXT X MILES
G20-6T	48X30	NAME, ADDRESS, CITY, STATE, CONTRACTOR
G20-9TP	24X24	BEGIN WORK ZONE
G20-2bT	36X18	END WORK ZONE
R20-3T	48X42	OBEY WARNING SIGNS STATE LAW
G20-1aT	72X36	ROAD WORK NEXT X MILES
CW20-1D	36X36	ROAD WORK AHEAD
R20-5T	24X30	TRAFFIC FINES DOUBLE
R20-5aTP	36X18	WHEN WORKERS ARE PRESENT
R2-1	30X36	SPEED LIMIT XX
G20-10T	60X48	STAY ALERT TALK OR TEXT LATER
G20-2	48X24	END ROAD WORK

NOTES:

1. ALL TRAFFIC CONTROL DEVICES WILL CONFORM WITH THE TEXAS "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" (TMUTCD), AND WILL BE MAINTAINED AS DIRECTED. ADDITIONAL GUIDELINES FOR TRAFFIC CONTROL DEVICES MAY BE FOUND IN THE TMUTCD.
2. FOR CHANNELING DEVICE PLACEMENT AND SPACING FOR ALL PHASES, REFER TO THE TCP STANDARDS.

GENERAL

A. INSTALL ALL SIGNS, BARRICADES AND TRAFFIC CONTROL DEVICES AS SHOWN AND IN ACCORDANCE WITH THE STANDARD BC SHEETS AND AS DIRECTED.

B. ADDITIONAL SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES OTHER THAN THOSE SPECIFIED MAY BE REQUIRED FOR THE SAFE MOVEMENT OF TRAFFIC THROUGH THE PROJECT. PAYMENT FOR ALL SUCH SIGNS, BARRICADES OR TRAFFIC CONTROL DEVICES WILL BE CONSIDERED SUBSIDIARY TO THE ITEM "BARRICADES, SIGNS AND TRAFFIC HANDLING".

C. WORK SITES SHOULD BE CAREFULLY MONITORED TO ENSURE THAT TRAFFIC CONTROL MEASURES ARE OPERATING EFFECTIVELY AND THAT ALL DEVICES USED ARE CLEARLY VISIBLE, CLEAN AND IN GOOD REPAIR.

D. THE CONTRACTOR WILL PROVIDE SAFE ACCESS TO AND FROM ALL PRIVATE PROPERTY AT ALL TIMES AND IN ALL WEATHER CONDITIONS.

E. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN ON THE TCP SEQUENCE OF OPERATION BELOW.

F. COMPLETE ALL WORK ON PROJECT AS SHOWN ON THE VARIOUS PLAN SHEETS AND IN COMPLIANCE WITH THE GENERAL NOTES OF THIS CONTRACT.

G. ANY REQUEST TO ALTER THE SEQUENCE OF OPERATION OR TRAFFIC CONTROL PLAN WILL BE SUBMITTED TO THE ENGINEER FOR WRITTEN APPROVAL.

SEQUENCE OF CONSTRUCTION

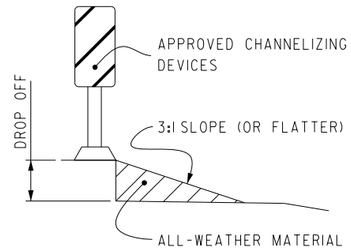
A. LANE CLOSURES WILL BE LIMITED TO 1 LANE PER DIRECTION AT A TIME.

B. ALL LANE CLOSURES WILL REQUIRE TEMPORARY RUMBLE STRIPS.

C. FINISH PROPOSED WORK IN EACH WORK AREA BEFORE PROCEEDING TO PERFORM WORK IN ANOTHER WORK AREA. AT A MINIMUM, ALL SAFETY END TREATMENT FOR SIDE ROAD AND CROSS DRAINAGE CULVERTS WILL BE COMPLETE AND IN PLACE. OBTAIN APPROVAL BEFORE PROCEEDING TO BEGIN WORK IN ANOTHER WORK AREA.

D. THE CONTRACTOR WILL BE REQUIRED TO SUBMIT A DETAILED SCHEDULE OF WORK TO THE AREA ENGINEER PRIOR TO THE BEGINNING OF CONSTRUCTION, WHICH GENERALLY CONFORMS TO THE FOLLOWING SEQUENCE:

1. PROVIDE AND INSTALL ALL SIGNS, BARRICADES, AND TRAFFIC CONTROL DEVICES IN ACCORDANCE WITH THE TRAFFIC CONTROL STANDARDS.
2. PROVIDE AND INSTALL ALL SWP3 DEVICES IN ACCORDANCE WITH THE APPLICABLE STANDARDS.
3. PLANE EXISTING ASPHALTIC CONCRETE PAVEMENT IN ACCORDANCE WITH PLAN SPECIFICATIONS.
4. PERFORM FULL DEPTH FLEXIBLE PAVEMENT STRUCTURE REPAIRS AND CONSTRUCT SUPER-PAVE B LAYER.
5. FURNISH AND PLACE WORK ZONE PAVEMENT MARKINGS. WORK ZONE PAVEMENT MARKING MUST BE PLACED PRIOR TO OPENING TRAFFIC.
6. USING TRAFFIC CONTROL STANDARD TCP (2-8)-23, INSTALL TEMPORARY TRAFFIC SIGNAL TO PERFORM STRUCTURAL REPAIR WORK INCLUDING APPROACH ROADWAY, BRIDGE DECK JOINTS, ABUTMENTS, WINGWALLS, AND POLYESTER POLYMER CONCRETE BRIDGE DECK OVERLAY. USING STANDARDS SSCB (2)-10 AND SSCB (5)-10 SUBSTITUTE PCTB FOR THE CHANNELIZING DEVICES SHOWN ON TCP (2-8)-23. SEE SHEETS 85 THRU 102 FOR BRIDGE REPAIR DETAILS.
7. CONSTRUCT UNDERSEAL COURSE IN ACCORDANCE WITH PLAN SPECIFICATIONS.
8. CONSTRUCT SUPER-PAVE C LAYER. PLACE TABS.
9. INSTALL ALL MBGF AS SHOWN IN PLANS.
10. PLACE PERMANENT PAVEMENT MARKERS.
11. PERFORM FINAL CLEAN UP.



PAV EDGE DROP-OFF DETAIL

1. LESS THAN 2 INCHES: CW 8-11 SIGNS ARE REQUIRED.
2. GREATER THAN 2 INCHES BUT LESS THAN 24 INCHES: VERTICAL PANELS AND EITHER CW 8-9a OR CW 8-11 SIGNS ARE REQUIRED.
3. GREATER THAN 24 INCHES: POSITIVE BARRIER REQUIRED.
4. THE SAFETY SLOPE WILL BE CONSTRUCTED WITH AN ALL- WEATHER MATERIAL SUCH AS RAP, WHICH IS CLEAN AND FREE OF DEBRIS AND LARGE ROCKS.

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171

TRAFFIC CONTROL SEQUENCE NARRATIVE

SHEET 1 OF 1

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.		HIGHWAY No.	
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET		SH 171	
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	20

DATE: 11/9/2023 TIME: 9:37:31 AM

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PEN TABLE: SH171_WACO_tbl
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0418	02	035	SH 171
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	WACO	HILL		21

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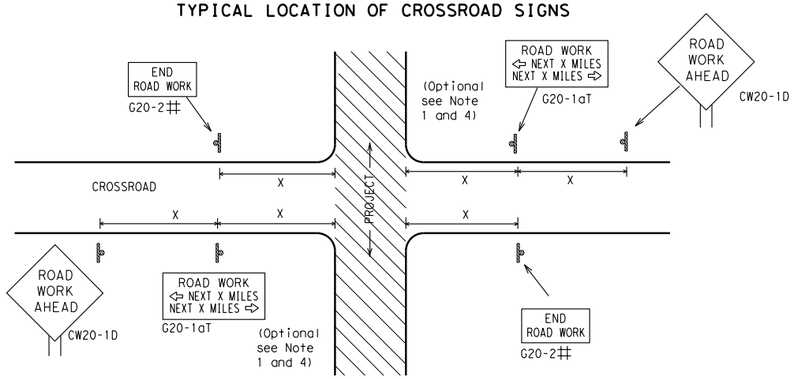
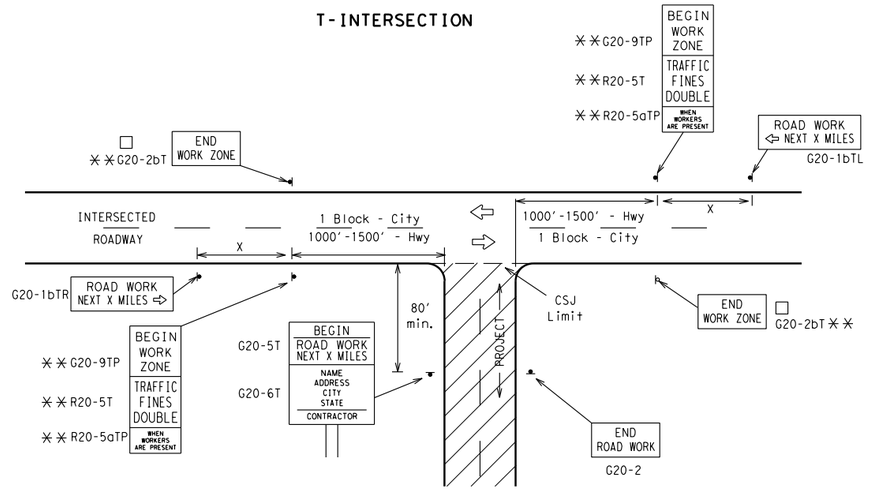
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

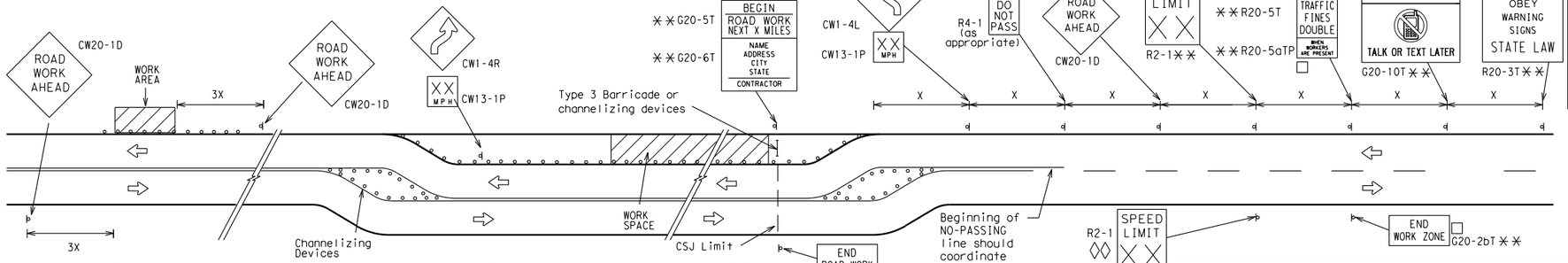
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

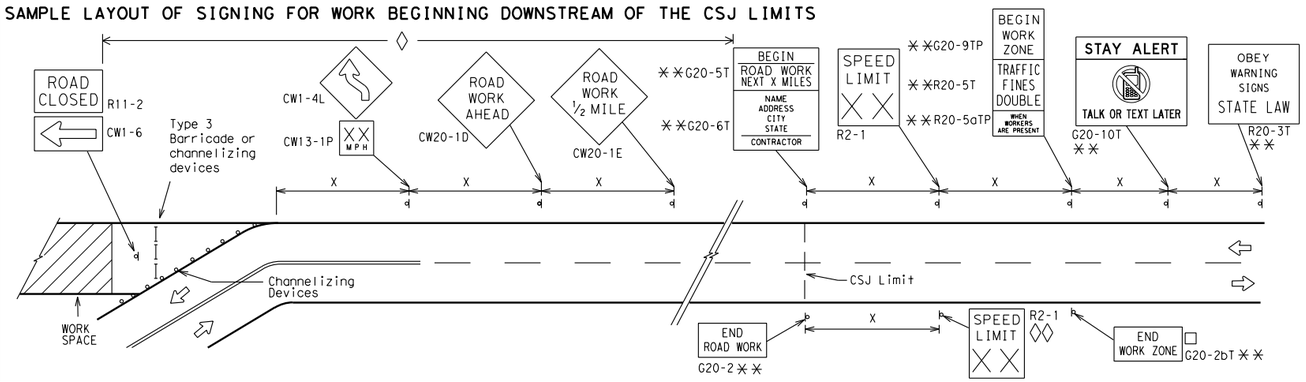
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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 DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✳✳ CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

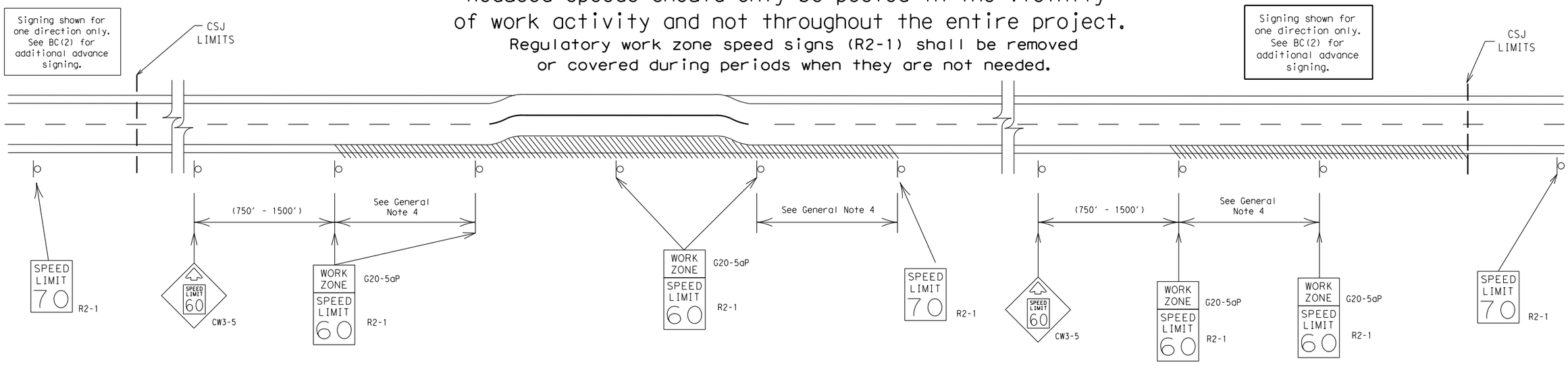
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	HILL		22

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 9-07 8-14 7-13 5-21	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		23

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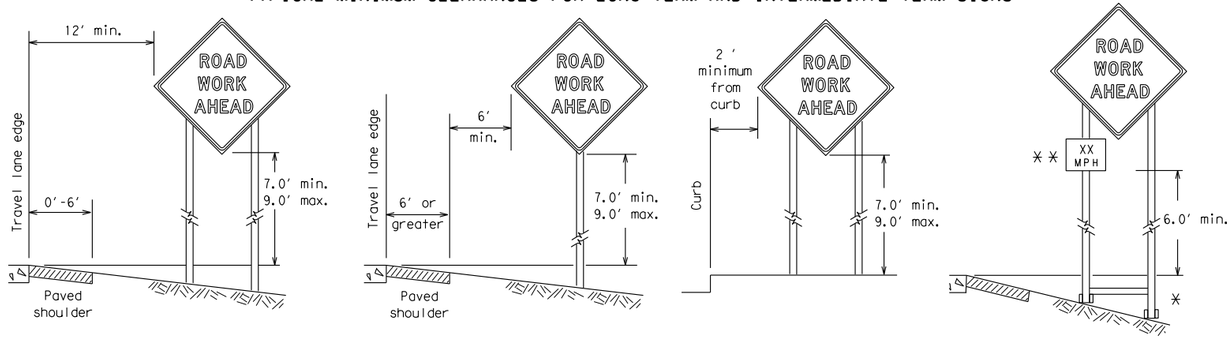
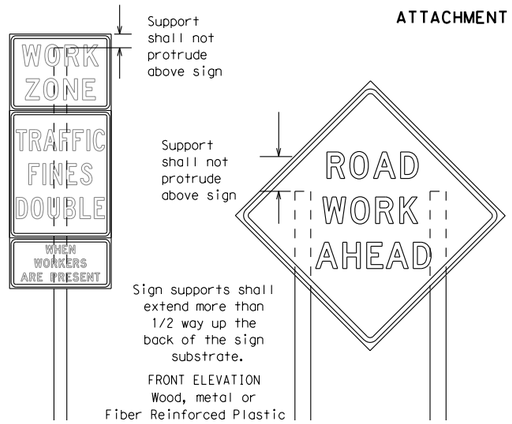
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



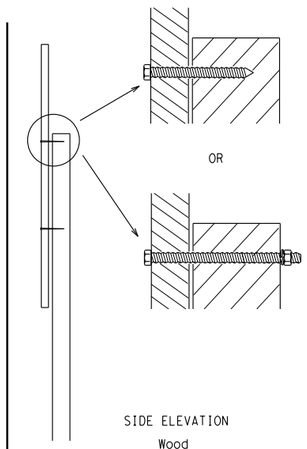
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

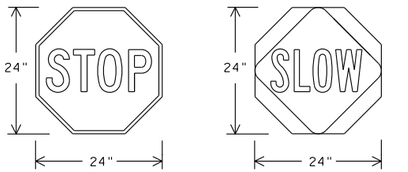
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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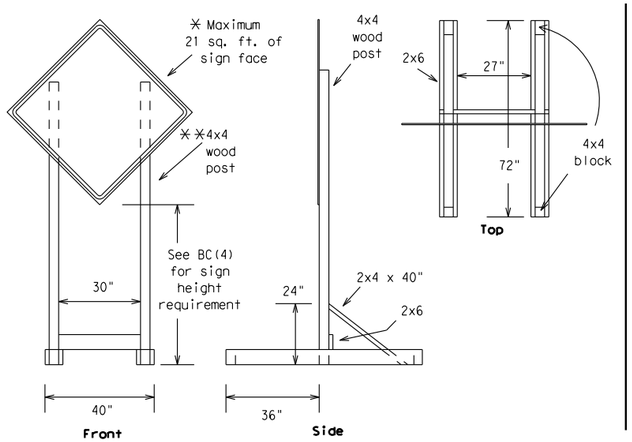
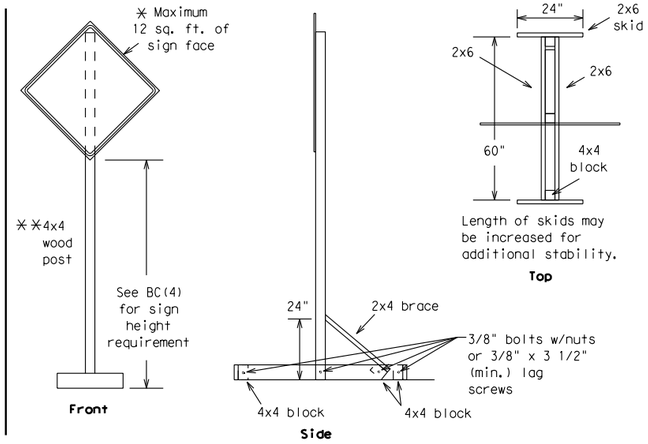
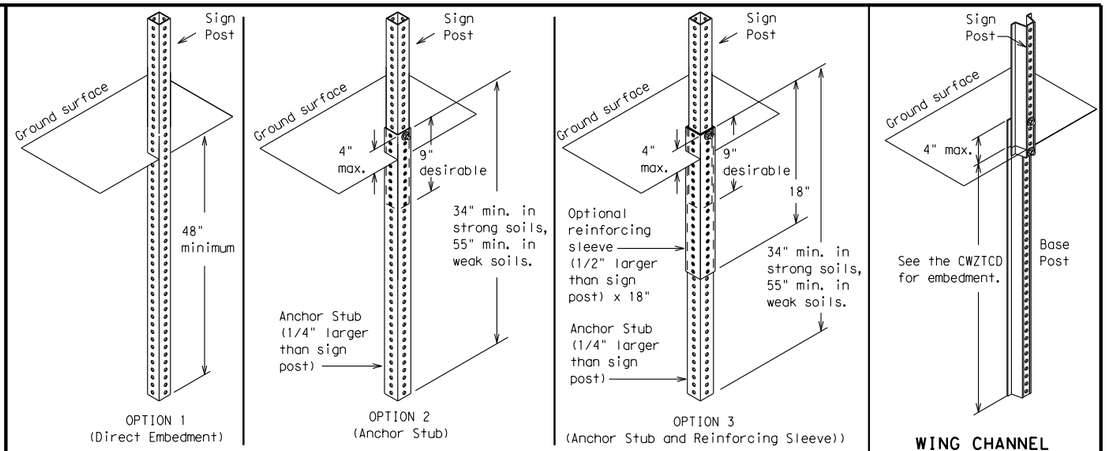




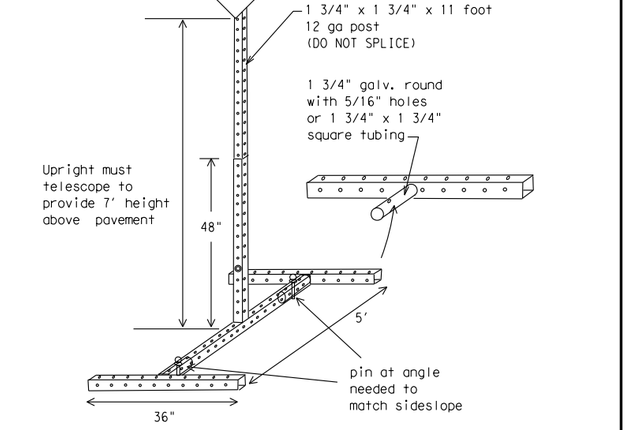
SKID MOUNTED WOOD SIGN SUPPORTS

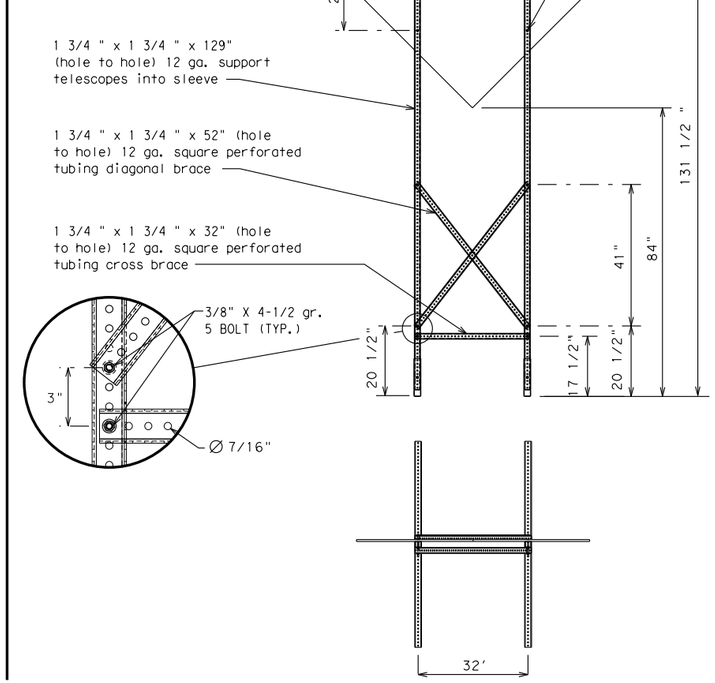
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

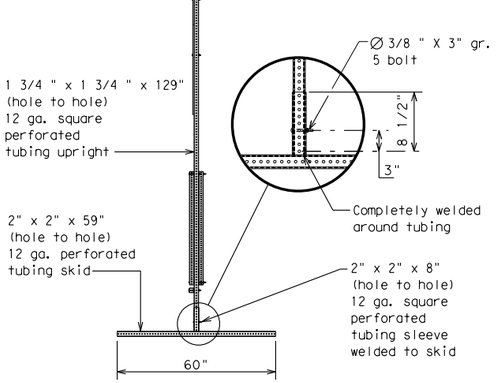


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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7-13 5-21	WACO	HILL		25

DATE: 6/29/2023 10:25:11 AM
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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

WORD OR PHRASE	ABBREVIATION
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

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

** 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	0418	02	035	SH 171
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	HILL		26

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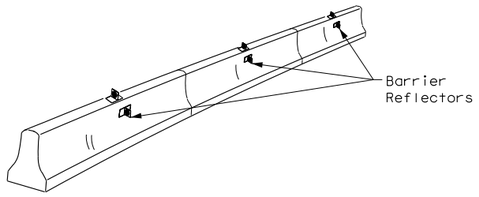
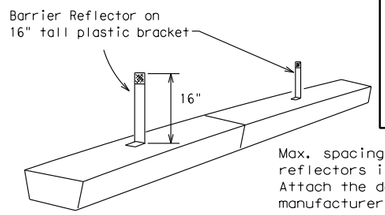
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

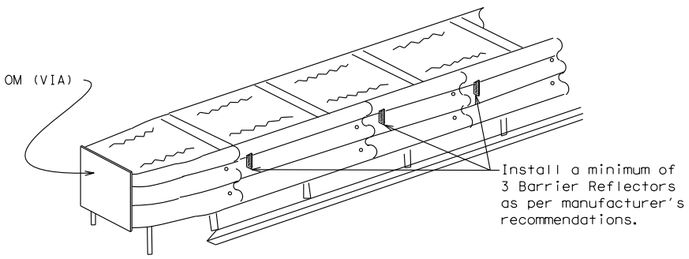


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

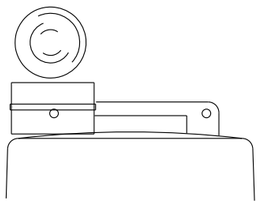


DELINEATION OF END TREATMENTS

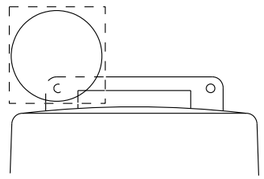
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

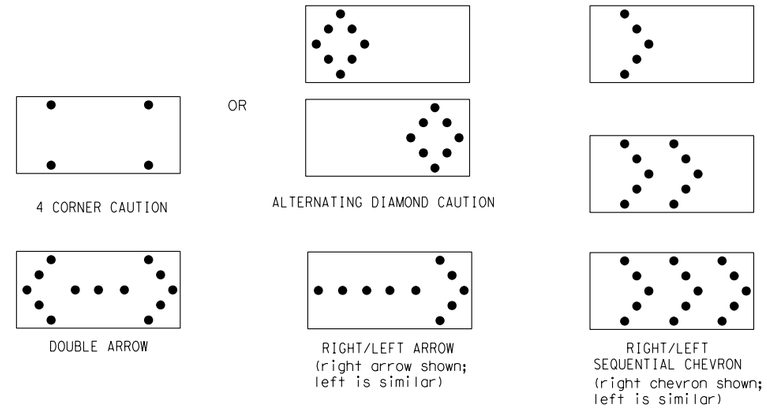
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	WACO	HILL		27

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

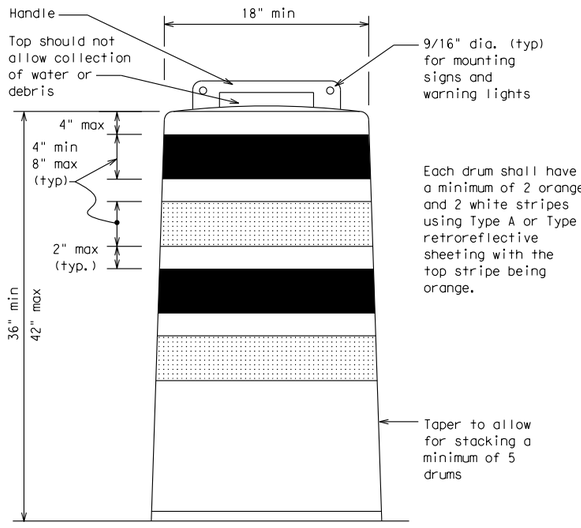
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

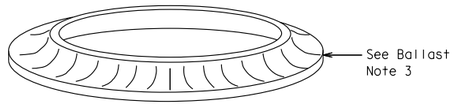
RETROREFLECTIVE SHEETING

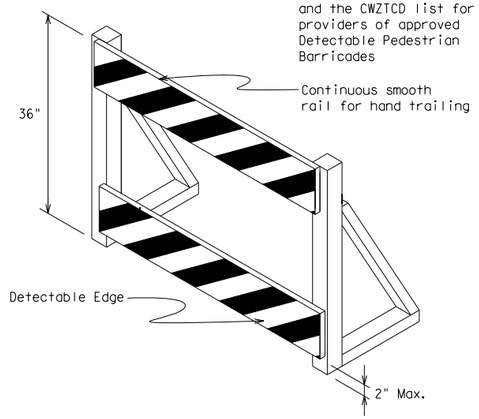
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

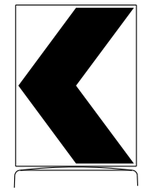




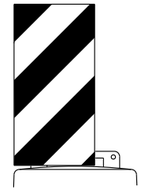


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	WACO	HILL		28
7-13				

102

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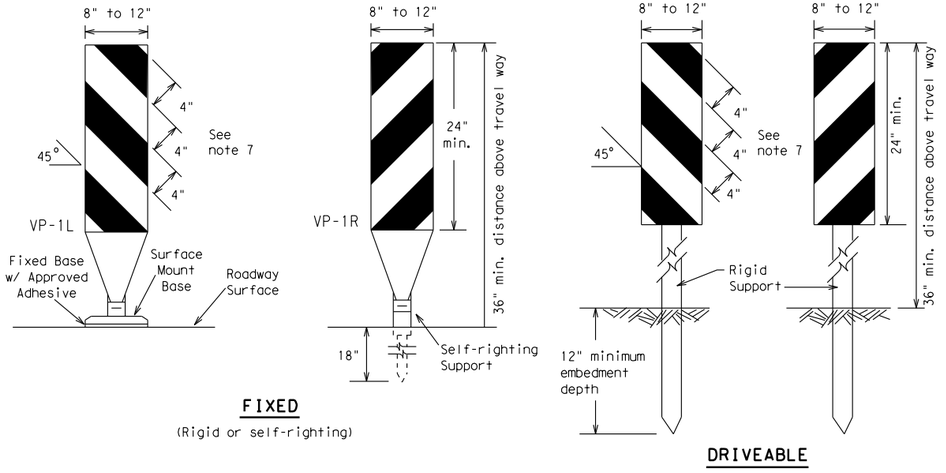


FIXED

(Rigid or self-righting)

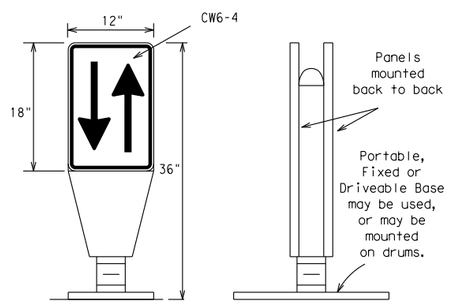
DRIVEABLE

(Rigid or self-righting)

PORTABLE

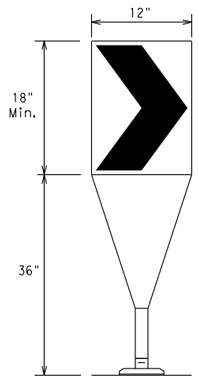
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



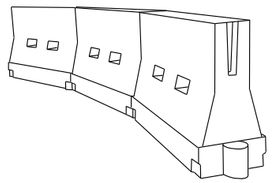
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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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7-13 5-21	WACO	HILL		29

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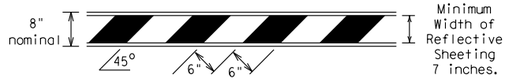
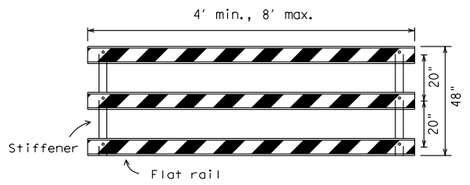
TYPE 3 BARRICADES

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.



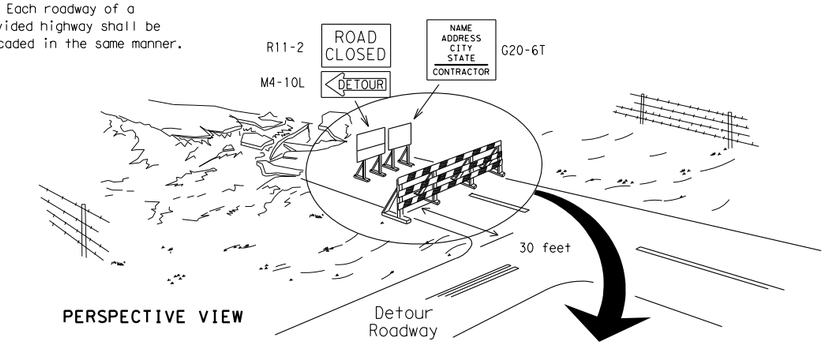
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

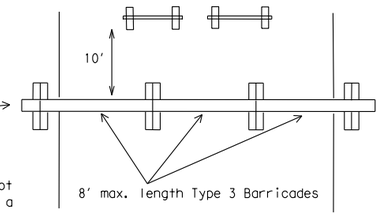
Each roadway of a divided highway shall be barricaded in the same manner.



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.

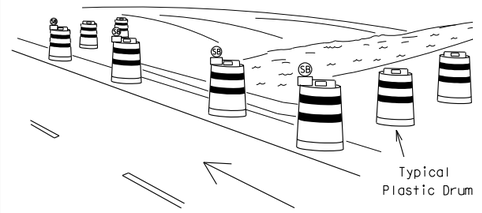
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

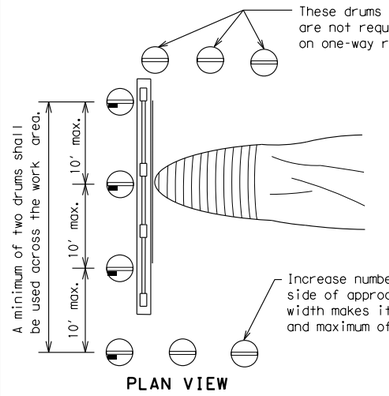
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

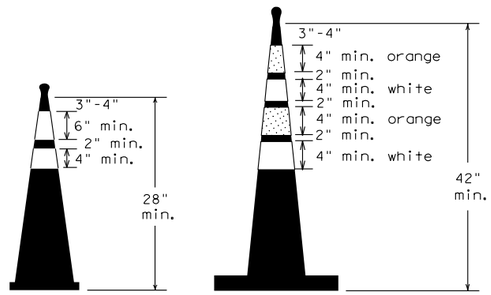
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

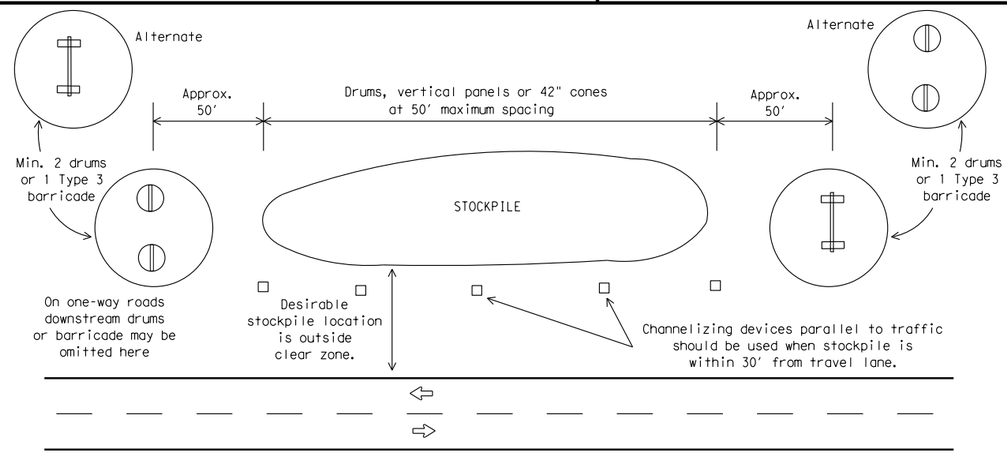
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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7-13 5-21	WACO	HILL		30

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.

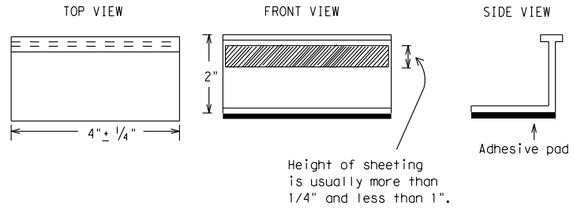
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

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11-02 8-14	WACO	HILL		31

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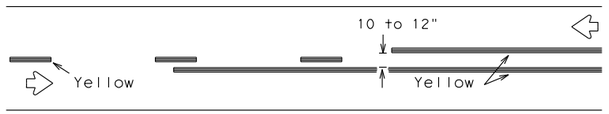
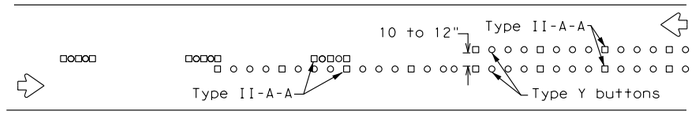
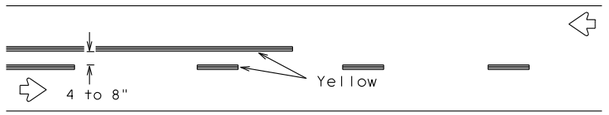
PAVEMENT MARKING PATTERNS



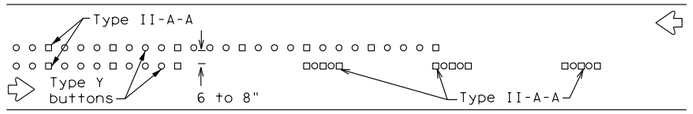
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



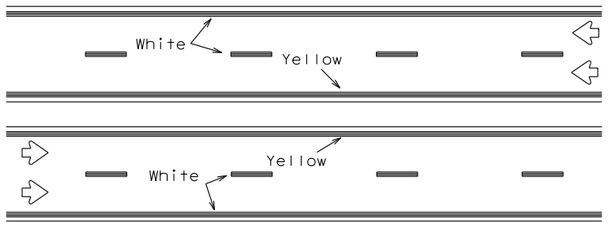
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



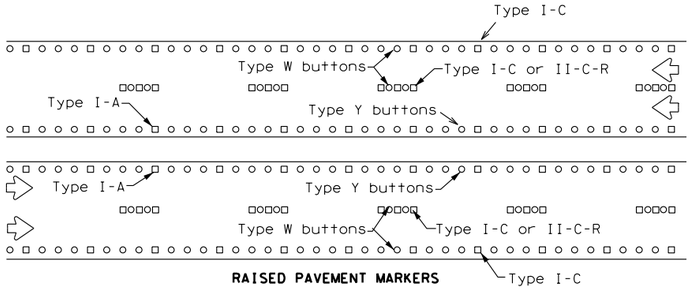
RAISED PAVEMENT MARKERS - PATTERN B

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



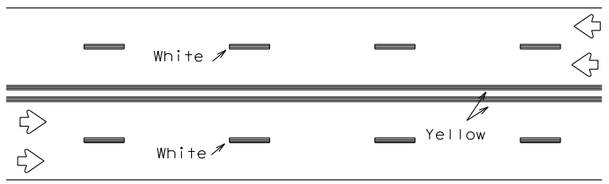
REFLECTORIZED PAVEMENT MARKINGS



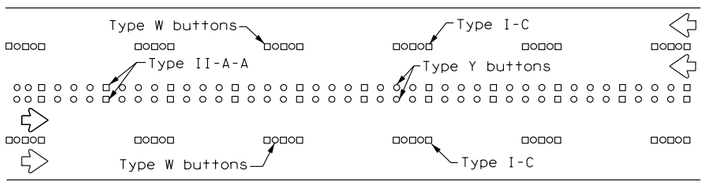
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



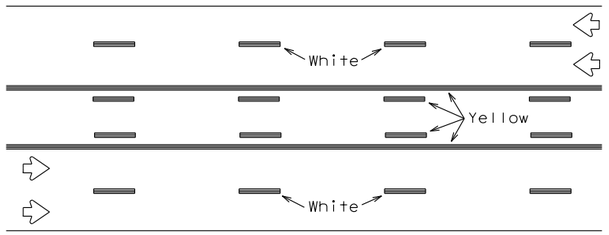
REFLECTORIZED PAVEMENT MARKINGS



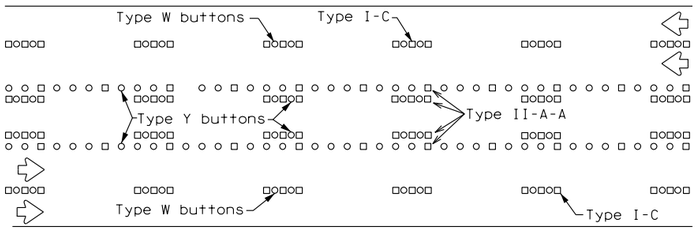
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

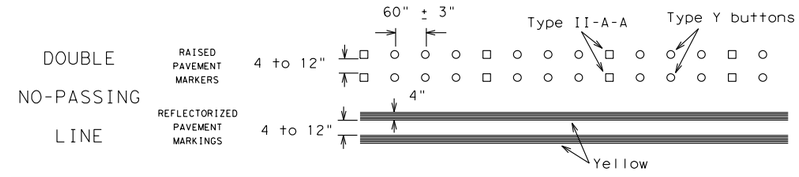
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

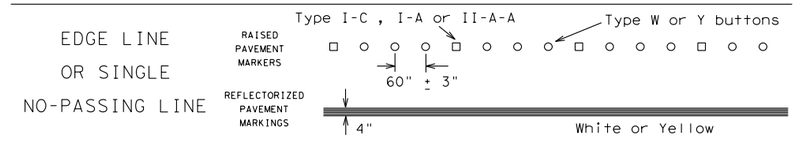
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

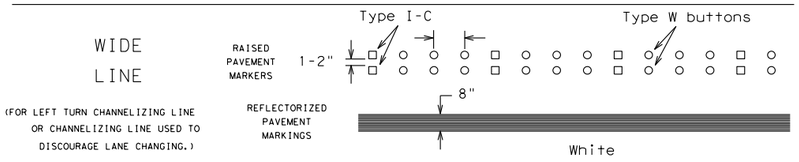


EDGE LINE OR SINGLE NO-PASSING LINE



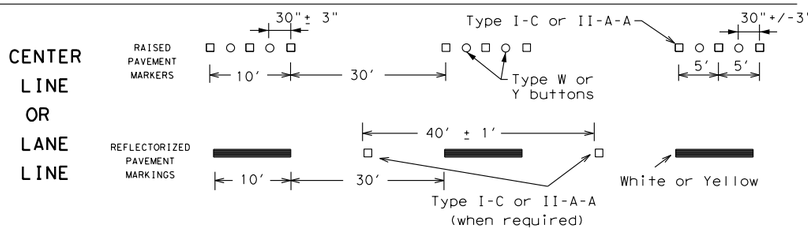
WIDE LINE

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

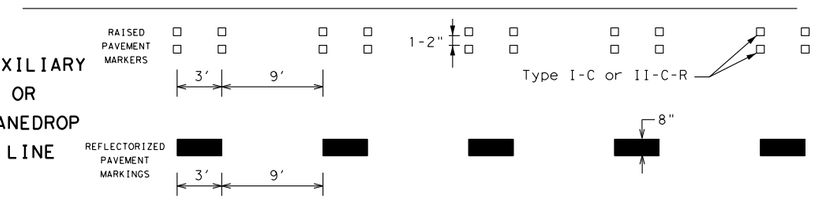


BROKEN LINES

CENTER LINE OR LANE LINE

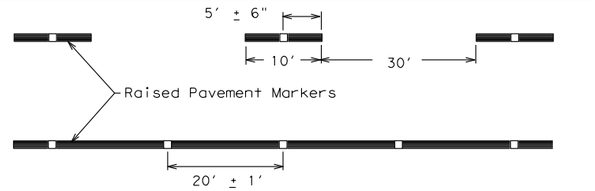


AUXILIARY OR LANEDROP LINE



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	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		32

106

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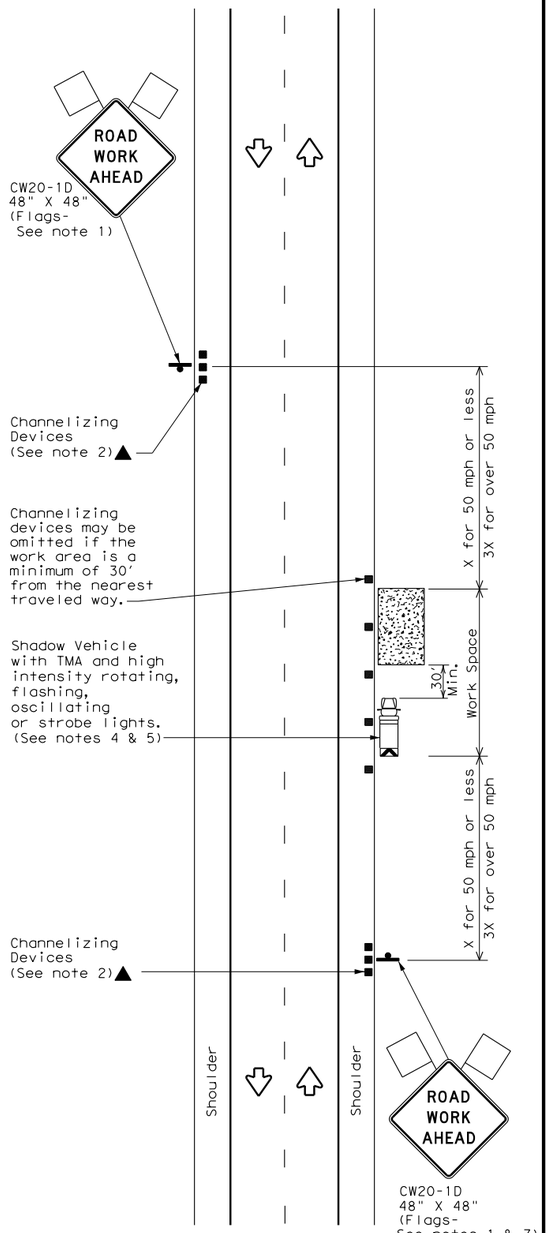
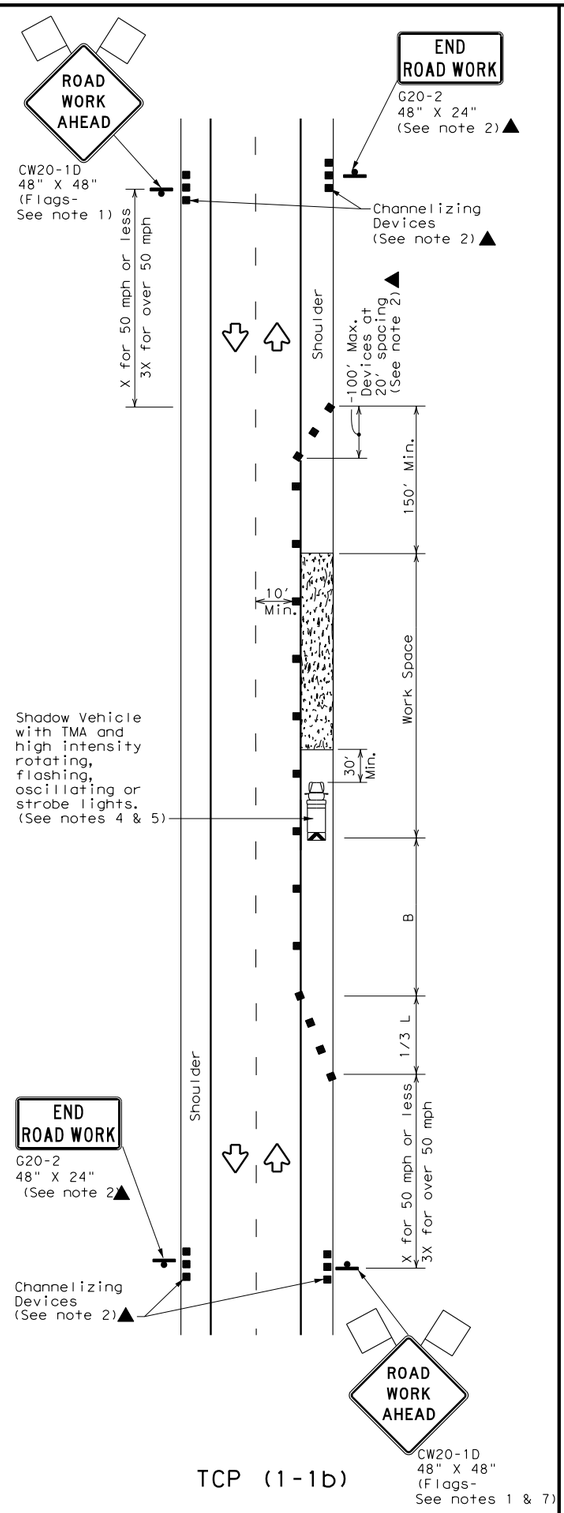


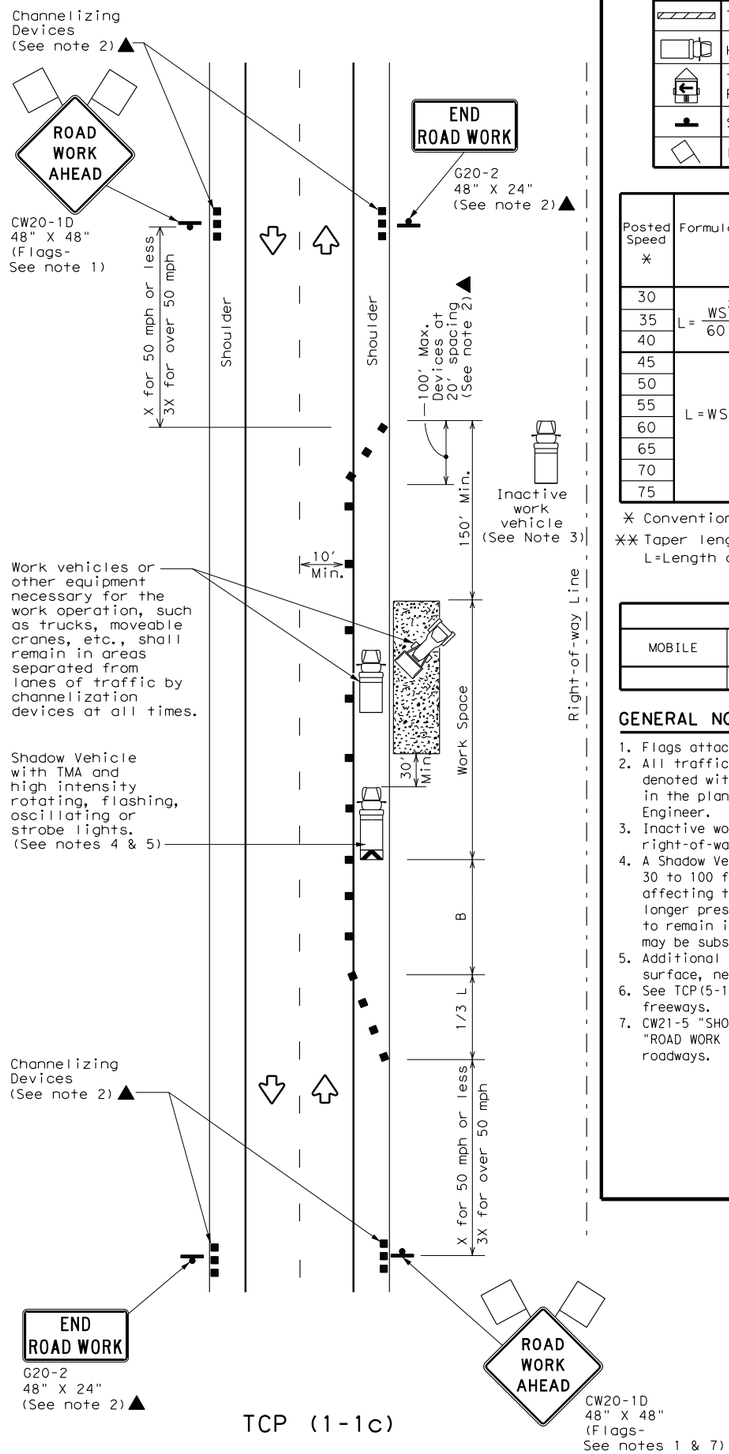
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1)for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	WACO	HILL		33
1-97 2-18				

151

DATE: 6/29/2023 10:25:30 AM
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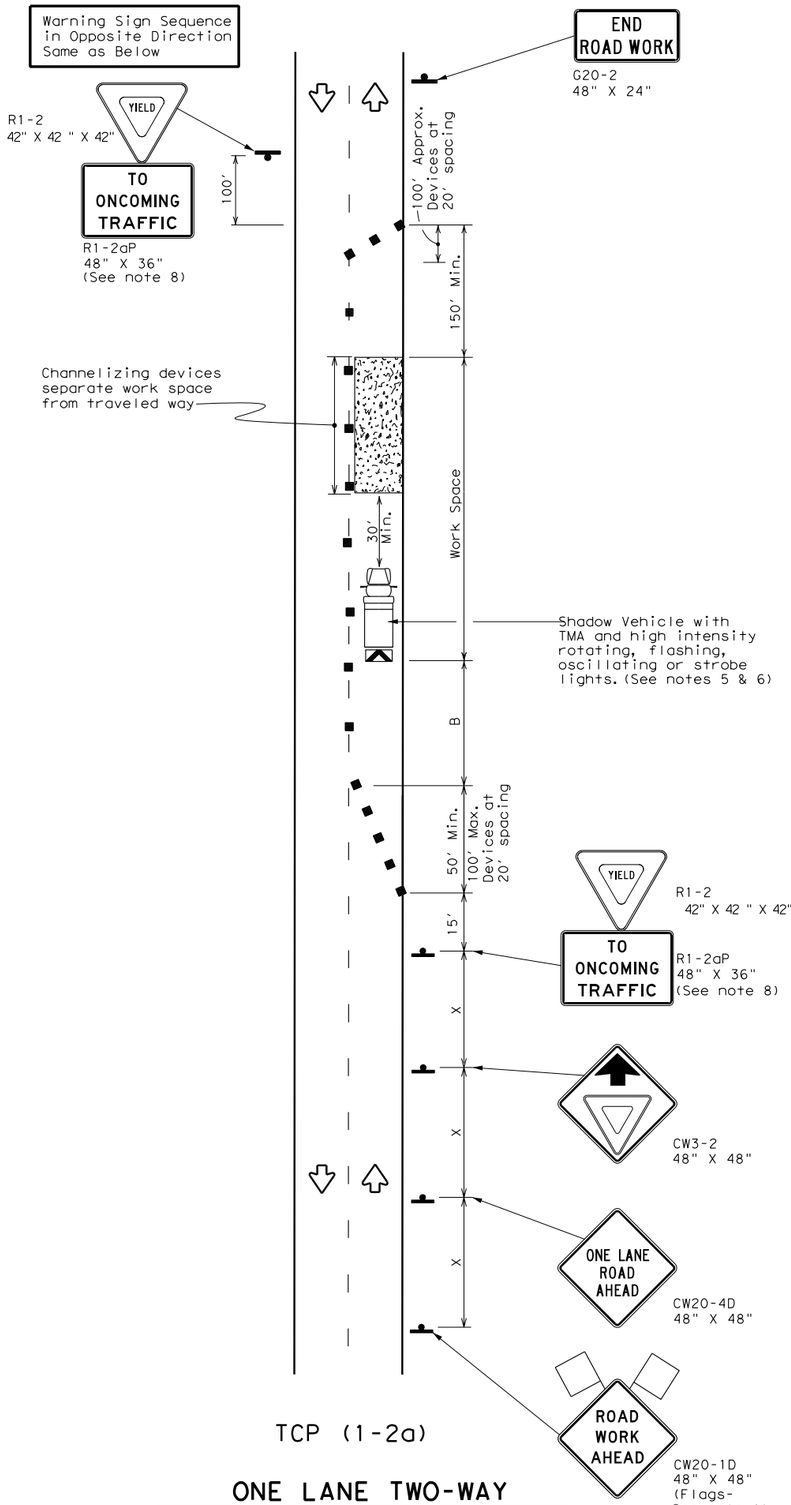
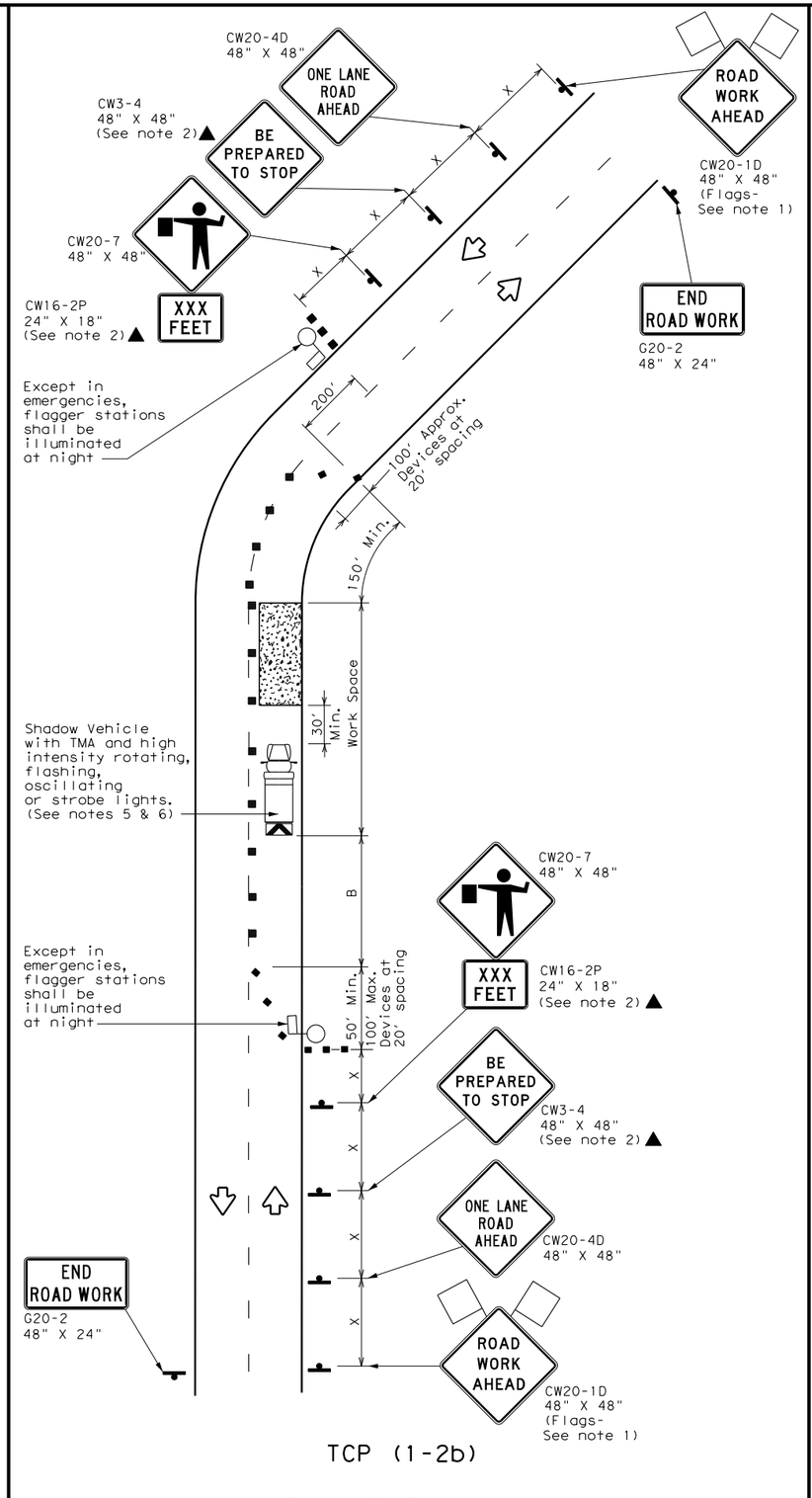


TCP (1-2a)

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	0418	02	035	SH 171
2-94 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	WACO	HILL		34

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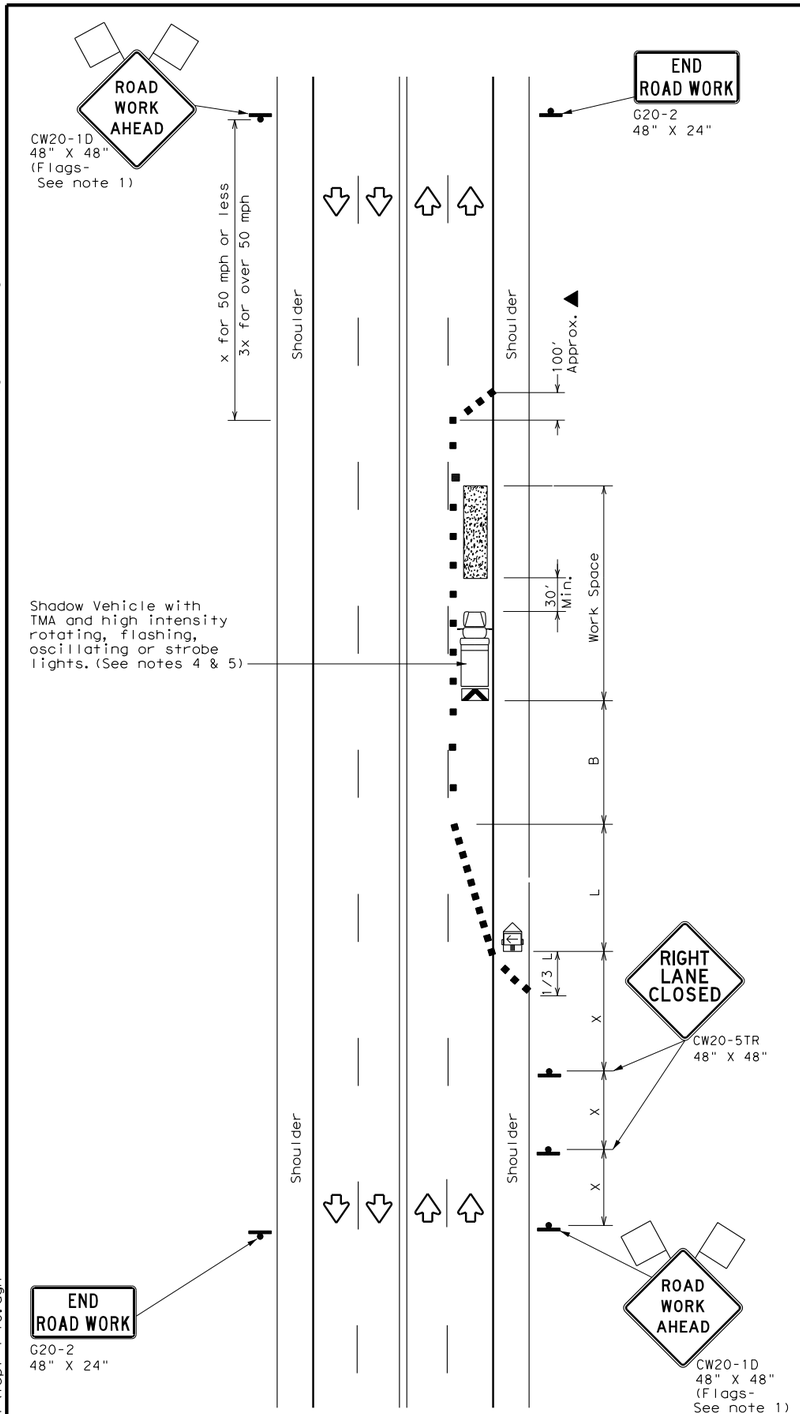
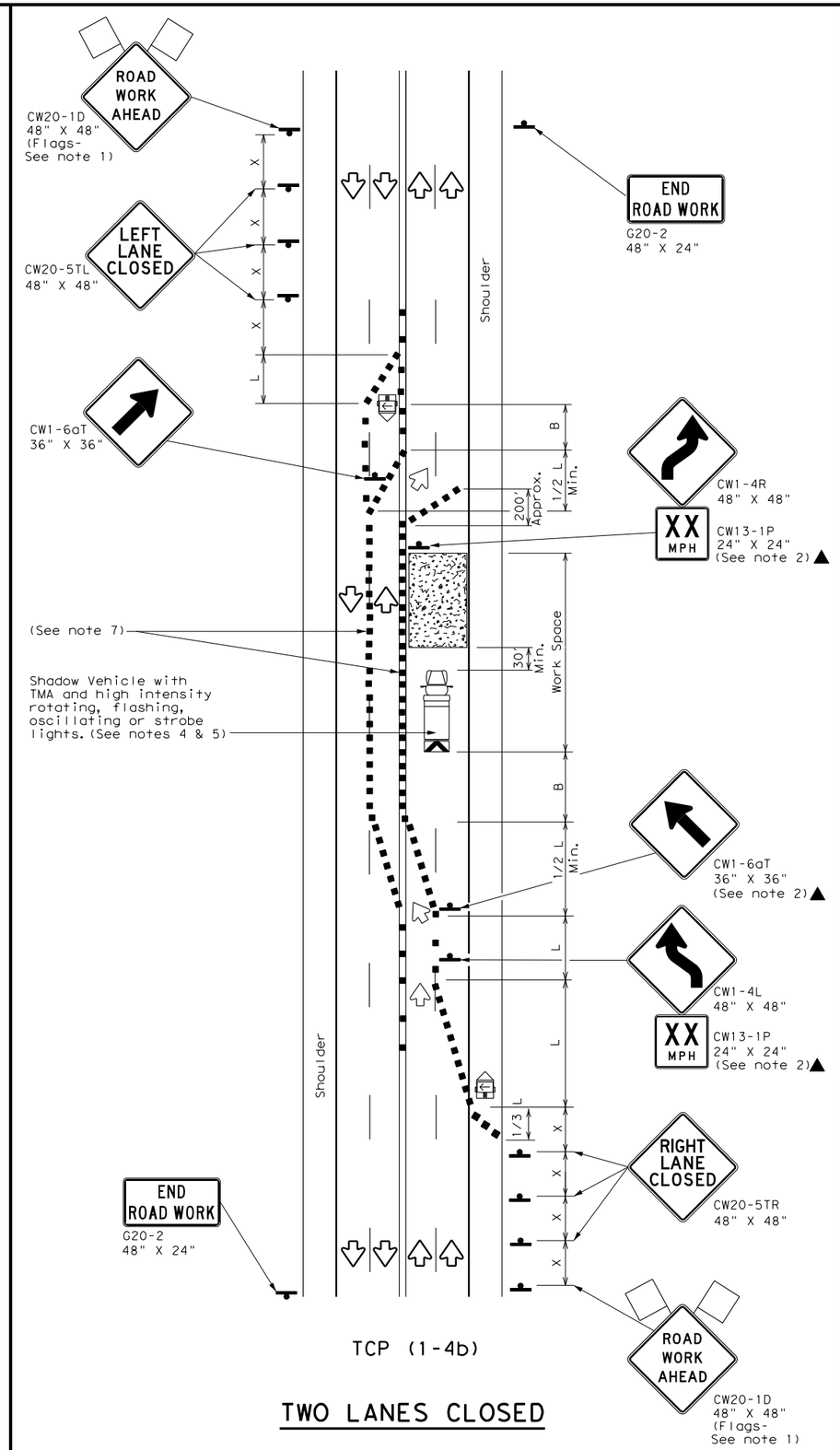


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
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.

TCP (1-4a)

6. If this TCP is used for a left lane closure , CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline where needed to protect the work space from opposing traffic with the arrow panel placed in the closed lane near the end of the merging taper.

TCP (1-4b)

7. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the areas of conflicting markings, not the entire work zone.

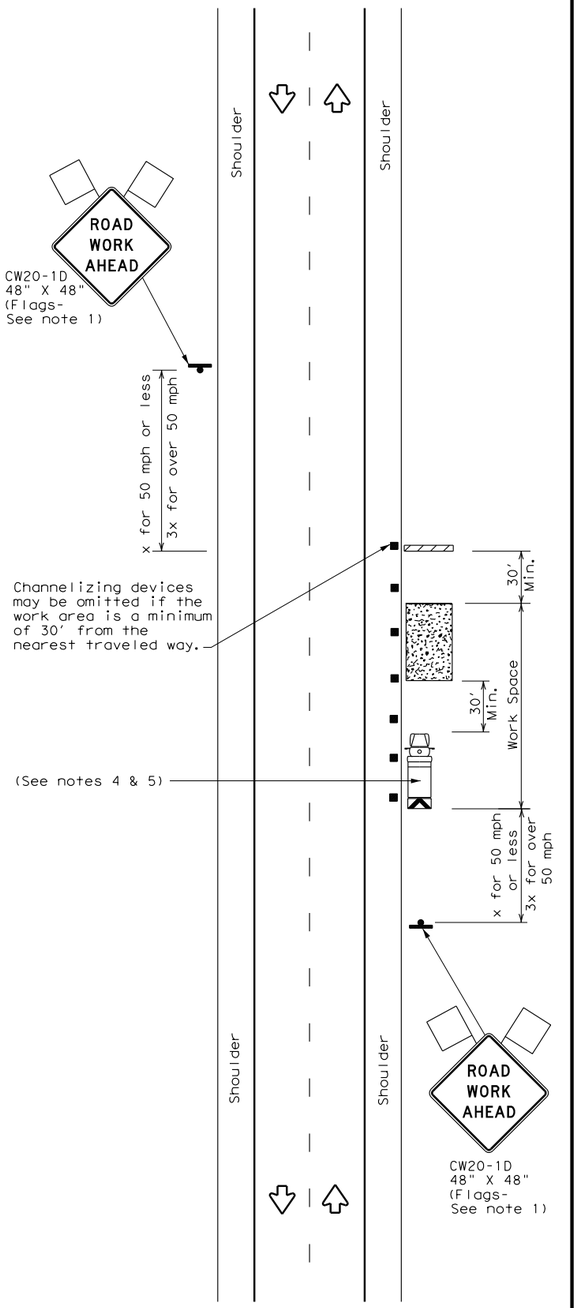
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

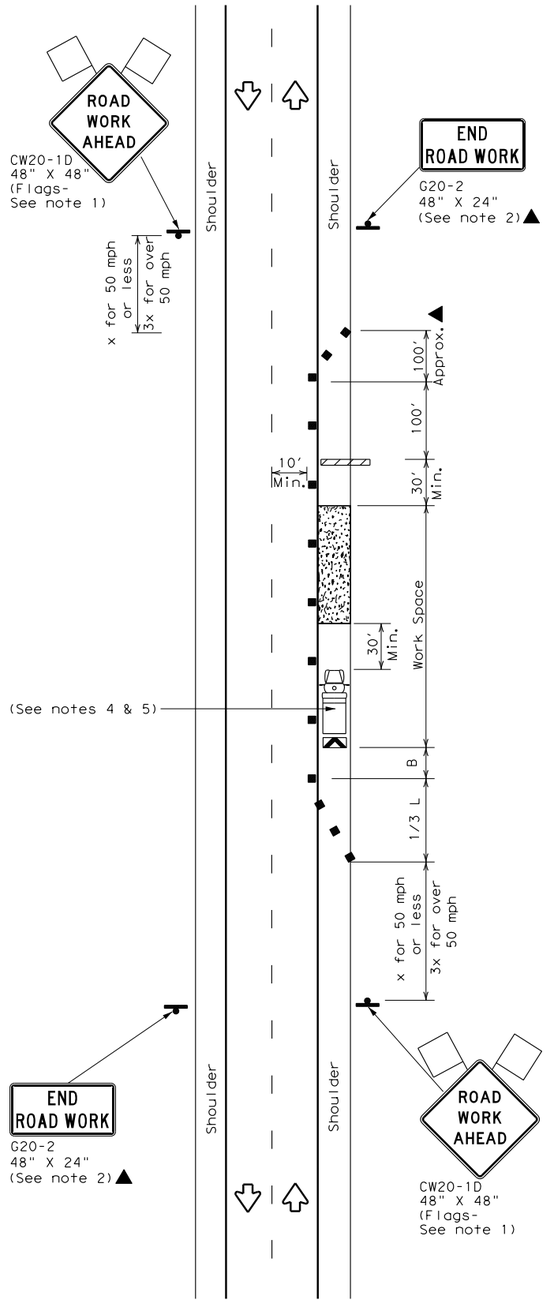
TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	WACO	HILL		35
1-97 2-18				



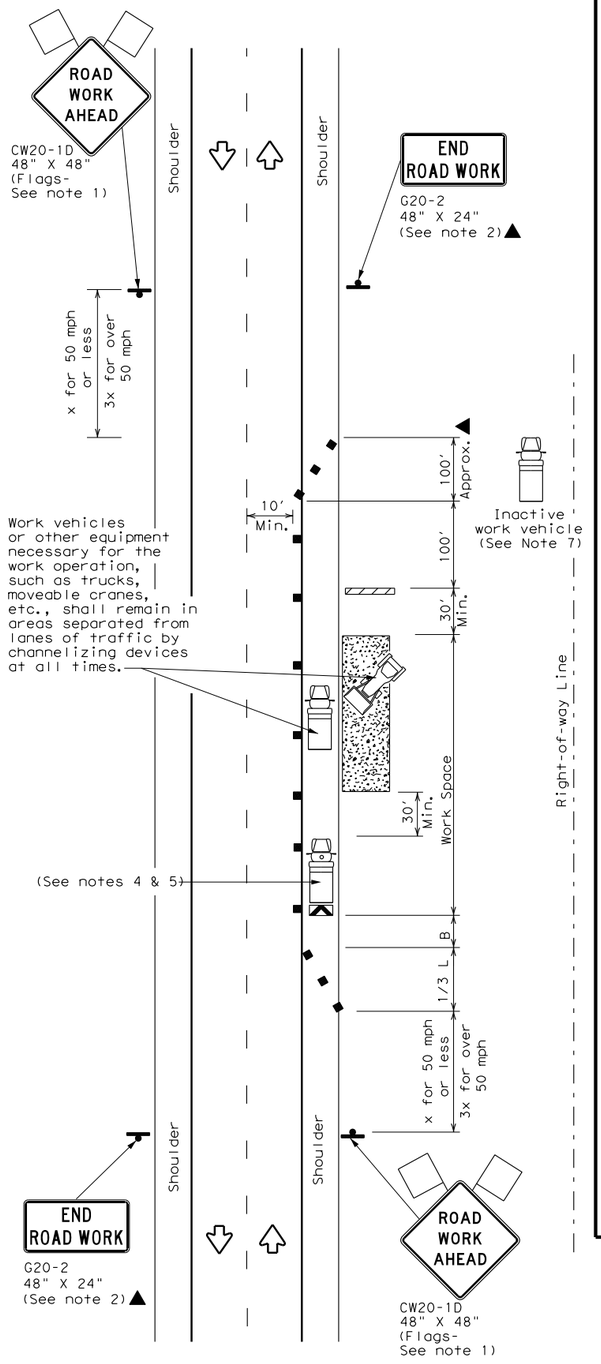
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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REVISIONS	0418	02	035	SH 171
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	WACO	HILL		36
1-97 2-18				

161

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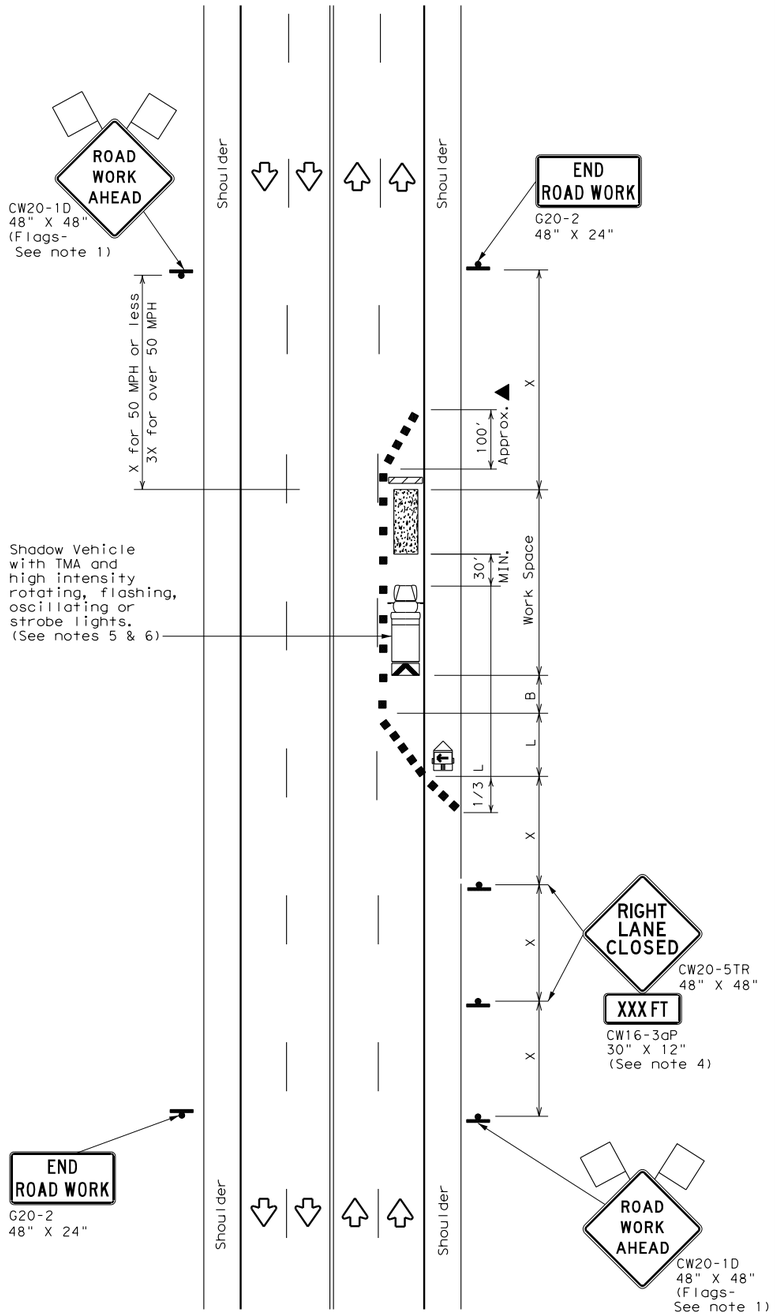
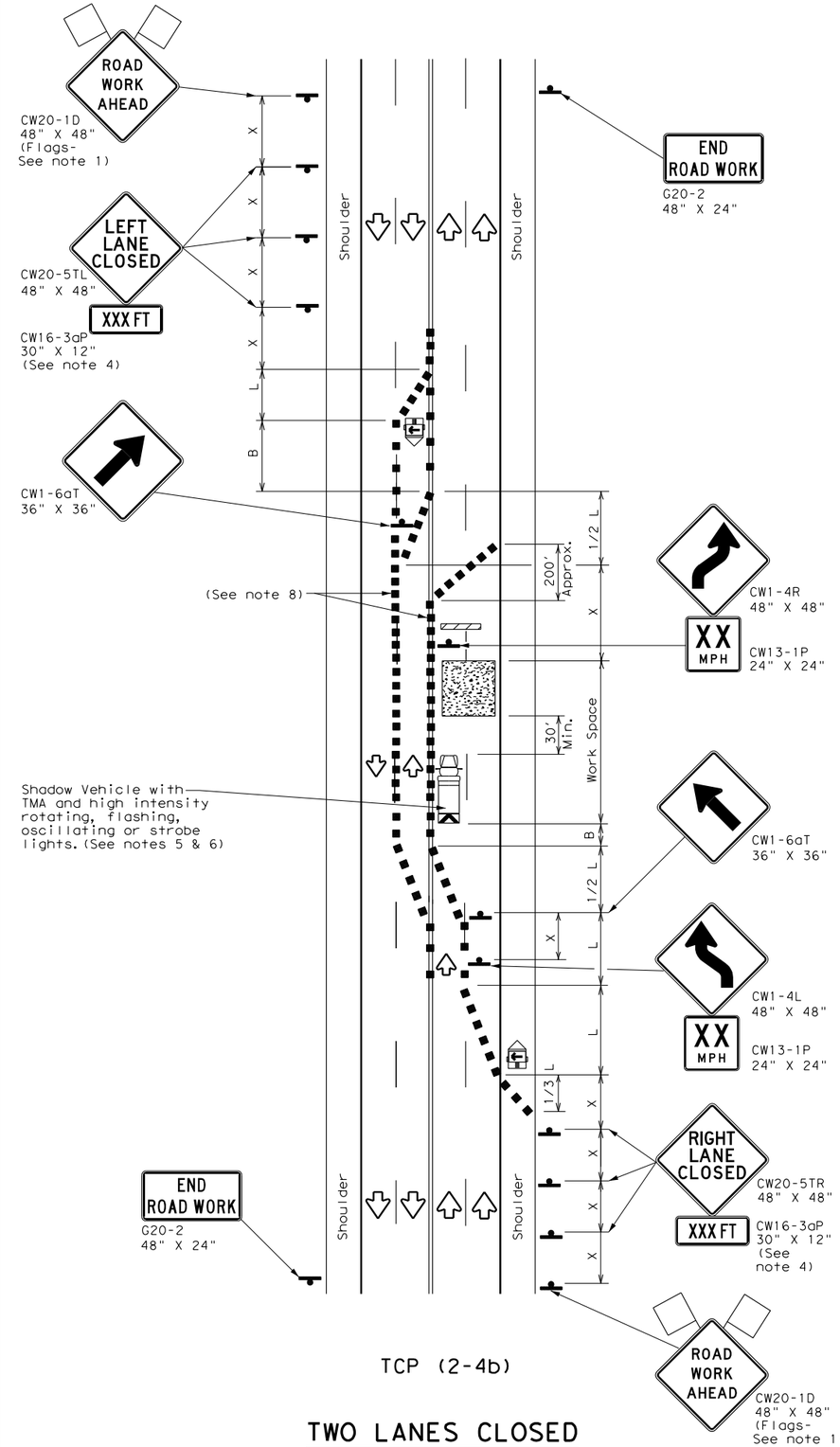


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
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 in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0418	02	035	SH 171
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	WACO	HILL		37

DATE: 6/29/2023 10:26:07 AM
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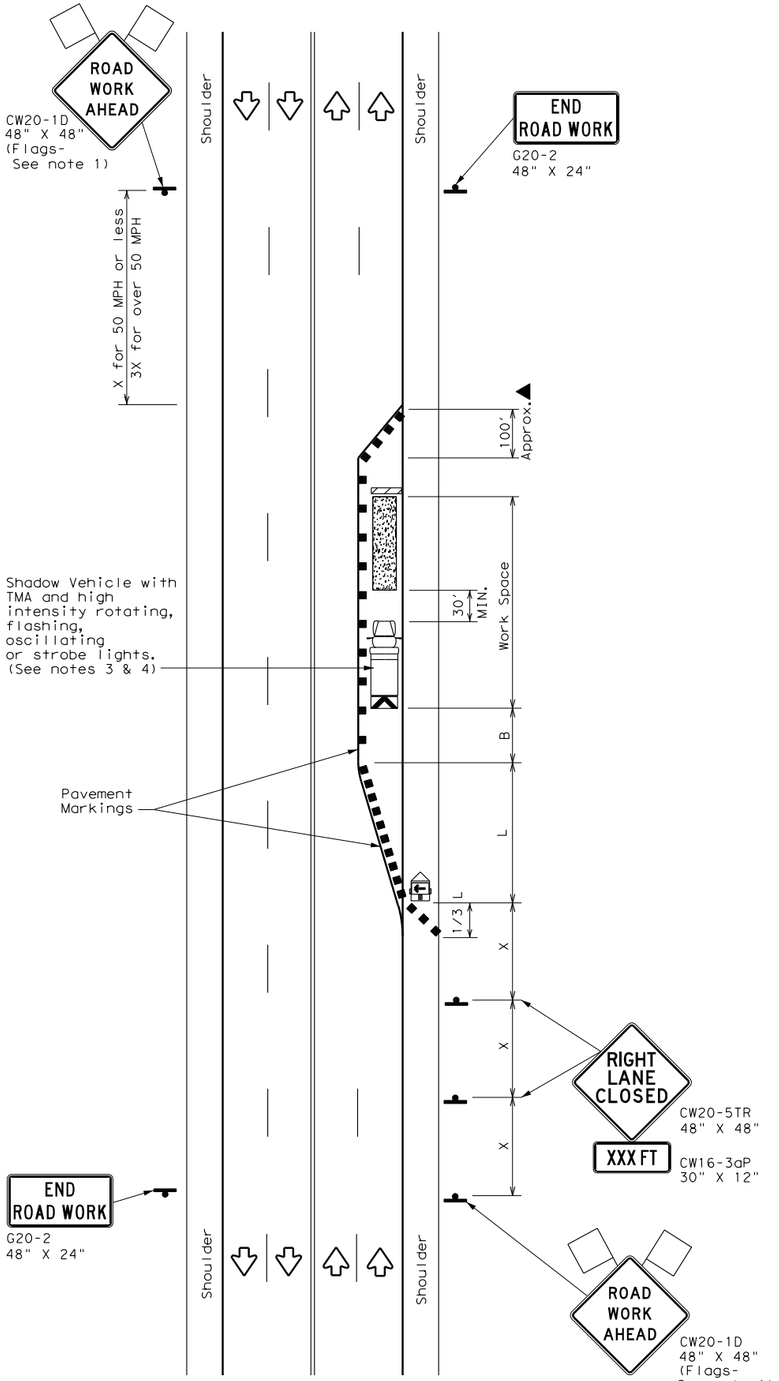
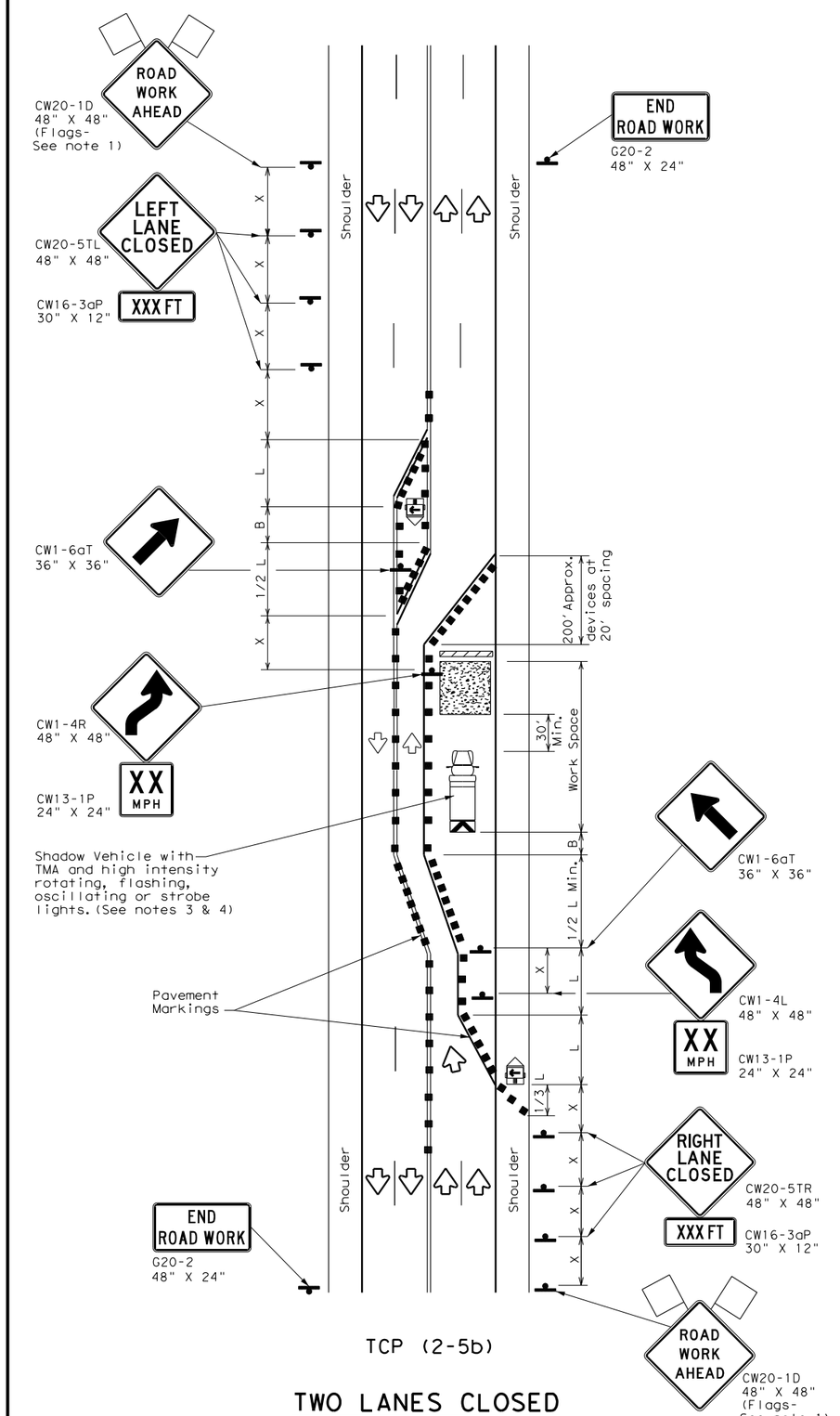


TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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. 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 eposure 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 substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

6. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED" signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic, with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM LANE CLOSURES
MULTILANE CONVENTIONAL RDS.

TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0418	02	035	SH 171
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	WACO	HILL		38

DATE: 6/29/2023 10:26:14 AM
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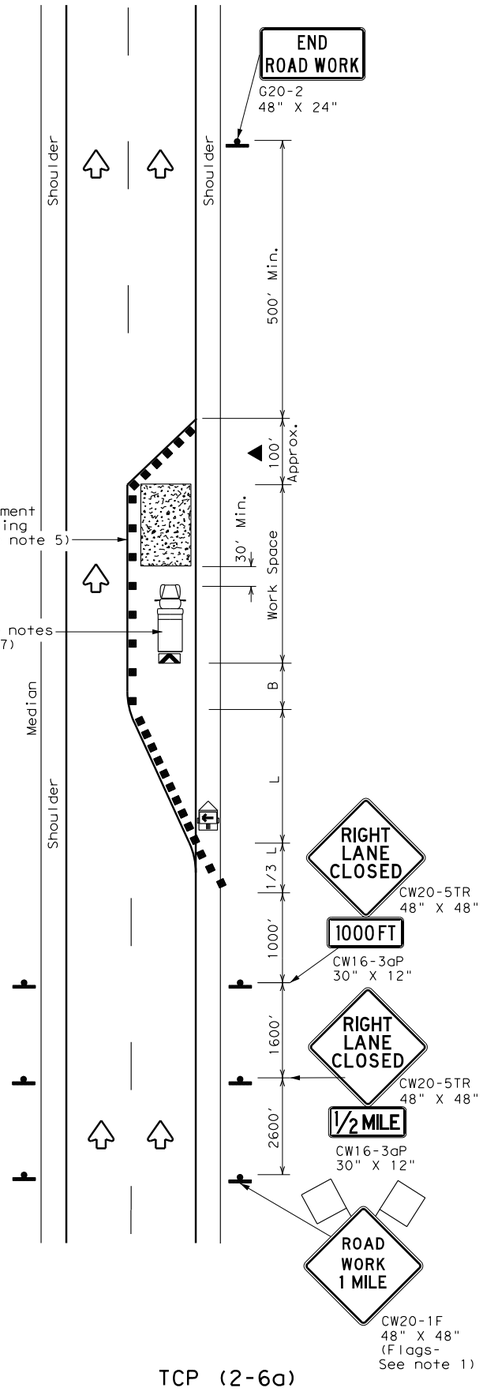
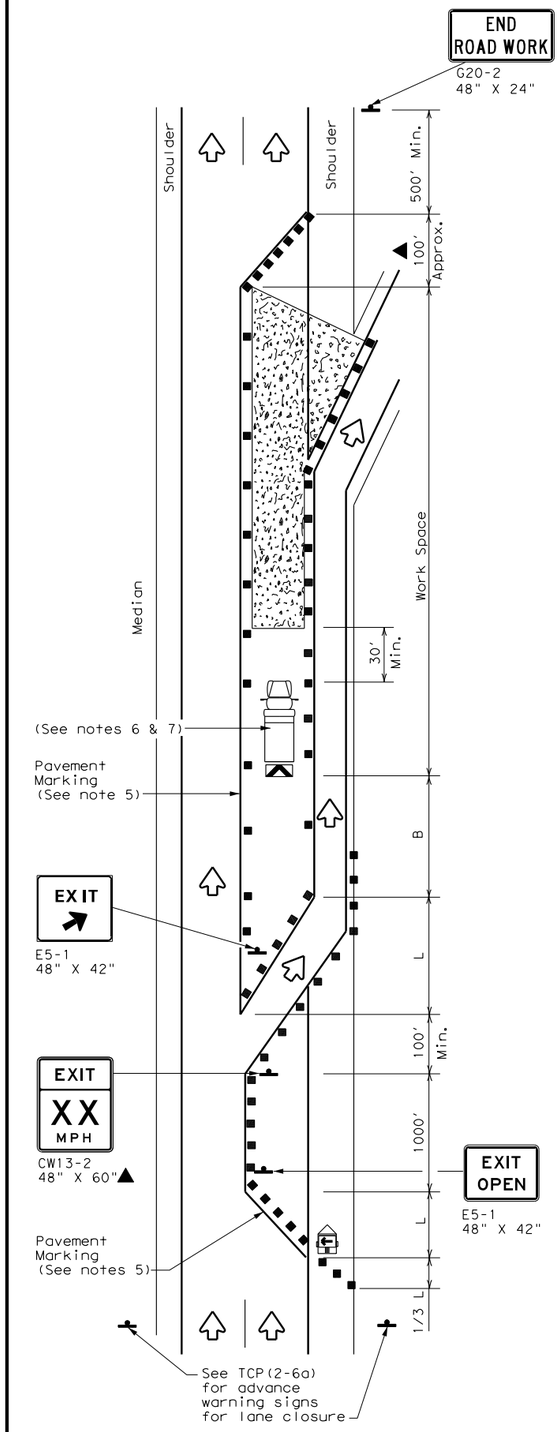


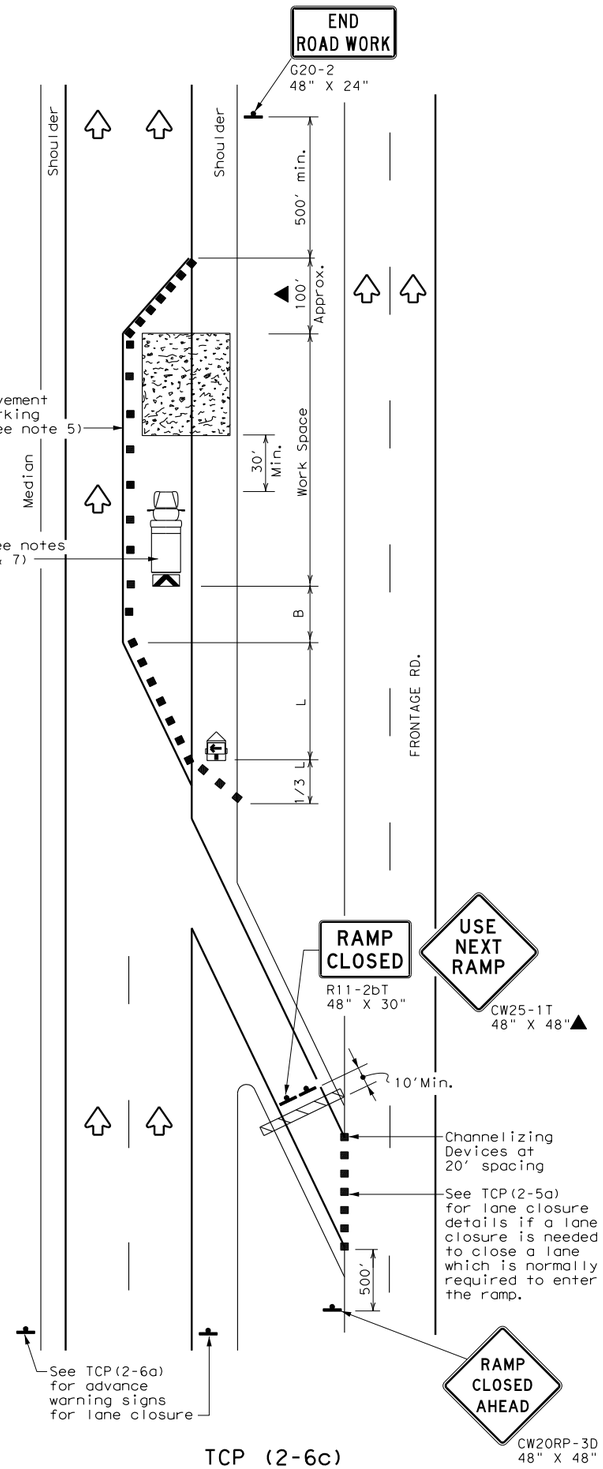
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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. Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
4. Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on everyother channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
5. The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
6. Shadow Vehicle with TMA and high intensity rotating, flashing,oscillating or strobe lights. 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.
7. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		39

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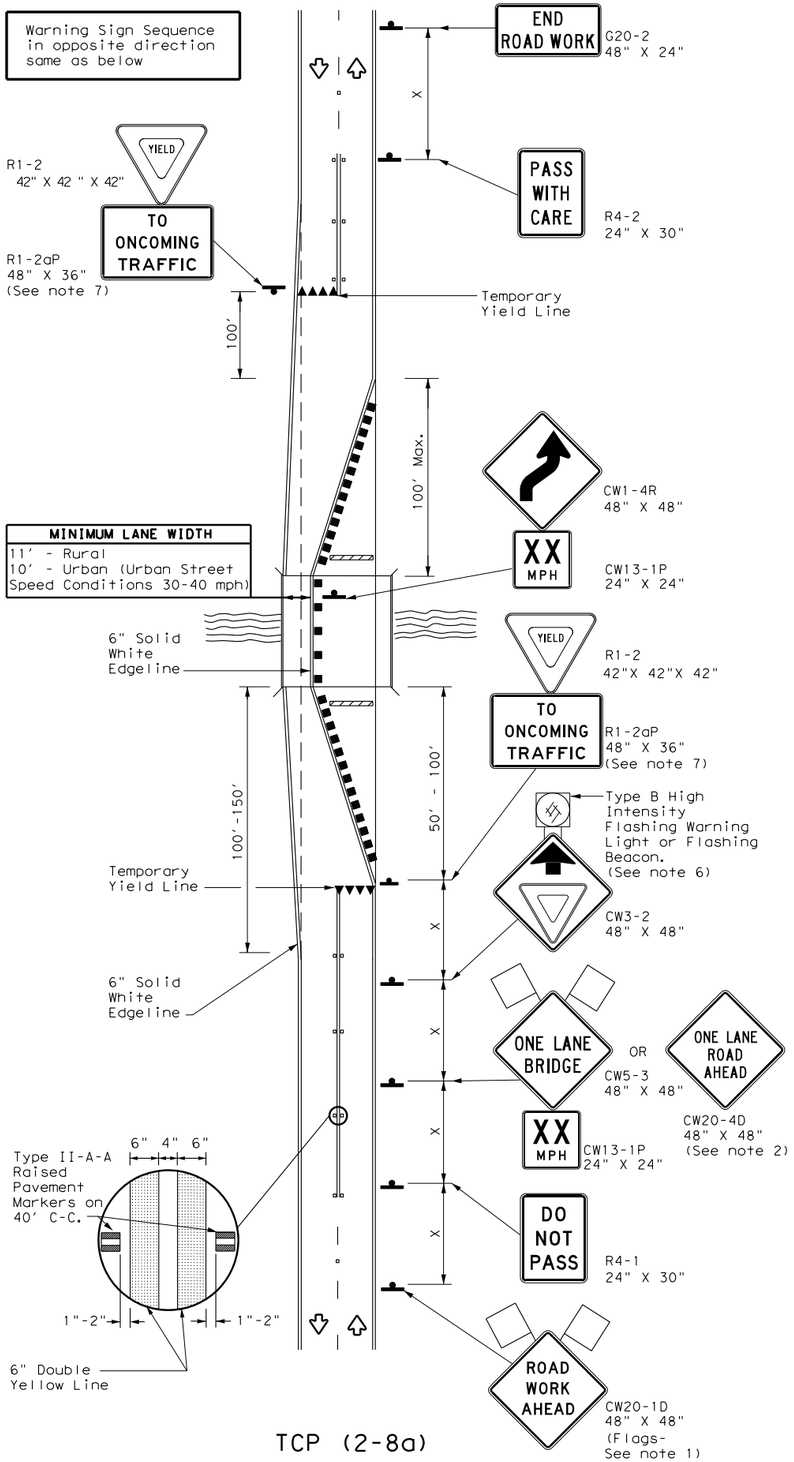
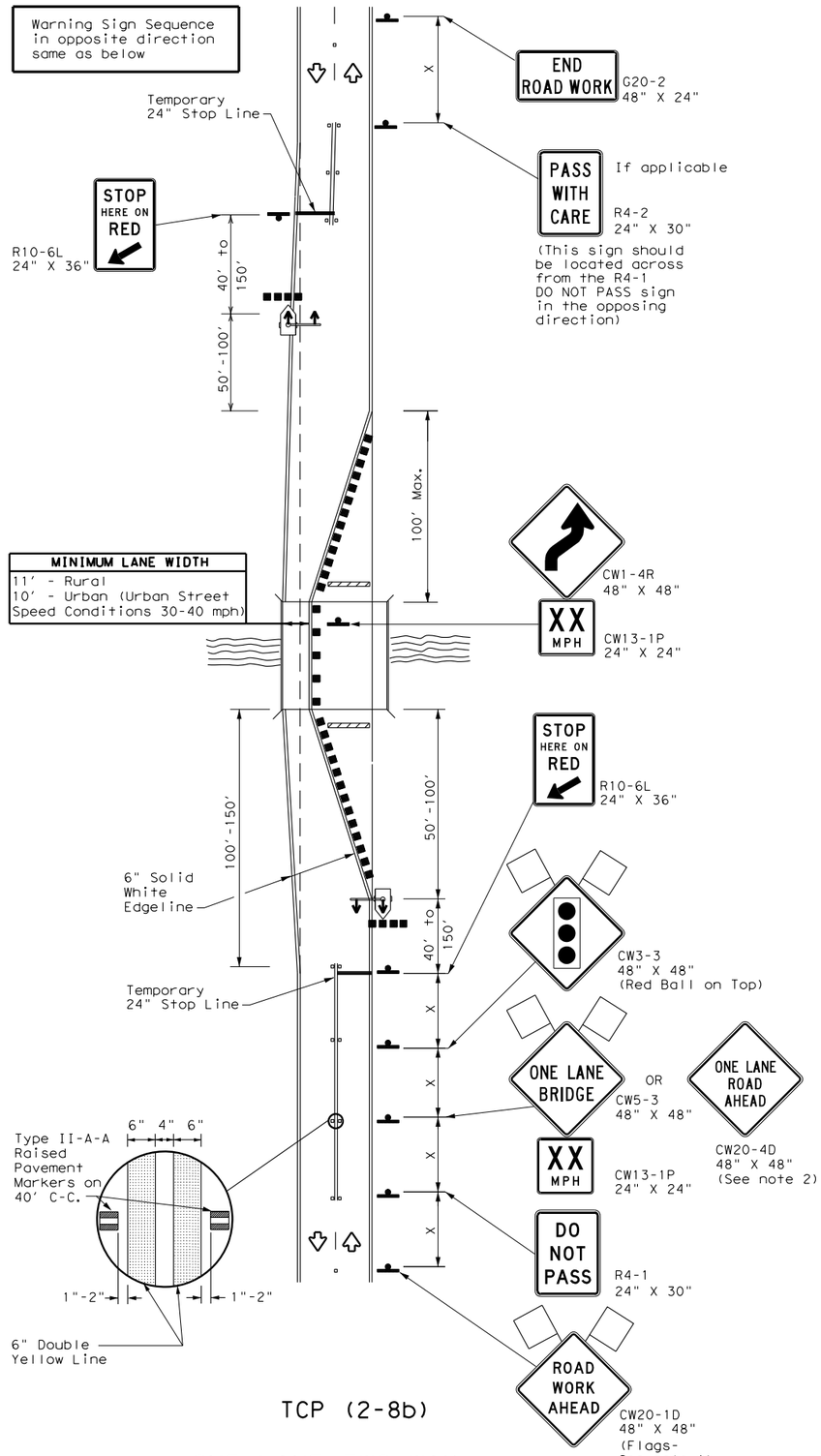


TCP (2-8a)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH YIELD SIGNS
(Less Than 2000 ADT-See Note 5)



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal

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. When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
3. Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
4. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

TCP (2-8a)

5. Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
6. If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
7. The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.

TCP (2-8b)

8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation — Traffic Safety Division Standard

TRAFFIC CONTROL PLAN
LONG TERM ONE-LANE TWO-WAY CONTROL

TCP(2-8)-23

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© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		40

DATE: 6/29/2023 10:26:27 AM
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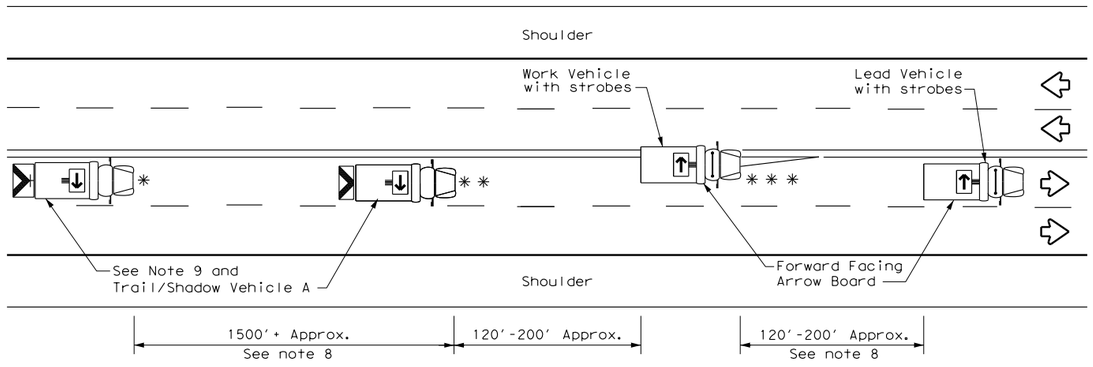
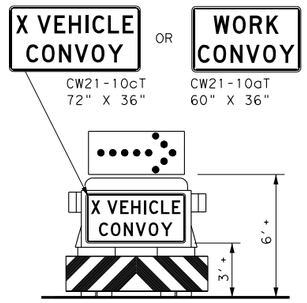


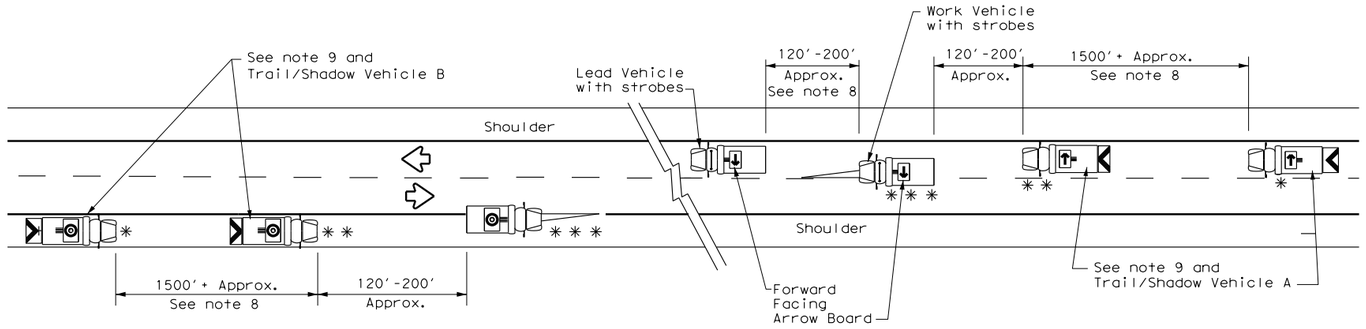
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

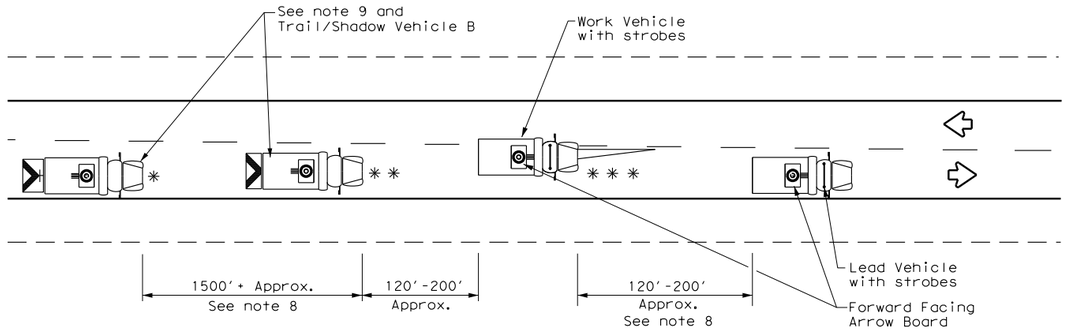


WORK ON SHOULDER

WORK ON TRAVEL LANE

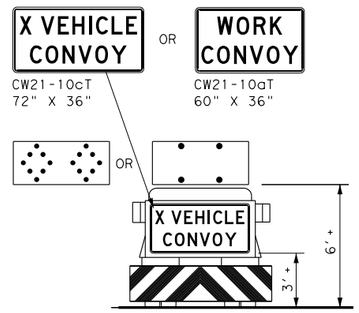
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

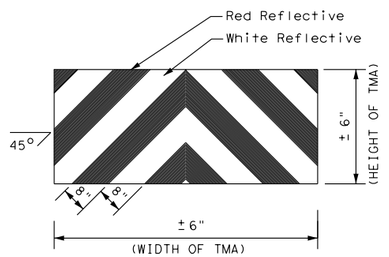
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		41

DATE: 6/29/2023 10:26:33 AM
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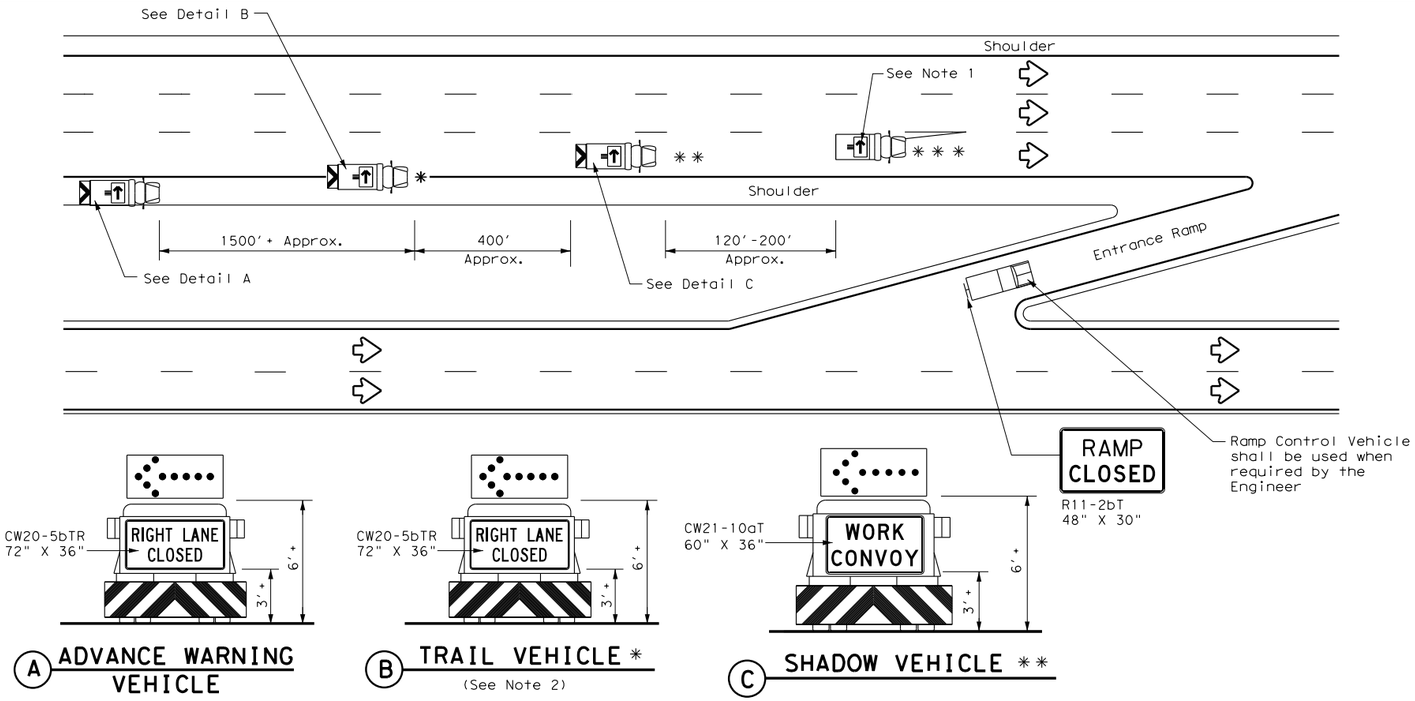
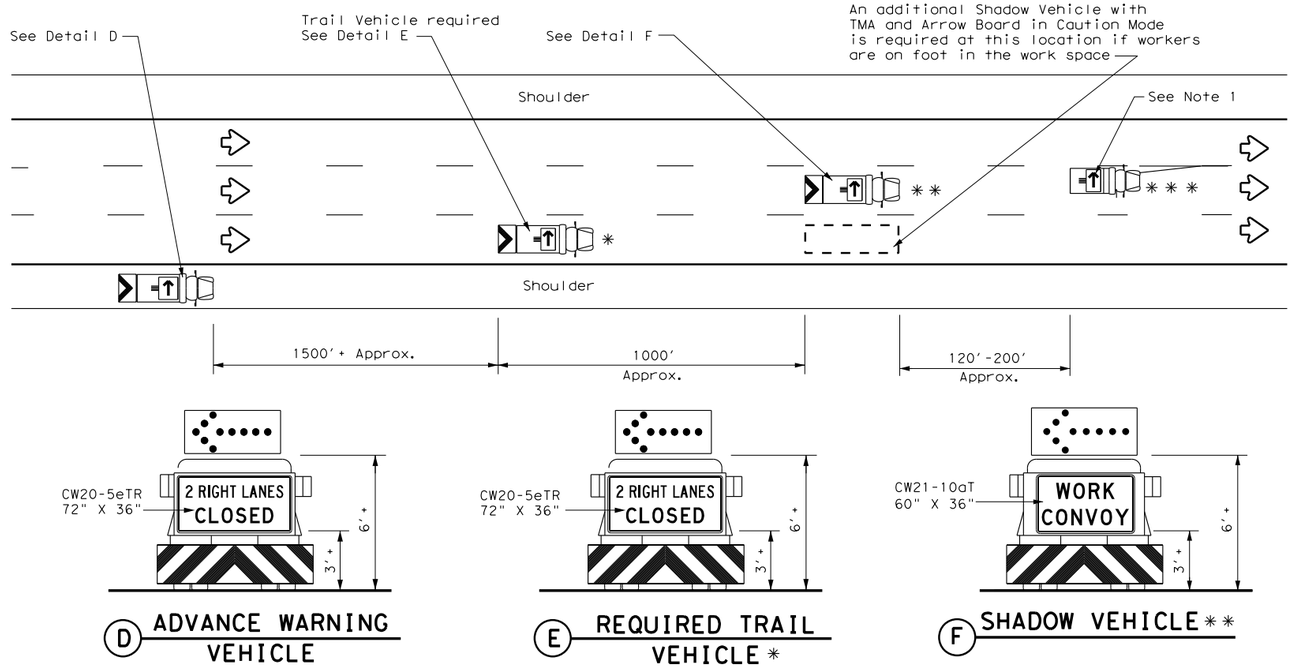


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



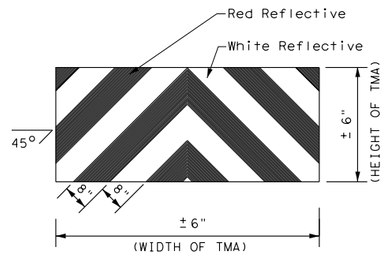
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		42

176

DATE: 6/29/2023 10:26:40 AM
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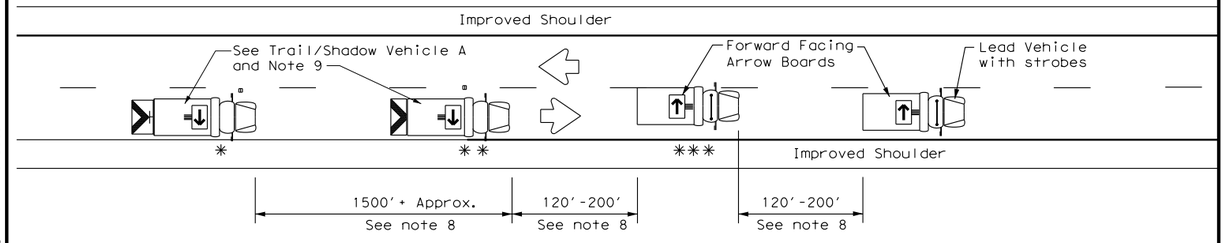
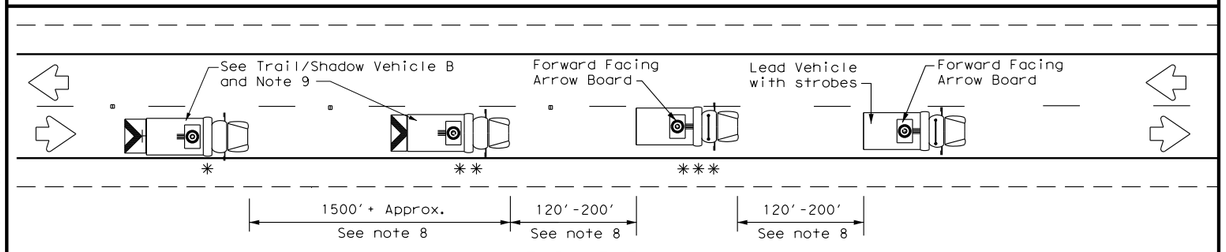


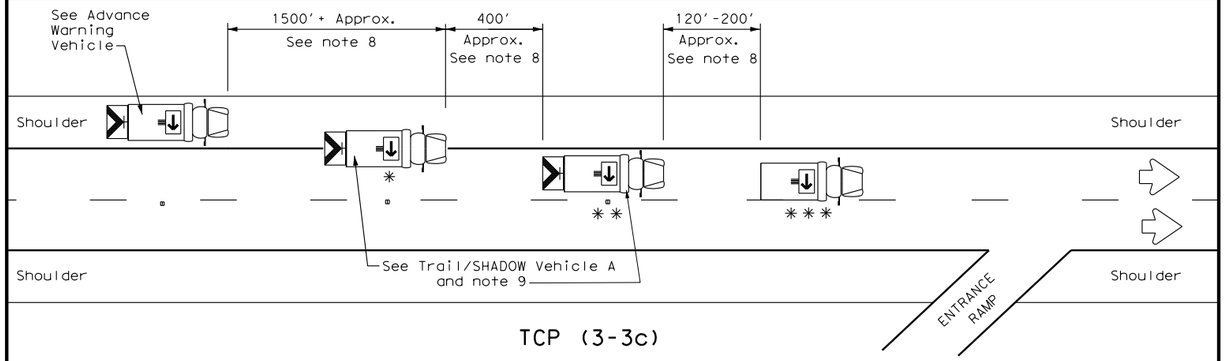
TCP (3-3a)

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



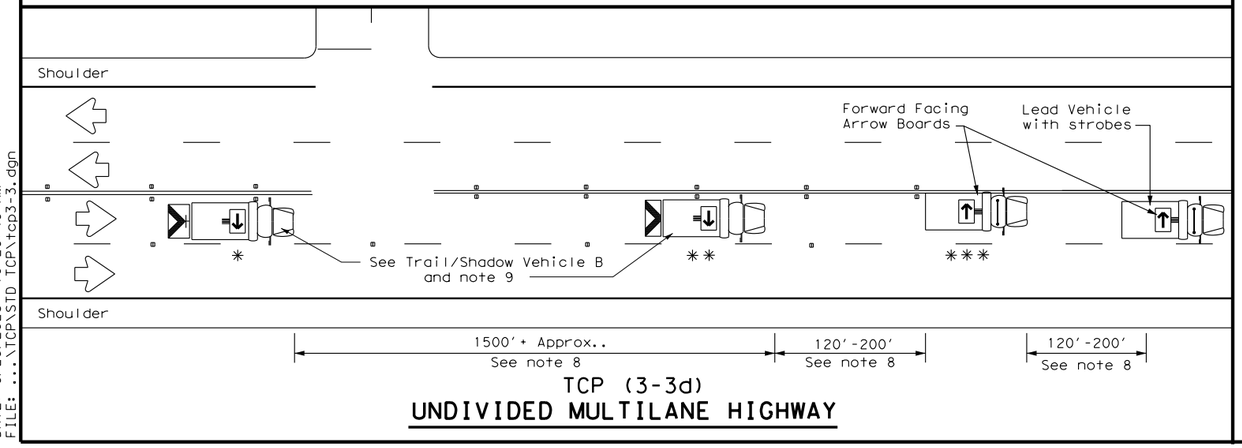
TCP (3-3b)

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



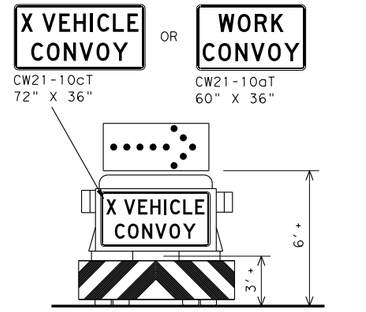
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



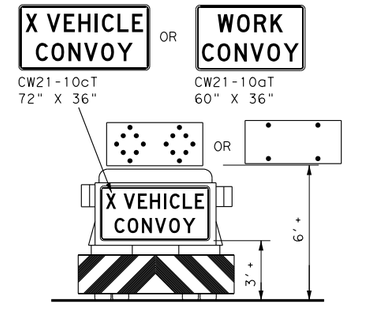
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



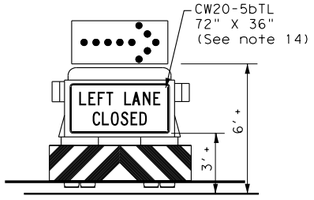
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

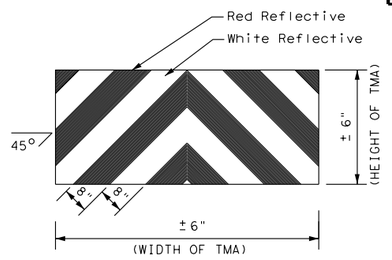


TRAIL/SHADOW VEHICLE B

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	WACO	HILL		43
1-97 7-14				

177

DATE: 6/29/2023 10:26:46 AM
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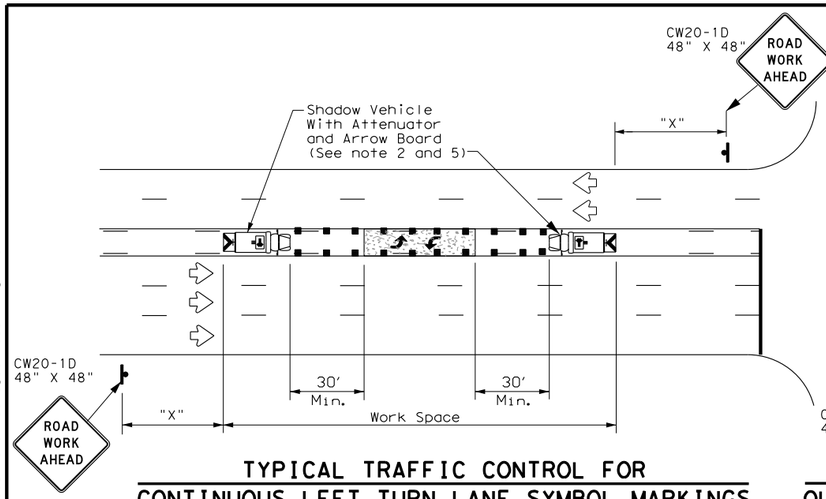
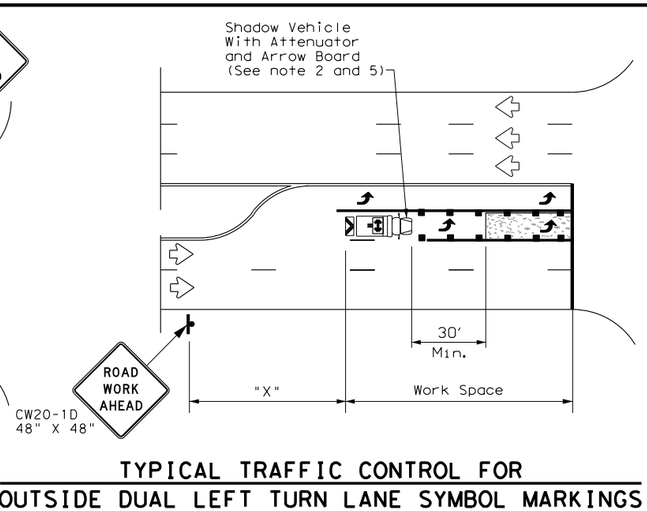
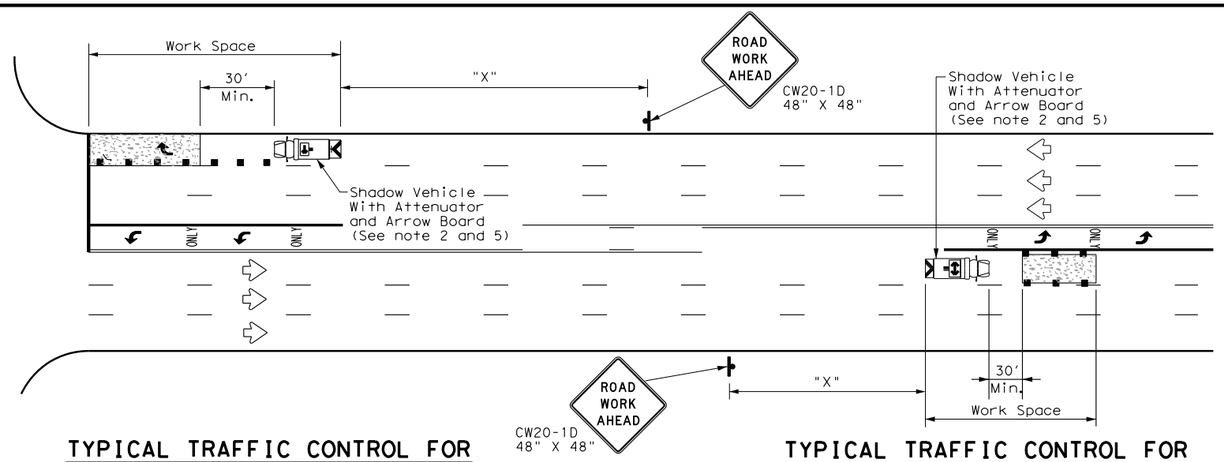


TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

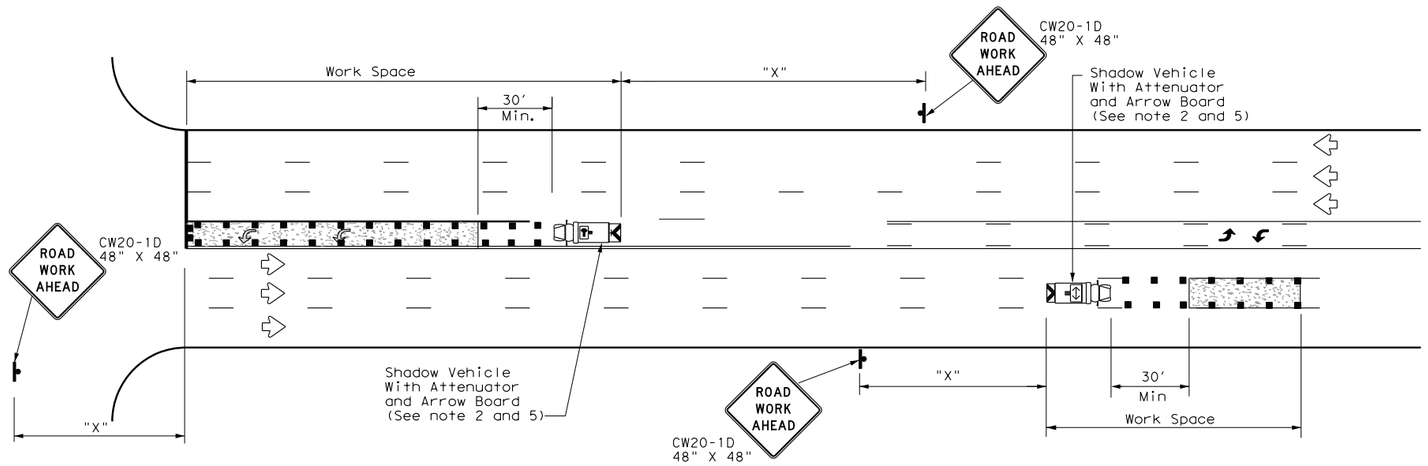


TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR
OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR
LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR
CENTER LANE MARKINGS

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

Posted Speed ✳	Formula	Minimum Desirable Taper Lengths ✳✳ 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

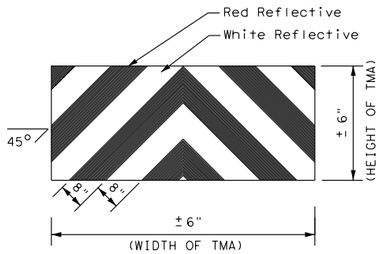
1. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.

2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.

3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.

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

5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS

TCP(3-4)-13

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©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
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	WACO	HILL		44

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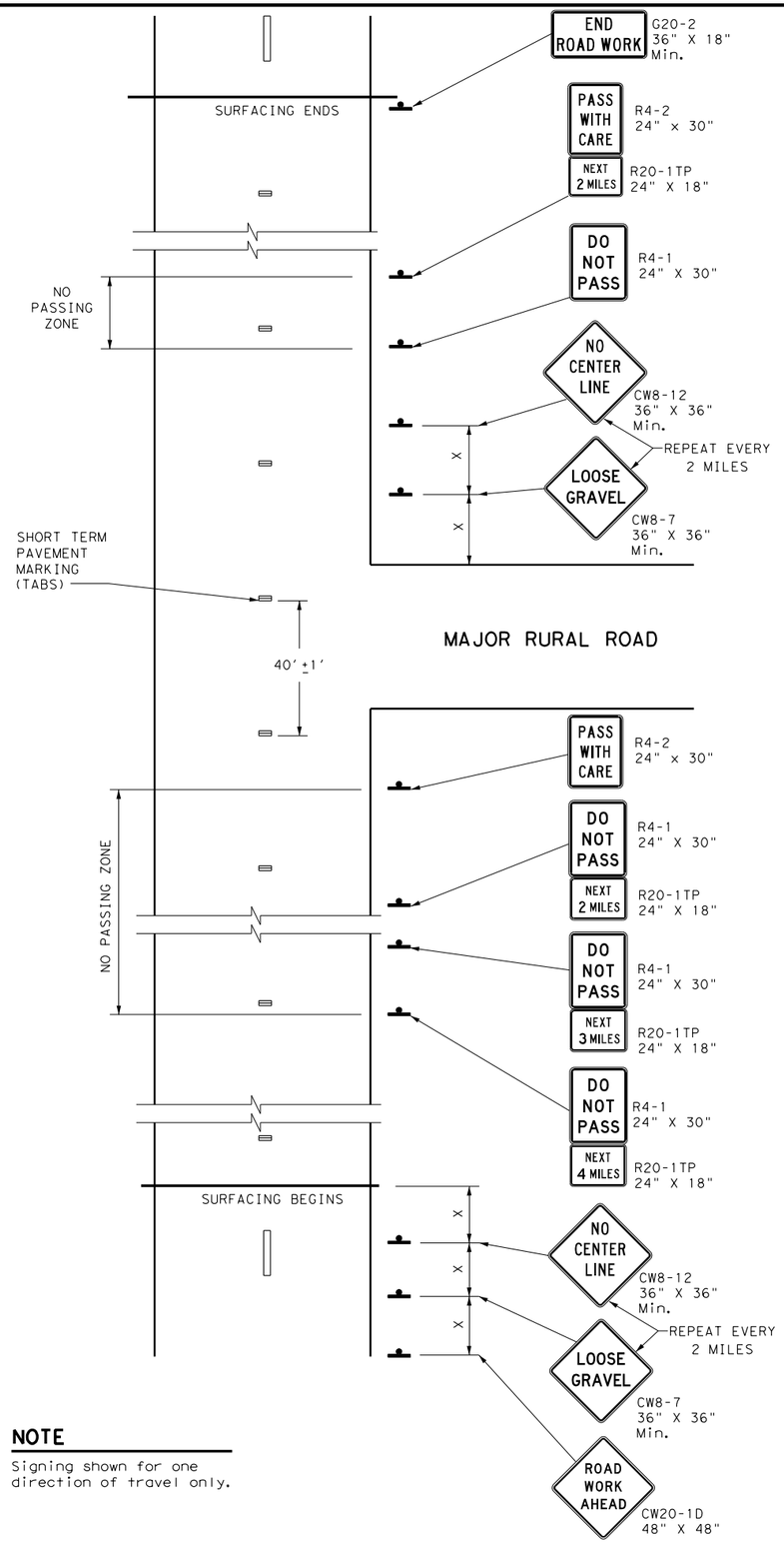
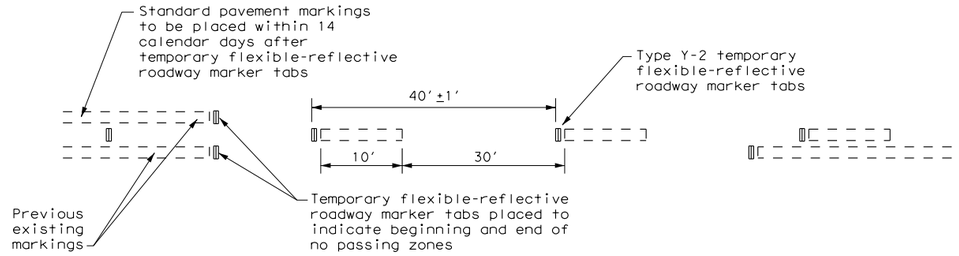


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

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

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

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

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

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

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE:	tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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4-92 4-98		DIST	COUNTY		SHEET NO.
1-97 7-13		WACO	HILL		45

210

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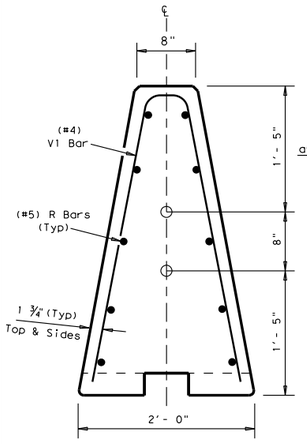
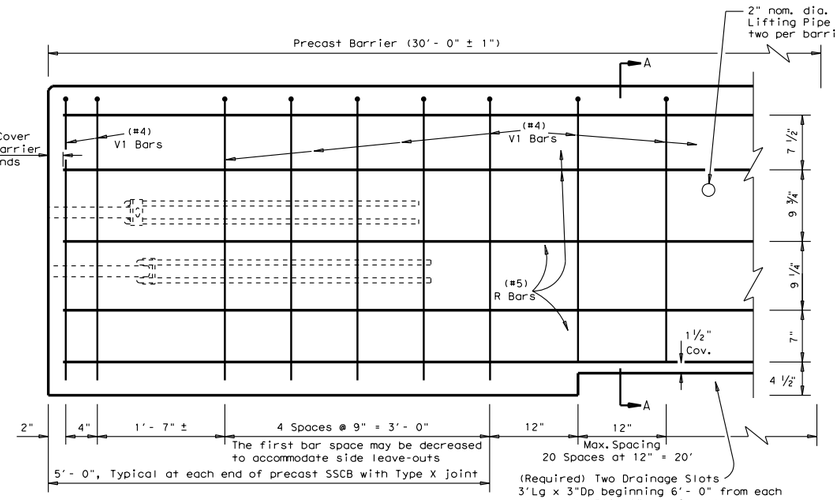


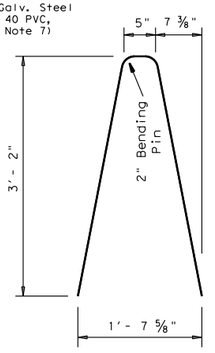
End View Precast Barrier

Pipe locations for Joint Type X connection



Reinforcement for Precast (SSCB) Single Slope Concrete Barrier (Type 1)

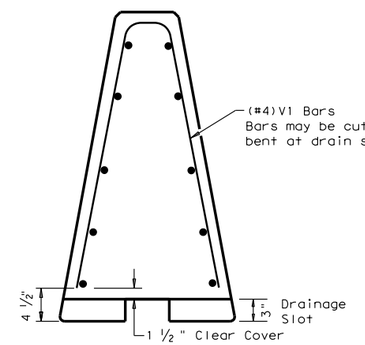
Showing reinforcement for Joint Connection (Type X)



V1 Bar

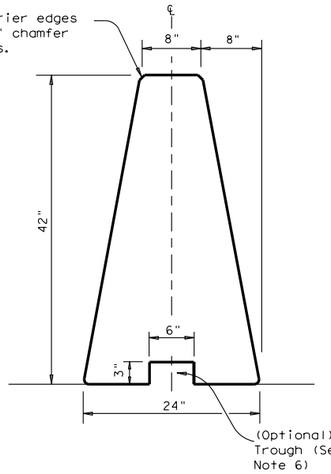
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomadate 1 ½" clear cover as directed by the Engineer.



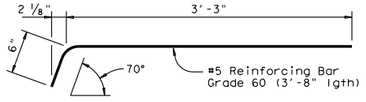
Section A-A

Steel Placement at (Required) Drainage Slots



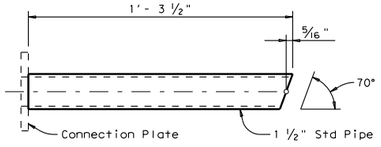
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



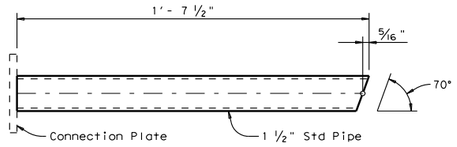
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



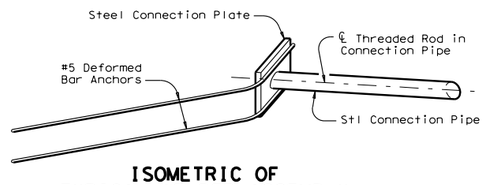
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

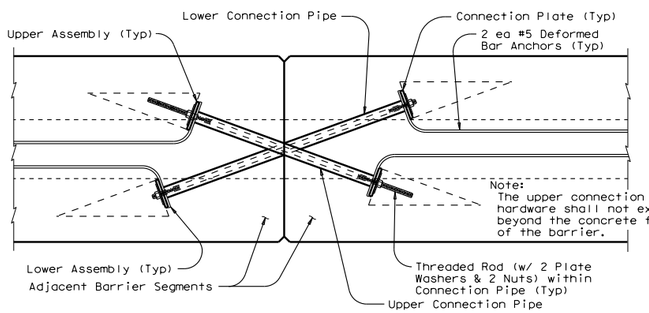


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

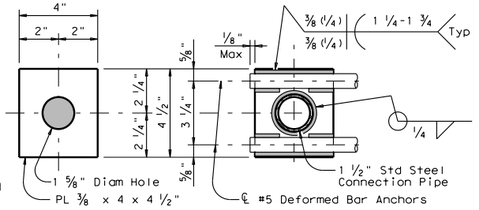
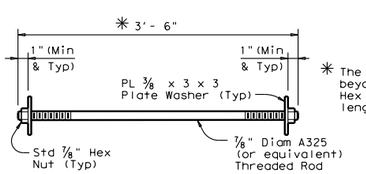


PLATE DIMENSIONS — WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.

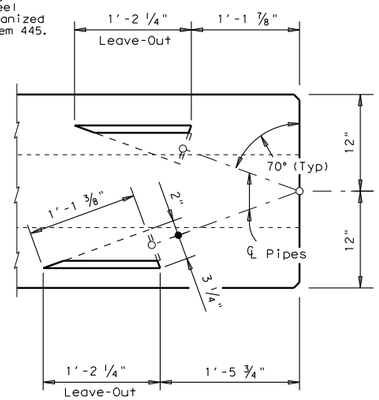


✳ The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

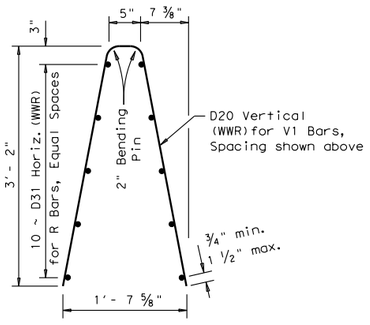
CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



BARRIER PLAN AT JOINT



Welded Wire Reinforcement (WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

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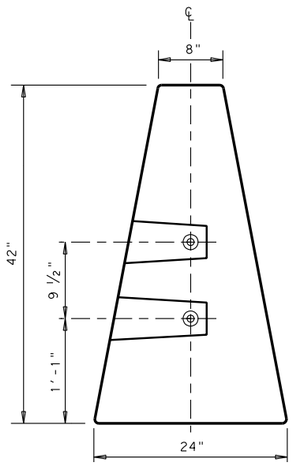
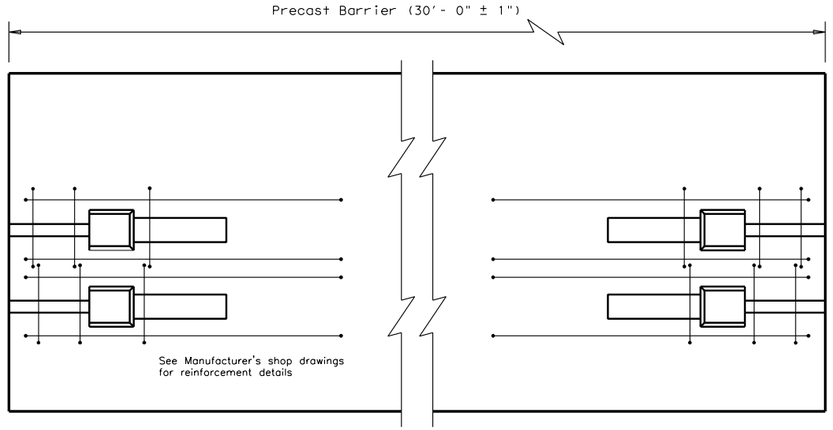
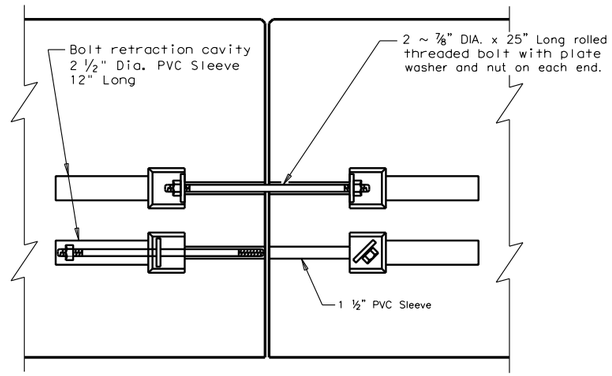


END VIEW
"QUICK-BOLT" POCKET LOCATIONS



ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details



ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

Joint Connection (Type Q)

TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details

VIEW FROM ABOVE
J-J HOOK CONNECTION

END VIEW

Proprietary Joint Connections (SSCB)

Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.

SECTION A-A
Showing (Type R) Rebar Grid

ELEVATION
V1 Bars (See Sheet 1)

TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment

(#4) V2 BARS
6 ~ two piece bars per barrier segment

WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

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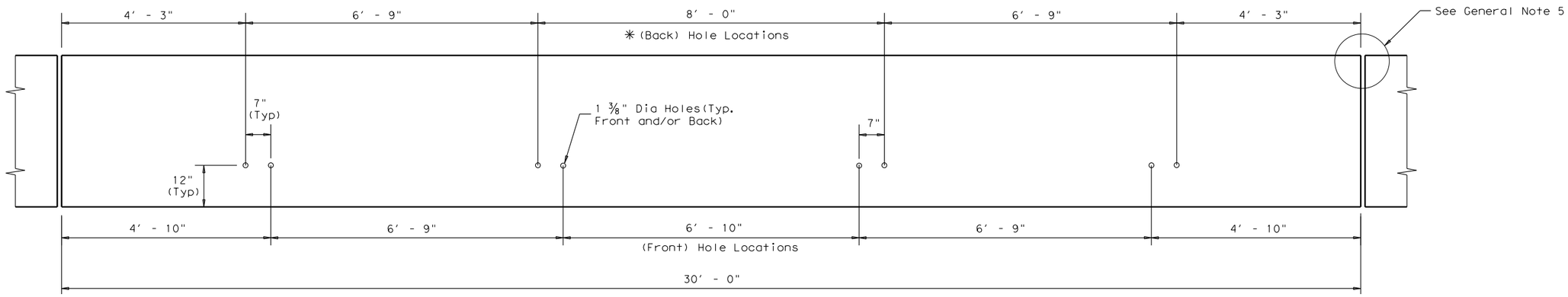
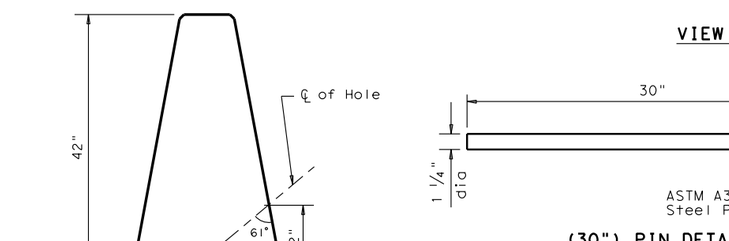


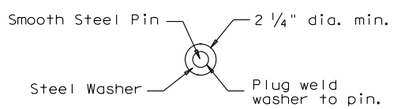
DETAIL 1

Precast SSCB(42")
Showing hole locations



DETAIL 2

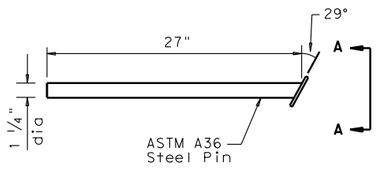
Placement on (ACP)
Asphalt Conc. Pavement
or Treated Base Material
(30" Pin required)



HOLE LOCATION DETAIL

VIEW A-A

(30") PIN DETAIL
See Detail 2

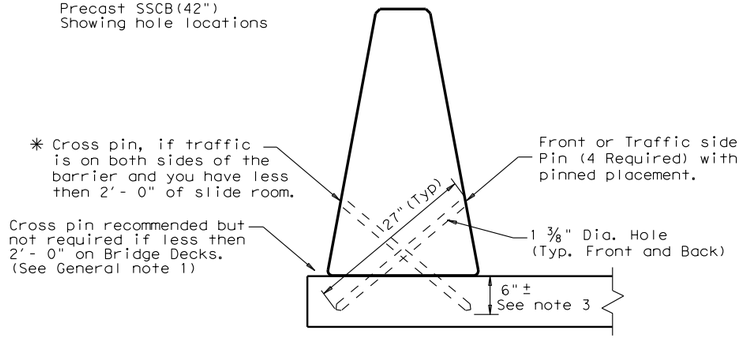


(27") PIN DETAIL
See Detail 3

Note:
Steel washer welded to pin at 29° angle so that the washer is flush with barrier surface. (See View A-A)

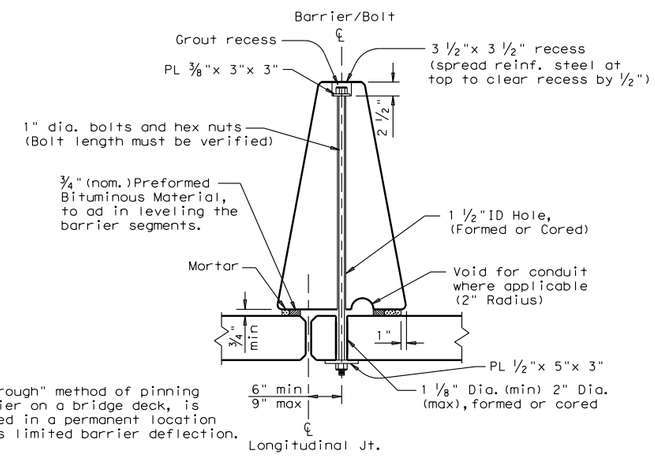
DETAIL 3

Bridge Deck or CRCP
(27" Pin required).



CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST SSCB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜in. ID holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See SSCB(2) standard sheet for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼in. pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 700 lbs per foot.

Texas Department of Transportation

Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

SSCB(5)-10

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	DIST	COUNTY		SHEET NO.
	WACO	HILL		45C

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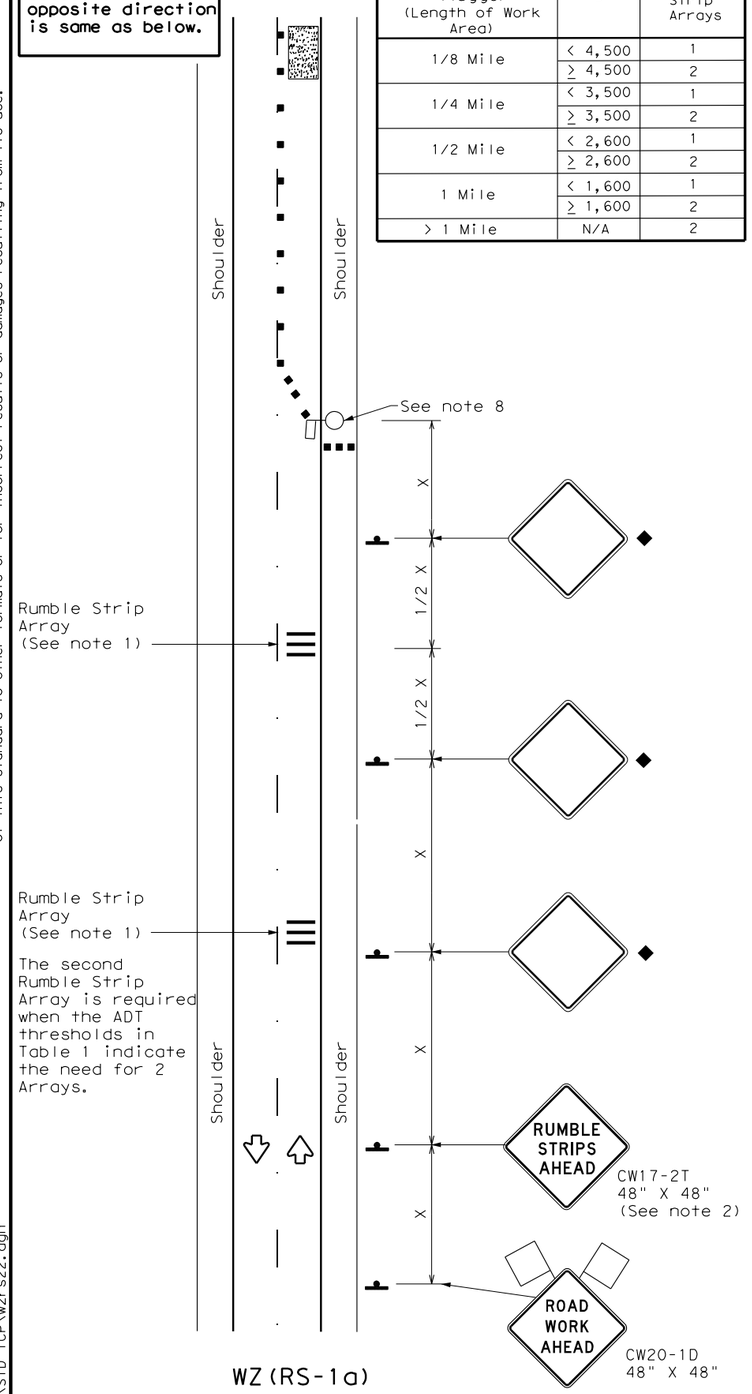
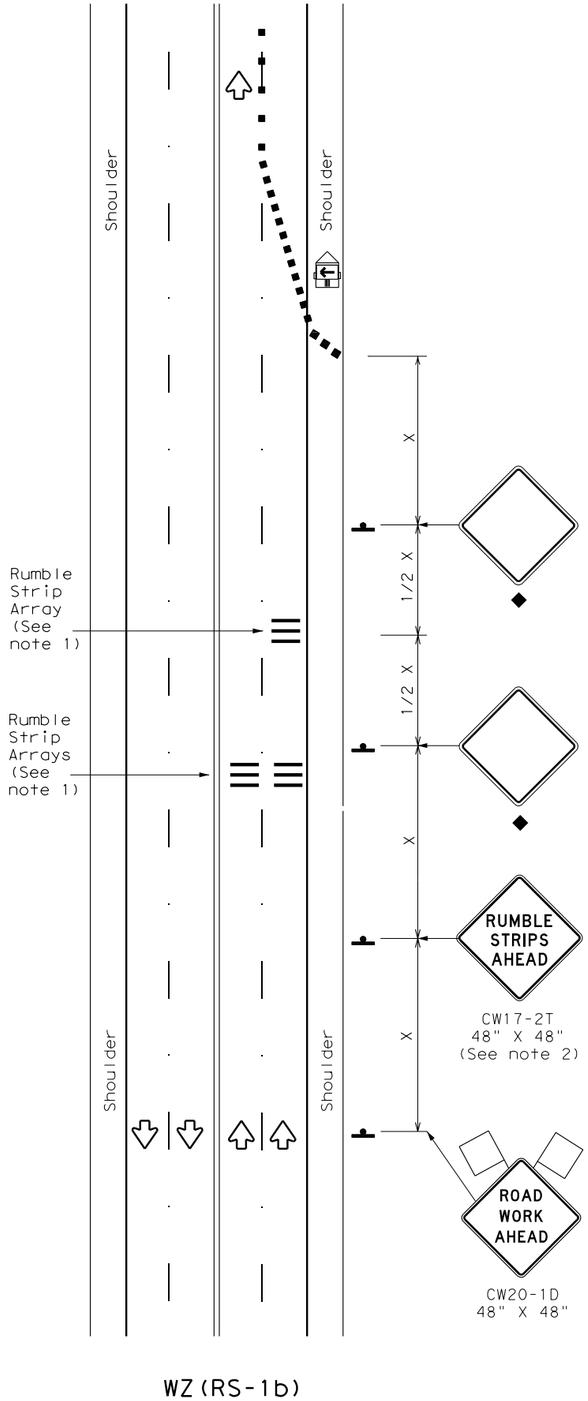
Warning sign and rumble strip sequence in opposite direction is same as below.

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
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	WACO	HILL		46

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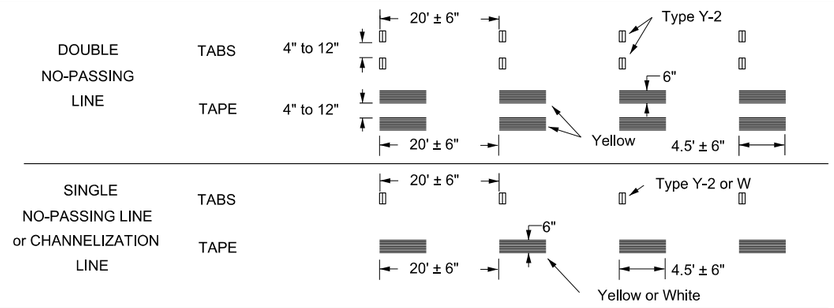
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



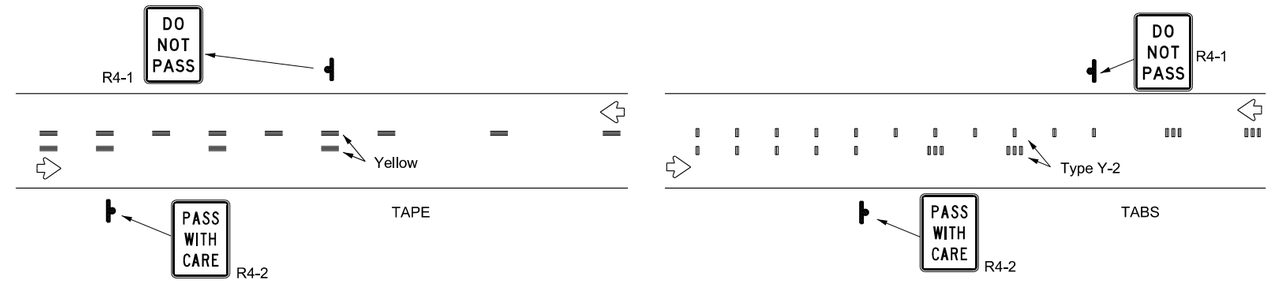
NOTES:

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.

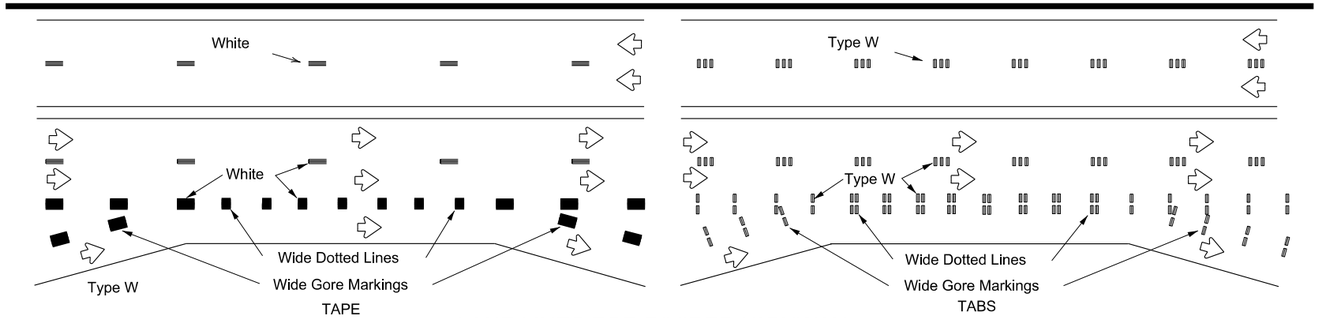
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

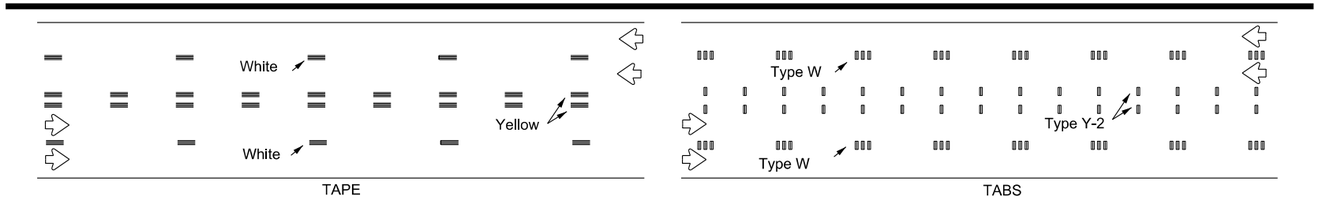
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



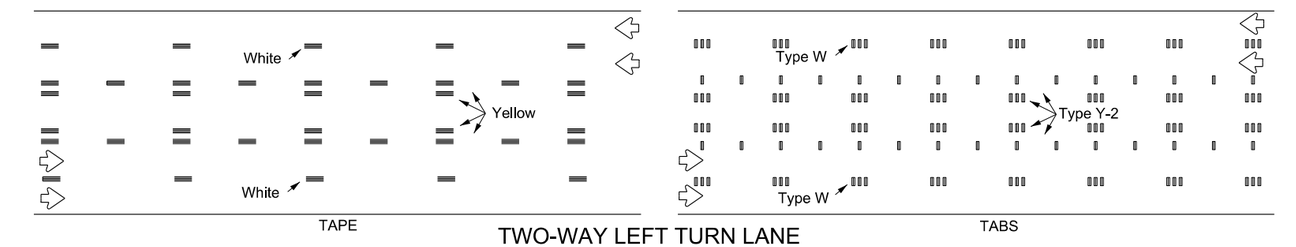
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



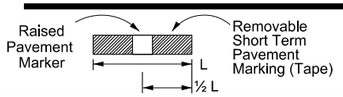
LANE LINES FOR DIVIDED HIGHWAY



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

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©TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	WACO	HILL		47

111

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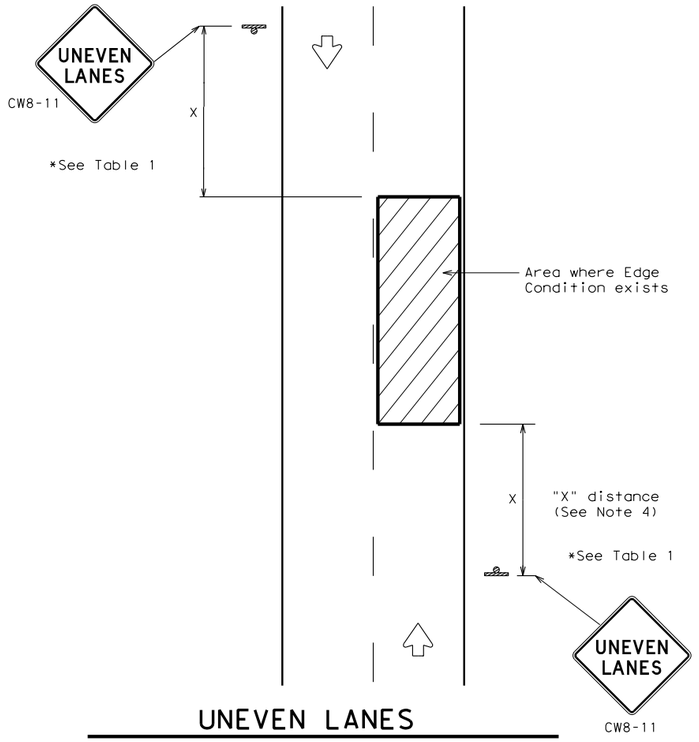
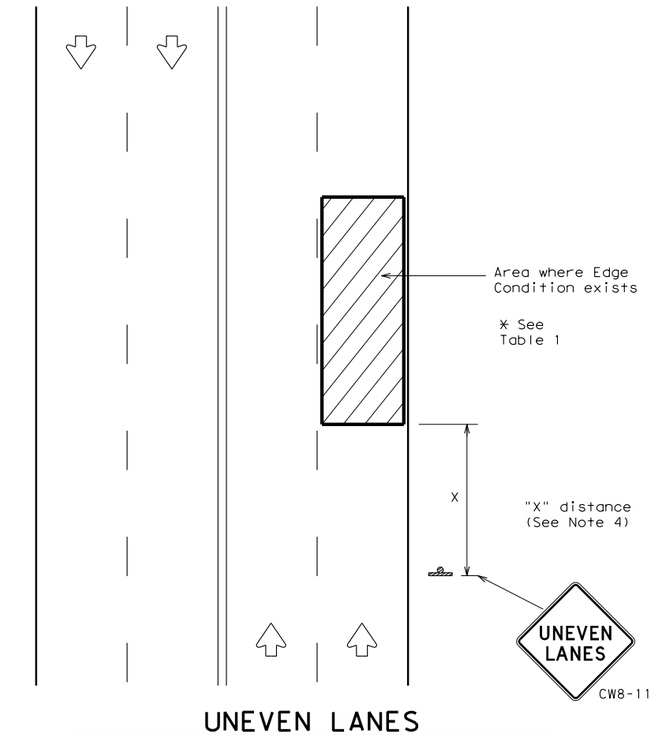
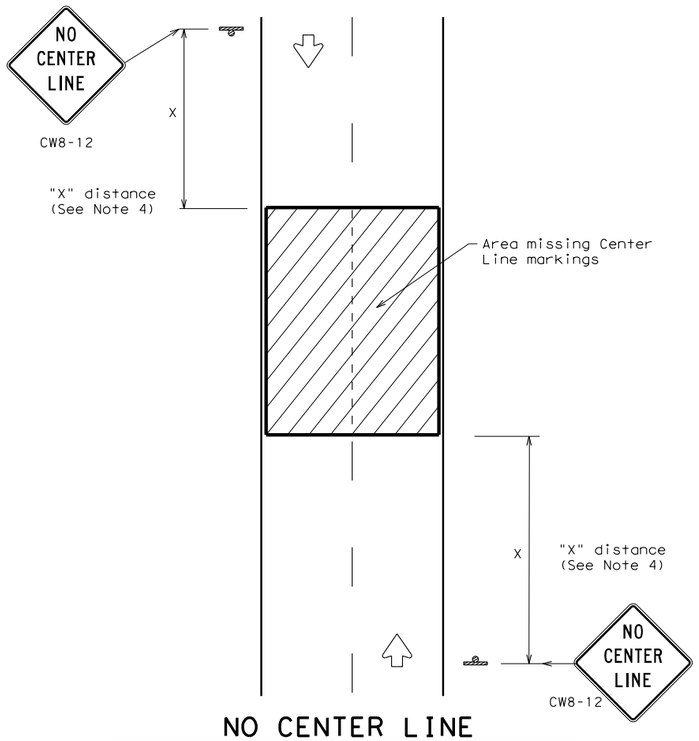


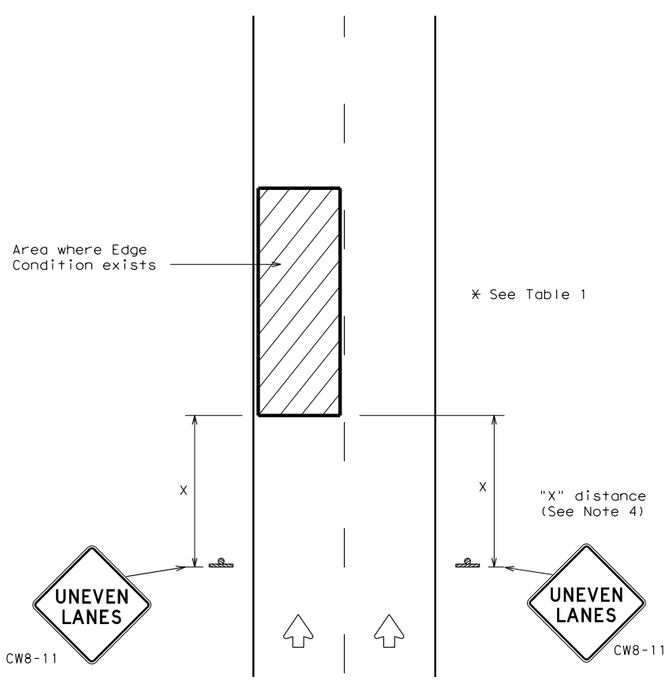
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

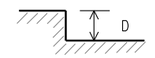
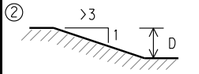
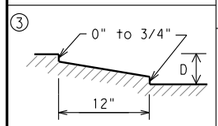
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	WACO	HILL		48

112

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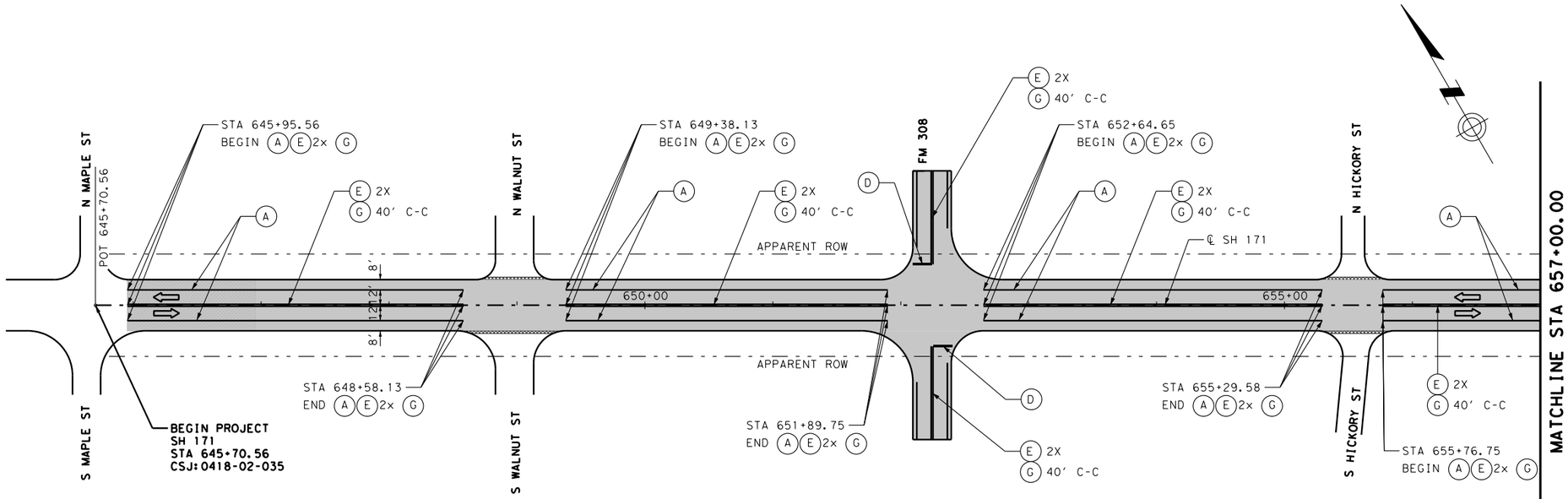

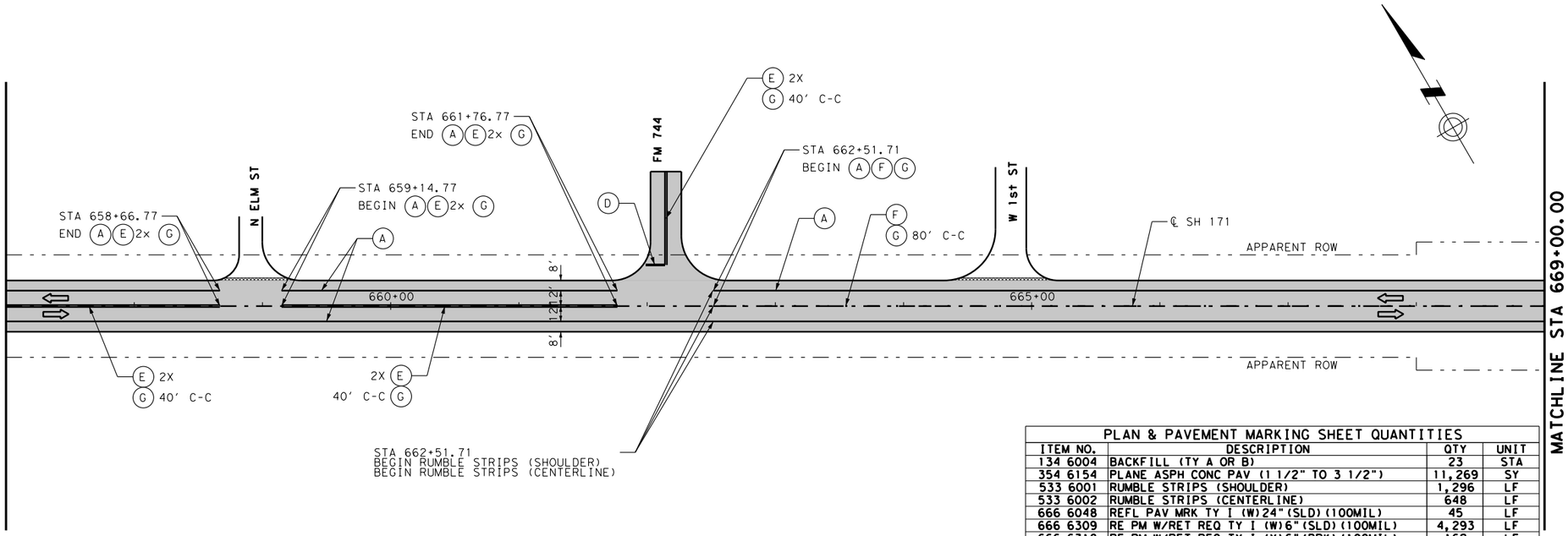

LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H

PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	23	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	11,269	SY
533 6001	RUMBLE STRIPS (SHOULDER)	1,296	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	648	LF
666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	45	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,293	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	162	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	3,102	LF
672 6009	REFL PAV MRKR TY II-A-A	47	EA
3077 6001	SP MIXES SP-B PG64-22	1,549	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,240	TON
3077 6075	TACK COAT	1,127	GAL
3085 6001	UNDERSEAL COURSE	2,817	GAL

THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
BEGIN TO STA 669+00.00

SCALE: 1"=100' SHEET 1 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.	HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET	SH 171

DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	49

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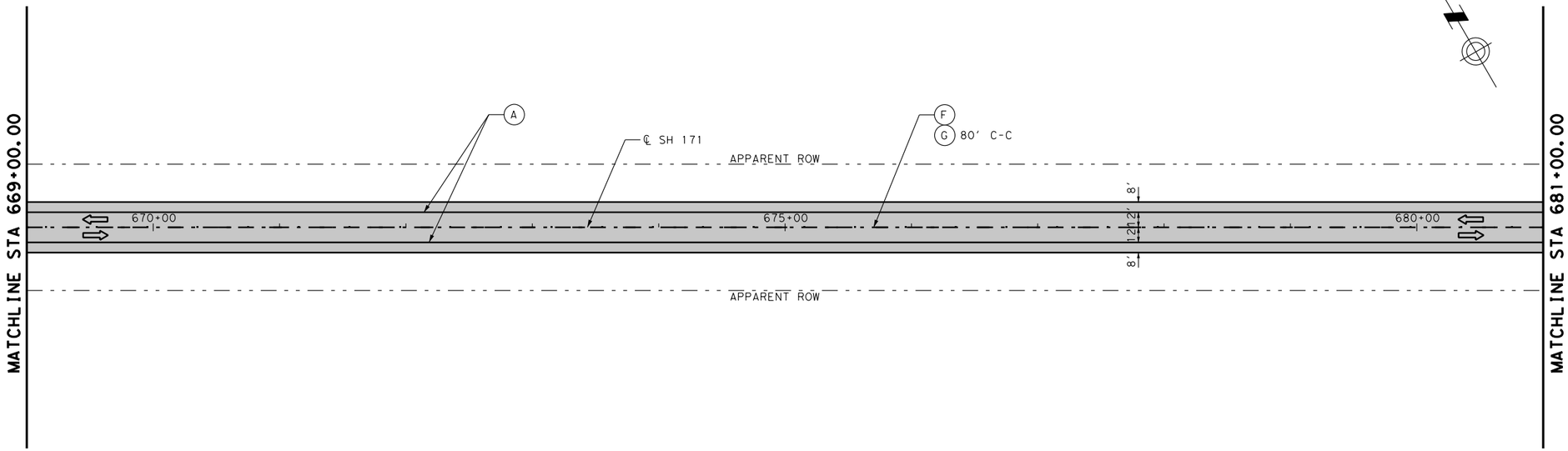

LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

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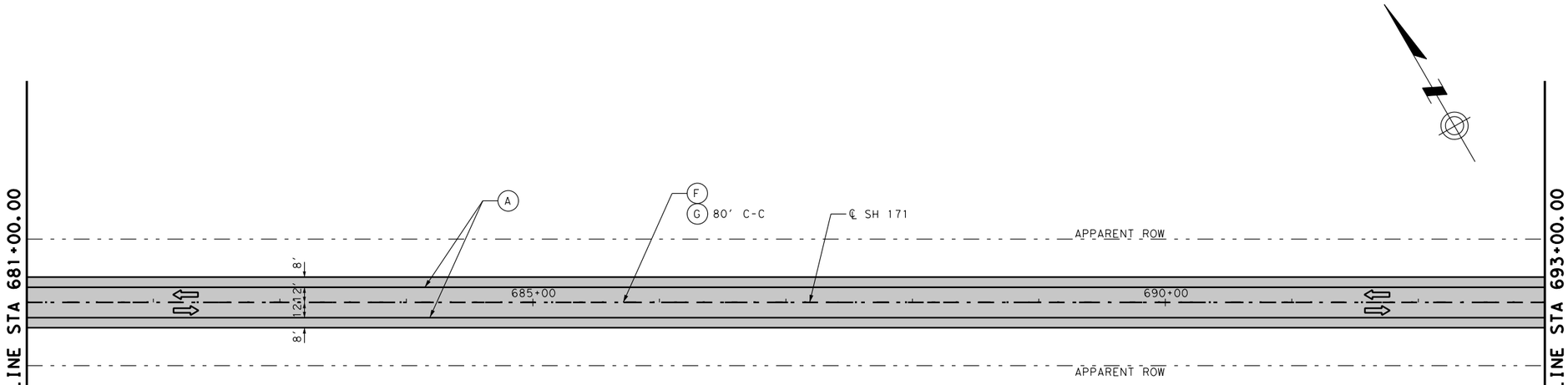

PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	600	LF
672 6009	REFL PAV MRKR TY II-A-A	30	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	SY
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,174	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 669+00.00 TO STA 693+00.00

SCALE: 1"=100' SHEET 2 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	50

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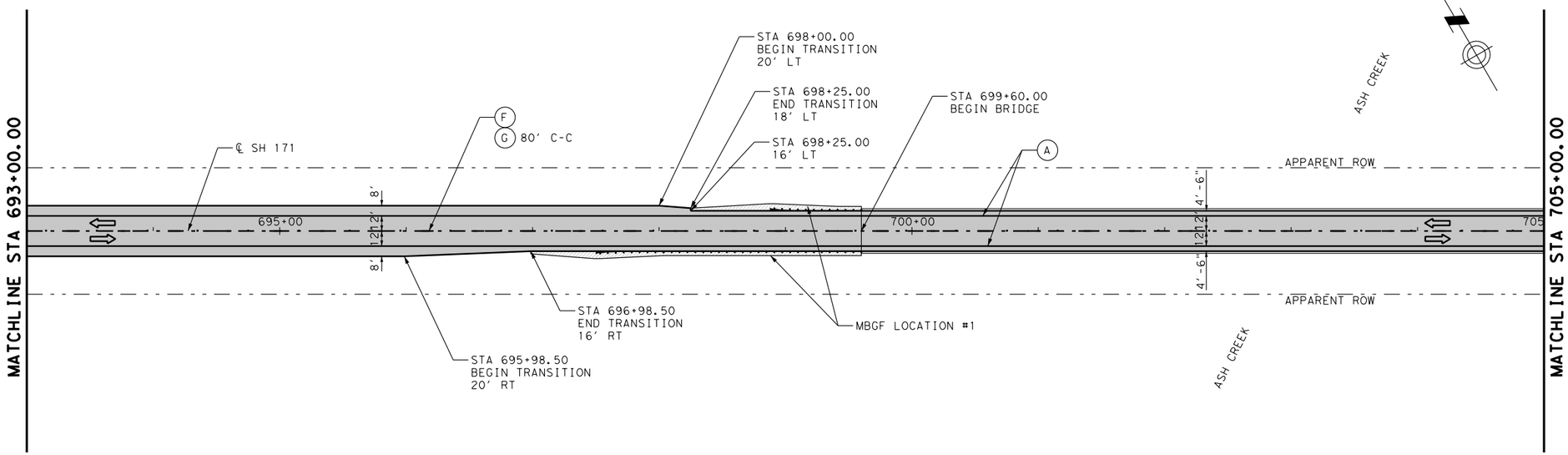


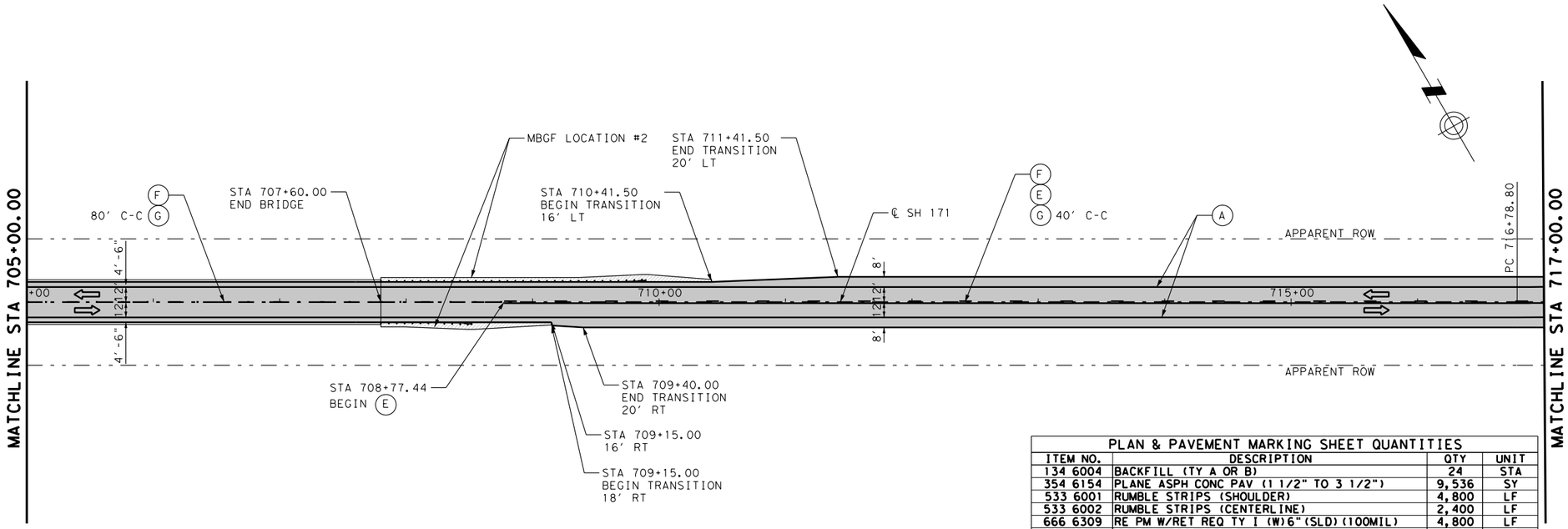
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	9,536	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	600	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	823	LF
672 6009	REFL PAV MRKR TY II-A-A	40	EA
3077 6001	SP MIXES SP-B PG64-22	1,311	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,049	TON
3077 6075	TACK COAT	954	GAL
3085 6001	UNDERSEAL COURSE	2,384	GAL

THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 693+00.00 TO STA 717+00.00

SCALE: 1"=100' SHEET 3 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	51

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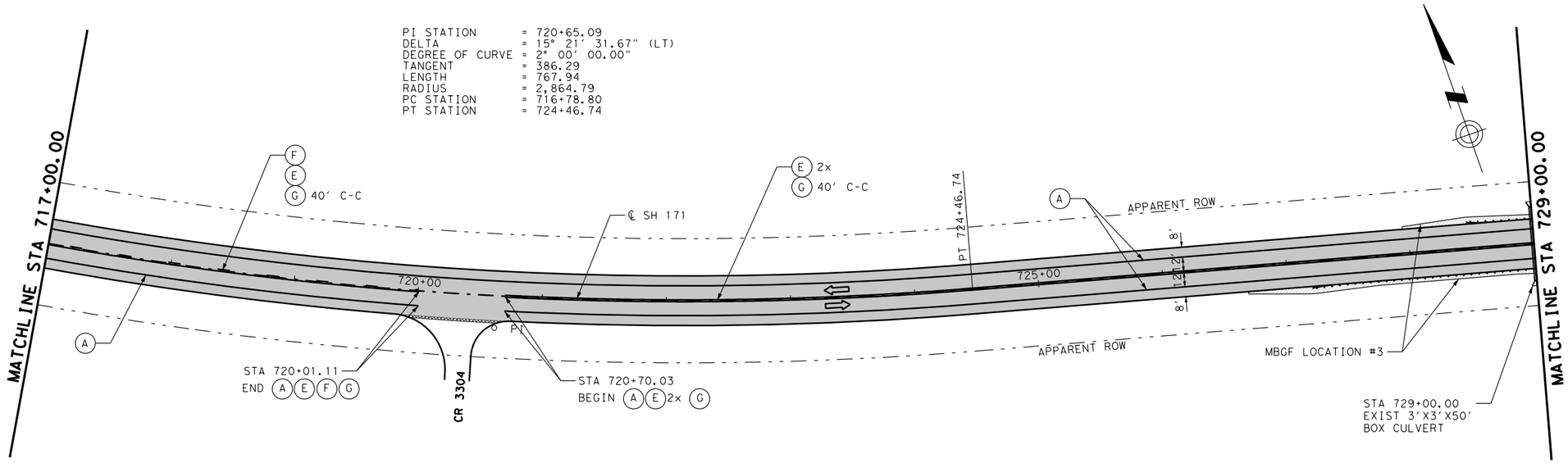

LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

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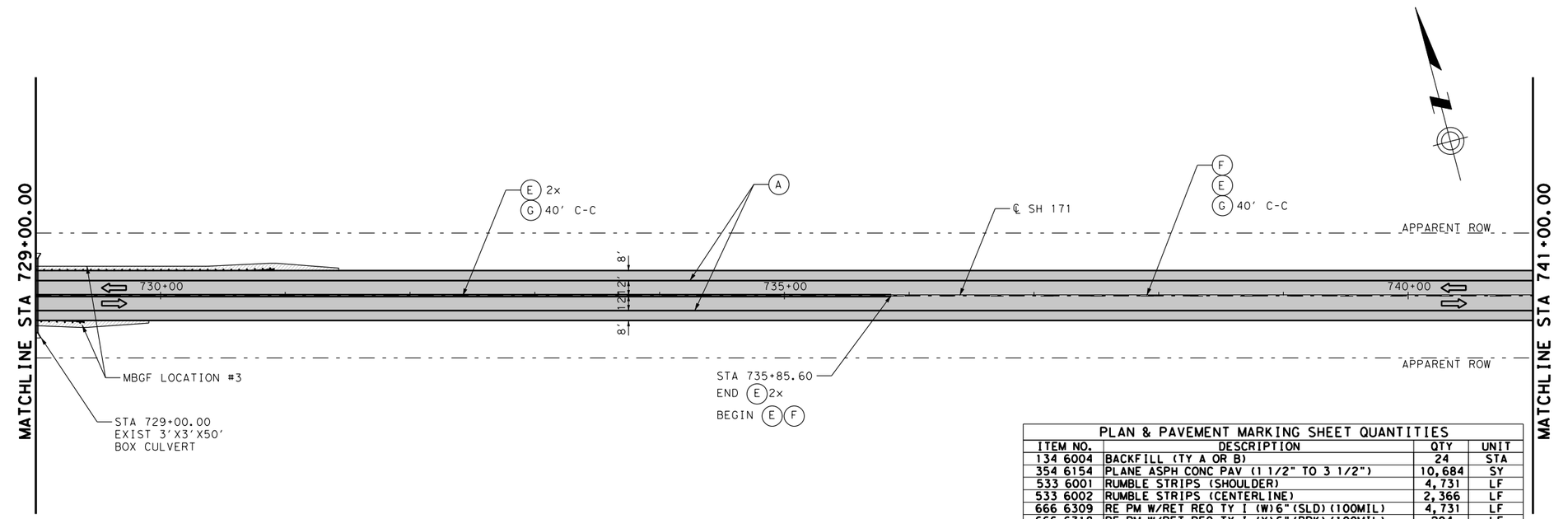

PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,684	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,731	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,366	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,731	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	204	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	3,848	LF
672 6009	REFL PAV MRKR TY II-A-A	58	EA
3077 6001	SP MIXES SP-B PG64-22	1,469	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,176	TON
3077 6075	TACK COAT	1,068	GAL
3085 6001	UNDERSEAL COURSE	2,671	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 717+00.00 TO STA 741+00.00

SCALE: 1"=100' SHEET 4 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	52

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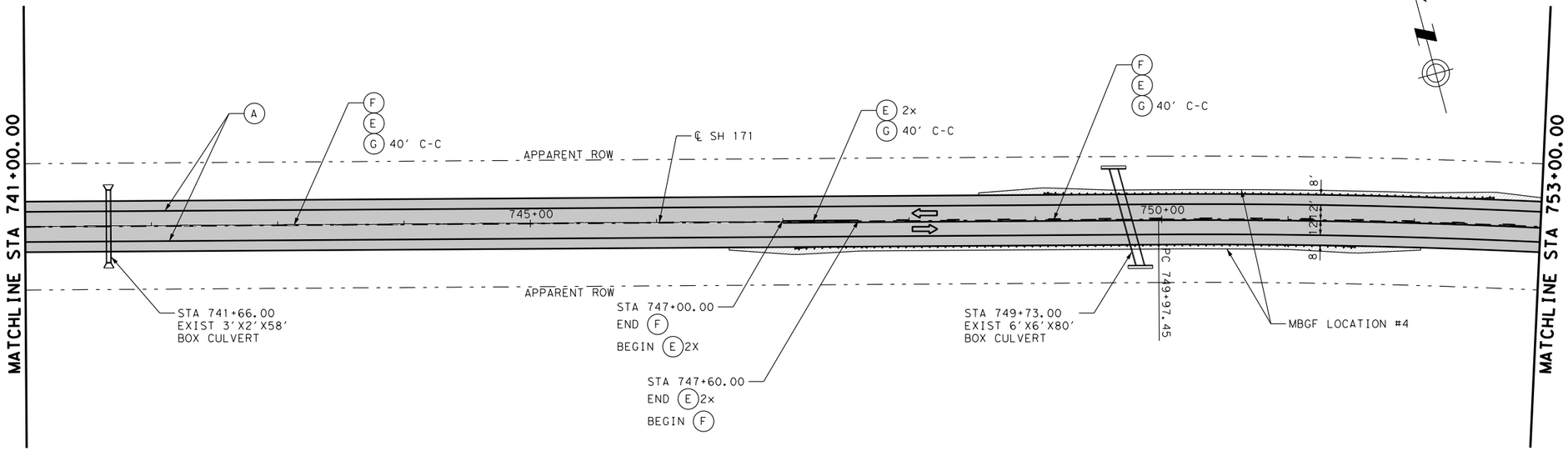


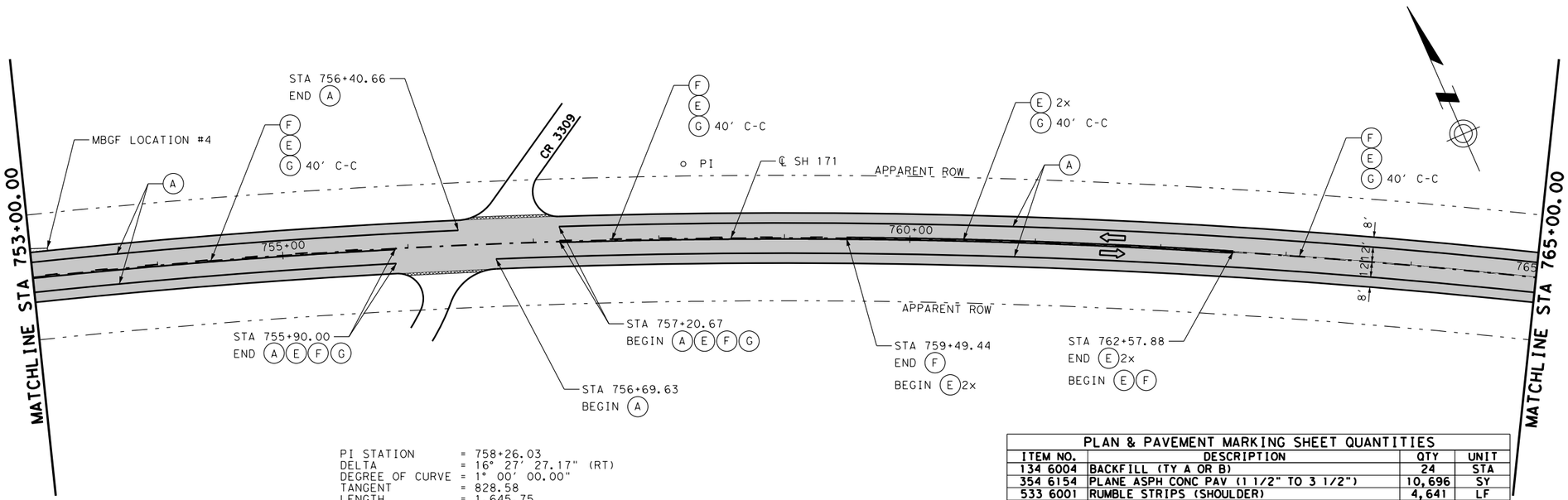
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



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DEGREE OF CURVE = 1° 00' 00.00"
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LENGTH = 1,645.75
RADIUS = 5,729.58
PC STATION = 749+97.45
PT STATION = 766+43.20

PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,696	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,641	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,321	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,641	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	478	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	2,627	LF
672 6009	REFL PAV MRKR TY II-A-A	57	EA
3077 6001	SP MIXES SP-B PG64-22	1,471	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,177	TON
3077 6075	TACK COAT	1,070	GAL
3085 6001	UNDERSEAL COURSE	2,674	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 741+00.00 TO STA 765+00.00

SCALE: 1"=100' SHEET 5 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	53

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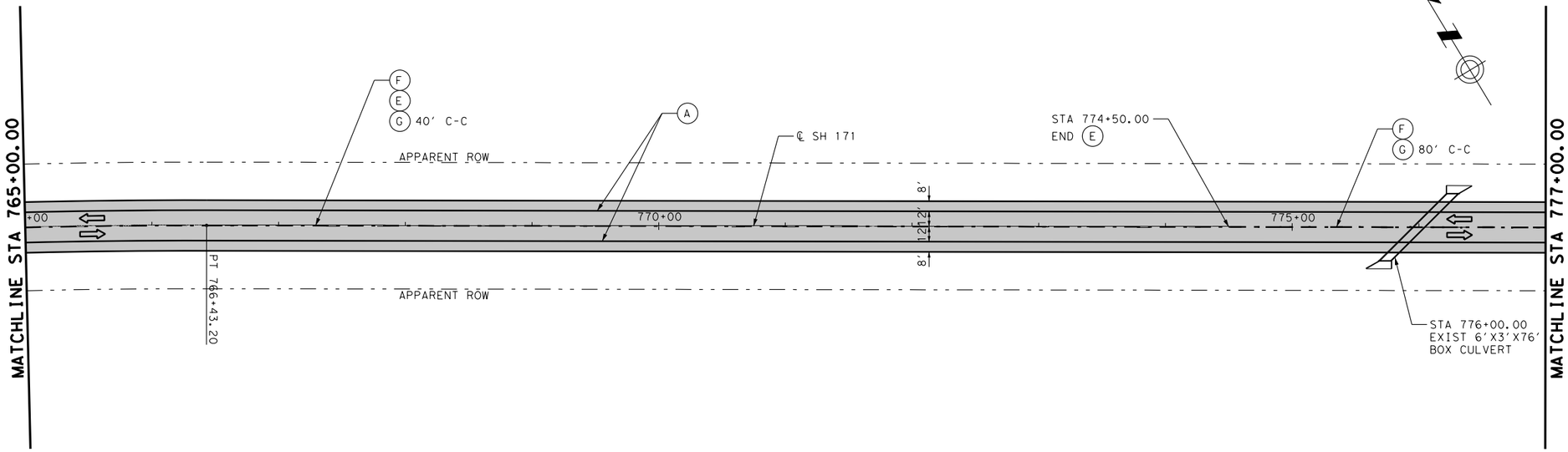
PEN TABLE: SH171_WACO_tbl
FILE: ...\PAV\SH171_S_PM_05.dgn



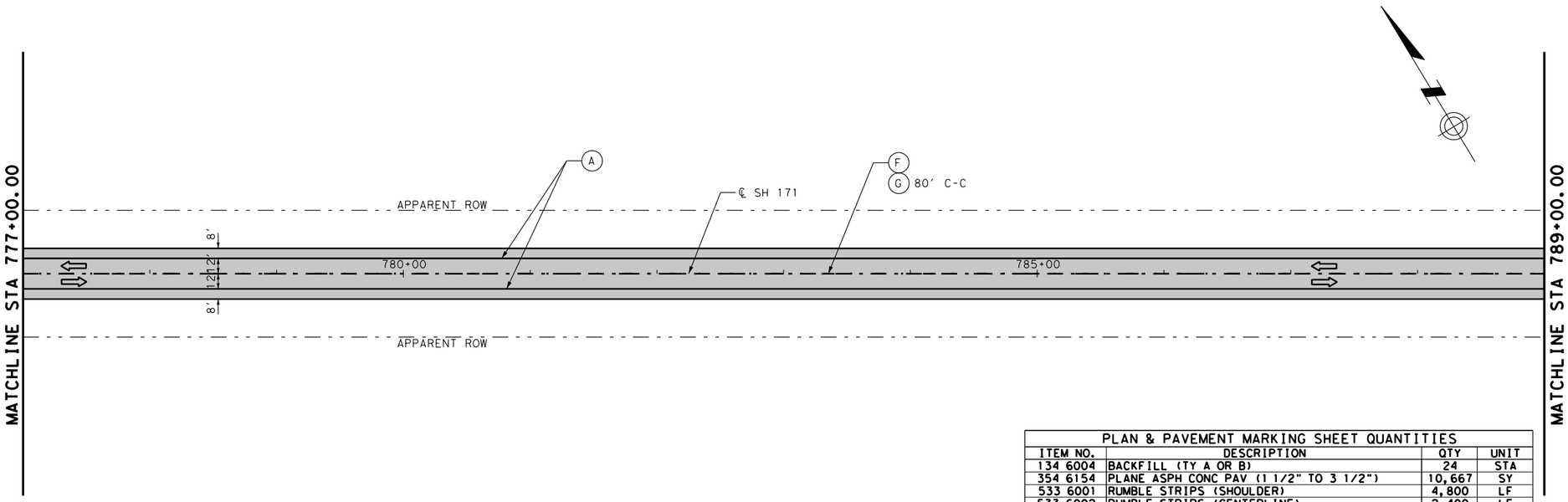
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	600	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	950	LF
672 6009	REFL PAV MRKR TY II-A-A	42	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/3/2023

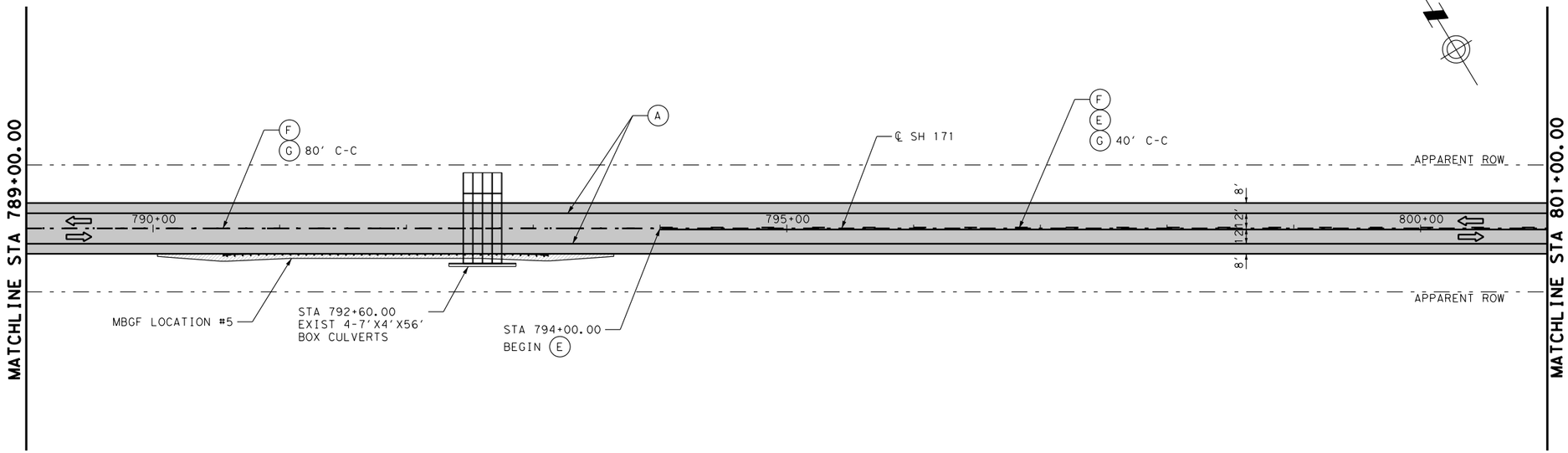
ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 765+00.00 TO STA 789+00.00

SCALE: 1"=100' SHEET 6 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	54



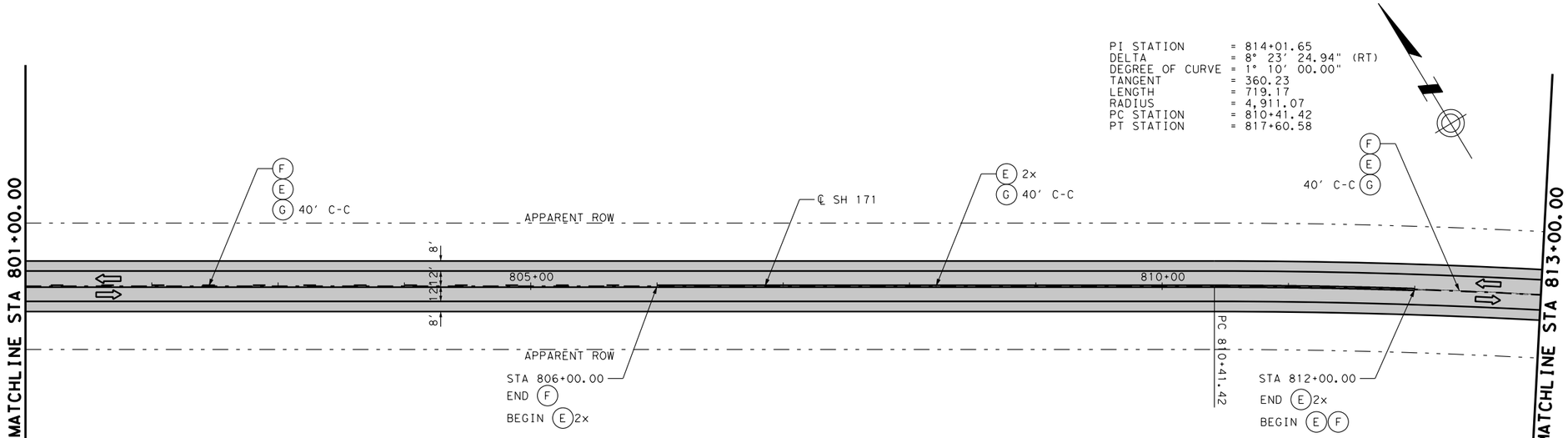
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	450	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	2,500	LF
672 6009	REFL PAV MRKR TY II-A-A	54	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 789+00.00 TO STA 813+00.00

SCALE: 1"=100' SHEET 7 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	55

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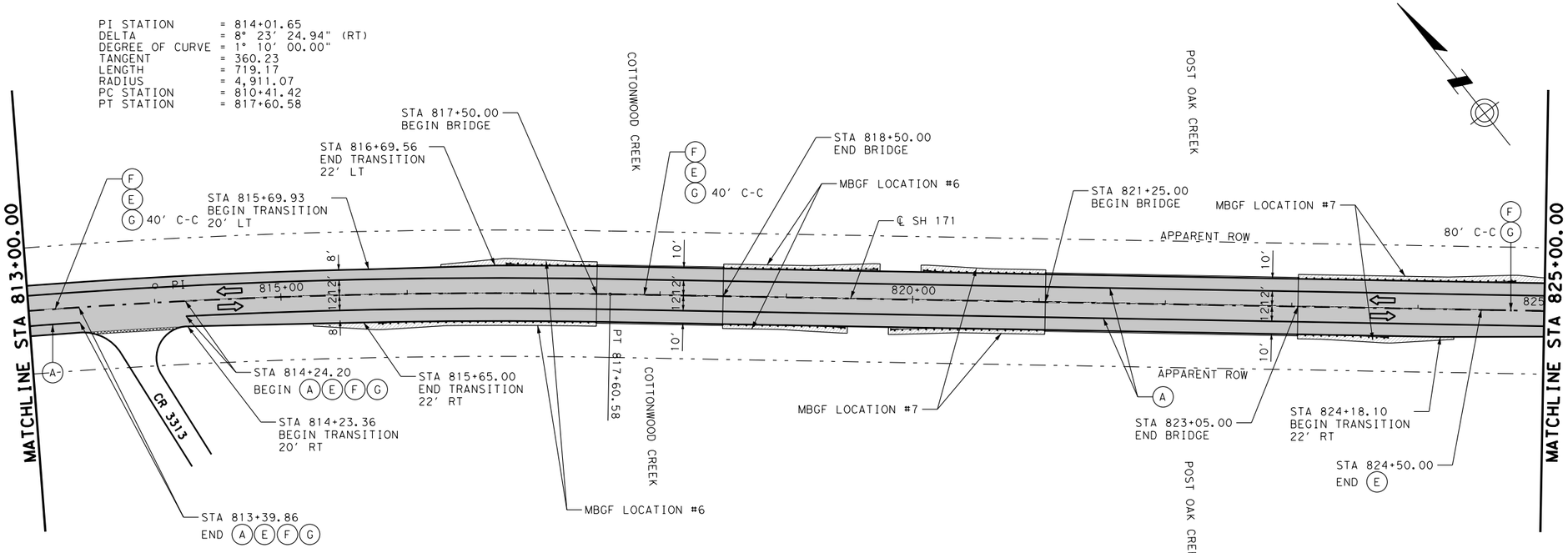


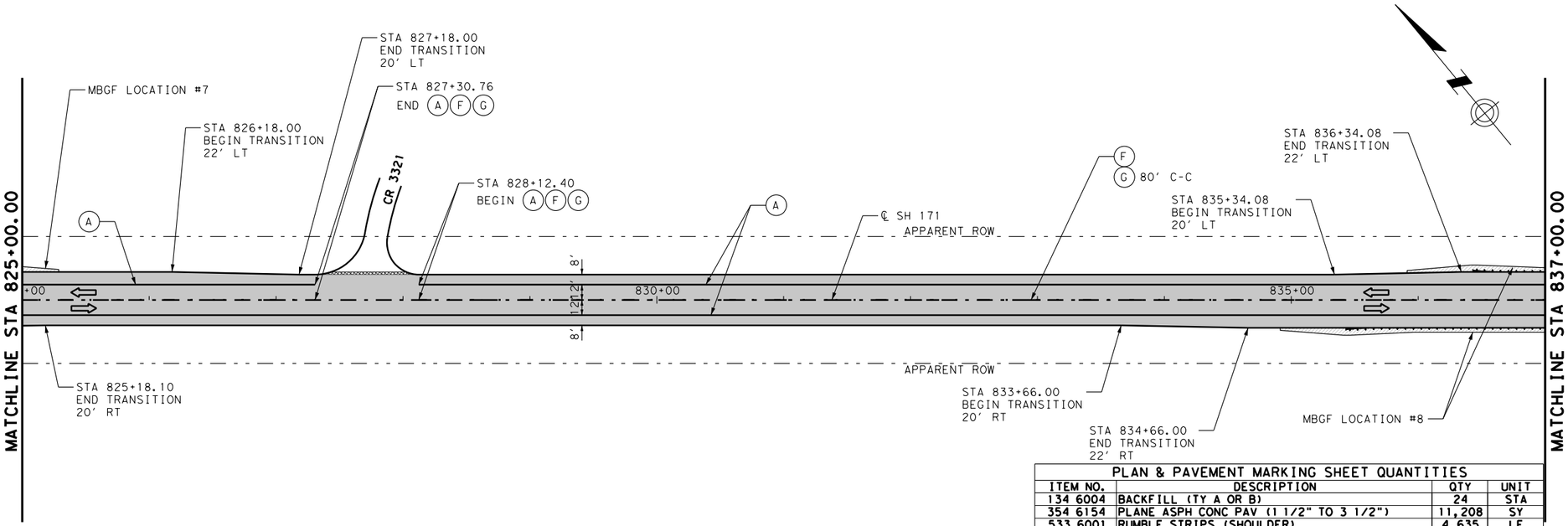
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	11,208	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,635	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,318	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,635	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	559	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	1,066	LF
672 6009	REFL PAV MRKR TY II-A-A	41	EA
3077 6001	SP MIXES SP-B PG64-22	1,541	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,233	TON
3077 6075	TACK COAT	1,120	GAL
3085 6001	UNDERSEAL COURSE	2,802	GAL

THOMAS T. LE 92771 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS 11/9/2023

ATKINS TBPE REG. # F-474

Texas Department of Transportation Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 813+00.00 TO STA 837+00.00

SCALE: 1"=100' SHEET 8 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	56

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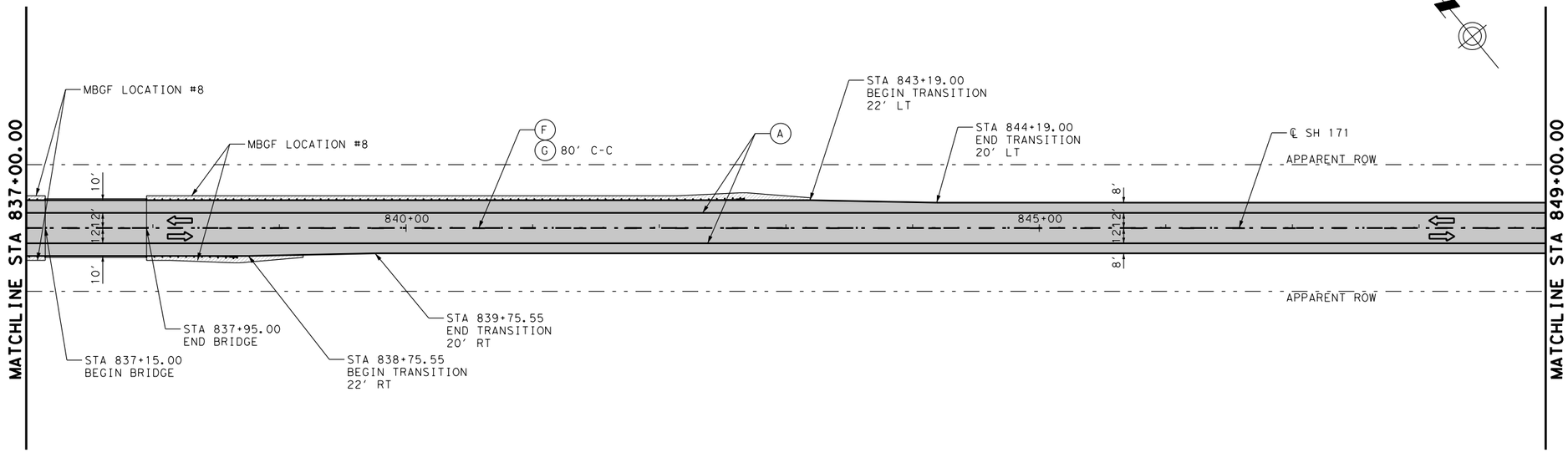

LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

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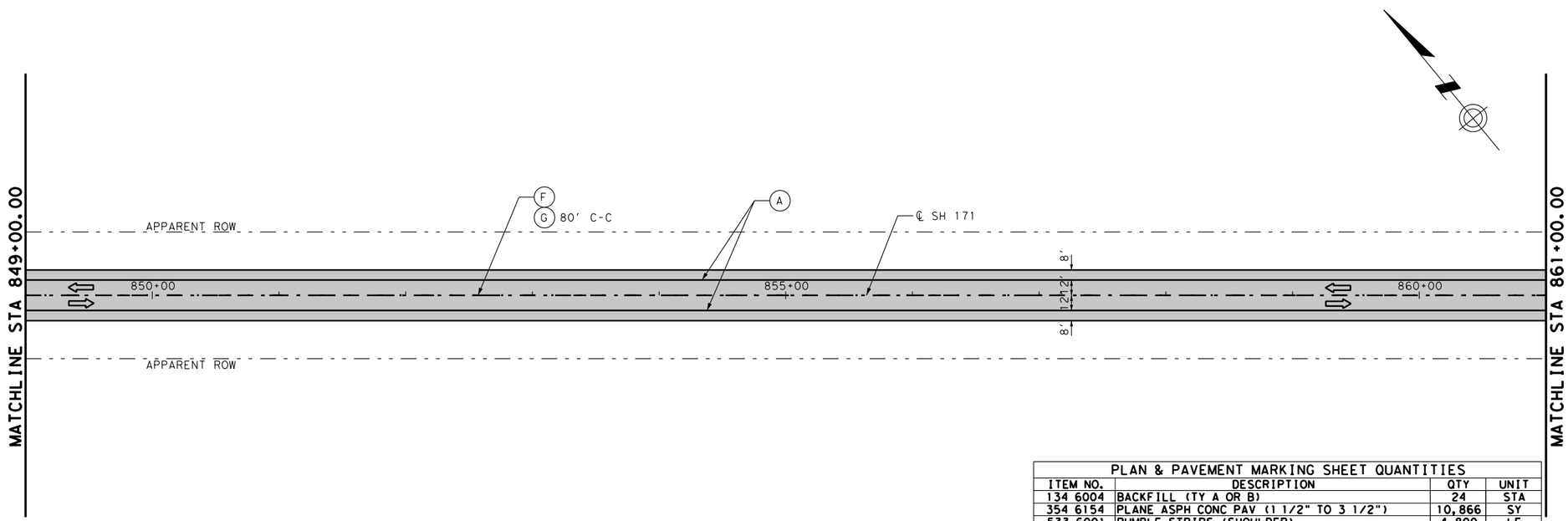
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,866	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	600	LF
672 6009	REFL PAV MRKR TY II-A-A	30	EA
3077 6001	SP MIXES SP-B PG64-22	1,494	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,195	TON
3077 6075	TACK COAT	1,087	GAL
3085 6001	UNDERSEAL COURSE	2,717	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

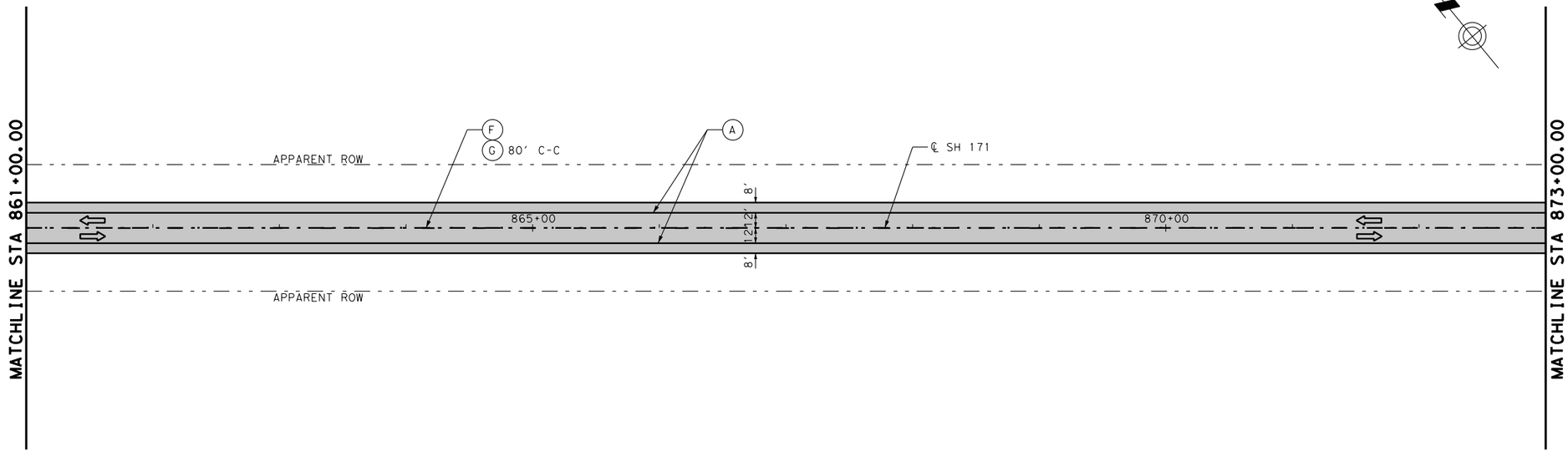
Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 837+00.00 TO STA 861+00.00

SCALE: 1"=100' SHEET 9 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	57

DATE: 11/9/2023 TIME: 8:07:28 AM



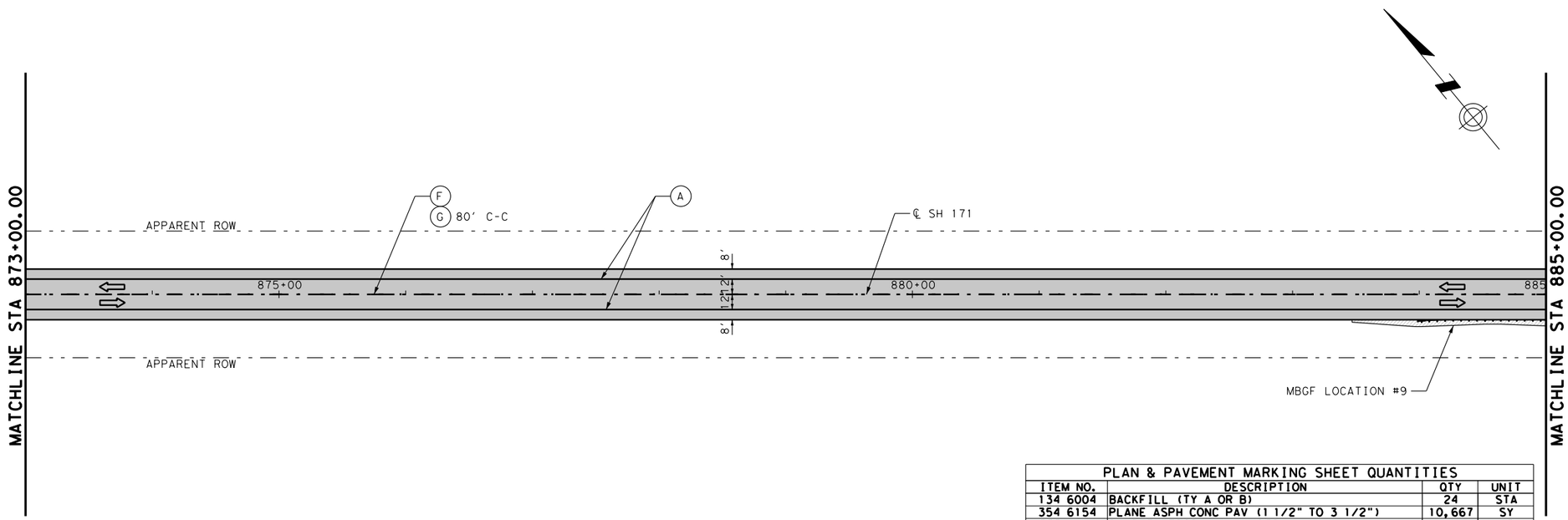
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	600	LF
672 6009	REFL PAV MRKR TY II-A-A	30	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 861+00.00 TO STA 885+00.00

SCALE: 1"=100' SHEET 10 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	58

PLOT DRIVER: RD_11x17_PDF.plt
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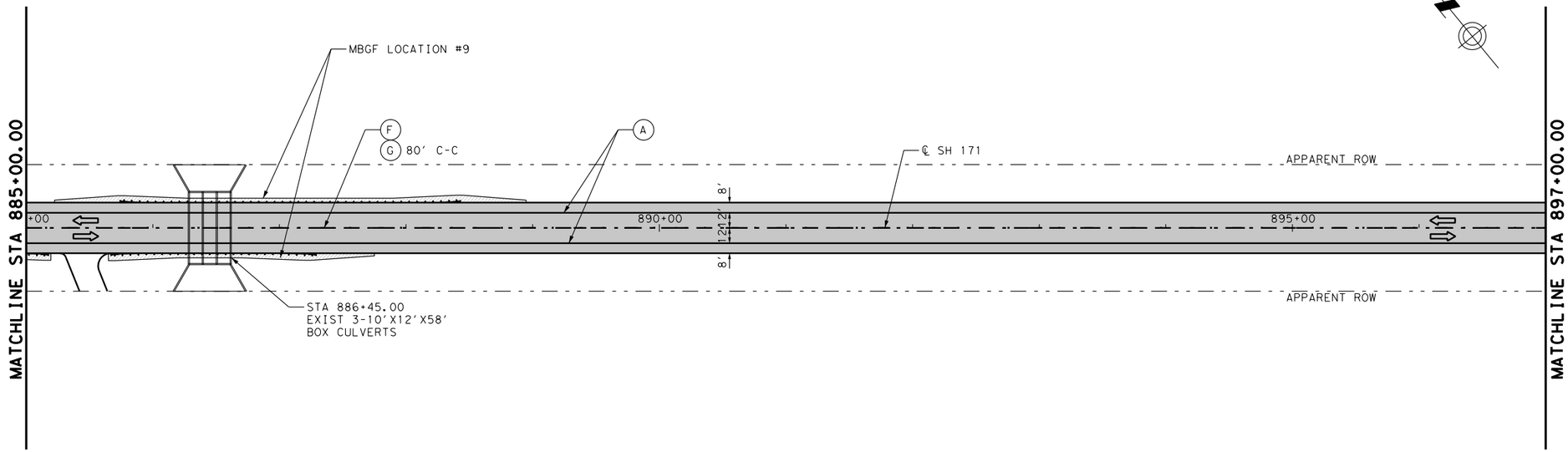


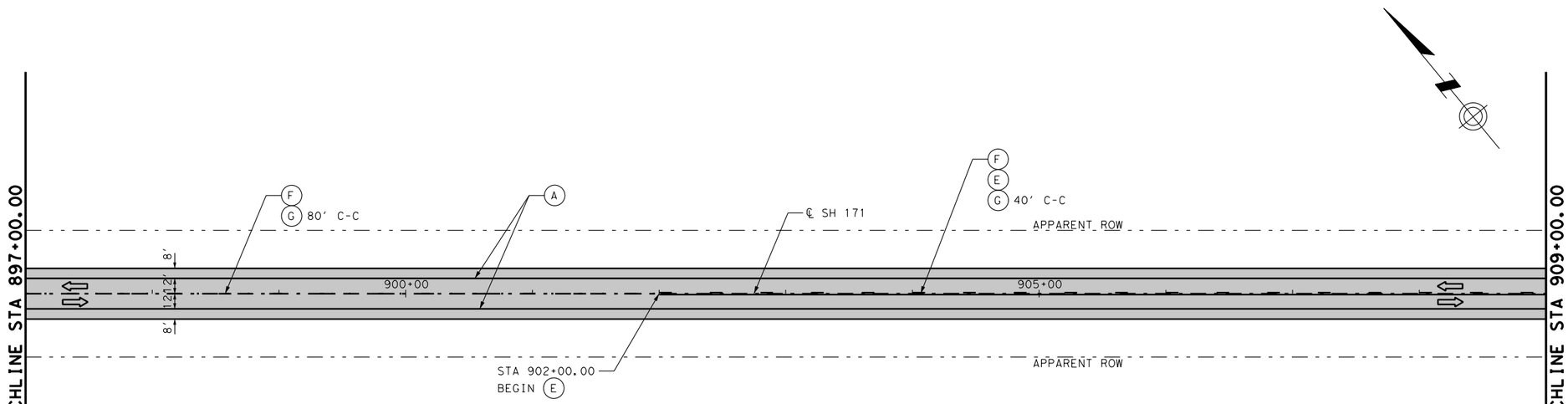
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	600	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	700	LF
672 6009	REFL PAV MRKR TY II-A-A	39	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

THOMAS T. LE
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LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 885+00.00 TO STA 909+00.00

SCALE: 1"=100' SHEET 11 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	59

DATE: 11/9/2023 TIME: 8:07:37 AM

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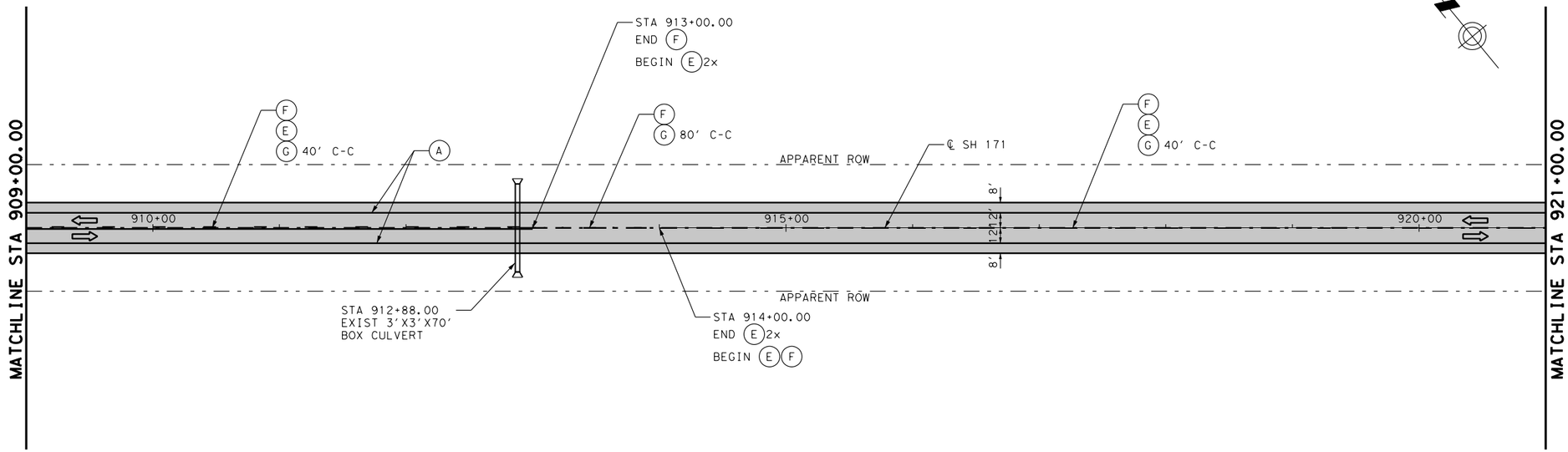


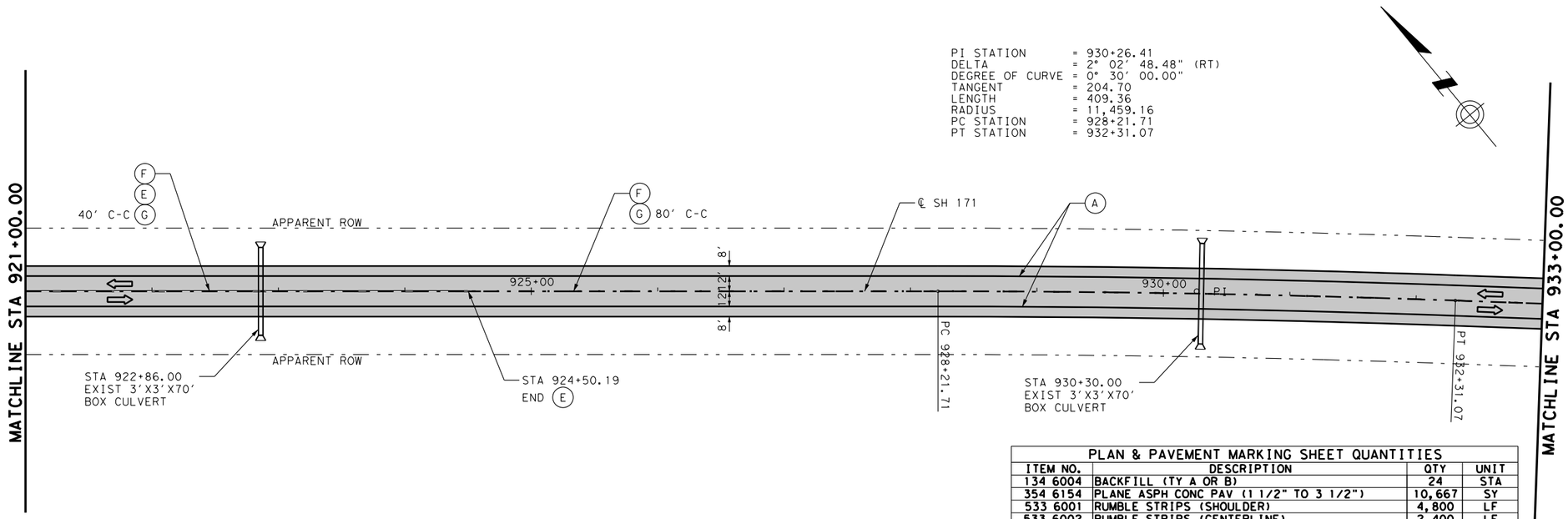
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PI STATION = 930+26.41
DELTA = 2° 02' 48.48" (RT)
DEGREE OF CURVE = 0° 30' 00.00"
TANGENT = 204.70
LENGTH = 409.36
RADIUS = 11,459.16
PC STATION = 928+21.71
PT STATION = 932+31.07

PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	600	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	1,450	LF
672 6009	REFL PAV MRKR TY II-A-A	51	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

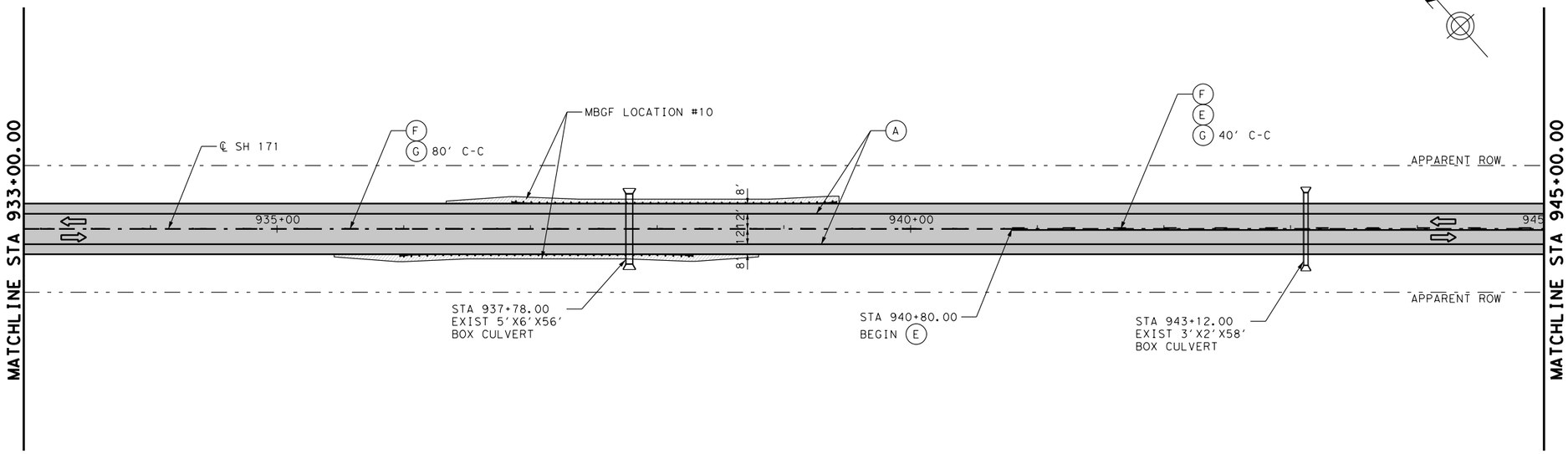
SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 909+00.00 TO STA 933+00.00

SCALE: 1"=100' SHEET 12 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	60

PLOT DRIVER: RD_11x17_PDF.plt
PEN TABLE: SH171_WACO.tbl
FILE: ...\PAV\SH171_S_PM_12.dgn

DATE: 11/9/2023 TIME: 8:07:54 AM



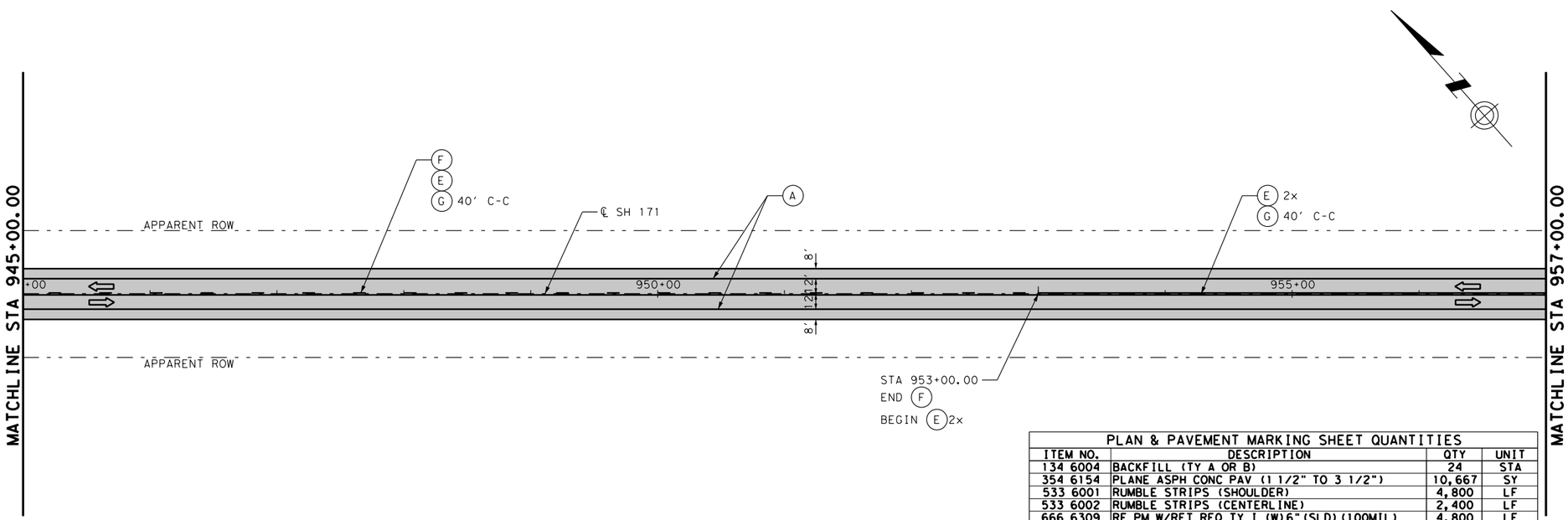
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	500	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	2,020	LF
672 6009	REFL PAV MRKR TY II-A-A	50	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

THOMAS T. LE
92771
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

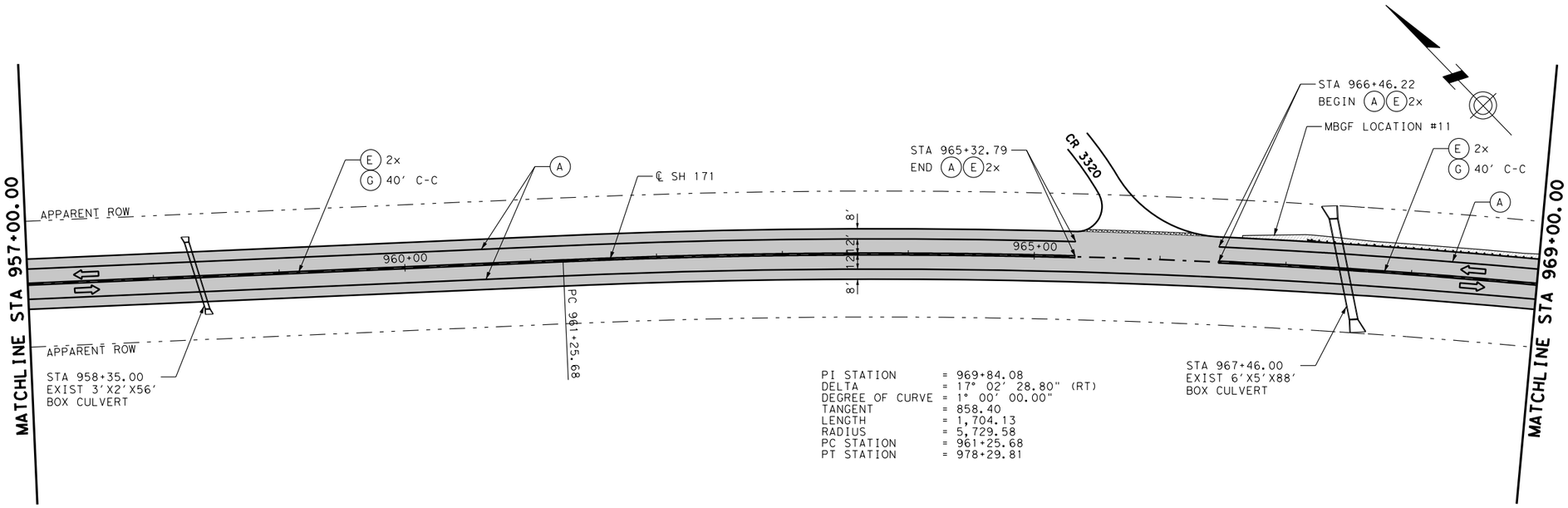
SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 933+00.00 TO STA 957+00.00

SCALE: 1"=100' SHEET 13 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.	HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET	SH 171

DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	61

PLOT DRIVER: RD_11x17_PDF.plt
PEN TABLE: SH171_WACO.tbl
FILE: ...\PAV\SH171_S_PM_13.dgn



PI STATION	= 969+84.08
DELTA	= 17° 02' 28.80" (RT)
DEGREE OF CURVE	= 1° 00' 00.00"
TANGENT	= 858.40
LENGTH	= 1,704.13
RADIUS	= 5,729.58
PC STATION	= 961+25.68
PT STATION	= 978+29.81

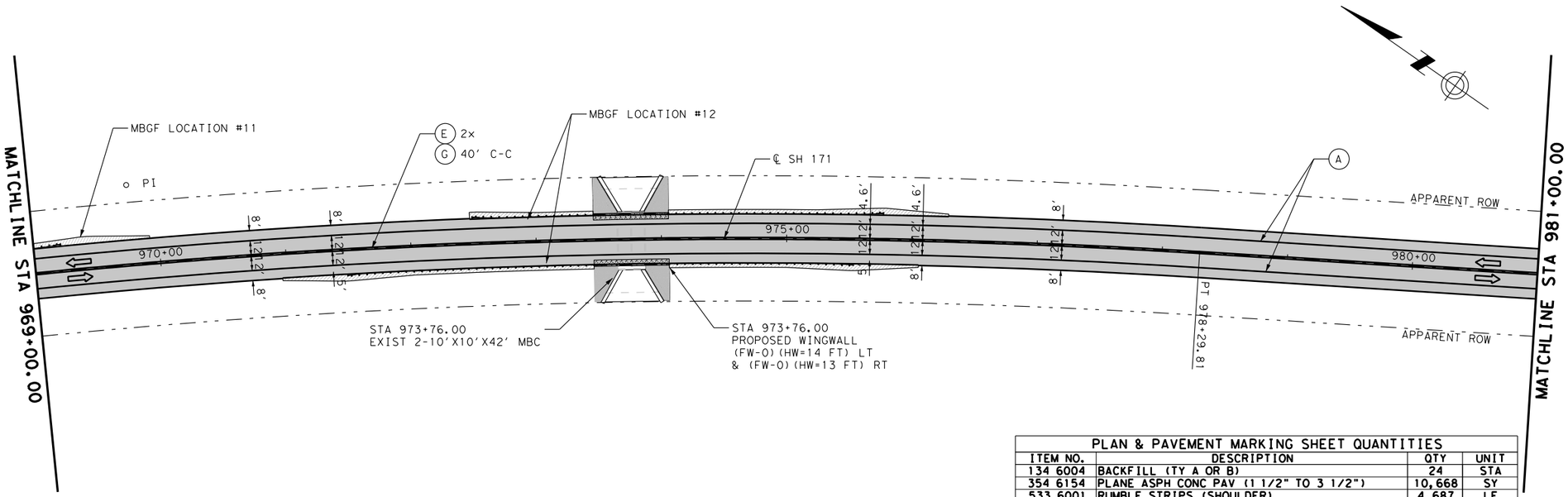
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,668	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,687	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,344	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,687	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	4,574	LF
672 6009	REFL PAV MRKR TY II-A-A	57	EA
3077 6001	SP MIXES SP-B PG64-22	1,470	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,176	TON
3077 6075	TACK COAT	1,068	GAL
3085 6001	UNDERSEAL COURSE	2,672	GAL

STATE OF TEXAS
THOMAS T. LE
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11/9/2023

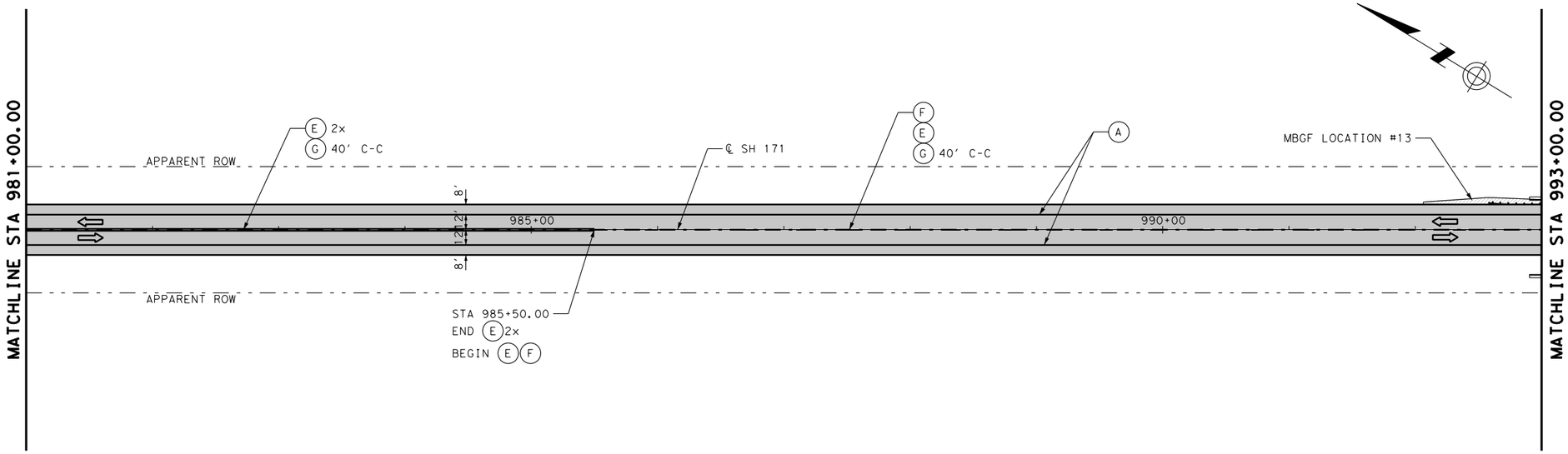
ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 957+00.00 TO STA 981+00.00

SCALE: 1"=100' SHEET 14 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	62



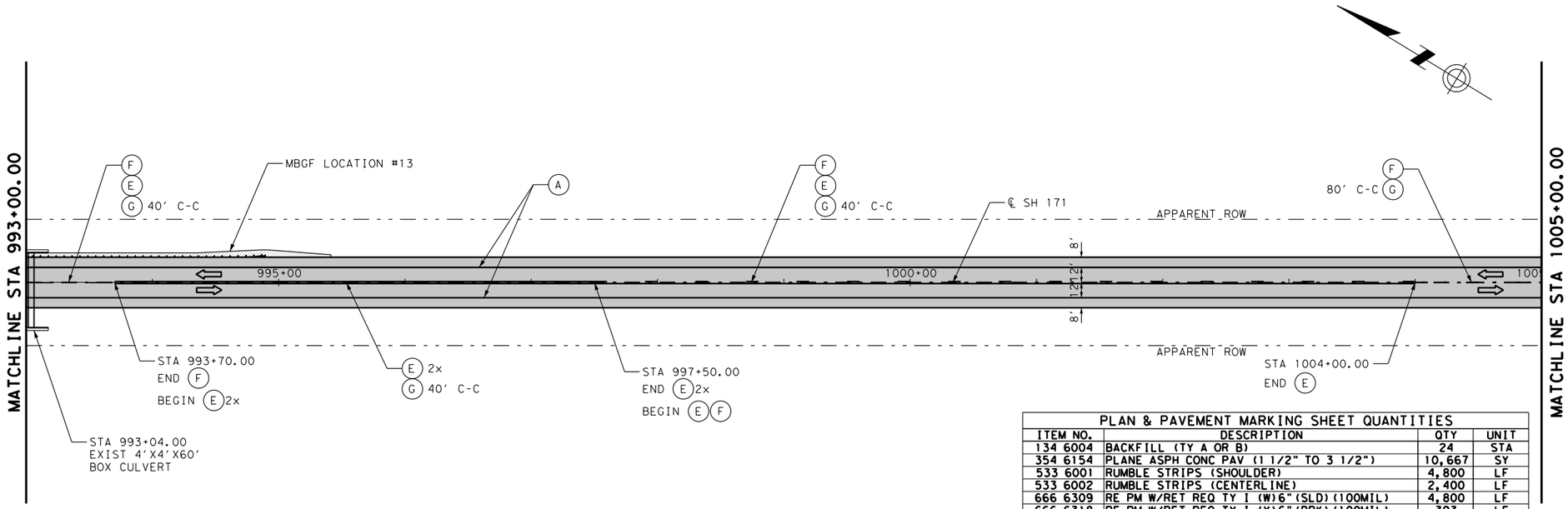
LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H



PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	10,667	SY
533 6001	RUMBLE STRIPS (SHOULDER)	4,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	2,400	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,800	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	393	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	3,130	LF
672 6009	REFL PAV MRKR TY II-A-A	59	EA
3077 6001	SP MIXES SP-B PG64-22	1,467	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,173	TON
3077 6075	TACK COAT	1,067	GAL
3085 6001	UNDERSEAL COURSE	2,667	GAL

STATE OF TEXAS
THOMAS T. LE
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11/9/2023

ATKINS
TBPE REG. # F-474

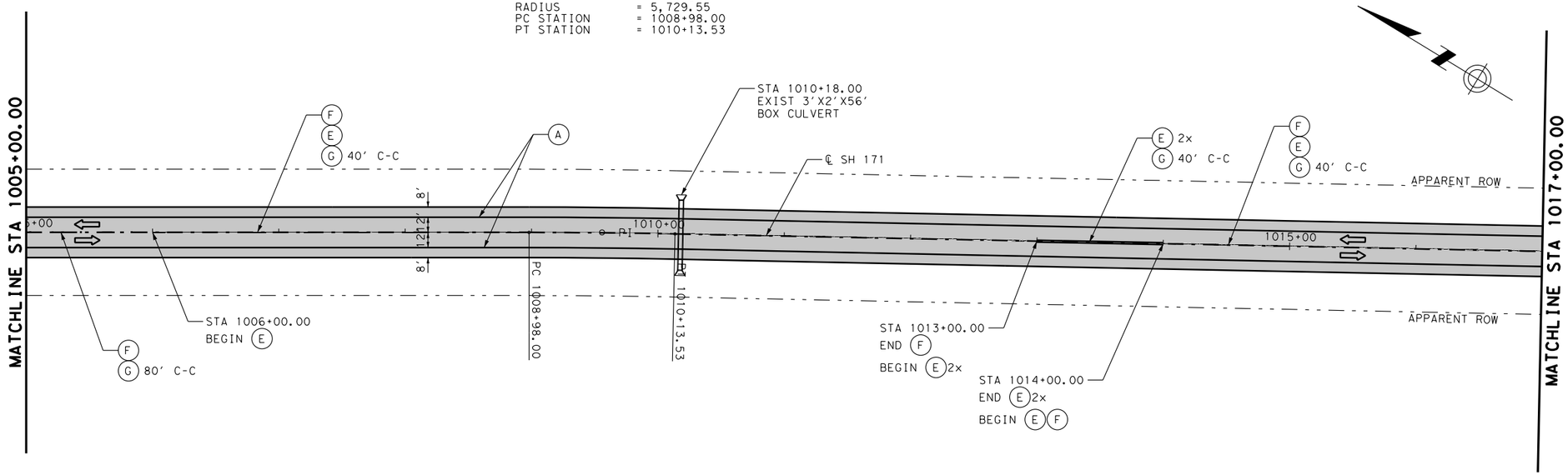
Texas Department of Transportation
Waco District

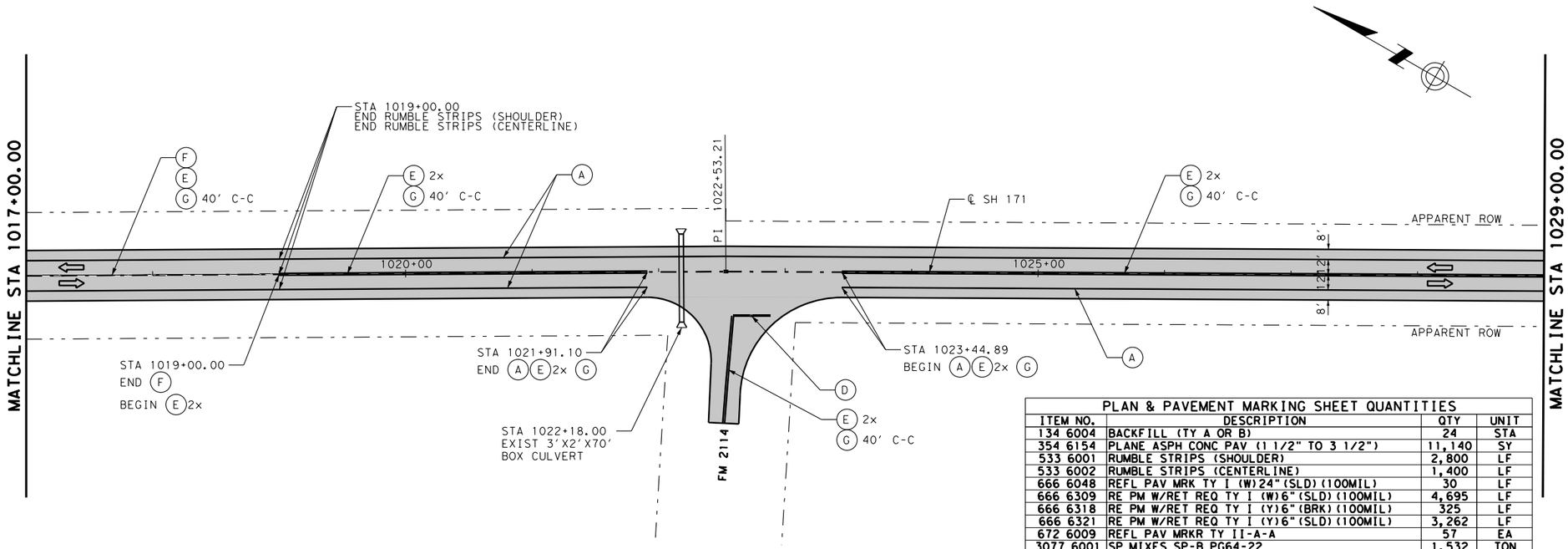
SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 981+00.00 TO STA 1005+00.00

SCALE: 1"=100' SHEET 15 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	63

PI STATION = 1009+55.77
DELTA = 1° 09' 19.22" (RT)
DEGREE OF CURVE = 1° 00' 00.02"
TANGENT = 57.77
LENGTH = 115.53
RADIUS = 5,729.55
PC STATION = 1008+98.00
PT STATION = 1010+13.53





LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H

PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	11,140	SY
533 6001	RUMBLE STRIPS (SHOULDER)	2,800	LF
533 6002	RUMBLE STRIPS (CENTERLINE)	1,400	LF
666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	30	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,695	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	325	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	3,262	LF
672 6009	REFL PAV MRKR TY II-A-A	57	EA
3077 6001	SP MIXES SP-B PG64-22	1,532	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,225	TON
3077 6075	TACK COAT	1,114	GAL
3085 6001	UNDERSEAL COURSE	2,785	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/3/2023

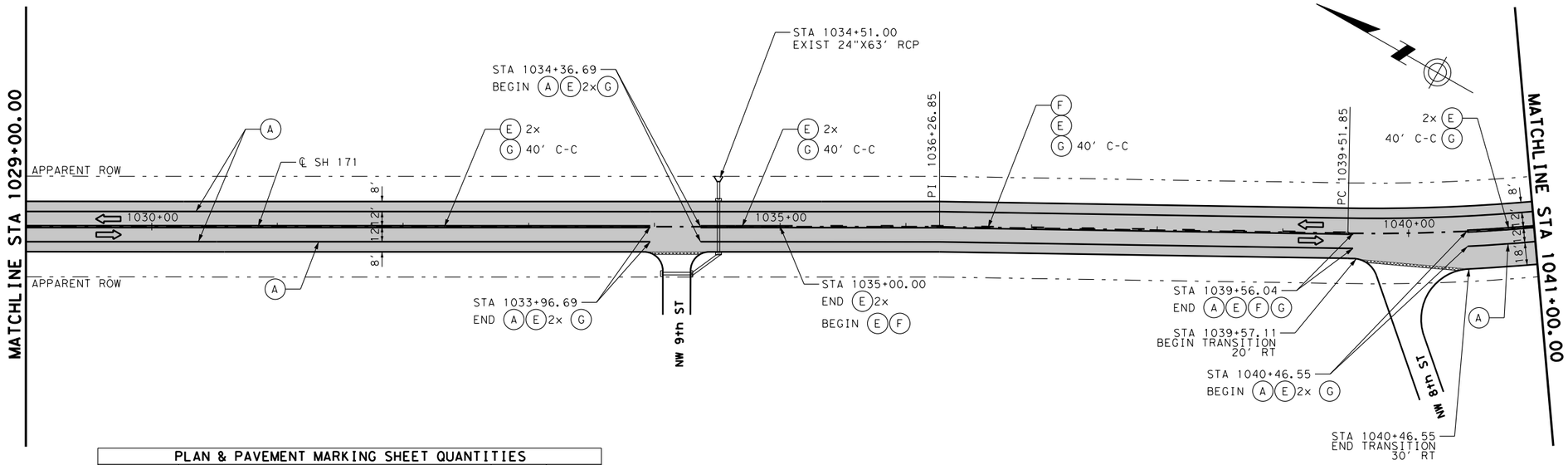
ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 1005+00.00 TO STA 1029+00.00

SCALE: 1"=100' SHEET 16 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	64



LEGEND

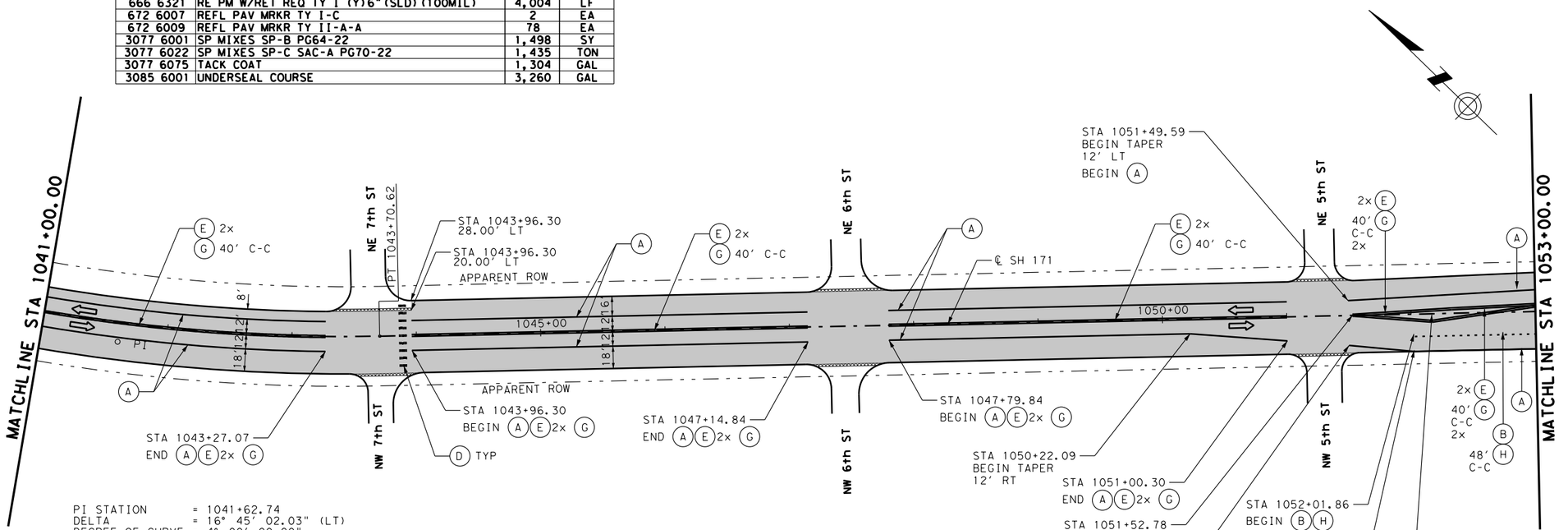
- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H

PLAN & PAVEMENT MARKING SHEET QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6057	PLANE ASPH CONC PAV (4")	10,723	SY
354 6154	PLANE ASPH CONC PAV (1 1/2" TO 3 1/2")	2,320	SY
666 6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	25	LF
666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	54	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	4,303	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	114	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	4,004	LF
672 6007	REFL PAV MRKR TY I-C	2	EA
672 6009	REFL PAV MRKR TY II-A-A	78	EA
3077 6001	SP MIXES SP-B PG64-22	1,498	SY
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,435	TON
3077 6075	TACK COAT	1,304	GAL
3085 6001	UNDERSEAL COURSE	3,260	GAL



PI STATION = 1041+62.74
DELTA = 16° 45' 02.03" (LT)
DEGREE OF CURVE = 4° 00' 00.00"
TANGENT = 210.89
LENGTH = 418.76
RADIUS = 1,432.39
PC STATION = 1039+51.85
PT STATION = 1043+70.62

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

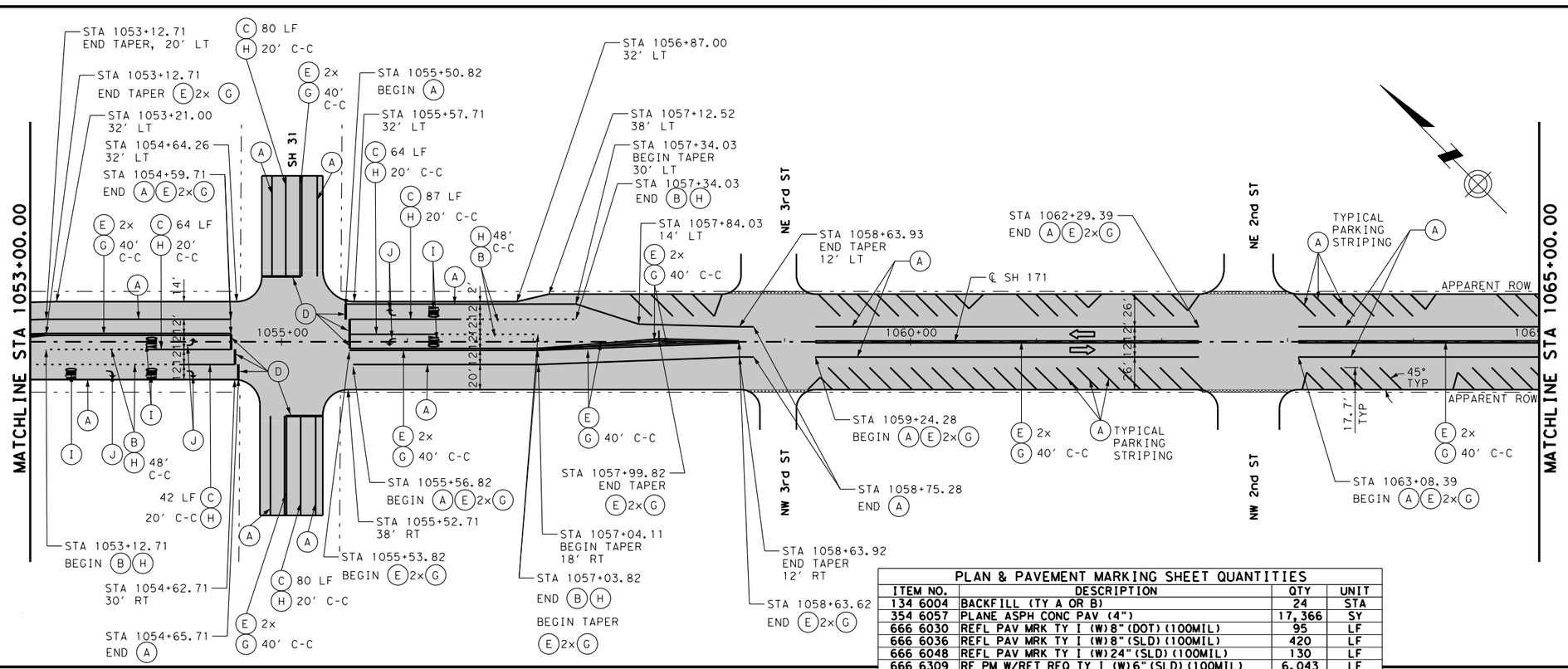
SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 1029+00.00 TO STA 1053+00.00

SCALE: 1"=100' SHEET 17 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.	
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171	
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.	
CHECKED: TTL	WAC	HILL	0418	02	035	65	

DATE: 11/3/2023 TIME: 7:35:54 AM

PLOT DRIVER: RD_11x17_PDF.plt
PEN TABLE: SH171_WACO.tbl
FILE: ...\PAV\SH171_S_PM_17.dgn



LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- ⇨ EXISTING TRAFFIC DIRECTION/TRAVEL LANE

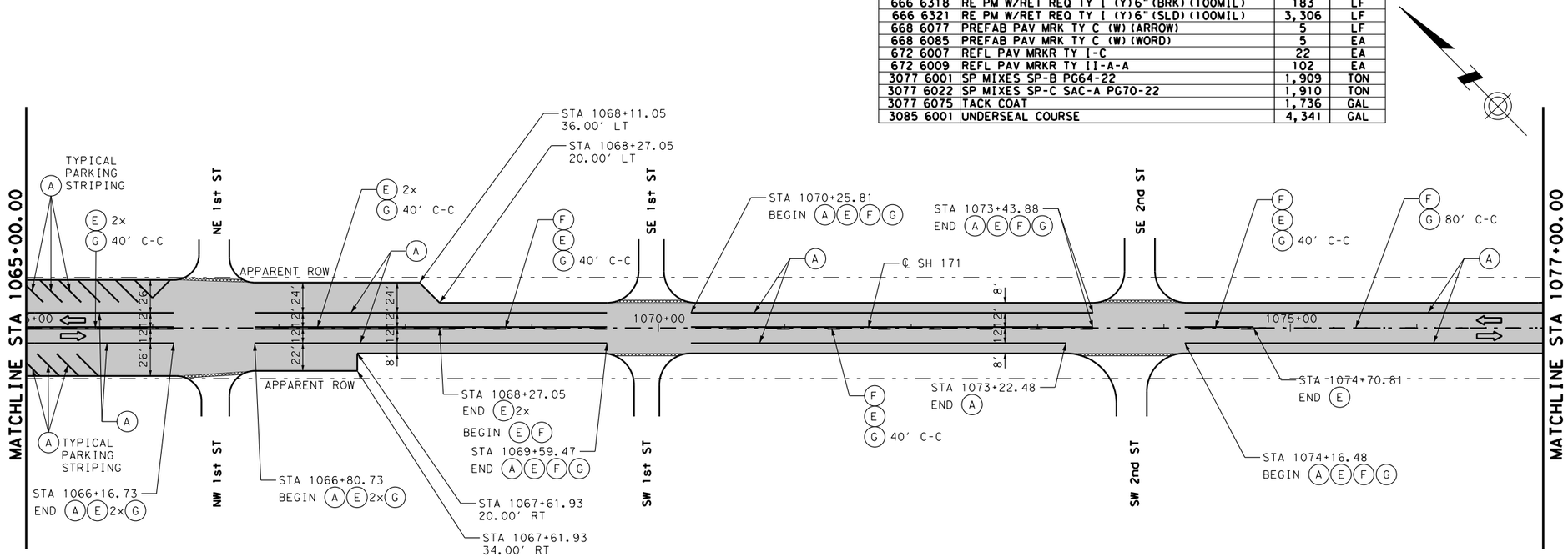
NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H

PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	24	STA
354 6057	PLANE ASPH CONC PAV (4")	17,366	SY
666 6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	95	LF
666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	420	LF
666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	130	LF
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	6,043	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	183	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	3,306	LF
668 6077	PREFAB PAV MRK TY C (W)(ARROW)	5	LF
668 6085	PREFAB PAV MRK TY C (W)(WORD)	5	EA
672 6007	REFL PAV MRKR TY I-C	22	EA
672 6009	REFL PAV MRKR TY II-A-A	102	EA
3077 6001	SP MIXES SP-B PG64-22	1,909	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	1,910	TON
3077 6075	TACK COAT	1,736	GAL
3085 6001	UNDERSEAL COURSE	4,341	GAL



THOMAS T. LE 92771 LICENSED PROFESSIONAL ENGINEER
11/3/2023

ATKINS TBPE REG. # F-474

Texas Department of Transportation
Waco District
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SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 1053+00.00 TO STA 1077+00.00

SCALE: 1"=100' SHEET 18 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	66

DATE: 11/3/2023 TIME: 7:36:15 AM

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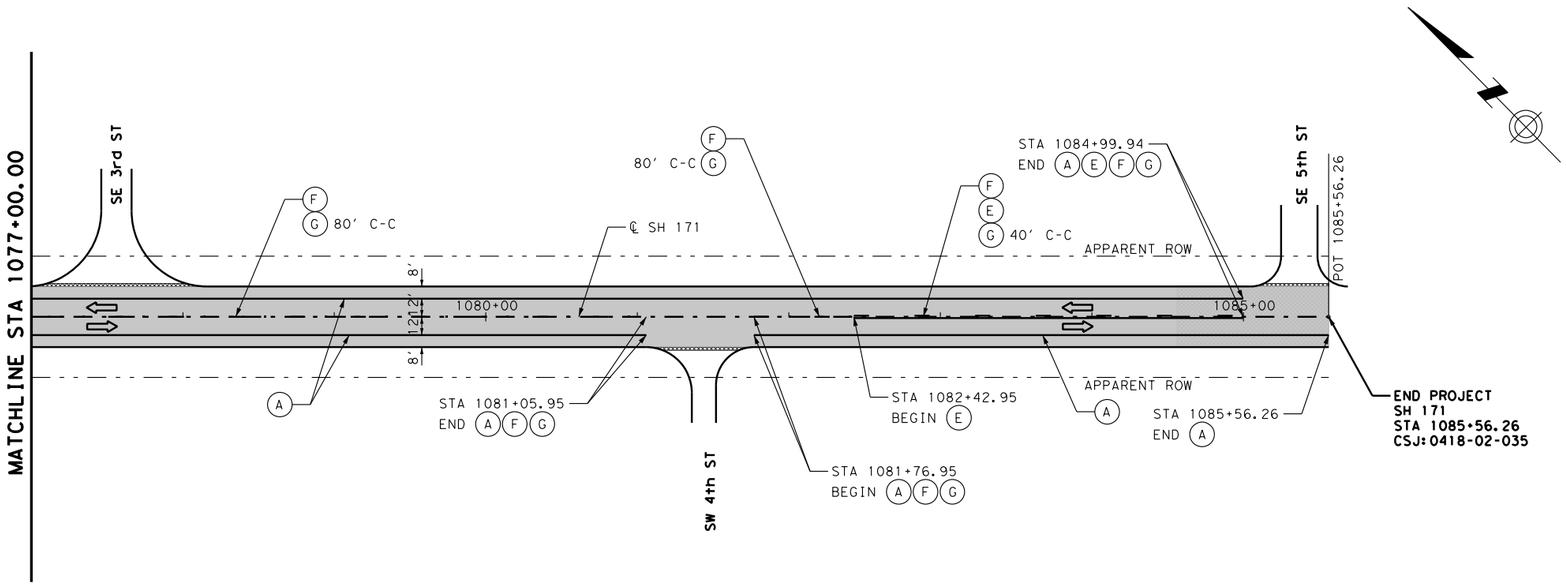


LEGEND

- MILL AND INLAY
- HMAC TAPER
- MOW STRIP
- (A) REFL PAV MRK TY I (W)(6")(SLD)
- (B) REFL PAV MRK TY I (W)(8")(DOT)
- (C) REFL PAV MRK TY I (W)(8")(SLD)
- (D) REFL PAV MRK TY I (W)(24")(SLD)
- (E) REFL PAV MRK TY I (Y)(6")(SLD)
- (F) REFL PAV MRK TY I (Y)(6")(BRK)
- (G) RAIS PAV MRKR CL B (REFL) TY II-A-A
- (H) RAIS PAV MRKR CL B (REFL) TY I-C
- (I) PREFAB PAV MRK TY C (W)(WORD)
- (J) PREFAB PAV MRK TY C (W)(ARROW)
- EXISTING TRAFFIC DIRECTION/TRAVEL LANE

NOTES:

1. CONTRACTOR TO MATCH PAVEMENT STRIPING SHOWN ON LAYOUT WITH EXISTING STRIPING.
2. REFER TO "GF(31)MS-19" STANDARD FOR MOW STRIP INFORMATION.
3. SEE "MBGF LAYOUTS" FOR MORE INFORMATION.

0 25 50 100
SCALE = 1"=100' H

PLAN & PAVEMENT MARKING SHEET QUANTITIES

ITEM NO.	DESCRIPTION	QTY	UNIT
134 6004	BACKFILL (TY A OR B)	9	STA
354 6057	PLANE ASPH CONC PAV (4")	3,851	SY
666 6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	1,585	LF
666 6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	182	LF
666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	257	LF
672 6009	REFL PAV MRKR TY II-A-A	12	EA
3077 6001	SP MIXES SP-B PG64-22	423	TON
3077 6022	SP MIXES SP-C SAC-A PG70-22	424	TON
3077 6075	TACK COAT	385	GAL
3085 6001	UNDERSEAL COURSE	962	GAL

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/3/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

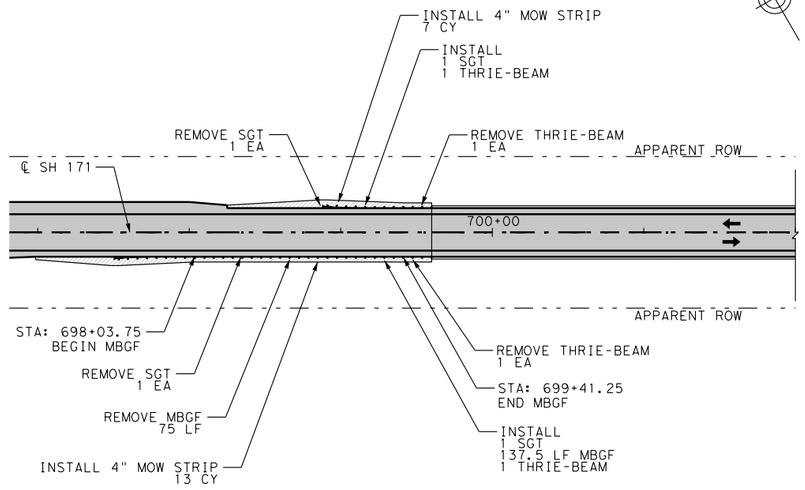
SH 171
PLAN & PAVEMENT MARKING LAYOUT
STA 1077+00.00 TO END

SCALE: 1"=100' SHEET 19 OF 19

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	67

DATE: 11/9/2023 TIME: 8:09:03 AM

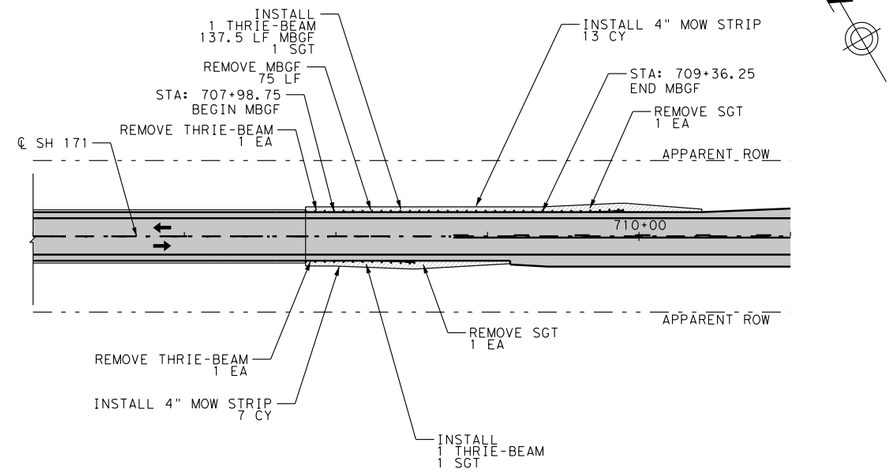
MBGF LOCATION #1 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	30	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	20	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	137.5	LF
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	2	EA
542 6001	REMOVE METAL BEAM GUARD FENCE	75	LF
542 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	2	EA
544 6001	GUARDRAIL END TREATMENT (INSTALL)	2	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	2	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	6	EA



MBGF LOCATION #1

ASH CREEK - EAST BOUND APPROACH
STA 699+60.00 TO STA 707+60.00

MBGF LOCATION #2 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	30	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	20	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	137.5	LF
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	2	EA
542 6001	REMOVE METAL BEAM GUARD FENCE	75	LF
542 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	2	EA
544 6001	GUARDRAIL END TREATMENT (INSTALL)	2	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	2	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	6	EA

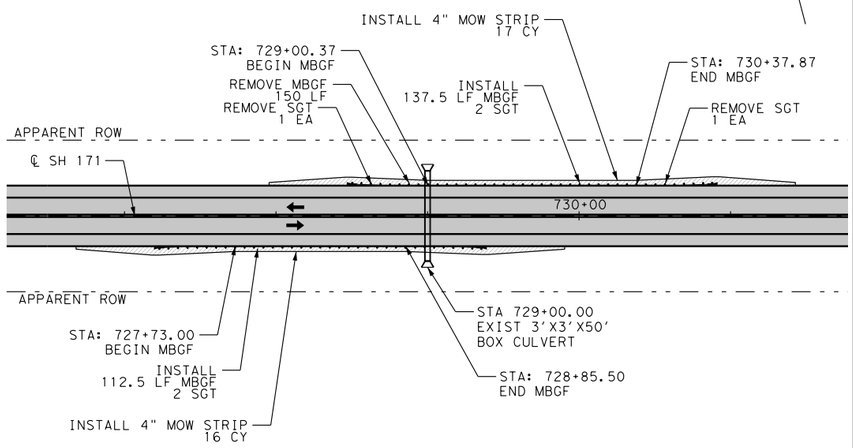


MBGF LOCATION #2

ASH CREEK - WEST BOUND APPROACH
STA 699+60.00 TO STA 707+60.00

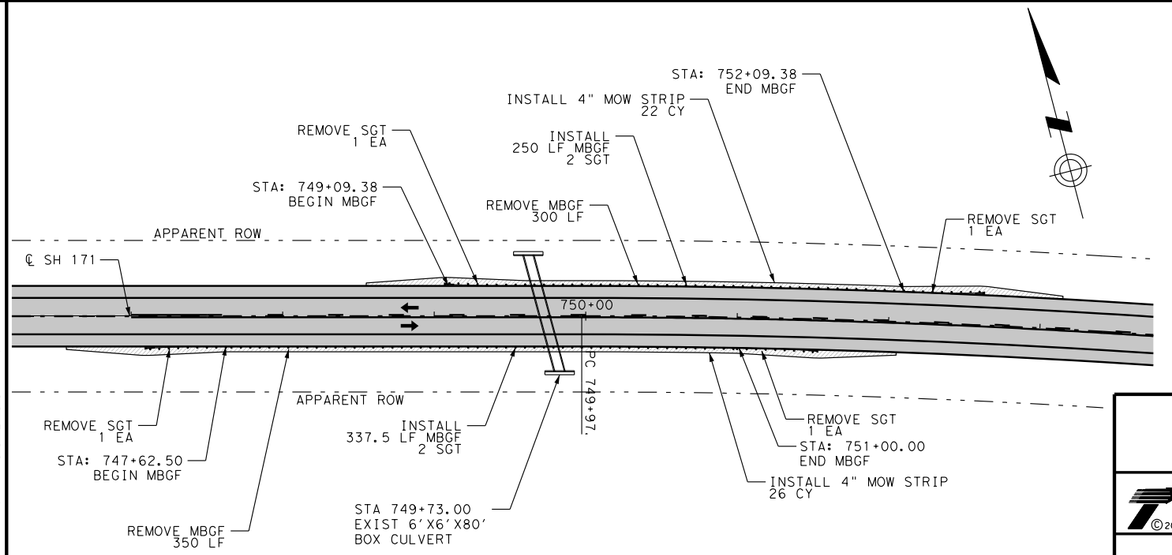
0 25 50 100
SCALE = 1"=100' H

MBGF LOCATION #3 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	50	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	33	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	250	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	150	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	2	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	7	EA



MBGF LOCATION #3

DRAW
STA 730+68.00



MBGF LOCATION #4

DRAW
STA 749+73.00

MBGF LOCATION #4 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	50	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	48	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	587.5	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	650	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	4	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	11	EA

STATE OF TEXAS
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11/9/2023

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Texas Department of Transportation
Waco District

SH 171
MBGF LAYOUTS

SCALE: 1"=100' SHEET 1 OF 4

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	68

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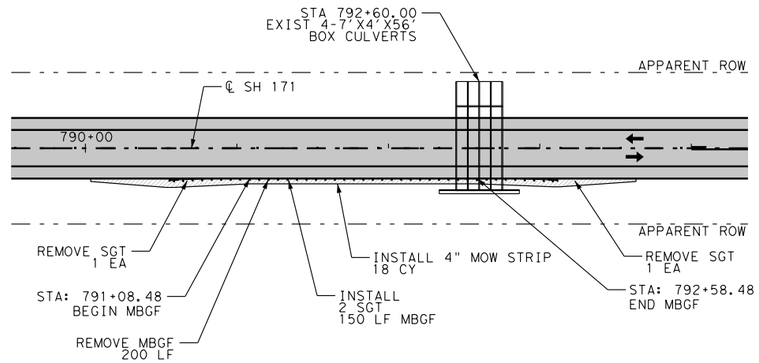
DATE: 11/9/2023 TIME: 8:09:21 AM

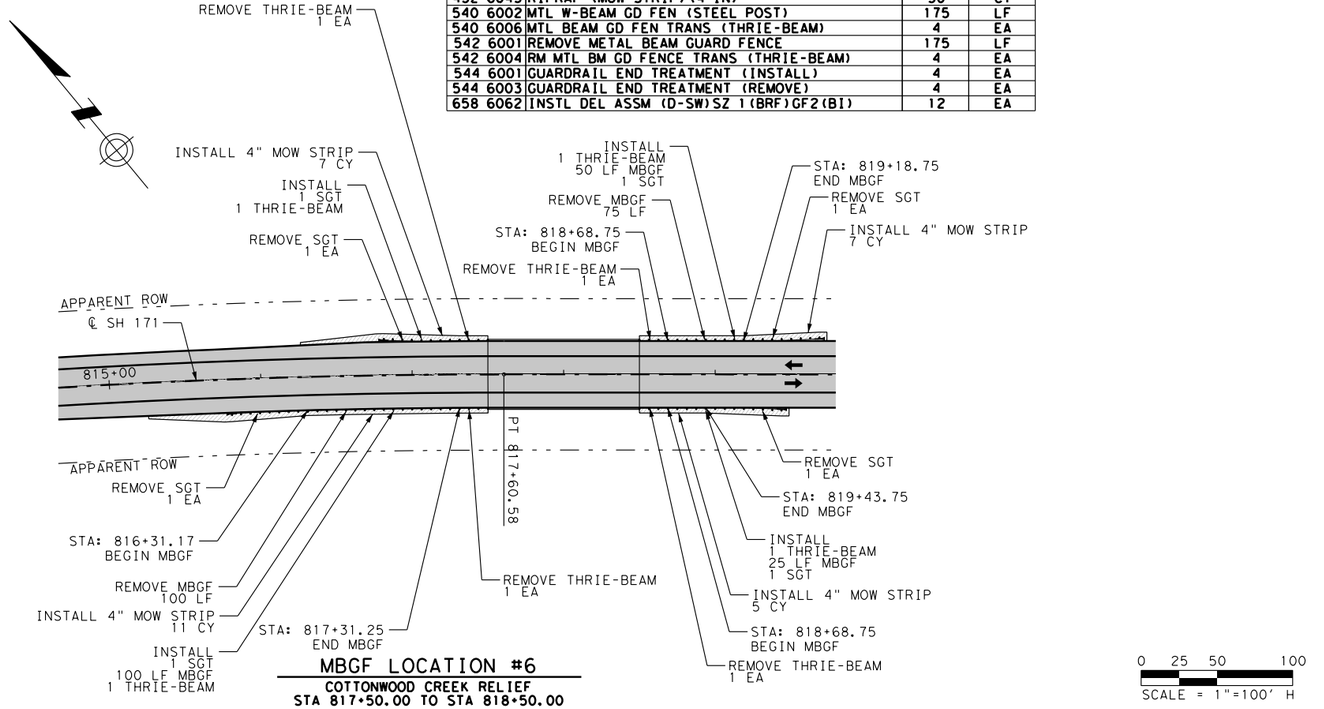
MBGF LOCATION #5 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	30	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	18	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	150	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	200	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	2	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	2	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	4	EA



MBGF LOCATION #5

MAY BRANCH
STA 792+44.50 TO STA 792+75.42

MBGF LOCATION #6 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	35	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	30	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	175	LF
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4	EA
542 6001	REMOVE METAL BEAM GUARD FENCE	175	LF
542 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	4	EA
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	4	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	12	EA

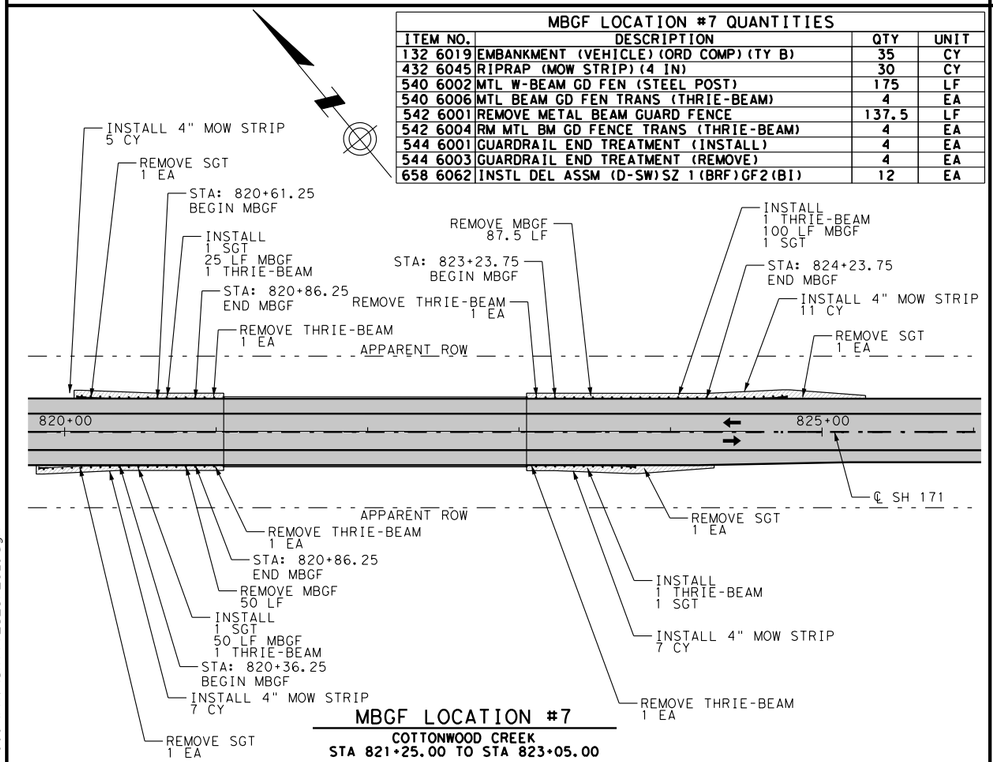


MBGF LOCATION #6

COTTONWOOD CREEK RELIEF
STA 817+50.00 TO STA 818+50.00

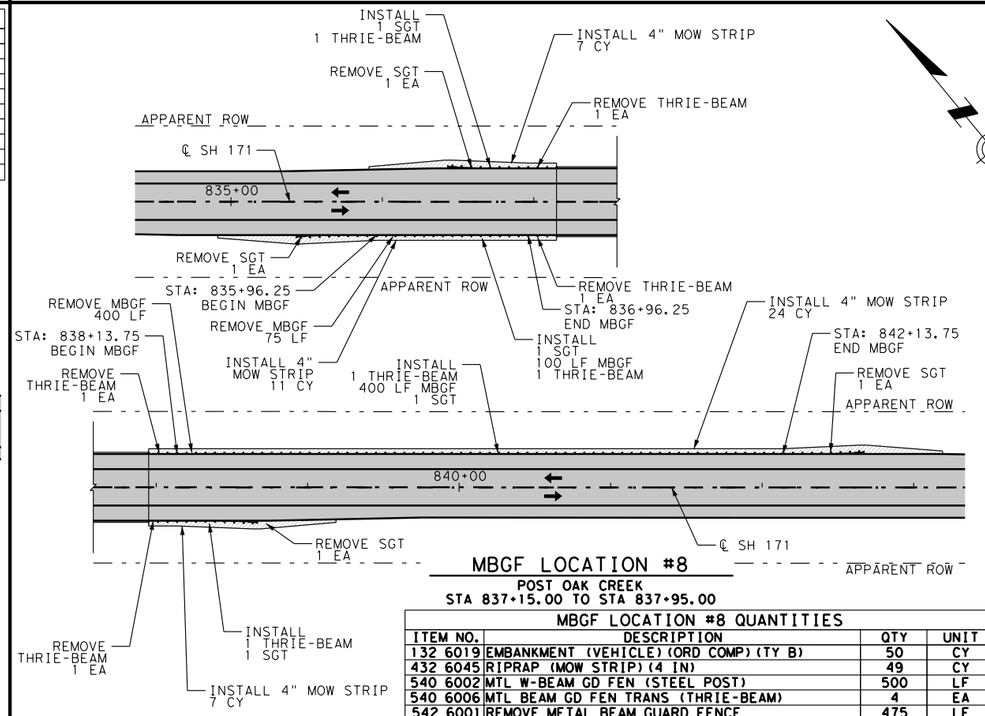
0 25 50 100
SCALE = 1"=100' H

MBGF LOCATION #7 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	35	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	30	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	175	LF
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4	EA
542 6001	REMOVE METAL BEAM GUARD FENCE	137.5	LF
542 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	4	EA
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	4	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	12	EA



MBGF LOCATION #7

COTTONWOOD CREEK
STA 821+25.00 TO STA 823+05.00



MBGF LOCATION #8

POST OAK CREEK
STA 837+15.00 TO STA 837+95.00

MBGF LOCATION #8 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	50	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	49	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	500	LF
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4	EA
542 6001	REMOVE METAL BEAM GUARD FENCE	475	LF
542 6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	4	EA
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	4	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	15	EA

STATE OF TEXAS
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11/9/2023

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TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
MBGF LAYOUTS

SCALE: 1"=100' SHEET 2 OF 4

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.		HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET		SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	69

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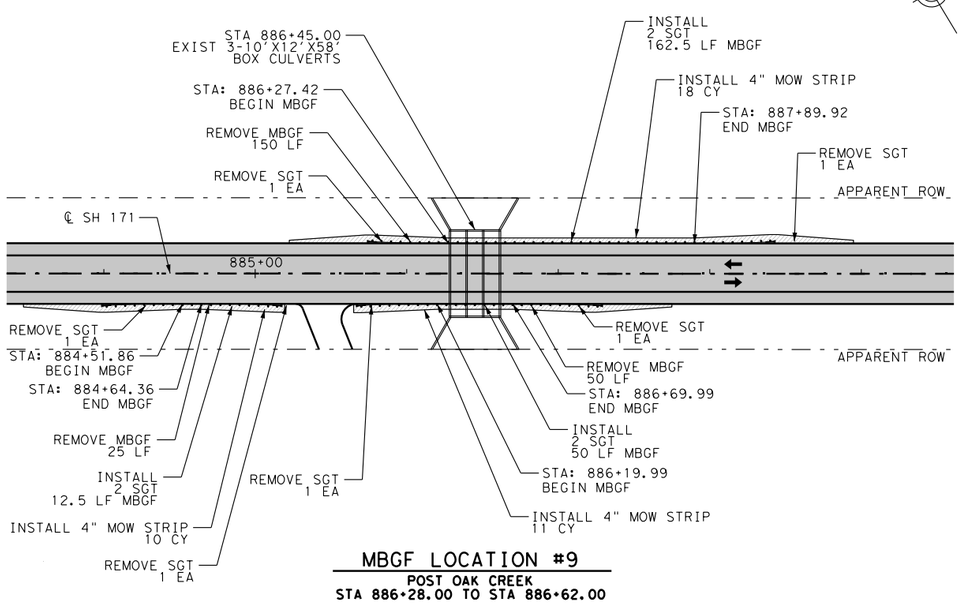
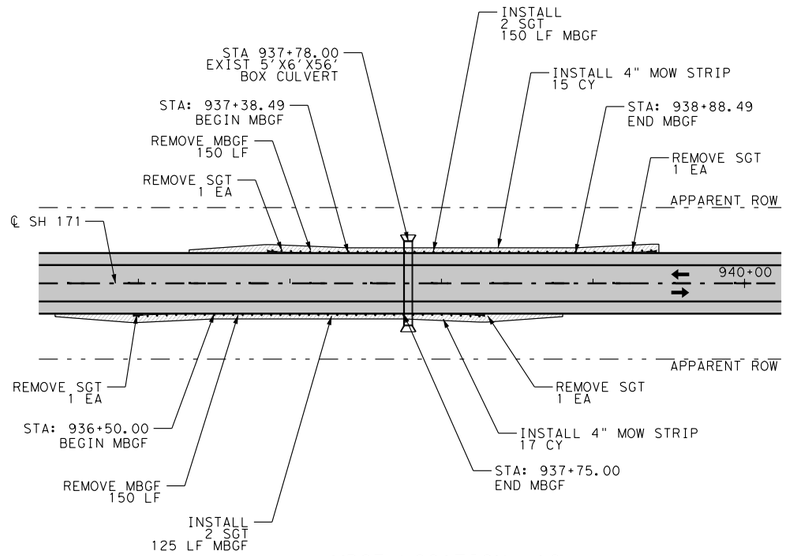
MBGF LOCATION #9 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	50	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	39	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	225	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	225	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	6	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	6	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	10	EA



MBGF LOCATION #9
POST OAK CREEK
STA 886+28.00 TO STA 886+62.00

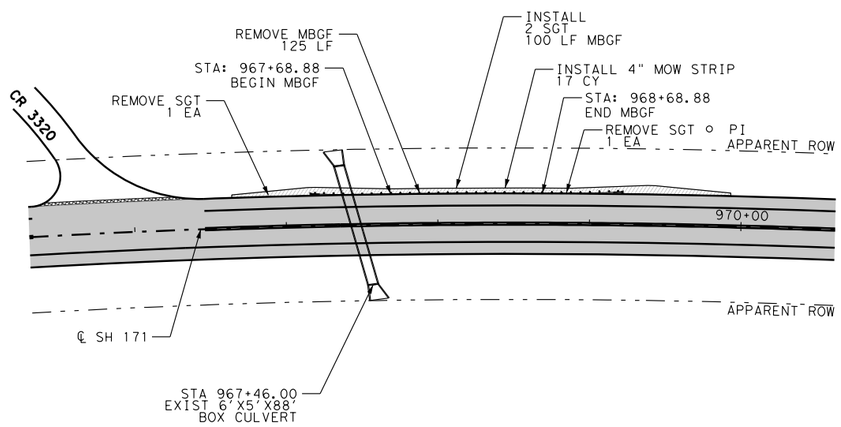
MBGF LOCATION #10 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	50	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	32	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	275	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	300	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	4	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	8	EA



MBGF LOCATION #10
SMALL DRAW
STA 937+78.00

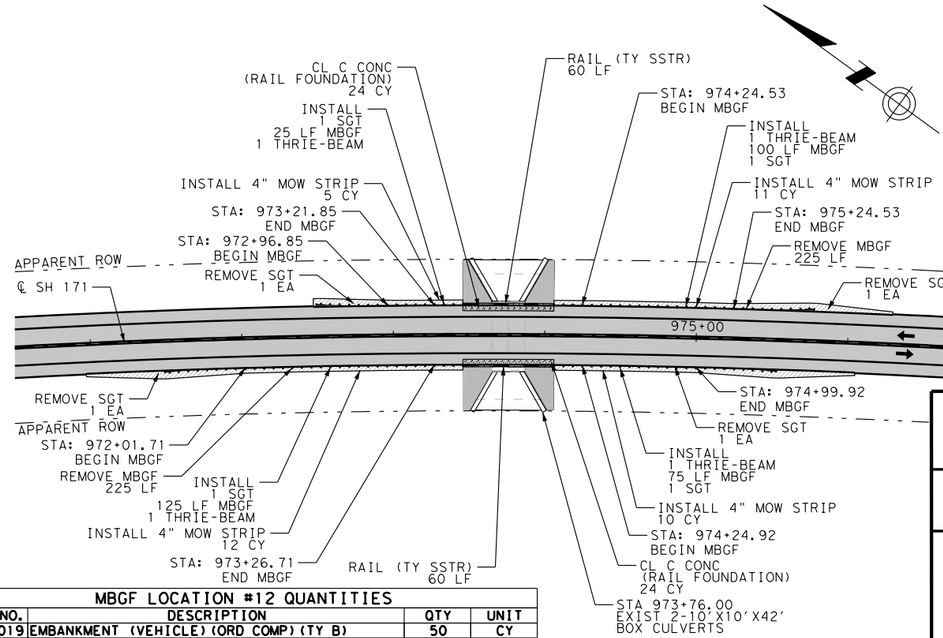
0 25 50 100
SCALE = 1"=100' H

MBGF LOCATION #11 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	30	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	17	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	100	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	125	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	2	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	2	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	3	EA



MBGF LOCATION #11
DRAW
STA 967+46

MBGF LOCATION #12 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	50	CY
420 6066	CL C CONC (RAIL FOUNDATION)	24	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	38	CY
450 6023	RAIL (SSTR)	120	LF
540 6002	MTL W-BEAM GD FEN (STEEL POST)	325	LF
540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4	EA
542 6001	REMOVE METAL BEAM GUARD FENCE	450	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	4	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	4	EA
658 6014	INSTL DEL ASSM (D-SW)SZ(BRF)CTB(BI)	6	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	9	EA



MBGF LOCATION #12
MITCHELL GROVE BRANCH
STA 973+71.75 TO STA 973+94.25

STATE OF TEXAS
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Texas Department of Transportation
Waco District

SH 171
MBGF LAYOUTS

SCALE: 1"=100'

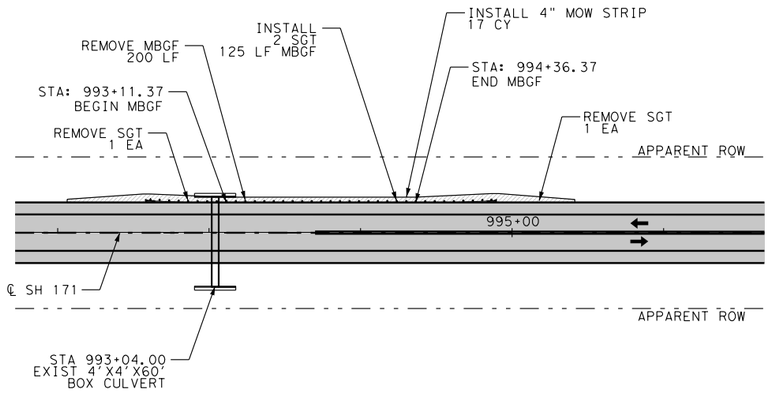
SHEET 3 OF 4

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	70

DATE: 11/9/2023 TIME: 8:09:35 AM

PLOT DRIVER: RD_11x17_PDF.plt
PEN TABLE: SH171_WACO.tbl
FILE: ...\PAV\SH171_S_GF_03.dgn

MBGF LOCATION #13 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
132 6019	EMBANKMENT (VEHICLE)(ORD COMP)(TY B)	30	CY
432 6045	RIPRAP (MOW STRIP)(4 IN)	17	CY
540 6002	MTL W-BEAM GD FEN (STEEL POST)	125	LF
542 6001	REMOVE METAL BEAM GUARD FENCE	200	LF
544 6001	GUARDRAIL END TREATMENT (INSTALL)	2	EA
544 6003	GUARDRAIL END TREATMENT (REMOVE)	2	EA
658 6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	4	EA



MBGF LOCATION #13

SMALL DRAW
STA 993+17.00

0 25 50 100
SCALE = 1"=100' H

11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
MBGF LAYOUTS

SCALE: 1"=100' SHEET 4 OF 4

DESIGNED: JMG	FED. RD DIV. NO.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	71

TIME: 8:09:44 AM
DATE: 11/9/2023
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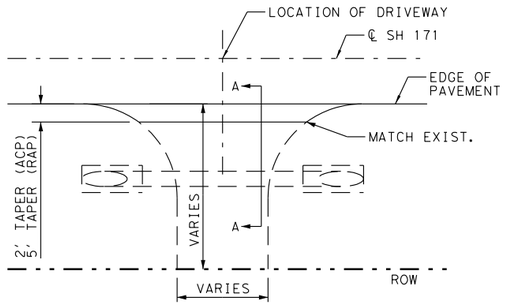
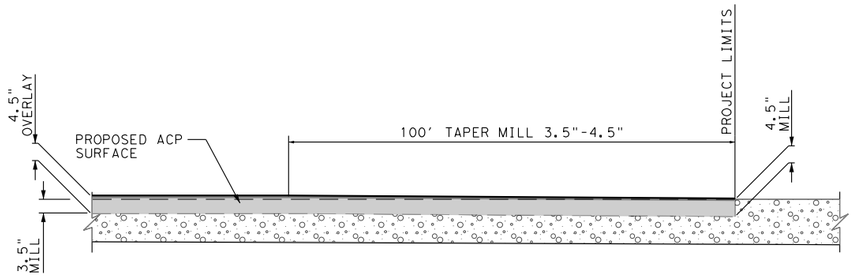


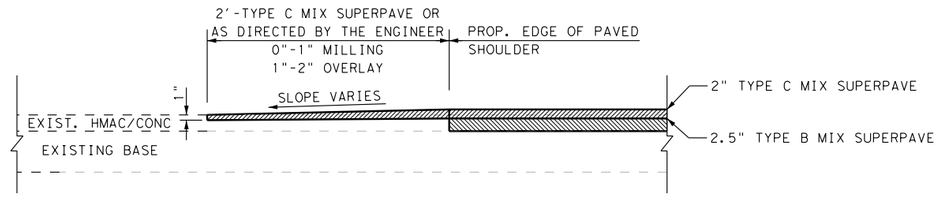
TYPICAL DRIVEWAY PLAN VIEW

N.T.S.



TYPICAL BUTTJOINT DETAIL

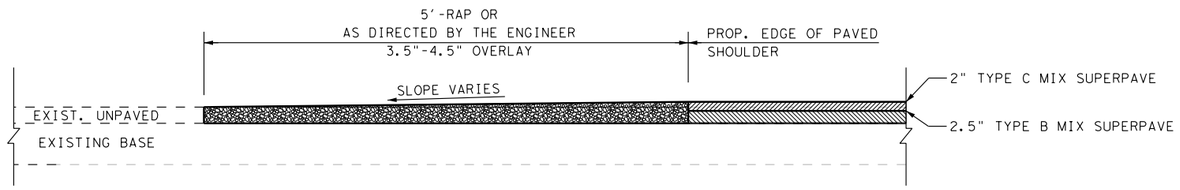
N.T.S.



SECTION A-A

PAVEMENT TRANSITION DETAIL @ PAVED DRIVEWAYS

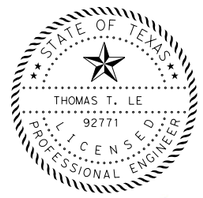
N.T.S.



SECTION A-A

PAVEMENT TRANSITION DETAIL @ UNPAVED DRIVEWAYS

N.T.S.



11/3/2023

ATKINS

TBPE REG. # F-474

Texas Department of Transportation

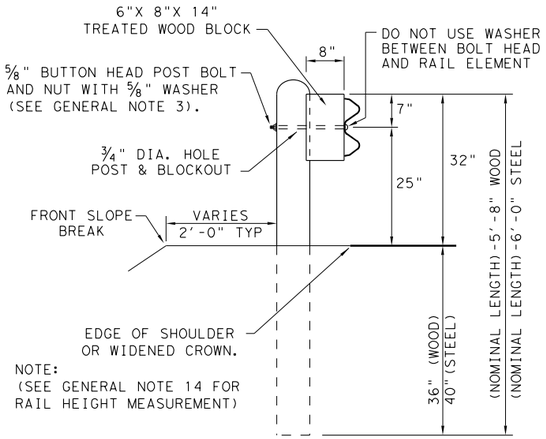
Waco District

SH 171 MISCELLANEOUS ROADWAY DETAILS

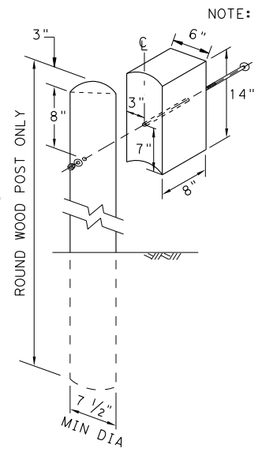
SCALE: N.T.S.

SHEET 1 OF 1

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	72

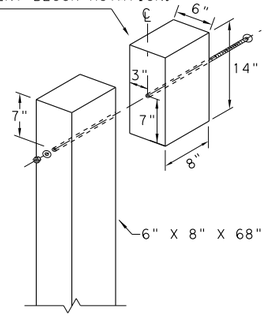


TYPICAL POST PLACEMENT

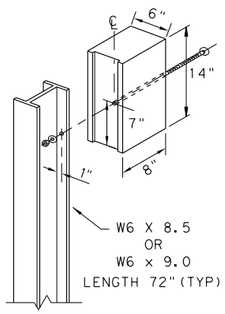


WOOD BLOCK TO ROUND WOOD POST

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

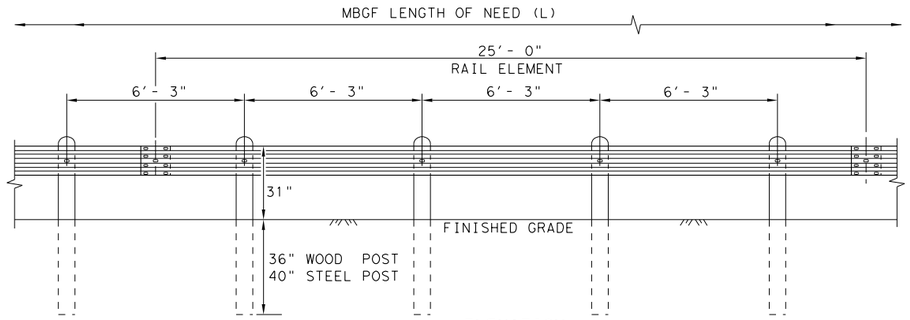


WOOD BLOCK TO RECTANGULAR WOOD POST



ROUTED WOOD BLOCK TO I-BEAM STEEL POST

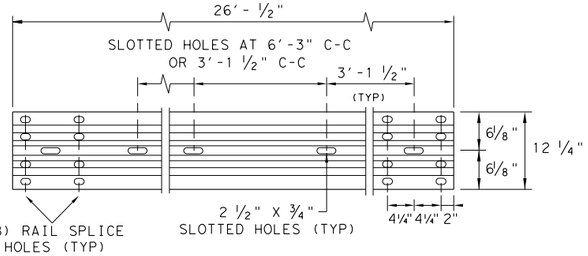
NOTE: ✻✻ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

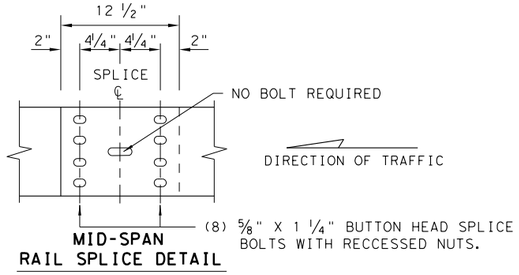
ELEVATION
MID-SPAN RAIL SPLICE

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



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

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

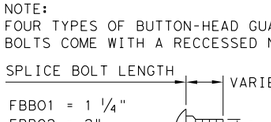


DIRECTION OF TRAFFIC

MID-SPAN RAIL SPLICE DETAIL

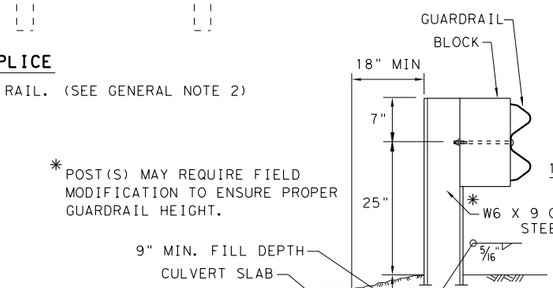
NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

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



BUTTON HEAD BOLT

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



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

LOW FILL CULVERT POST

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.

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

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 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. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT		CK: KM	DW: VP		CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0418	02	035		SH 171	
	DIST	COUNTY				SHEET NO.
	WACO	HILL				73

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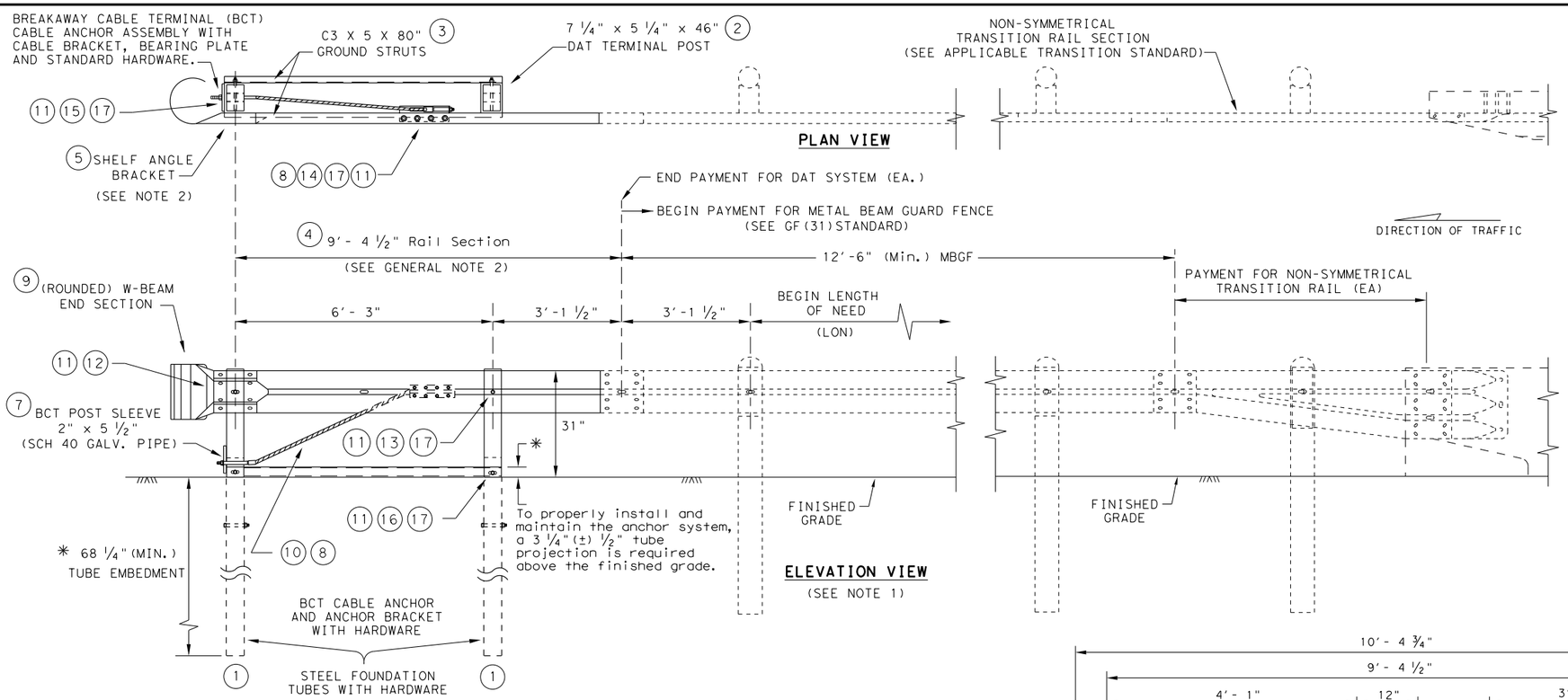


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

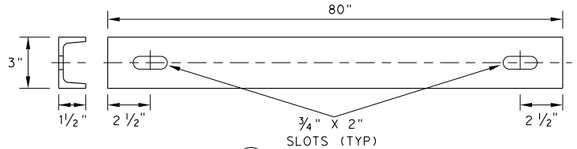
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

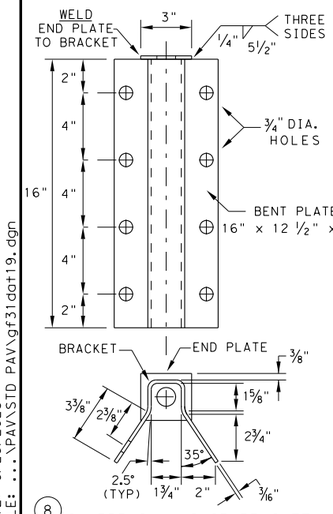
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

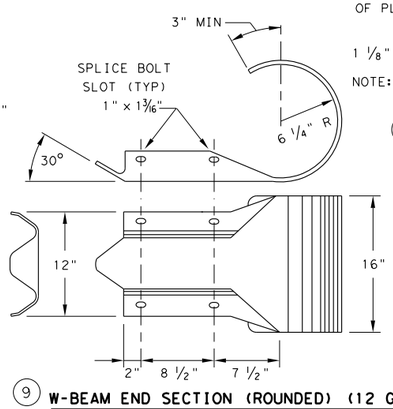
(4) TERMINAL RAIL ELEMENT FOR DAT



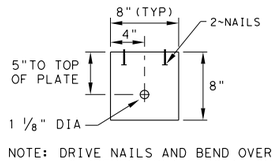
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

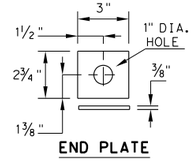


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

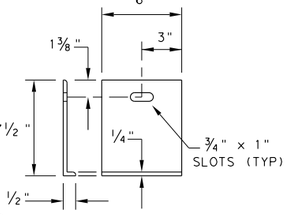


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

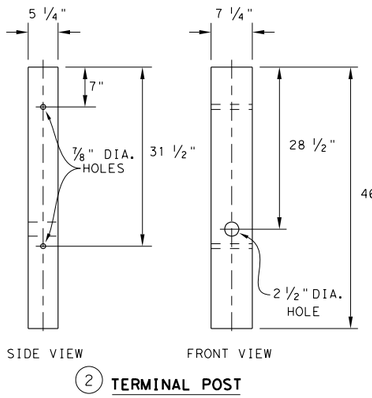
(6) BEARING PLATE
8"x 8"x 5/8" PL



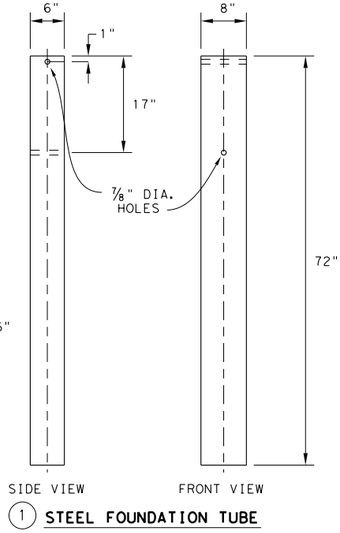
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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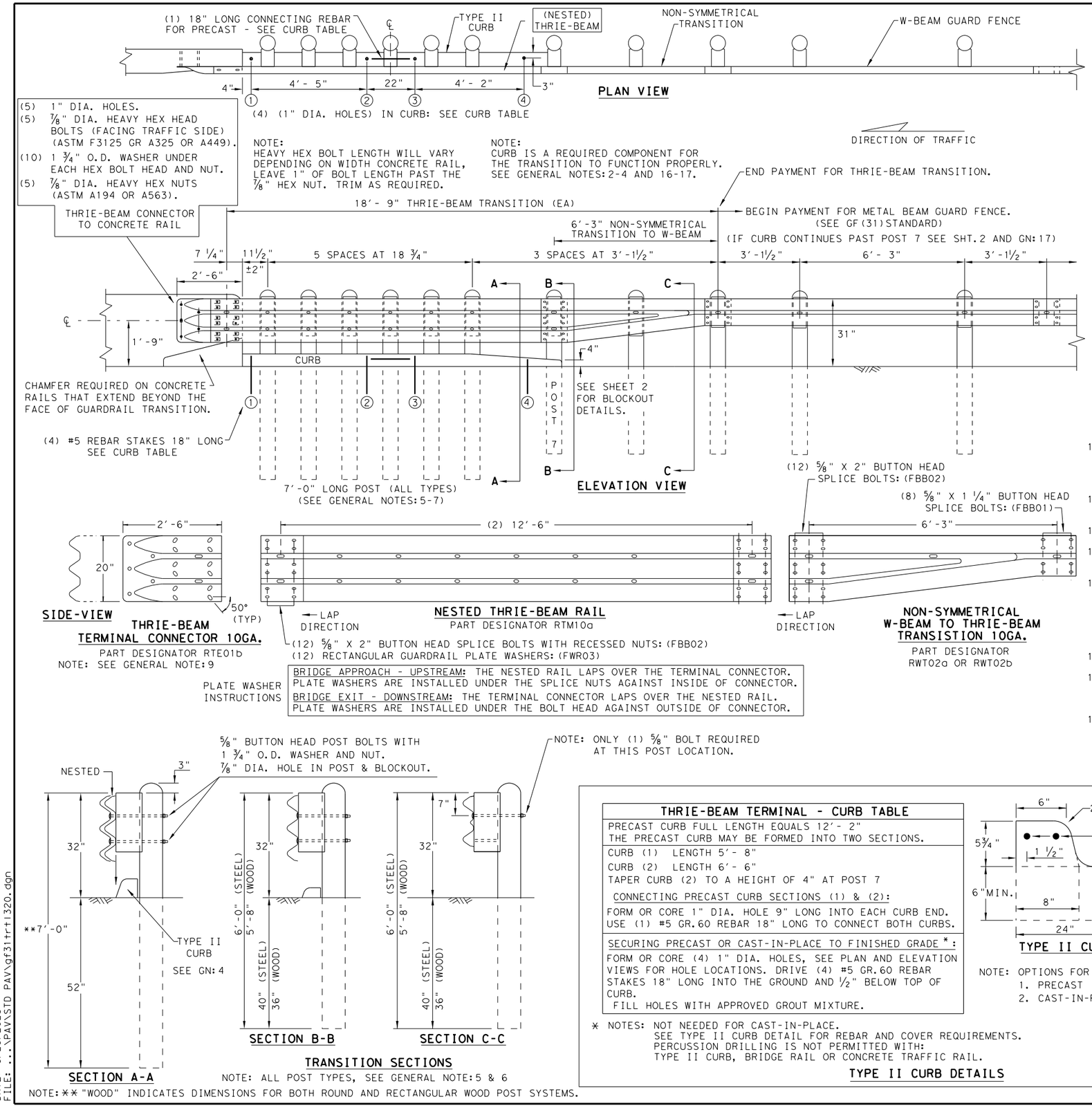
	DIST	COUNTY		SHEET NO.
	WACO	HILL		74



GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT 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 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (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.

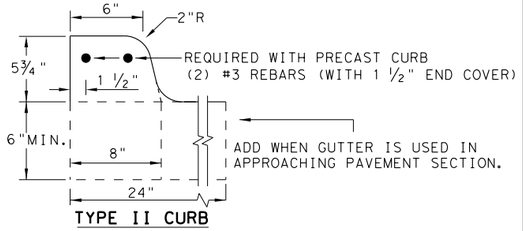
THRIE-BEAM TERMINAL - CURB TABLE

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 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

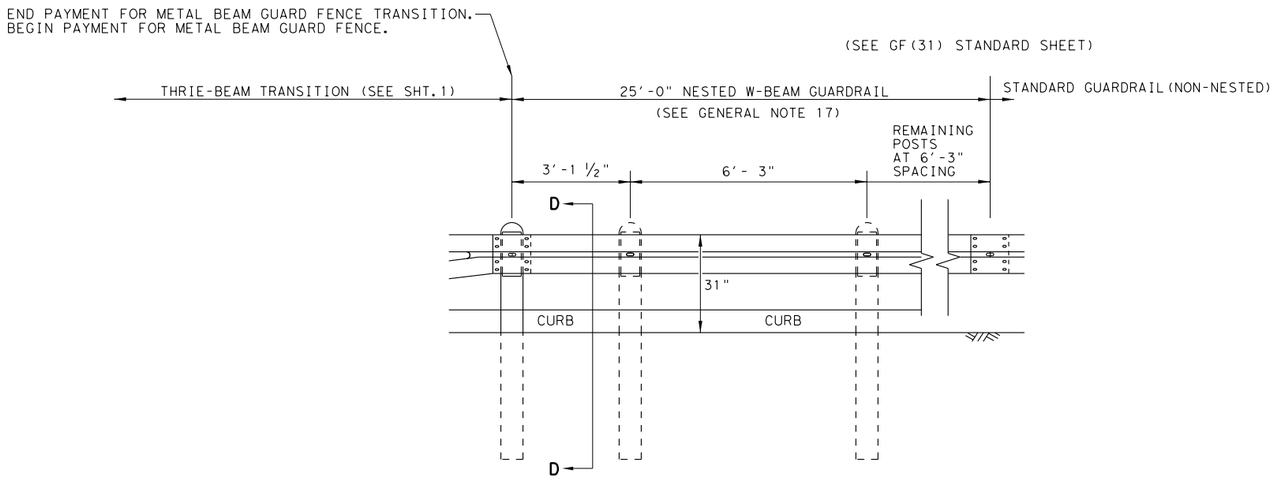
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

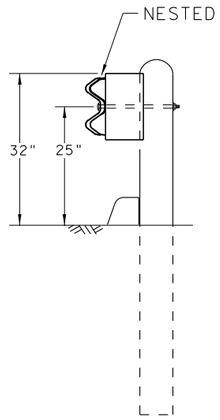
FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		75

DATE: 6/29/2023
FILE: ...\PAV\STD PAV\gf31trt1320.dgn

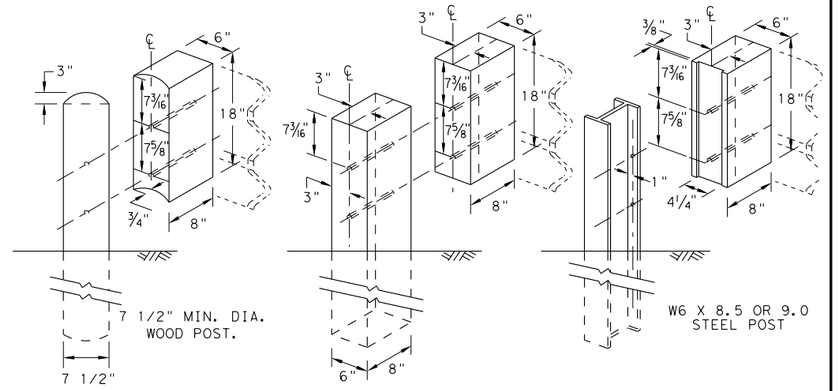
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		76

DATE: 6/29/2023
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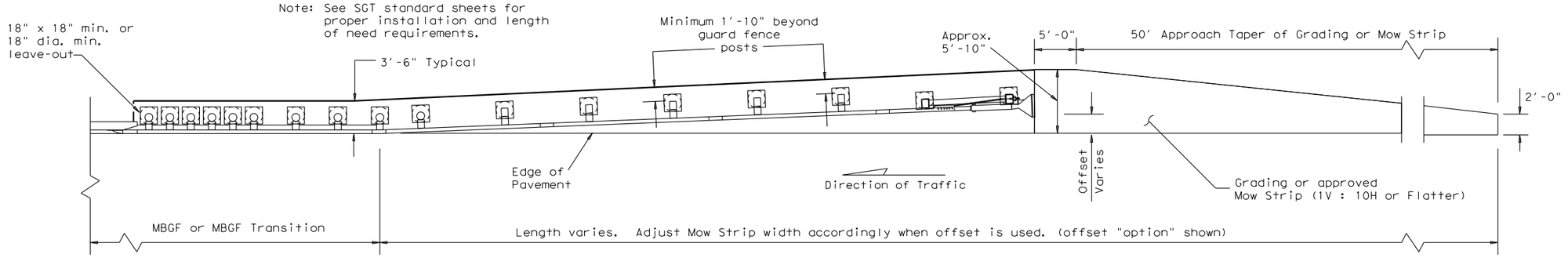
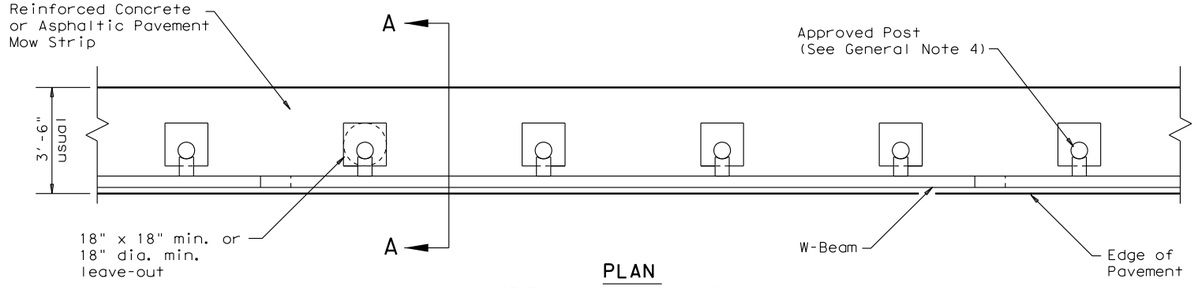
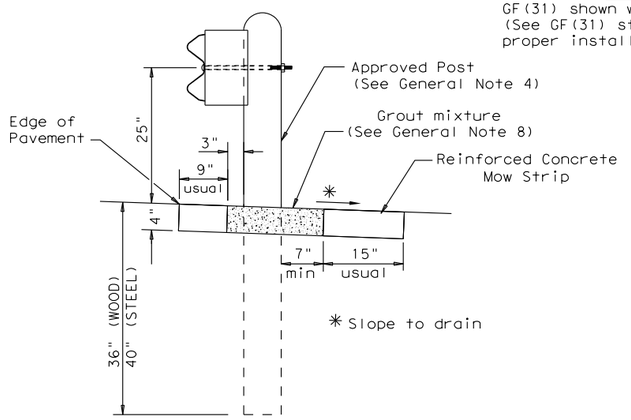


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



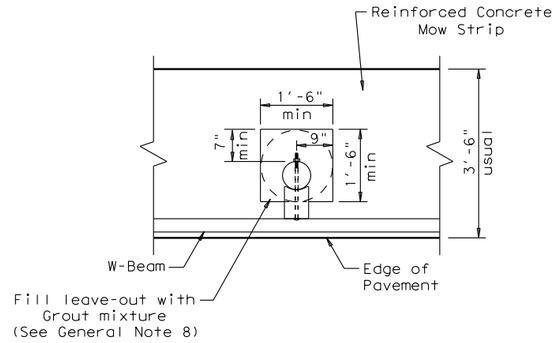
PLAN

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



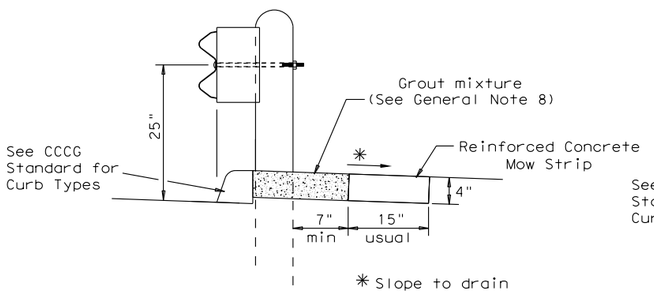
SECTION A-A

Typical



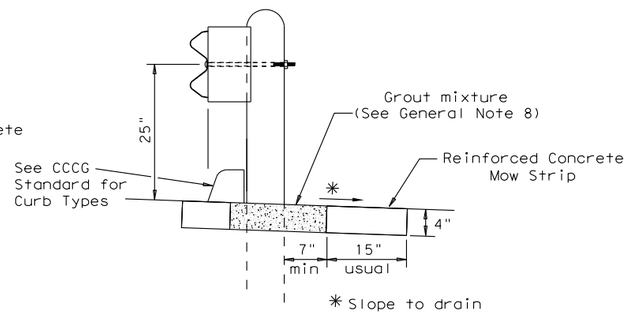
MOW STRIP DETAIL

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



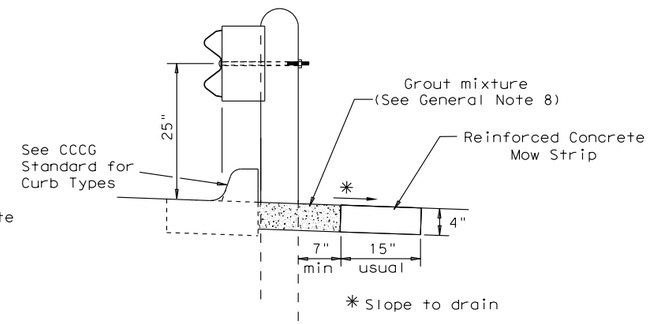
CURB OPTION (1)

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

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0418	02	035		SH 171	
	DIST	COUNTY			SHEET NO.	
	WACO	HILL			77	

DATE: 6/29/2023
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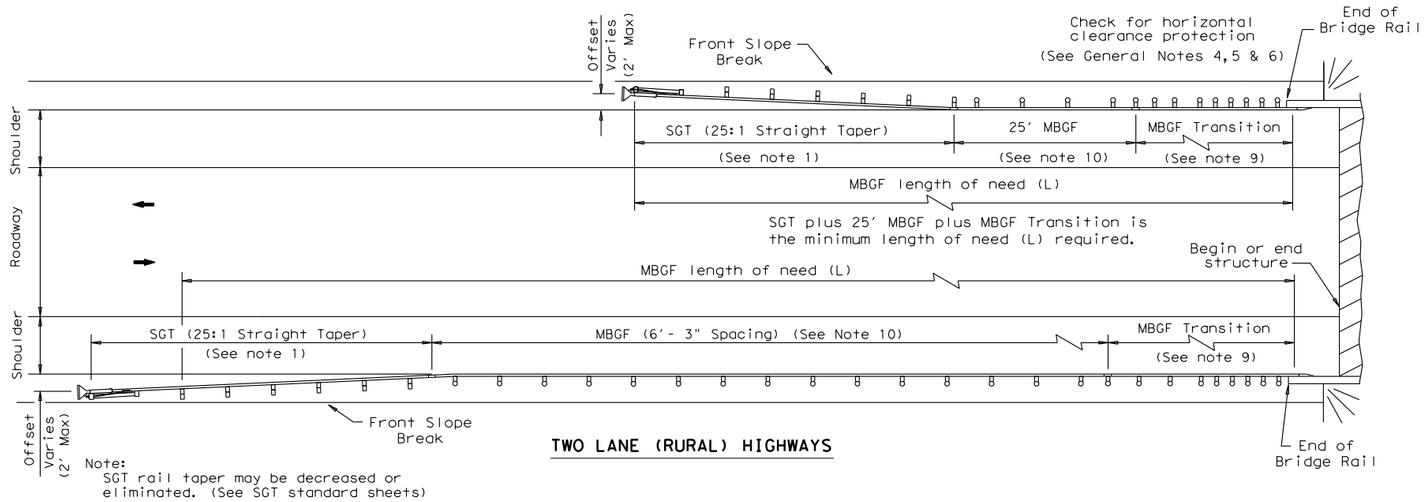
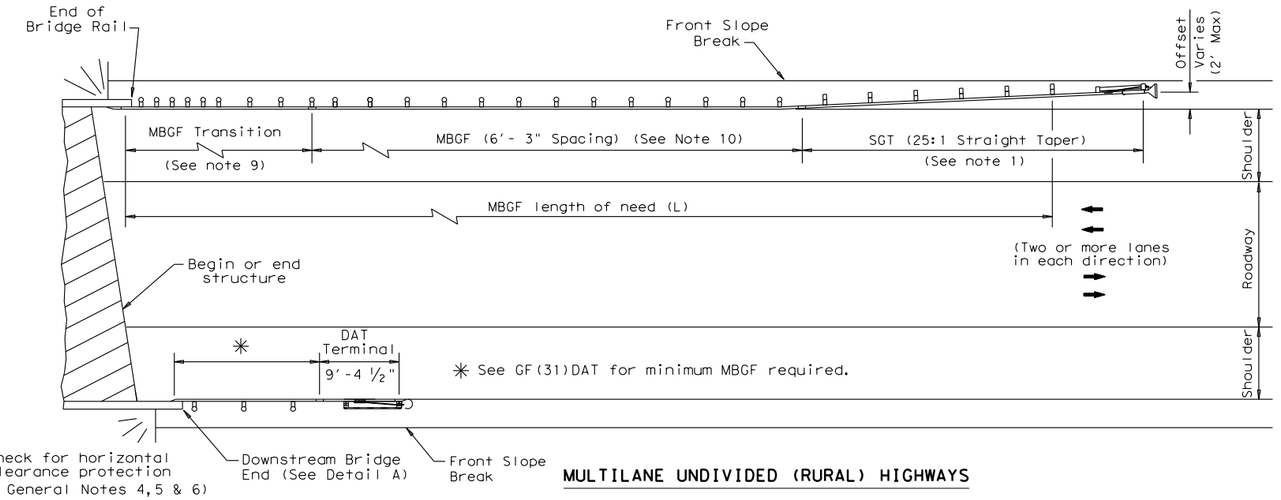
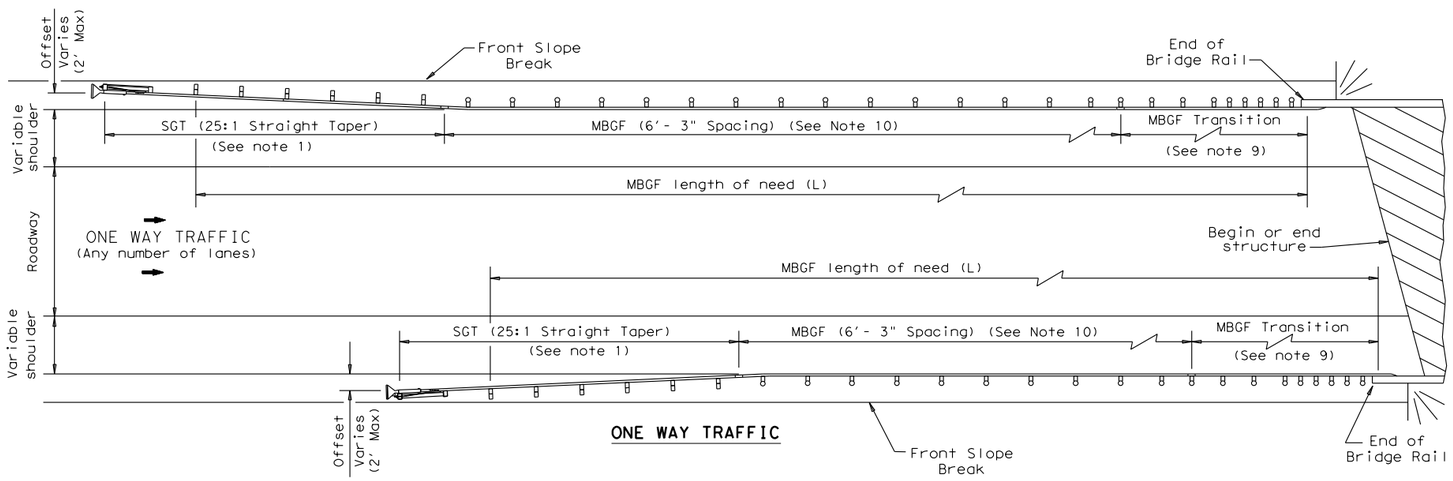


TWO LANE (RURAL) HIGHWAYS

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



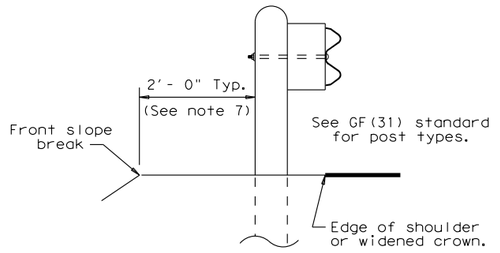
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



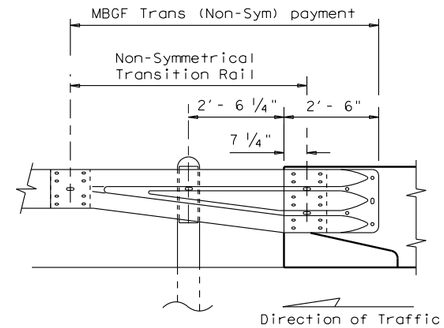
ONE WAY TRAFFIC

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 REVISED APRIL 2014 SEE (MEMO 0414)	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		78

DATE: 6/29/2023 10:39:07 AM
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(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

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 9/16"

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

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL
HEIGHT

31"

ARROWS

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

DETAIL (D)

RAIL
HEIGHT

31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

68-⅛"

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

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 5/16"

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)

✳ TO BE PROVIDED BY DISTRIBUTOR
OR CONTRACTOR.

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

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

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	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		79

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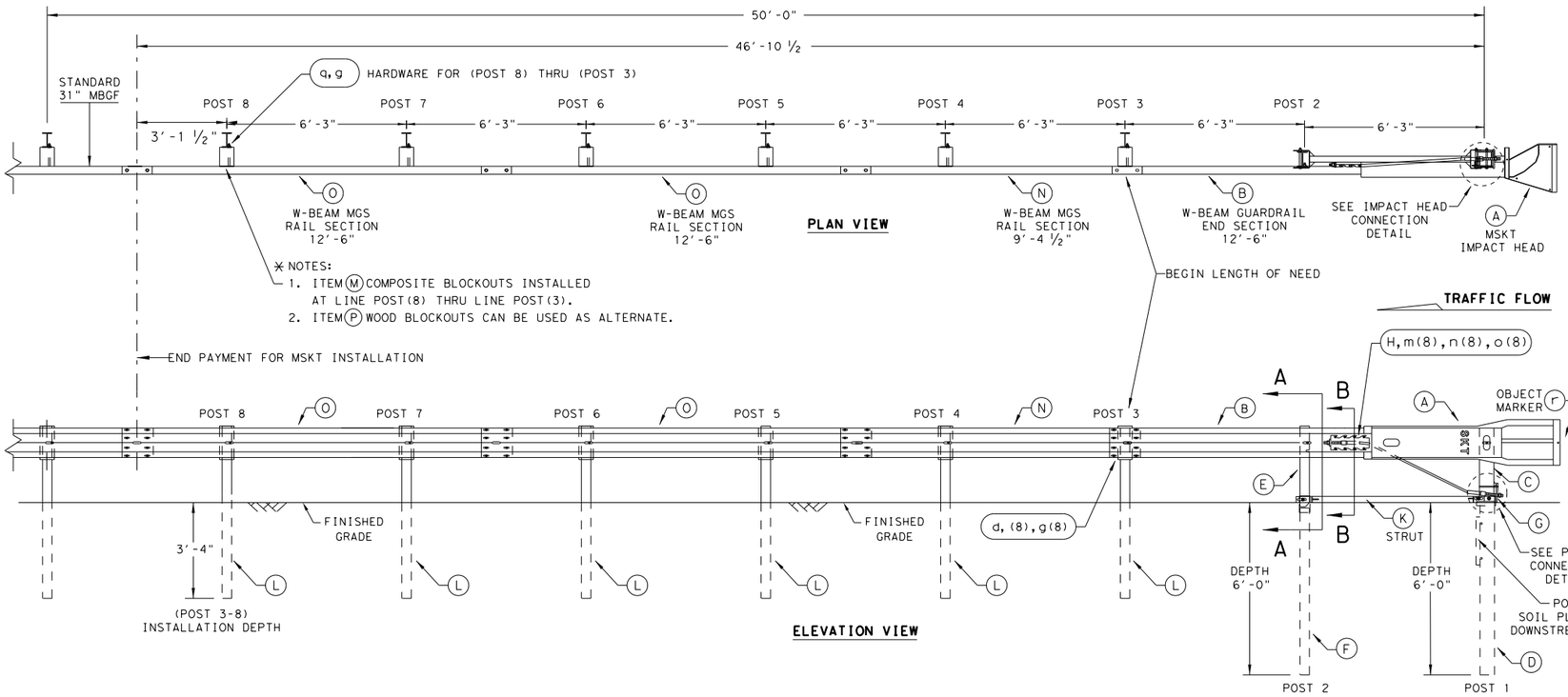
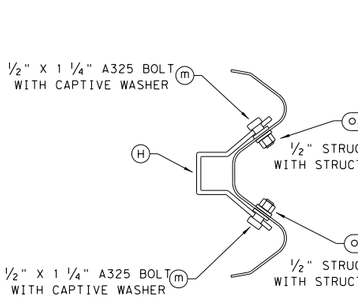
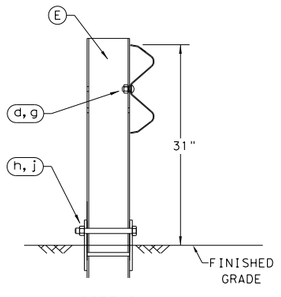


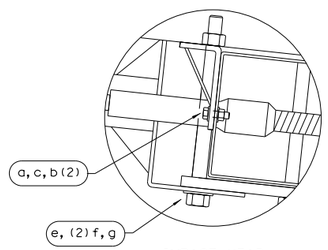
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



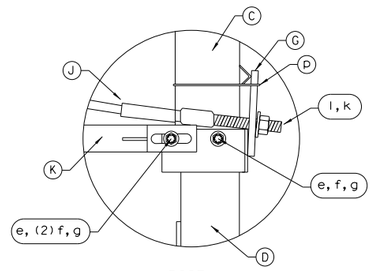
SECTION B-B
ANCHOR BRACKET



POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



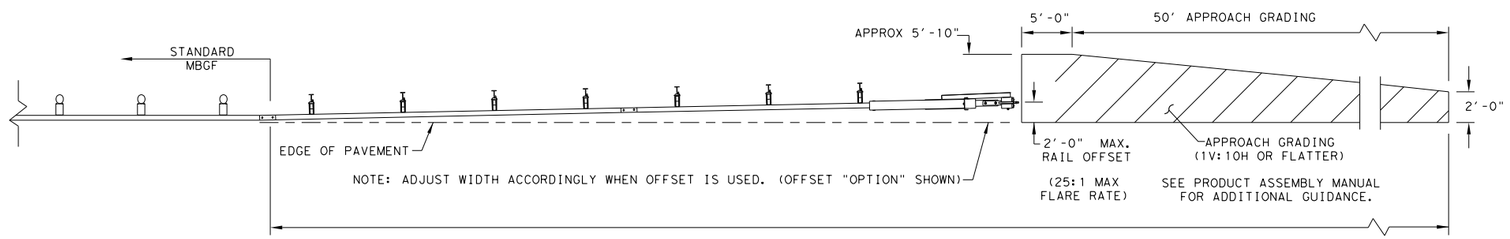
POST 1
CONNECTION DETAIL

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

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	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 3/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

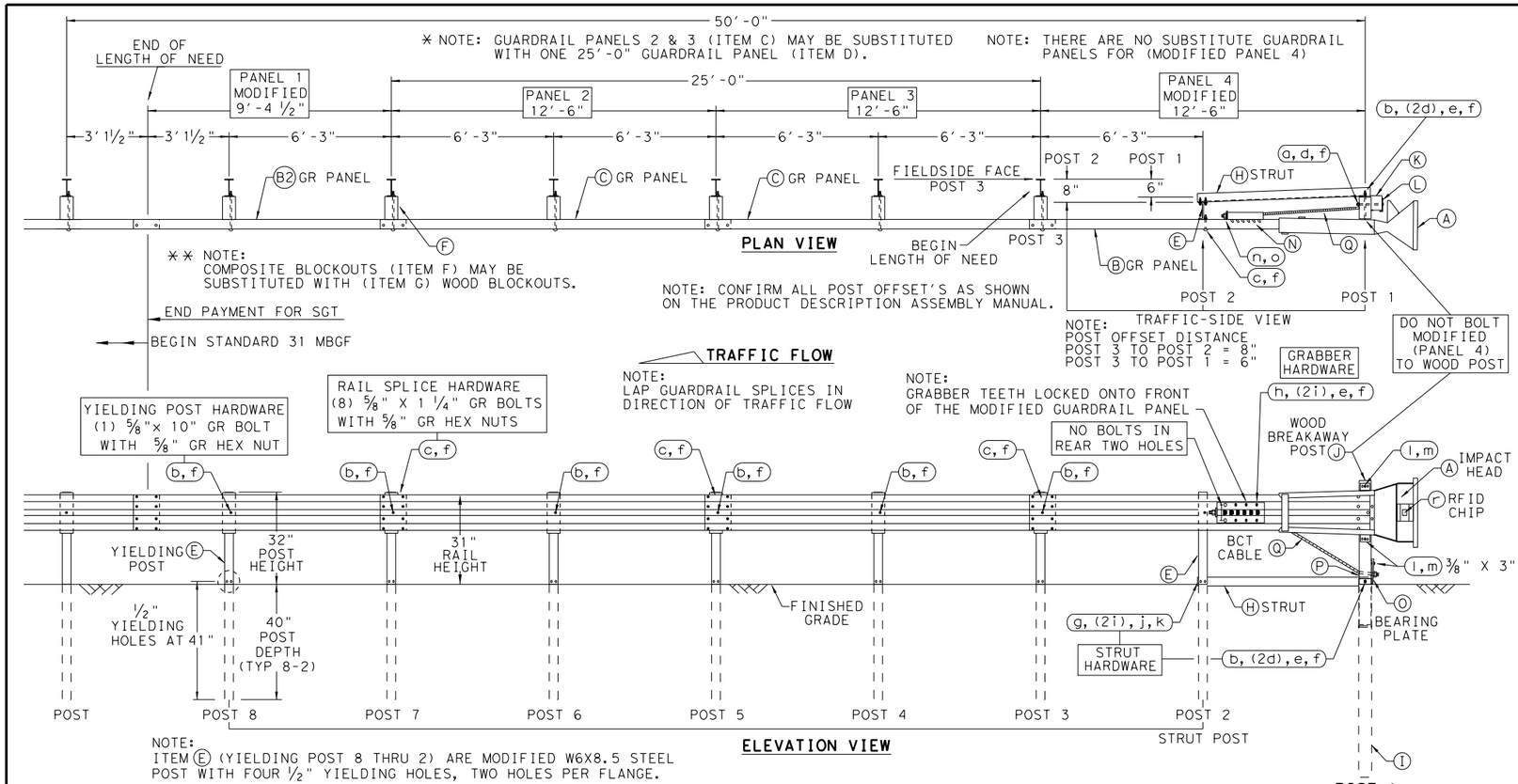
REVISIONS

FILE: sgt12s3118.dgn | DN:TxDOT | CK:KM | DW:VP | CK:CL

CONT	SECT	JOB	HIGHWAY
0418	02	035	SH 171

DIST	COUNTY	SHEET NO.
WACO	HILL	80

DATE: 6/29/2023
FILE: ...\PAVSTD PAVE\sgt153120.dgn

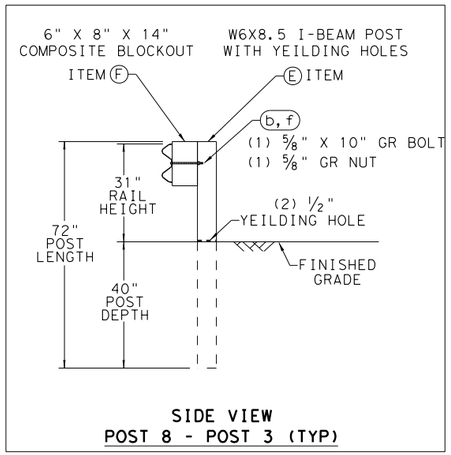


GENERAL NOTES

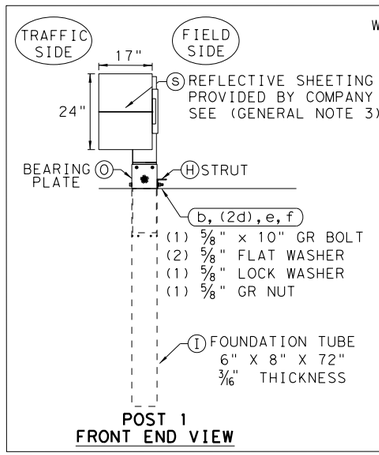
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

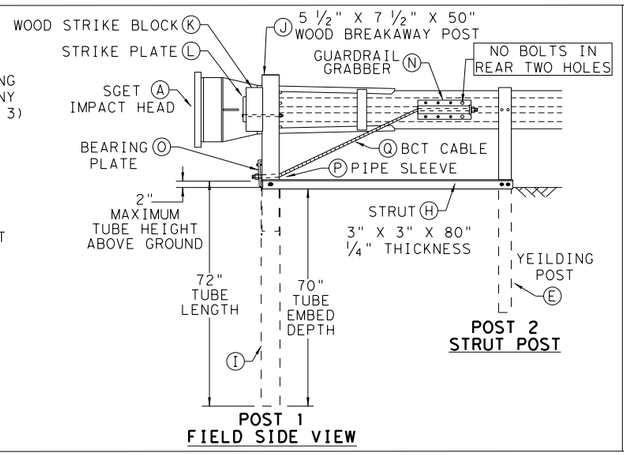
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

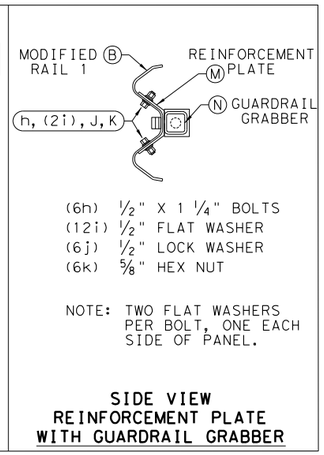


POST 1
FRONT END VIEW

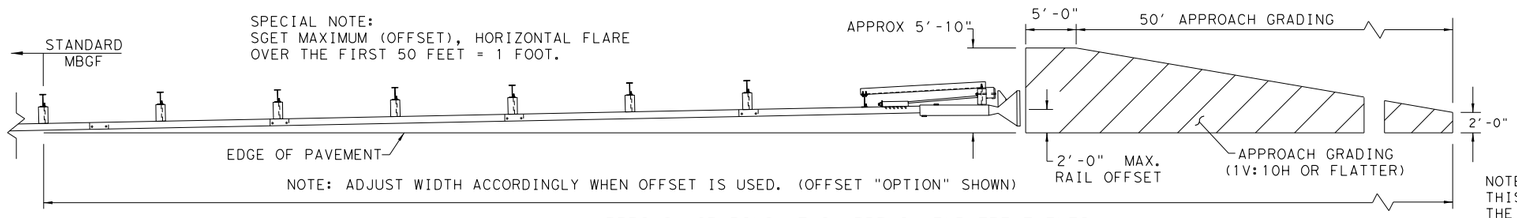


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



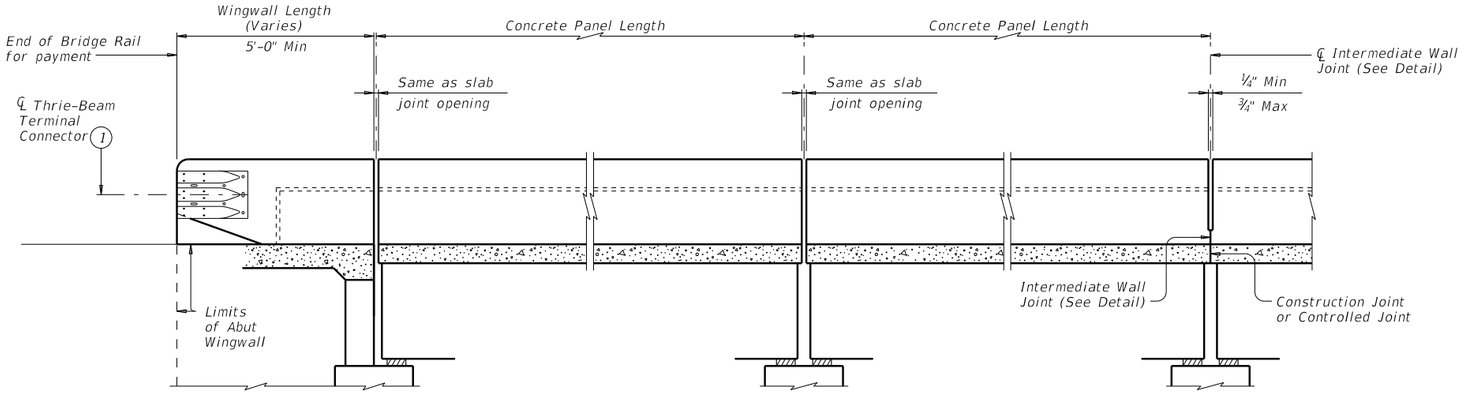
APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

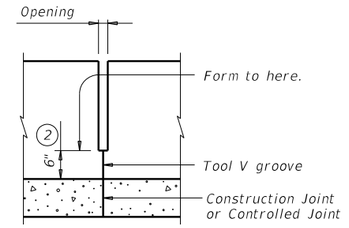
Texas Department of Transportation
Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0418	02	035	SH 171		
	DIST	COUNTY		SHEET NO.		
	WACO	HILL		81		

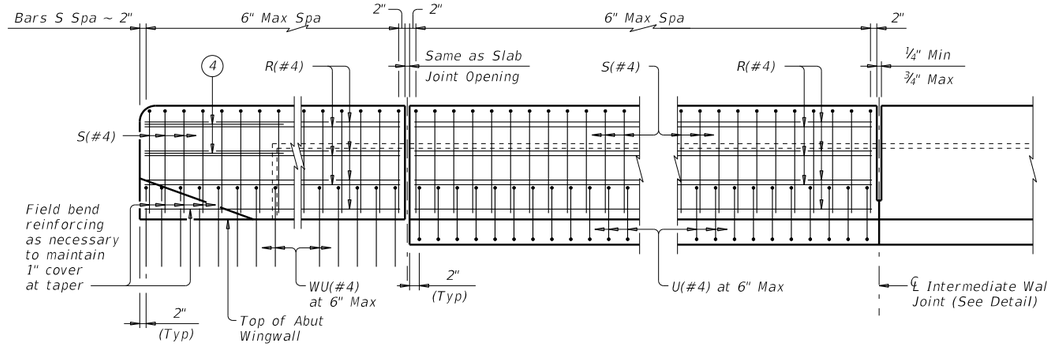


ROADWAY ELEVATION OF RAIL

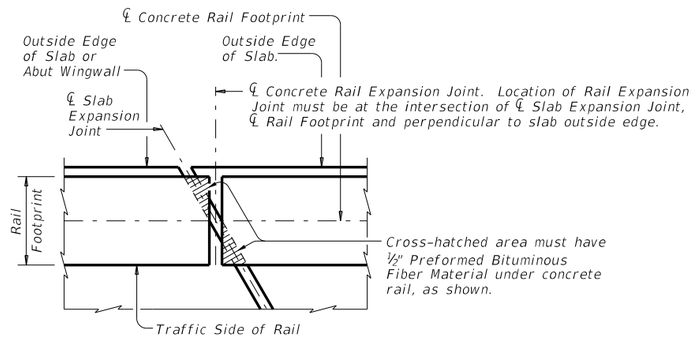


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



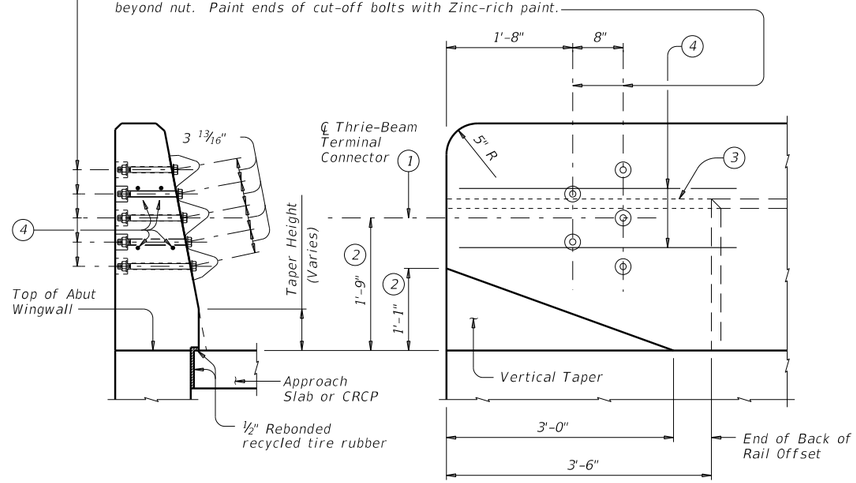
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts off after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-off bolts with Zinc-rich paint.



TERMINAL CONNECTION DETAILS

(1) *Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence." Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.*

(2) *Increase 2" for structures with Overlay.*

(3) *Back of rail offset may, with Engineer's approval, be continued to the end of the railing.*

(4) *Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.*

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

FILE:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		81A

DATE: 11/9/2023 8:25:17 AM
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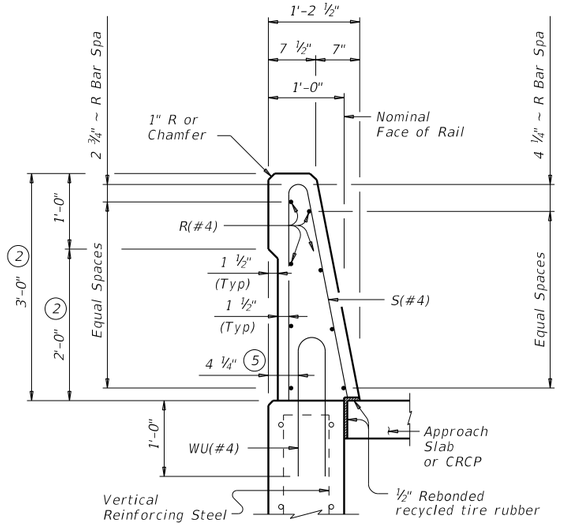
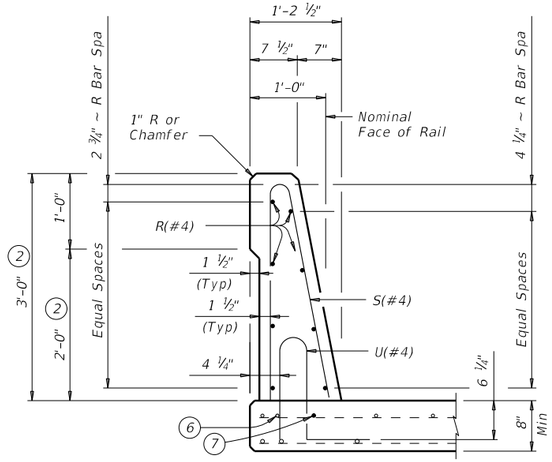


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

(5) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(6) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

(7) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(8) No longitudinal wires may be within upper bend.

(9) Bend or cut as required to clear drain slots.

(10) Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greater to side slot drain.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

If rail is slipformed, apply an heavy epoxy bead 1" behind toe of traffic side of rail to concrete deck just prior to slip forming. Provide a ⅜" width x ¼" tall heavy epoxy bead with Type III, Class C or a Type V epoxy.

The back of railing must be vertical unless otherwise shown in the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other than shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

This rail has been successfully evaluated by full-scale crash test to meet MASH TL-4 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

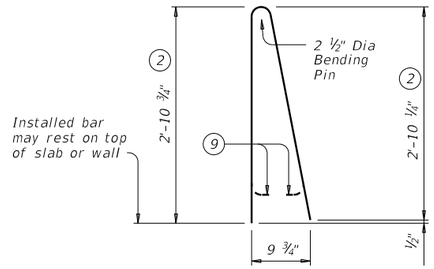
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

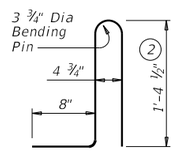
Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

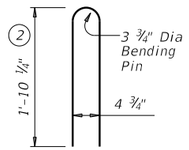
Reinforcing bar dimensions shown are out-to-out of bar.



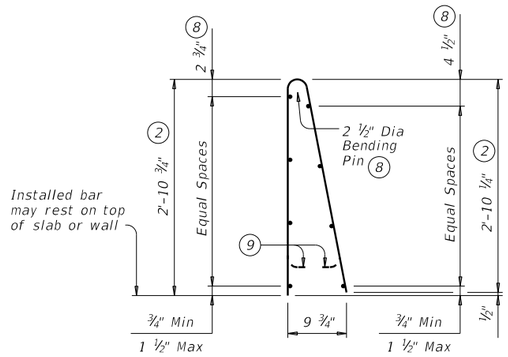
BARS S (#4)



BARS U (#4)

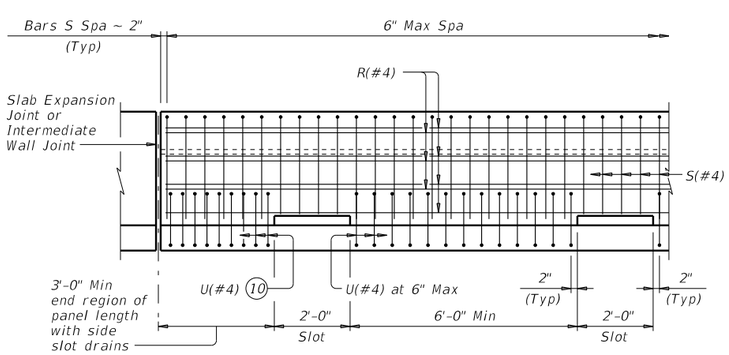


BARS WU (#4)



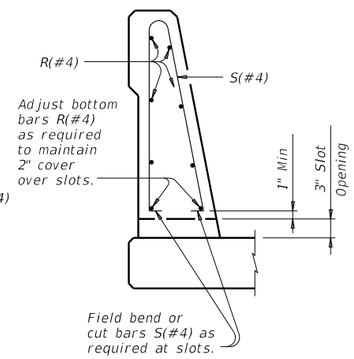
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



OPTIONAL SIDE SLOT DRAIN DETAIL

Note: Side Slot Drains may be used where shown elsewhere on the plans or as directed by the Engineer. Drains should not be placed over railroad tracks, lower roadways, or sidewalks. When this rail is used as a separator between a roadway surface and a sidewalk surface, side drain slots will not be permitted.



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

FILE:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		81B

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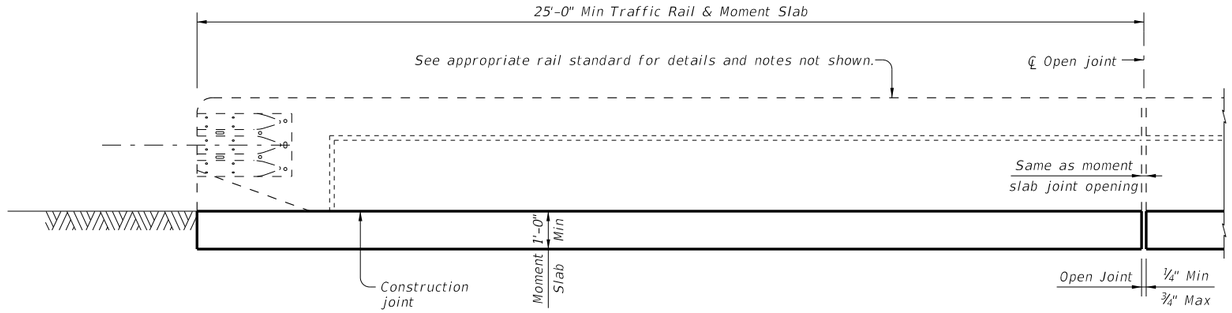
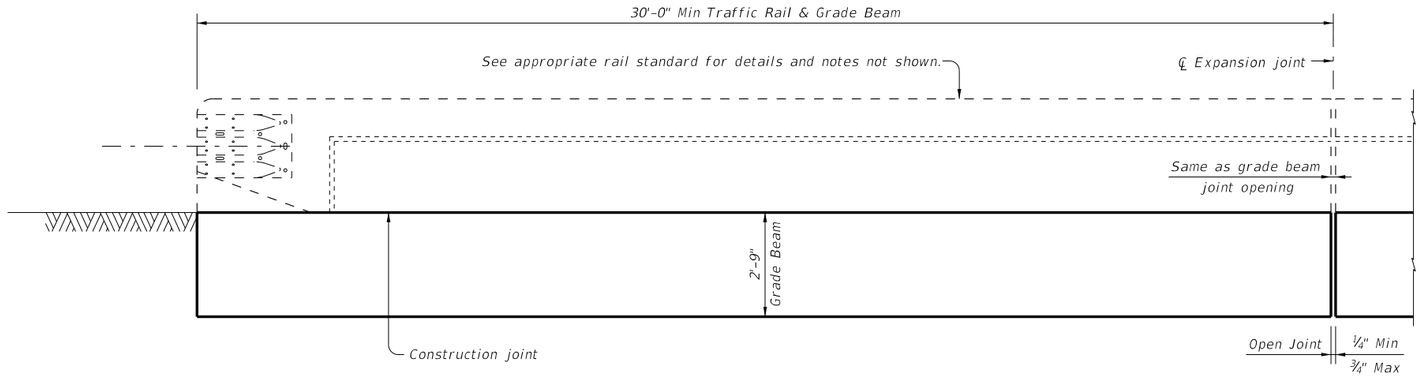


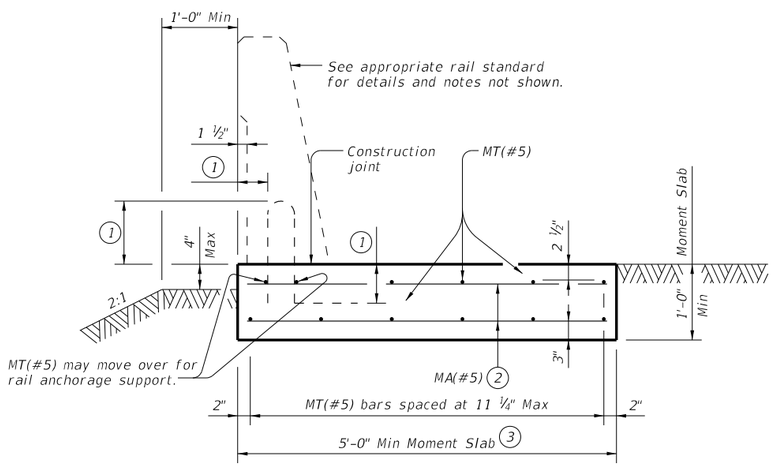
ROADWAY ELEVATION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



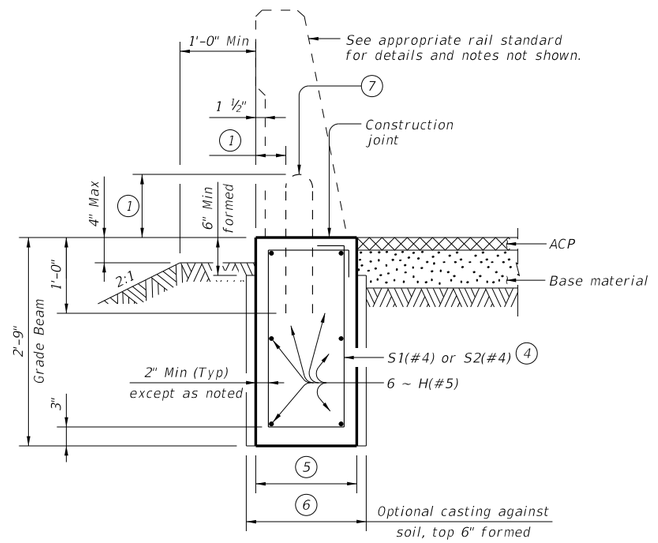
ROADWAY ELEVATION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar. Reinforcing not shown for clarity.)



SECTION OF TRAFFIC RAIL ON MOMENT SLAB (TRF-MS)

(Showing SSTR rail other rails are similar.)



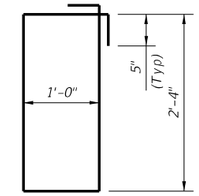
SECTION OF TRAFFIC RAIL ON GRADE BEAM (TRF-GB)

(Showing SSTR rail other rails are similar.)

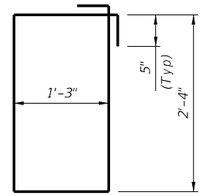
1. See applicable bridge rail standard.
2. MA(#5) space longitudinally along moment slab at 12" Max. (Spaced 2 ½" longitudinally from outside edge of moment slab).
3. Approximate moment slab concrete = 0.19 CY/LF and reinforcement = 22.4 LB/LF.
4. S1(#4) or S2(#4) spaced longitudinally along grade beam at 8" Max. (Spaced 2 ½" longitudinally from outside edge of grade beam).
5. Use bar S1(#4) with 1'-4" grade beam width and bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.
   Approximate grade beam concrete = 0.14 CY/LF and reinforcement = 13.8 LB/LF.

   Use bar S2(#4) with 1'-7" grade beam width and bridge rail types: T66 and C66.
   Approximate grade beam concrete = 0.16 CY/LF and reinforcement = 14.2 LB/LF.
6. 1'-6" for bridge rail types: All rails except for T224, C412, T66, C66, T80HT and T80SS.

   1'-9" bridge rail types: T66 and C66.
7. Modify reinforcing on standard bridge rail anchorage if necessary by extending rail anchorage 12" Min, vertically into traffic rail



BARS S1(#4)



BARS S2(#4)

CONSTRUCTION NOTES:

Align moment slab (TRF-MS) or grade beam (TRF-GB) open joints with rail open joints maintaining no less than minimum rail length. Provide moment slab (TRF-MS) or grade beam (TRF-GB) with open joints at no greater than 100' spacing unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if required elsewhere.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for bars S1(#4), S2(#4) and H(#5) unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-4"
Epoxy coated ~ #5 = 3'-6"

GENERAL NOTES:

Use of these details will result in a moment slab (TRF-MS) or grade beam (TRF-GB) foundation that is acceptable for traffic rails which are MASH TL-2, TL-3, or TL-4 compliant.

See elsewhere in the plans for selected options between moment slab (TRF-MS) and/or grade beam (TRF-GB).

The foundation design resistance is based on the current AASHTO bridge railing requirements with the assumption of fair to good soil support conditions. Poor soil conditions will require suitably deeper and/or wider foundations.

See appropriate rail standard for details and notes not shown.

This detail is intended for use as a guide to unusual railing anchorage situations but may be included in the plans, modified as necessary to apply to specific installations required on the project.

Payment for moment slab (TRF-MS) and/or grade beam (TRF-GB) will be by Class "C" concrete or Class "C" (HPC) concrete for rail foundations.

The associated bridge railing will be paid for by the linear foot which includes the concrete and reinforcement.

Excavation will be subsidiary to other Items.

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

Texas Department of Transportation

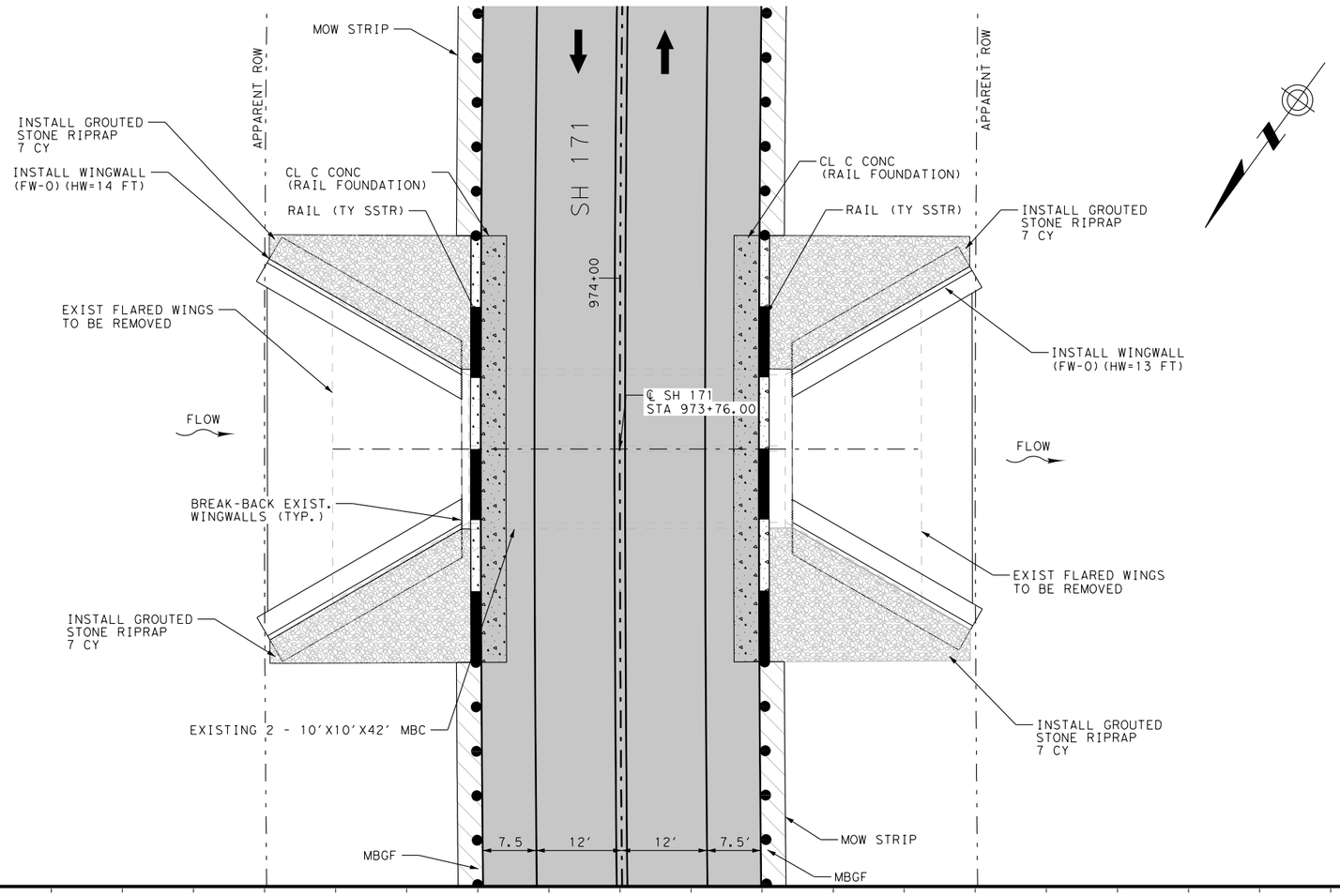
Bridge Division Standard

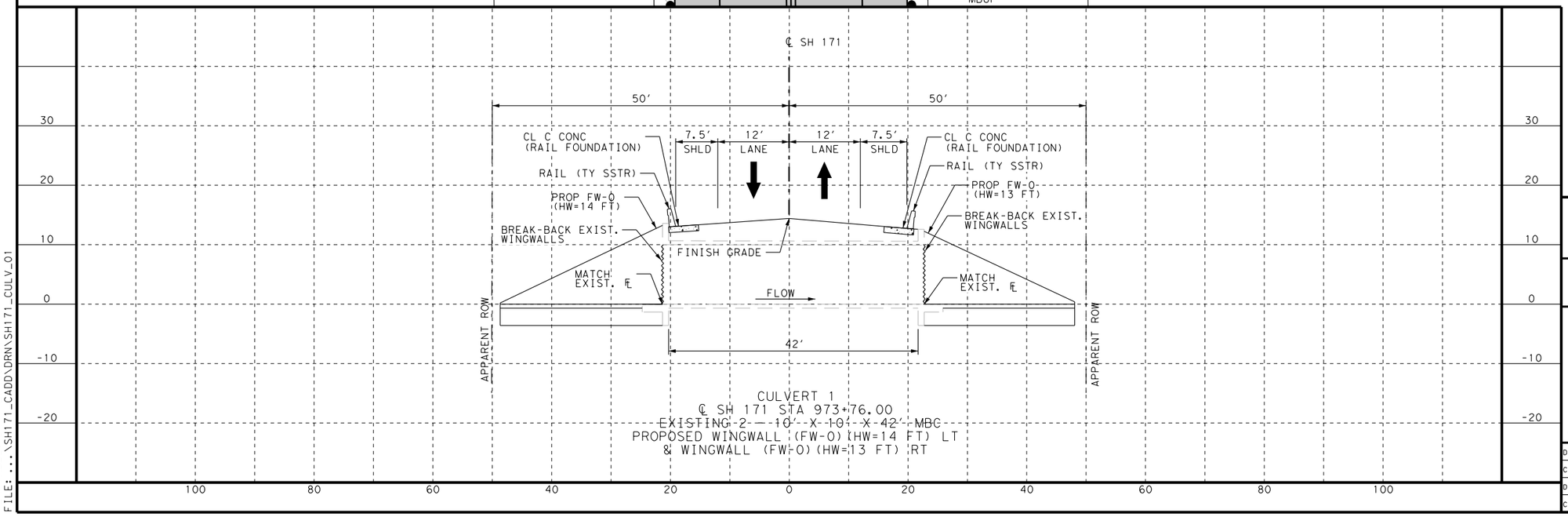
TRAFFIC RAIL FOUNDATIONS
FOR MASH TL-2, TL-3 & TL-4 BRIDGE RAILS

TRF

FILE:	DN: TxDOT	CK: TAR	DW: JTR	CK: TAR
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS 07-20: Added moment slab with rail foundation lengths.	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		81C

DATE: 11/9/2023 8:25:23 AM
FILE: ...\PAVE\STD PAVE\RL-TRF-20.dgn





CULVERT 1
℄ SH 171 STA 973+76.00
EXISTING 2 — 10' X 10' X 42' MBC
PROPOSED WINGWALL (FW-0) (HW=14 FT) LT
& WINGWALL (FW-0) (HW=13 FT) RT

CULVERT 1 QUANTITIES			
ITEM NO.	DESCRIPTION	QTY	UNIT
100 6002	PREPARING ROW	2	STA
402 6001	TEMPORARY SPL SHORING	750	SF
432 6020	RIPRAP (STONE TY F) (GROUT) (6 IN)	28	CY
466 6145	WINGWALL (FW - 0) (HW=14 FT)	1	EA
466 6146	WINGWALL (FW - 0) (HW=13 FT)	1	EA
496 6005	REMOV STR (WINGWALL)	2	EA
506 6038	TEMP SEDMT CONT FENCE (INSTALL)	100	LF
506 6039	TEMP SEDMT CONT FENCE (REMOVE)	100	LF
658 6099	INSTL OM ASSM (OM-2Z) (WFLX) GND	4	EA

NOTES:

1. TXDOT TO WORK WITH PROPERTY OWNER ON REMOVAL OF FLOOD GATE/CATTLE GUARD FROM DOWNSTREAM HEADWALL. PAYMENT SUBSIDIARY TO ITEM 496-REMOV STR (WINGWALL).
2. SEE MBGF LAYOUTS - SHEET 3 OF 4 FOR MORE INFORMATION.

0 5 10 20
SCALE = 1"=20' H

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

ATKINS
TBPE REG. # F-474

Texas Department of Transportation
Waco District

SH 171
CULVERT 1
LAYOUT

NBI 09-110-0-0418-02-034
MITCHELL GROVE BRANCH

SCALE: 1"=20'H, 1"=20'V SHEET 1 OF 1

DESIGNED: JMG	FED. RD DIV. No.	STATE	PROJECT No.			HIGHWAY No.
CHECKED: TTL	6	TEXAS	SEE TITLE SHEET			SH 171
DRAWN: JMG	STATE DISTRICT	COUNTY	CONTROL No.	SECTION No.	JOB No.	SHEET No.
CHECKED: TTL	WAC	HILL	0418	02	035	82

PLOT DRIVER: RD_11x17_PDF.pltPEN TABLE: SH171_WACO.tblFILE: ...\SH171_CADD\DRN\SH171_CULV_01
DATE: 11/9/2023 TIME: 2:56:06 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 (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
STA 973+76.00 (Lt)	2 ~10'x 10	3'	MC-10-7	FW-0	0°	2:1	8"	7"	2.917'	13.333'	26.000'	15.011'	30.022'	21.750'	N/A	0.0	2.3	29.6	410
STA 973+76.00 (Rt)	2 ~10'x 10	3'	MC-10-7	FW-0	0°	2:1	8"	7"	2.000'	12.417'	24.167'	13.953'	27.905'	21.750'	N/A	0.0	1.6	24.7	356

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

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

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

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

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

STATE OF TEXAS
THOMAS T. LE
92771
LICENSED
PROFESSIONAL ENGINEER
11/9/2023

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 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		82A

DATE: 11/9/2023 9:12:31 AM
FILE: ...\SH171_CADD\DRN\bcsstde1-20.dgn

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

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

TABLE OF WINGWALL REINFORCING
(2~wings)

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

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

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

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

Hw = H + T + C - 0.250'
A = (Hw - 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

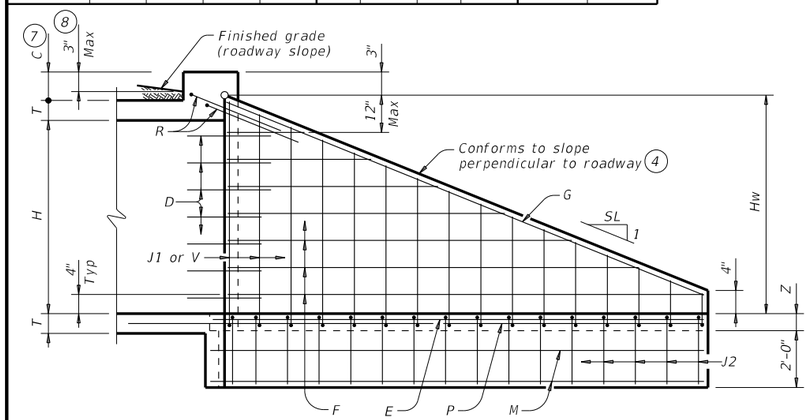
For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

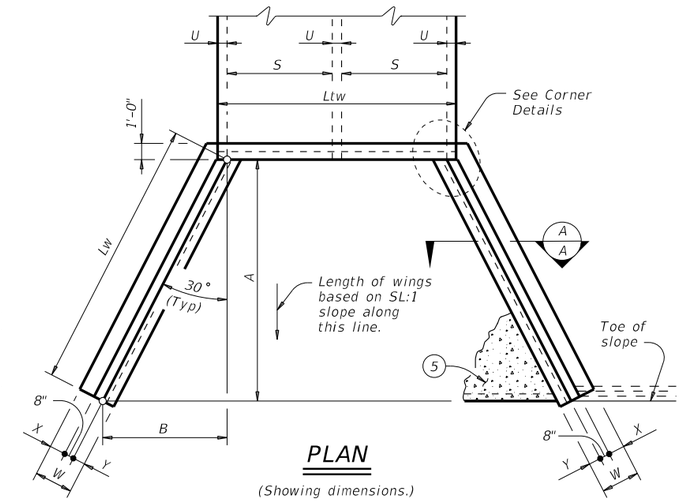
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

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



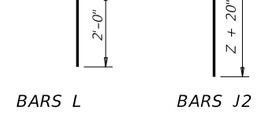
INSIDE ELEVATION

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



PLAN

(Showing dimensions.)

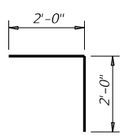


BARS D

BARS R

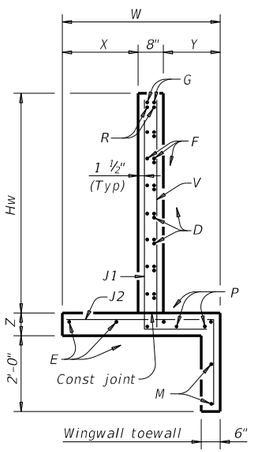
BARS J1

BARS V

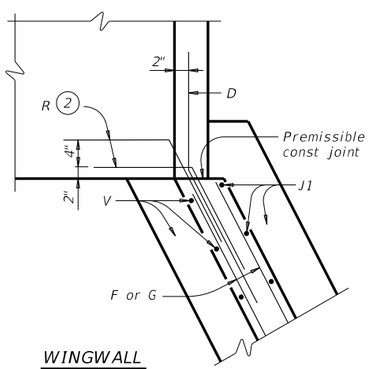


BARS L

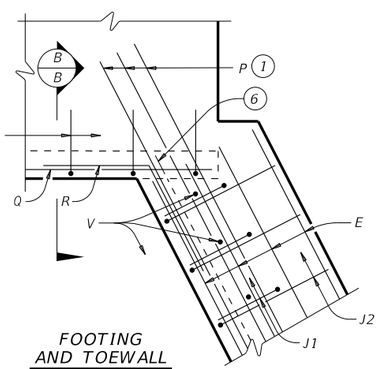
BARS J2



SECTION A-A



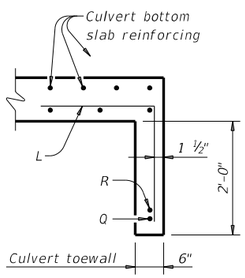
WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS

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



SECTION B-B (5)

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

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

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap." Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 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 Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

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

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

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS
WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

FILE:	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		83

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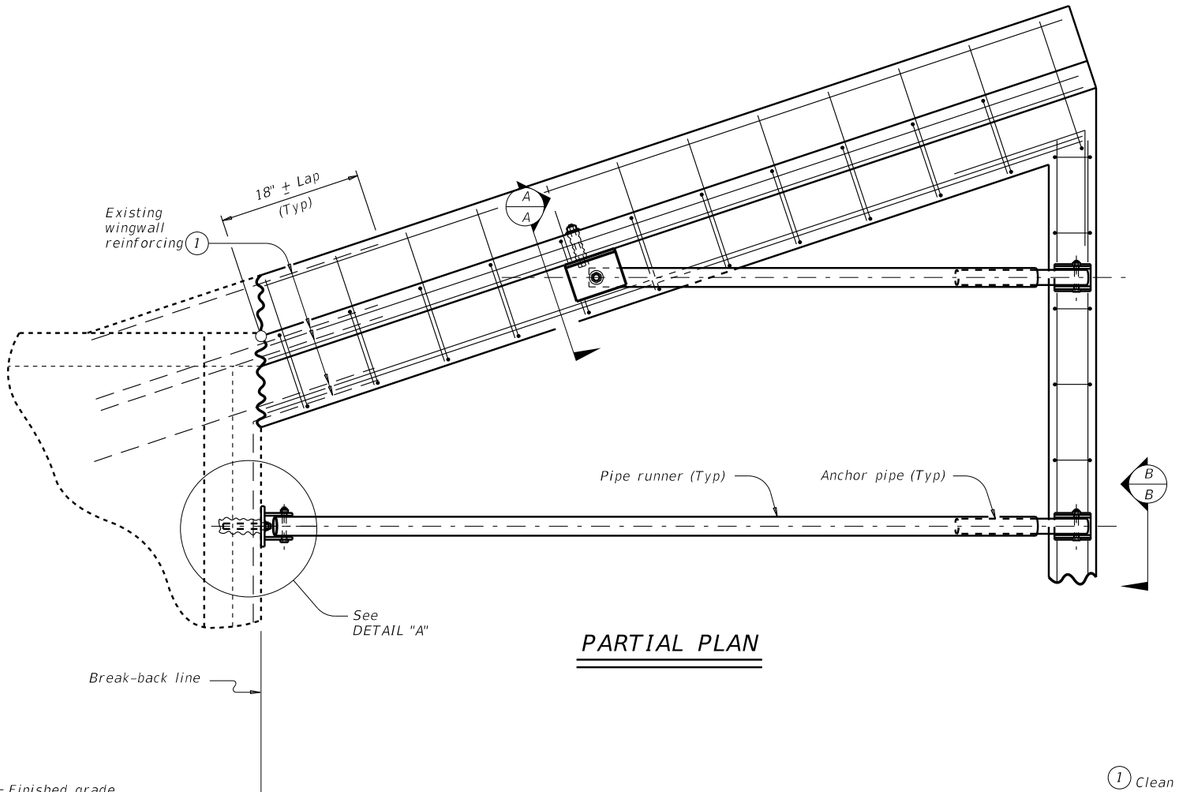
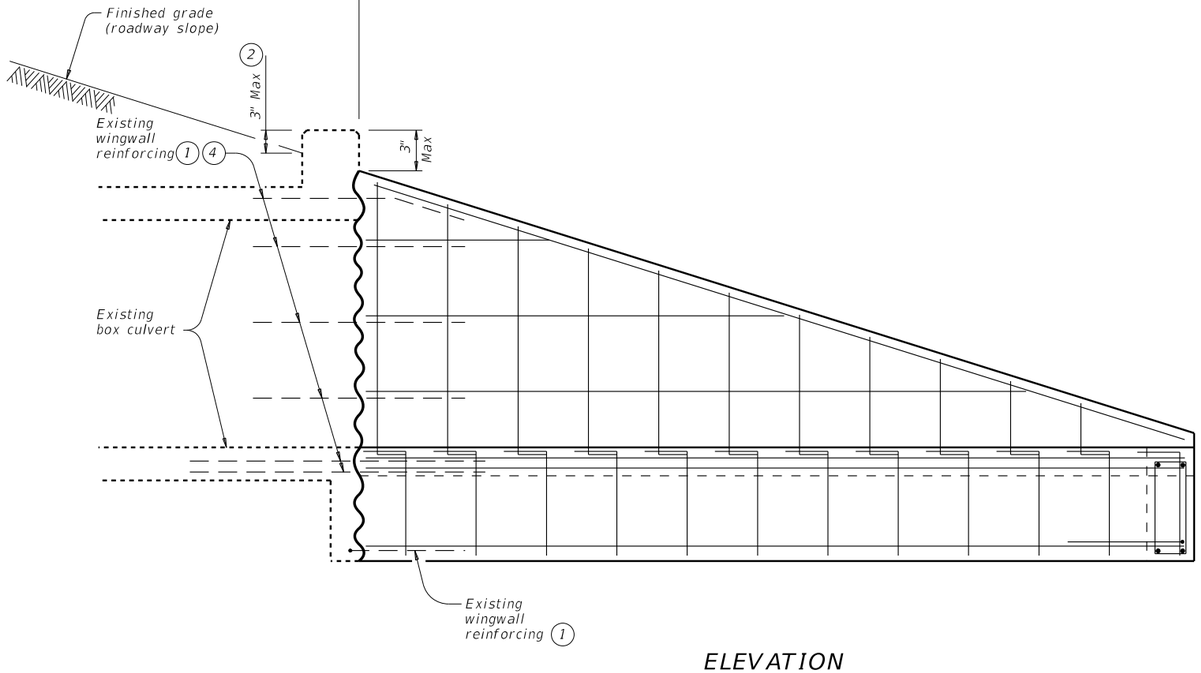
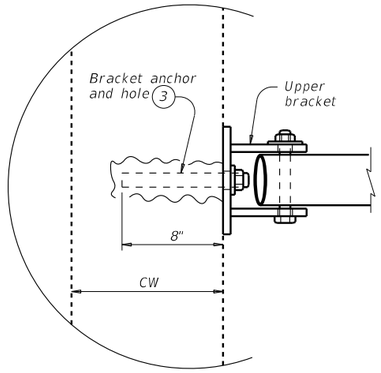


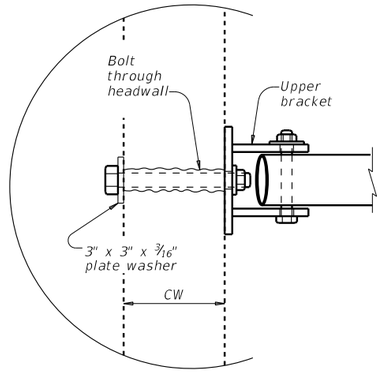
PARTIAL PLAN



ELEVATION

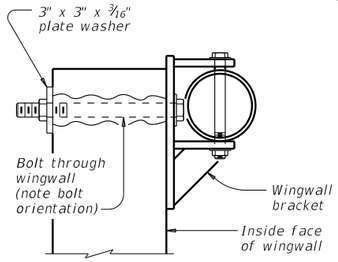


For CW greater than 8"

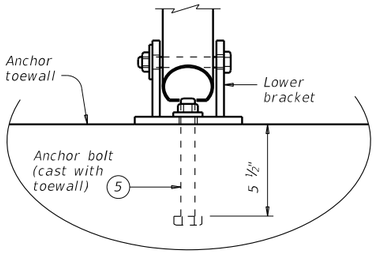


For CW 8" and less

DETAIL "A"



SECTION A-A



SECTION B-B

(1) Clean and straighten existing reinforcing to lap with new reinforcing as shown. The Engineer may require additional dowels to lap with the new reinforcing if the existing reinforcing is damaged or is not suitably located to lap with new reinforcing. These additional dowels must be #5 x 2'-0".

(2) For vehicle safety, reduce curb height, if necessary to provide a maximum 3" projection above finished grade. No quantity changes or additional compensation will be allowed for this work.

(3) Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rod with one hex head nut and one hardened steel washer. Embed threaded rods into curb, wingwall, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

(4) If required, embed wingwall anchor dowels into existing box culvert using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8".

(5) At Contractor's option, adhesive anchors may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 8". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

MATERIAL NOTES:

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

GENERAL NOTES:

Use these details in conjunction with the SETB standard sheets.

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

Texas Department of Transportation

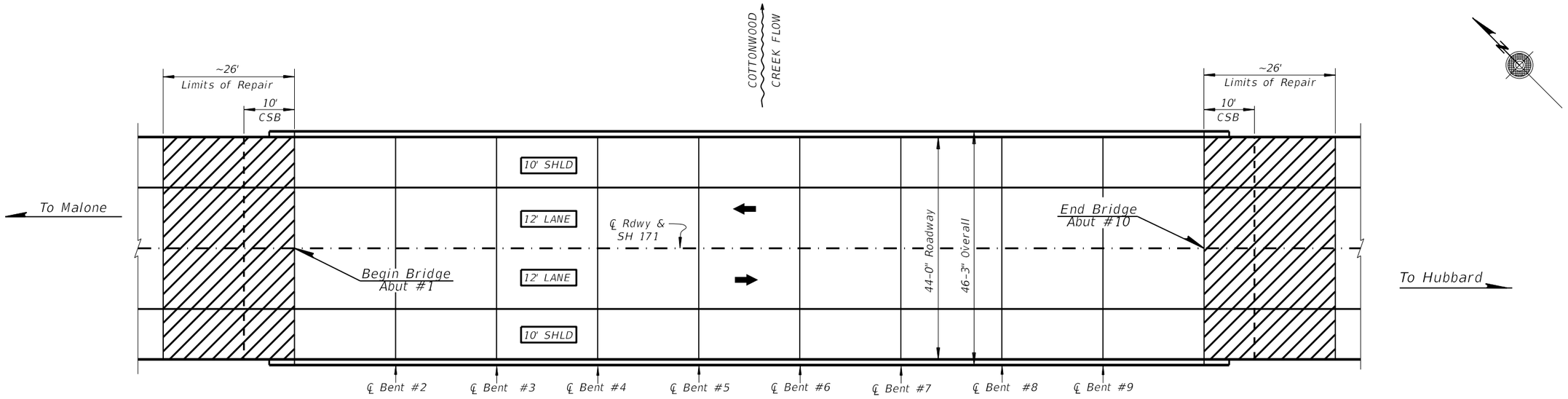
Bridge Division Standard

SAFETY END TREATMENT
RETROFIT DETAILS FOR EXISTING BOX CULVERTS

SETBR

FILE:	DN: GAF	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		84

DATE: 11/9/2023 9:11:14 AM
FILE: ...\DRN\STD_DRN\CD-SETBR-20.dgn



LAYOUT PLAN

SH 171 OVER COTTONWOOD CREEK
(NBI # 09-110-0-0418-02-031)

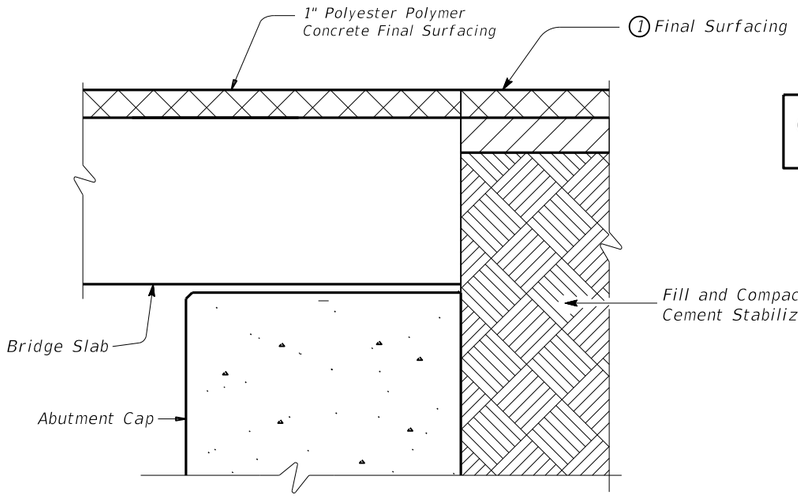
SH 171 OVER COTTONWOOD CREEK
180'-0" OVERALL LENGTH
180'-0" (9 @ 20'-0") CONCRETE SLAB SPANS
44'-0" ROADWAY TYPE T501 RAIL

GENERAL NOTES:

All Materials and Labor required for installing Cement Stabilized Back II, shall be included in the price bid per CY for Item 400, CEM STABIL BKFL.

Re-working Base material and compaction will be subsidiary to various bid items.

Provide Cement Stabilized Back II (CSB) meeting the requirements of Item 400 "Excavation and Back II for Structures", to the limits shown at bridge abutments.

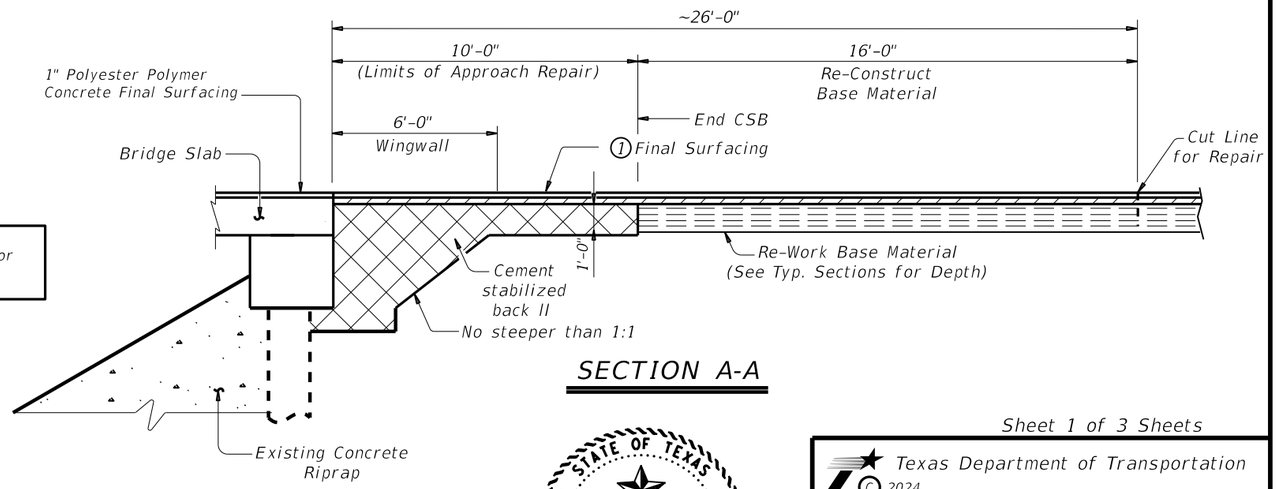


① See Roadway Typical Sections for additional information.

END OF BRIDGE LOCATIONS

SECTION THRU ABUTMENT

(APPROACH ROADWAY REPAIR)



SECTION A-A

ESTIMATED QUANTITIES

ITEM	0400-6005
SH171 OVER COTTONWOOD CREEK	CEM STABIL BKFL
	C.Y.
NORTWEST ABUTMENT	34.0
SOUTHEAST ABUTMENT	34.0
TOTAL	68.0

STATE OF TEXAS
ROSS L. LANGDALE
126994
LICENSED
PROFESSIONAL ENGINEER
10/24/2023

Ross L Langdale, P.E.

Sheet 1 of 3 Sheets

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ROADWAY REPAIR DETAILS

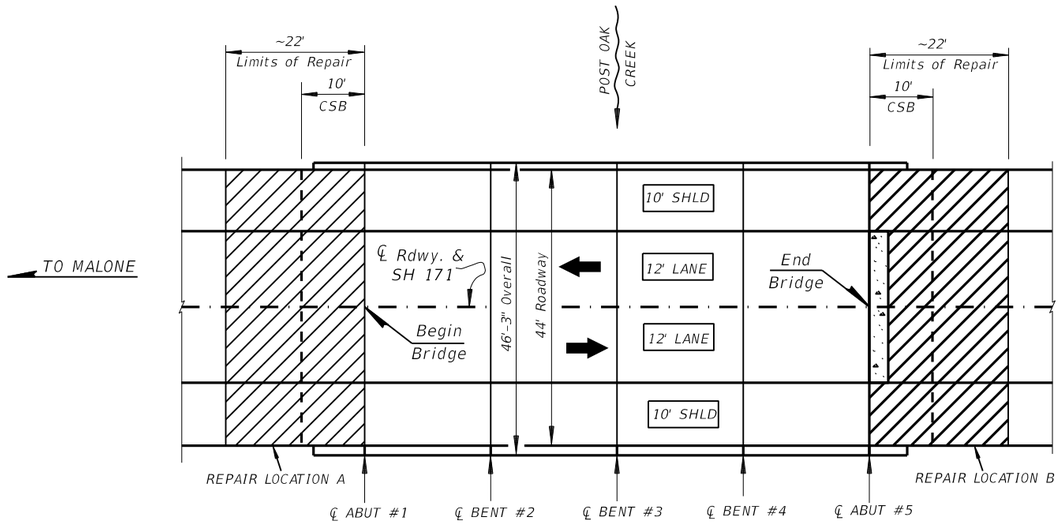
(SH 171 @ COTTONWOOD CREEK)

(STR.#031)

FILE: CotRdwyRep.dgn	DN: DOT	CK: DOT	DW: JB	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	WACO	6		85
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	HILL	0418	02	035	SH 171

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

SH 171 OVER POST OAK CREEK
80'-0" OVERALL LENGTH
(4 @ 20'-0") CONCRETE SLAB SPANS
44'-0" ROADWAY T501 RAIL



SH 171 OVER POST OAK CREEK
(NBI # 09-110-0-0418-02-032)

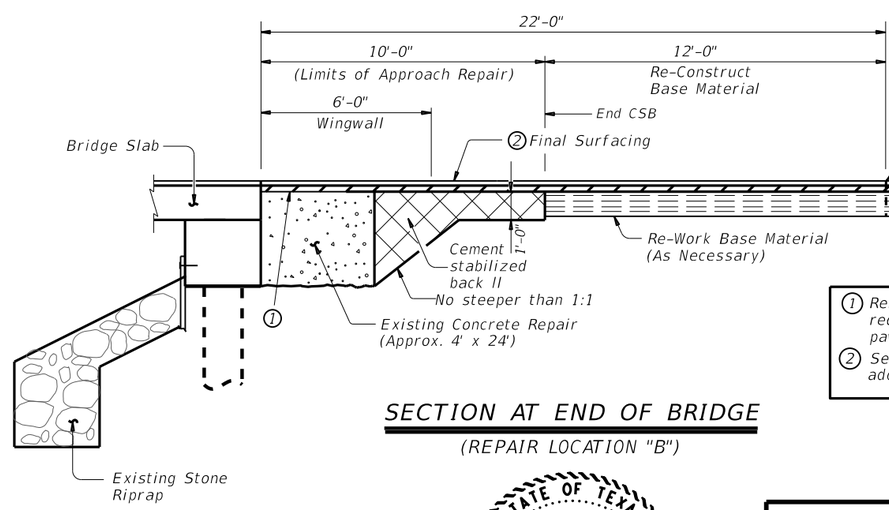
GENERAL NOTES:

All Materials and Labor required for installing Cement Stabilized Back II, shall be included in the price bid per CY for Item 400, CEM STABIL BKFL.

Re-working Base material and compaction including partial removal of of existing repair shall be subsidiary to various bid items.

Provide Cement Stabilized Back II (CSB) meeting the requirements of Item 400 "Excavation and Back II for Structures", to the limits shown at bridge abutments.

EXISTING CONCRETE REPAIR AT END OF BRIDGE
(REPAIR LOCATION B)



SECTION AT END OF BRIDGE
(REPAIR LOCATION "B")

1. Remove existing concrete as required to accomodate new pavement.
2. See Roadway Typical Sections for additional information.

ESTIMATED QUANTITIES

ITEM	0400-6005
SH171 OVER POST OAK CREEK	CEM STABIL BKFL
	C.Y.
NORTWEST ABUTMENT	34.0
SOUTHEAST ABUTMENT	22.0
TOTAL	56.0

STATE OF TEXAS
ROSS L. LANGDALE
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LICENSED
PROFESSIONAL ENGINEER
10/24/2023

SHEET 2 OF 3 SHEETS

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LAYOUT & DETAILS FOR ABUTMENT AND APPROACH ROADWAY REPAIR

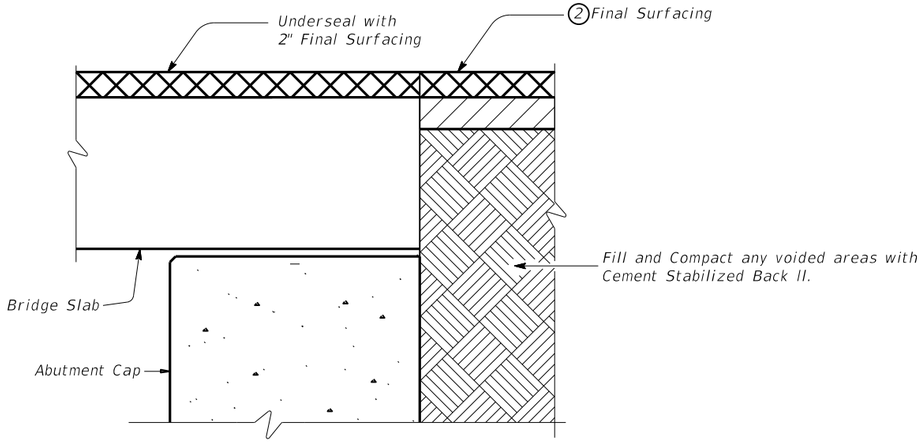
(SH 171 @ POST OAK CREEK)

(STR# 032)

FILE: POSTOAKABUT.DGN	DN: DOT	CK: DOT	DW: JB	CK: DOT
ORIG DATE: FEBRUARY 2022	DIST	FED REG	FEDERAL AID PROJECT •	SHEET
REVISIONS	WACO	6		86

COUNTY	CONTROL	SECT	JOB	HIGHWAY
HILL	0418	02	035	SH 171

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

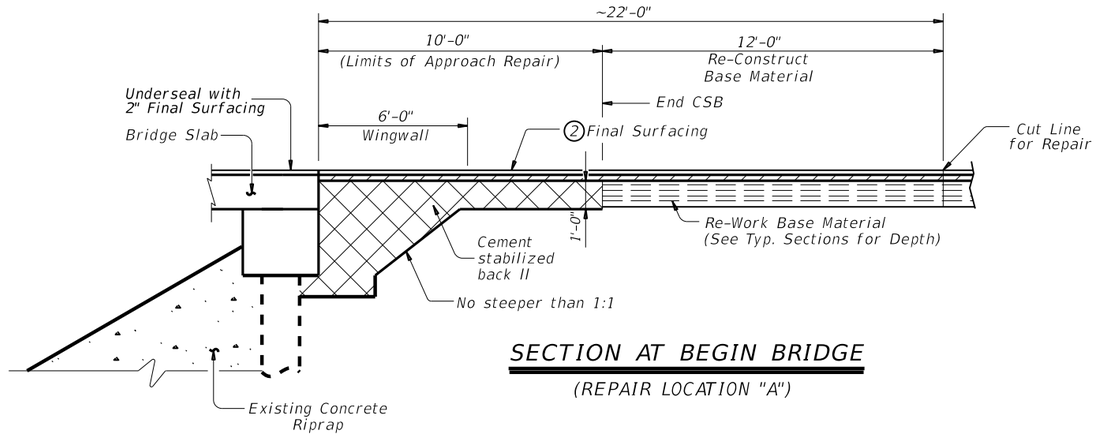


END OF BRIDGE LOCATIONS

SECTION THRU ABUTMENT

(APPROACH ROADWAY REPAIR)

2 See Roadway Typical Sections for additional information.



SECTION AT BEGIN BRIDGE

(REPAIR LOCATION "A")

STATE OF TEXAS
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PROFESSIONAL ENGINEER

10/24/2023

Ross L. Langdale, P.E.

SHEET 3 OF 3 SHEETS

LAYOUT & DETAILS FOR ABUTMENT AND APPROACH ROADWAY REPAIR

(SH 171 @ POST OAK CREEK)

(STR# 032)

FILE: POSTOAKABUT.DGN	DN: DOT	CK: DOT	DW: JB	CK: DOT		
ORIG DATE: FEBRUARY 2022	DIST	FED REG	FEDERAL AID PROJECT			SHEET
REVISIONS	WACO	6				87
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HILL		0418	02	035	SH 171

LEVELS DISPLAYED
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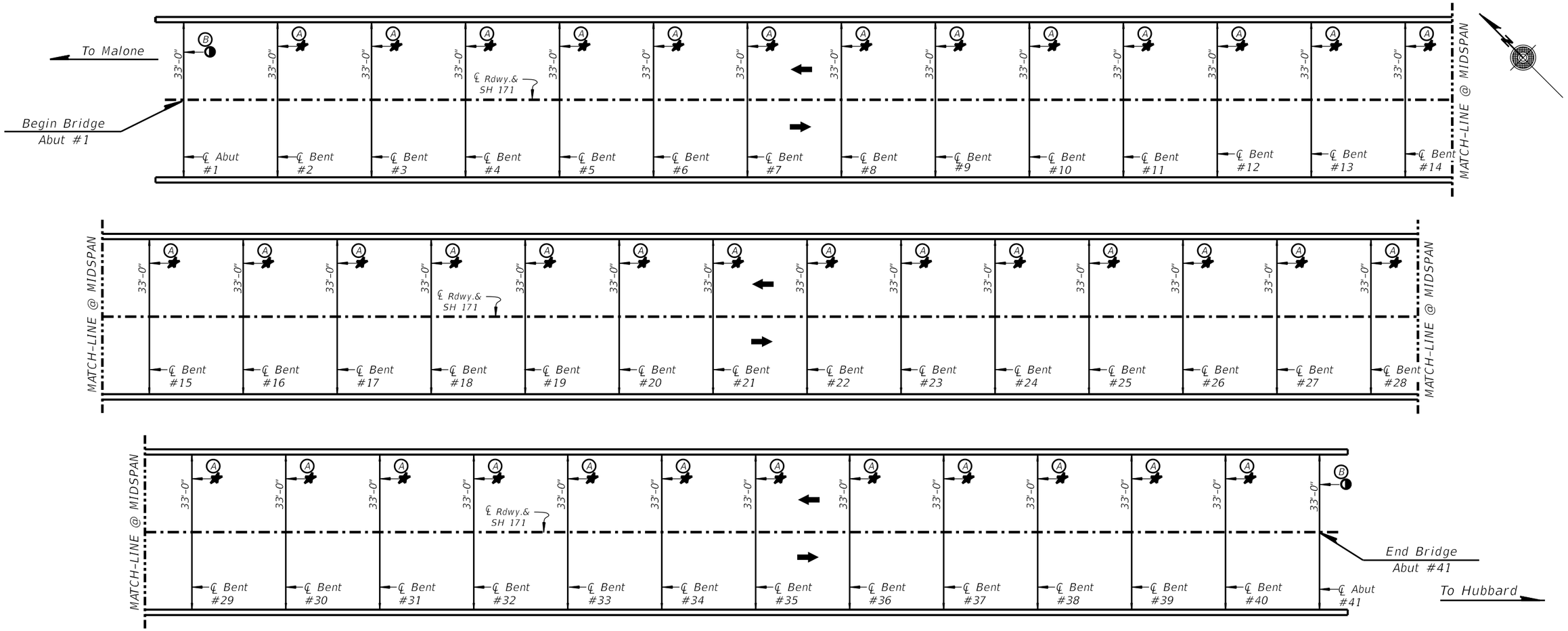

★ Denotes Location for Cleaning and Sealing Expansion Joints.

◑ Denotes Location for Cleaning and Sealing Relief Joints.

NOTE:
AN EXISTING OVERLAY (APPROX. 3"±)
TO BE REMOVED OFF THE BRIDGE DECK

LAYOUT PLAN

SH 171 OVER ASH CREEK
(NBI # 09-110-0-0418-02-028)

SH 171 OVER ASH CREEK
800'-0" OVERALL LENGTH
800'-0" (40 @ 20'-0") CONCRETE SLAB SPANS
33'-0" ROADWAY TYPE T501 RAIL

STATE OF TEXAS
ROSS L. LANGDALE
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LICENSED
PROFESSIONAL ENGINEER

10/24/2023

Ross Langdale, P.E.

Sheet 1 of 5 Sheets

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LAYOUT & DETAILS FOR CLEANING AND SEALING EXPANSION JOINTS

(SH 171 @ ASH CREEK)

(STR.#028)

FILE: AshCreekJt.dgn	DN: DOT	CK: DOT	DW: JB	CK: DOT	
ORIG DATE: FEB. 2022	DIST	FED REG	PROJECT NO.	•	SHEET
REVISIONS	WACO	6			90
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HILL		0418	02	035	SH 171

LEVELS DISPLAYED
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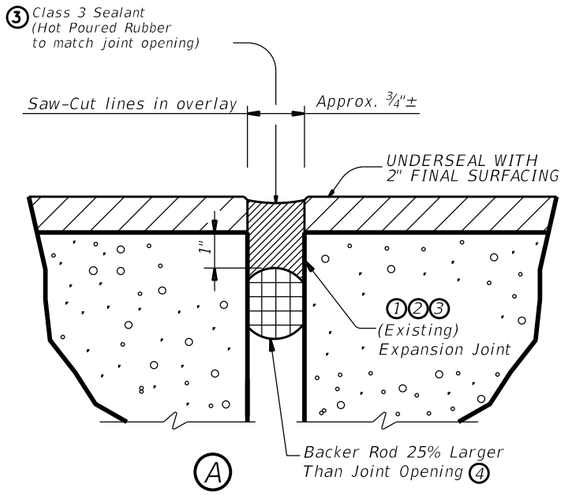
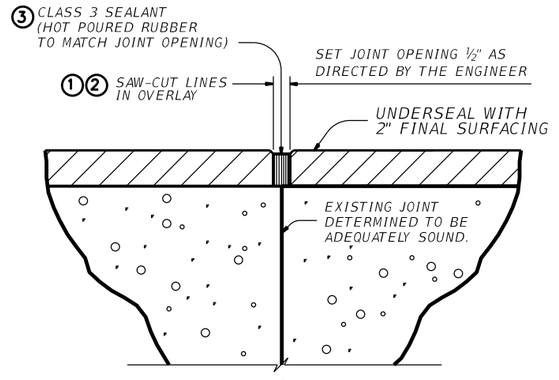
ACC:



A

SECTION THRU EXPANSION JOINT



B

SECTION THRU RELIEF JOINT

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

1. *SAW CUT THROUGH THE ASPHALT AT THE CENTERLINE OF JOINT. MAKE MULTIPLE SAW CUTS TO CREATE A ½" MINIMUM JOINT OPENING OR MATCH THE EXISTING JOINT OPENING. CLEAN JOINT OPENING OF ALL OLD EXPANSION MATERIALS/DEVICES, BITUMINOUS MATERIALS, DIRT, GREASE AND ALL OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS."*
2. *OBTAIN APPROVAL OF CLEANED JOINT PRIOR TO PROCEEDING WITH JOINT SEALING OPERATION.*
3. *SEAL THE JOINT OPENING WITH A CLASS 3, "HOT POURED RUBBER." SEAL FLUSH TO THE TOP OF THE ASPHALTIC CONCRETE PAVEMENT. PREPARE JOINT AND SEAL IN ACCORDANCE WITH ITEM 438 "CLEANING AND SEALING JOINTS."*

NOTES:

1. *Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a 1/2" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices. bituminous materials, dirt, grease and all other deleterous materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.*
2. *Obtain approval of cleaned joint prior to proceeding with joint sealing operation.*
3. *Place backer rod into joint opening 1" below the top of concrete. When sealing joints for slab spans, slab beam spans, or box beam spans, fill void below backer rod with extruded polystyrene foam before placing backer rod.*
4. *Seal the joint opening with a Class 3 joint sealant. Seal flush to the top of the asphaltic concrete pavement.*
5. *Provide backer rod 25% larger than joint opening and compatible with the sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.*
6. *Use Class 3 joint sealant in accordance with DM5-6310, "Joint Sealants and Fillers". Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."*
7. *Backer rod must be compatible with the hot poured rubber sealant and rated for a minimum of 400°F.*

ESTIMATED QUANTITIES

	A B
ITEM	438-6002
LOCATION	CLEANING AND SEALING EXIST JOINTS (CL 3)
	L.F.
STR. #028 SH 171 OVER ASH CREEK	1353.00
TOTAL	1353.00

GENERAL NOTES:

All work, including cleaning exist joint opening of all debris, and sealing joint, is paid for by Item 438, "Cleaning and Sealing Existing Joints."

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

Provide the joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers."

STATE OF TEXAS
ROSS L. LANGDALE
126994
LICENSED
PROFESSIONAL ENGINEER

10/24/2023

Ross Langdale, P.E.

LAYOUT & DETAILS FOR CLEANING AND SEALING EXPANSION JOINTS

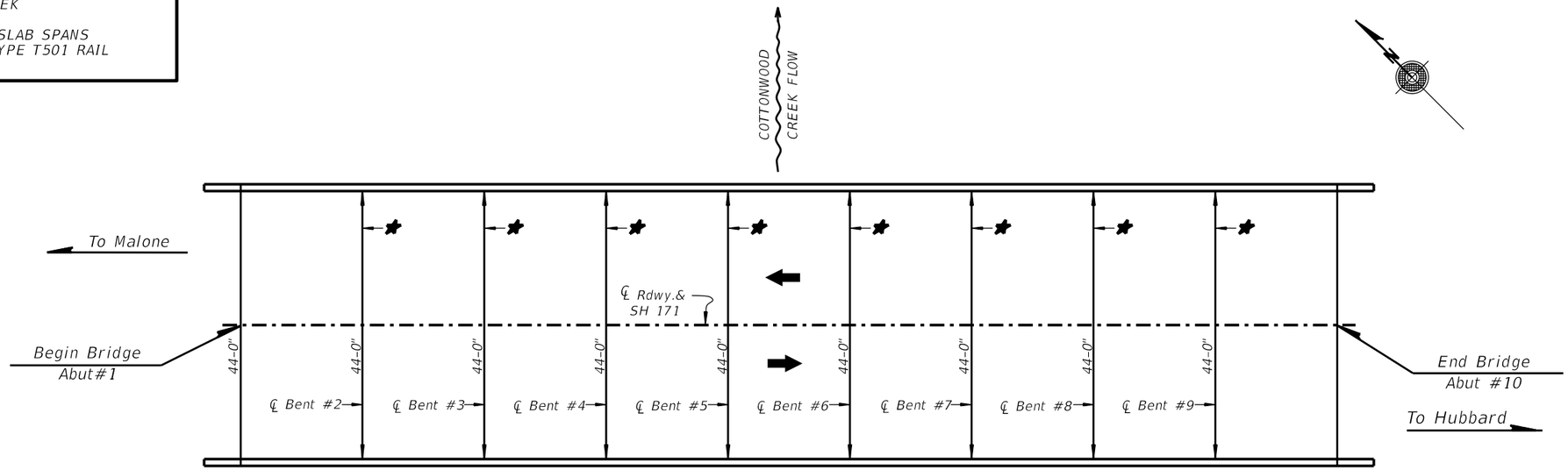
(SH 171 @ ASH CREEK)

(STR.#028)

FILE: AshCreekJt.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT			
ORIG DATE: FEB. 2022	DIST	FED REG	PROJECT NO.	•			SHEET
REVISIONS	WACO	6					91
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	HILL			0418	02	035	SH 171

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

SH 171 OVER COTTONWOOD CREEK
180'-0" OVERALL LENGTH
180'-0" (9 @ 20'-0") CONCRETE SLAB SPANS
44'-0" ROADWAY TYPE T501 RAIL



★ Denotes Location for Cleaning and Sealing Expansion Joints.

LAYOUT PLAN

SH 171 OVER COTTONWOOD CREEK
(NBI # 09-110-0-0418-02-031)

ESTIMATED QUANTITIES

ITEM	438-6004
LOCATION	CLEANING AND SEALING EXIST JOINTS (CL 7)
	L.F.
STR. #031 SH 171 OVER COTTONWOOD CREEK	352.00
TOTAL	352.00

NOTE:
AN EXISTING OVERLAY (APPROX. 3"±) TO BE REMOVED OFF THE BRIDGE DECK

NOTES:

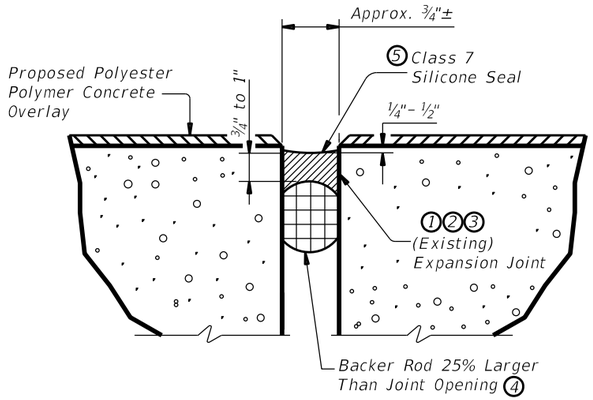
1. The joints shall be cleaned in accordance with Item 438 and prior to beginning operations, the Contractor shall submit a statement from the Sealant Manufacturer showing the recommended equipment and Installation procedures to be used.

2. Condition of existing expansion joint or rail shall be determined prior to placing sealant material. The entire length of existing joint shall be checked and any portion that is determined unsound by the Engineer shall be removed as directed by the Engineer. Any existing seal shall be removed and disposed of.

3. Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint. Obtain approval of cleaned joint prior to proceeding with joint sealing operation. Seal the joint opening with a Class 7 Silicone.

4. Place backer rod into joint opening below top of concrete as shown. The backer rod must be 25% larger than the joint opening.

5. Seal the joint opening with Class 5 or Class 7 Silicone as shown. Prepare surfaces where sealant is to be placed in accordance with manufacturers speci cations.



SECTION THRU SEALED EXPANSION JOINT

NOT TO SCALE

Clean and Seal existing Bridge Joints prior to installing POLYESTER POLYMER CONCRETE OVERLAY.
See elsewhwre in Plans for Traffic Control.

GENERAL NOTES:

All work, including cleaning exist joint opening of all debris, and sealing joint, is paid for by Item 438, "Cleaning and Sealing Existing Joints."

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

Provide the joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers."

STATE OF TEXAS
ROSS L. LANGDALE
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PROFESSIONAL ENGINEER
10/24/2023
Ross L Langdale, P.E.

LAYOUT & DETAILS FOR CLEANING AND SEALING EXPANSION JOINTS

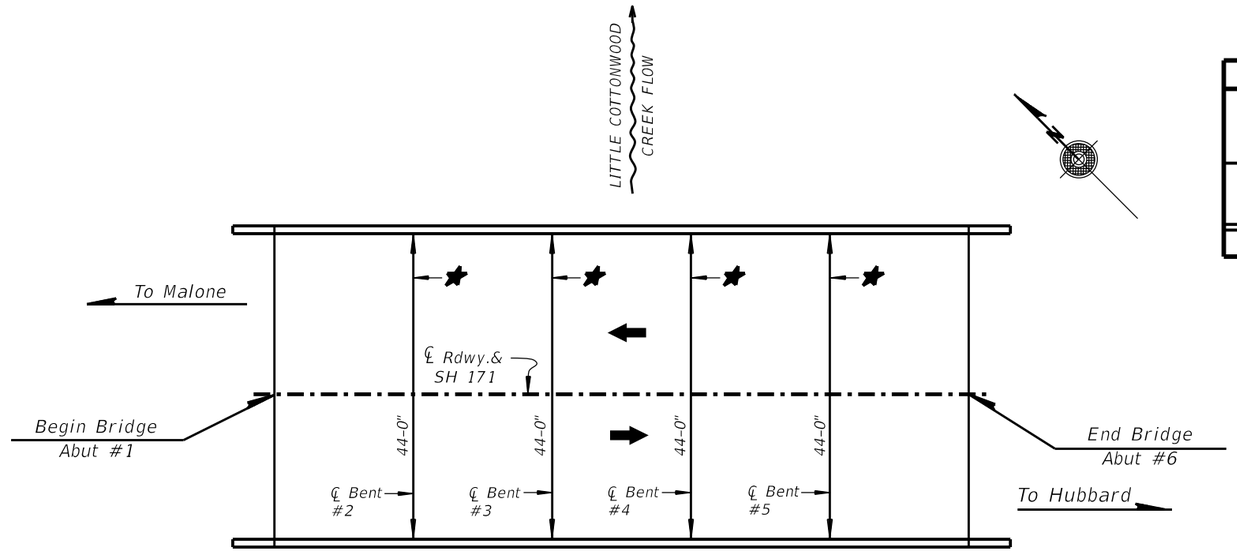
(SH 171 @ COTTONWOOD CREEK)

(STR.#031)

FILE: CottonwoodCrkJt.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT		
ORIG DATE: FEB. 2022	DIST	FED REG	PROJECT NO.	•		SHEET
REVISIONS	WACO	6				92
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HILL		0418	02	035	SH 171

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

SH 171 OVER LITTLE COTTONWOOD CREEK
100'-0" OVERALL LENGTH
100'-0" (5 @ 20'-0") CONCRETE SLAB SPANS
44'-0" ROADWAY TYPE T501 RAIL



✱ Denotes Location for Cleaning and Sealing Expansion Joints.

LAYOUT PLAN

SH 171 OVER LITTLE COTTONWOOD CREEK
(NBI # 09-110-0-0418-02-030)

ESTIMATED QUANTITIES

ITEM	438-6004
LOCATION	CLEANING AND SEALING EXIST JOINTS (CL 7)
	L.F.
STR. #030 SH 171 OVER LITTLE COTTONWOOD CREEK	176.00
TOTAL	176.00

NOTE:
AN EXISTING OVERLAY (APPROX. 3"±)
TO BE REMOVED OFF THE BRIDGE DECK

NOTES:

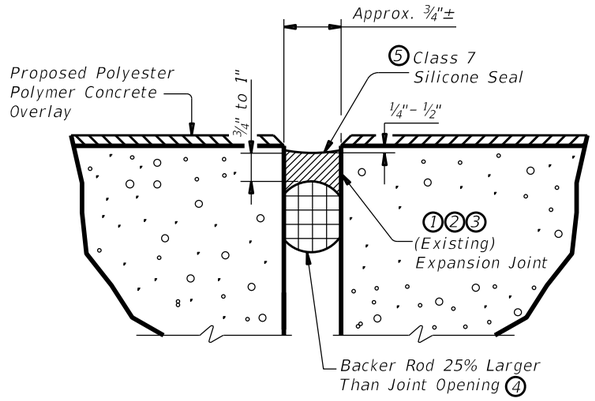
1. The joints shall be cleaned in accordance with Item 438 and prior to beginning operations, the Contractor shall submit a statement from the Sealant Manufacturer showing the recommended equipment and Installation procedures to be used.

2. Condition of existing expansion joint or rail shall be determined prior to placing sealant material. The entire length of existing joint shall be checked and any portion that is determined unsound by the Engineer shall be removed as directed by the Engineer. Any existing seal shall be removed and disposed of.

3. Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint. Obtain approval of cleaned joint prior to proceeding with joint sealing operation. Seal the joint opening with a Class 7 Silicone.

4. Place backer rod into joint opening below top of concrete as shown. The backer rod must be 25% larger than the joint opening.

5. Seal the joint opening with Class 5 or Class 7 Silicone as shown. Prepare surfaces where sealant is to be placed in accordance with manufacturers speci cations.



SECTION THRU SEALED EXPANSION JOINT

NOT TO SCALE

Clean and Seal existing Bridge Joints prior to installing POLYESTER POLYMER CONCRETE OVERLAY.
See elsewhwre in Plans for Tra c Control.

GENERAL NOTES:

All work, including cleaning exist joint opening of all debris, and sealing joint, is paid for by Item 438, "Cleaning and Sealing Existing Joints."

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

Provide the joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers."

STATE OF TEXAS
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10/24/2023
Ross L Langdale, P.E.

Sheet 4 of 5 Sheets

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LAYOUT & DETAILS FOR CLEANING AND SEALING EXPANSION JOINTS

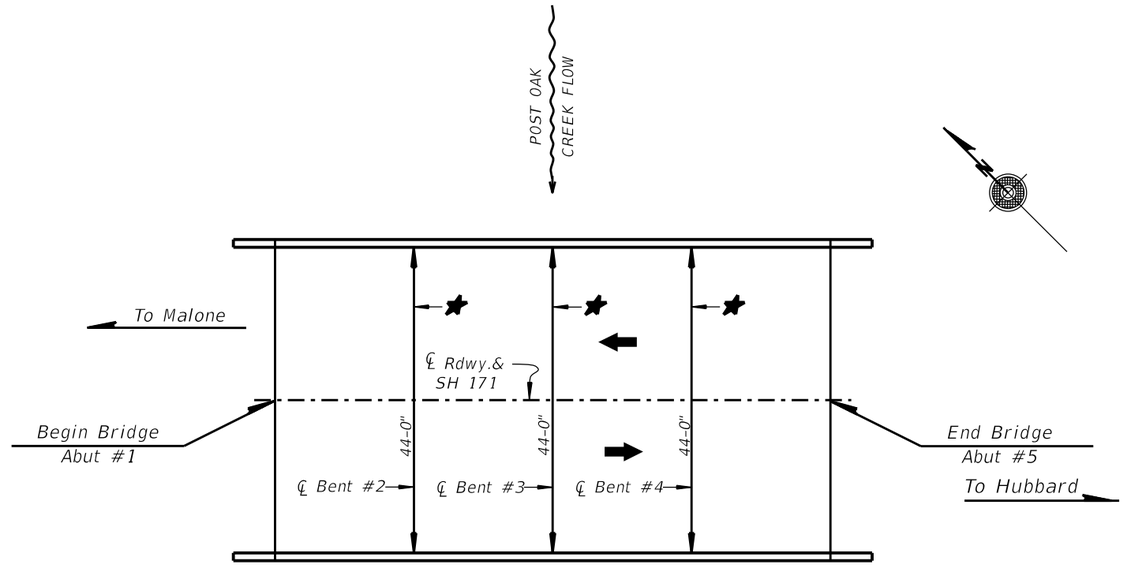
(SH 171 @ LITTLE COTTONWOOD CREEK)

(STR.#030)

FILE: LaCotwoodCrk.dgn	DN: DOT	CK: DOT	DW: JB	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	PROJECT NO. •	SHEET
REVISIONS	WACO	6		93
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HILL		0418 02 035	SH 171

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

SH 171 OVER POST OAK CREEK
80'-0" OVERALL LENGTH
80'-0" (4 @ 20'-0") CONCRETE SLAB SPANS
44'-0" ROADWAY TYPE T501 RAIL



★ Denotes Location for Cleaning and Sealing Expansion Joints.

ESTIMATED QUANTITIES

ITEM	438-6004
LOCATION	CLEANING AND SEALING EXIST JOINTS (CL 7)
	L.F.
STR. #030 SH 171 OVER POST OAK CREEK	132.00
TOTAL	132.00

NOTE:
AN EXISTING OVERLAY (APPROX. 3"±)
TO BE REMOVED OFF THE BRIDGE DECK

LAYOUT PLAN

SH 171 OVER POST OAK CREEK
(NBI # 09-110-0-0418-02-032)

NOTES:

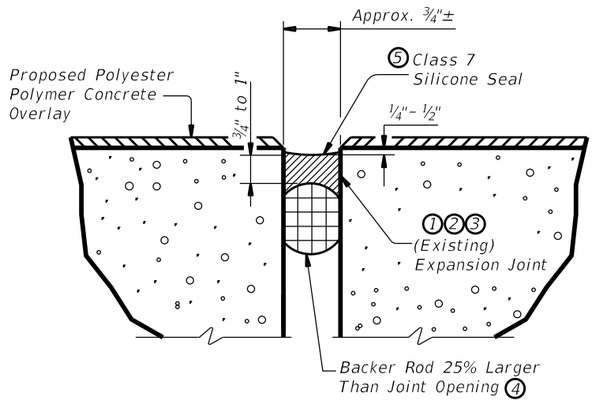
1. The joints shall be cleaned in accordance with Item 438 and prior to beginning operations, the Contractor shall submit a statement from the Sealant Manufacturer showing the recommended equipment and Installation procedures to be used.

2. Condition of existing expansion joint or rail shall be determined prior to placing sealant material. The entire length of existing joint shall be checked and any portion that is determined unsound by the Engineer shall be removed as directed by the Engineer. Any existing seal shall be removed and disposed of.

3. Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint. Obtain approval of cleaned joint prior to proceeding with joint sealing operation. Seal the joint opening with a Class 7 Silicone.

4. Place backer rod into joint opening below top of concrete as shown. The backer rod must be 25% larger than the joint opening.

5. Seal the joint opening with Class 5 or Class 7 Silicone as shown. Prepare surfaces where sealant is to be placed in accordance with manufacturers speci cations.



SECTION THRU SEALED EXPANSION JOINT

NOT TO SCALE

Clean and Seal existing Bridge Joints prior to installing POLYESTER POLYMER CONCRETE OVERLAY.
See elsewhwre in Plans for Tra c Control.

GENERAL NOTES:

All work, including cleaning exist joint opening of all debris, and sealing joint, is paid for by Item 438, "Cleaning and Sealing Existing Joints."

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

Provide the joint sealant in accordance with DMS-6310, "Joint Sealants and Fillers."

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ROSS L. LANGDALE
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PROFESSIONAL ENGINEER
10/24/2023

Ross L Langdale, P.E.

Sheet 5 of 5 Sheets

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LAYOUT & DETAILS FOR CLEANING AND SEALING EXPANSION JOINTS

(SH 171 @ POST OAK CREEK)

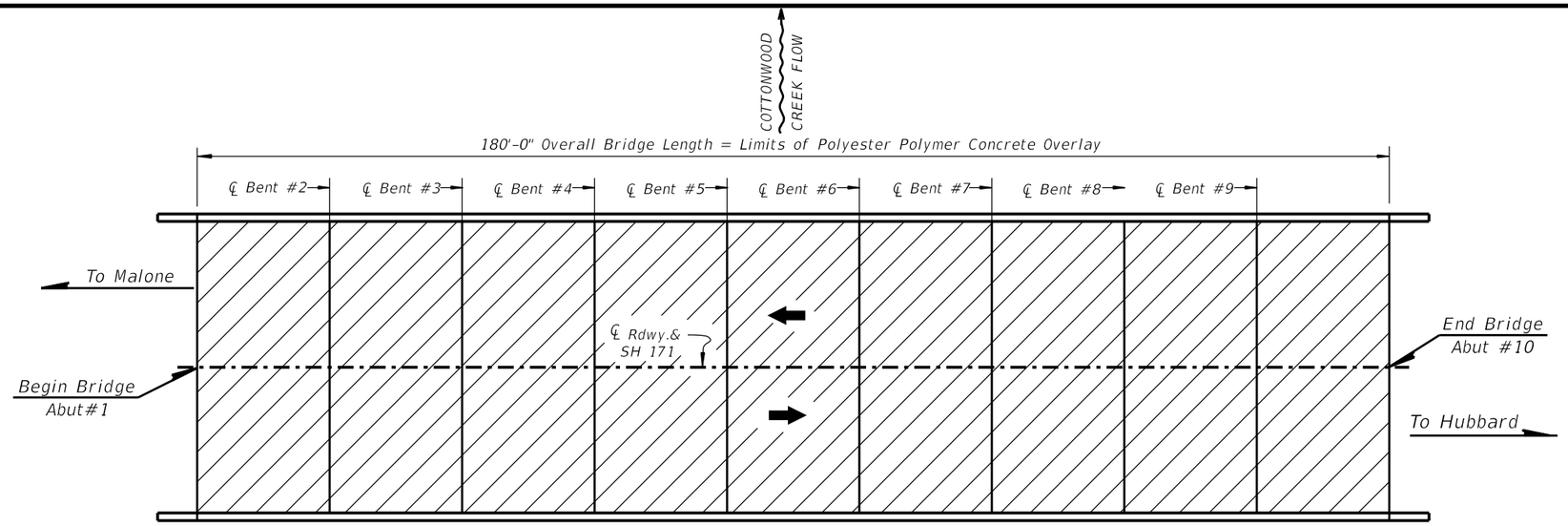
(STR.#032)

FILE: PostOakJtRep.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: FEB. 2022	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	WACO	6		94
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HILL		0418 02 035	SH 171

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

GENERAL NOTES:

1. Perform work in accordance with Special Specification 4106 and below instructions. A technical representative of the overlay manufacturer should be present at the pre-construction meeting and execution of all work associated with the overlay installation.
2. Plane asphalt from bridge deck per Item 354, "Planing and Texturing Pavement." The thickness of the existng ACP is approximately 3"±.
3. Inspect the bridge deck for any potential deck repairs or delaminated concrete. Perform partial and/or full depth bridge deck repairs in accordance with Item 429. "Concrete Structure Repair" and Chapter 3, Section 4 of TxDOT Concrete Repair Manual. Cure repairs in accordance with Manufacturer's recommendations unless approved otherwise. This work will be paid for in accordance with Item 429, "Concrete Structure Repair."
4. Prepare the deck surface by shot blasting and cleaning with high pressure air. Remove all oil and other contaminants. Provide a surface profile with no less than 1/4" deviation. This work is subsidiary to Special Specification 4106.
5. Mask existing joints and deck drains. Saw cutting of joints after overlay installation is prohibited.
6. Install 1" Polymer Concrete Overlay per Special Specification 4106.
7. The Contractor is responsible for the ride quality of the finished surface. See Article 422.4.10, "Defective Work" for acceptance criteria to be enforced for this work.
8. Groove surface in accordance with Article 422.4.11 "Final Surface Texture."
9. Install pavement markings. See elsewhere in plans for pavement marking details.
10. Seal all expansion joints. See elsewhere in plans for joint details.



LAYOUT PLAN

SH 171 OVER COTTONWOOD CREEK
(NBI # 09-110-0-0418-02-031)

ESTIMATED QUANTITIES

LOCATION	429-6009 CONC STR REPAIR (STANDARD)	4106-6007 POLYESTER POLYMER CONC OVERLAY (1")
SH 171 (COTTONWOOD CREEK)	SF	SY
	43.0	869
TOTAL	43.0	869

GENERAL NOTES:

Refer to Special Specification 4106 for Materials, Equipment, Construction and Payment.

Repair any deteriorated concrete below the level of scarification in accordance with Item 429, "Concrete Structure Repair."

See elsewhere in Plans for Traffic Control.

STATE OF TEXAS
ROSS L. LANGDALE
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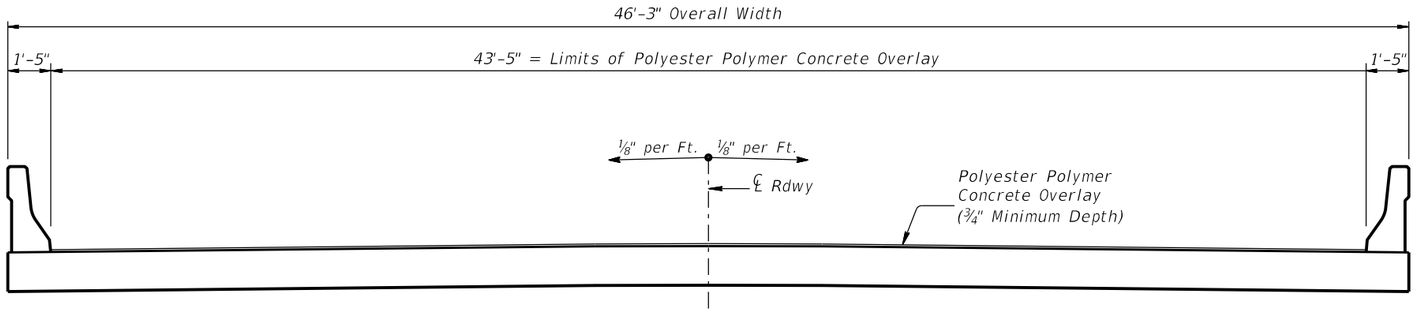
PROFESSIONAL ENGINEER

10/24/2023

Ross L. Langdale, P.E.



TYPICAL BRIDGE SECTION

(SHOWING CONCRETE SLAB SPAN)

NOTE:
AN EXISTING OVERLAY (APPROX. 3"±) TO BE REMOVED OFF THE BRIDGE DECK

LEVELS DISPLAYED ACC:

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

Sheet 1 of 3 Sheets

Texas Department of Transportation

POLYESTER POLYMER CONCRETE OVERLAY DETAILS

(SH 171 @ COTTONWOOD CREEK)

(STR.#031)

FILE: SH171PVMT.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: SEPT.2022	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	WACO	6		95
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HILL		0418 02 035	SH 171

GENERAL NOTES:

1. Perform work in accordance with Special Specification 4106 and below instructions. A technical representative of the overlay manufacturer should be present at the pre-construction meeting and execution of all work associated with the overlay installation.

2. Plane asphalt from bridge deck per Item 354, "Planing and Texturing Pavement." The thickness of the existng ACP is approximately 3"±.

3. Inspect the bridge deck for any potential deck repairs or delaminated concrete. Perform partial and/or full depth bridge deck repairs in accordance with Item 429. "Concrete Structure Repair" and Chapter 3, Section 4 of TxDOT Concrete Repair Manual. Cure repairs in accordance with Manufacturer's recommendations unless approved otherwise. This work will be paid for in accordance with Item 429, "Concrete Structure Repair."

4. Prepare the deck surface by shot blasting and cleaning with high pressure air. Remove all oil and other contaminants. Provide a surface profile with no less than 1/4" deviation. This work is subsidiary to Special Specification 4106.

5. Mask existing joints and deck drains. Saw cutting of joints after overlay installation is prohibited.

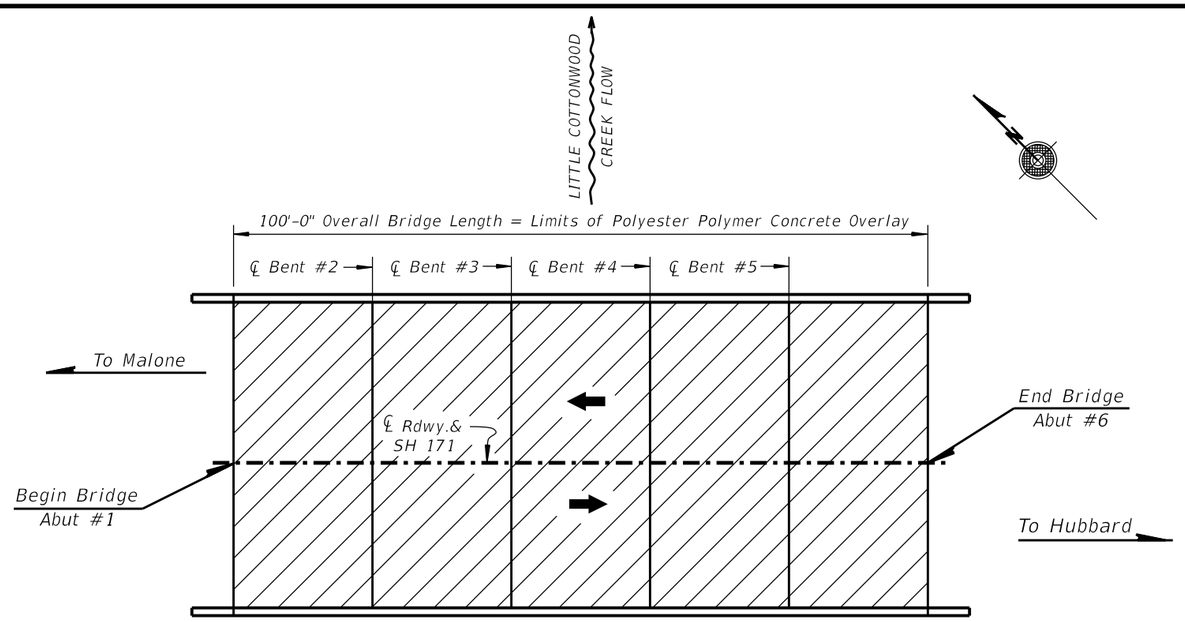
6. Install 1" Polymer Concrete Overlay per Special Specification 4106.

7. The Contractor is responsible for the ride quality of the finished surface. See Article 422.4.10, "Defective Work" for acceptance criteria to be enforced for this work.

8. Groove surface in accordance with Article 422.4.11 "Final Surface Texture."

9. Install pavement markings. See elsewhere in plans for pavement marking details.

10. Seal all expansion joints. See elsewhere in plans for joint details.



LAYOUT PLAN

SH 171 OVER LITTLE COTTONWOOD CREEK
(NBI # 09-110-0-0418-02-030)

ESTIMATED QUANTITIES

LOCATION	429-6009	4106-6007
	CONC STR REPAIR (STANDARD)	POLYESTER POLYMER CONC OVERLAY (1")
SH 171 (LITTLE) (COTTONWOOD CREEK)	SF	SY
	22.0	483
TOTAL	22.0	483

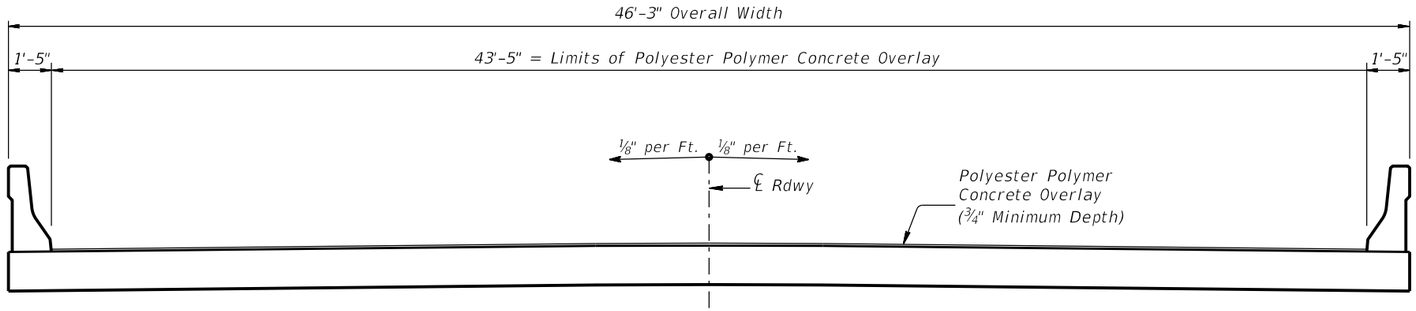
GENERAL NOTES:

Refer to Special Specification 4106 for Materials, Equipment, Construction and Payment.

Repair any deteriorated concrete below the level of scarification in accordance with Item 429, "Concrete Structure Repair."

See elsewhere in Plans for Traffic Control.

NOTE:
AN EXISTING OVERLAY (APPROX. 3"±)
TO BE REMOVED OFF THE BRIDGE DECK



TYPICAL BRIDGE SECTION

(SHOWING CONCRETE SLAB SPAN)

STATE OF TEXAS
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PROFESSIONAL ENGINEER
10/24/2023
Ross L. Langdale, P.E.

POLYESTER POLYMER CONCRETE OVERLAY DETAILS

(SH 171 @ LITTLE COTTONWOOD CREEK)

(STR.#030)

FILE: SH171PVMT.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT			
ORIG DATE: SEPT.2022	DIST	FED REG	PROJECT NO.				SHEET
REVISIONS	WACO	6					96
	COUNTY		CONTROL	SECT	JOB		HIGHWAY
	HILL		0418	02	035		SH 171

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

GENERAL NOTES:

1. Perform work in accordance with Special Specification 4106 and below instructions. A technical representative of the overlay manufacturer should be present at the pre-construction meeting and execution of all work associated with the overlay installation.

2. Plane asphalt from bridge deck per Item 354, "Planing and Texturing Pavement." The thickness of the existng ACP is approximately 3"±.

3. Inspect the bridge deck for any potential deck repairs or delaminated concrete. Perform partial and/or full depth bridge deck repairs in accordance with Item 429. "Concrete Structure Repair" and Chapter 3, Section 4 of TxDOT Concrete Repair Manual. Cure repairs in accordance with Manufacturer's recommendations unless approved otherwise. This work will be paid for in accordance with Item 429, "Concrete Structure Repair."

4. Prepare the deck surface by shot blasting and cleaning with high pressure air. Remove all oil and other contaminants. Provide a surface profile with no less than 1/4" deviation. This work is subsidiary to Special Specification 4106.

5. Mask existing joints and deck drains. Saw cutting of joints after overlay installation is prohibited.

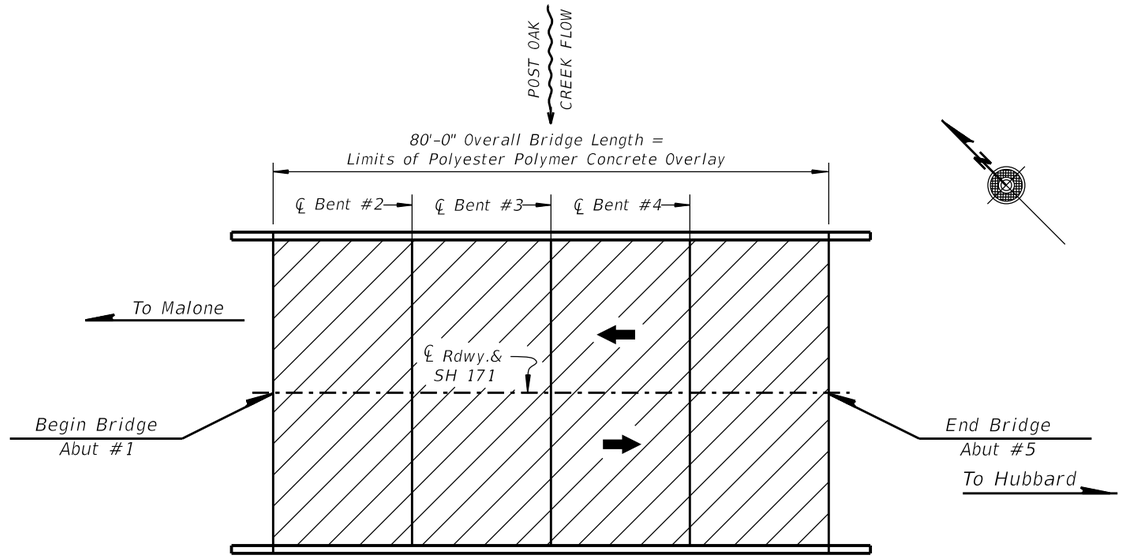
6. Install 1" Polymer Concrete Overlay per Special Specification 4106.

7. The Contractor is responsible for the ride quality of the finished surface. See Article 422.4.10, "Defective Work" for acceptance criteria to be enforced for this work.

8. Groove surface in accordance with Article 422.4.11 "Final Surface Texture."

9. Install pavement markings. See elsewhere in plans for pavement marking details.

10. Seal all expansion joints. See elsewhere in plans for joint details.



LAYOUT PLAN

SH 171 OVER POST OAK CREEK
(NBI # 09-110-0-0418-02-032)

ESTIMATED QUANTITIES

LOCATION	429-6009 CONC STR REPAIR (STANDARD)	4106-6007 POLYESTER POLYMER CONC OVERLAY (1")
SH 171 (POST OAK CREEK)	SF	SY
	20.0	386
TOTAL	20.0	386

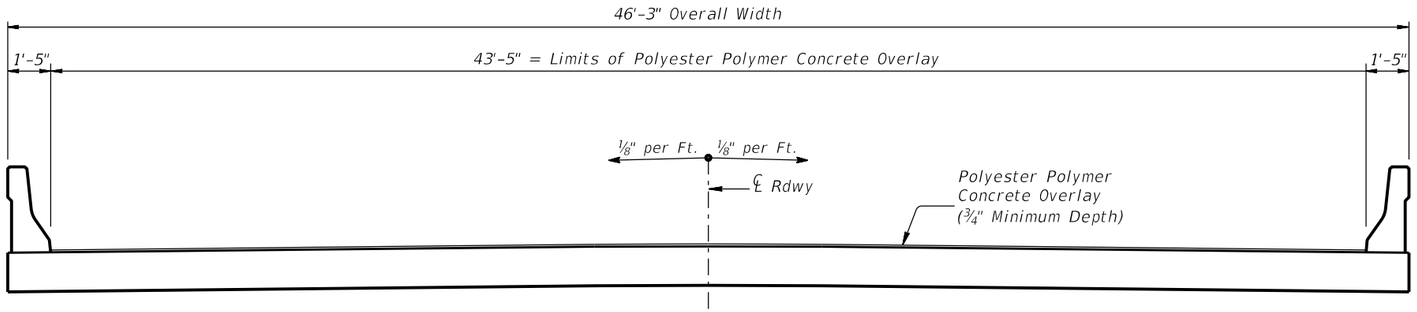
NOTE:
AN EXISTING OVERLAY (APPROX. 3"±)
TO BE REMOVED OFF THE BRIDGE DECK

GENERAL NOTES:

Refer to Special Specification 4106 for Materials, Equipment, Construction and Payment.

Repair any deteriorated concrete below the level of scarification in accordance with Item 429, "Concrete Structure Repair."

See elsewhere in Plans for Traffic Control.



TYPICAL BRIDGE SECTION

(SHOWING CONCRETE SLAB SPAN)

STATE OF TEXAS
ROSS L. LANGDALE
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PROFESSIONAL ENGINEER
10/24/2023
Ross L. Langdale, P.E.

POLYESTER POLYMER CONCRETE OVERLAY DETAILS

(SH 171 @ POST OAK CREEK)

(STR.#032)

FILE: SH171PVMT.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT		
ORIG DATE: SEPT.2022	DIST	FED REG	PROJECT NO.			SHEET
REVISIONS	WACO	6				97
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	HILL		0418	02	035	SH 171

LEVELS DISPLAYED ACC:

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33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
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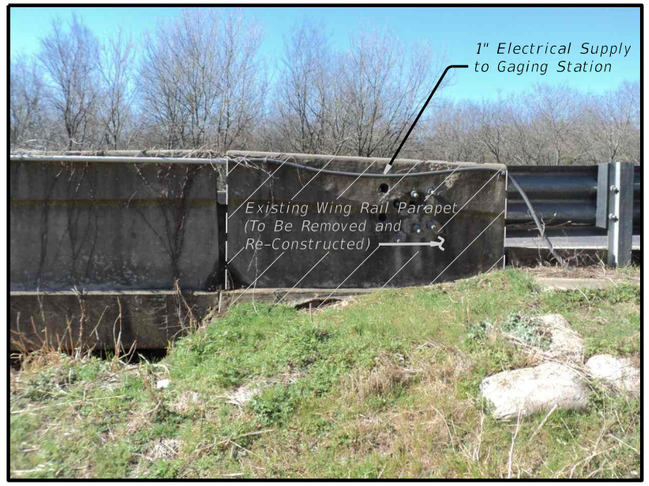
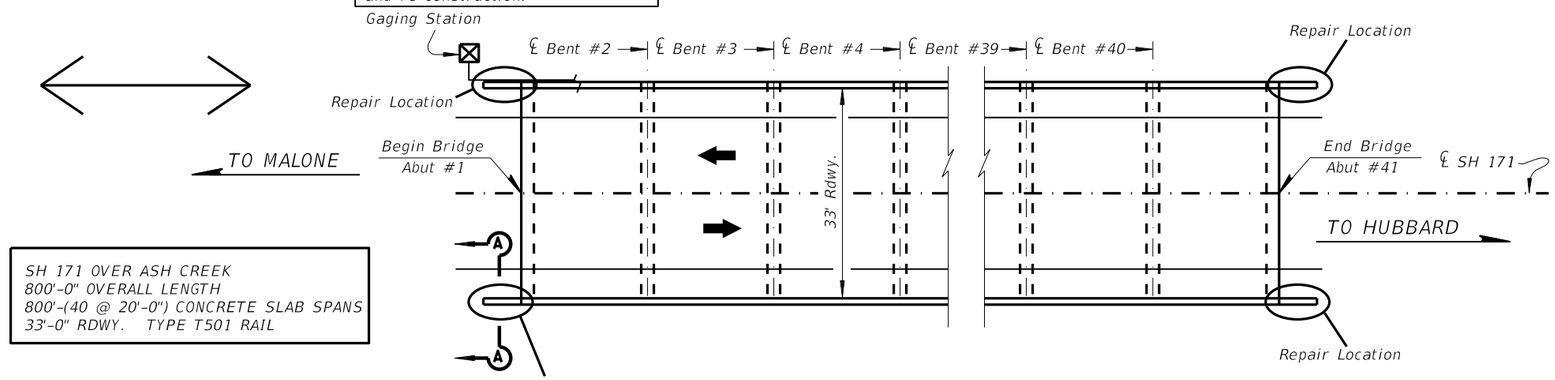


ELEVATION OF EXISTING SETTLED RAIL PARAPET

(SHOWING NW CORNER – STR #028 ASH CREEK)

Note:
Power Supply to Gaging Station will need to be removed from back of Rail Parapet prior to removal and re-construction.

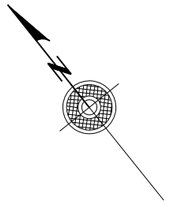


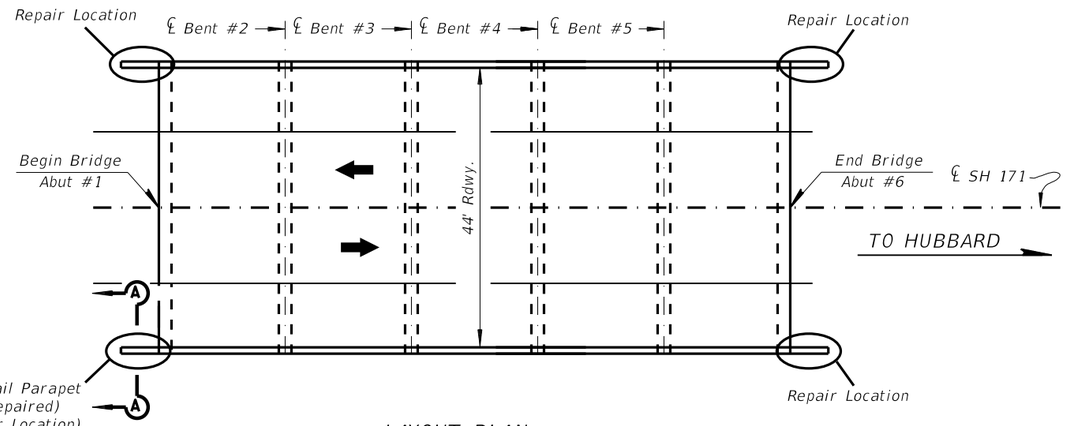
SH 171 OVER ASH CREEK
800'-0" OVERALL LENGTH
800'-(40 @ 20'-0") CONCRETE SLAB SPANS
33'-0" RDWY. TYPE T501 RAIL

LAYOUT PLAN

SH 171 OVER ASH CREEK

NBI NO. = 09-110-0-0418-02-028





SH 171 OVER LITTLE COTTONWOOD CREEK
100'-0" OVERALL LENGTH
100'-(5 @ 20'-0") CONCRETE SLAB SPANS
44'-0" RDWY. TYPE T501 RAIL

LAYOUT PLAN

SH 171 OVER LITTLE COTTONWOOD CREEK

NBI NO. = 09-110-0-0418-02-030

GENERAL NOTES:

All materials and Labor required for constructing Tra c Rail Foundation, Anchor Shaft and including excavation and back lling shall be included in the price bid per CY for CL C CONC (RAIL FOUNDATION).

All materials and Labor required for constructing Tra c Rail Parapet shall be included in the price bid per LF for RETROFIT RAIL (CONC PARAPET).

Shop drawings will not be required for this rail. Average weight of railing with no overlay is 326 plf.

ESTIMATED QUANTITIES

ITEM	0420-6066	0451-6073	*
LOCATION	CL C CONC (RAIL FOUNDATION)	RETROFIT RAIL (CONC PARAPET)	EXISTING RAIL PARAPET (REMOVAL)
	C.Y.	L.F.	L.F.
STR #028 ASH CREEK	4.0	24.0	24.0
STR #030 LITTLE COTTONWOOD CREEK	4.0	24.0	24.0
STR #031 COTTONWOOD CREEK	4.0	24.0	24.0
STR #032 POST OAK CREEK	4.0	24.0	24.0
TOTAL	16.0	96.0	96.0

See elsewhere in plans for removal of MBGF, and proposed MBGF quantities with end treatment.

* FOR CONTRACTORS INFORMATION ONLY. Removal of Existing Rail Parapets are included in the Unit Bid Price per LF for RETROFIT RAIL (CONC PARAPET).

STATE OF TEXAS
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10/24/2023

Ross L Langdale, P.E.

SHEET 1 OF 4 SHEETS

Texas Department of Transportation

WINGWALL REPAIR DETAILS

STR #028 ASH CREEK

STR #030 LITTLE COTTONWOOD CREEK

STR #031 COTTONWOOD CREEK

STR #032 POST OAK CREEK

FILE: SH171WINGREP.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL AID PROJECT	SHEET
REVISIONS	WACO	6		99
	COUNTY		CONTROL SECT	JOB HIGHWAY
	HILL		0418 02	035 SH171

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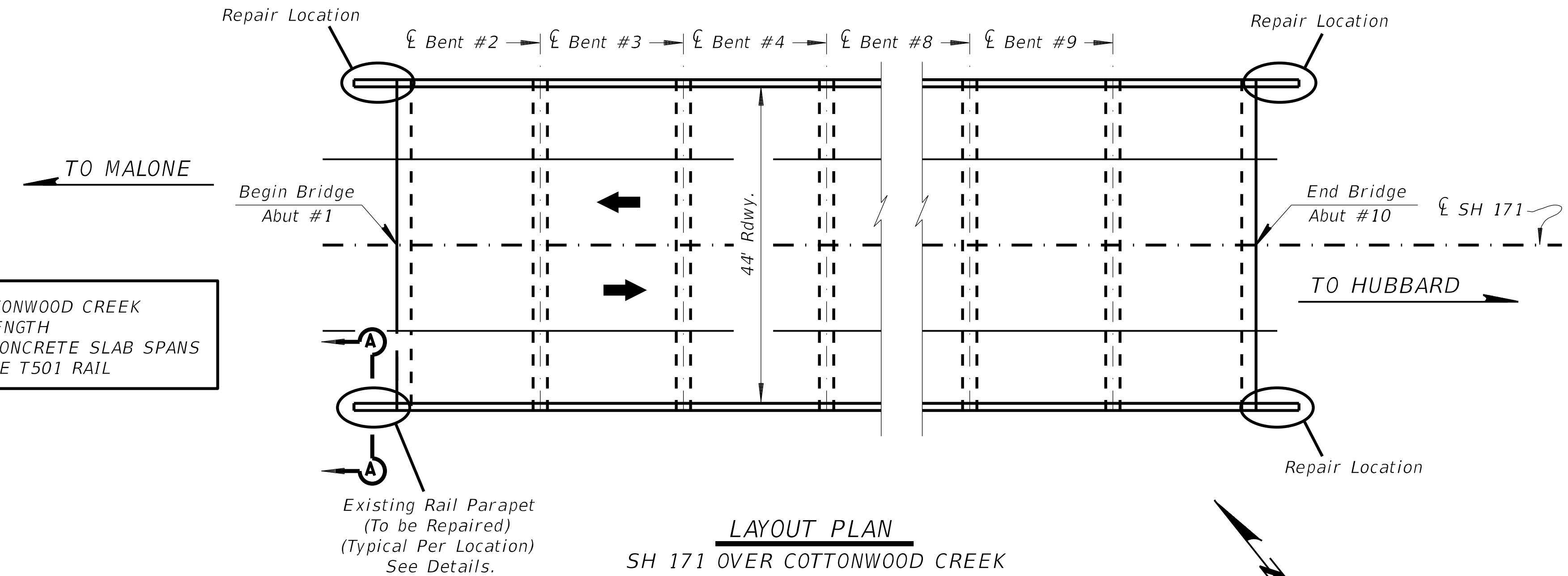
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63

ACC:

ELEVATION OF EXISTING SETTLED RAIL PARAPET

(SHOWING SW CORNER - STR #028 ASH CREEK)
OTHER LOCATIONS ~ SIMILAR

SH 171 OVER COTTONWOOD CREEK
180'-0" OVERALL LENGTH
180'-(9 @ 20'-0") CONCRETE SLAB SPANS
44'-0" RDWY. TYPE T501 RAIL



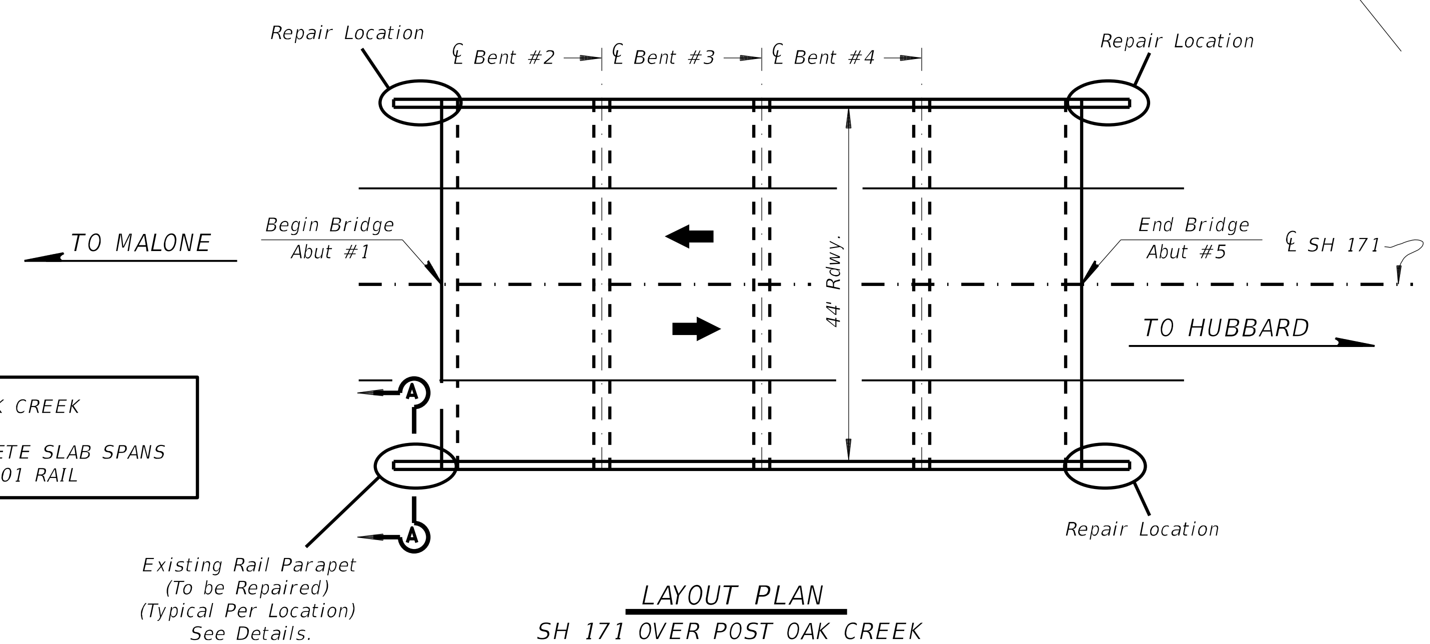
LAYOUT PLAN

SH 171 OVER COTTONWOOD CREEK
NBI NO. = 09-110-0-0418-02-031

ELEVATION OF EXISTING SETTLED RAIL PARAPET

(SHOWING THRIE-BEAM CONNECTION)
TYPICAL FOR ALL LOCATIONS

SH 171 OVER POST OAK CREEK
80'-0" OVERALL LENGTH
80'-(4 @ 20'-0") CONCRETE SLAB SPANS
44'-0" RDWY. TYPE T501 RAIL



LAYOUT PLAN

SH 171 OVER POST OAK CREEK
NBI NO. = 09-110-0-0418-02-032

STATE OF TEXAS
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10/24/2023
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SHEET 2 OF 4 SHEETS

Texas Department of Transportation

WINGWALL REPAIR DETAILS

STR #028 ASH CREEK
STR #030 LITTLE COTTONWOOD CREEK
STR #031 COTTONWOOD CREEK
STR #032 POST OAK CREEK

FILE: SH171WINGREP.dgn	DN: DOT		CK: DOT		DW: GNH		CK: DOT	
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL AID PROJECT ⊕					SHEET
REVISIONS	WACO	6						100
	COUNTY			CONTROL	SECT	JOB		HIGHWAY
	HILL			0418	02	035		SH171

LEVELS DISPLAYED																ACC:
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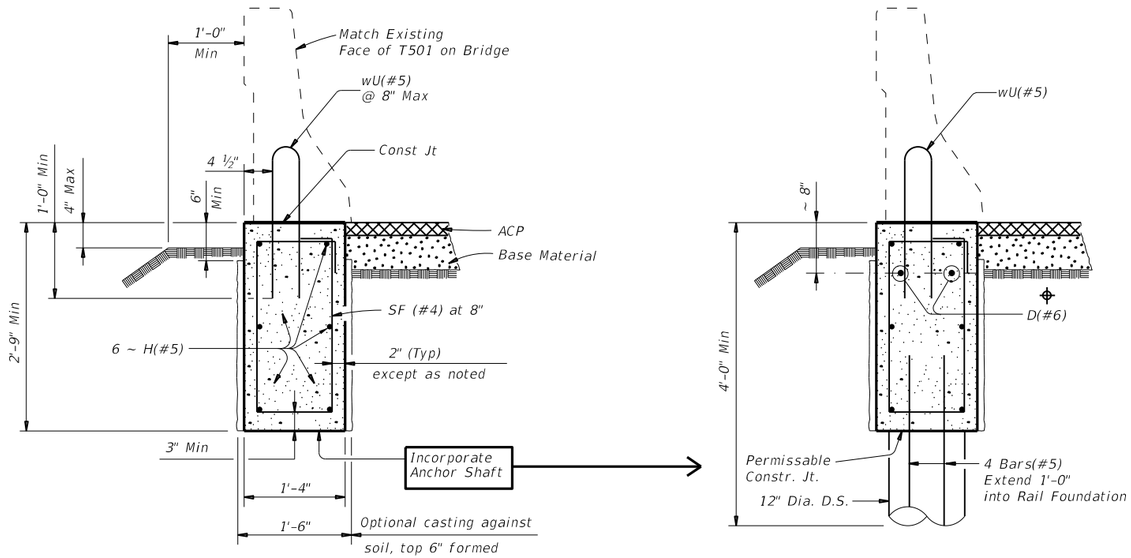
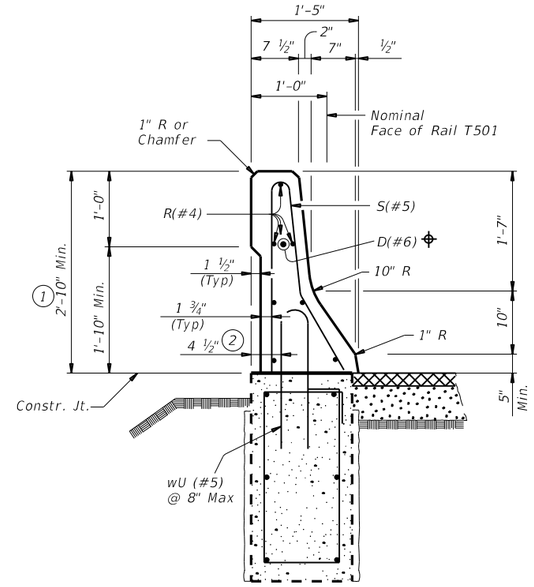


SECTION THRU TRAFFIC RAIL FOUNDATION

(Showing proposed Rail Foundation @ Wing)

SECTION THRU TRAFFIC RAIL FOUNDATION

(Showing Dowel Placement & Anchor Shaft)



SECTION B-B THRU TRAFFIC RAIL T501

(Showing proposed Rail T501 at Wing)

Drill and Grout Bars D (#6) 8" into existing Structure using Epoxy Adhesive. Conforming to the requirements of (DMS-6100).

(1) Match existing rail height.

(2) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment Tra c Rail Foundation on tra c side of wall.

(3) No longitudinal wires may be in top center of cage.

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage.

The back of railing must be vertical unless otherwise shown on the plans or approved by the Engineer.

MATERIAL NOTES:

Provide Class "C" concrete.

Provide Grade 60 reinforcing steel.

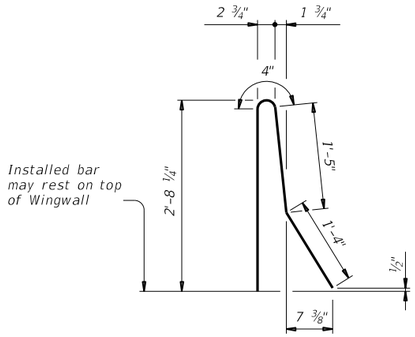
Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars WU unless noted otherwise. Deformed WWR (ASTM A1064) may be substituted for Bars S as shown. Combinations of reinforcing steel and WWR or con gurations of WWR other than shown are permitted if conditions in the table are satis ed. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"

Cover dimensions are clear dimensions, unless noted otherwise.

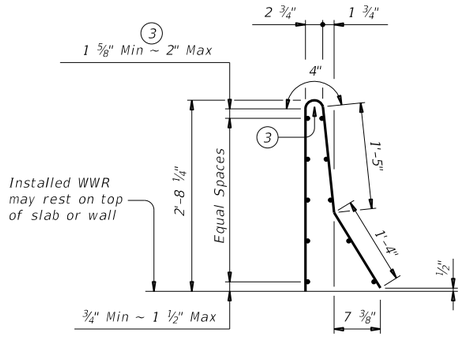
Reinforcing bar dimensions shown are out-to-out of bar.



BARS S (#5)

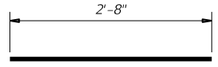
(Rail Parapet)

(10 – PER LOCATION)



OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

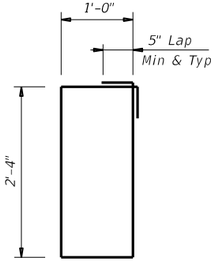
DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	0.933 Sq In.	0.248 Sq In. per Ft
	No. of Wires	Spacing
Minimum	6	4"
Maximum	11	12"
Maximum Wire Size Di erential	The smaller wire shall have an area of 40% or more of the larger wire.	



BARS D (#6)

(RAIL PARAPET AND RAIL FOUNDATION)

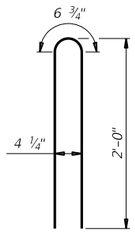
(3 – PER LOCATION)



BARS SF (#4)

(Foundation)

(10 – PER LOCATION)



BARS wU (#5)

(Foundation/Rail Parapet)

(10 – PER LOCATION)

STATE OF TEXAS
ROSS L. LANGDALE
126994
LICENSED
PROFESSIONAL ENGINEER

10/24/2023

Ross L Langdale, P.E.

SHEET 3 0F 4 SHEETS

Texas Department of Transportation

WINGWALL REPAIR DETAILS

STR #028 ASH CREEK

STR #030 LITTLE COTTONWOOD CREEK

STR #031 COTTONWOOD CREEK

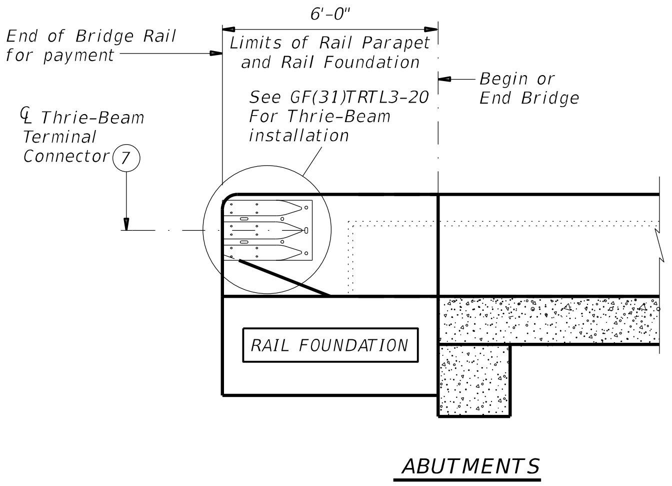
STR #032 POST OAK CREEK

FILE: SH171WINGREP.dgn	DN: DOT	CK: DOT	DW: GNH	CK: DOT
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL AID PROJECT •	SHEET
REVISIONS	WACO	6		101
	COUNTY		CONTROL SECT JOB	HIGHWAY
	HILL		0418 02 035	SH171

LEVELS DISPLAYED

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

ACC:

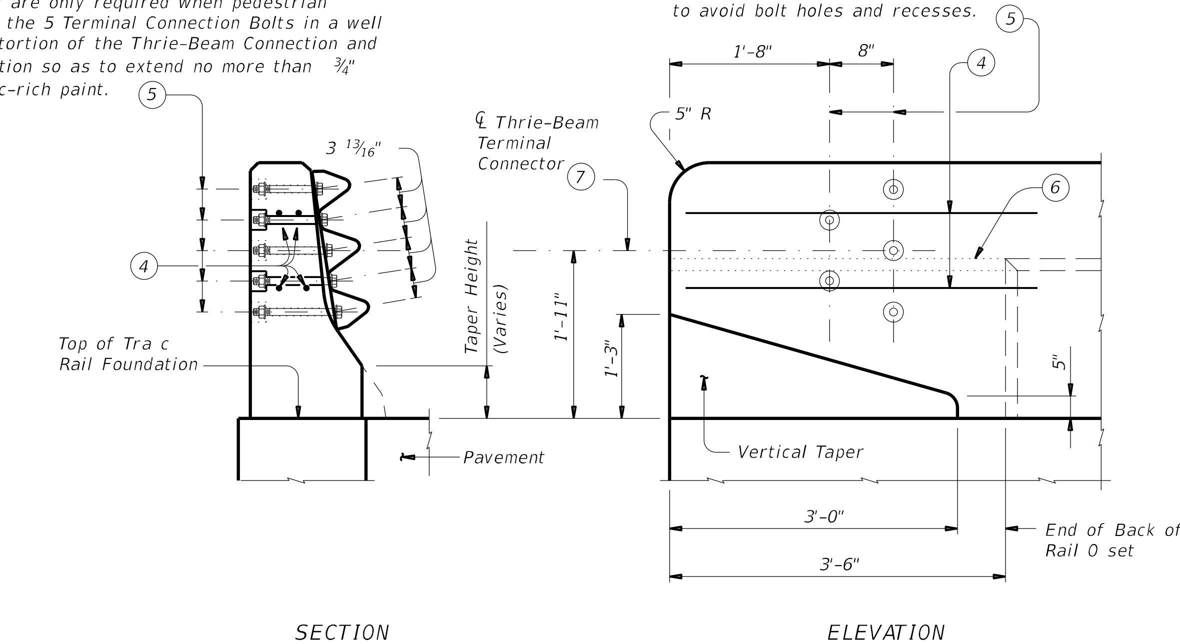


ROADWAY ELEVATION OF RAIL

SHOWING LIMITS OF T501 RAIL PARAPET W/TRAFFIC RAIL FOUNDATION

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Form or core holes and recesses. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail. Tighten the 5 Terminal Connection Bolts in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Cut bolts o after installation so as to extend no more than ¾" beyond nut. Paint ends of cut-o bolts with Zinc-rich paint.

℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Holes and recesses must be formed or cored. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes and recesses.



TL-3 TERMINAL CONNECTION DETAILS

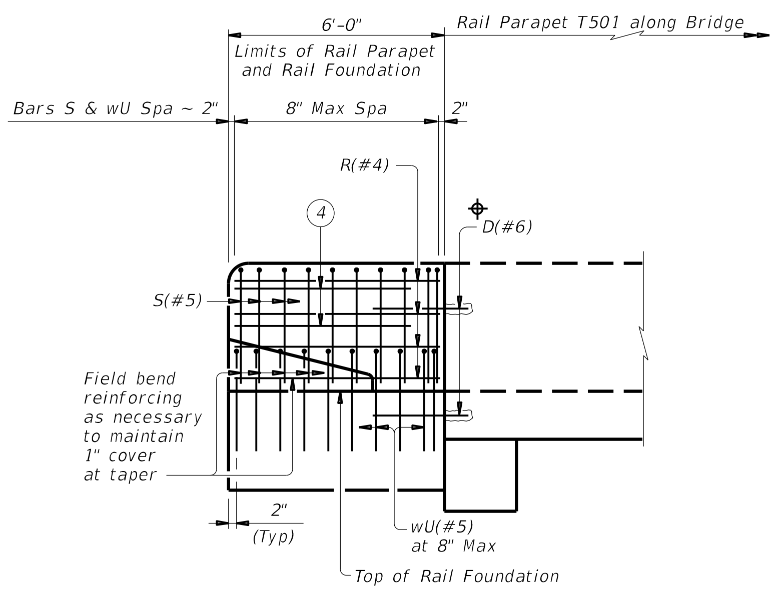
4 additional Bars R(#4) 3'-8" in length shall be placed inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required.

5 Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.

6 Back of rail o set may, with Engineer's approval, be continued to the end of the railing.

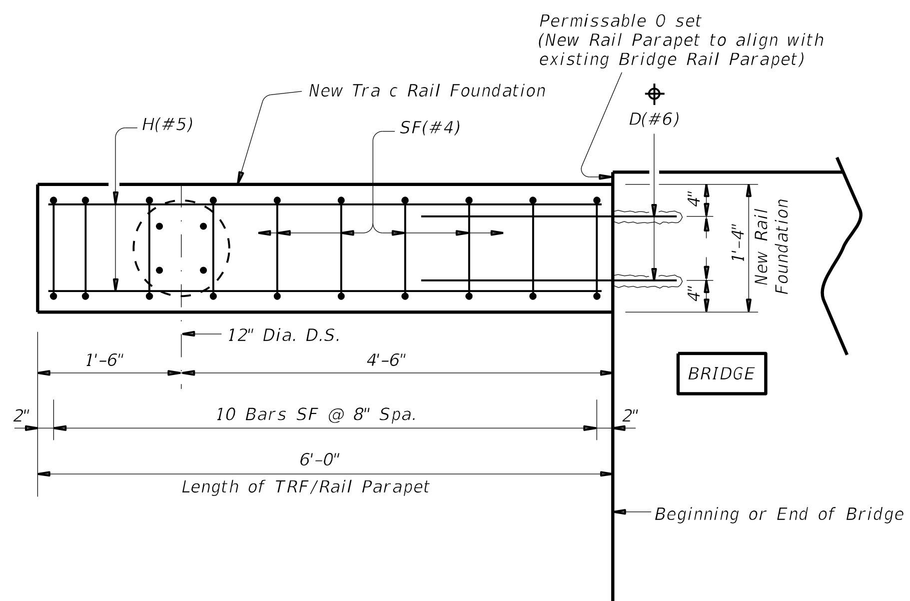
7 Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

⌖ Drill and Grout Bars D (#6) 8" into existing Structure using Epoxy Adhesive. Conforming to the requirements of (DMS-6100).



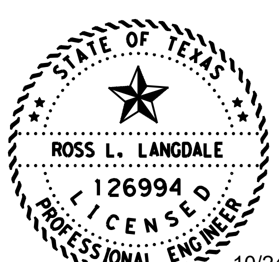
ELEVATION

SHOWING REINF. PLACEMENT IN PARAPET



PLAN

Showing Reinf. in new Tra c Rail foundation



10/24/2023

Ross L. Langdale, P.E.

SHEET 4 OF 4 SHEETS

Texas Department of Transportation

WINGWALL REPAIR DETAILS

STR #028 ASH CREEK

STR #030 LITTLE COTTONWOOD CREEK

STR #031 COTTONWOOD CREEK

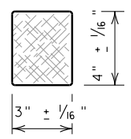
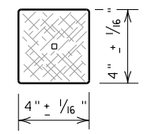
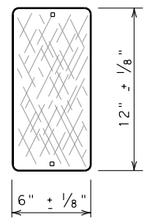
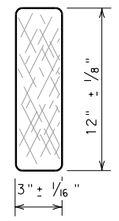
STR #032 POST OAK CREEK

FILE: SH171WINGREP.dgn	DN: DOT		CK: DOT	DW: GNH		CK: DOT	
ORIG DATE: JAN. 2022	DIST	FED REG	FEDERAL AID PROJECT				SHEET
REVISIONS	WACO	6					102
	COUNTY			CONTROL	SECT	JOB	HIGHWAY
	HILL			0418	02	035	SH171

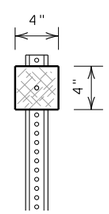
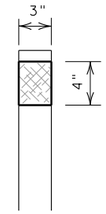
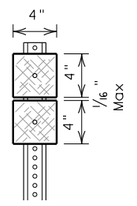
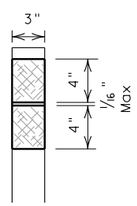
LEVELS DISPLAYED ACC:

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

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

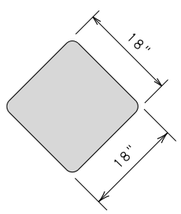
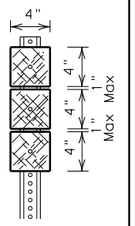
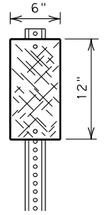
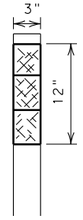
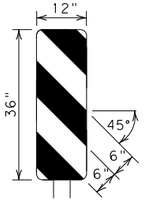
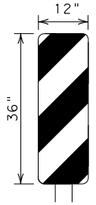
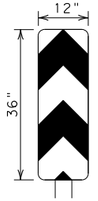
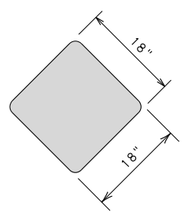
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

TYPE OF POST
WC = Wing Channel Post
WFLX = White Flexible Post
TWT = Thin Walled Tubing

TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

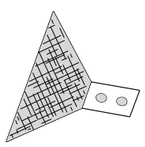
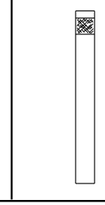
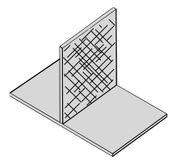
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{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

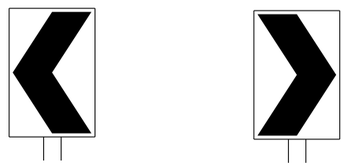
DEPARTMENTAL MATERIAL SPECIFICATIONS

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

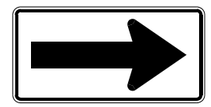
BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WACO	HILL		103

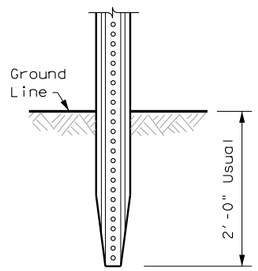
20A

DATE: 6/29/2023 10:46:48 AM
FILE: ...\PAVSTD PAV\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

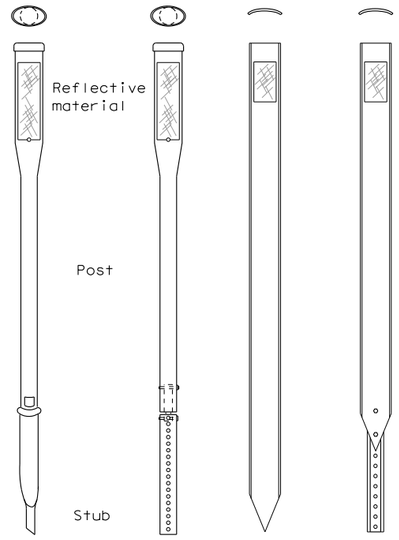


NOTES

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

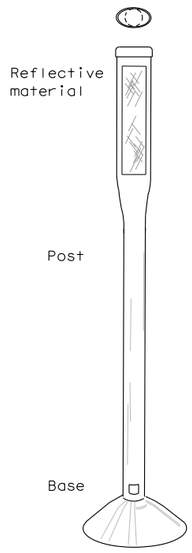
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



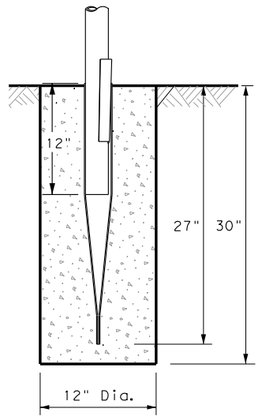
SURFACE MOUNT

NOTES

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

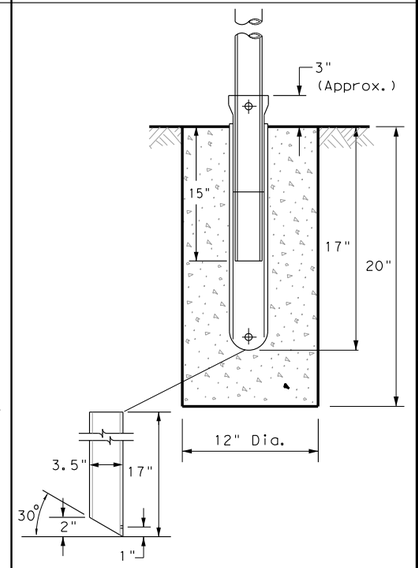
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

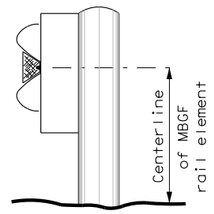
NOTE

1. Install per manufacturer's recommendations.

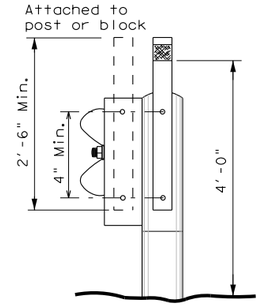
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

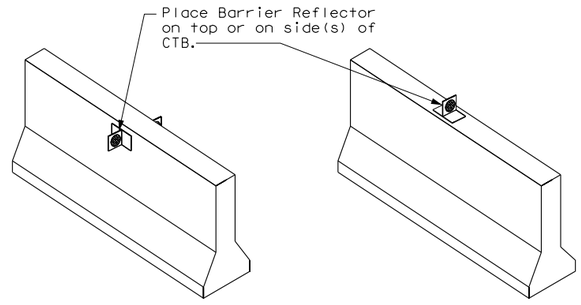
GF1



GF2



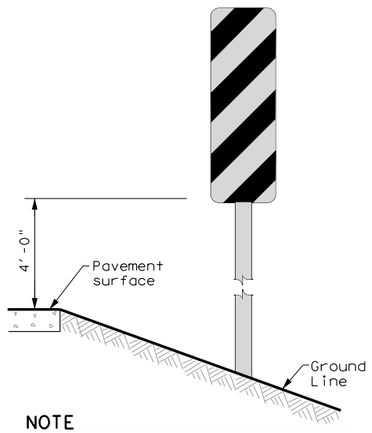
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

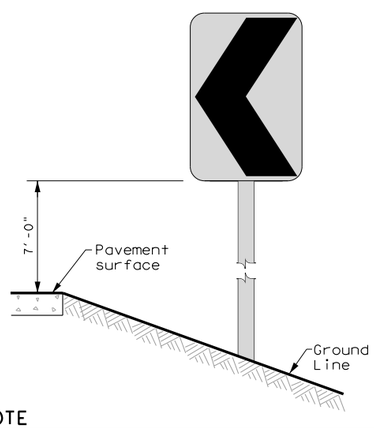
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

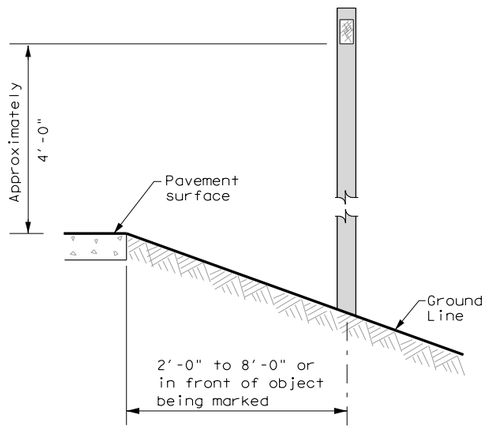
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	WACO	HILL		104

20B

DATE: 6/29/2023 10:46:54 AM
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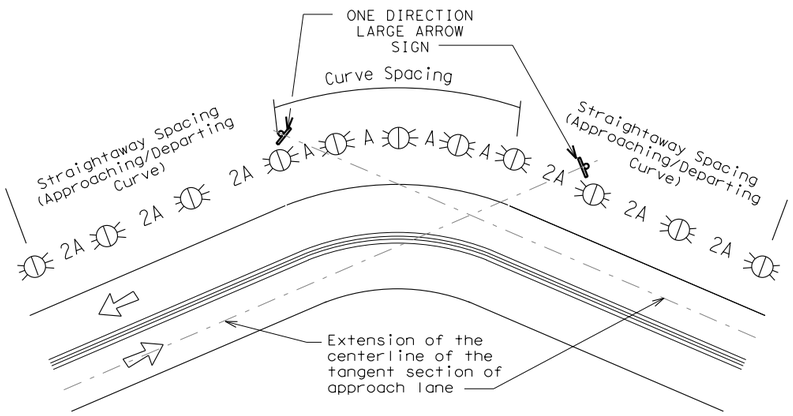
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

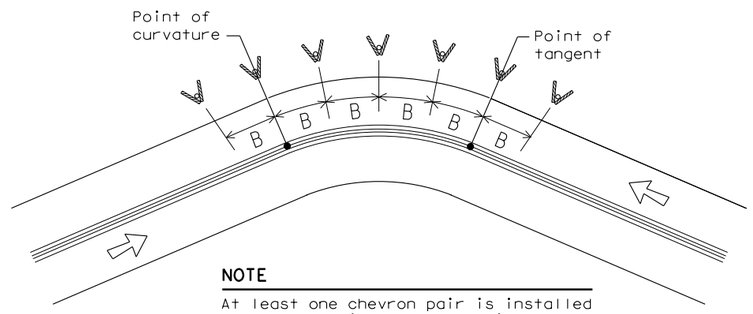
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
REVISIONS	0418	02	035	SH 171
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	WACO	HILL		105

20C

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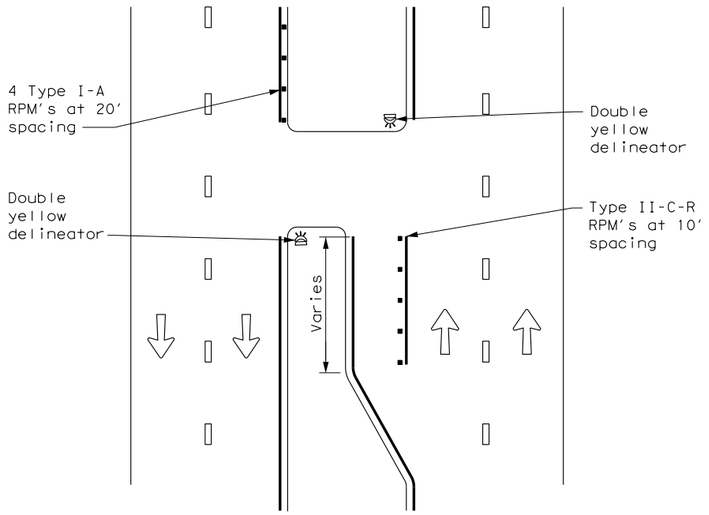
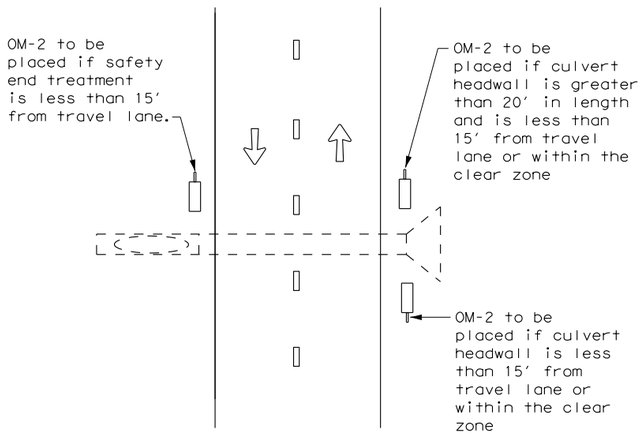
CROSSOVERS



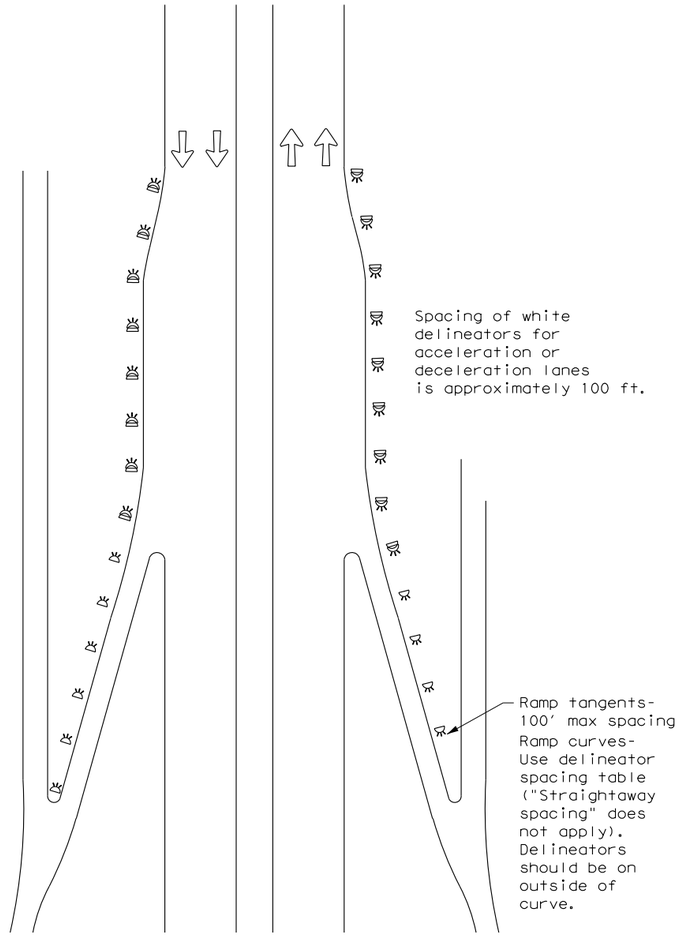
DETAIL 1

FOR CULVERTS WITH MBGF



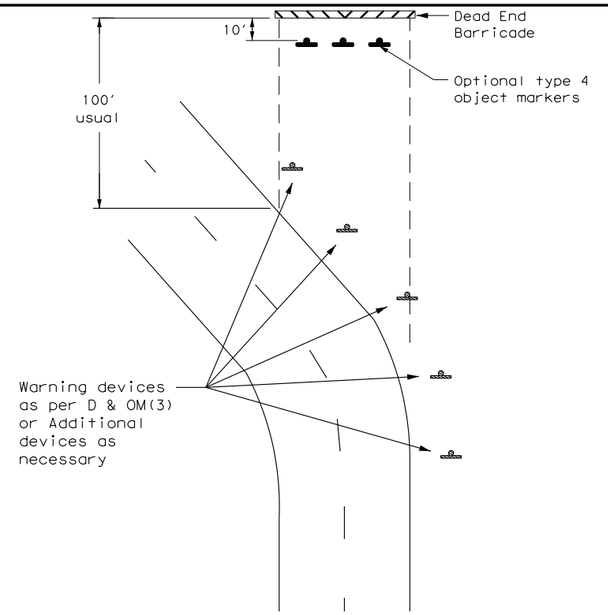
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



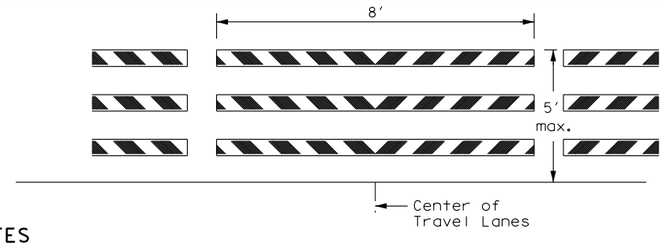
DETAIL 3

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

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
3-15	DIST	COUNTY		SHEET NO.
7-20	WACO	HILL		106

20D

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DATE: 6/29/2023 10:47:33 AM
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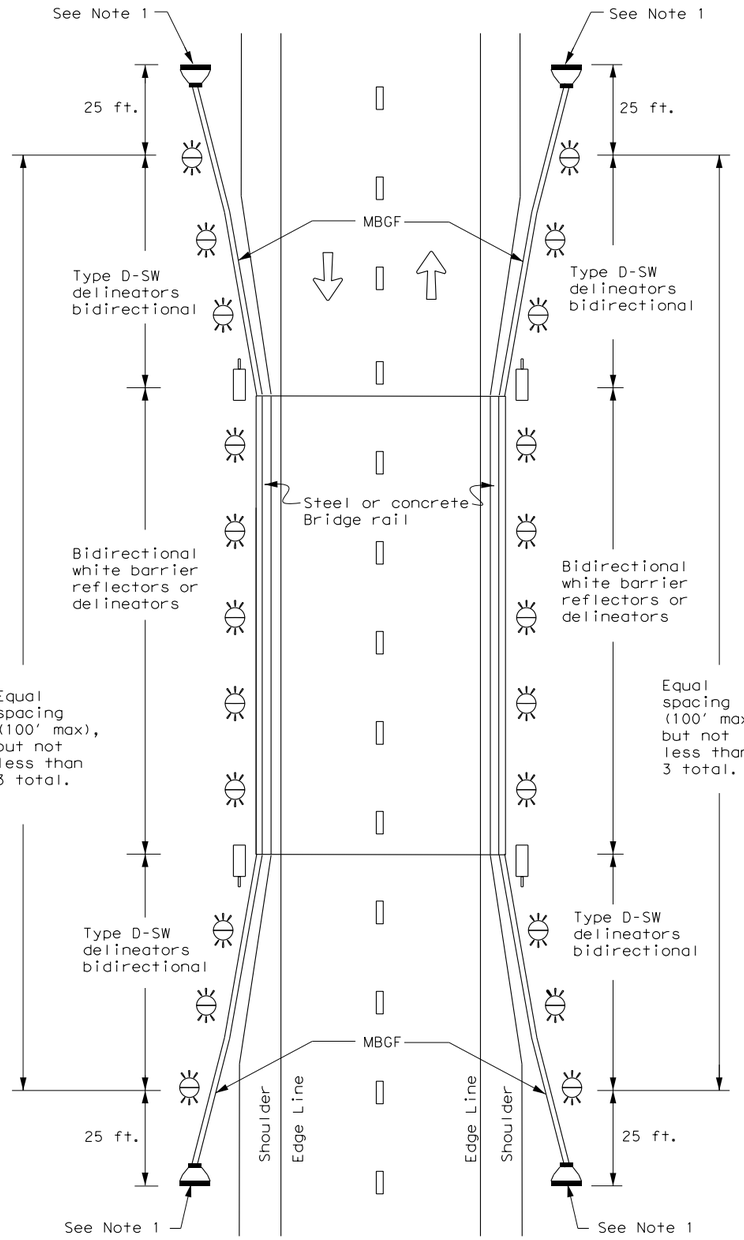
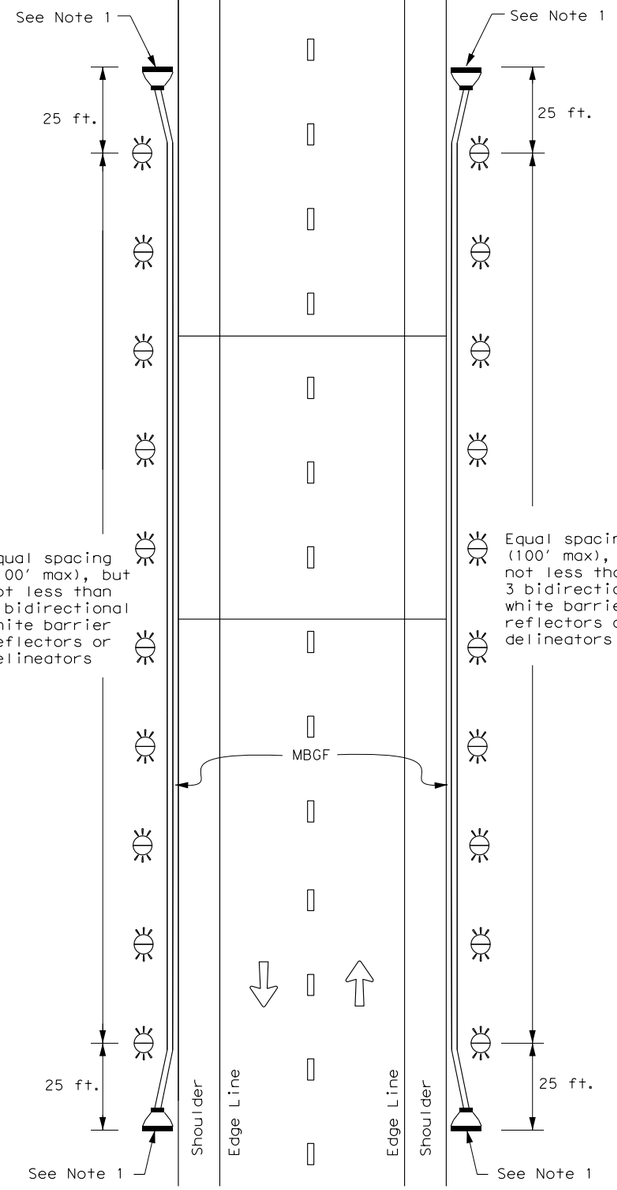
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

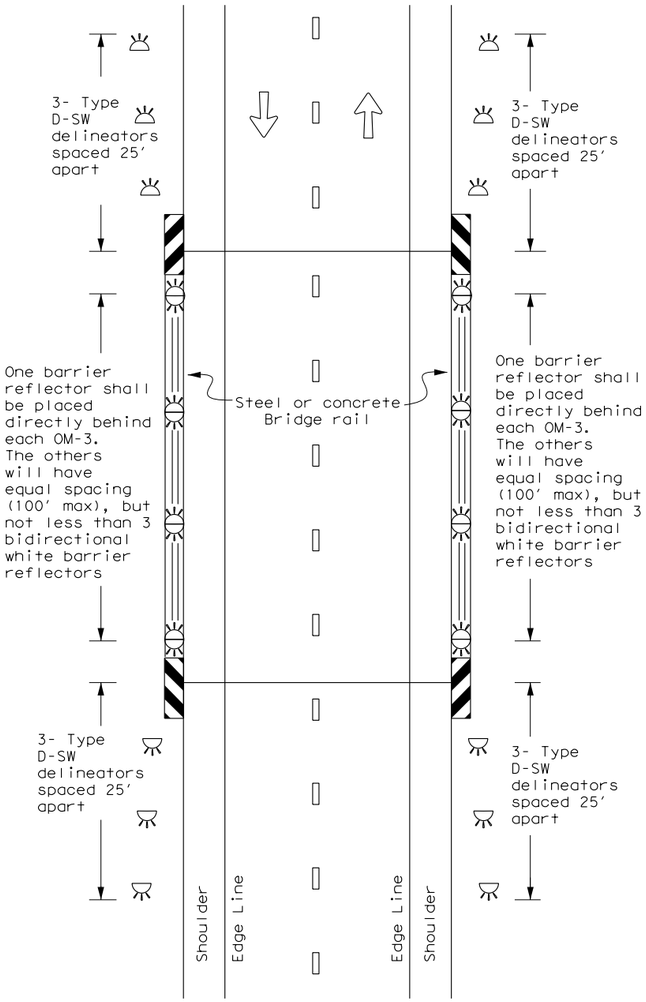
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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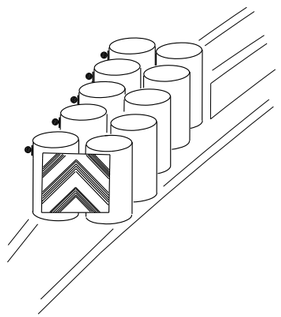
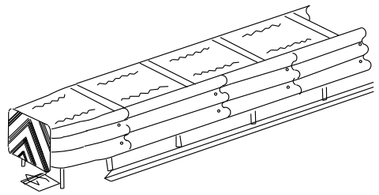
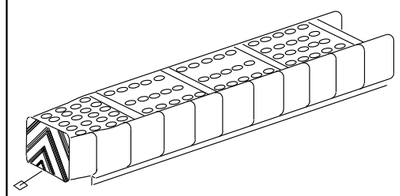
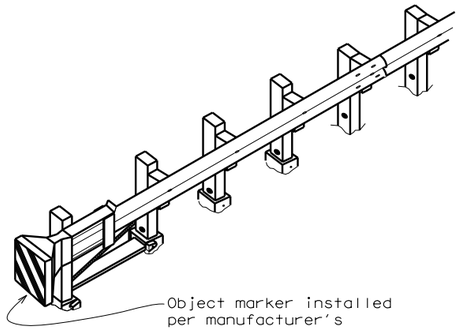
7-20	DIST	COUNTY		SHEET NO.
	WACO	HILL		107

20E

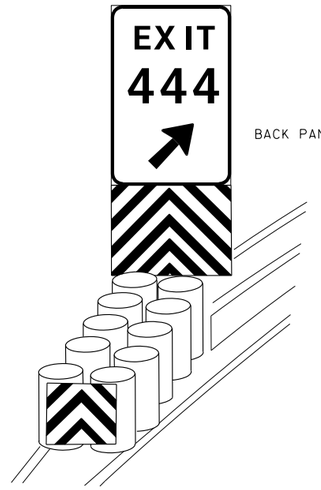




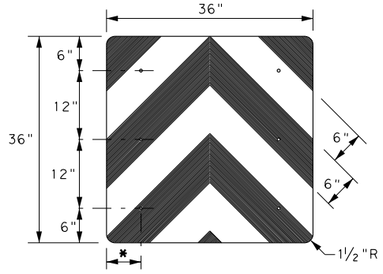


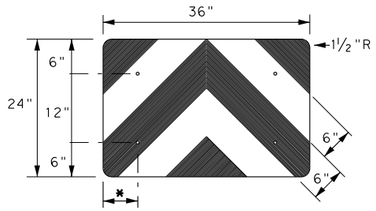


Object marker installed per manufacturer's recommendations.

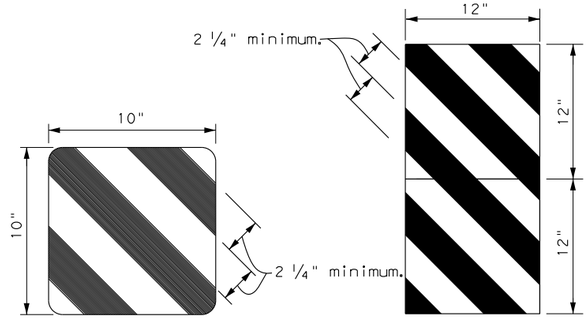


BACK PANEL (OPTIONAL)

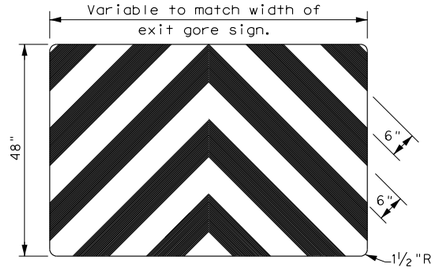


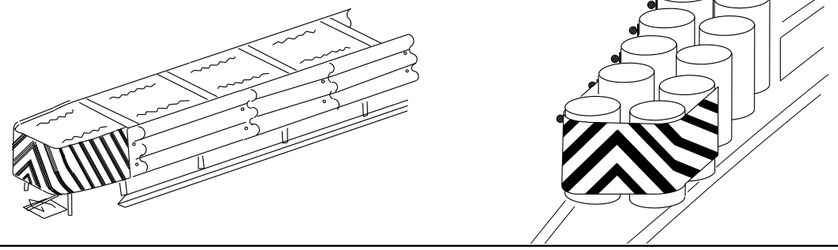


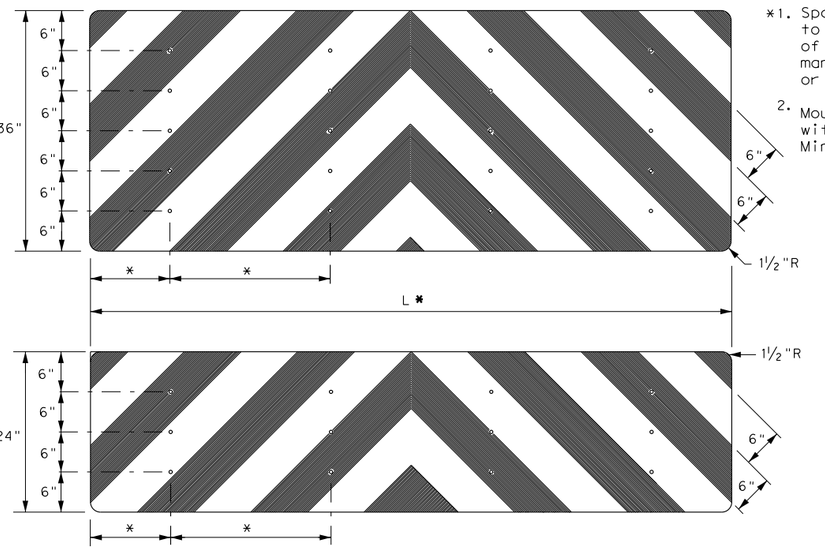
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



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	0418	02	035	SH 171
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	WACO	HILL		108
4-98 7-20				

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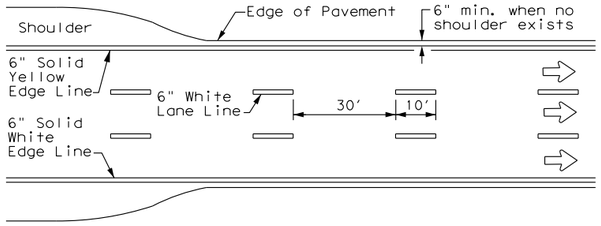
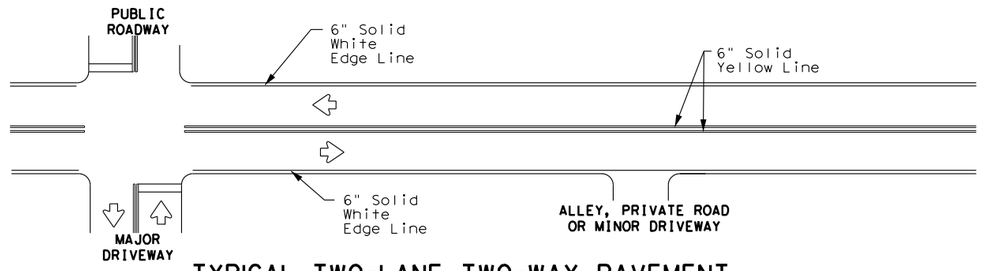
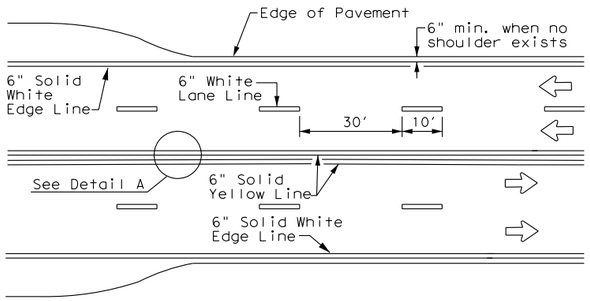
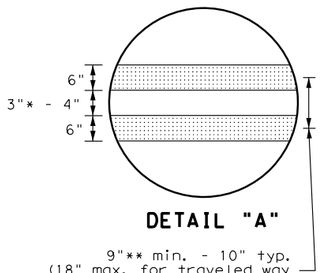


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

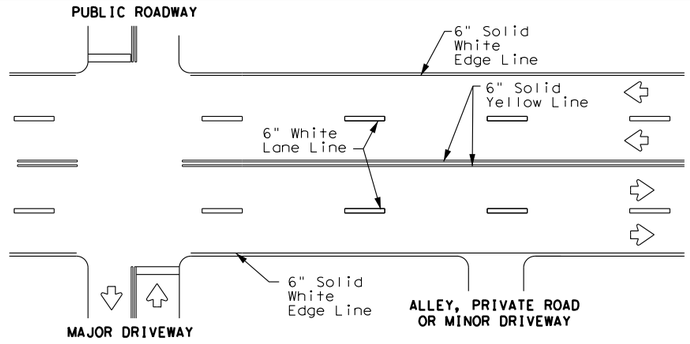




CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

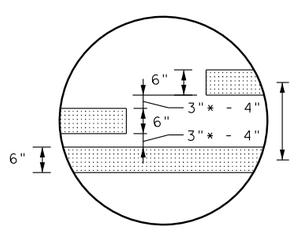
* 2" minimum for restripe projects when approved by the Engineer.

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

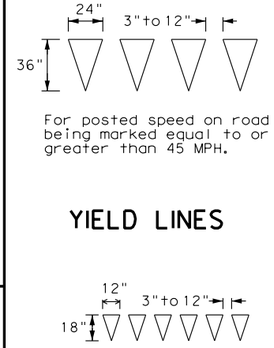


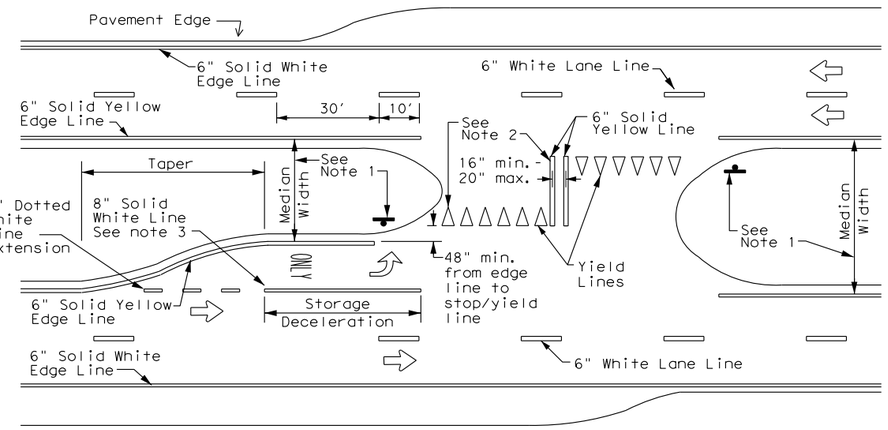
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS

TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

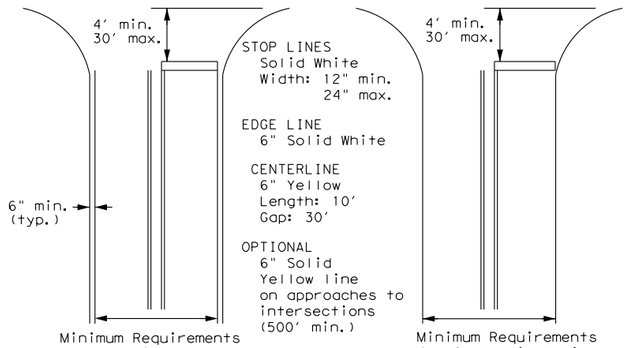
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

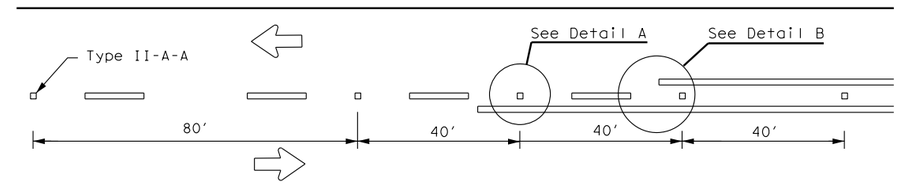
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		109

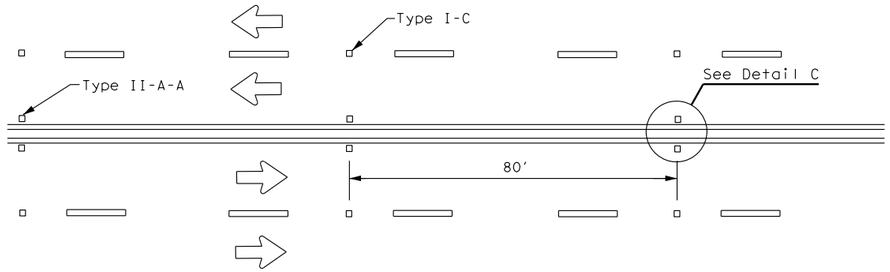
22A

DATE: 6/29/2023 10:47:46 AM
FILE: ...\PAV\STD PAV\pm1-22 (1).dgn

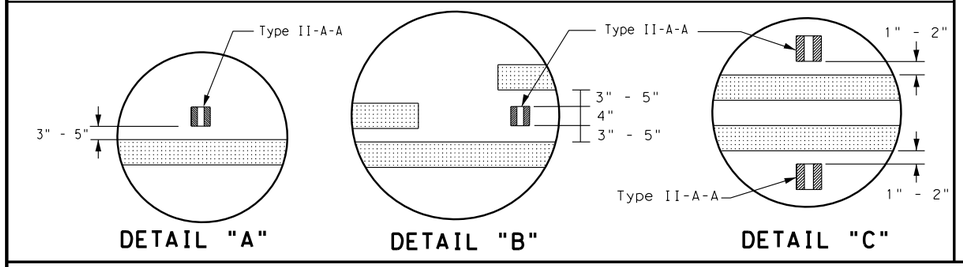
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

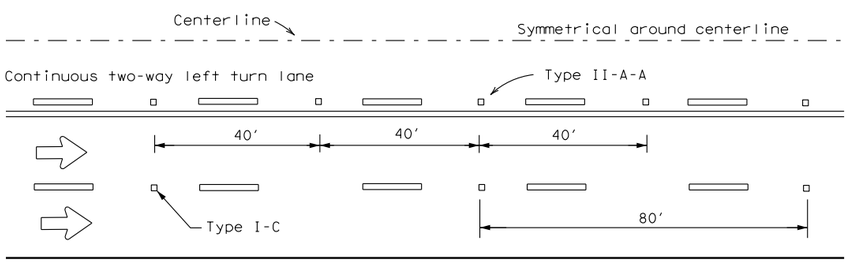


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

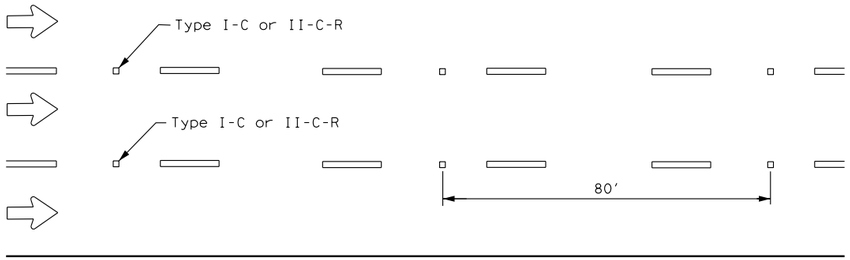


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



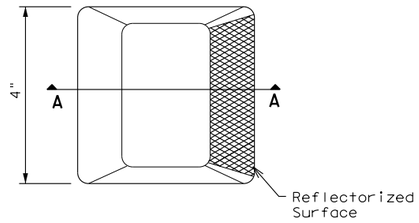
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

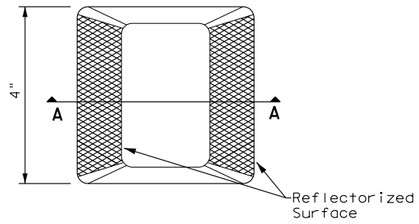
See Note 3.

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

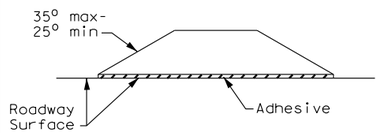
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

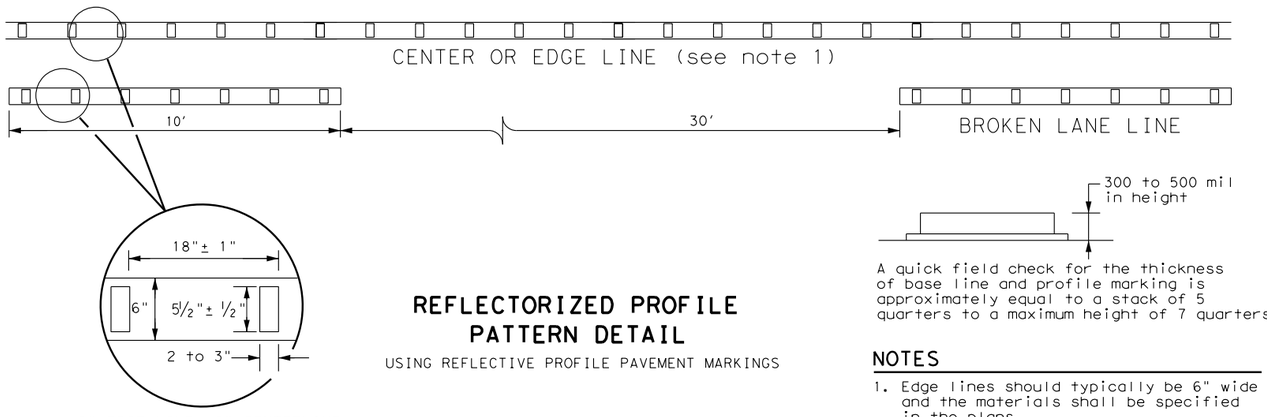


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



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

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.

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	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		110

22B

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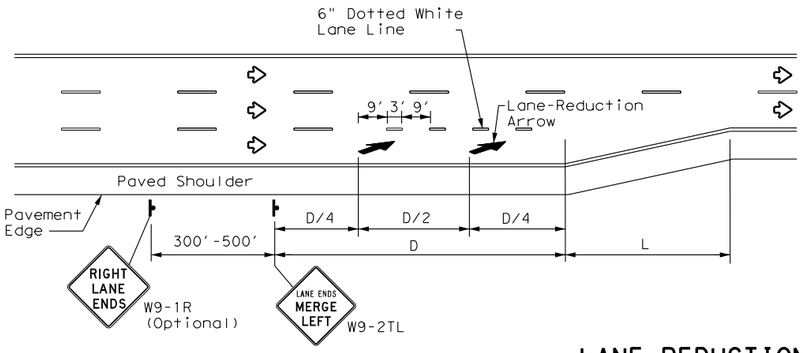
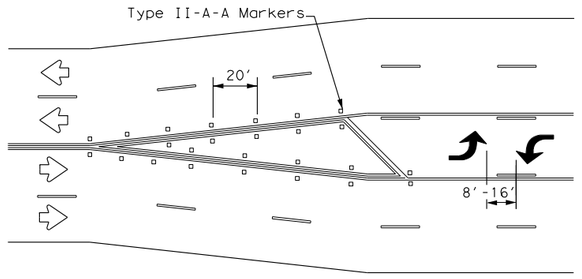


LANE REDUCTION

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	



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.

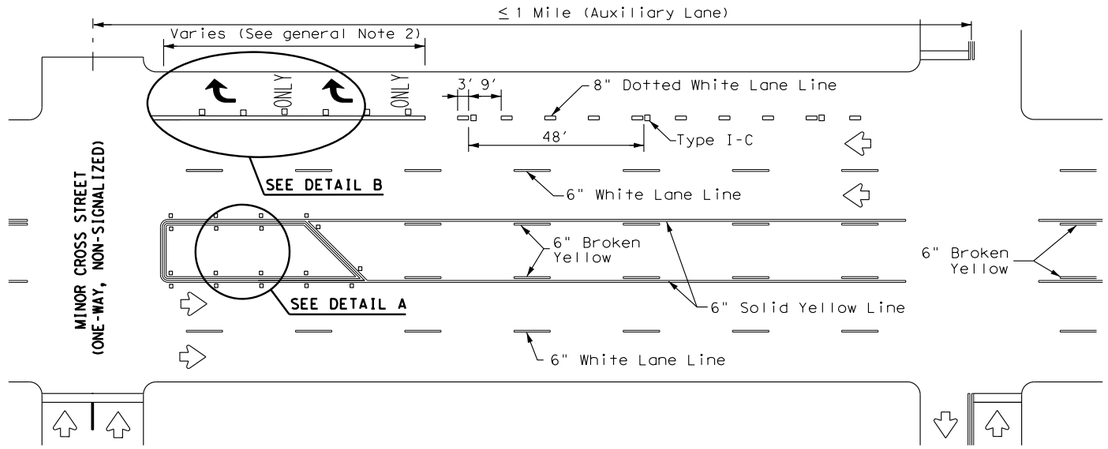
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

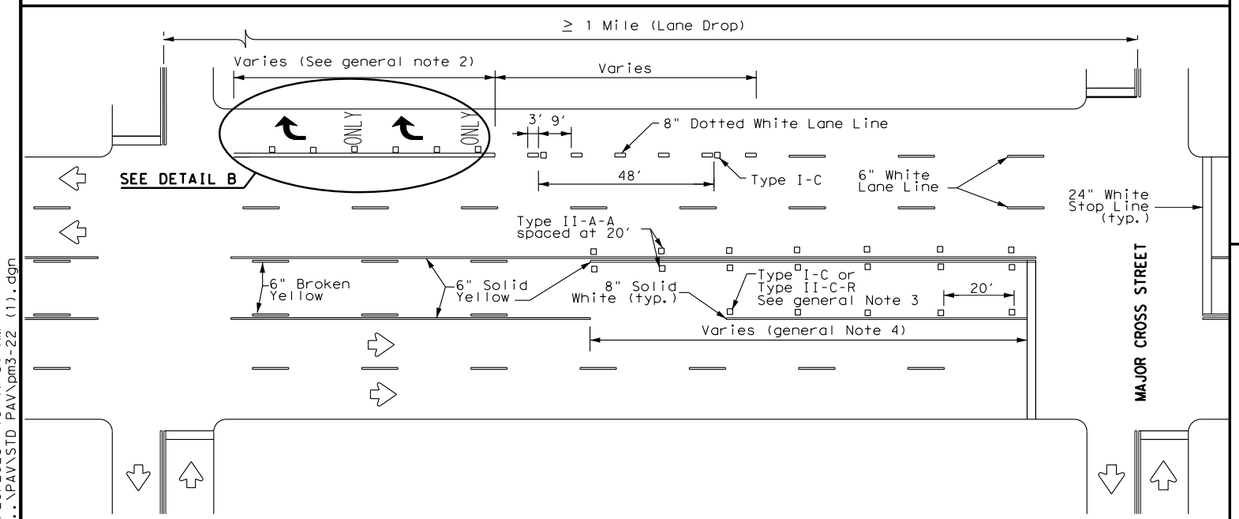
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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

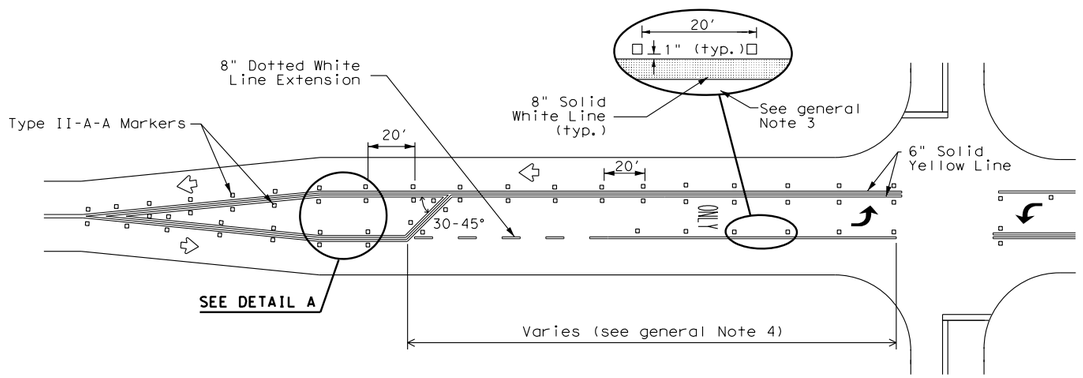
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



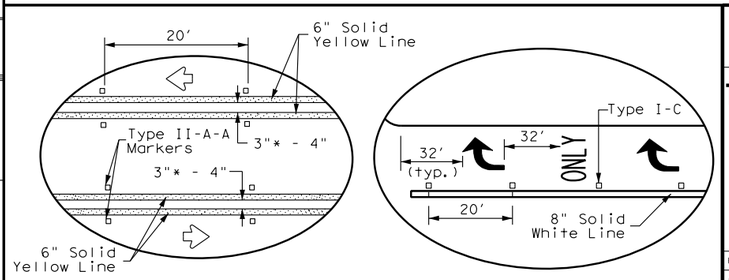
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



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 5-00 2-10 12-22 8-00 2-12	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		111

22C

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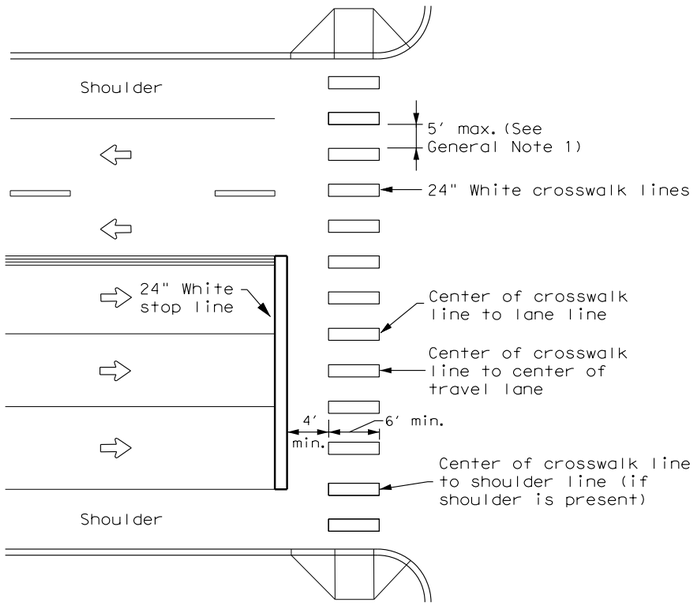


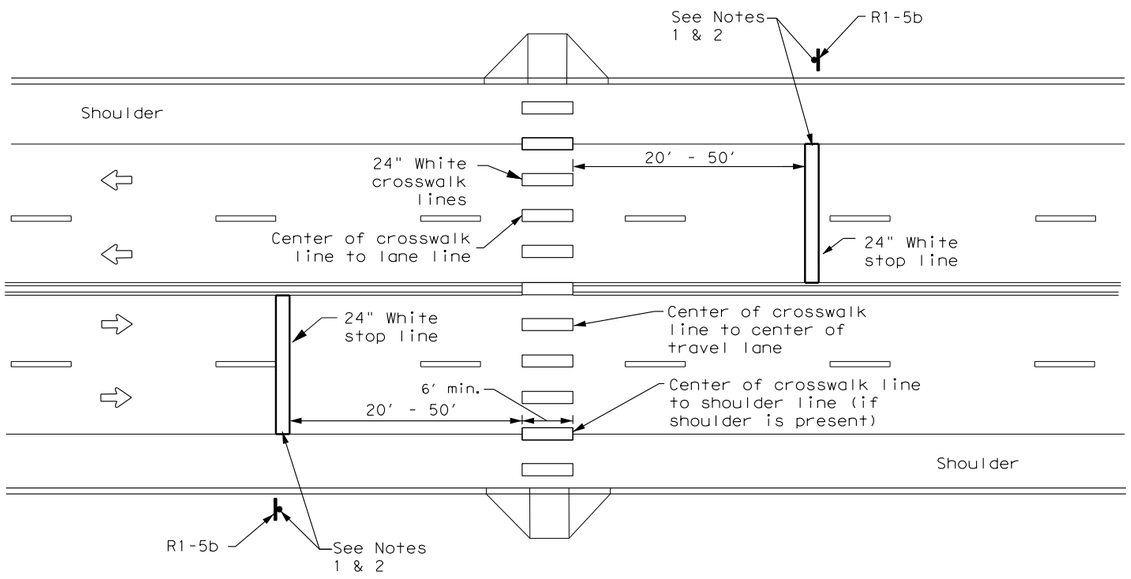
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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.



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock cross walks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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6-20	DIST	COUNTY		SHEET NO.
6-22	WACO	HILL		112
12-22				
22D				

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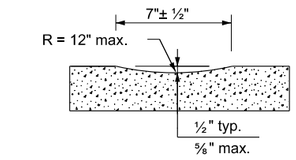
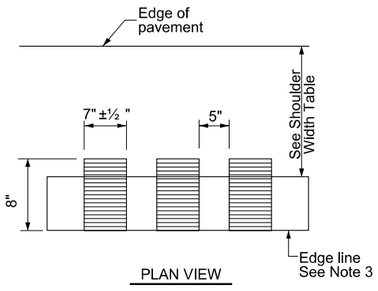
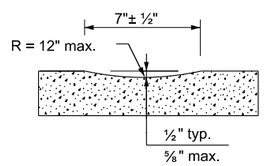


PROFILE VIEW
OPTION 1

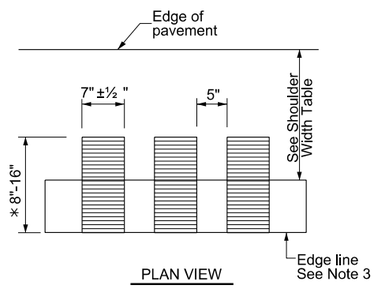


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



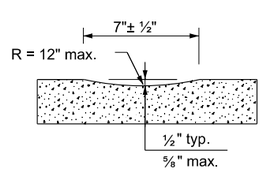
PROFILE VIEW
OPTION 2



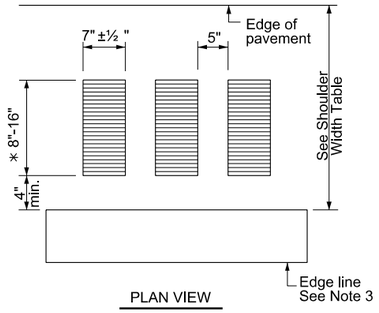
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



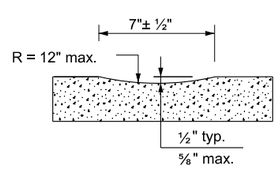
PROFILE VIEW
OPTION 3



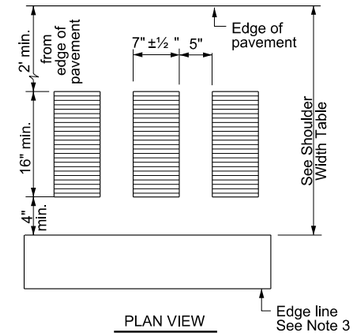
PLAN VIEW

∗ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

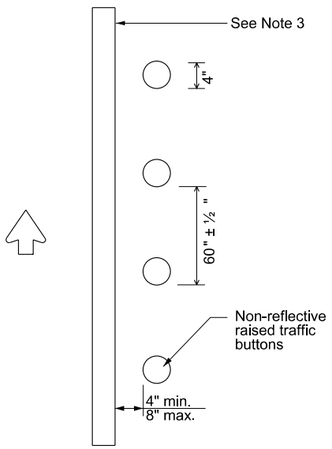


PROFILE VIEW
OPTION 4



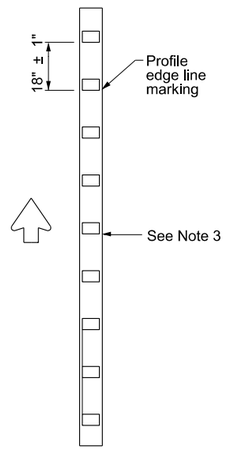
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



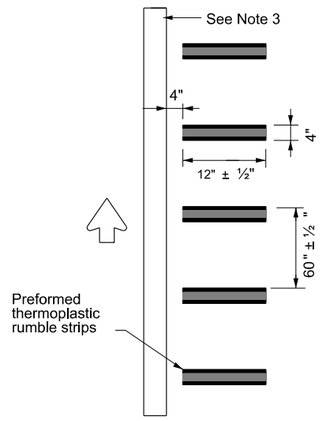
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



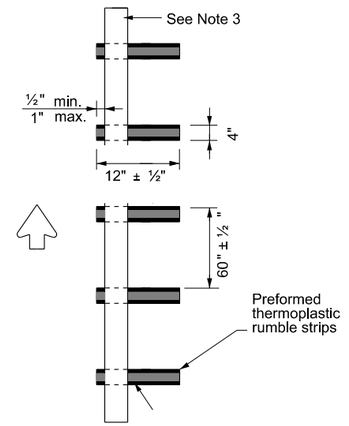
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

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

GENERAL NOTES

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

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

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

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

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

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
10-13 1-23	DIST	COUNTY		SHEET NO.
	WACO	HILL		113

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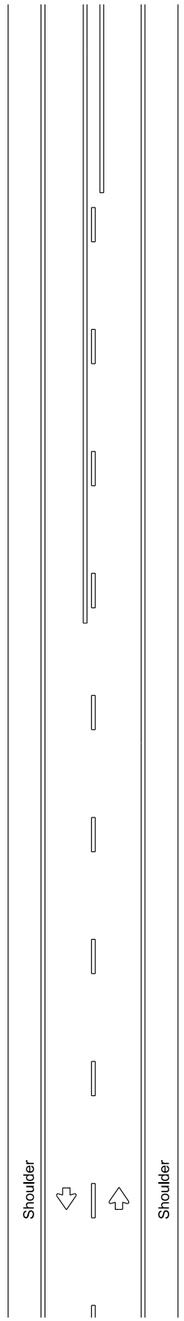
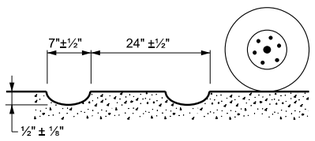
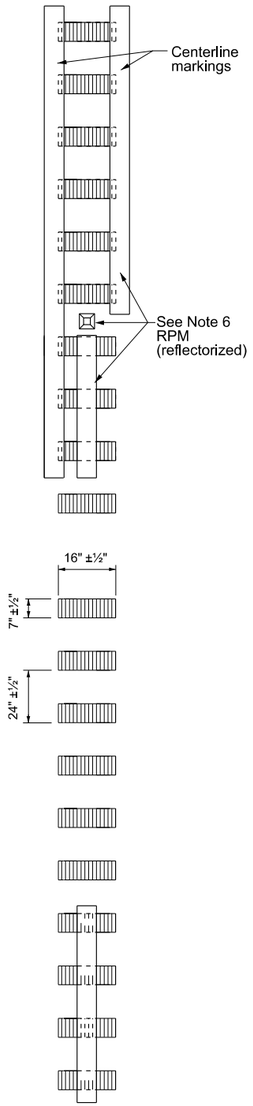
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

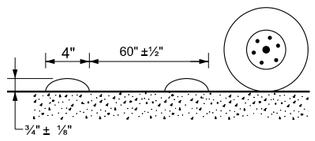


PROFILE VIEW

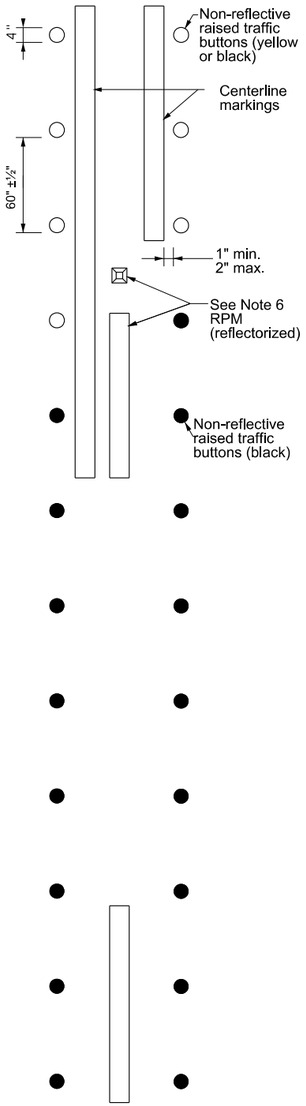


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

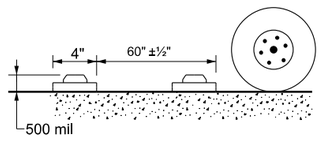


PROFILE VIEW

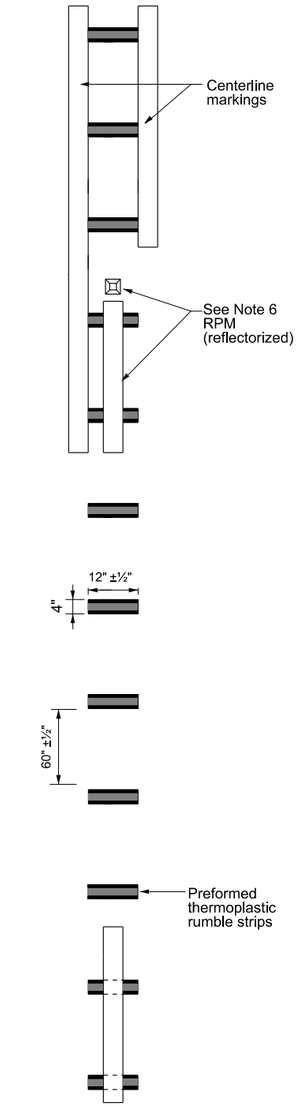


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

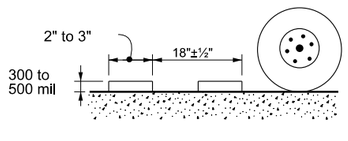


PROFILE VIEW

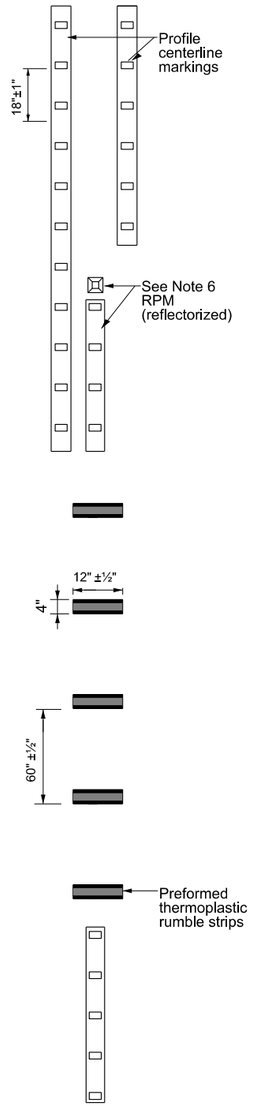


PLAN VIEW
OPTION 3

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

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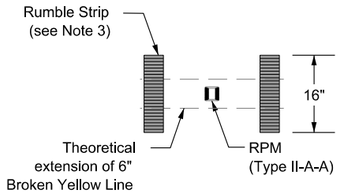
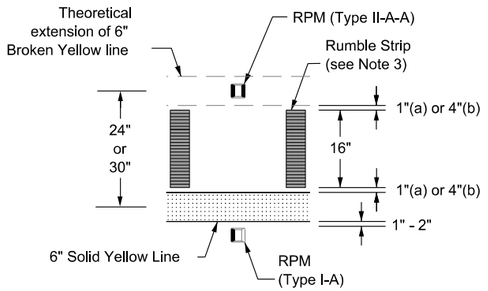
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
10-13	DIST	COUNTY		SHEET NO.
1-23	WACO	HILL		114



DETAIL "A"



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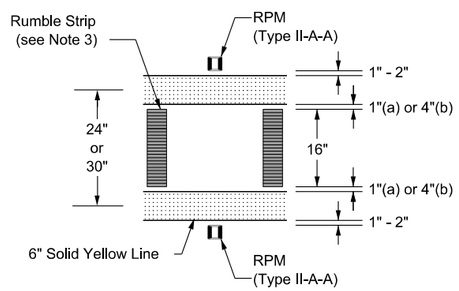
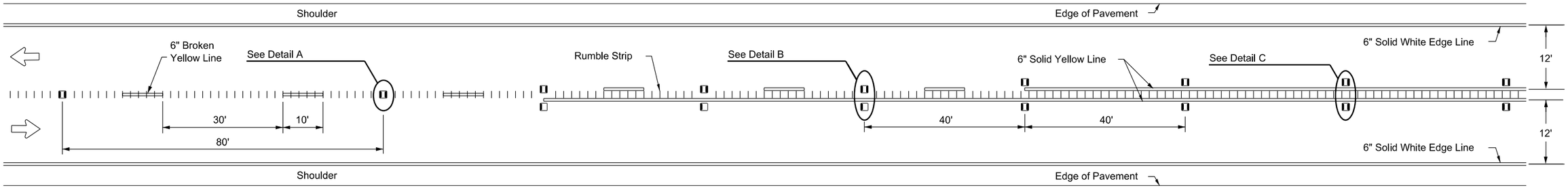


DETAIL "C"

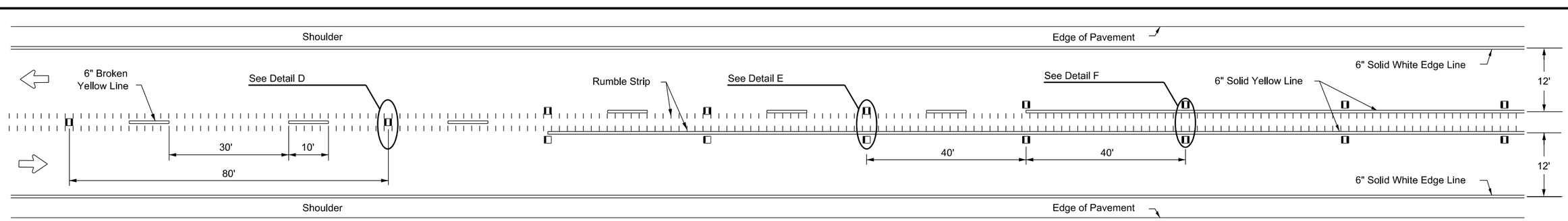
GENERAL NOTES:

1. A buffer shall not be implemented if it will require the width of travel lanes to be less than 12 feet.
2. See standard sheet PM(2) for additional details regarding retroreflectorized raised pavement markers (RPMs).
3. This sheet shows the application of milled rumble strips, though other types may be used. See the Rumble Strips (RS) standard for installation details.
4. Dimension notations (a) through (e) correspond to the following buffer widths: a = 24 inches; b = 30 inches; c = 36 inches; d = 42 inches; and e = 48 inches.
5. The Engineer must consider bicycle accomodation during the planning and implementation of all construction and rehabilitation projects. See standard sheet RS(6) and the TxDOT Roadway Design Manual (RDM) Bicycle Facilities section for applicable policies, references and guidance.



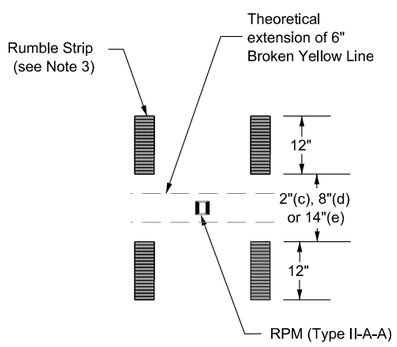
CENTERLINE BUFFER FOR TWO-LANE UNDIVIDED ROADWAYS

FOR BUFFER WIDTHS OF 24 INCHES(a) or 30 INCHES(b)



WIDE CENTERLINE BUFFER FOR TWO-LANE UNDIVIDED ROADWAYS

FOR BUFFER WIDTHS OF 36 INCHES(c), 42 INCHES(d) OR 48 INCHES(e)



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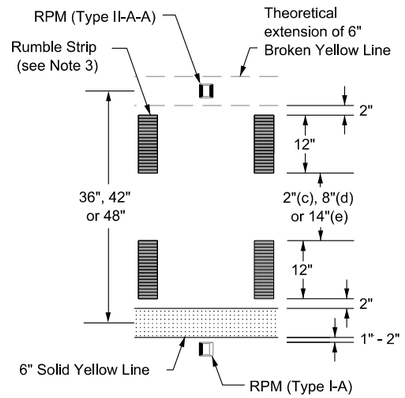
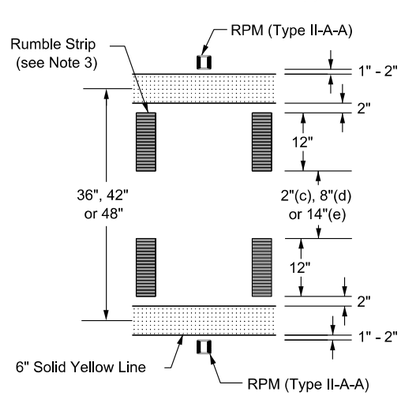


DETAIL "E"



DETAIL "F"

MATERIAL SPECIFICATIONS	
Pavement Markers (Reflectorized)	DMS-4200
Epoxies 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.

Texas Department of Transportation

Traffic Safety Division Standard

CENTERLINE BUFFER TWO-LANE ROADWAYS

CLB(2)-23

FILE: clb2-23.dgn	DN:	CK:	DW:	CK:
© TxDOT September 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		114A

24A

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STORMWATER POLLUTION PRVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0418-02-035

1.2 PROJECT LIMITS:

From: N MAPLE ST (MALONE)

To: SE FIFTH ST (HUBBARD)

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 31°55'03.59"N ,(Long) 96°53'50.83"W

END: (Lat) 31°50'32.26"N ,(Long) 96°47'25.75"W

1.4 TOTAL PROJECT AREA (Acres): 42.663

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.675

1.6 NATURE OF CONSTRUCTION ACTIVITY:

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

X Mobilization
X Install sediment and erosion controls
☐ Blade existing topsoil into windrows, prep ROW, clear and grub
☐ Remove existing pavement
☐ Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
X Remove existing metal beam guard fence (MBGF), bridge rail
X Install proposed pavement per plans
☐ 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
X 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 Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
☐ Other: _____
☐ Other: _____

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

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			115
STATE	STATE DIST.	COUNTY	
TEXAS	WACO	HILL	
CONT.	SECT.	JOB	HIGHWAY NO.
0418	02	035	SH 171

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☐ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

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

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

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

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 DEWATERING:

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

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

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			116
STATE	STATE DIST.	COUNTY	
TEXAS	WACO	HILL	
CONT.	SECT.	JOB	HIGHWAY NO.
0418	02	035	SH 171

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# 3

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

1.
2.
3.
4.
5.
6.
7.
8.

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 Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ 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 Compost	☐ 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. SEE STATEMENT ABOVE

2.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. SEE STATEMENT ABOVE

2.

3.

4.

☐ No Action Required ☒ Required Action

Action No.

1. Comply with Migratory Bird Treaty Act (MBTA)

2.

3.

4.

5. SEE STATEMENT BELOW

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

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

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

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

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

☐ Yes ☒ No

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

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

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

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

☐ No Action Required ☐ Required Action

Action No.

1.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0418	02	035	SH 171
	DIST	COUNTY		SHEET NO.
	WACO	HILL		117

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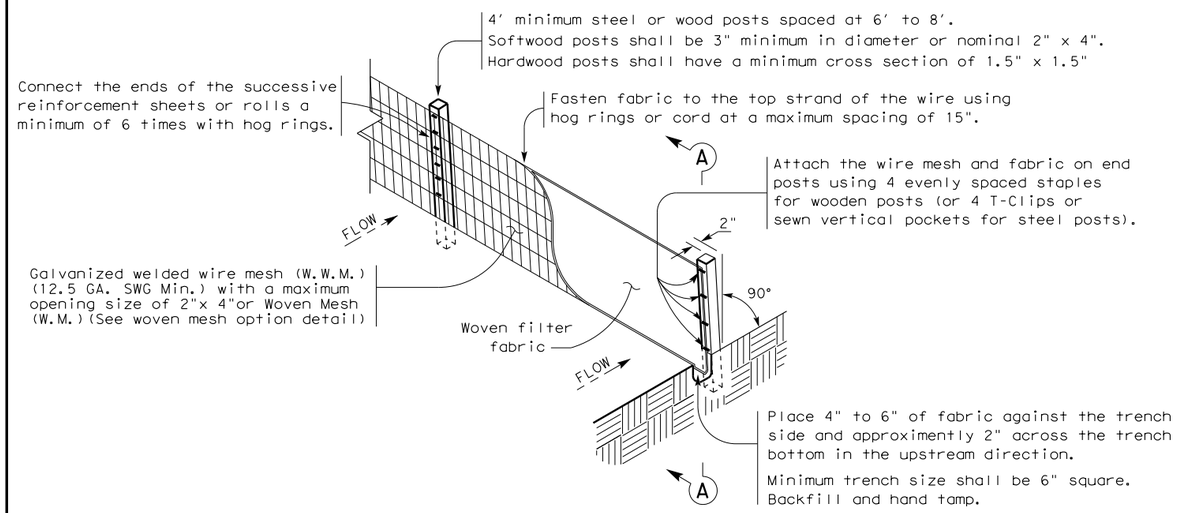
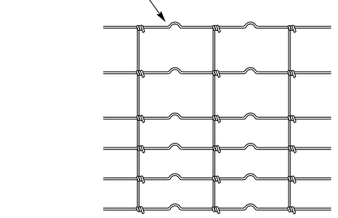
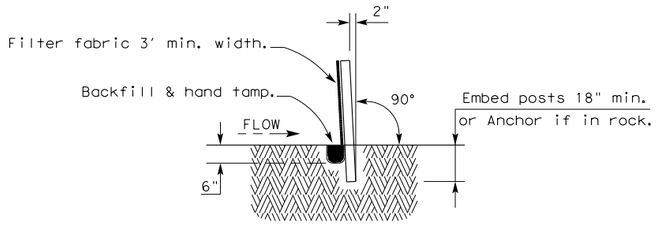


TEMPORARY SEDIMENT CONTROL FENCE

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.

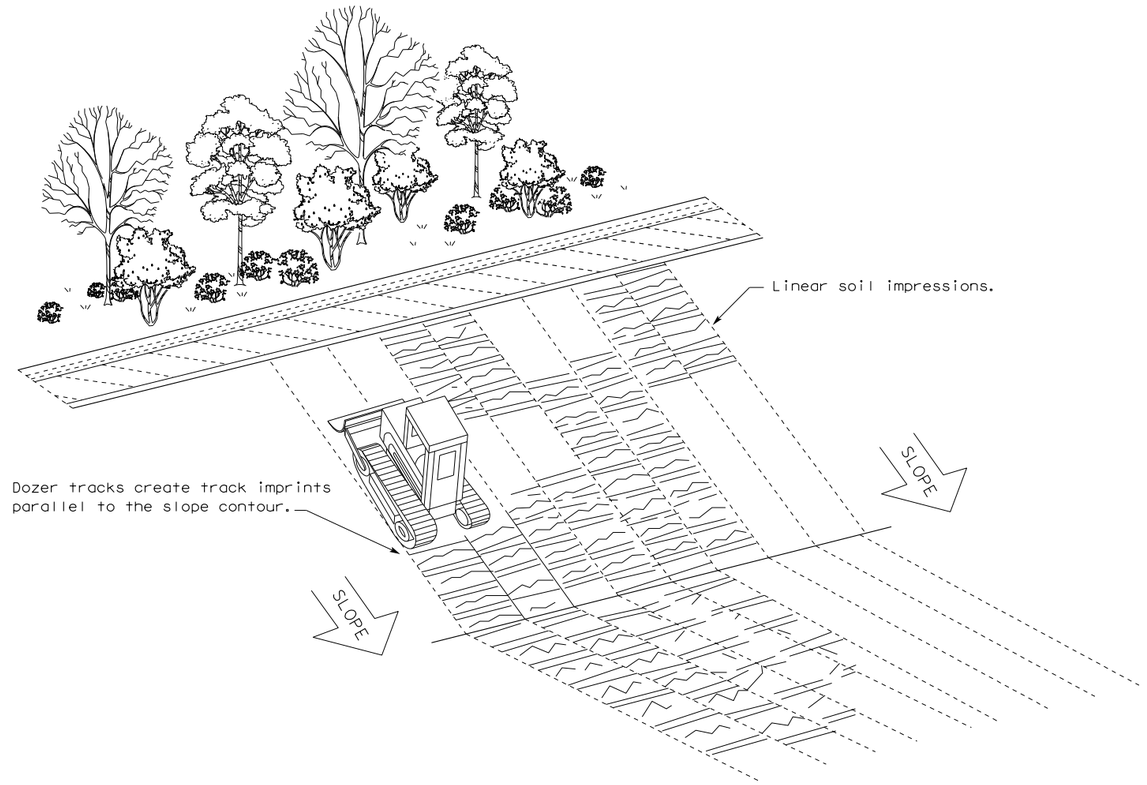
LEGEND

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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	WACO	HILL			118	

6/29/2023
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BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

1. Prior to TxDOT allowing the Contractor to start construction, the Contractor will provide the required storm water and 404 permit documentation and support activities, including but not limited to the following:

   - Provide a list of all chemicals, construction and waste products that will be generated, stored or brought upon TxDOT ROW. The list includes expected construction debris, sanitary wastes, construction chemicals and petroleum products used or generated by the Contractor and sub-contractors. Along with the list, the Contractor will supply a spill prevention plan and clean up procedures that will include each of these chemical products or generated waste.

   - Provide in the construction schedule the necessary line items that will comply with the schedule and planning requirements of the storm water permit.

   - Post the TxDOT storm water permit and any Contractor permits, per permit requirements.

   - Provide copies of storm water permits for Contractor PSL(s). As new PSL(s) may be obtained for the project, provide copies of new or amended permits to TxDOT. The Contractor will not disturb soil without the proper permits.

   - Provide scale drawings of off ROW PSL's within one mile of the project, for field offices, borrow sources, plant sites or other uses.

   - Provide permit information on any Contractor batch plants or concrete crushing plants to be located at a Contractor PSL(s) within one mile of the project limits or boundaries. Copies of the air and water permits are to be provided to TxDOT before materials will be used on the project. No asphalt or concrete batch plants or concrete crushing plants will be located on TxDOT ROW.

   - Provide a letter indicating a Contractor Responsible Person for environmental compliance (CRP) for the project, and maintain a CRP throughout the project duration.

   - Provide all environmental documentation including certification of compliance and EMS training documents/certificates prior to starting work. The Contractor is to provide daily BMP inspection reports that document all field BMPs needing repair or replacement. The Contractor is to clearly document specific BMPs needing repair and location each work day. The Contractor is encouraged to be proactive in fixing BMPs without TxDOT direction.

   - Provide documentation required for Waters of the US, Note #3 and submittals for Item 496 bridge removal. Bridge removal methods submitted will follow all Waters of the US note requirements. The Contractor is not to start construction within the Ordinary High Water Marks of any stream until receiving approval for stream channel construction methods from TxDOT.

   - Provide a written procedure for managing all chemicals and construction items placed in vertical containment structures. Also, provide methods to be used for the treatment, disposal, collection or release of storm water.

   - Provide an estimated date by letter, for the submittal of marked up bridge drawings, indicating cut locations for any structural steel requiring cutting or torching of steel, coated with lead containing paints.

2. Place and maintain trash cans and portable sanitary facilities at locations where there is active construction. Worker generated trash and construction debris will be kept from being transported by storm water and will be collected daily from the ground and routinely hauled from the work area.

3. Contractor will provide TxDOT copies of all correspondence with MS4s, TCEQ, EPA, DSHS and Corps of Engineers regarding activities on this project.

4. Contractor to conduct storm water inspections and develop SWPPP documents to support Contractor permits obtained for the project including PSL(s).

5. Contractor will maintain written documentation of locations of all portable sanitary facilities. The Contractor is required to document the location and disposition of all spills and cleanups from portable sanitary facilities.

6. Contractor will not store chemicals on TxDOT ROW, unless chemicals are stored following all environmental and safety regulations. Fuels for construction equipment will not be stored on TxDOT ROW.

7. The Contractor will store fuels and bulk chemicals on Contractor PSL(s) using a secondary containment method, such as double lined tanks and/or free standing containment reservoirs made of plastic or steel designed to hold bulk chemicals or drums.

8. The Contractor will not remove sediment controls without the prior approval of TxDOT, except for a sediment control that may back up water and cause safety or traffic problems.

SCALE = NTS SHEET 1 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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REVISIONS	0418	02	035	SH 171
DEC 2013	DIST	COUNTY		SHEET NO.
FEB 2015	WACO	HILL		120

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

9. Any sediment controls removed by the Contractor must be re-installed before the next rainfall event or by the end of day, as approved in advance.

10. Vegetative buffer strips may be used in place of temporary sediment controls such as silt fences and rock filter dams. The amount of disturbed soil area will be limited to 1/3 of an acre or less for a minimum of 50 feet of grassed ditch and 2/3 of an acre of disturbed soil for a minimum of 100 feet of grassed ditch.

11. Construction equipment found to be leaking oil, fuel or coolant will be immediately stopped, the leaking fluid collected and the equipment fixed. Equipment continuing to leak will be removed from the project at no cost to TxDOT. Leaking fluids from equipment will be collected and removed from the project or PSL.

12. Earth berms or mounds typically used to stockpile topsoil and used in place of boundary silt fence will be seeded upon being constructed. Long term use of earth berms or mounds will not be continued without establishing grass on the control.

13. The Contractor will inform TxDOT of new areas where soil will be disturbed to facilitate planning for new sediment controls. Areas of vegetated soil will not be disturbed by the Contractor, unless adequate sediment controls can be installed before the next rainfall event. The Contractor will assist TxDOT in keeping an accurate set of working SWPPP drawings that show the locations of all temporary sediment and erosion controls.

14. The Contractor will maintain an adequate amount of temporary sediment controls on hand at the field office or project staging area for critical SWPPP maintenance, including silt fence (minimum of 200 feet) and rock / fabric for rock filter dams (minimum for 100 feet of Type III dams).

    The requirement for BMP rock quantities on hand is waived for small projects for on and off system bridge installations. The Contractor having a BMP Subcontractor does not eliminate the requirement for the Contractor to have the required silt fence and rock on hand, typically stored at the Contractor PSL.

15. Failure of a sub-contractor to complete storm water work on time will require the Contractor to start storm water sediment control work immediately and complete the work with high priority, or be subject to stop work on the entire project.

16. Earth materials on roads as a result of soil tracking will not be allowed to be transported off ROW in storm water. Soil or rock material found on roadways deposited from Contractor equipment will be removed daily.

17. Unless approved, completed concrete curb inlets will not be blocked by sediment controls. The contractor will frequently sweep the completed or partially completed roadway to keep sediment out of drainage pipes.

18. The Contractor will be responsible for proper dust control and will route construction traffic in a manner that minimizes dust generation.

19. Water for dust control will contain no pollutants, but may be non-potable from upland stock ponds. No quantity of water to be used for construction purposes may be taken from a 404 stream, prior to the proper authorizations or permits being obtained by the Contractor.

20. Contractor is to direct workers and sub-contractors to use portable sanitary facilities provided by the Contractor and not to trespass off ROW.

21. Contractor will provide written verification to TxDOT that earth borrow pits and disposal sources meet environmental and regulatory requirements, prior to use. Excavations will meet all OSHA requirements and the current safety guidelines established for TxDOT Quarries and Pits.

22. Boundary silt fences that are terminated down slope, with one end being at the lowest elevation, will be installed with an L - hook to contain sediment. Boundary silt fences that are installed on flat ground will have L-hooks on both ends.

23. Rock filter dams across ditches will be constructed where the rock filter dam ends are embedded within the ditch side slopes and ditch bottom. The top center elevation of the rock filter dam will be at least 6 inches lower than the elevations on the rock filter dam ends.

24. Silt fence will be constructed in a U or V pattern across ditch lines and up the ditch side slope to keep storm water from flowing around the ends of the silt fence. Small silt fences that do not adequately span the ditch and allows storm water around the end(s) will not be used. Where there is adequate space, large U pattern silt fences are preferred to facilitate sediment collection and sediment removal with equipment.

25. Sediment controls (RFDs or silt fences) will be located along road ditches as marked on the SWPPP drawings. Modifications to the sediment control spacing will be adjusted during the project based on sediment control effectiveness. The installation and maintenance of sediment controls at or near outfalls, where storm water leaves TxDOT ROW, takes persistent over ditch line sediment controls.

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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REVISIONS	0418	02	035	SH 171
DEC 2013	DIST	COUNTY		SHEET NO.
FEB 2015	WACO	HILL		121

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

26. Storm water draining sheet flow over disturbed soil sloped towards the ROW property line, will be intercepted by a boundary silt fence typically installed with L-shaped ends.

27. For ditch grading and shoulder up work, the Contractor is limited during good weather to remove up to one mile (limited to five acres of disturbed soil) of ditch line sediment controls; on one side of the roadway. Outfall controls cannot be removed during this activity. Ditch line controls must be replaced upon completion of work and before the next rain event.

28. Sediment controls damaged by the Contractor, as defined by permit, must be fixed or replaced immediately upon discovery.

29. Notches in silt fences are not typically allowed. Specific silt fences that back up water onto lanes of traffic may be notched if approved.

30. For silt fence maintenance, the Contractor will leave approximately 4 inches of deposited sediment up stream of silt fences and not over excavate around silt fences or rock filter dams.

31. The Contractor will inform TxDOT of new construction areas and where soil is planned to be disturbed. Sediment controls will be installed at outfalls prior to the Contractor beginning soil disturbing activities up slope from the outfall.

32. Water from concrete saw cutting, concrete grinding and concrete coring activities; or fine materials from concrete chipping and salvage will not be allowed to enter storm drains or enter streams.

33. Storm water containing suspended sediment and turbidity needing to be removed from excavations or low areas will be pumped or gravity drained through vegetated buffer strips (50 foot minimum) or placed in ditches with temporary sediment controls, prior to the water being discharged into a stream.

34. Uncontaminated water from natural groundwater seepage, springs, foundations and drains that does not contain suspended sediment or any pollutants may be discharged without storm water controls.

35. Lime or cement if spilled in ditches or outside the defined limits of application is considered a pollutant and will be excavated and removed the same day, to avoid contaminating streams.

36. If located along the project ROW, RAP stockpiles will be located where there is a minimum 100 feet of vegetative buffer strip before storm water will reach a stream. RAP will not be used as a construction material within the Ordinary High Water Marks of a stream channel of a 404 designated stream.

37. If allowed on the project, concrete truck wash out areas will have adequate volume to allow 12 inch freeboard for rain and will be lined with 6 mils of plastic. No concrete will be stored higher than the 12 inch freeboard. Cleaning of truck chutes and equipment does not constitute concrete truck wash out and this activity may be completed at the concrete placement location. Wash out areas will not be located closer than 50 ft from down slope inlets or stream channels.

38. For outfalls near stock ponds closer than 50 foot from disturbed soil at the ROW line, redundant sediment controls will be provided, typically a combination of rock filter dam and a silt fence constructed in line of the flow.

39. Earth stockpiles will utilize silt fence sediment controls, positioned on the low end of the stockpile drainage area with L-hooks or silt fence installed around the entire stockpile.

40. Sediment controls including rock filter dams and silt fences will not be installed across any 404 streams. Sediment controls at 404 streams will be positioned to limit sediment entering the stream from the banks and around structures/culverts, and will allow free flow of storm water to pass through the ROW without being dammed by any sediment controls. Remove loose materials from stream channels prior to each rain event.

41. Sediment controls for non-404 streams may be constructed across the drainage channel in unlimited locations. It is appropriate to use sediment control details typically used for 404 streams for non-404 streams when flow velocities are high. Remove loose material from stream channels prior to each rain event.

42. Incomplete drainage pipe installation across the roadway does not remove the requirement for having sediment controls around the ends of the pipe. To stay within permit requirements, sediment controls should be installed over and around the terminated end and along each side of the banks as soon as construction on the pipe has been completed. Remove loose material from stream channels prior to each rain event.

43. Safety end / headwall construction temporarily will require the removal of part of the sediment control placed over and around the pipe end. Retain in place as much functioning sediment control as possible. Replace the silt fence over and around the top of the pipe, immediately upon concrete placement and form removal. Do not remove culvert sediment controls that cannot be replaced before the next rain event. Sediment control at the ends of culverts must be in place and available for any rain event until the disturbed soil areas are re-vegetated.

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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REVISIONS	0418	02	035	SH 171
DEC 2013 FEB 2015	DIST	COUNTY		SHEET NO.
	WACO	HILL		122

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

44. Between the Ordinary High Water Marks of a 404 stream channel, the Contractor will disturb only the minimum amount of stream channel that is necessary to complete the work.

45. Rock riprap for erosion control does not replace the requirements to maintain sediment control until vegetation is re-established. Replace sediment controls immediately after installing erosion rock.

46. At the direction of TxDOT, sediment deposited into existing and new culverts will be removed subsidiary to Item 506. Sediment to be removed is either pre-existing material before construction starts or sediment generated as a part of this project.

47. Provide treated 2X4 cross bracing for rectangular inlet silt fence, subsidiary to Item 506.

48. Loose or granular earth materials will not be used to repair silt fence undercuts. Silt fence undercut repairs will be conducted with well compacted soils or the silt fence will be reset in a nearby location.

49. Silt fence steel T posts of approximately 1.25 pounds per foot are allowed at a spacing of 8 feet or less. Silt fence steel T posts between approximately 1.25 pounds per foot and 0.85 pounds per foot are allowed for T post spacing of 5 feet or less.

50. Silt fence to be used to slow the flow of storm water down slopes will be positioned approximately horizontal (on the contour) with L hooks on the ends and limited to approximately 200 feet in length. Multiple sections and levels of silt fence may be required in addition to temporary / permanent erosion control flumes.

51. Soil retention blankets will be installed rolled down the slope with the small dimension side embedded at the top of slope, unless recommended otherwise by the manufacturer. Excess grass, rocks, trash, debris or clods will be removed before seeding and installing soil retention blankets. All installations will be by the manufacturer recommendations. Contractor equipment, including tractor mowers will be kept off areas with soil retention blankets until the grass is established.

SCALE = NTS SHEET 4 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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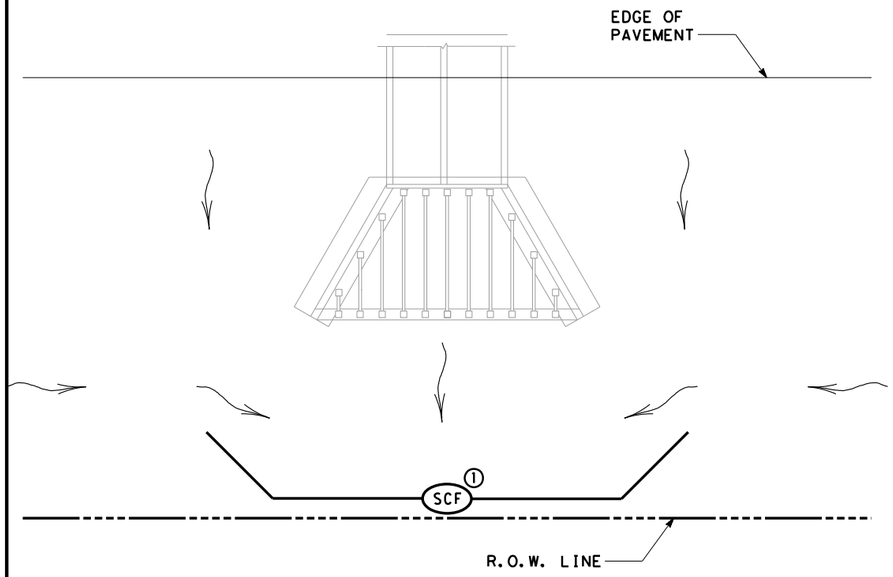
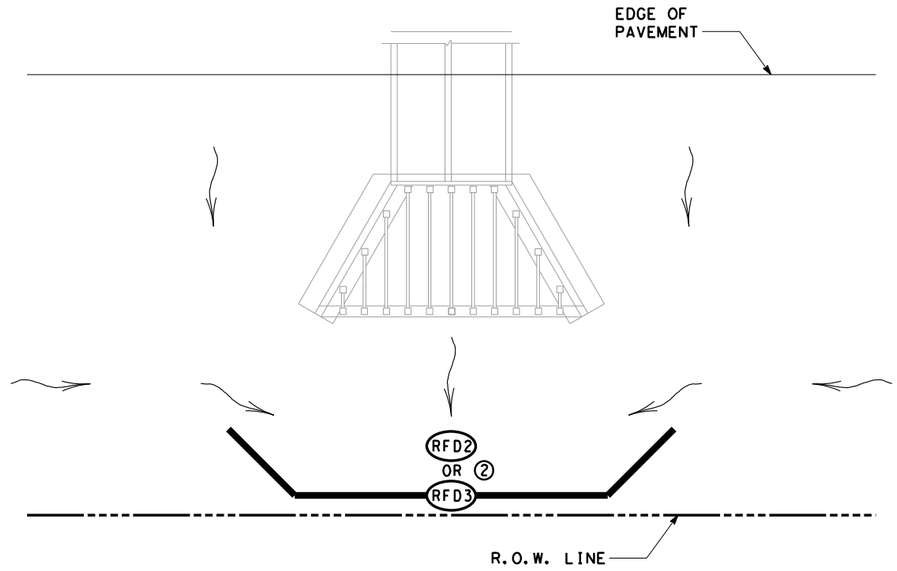


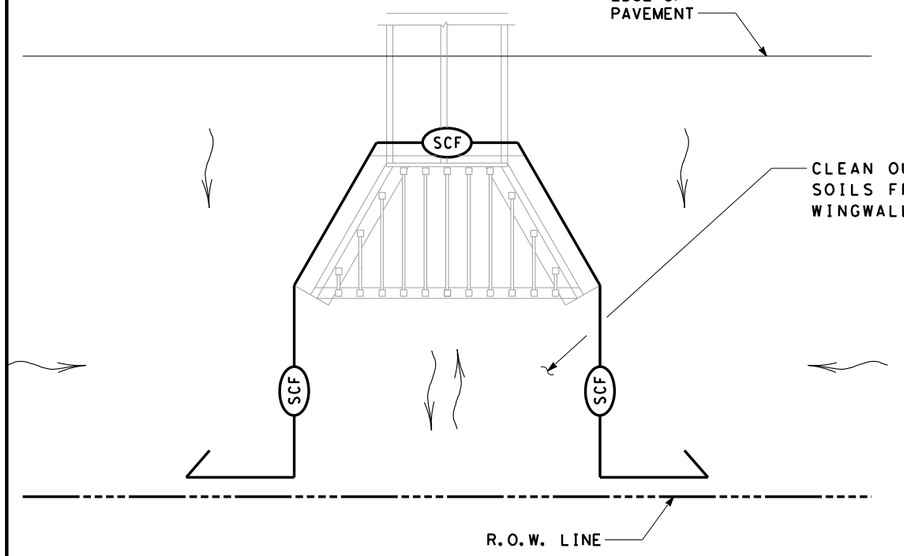
BEST MANAGEMENT PRACTICE (BMP) #1

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



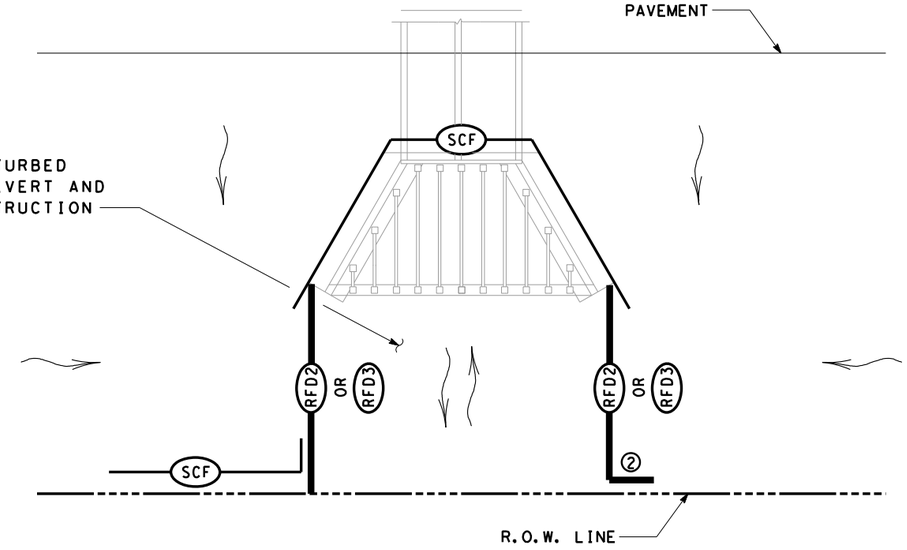
BEST MANAGEMENT PRACTICE (BMP) #2

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #3

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #4

FOR 404 OR NON-404 STREAMS ~ SEDIMENT CONTROL AT EXIT OR ENTRANCE OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

1. EXTEND SILT FENCE SO STORM WATER DOES NOT GO AROUND THE ENDS. USE L-HOOKS ON ENDS AS REQUIRED.
2. EXTEND ROCK FILTER DAM SO STORM WATER DOES NOT GO AROUND THE ENDS.

SCALE = NTS SHEET 5 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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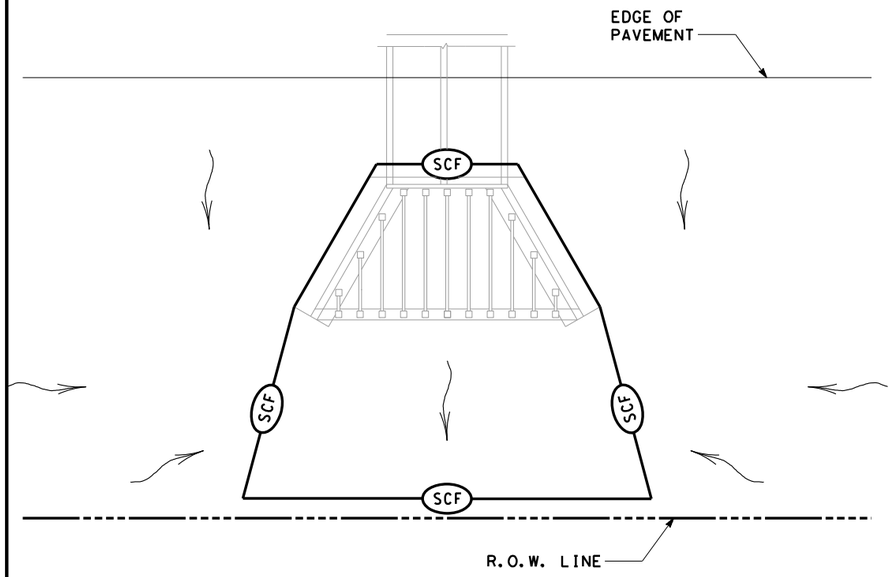
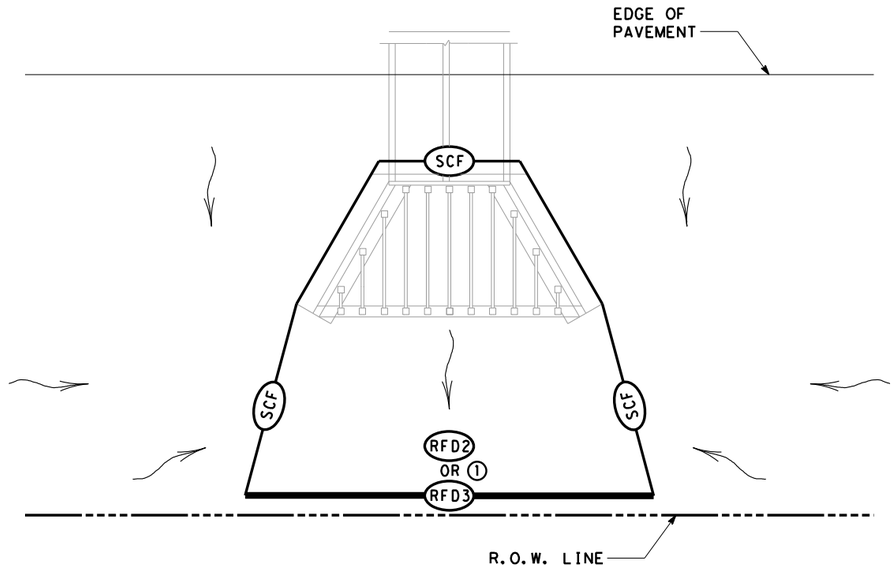


BEST MANAGEMENT PRACTICE (BMP) #5

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #6

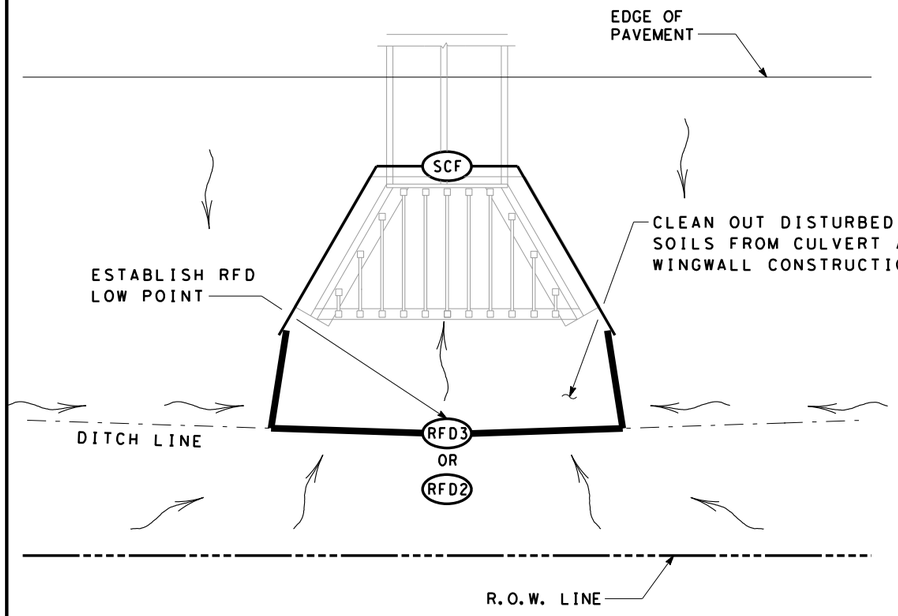
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

NOTES:

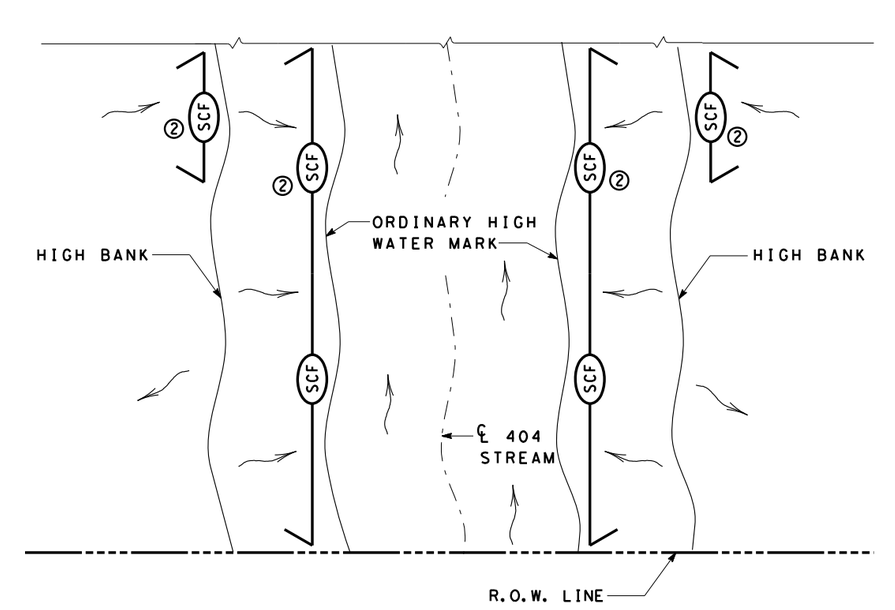
① PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.

② USE SILT FENCE L-HOOKS ON ENDS TO BLOCK STORM WATER SEDIMENT



BEST MANAGEMENT PRACTICE (BMP) #7

FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #8

FOR 404 STREAMS ~ SEDIMENT CONTROL DURING PROJECT CLEARING AND GRUBBING

SCALE = NTS SHEET 6 OF 10

Texas Department of Transportation
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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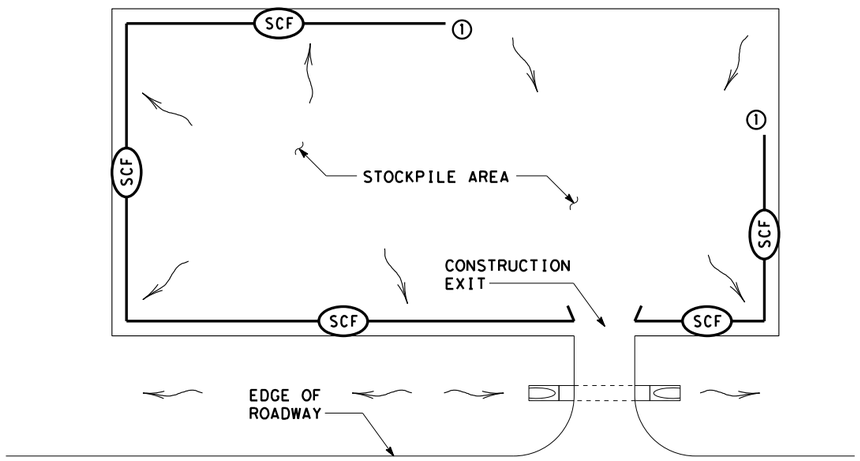
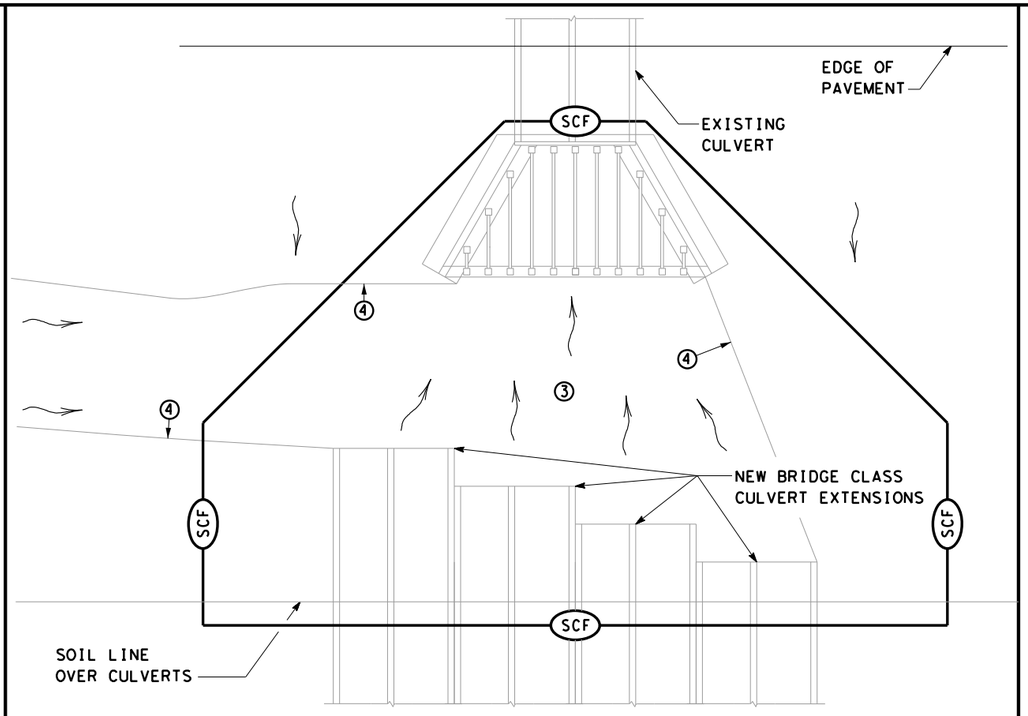


BEST MANAGEMENT PRACTICE (BMP) #9

STOCKPILE SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #10

FOR 404 OR NON-404 STREAMS ONLY ~
SEDIMENT CONTROL AT PHASED CONSTRUCTION OF BRIDGE CLASS CULVERTS

SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

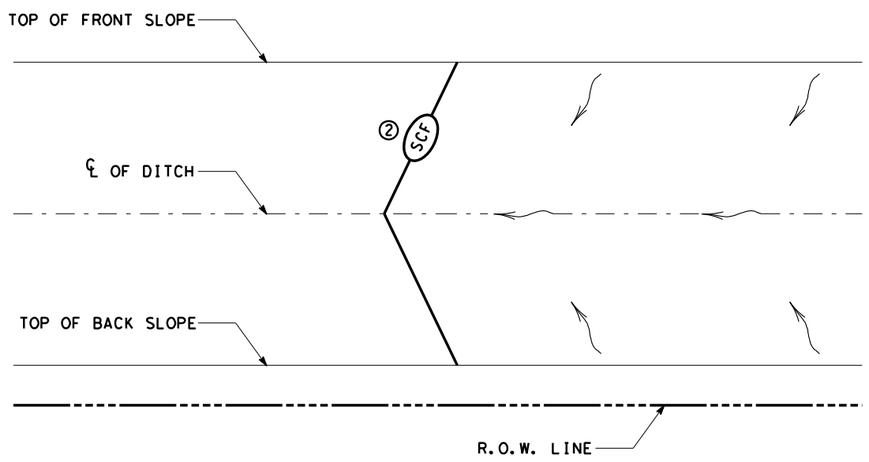
NOTES:

① START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED

② ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.

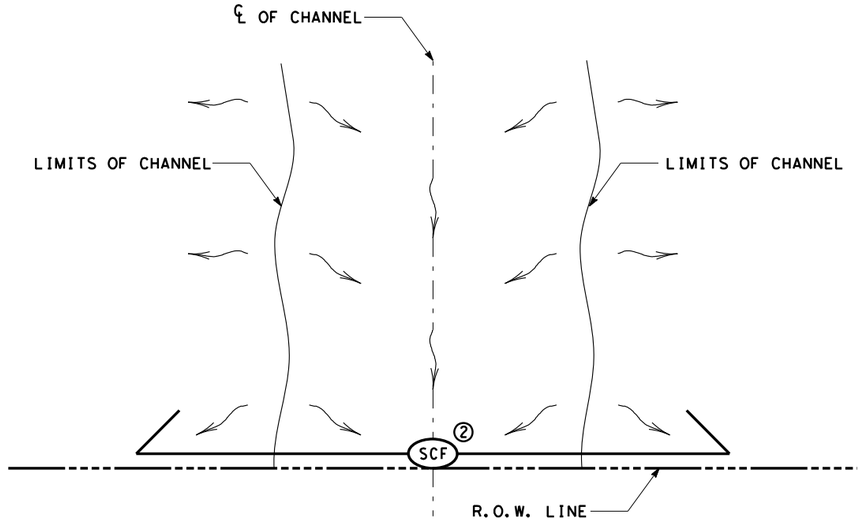
③ PROVIDE A SMOOTH TRANSITION FROM THE INVERT ELEVATIONS BETWEEN CULVERTS. REMOVE LOOSE SOIL FROM EXCAVATED AREA BETWEEN CULVERTS.

④ PROVIDE AND INSTALL PNEUMATICALLY PLACED CONCRETE ON THE DITCH BOTTOM AND SIDE SLOPES BETWEEN TEMPORARY TERMINATIONS BETWEEN OLD AND NEW CULVERTS. PNEUMATICALLY PLACED CONCRETE WILL BE PLACED TO THE HEIGHT OF THE LARGEST CULVERT ON THE DITCH SIDE SLOPES; AND TO A LIMIT 10 FEET OUTSIDE THE LOCATION OF BMPS ALONG THE DITCH BOTTOM. CEMENT STABILIZED SAND MAY BE SUBSTITUTED FOR PNEUMATICALLY PLACED CONCRETE, IN AREAS WHERE INSTALLATION WORKS AND AT THE OPTION OF TXDOT.



BEST MANAGEMENT PRACTICE (BMP) #11

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE



BEST MANAGEMENT PRACTICE (BMP) #12

BOUNDRY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED DOWN SLOPE

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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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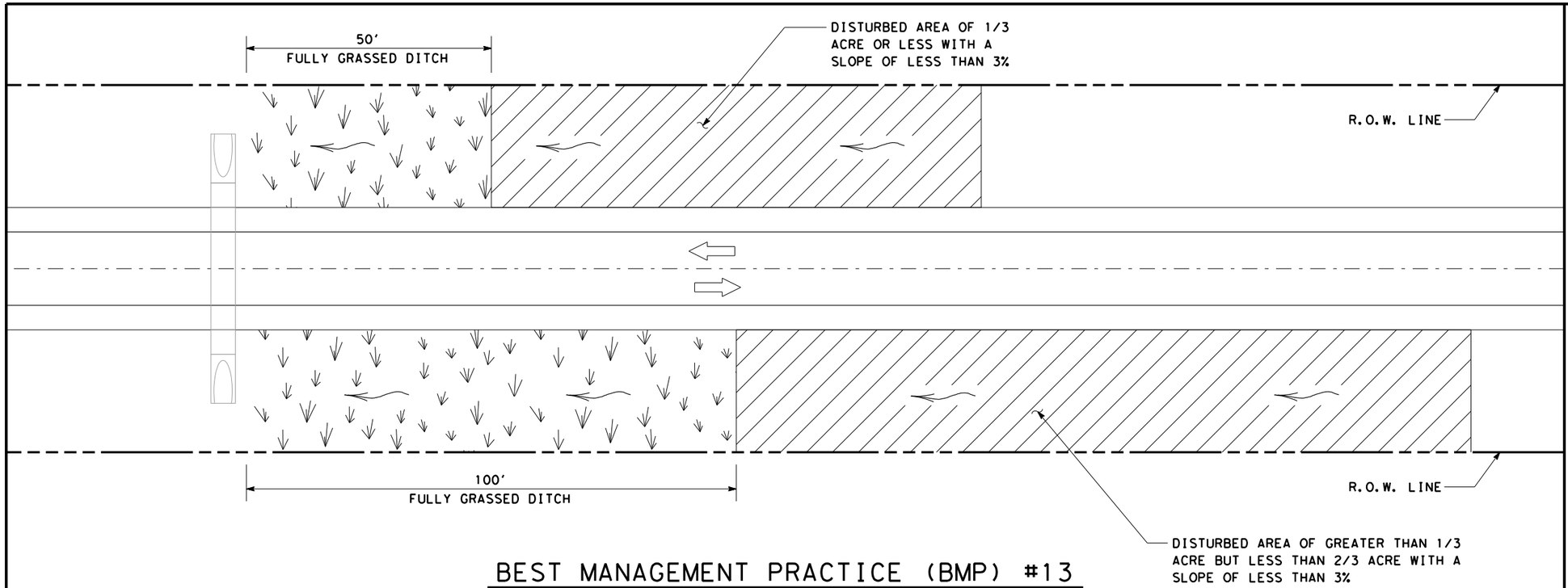
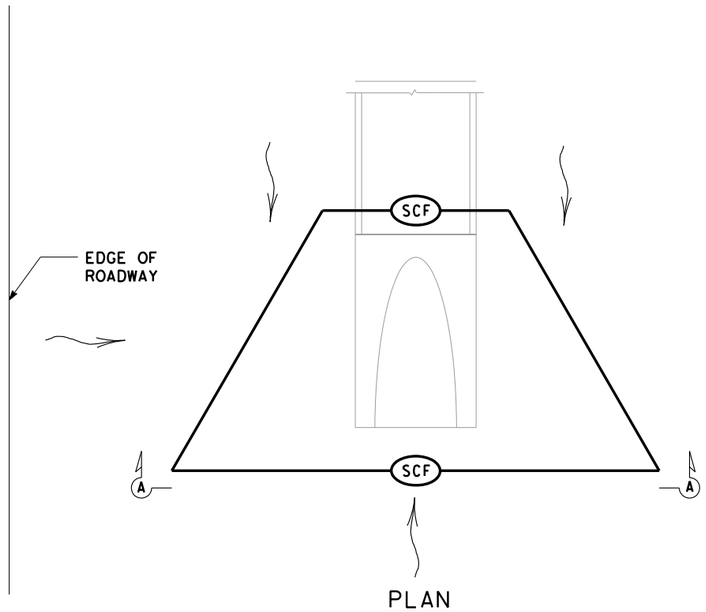
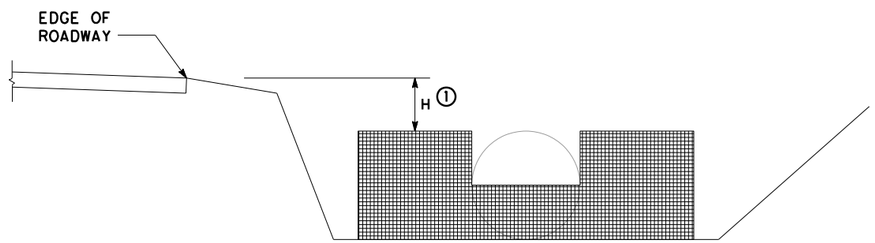


BEST MANAGEMENT PRACTICE (BMP) #13

USE OF VEGETATIVE BUFFERS IN PLACE OF TEMPORARY SEDIMENT CONTROLS SUCH AS SILT FENCE AND ROCK FILTER DAMS



PLAN



VIEW A-A

BEST MANAGEMENT PRACTICE (BMP) #14

NON-404 STREAMS AND DITCHES ONLY ~ SEDIMENT CONTROL AT PARALLEL DRAINAGE STRUCTURE ENTRANCE ②

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE

① FOR H DIMENSIONS LESS THAN 1.5' SILT FENCE MAY NEED TO BE NOTCHED AS SHOWN IN VIEW A-A. ADD EXTRA POSTS AT NOTCH.

② BMP #14 MAY BE USED AT CROSS DRAINAGE STRUCTURES AS DIRECTED.

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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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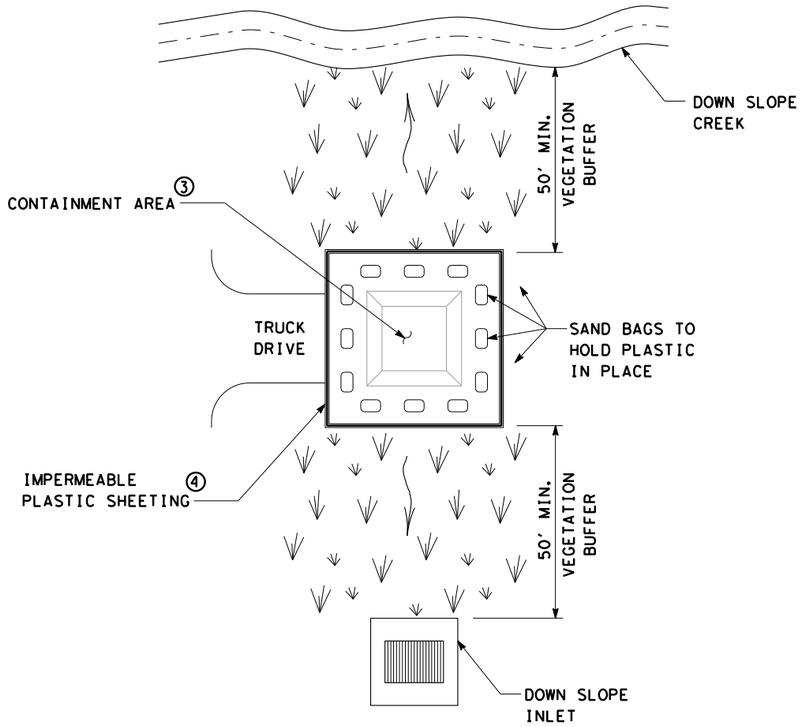
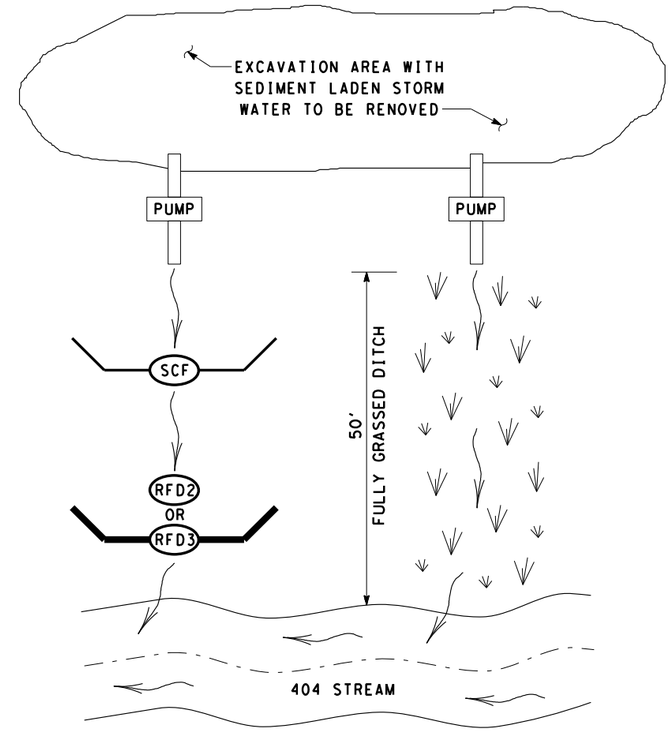


BEST MANAGEMENT PRACTICE (BMP) #15

CONCRETE TRUCK WASHOUT AREA



BEST MANAGEMENT PRACTICE (BMP) #16

PUMPED STORM WATER SEDIMENT CONTROLS ①

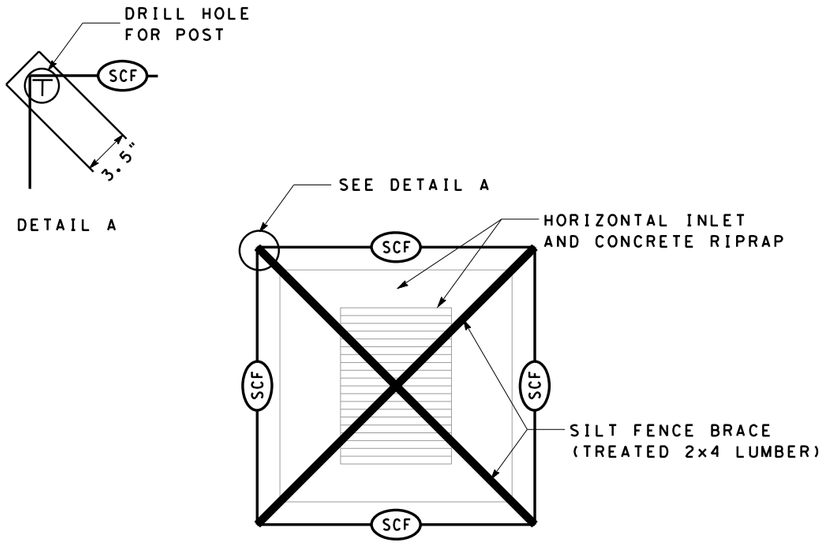
	FULLY GRASSED DITCH
	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD2	ROCK FILTER DAM (TY 2)
RFD3	ROCK FILTER DAM (TY 3)

① PUMPED STROM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS BEFORE ENTERING A 404 STREAM.

② FOR LANDOWNER STOCKPONDS WITHIN 50' OF THE RIGHT OF WAY LINE, PROVIDE REDUNDANT SEDIMENT CONTROLS AT THE CONVEYANCE OF THE POND. MINIMUM OF TWO SEDIMENT CONTROLS.

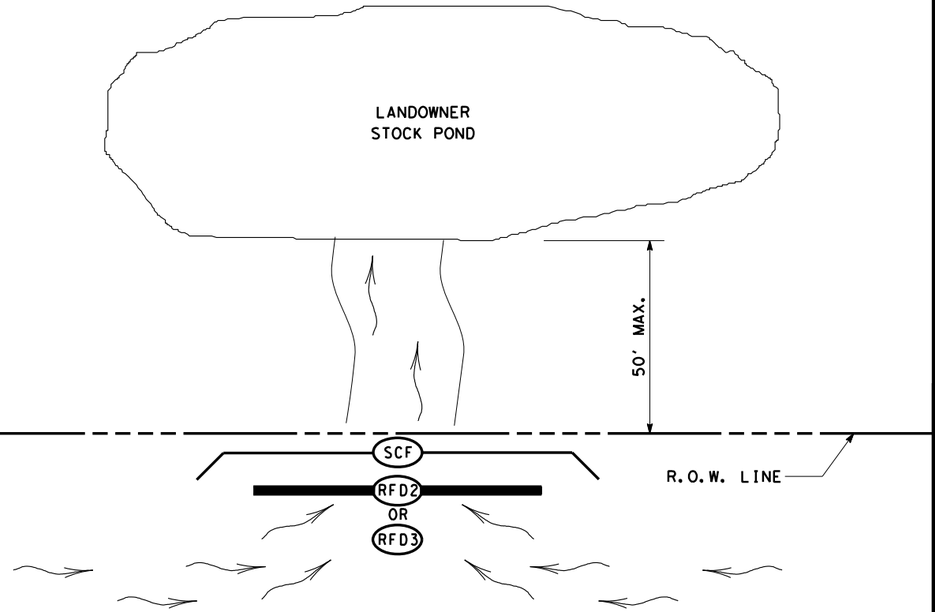
③ WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.

④ EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING.



BEST MANAGEMENT PRACTICE (BMP) #17

HORIZONTAL INLET SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #18

LANDOWNER STOCKPOND SEDIMENT CONTROL ②

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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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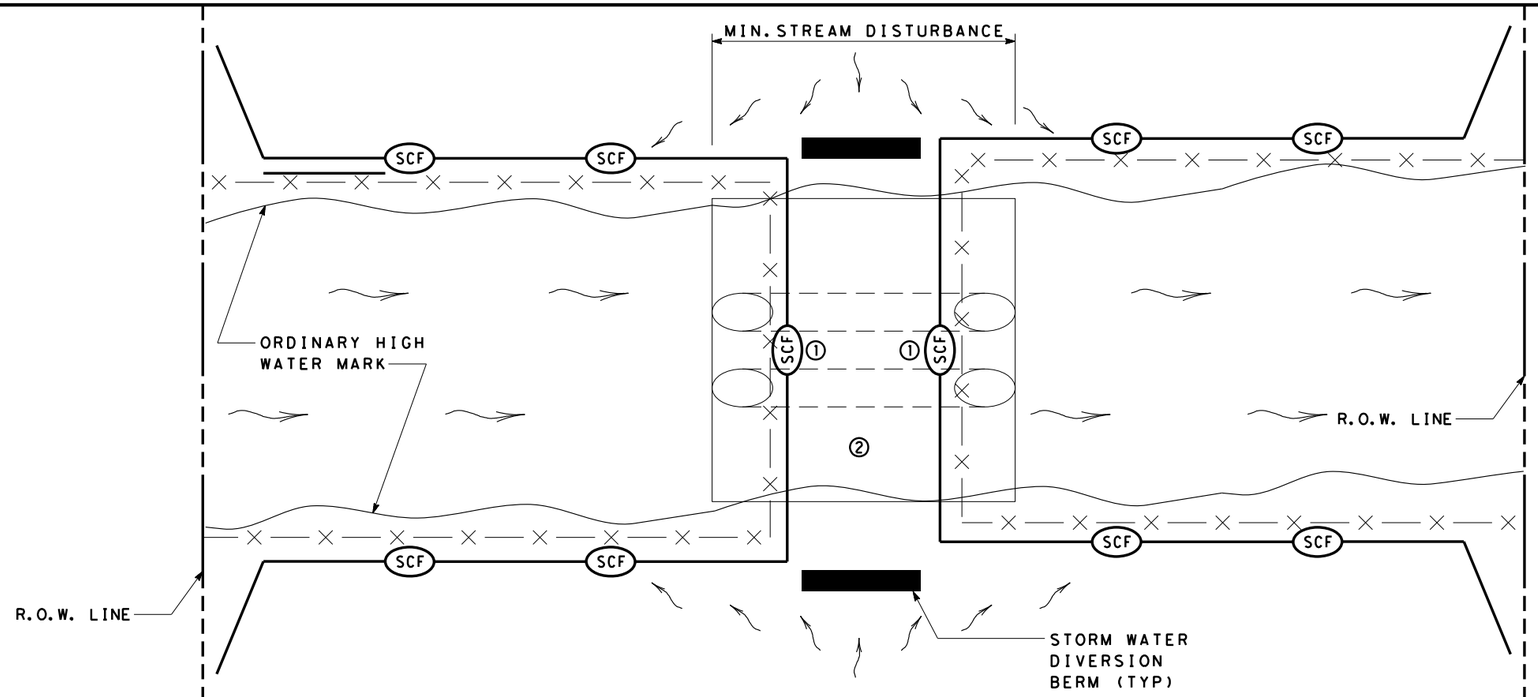


BEST MANAGEMENT PRACTICE (BMP) #19

TYPICAL 404 STREAM CROSSING (SEDIMENT CONTROL AT CROSSING)

	DIRECTION OF FLOW
SCF	SEDIMENT CONTROL FENCE
RFD	ROCK FILTER DAM
× — ×	SECURITY FENCING

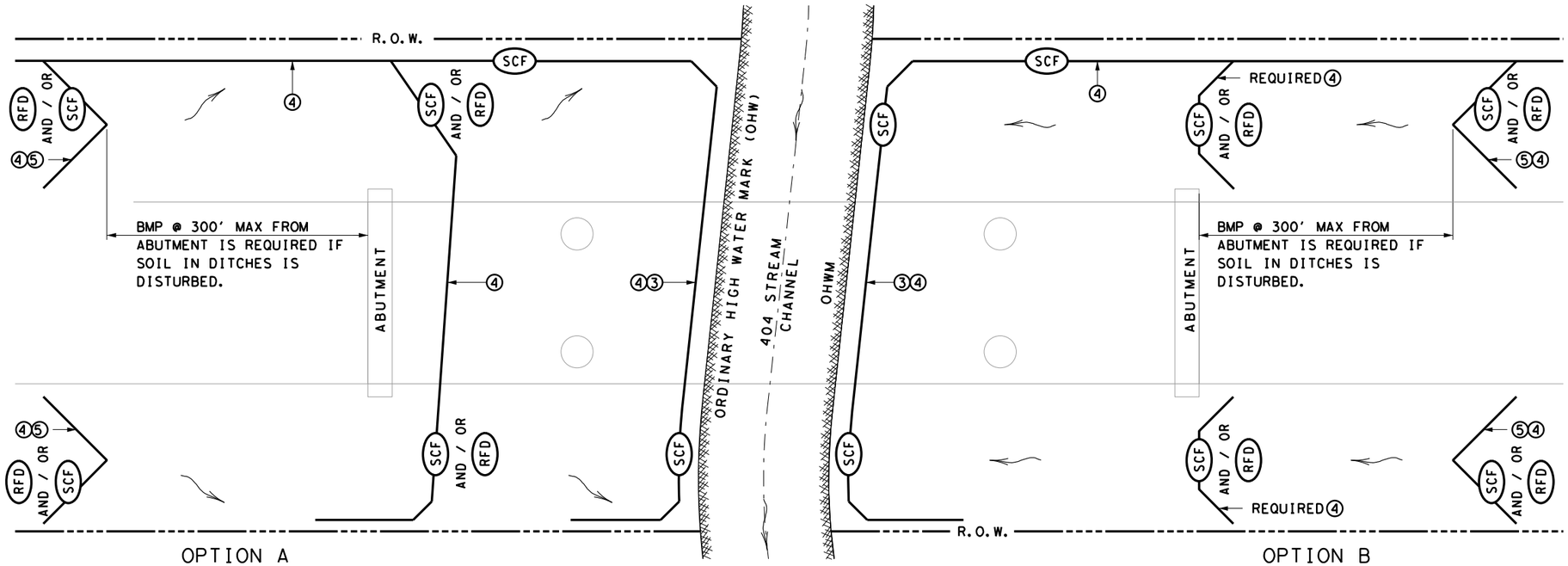
① HAY BALES MAY BE SUBSTITUTED FOR SILT FENCE OVER THE STREAM CROSSING.

② CROSSING WILL BE AS PER REQUIREMENTS OF THE WATERS OF THE US GENERAL NOTES.

③ INSTALL SILT FENCE SLIGHTLY UP FROM OHW MARK FROM R.O.W. TO R.O.W.

④ USE SILT FENCE L-HOOKS ON LEVEL OR DOWN SLOPING ENDS TO BLOCK STORM WATER SEDIMENT

⑤ INSTALL LARGE V OR U SHAPED BMP'S FROM ABUTMENT AS SHOWN. IF THERE IS STEEP DITCH CONDITIONS DECREASE SPACING AND CONSIDER RFD'S. ADD ADDITIONAL BMP'S IF GRADE IS STEEP OR IF FLOW IS HIGH.



OPTION A OPTION B

BEST MANAGEMENT PRACTICE (BMP) #20

FOR 404 STREAMS ~ BMP'S AT BRIDGES

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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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