STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

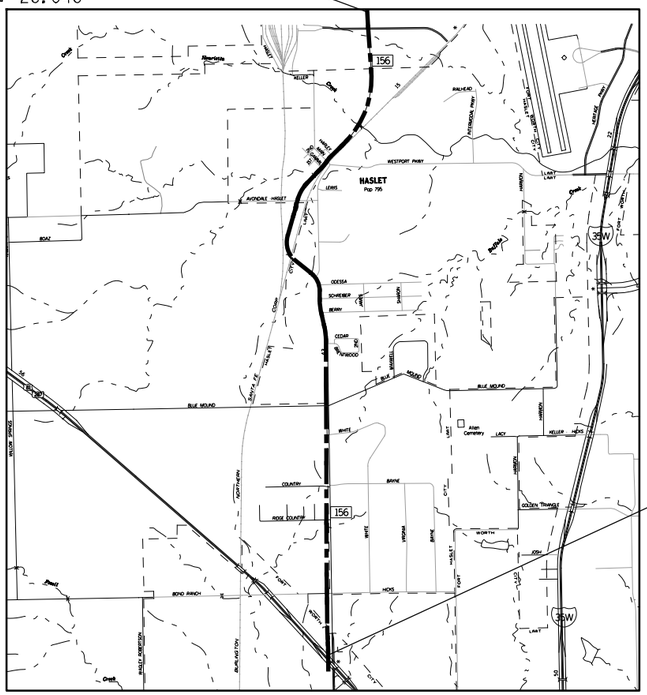
FEDERAL PROJECT NUMBER: F 2023(819)

HIGHWAY: FM 156
TARRANT COUNTY

NET LENGTH OF PROJECT= 29434.00 FT. = 5.575MI.
LIMITS: FROM DENTON COUNTY LINE TO US 287

FOR THE CONSTRUCTION OF RESURFACE ROADWAY
CONSISTING OF 2" MILL, OVERLAY AND BASE REPAIR

BEGIN PROJECT
CSJ 0718-02-072
℄ FM 156 STA 0+20.00
REF MARKER: 252+4.258
MP: 20.004
DFO: 26.046



VICINITY MAP
N.T.S.

END PROJECT
CSJ 0718-02-072
℄ FM 156 STA 294+54.00
REF MARKER: 260+1.521
MP: 25.392
DFO: 31.434

DESIGN	FED.RD. DIV.NO.	FEDERAL PROJECT NO.		SHEET NO.
EW	6	F 2023(819)		1
GRAPHICS RB	STATE	STATE DIST.NO.	COUNTY	
CHECKED PCW	TEXAS	02	TARRANT	
CHECKED PCW	CONT.	SECT.	JOB	HIGHWAY NO.
	0718	02	072	FM 156

ROADWAY CLASSIFICATION:
MINOR RURAL ARTERIAL

DESIGN SPEED: 55 MPH

CURRENT ADT 2021 = 18622

PROJECTED 2041 ADT = 31657

LETTING DATE:

CONTRACTOR:

DATE WORK BEGAN:

DATE WORK COMPLETED:

DATE WORK ACCEPTED:

FINAL CONTRACT COST:

STATE OF TEXAS
PHAISARN CWATANAPHOL
89252
REGISTERED
PROFESSIONAL ENGINEER

Phaisarn Cwatanaphol, P.E. 2/10/2023

COUNTY TARRANT PROJ. NO.
HWY. NOFM 156 LETTING DATE
DATE ACCEPTED

TDLR IS NOT REQUIRED

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022)

EXCEPTIONS: STA. 5+10.86 TO STA. 6+47.76
EQUATIONS: STA. 0+20.00 (CSJ 0718-02-072)
= STA. 103+26.83 (CSJ 0-718-01-047)
RAILROADS: BNSF

Texas Department of Transportation

2/13/2023
SUBMITTED FOR LETTING: _____20__
DocuSigned by:
AREA ENGINEER

2/14/2023
DocuSigned by: FOR LETTING: _____20__
DIRECTOR TP&D
7879B0B92E5D403...

2/14/2023
DocuSigned by: FOR LETTING: _____20__
David M Salazar, P.E.
DISTRICT ENGINEER
B741E64FAD82411...

100% PLANS SUBMITTAL

	SHEET NUMBERS	DESCRIPTION
		I. GENERAL
	1	TITLE SHEET
	2	INDEX OF SHEETS
	3 - 16	PROJECT LAYOUT
	17 - 20	EXISTING TYPICAL SECTIONS
	21 - 24	PROPOSED TYPICAL SECTIONS
	25, 25A-25I	GENERAL NOTES
	26, 26A-26B	ESTIMATES & QUANTITIES
	27	ROADWAY, DRAINAGE & SW3P SUMMARY
	28	PAVEMENT MARKING AND TRAFFIC CONTROL SUMMARY
	29	BRIDGE SUMMARY
	30 - 40	SUMMARY OF SMALL SIGNS
		II. TRAFFIC CONTROL
	41 - 42	SEQUENCE OF WORK
	43 - 44	TRAFFIC CONTROL PLAN TYPICAL SECTIONS
	45	TRAFFIC CONTROL PLAN - FM 156 DETOUR BRIDGE 1
	46	TRAFFIC CONTROL PLAN - FM 156 DETOUR BRIDGE 2
	47	TRAFFIC CONTROL PLAN - FM 156 DETOUR BRIDGE 3
		-STANDARDS-
#	48 - 59	BC(1)-21 THRU BC(12)-21
#	60	TCP (1-1)-18
#	61	TCP (1-2)-18
#	62	TCP (1-3)-18
#	63	TCP (1-4)-18
#	64	TCP (2-1)-18
#	65	TCP (2-2)-18
#	66	TCP (2-4)-18
#	67	TCP (3-1)-13
#	68	TCP (3-3)-14
#	69	TCP (3-4)-13
#	70	WZ (STPM)-13
#	71	WZ(TD)-17
#	72	WZ (UL)-13
#	73	WZ (RS)-22
		III. RAILROAD
	73A	RAILROAD SCOPE OF WORK
		IV. ROADWAY
	74 - 75	HORIZONTAL DATA SHEET
	76 - 78	MISCELLANEOUS ROADWAY DETAILS
	79	MBGF SUMMARY
		-STANDARDS-
#	80	BED-14
#	81	GF (31)-19
#	82	GF (31)DAT-19
#	83	GF (31)MS-19
#	84 - 85	GF (31)TR TL3-20
#	86 - 88	SRG(TL-3)-21
#	89	SGT (10S) 31-16
#	90	SGT (11S) 31-18
#	91	SGT (12S) 31-18
	92	T5/T501/T502TR (MOD)
#	93	PSET-SC
#	94	MDD-FTW
		V. SIGNING AND STRIPING
	95 - 108	SIGNING & PAVEMENT MARKING LAYOUT
		-STANDARDS-
#	109	D&OM(1) -20
#	110	D&OM(2) -20
#	111	D&OM(3) -20
#	111B	D&OM(4) -20
#	112	D&OM(5) -20
#	113	D&OM (VIA)-20
#	114	PM(1)-22
#	115	PM(2)-22
#	116A	PM(3)-22
#	116B	PM(4)-22A
#	116C	PM(5)-22
#	116D	RS(4)-13
#	117	SMD (GEN)-08
#	118	SMD (SLIP-1)-08
#	119	SMD (SLIP-2)-08
#	120	SMD (SLIP-3)-08
#	121	TSR (3)-13

	SHEET NUMBERS	DESCRIPTION
		VI. BRIDGE
	122-130	BRIDGE LAYOUT & BRIDGE REPAIR TABLE
	131-133	BRIDGE REPAIR DETAILS
		-STANDARDS-
	134	ARMOR JOINT DETAILS (MOD)
	135	BRIDGE FOAM EXPANSION JOINT SEAL (MOD)
		VII. ENVIRONMENTAL
	136-137	STORMWATER POLLUTION PREVENTION PLAN (SWP3)
	138	EPIC - ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
		-ENVIRONMENTAL ISSUES STANDARDS-
#	139	EC(1)-16
#	140	EC(3)-16
#	141-143	EC(9)-20

"#" THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN ISSUED BY ME AND APPLICABLE TO THIS PROJECT.

P.E. 3/13/23 DATE

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

03/13/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

INDEX OF SHEETS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	2
CONTROL	SECTION	JOB	
0718	02	072	

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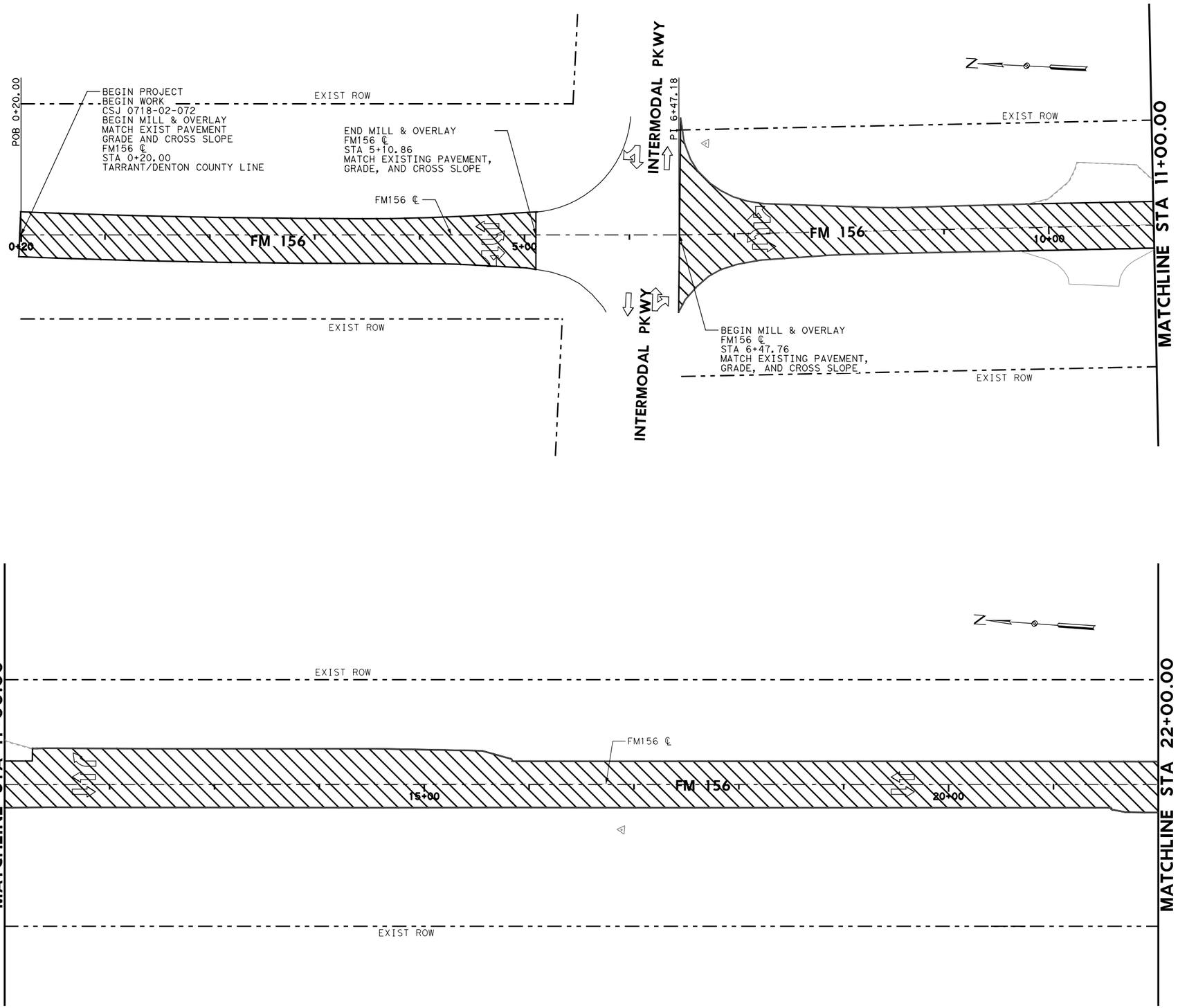
FILE: FM156_INDEX.dgn

100% PLANS SUBMITTAL



0 50 100 150 200

HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ANY WORK WITHIN 500 FEET OF A TXDOT TRAFFIC SIGNAL, ILLUMINATION SYSTEM, AND/OR ITS SYSTEM WILL REQUIRE THE CONTRACTOR TO CONTACT THE TXDOT FORT WORTH SIGNAL SHOP AT 817-370-3664.
7. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
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PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

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613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

PROJECT LAYOUT
BEGIN TO STA 22+00

SCALE: 1"=100' SHEET 1 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	3
CONTROL	SECTION	JOB	
0718	02	072	

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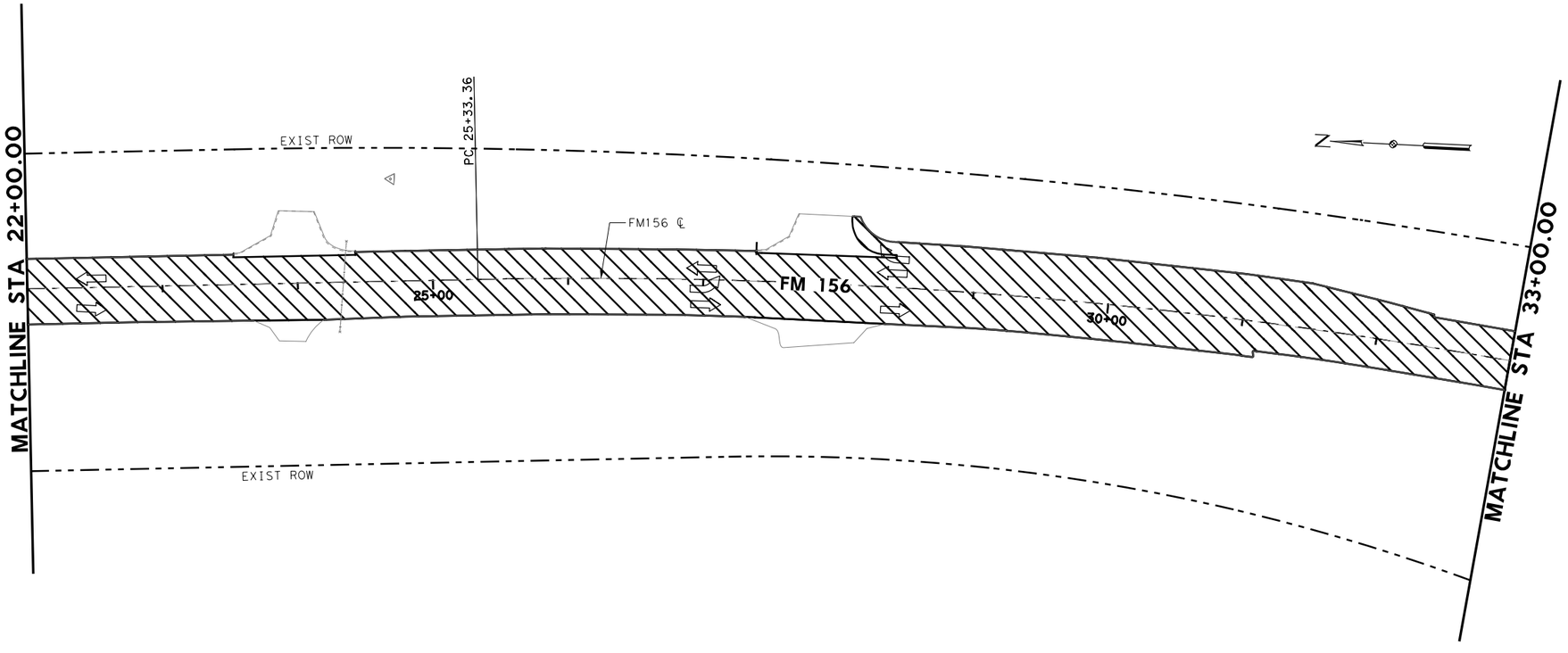
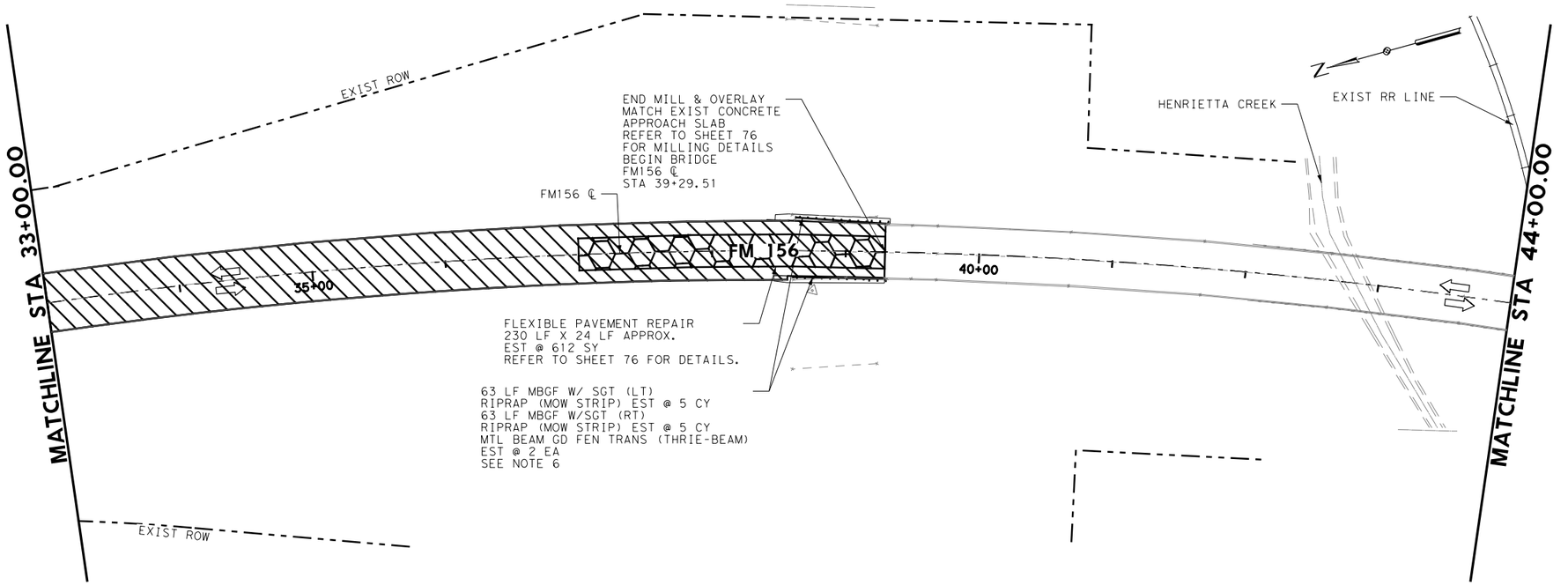
100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

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7. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
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02/09/23

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613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

PROJECT LAYOUT
STA 22+00 TO STA 44+00

SCALE: 1"=100' SHEET 2 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	4
CONTROL	SECTION	JOB	
0718	02	072	

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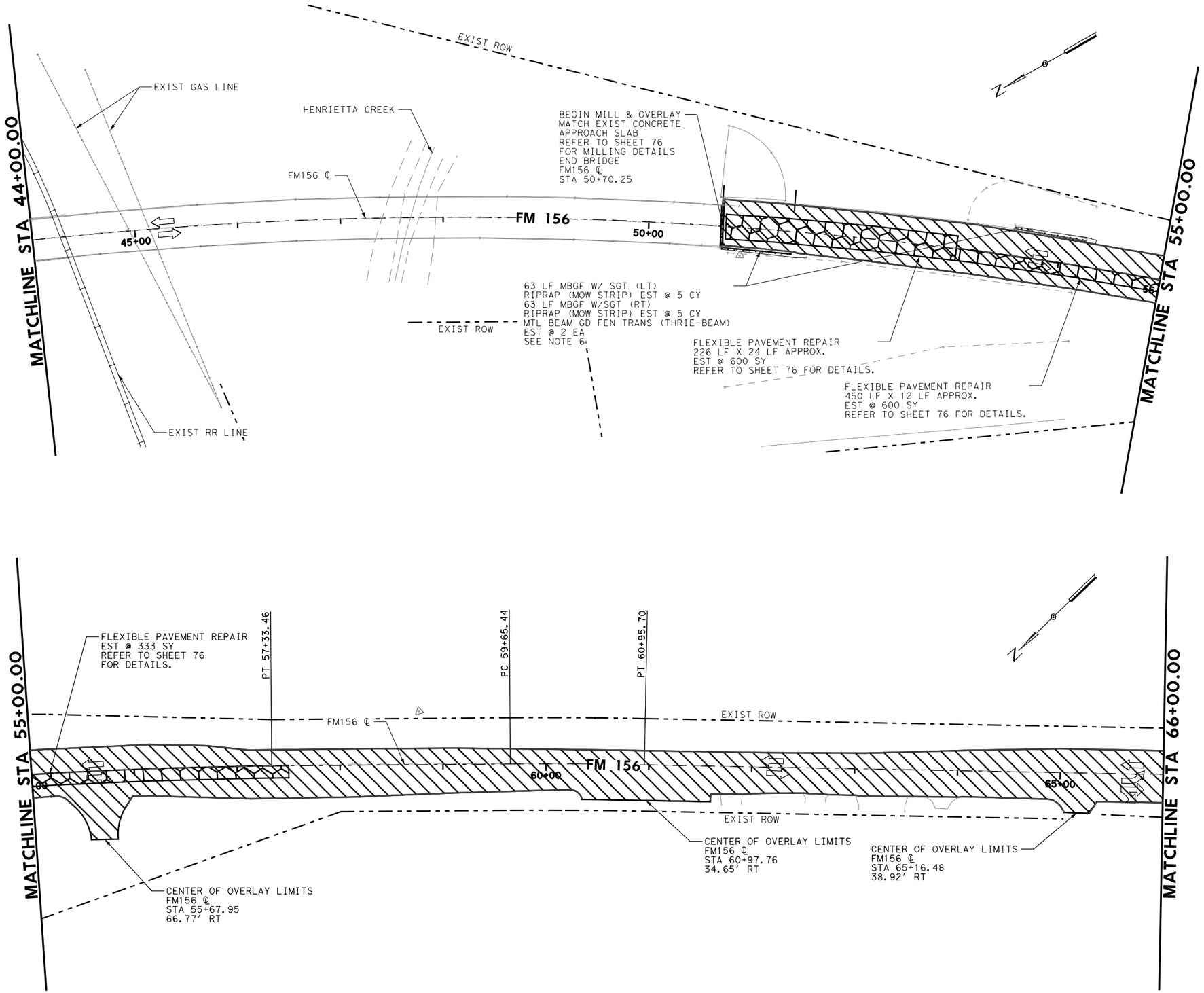
100% PLANS SUBMITTAL



ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

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613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156

PROJECT LAYOUT
STA 44+00 TO STA 66+00

SCALE: 1"=100' SHEET 3 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	5
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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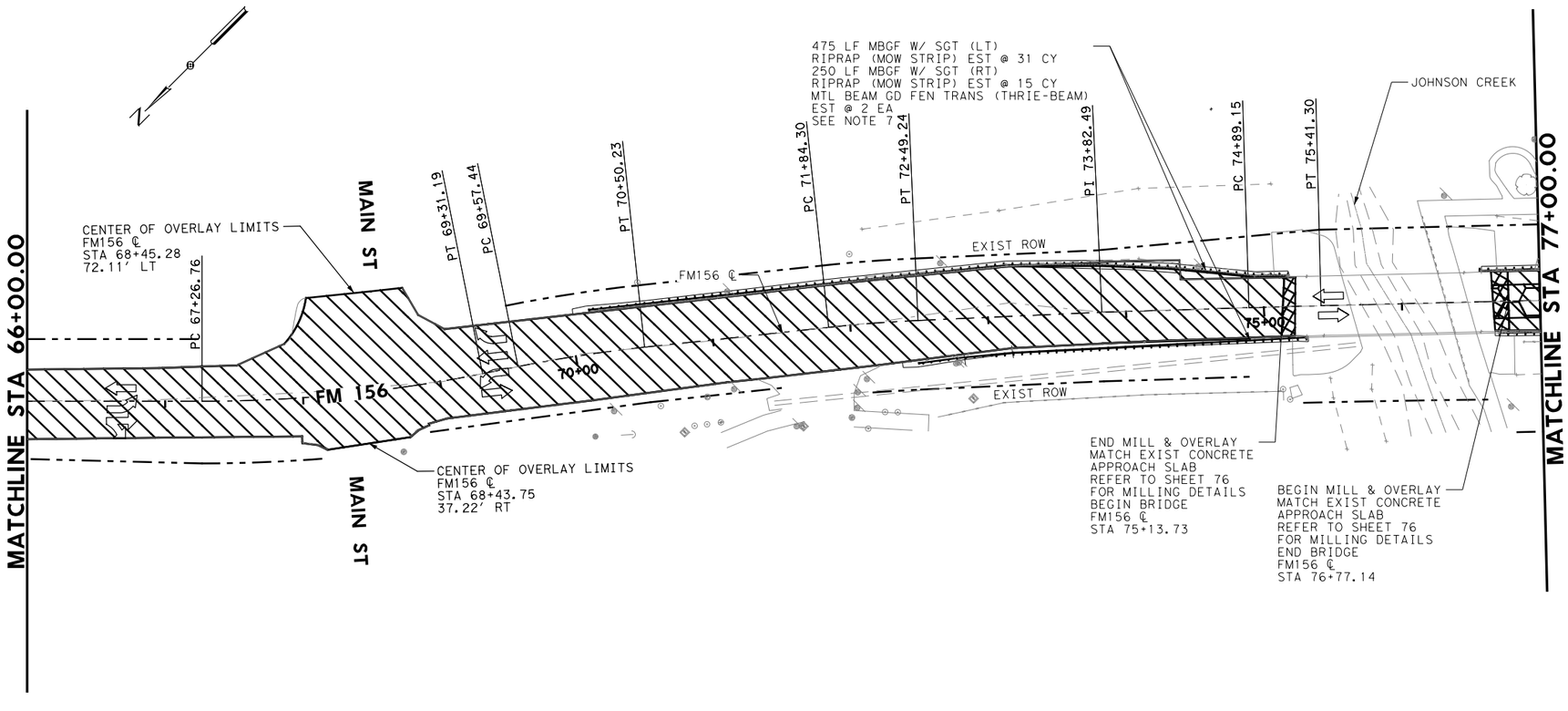
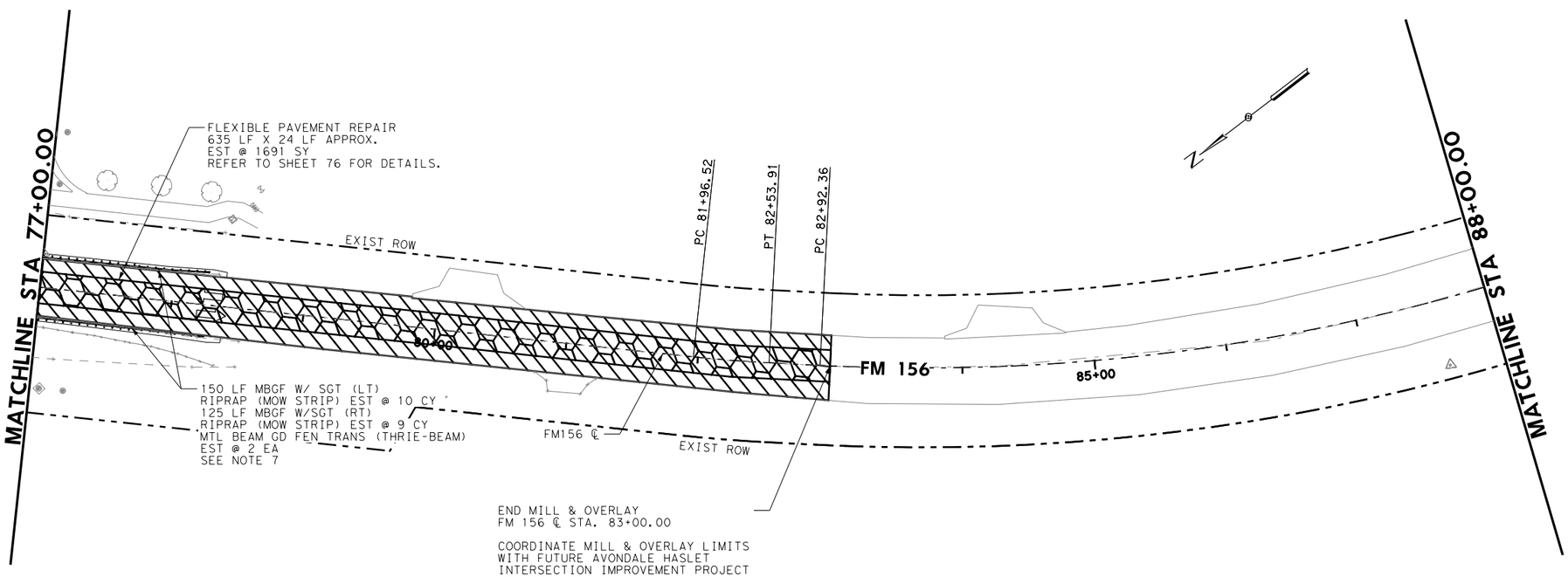
100% PLANS SUBMITTAL





0 50 100 150 200

HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

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8. ROW LINES ARE APPROXIMATE

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02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156

PROJECT LAYOUT
STA 66+00 TO STA 88+00

SCALE: 1"=100' SHEET 4 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	6
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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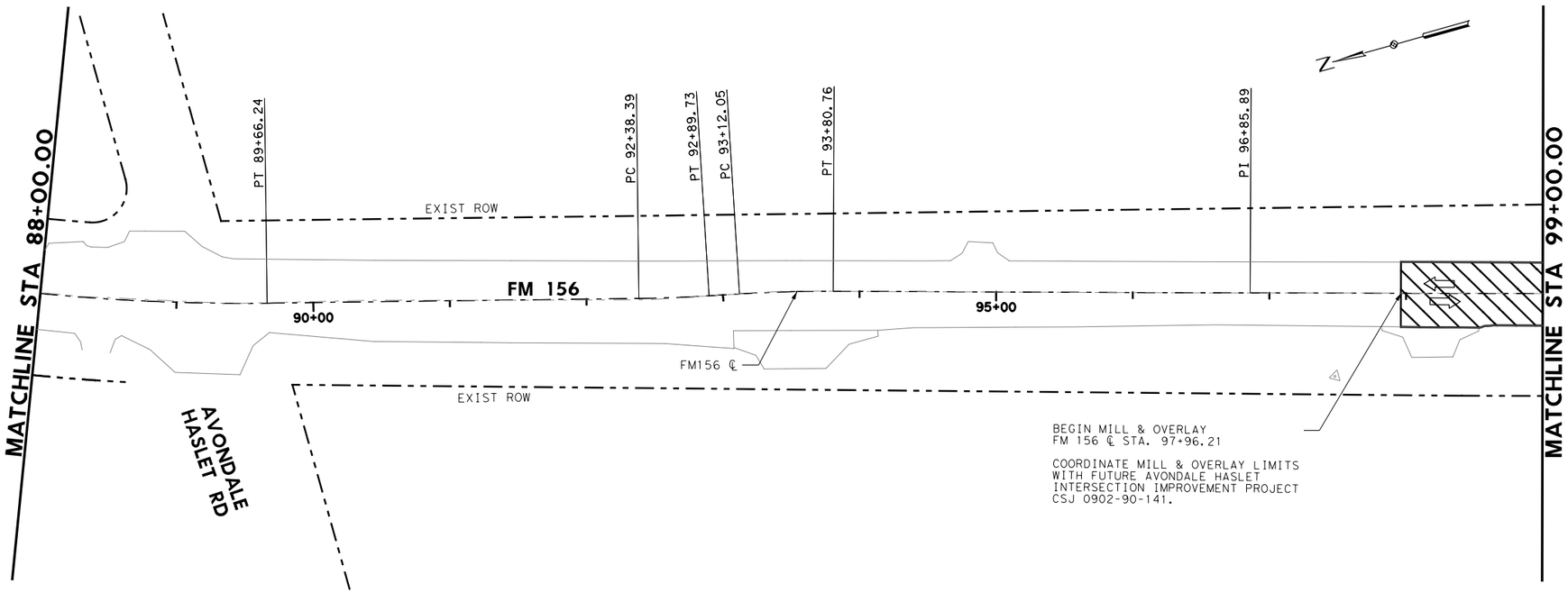
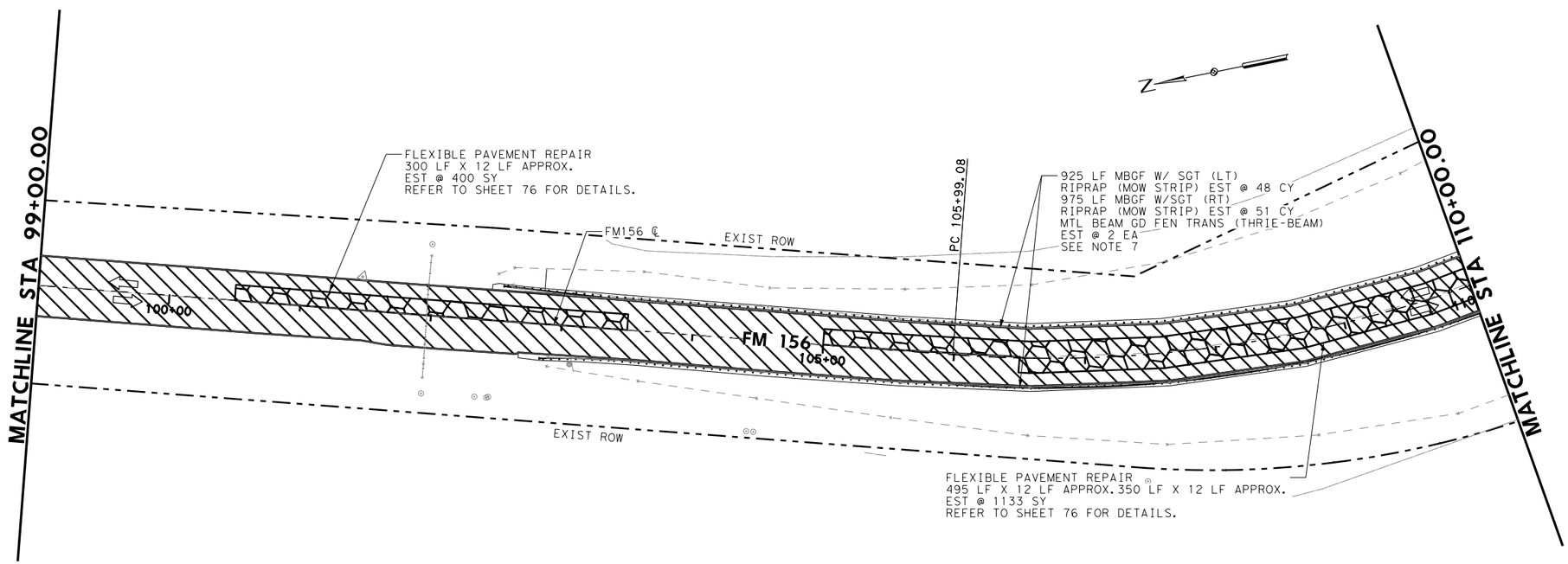
100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

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STATE OF TEXAS
EN WANG
123262
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02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

PROJECT LAYOUT
STA 88+00 TO STA 110+00

SCALE: 1"=100' SHEET 5 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	7
CONTROL	SECTION	JOB	
0718	02	072	

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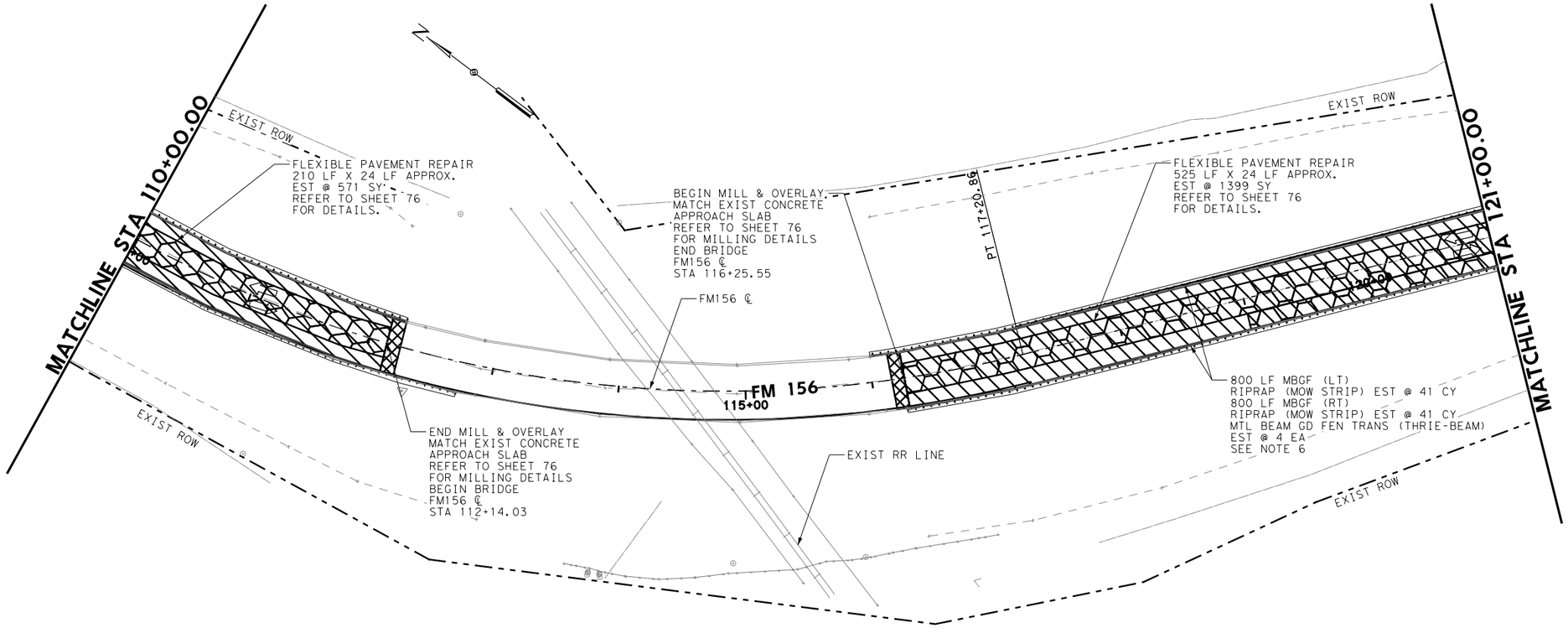
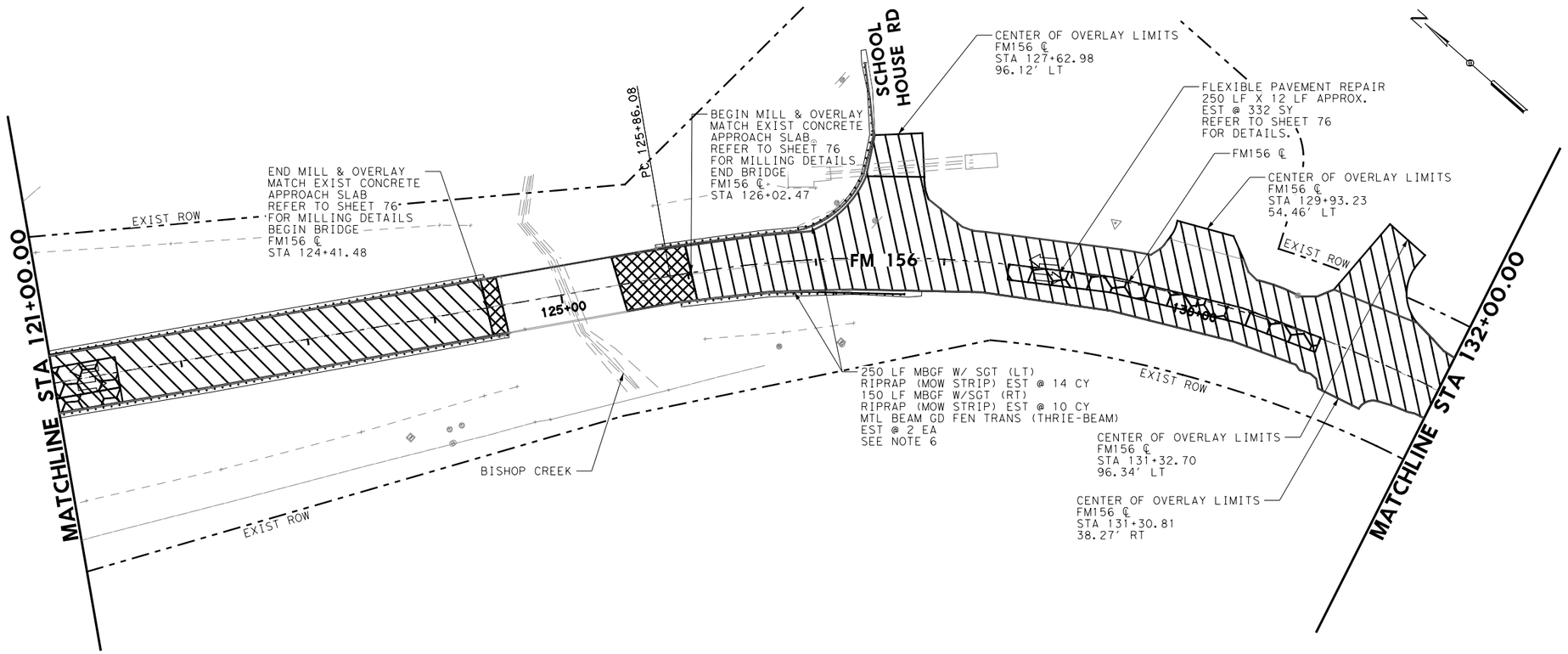
100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

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STATE OF TEXAS
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PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156

PROJECT LAYOUT
STA 110+00 TO STA 132+00

SCALE: 1"=100' SHEET 6 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	8
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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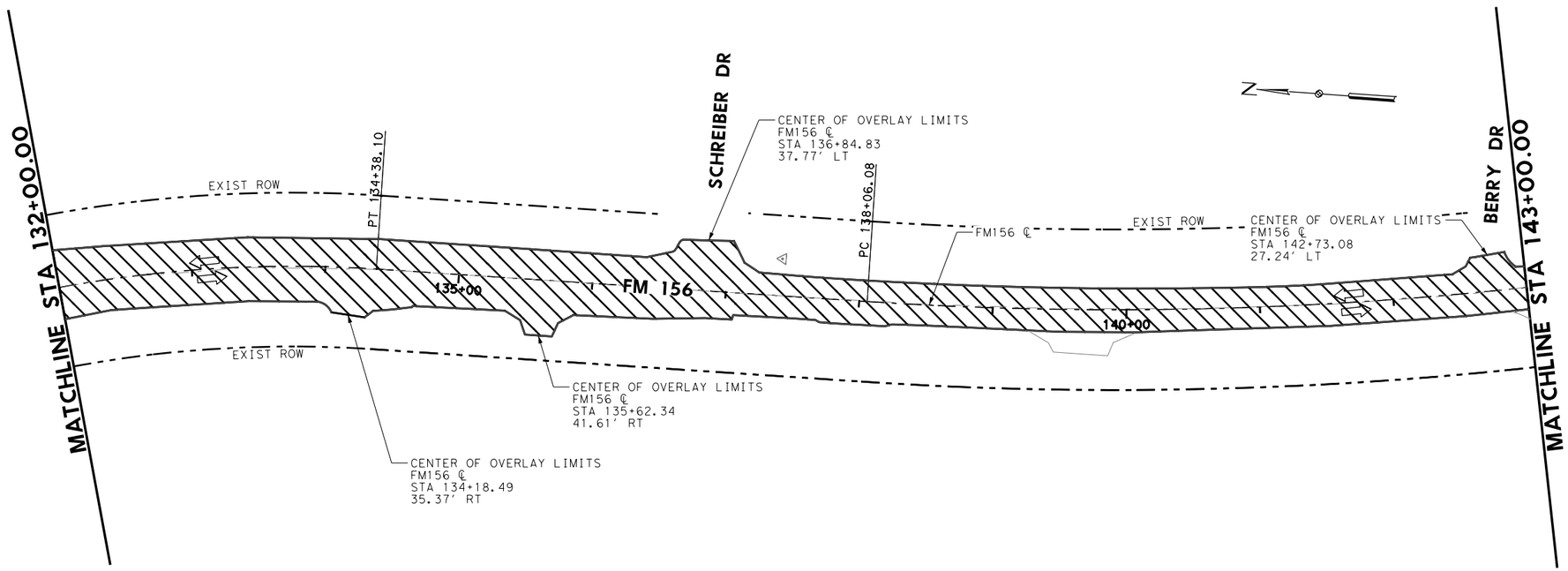
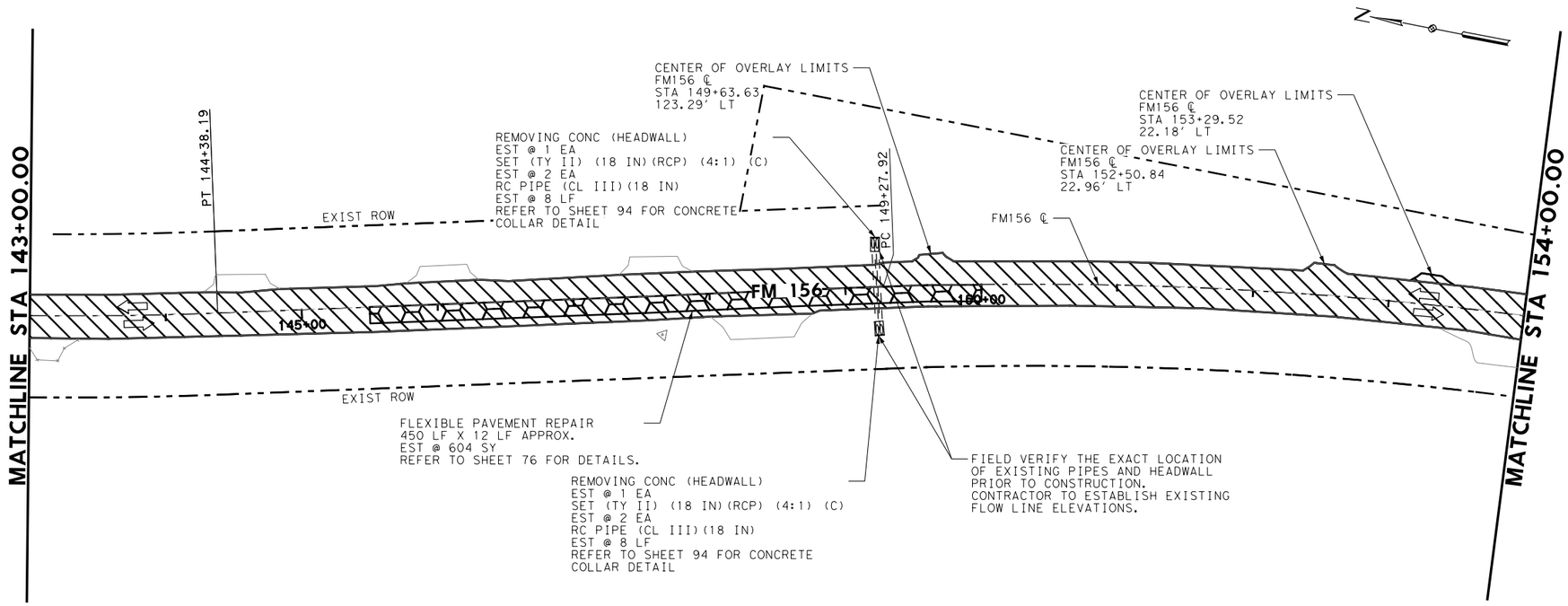
100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
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REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

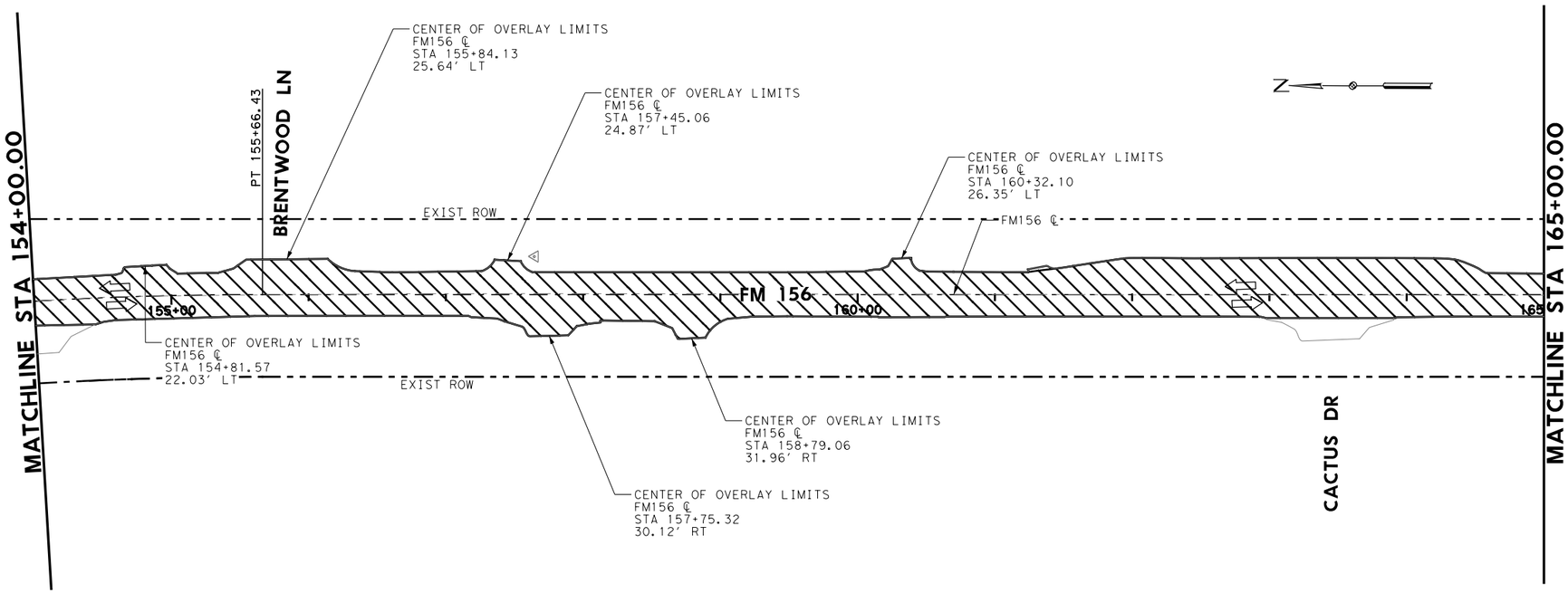
PROJECT LAYOUT
STA 132+00 TO STA 154+00

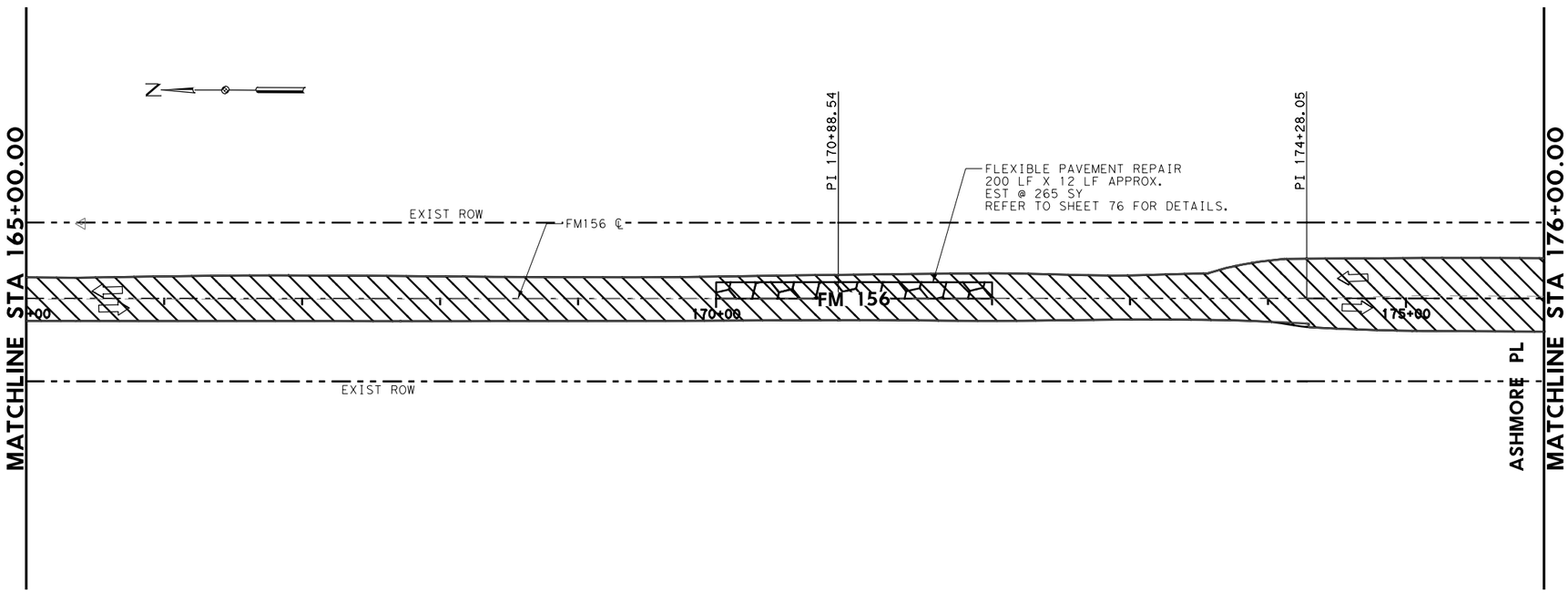
SCALE: 1"=100' SHEET 7 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	9
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:19 PM SCALE: 1:00
FILE: FM156-PLAN-07.dgn

100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

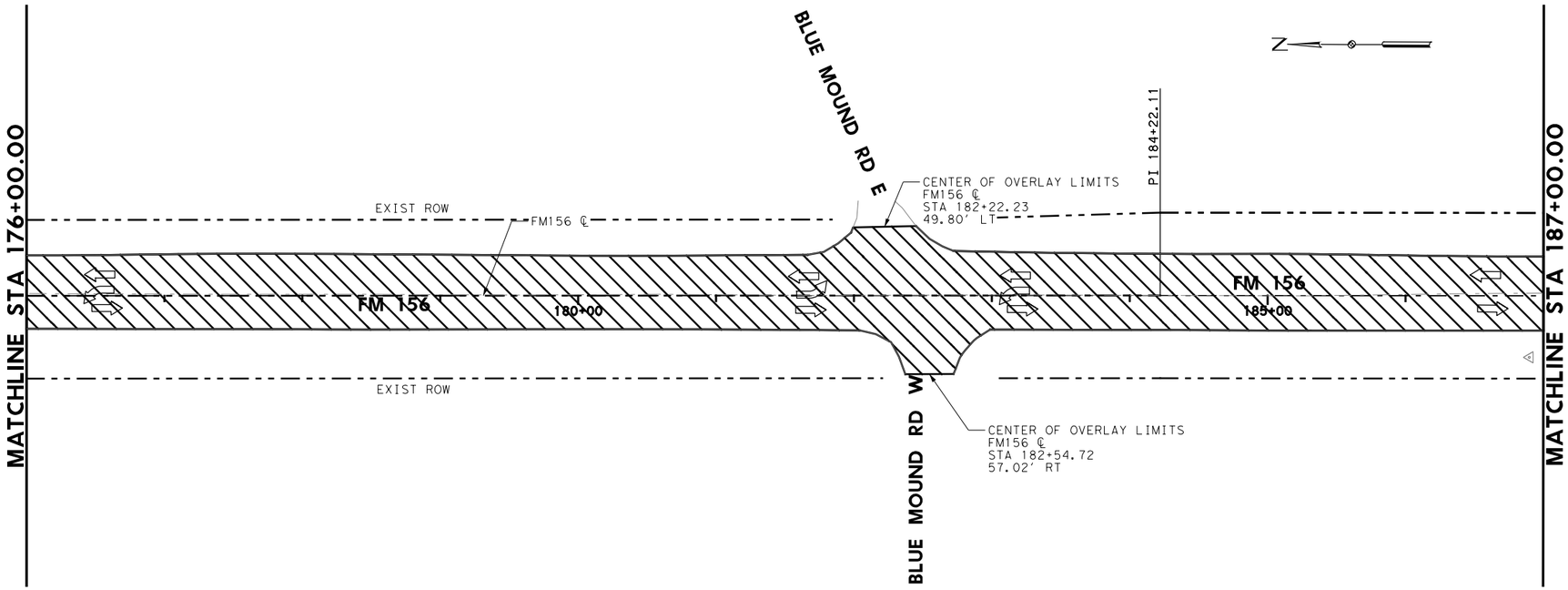
PROJECT LAYOUT
STA 154+00 TO STA 176+00

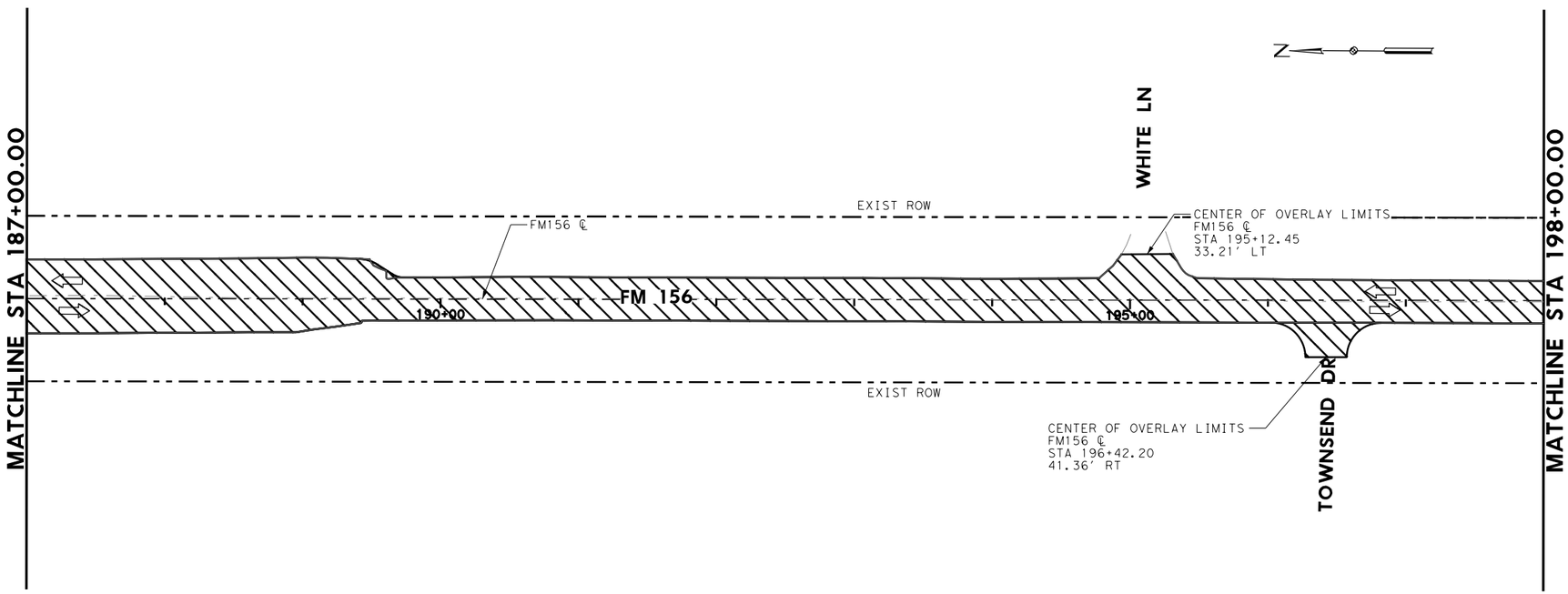
SCALE: 1"=100' SHEET 8 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	10
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:23 PM SCALE: 1:00
FILE: FM156-PLAN-08.dgn

100% PLANS SUBMITTAL





0 50 100 150 200

HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ANY WORK WITHIN 500 FEET OF A TXDOT TRAFFIC SIGNAL, ILLUMINATION SYSTEM, AND/OR ITS SYSTEM WILL REQUIRE THE CONTRACTOR TO CONTACT THE TXDOT FORT WORTH SIGNAL SHOP AT 817-370-3664.
7. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

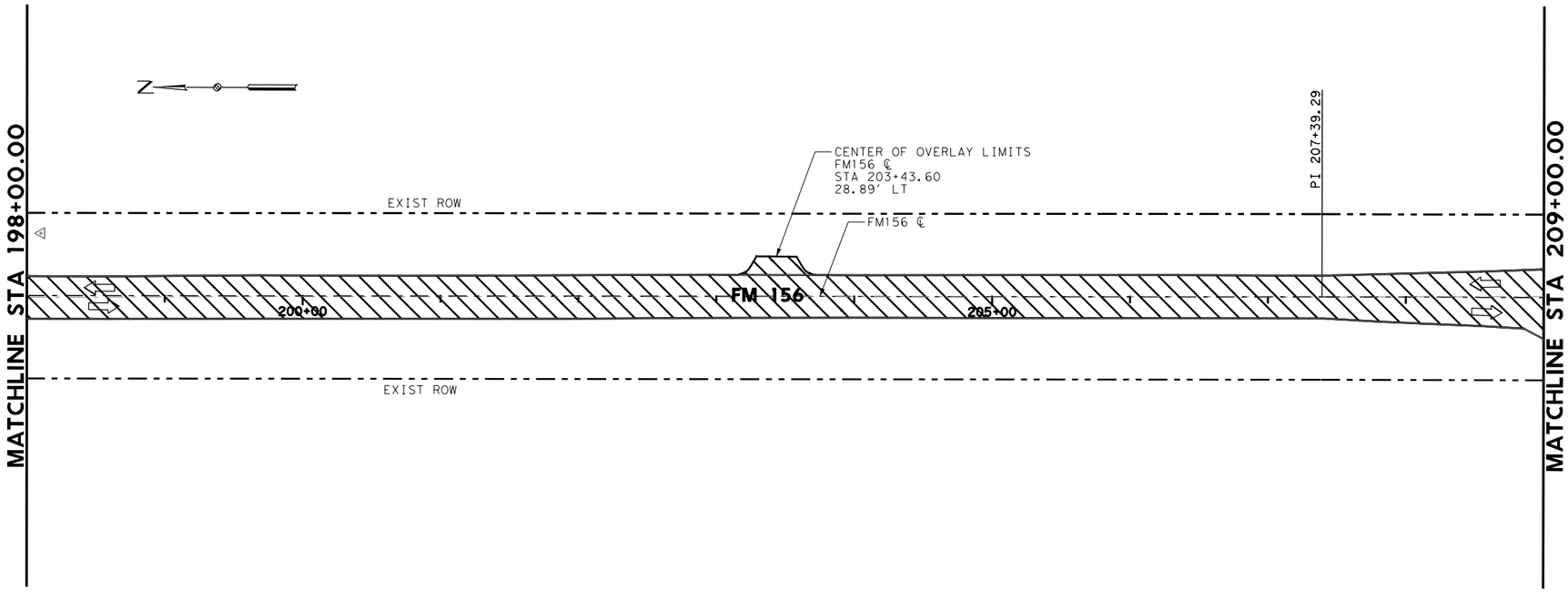
PROJECT LAYOUT
STA 176+00 TO STA 198+00

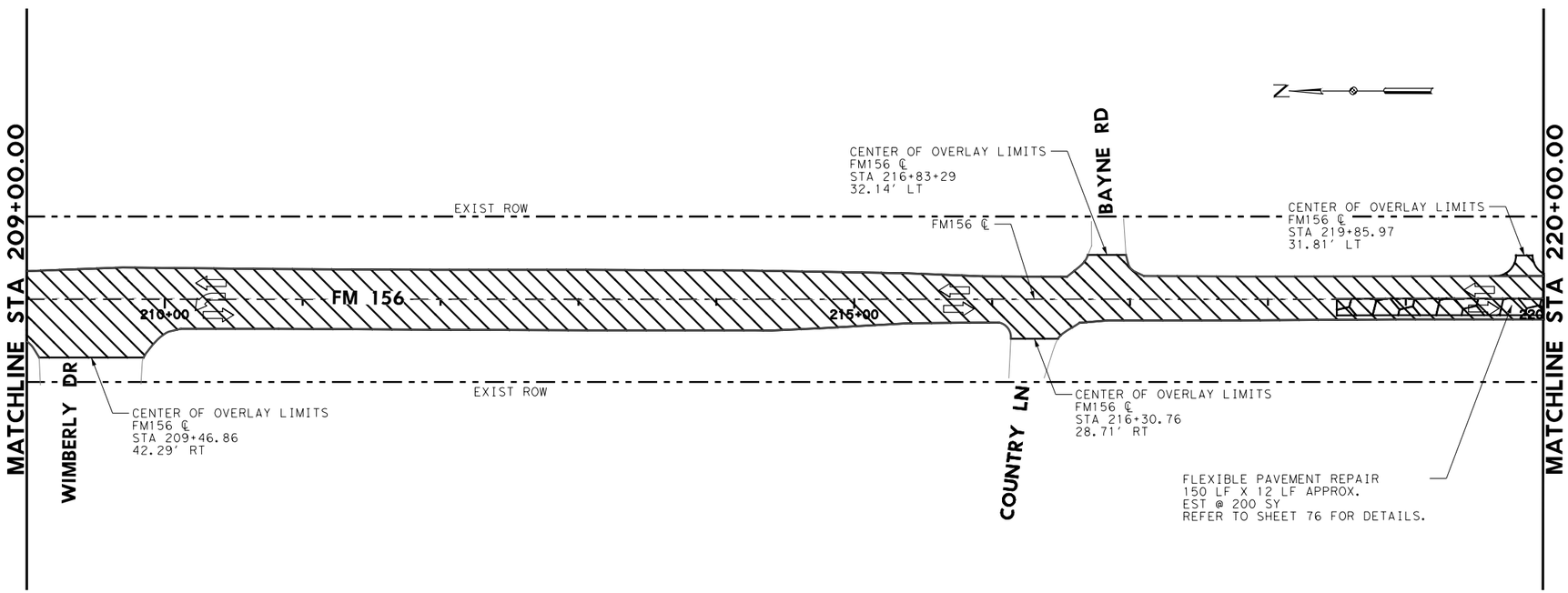
SCALE: 1"=100' SHEET 9 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	11
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:26 PM SCALE: 1:00
FILE: FM156-PLAN-09.dgn

100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

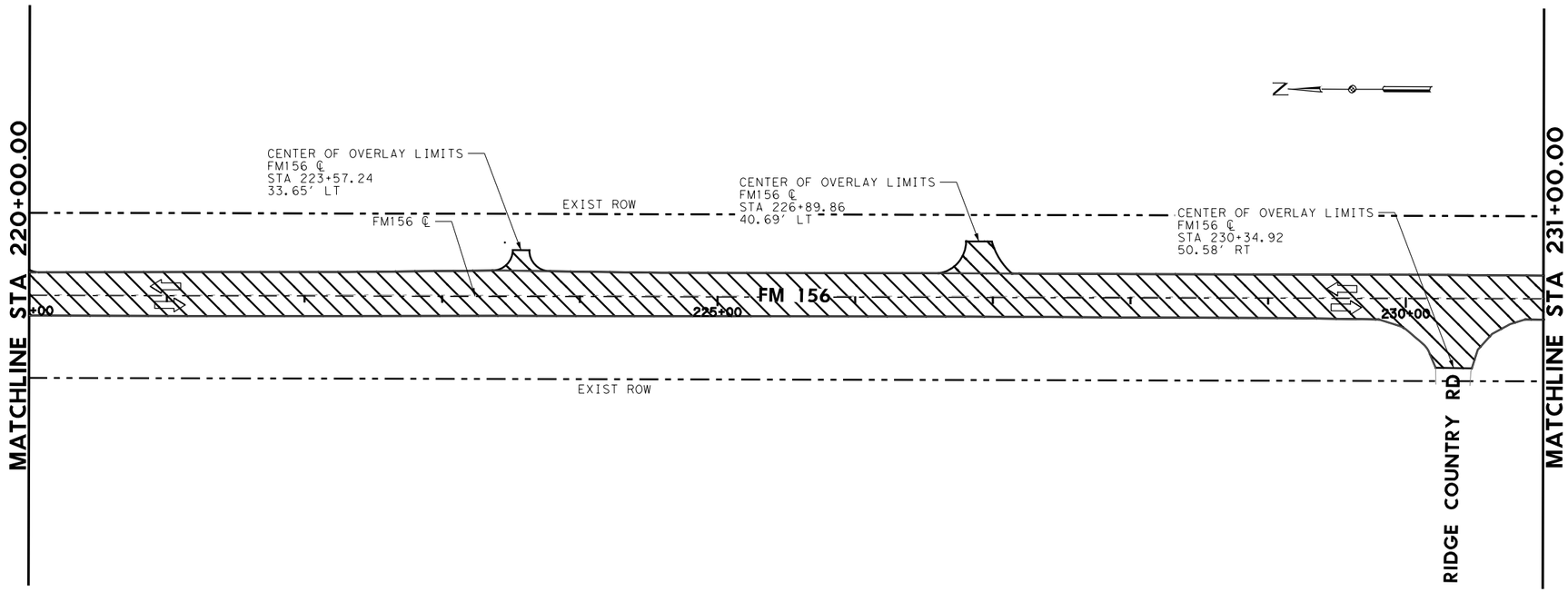
PROJECT LAYOUT
STA 198+00 TO STA 220+00

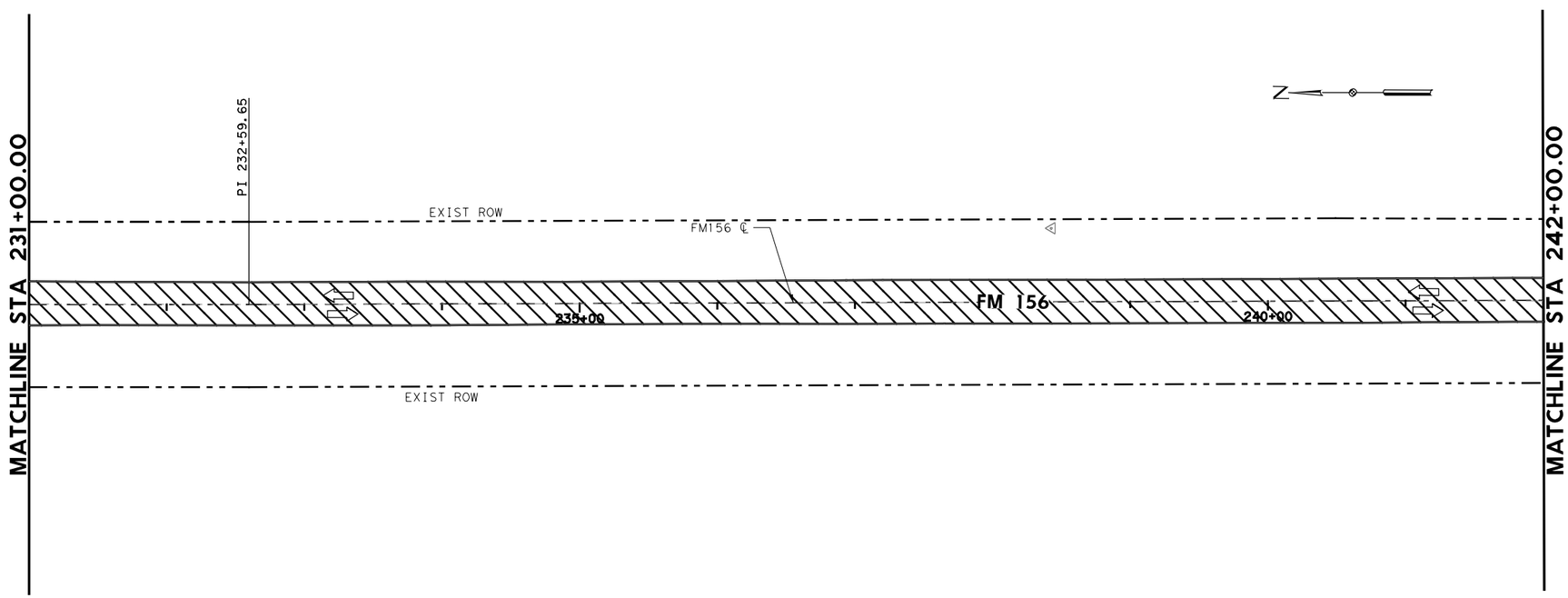
SCALE: 1"=100' SHEET 10 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	12
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:30 PM SCALE: 1:100
FILE: FM156-PLAN-10.dgn

100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

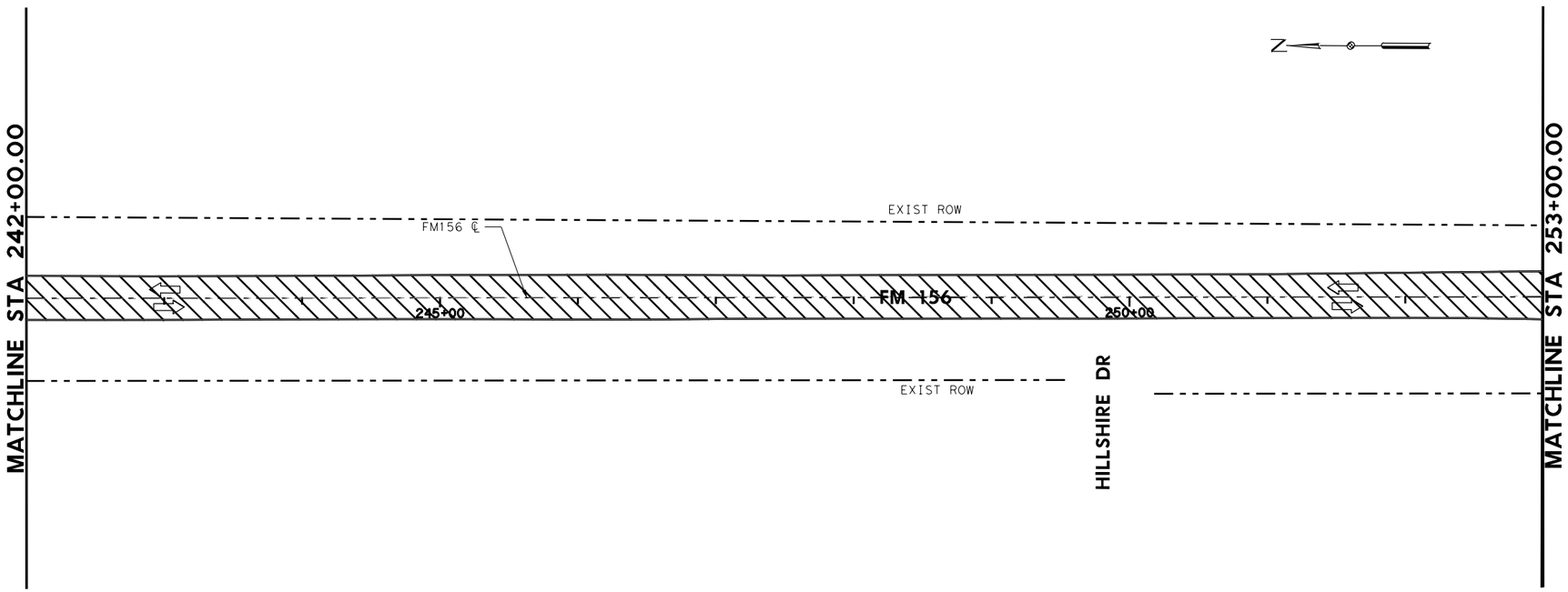
PROJECT LAYOUT
STA 220+00 TO STA 242+00

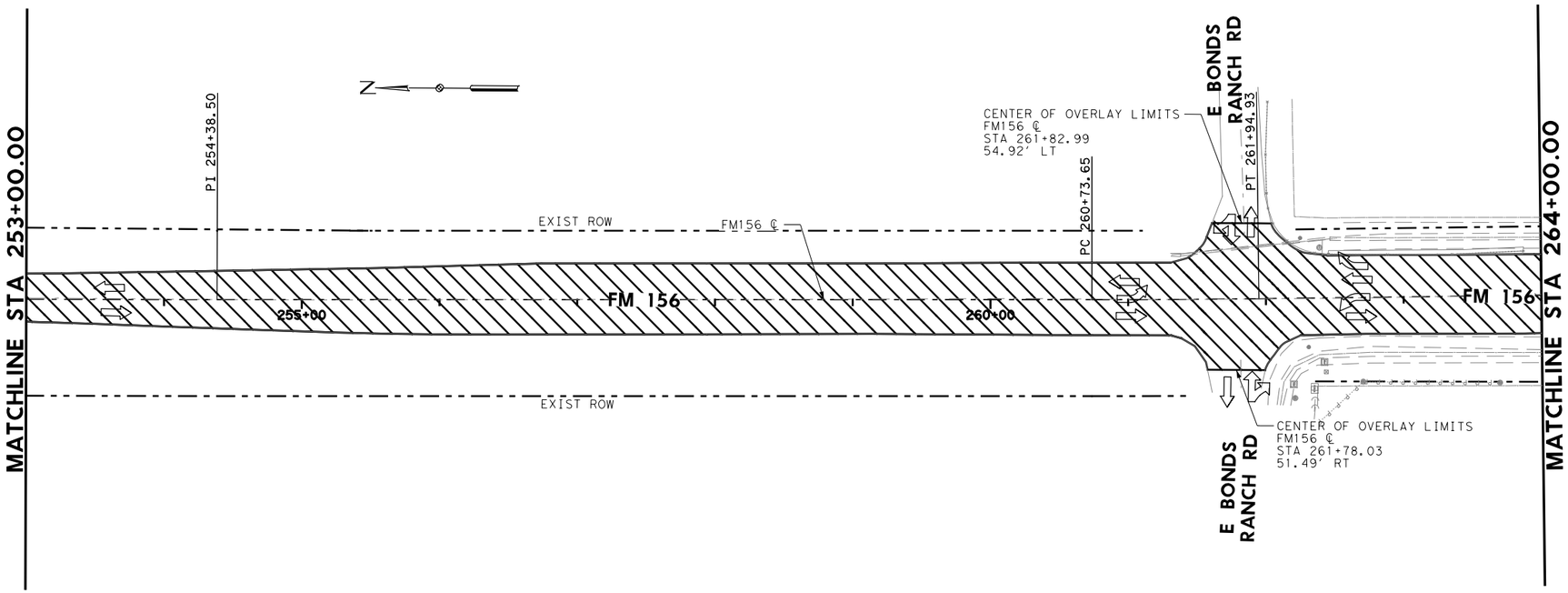
SCALE: 1"=100' SHEET 11 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	13
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:34 PM SCALE: H:00
FILE: FM156-PLAN-11.dgn

100% PLANS SUBMITTAL





0 50 100 150 200
HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ANY WORK WITHIN 500 FEET OF A TXDOT TRAFFIC SIGNAL, ILLUMINATION SYSTEM, AND/OR ITS SYSTEM WILL REQUIRE THE CONTRACTOR TO CONTACT THE TXDOT FORT WORTH SIGNAL SHOP AT 817-370-3664.
7. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

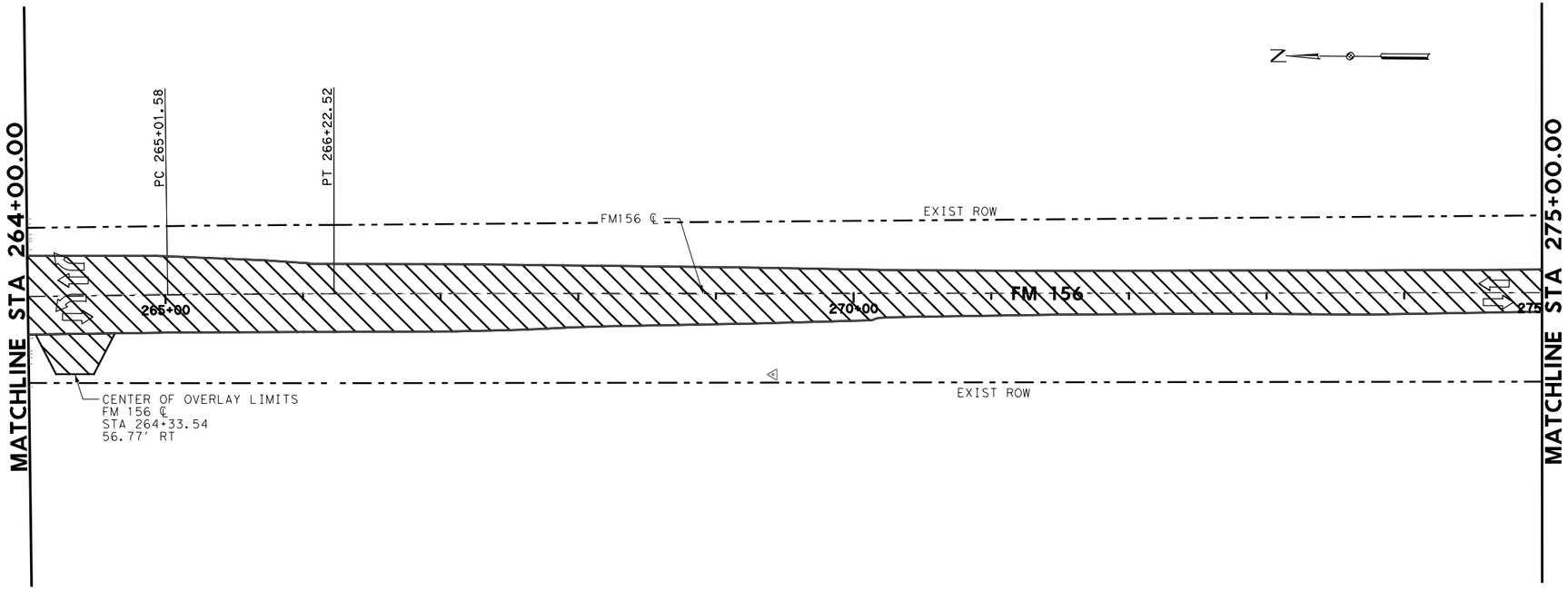
PROJECT LAYOUT
STA 242+00 TO STA 264+00

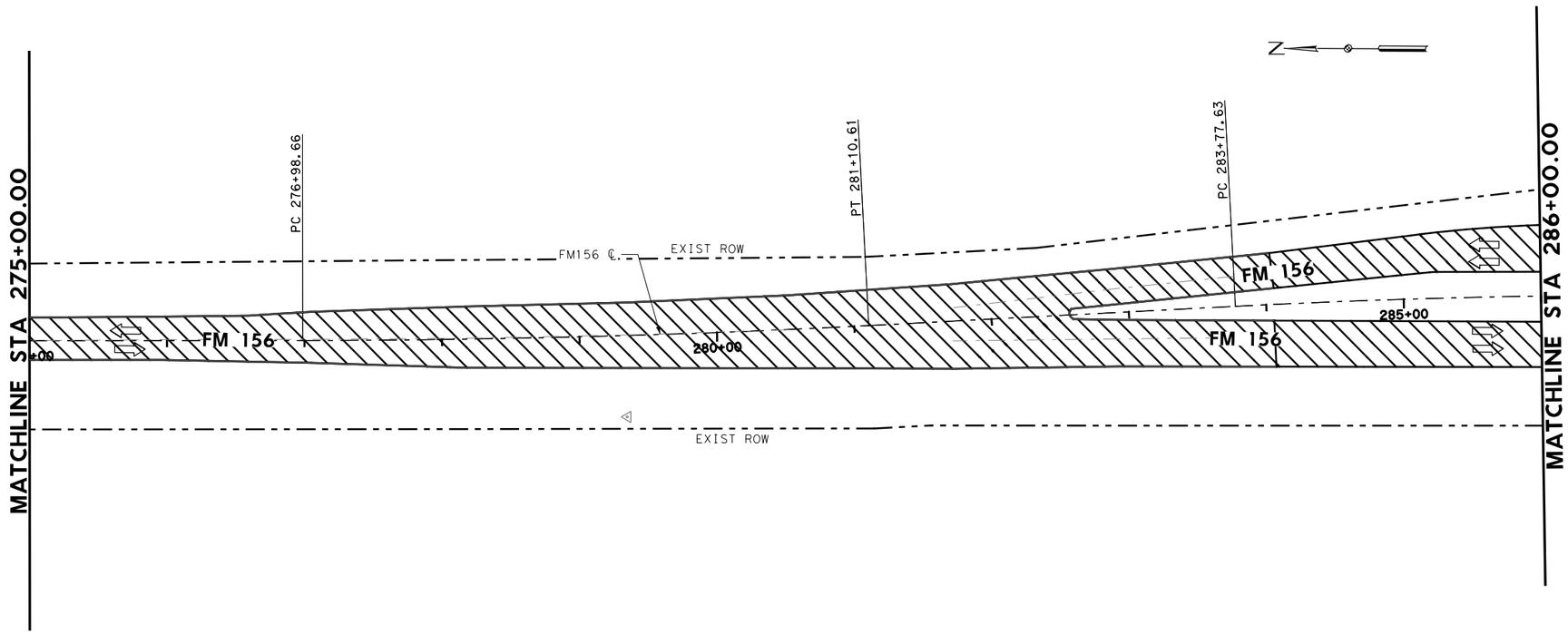
SCALE: 1"=100' SHEET 12 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	14
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:37 PM SCALE: 1:100
FILE: FM156-PLAN-12.dgn

100% PLANS SUBMITTAL





0 50 100 150 200

HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

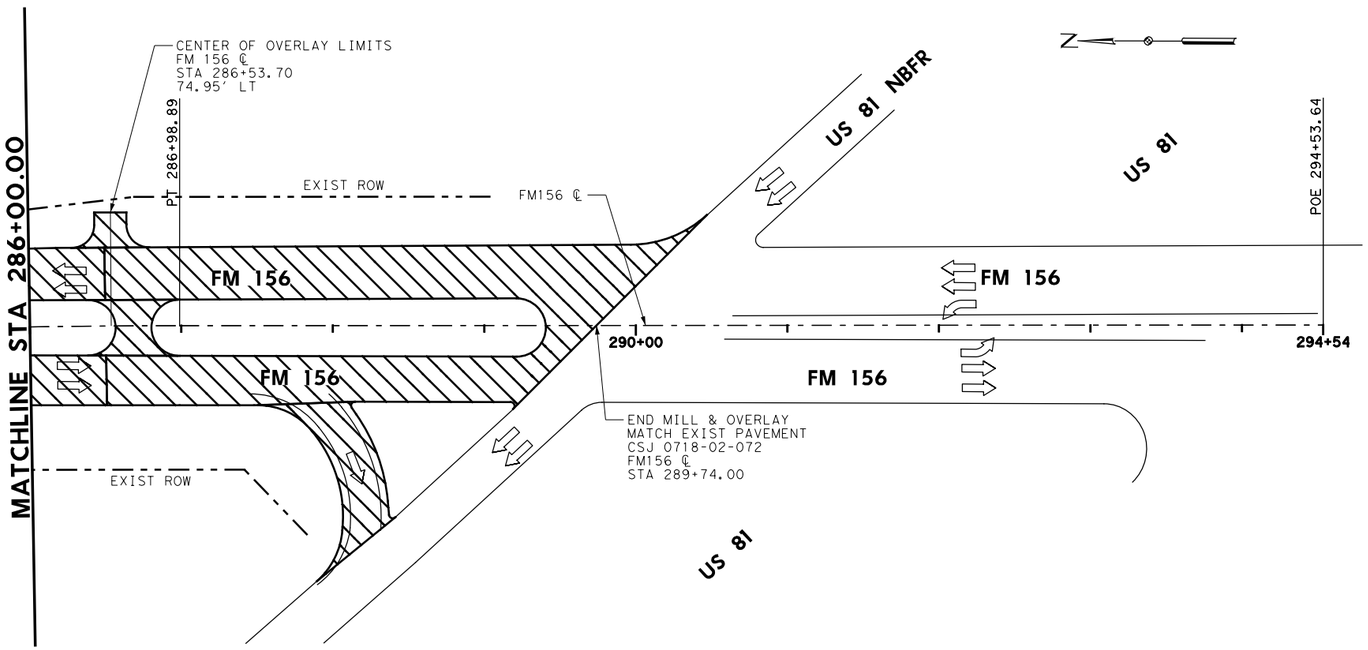
PROJECT LAYOUT
STA 264+00 TO STA 286+00

SCALE: 1"=100' SHEET 13 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	15
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:41 PM SCALE: H:00
FILE: FM156-PLAN-13.dgn

100% PLANS SUBMITTAL



0 50 100 150 200

HORIZ. SCALE IN FEET

ROADWAY PLAN LEGEND

- MILL & OVERLAY
- MILL
- BASE REPAIR
- EXISTING RIGHT OF WAY
- TRAFFIC FLOW
- SAWCUT LINE

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS 74-75 FOR ADDITIONAL INFORMATION.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS 76-78 FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
6. ANY WORK WITHIN 500 FEET OF A TXDOT TRAFFIC SIGNAL, ILLUMINATION SYSTEM, AND/OR ITS SYSTEM WILL REQUIRE THE CONTRACTOR TO CONTACT THE TXDOT FORT WORTH SIGNAL SHOP AT 817-370-3664.
7. ROW LINES ARE APPROXIMATE.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

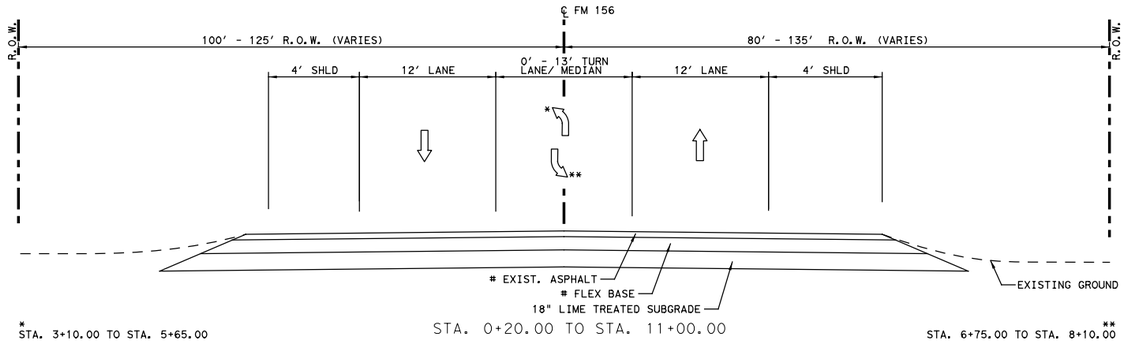
FM 156

PROJECT LAYOUT
STA 286+00 TO END

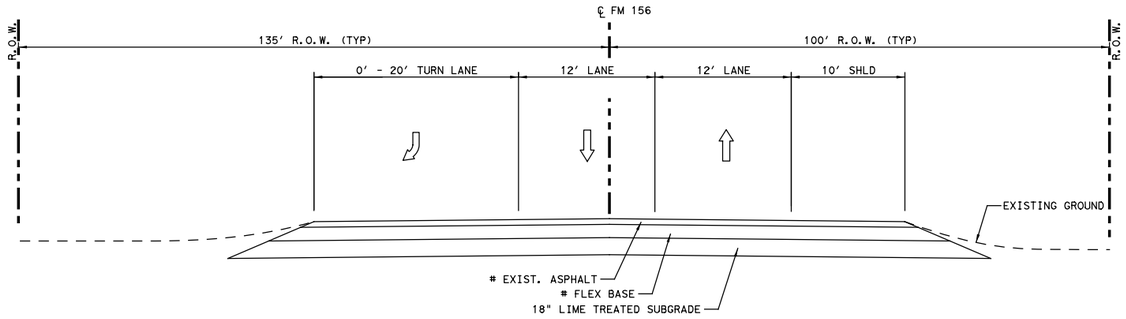
SCALE: 1"=100'

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	16
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0248000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:45 PM SCALE: 1:100
FILE: FM156-PLAN-14.dgn

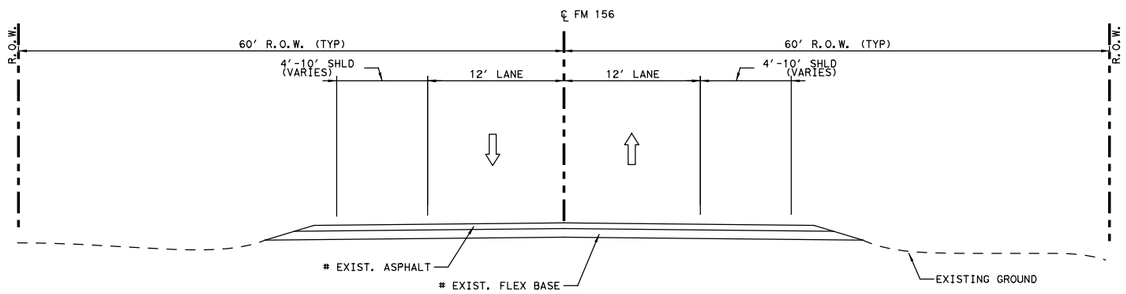


EXISTING FM 156 SECTION



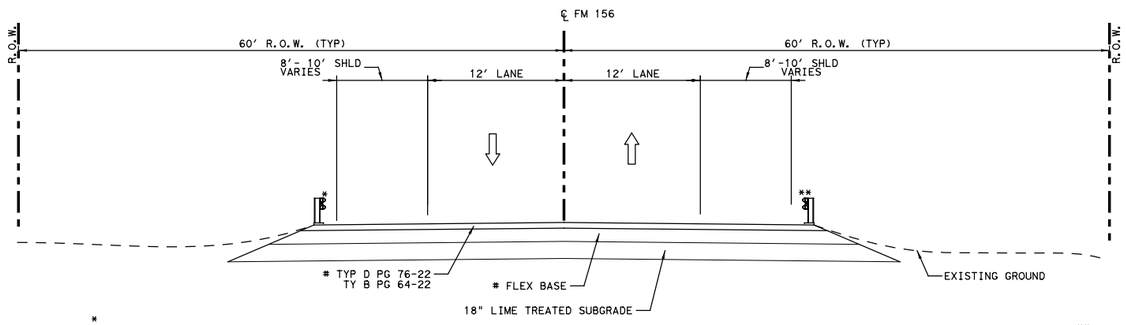
STA. 11+00.00 TO STA. 16+50.00

EXISTING FM 156 SECTION



STA. 57+33.46 TO STA. 64+80.00
STA. 137+10.80 TO STA. 173+56.00
STA. 189+60.00 TO STA. 207+39.90
STA. 216+00.00 TO STA. 262+46.35
STA. 266+11.67 TO STA. 281+09.49

EXISTING FM 156 SECTION



EXISTING FM 156 SECTION

NOTES:

1. RAILROAD BRIDGE FROM
   STA. 39+29.51 TO STA. 50+72.25
   STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

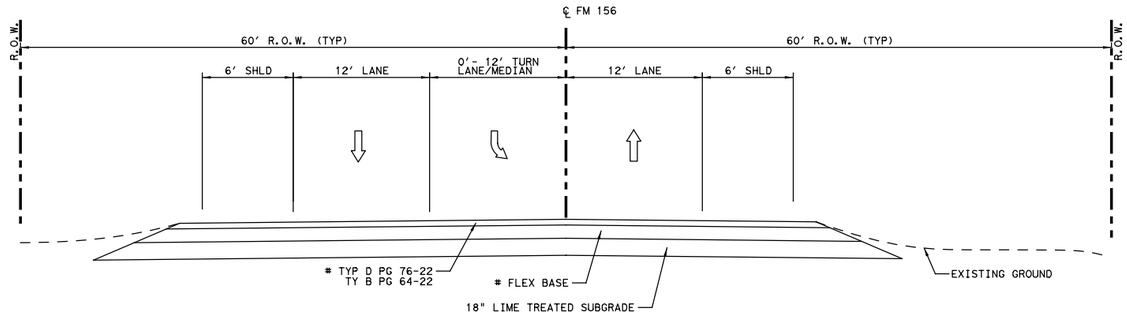
EXISTING
TYPICAL SECTION

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.	HIGHWAY NO.
6	SEE TITLE SHEET	FM156
STATE	DISTRICT / COUNTY	SHEET NO.
TEXAS	FTW / TARRANT	17
CONTROL	SECTION / JOB	
0718	02 / 072	

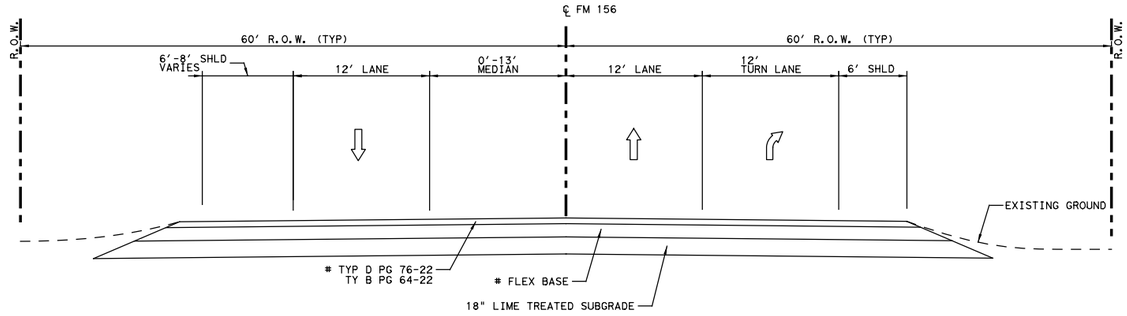
PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:48 PM SCALE: 1:1
FILE: FM156_TYP_EX_1.dgn

100% PLANS SUBMITTAL



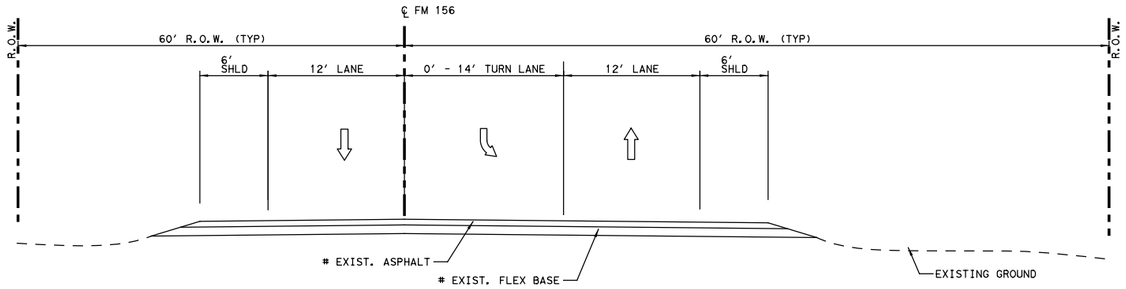
STA. 19+50.00 TO STA. 28+14.00

EXISTING FM 156 SECTION



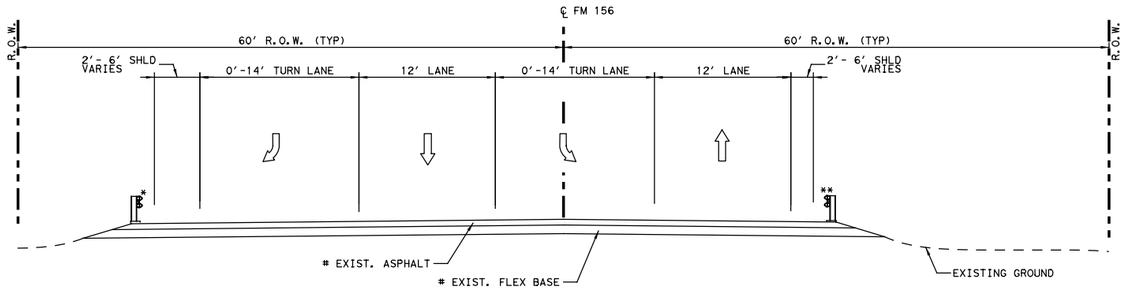
STA. 28+14.00 TO STA. 32+40.00

EXISTING FM 156 SECTION



STA. 64+80.00 TO STA. 68+80.00

EXISTING FM 156 SECTION



* STA. 72+05.00 TO STA. 75+00.00

STA. 68+80.00 TO STA. 75+00.00
STA. 262+43.35 TO STA. 266+11.67

** STA. 70+21.00 TO STA. 75+00.00

EXISTING FM 156 SECTION

NOTES:

1. RAILROAD BRIDGE FROM
   STA. 39+29.51 TO STA. 50+72.25
   STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

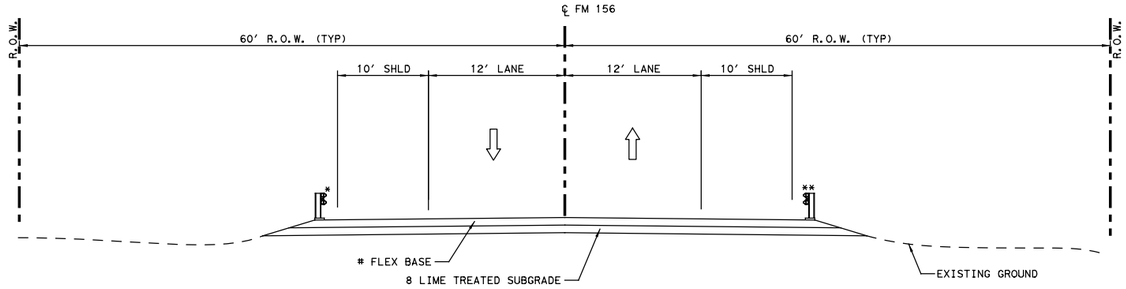
EXISTING
TYPICAL SECTION

SHEET 2 OF 4

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	18
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM156_TYP_EX_2.dgn
DATE: 2/9/2023
TIME: 2:45:50 PM
PENTABLE: I0246000.tbl
SCALE: 1:0

100% PLANS SUBMITTAL

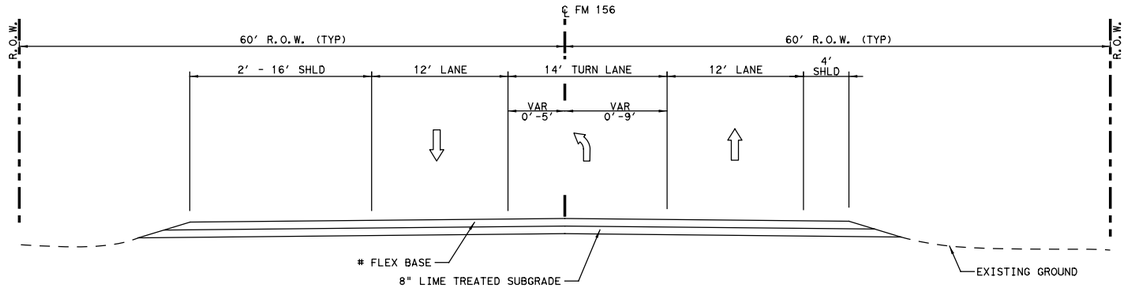


* STA. 75+00.00 TO STA. 78+20.90
STA. 102+90.00 TO STA. 127+26.30

STA. 75+00 TO STA. 89+00.00
STA. 93+05.00 TO STA. 93+84.59
STA. 97+13.62 TO STA. 137+10.80

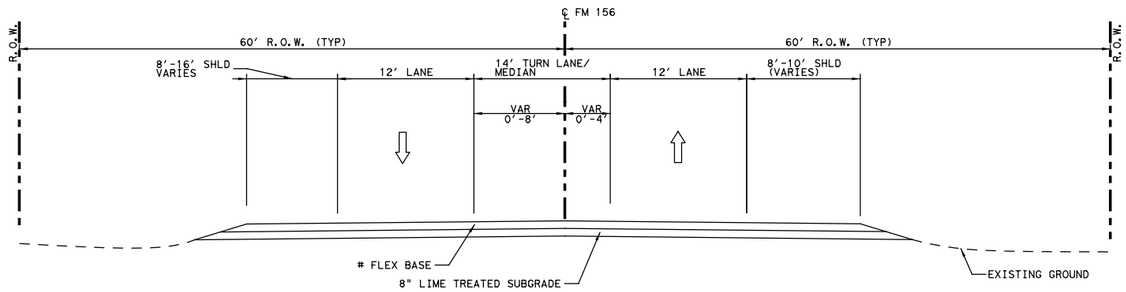
** STA. 75+00.00 TO STA. 78+33.80
STA. 102+60.45 TO STA. 127+40.40

EXISTING FM 156 SECTION



STA. 89+00.00 TO STA. 93+05.00

EXISTING FM 156 SECTION



STA. 93+84.59 TO STA. 97+13.62
STA. 173+56.00 TO STA. 189+60.00

EXISTING FM 156 SECTION

NOTES:

1. RAILROAD BRIDGE FROM
   STA. 39+29.51 TO STA. 50+72.25
   STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
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San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

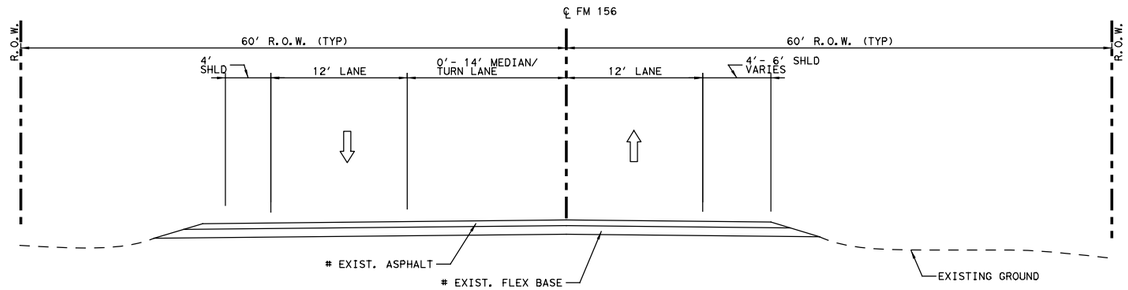
EXISTING
TYPICAL SECTION

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	19
CONTROL	SECTION	JOB	
0718	02	072	

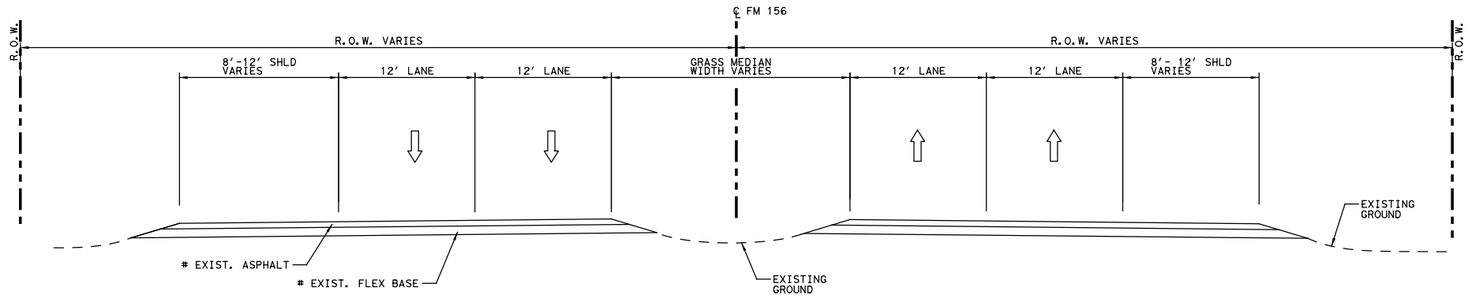
PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM156_TYP_EX_3.dgn
DATE: 2/9/2023
TIME: 2:45:53 PM
PENTABLE: 10246000.tbl
SCALE: 1:10

100% PLANS SUBMITTAL



STA. 207+39.29 TO STA. 216+00.00

EXISTING FM 156 SECTION



STA. 281+09.49 TO STA. 289+74.00

EXISTING FM 156 SECTION

NOTES:

1. RAILROAD BRIDGE FROM
   STA. 39+29.51 TO STA. 50+72.25
   STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

02/09/23

NO.	DATE	REVISION	APPROVED

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Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

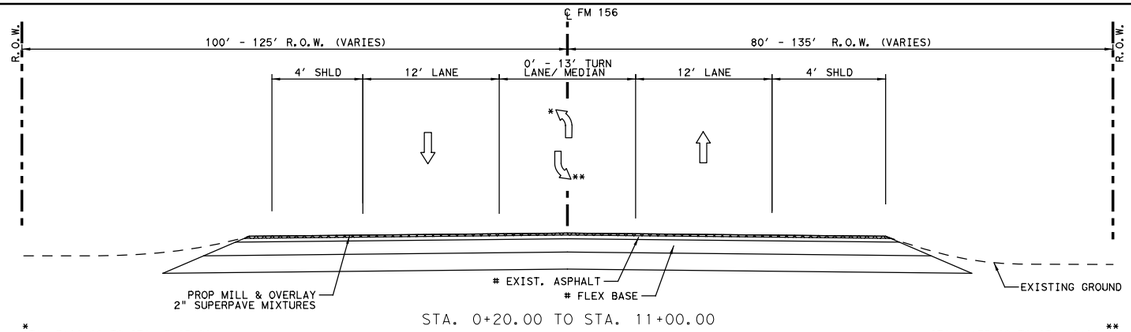
EXISTING
TYPICAL SECTION

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	20
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM156_TYP_EX_4.dgn
DATE: 2/9/2023
TIME: 2:45:56 PM
PENTABLE: I0246000.tbl
SCALE: 1:10

100% PLANS SUBMITTAL

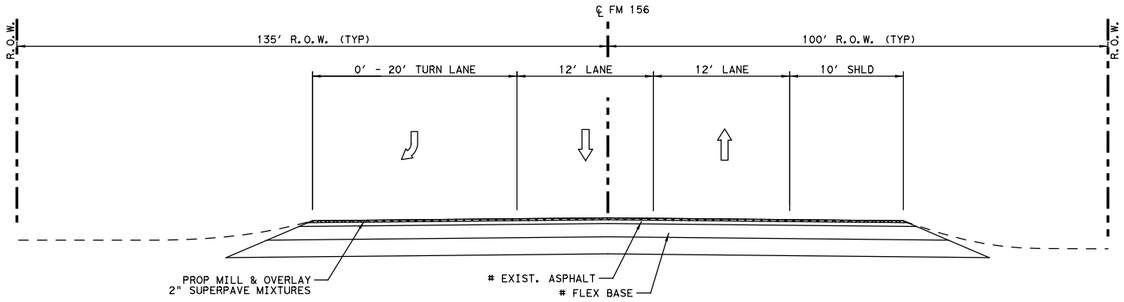


STA. 0+20.00 TO STA. 11+00.00

* STA. 3+10.00 TO STA. 5+65.00

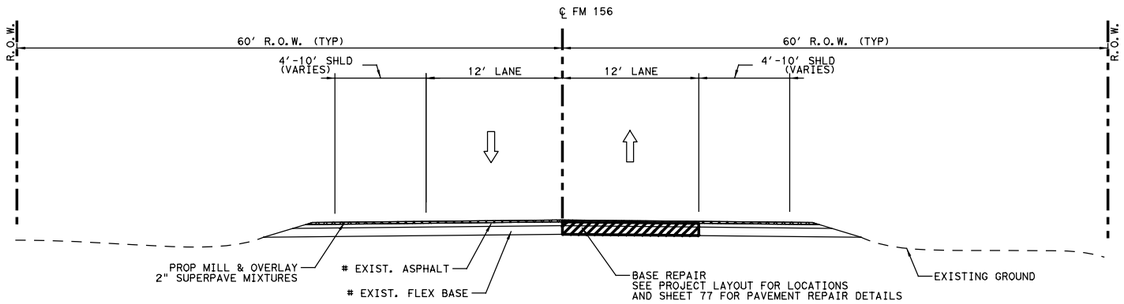
** STA. 6+75.00 TO STA. 8+10.00

PROPOSED FM 156 SECTION



STA. 11+00.00 TO STA. 16+50.00

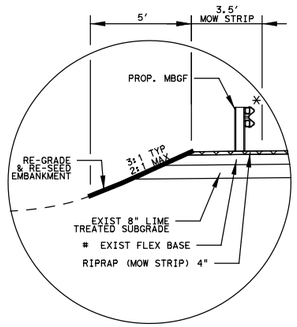
PROPOSED FM 156 SECTION

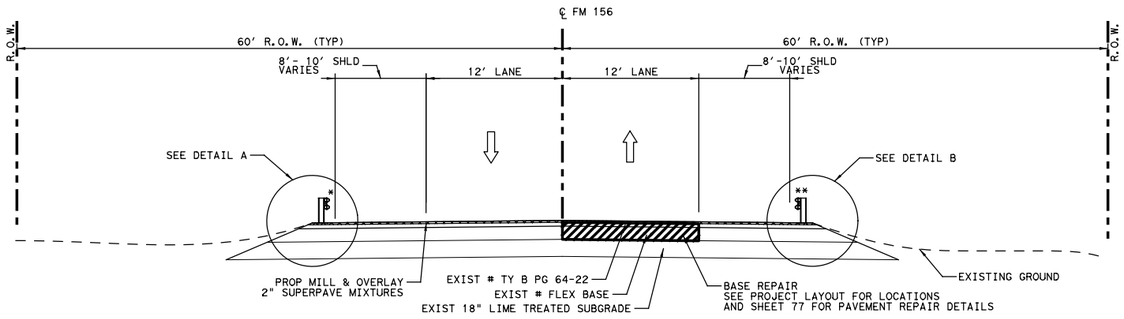


STA. 57+33.46 TO STA. 64+80.00
STA. 137+10.80 TO STA. 173+56.00
STA. 189+60.00 TO STA. 207+39.90
STA. 216+00.00 TO STA. 262+46.35
STA. 266+11.67 TO STA. 281+09.49

PROPOSED FM 156 SECTION

DETAIL A





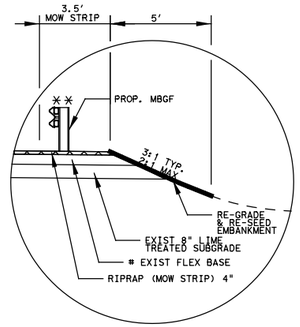
* STA. 39+31.00 TO STA. 50+70.00

STA. 6+47.18 TO STA. 24+35.00
STA. 32+40.00 TO STA. 57+33.46

** STA. 39+31.00 TO STA. 54+24.20

PROPOSED FM 156 SECTION

DETAIL B



NOTES:

1. LEAVE A UNIFORM SURFACE OF PLANED PAVEMENT FREE OF LOOSE ASPHALT MATERIAL AND FABRIC UNDERSEAL.
2. REPAIR PAVEMENT FAILURES IN ACCORDANCE WITH FLEXIBLE PAVEMENT REPAIR DETAIL AND/OR AS DIRECTED BY THE ENGINEER.
3. REFERENCE ALL EXISTING PAVEMENT MARKINGS PRIOR TO PLANING OPERATIONS.
4. FOR DETAILS NOT SHOWN, SEE PM STANDARD SHEETS.
5. MATCH EXISTING PAVEMENT CROSS-SLOPE.
6. RAILROAD BRIDGE FROM
   STA. 39+29.51 TO STA. 50+72.25
   STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

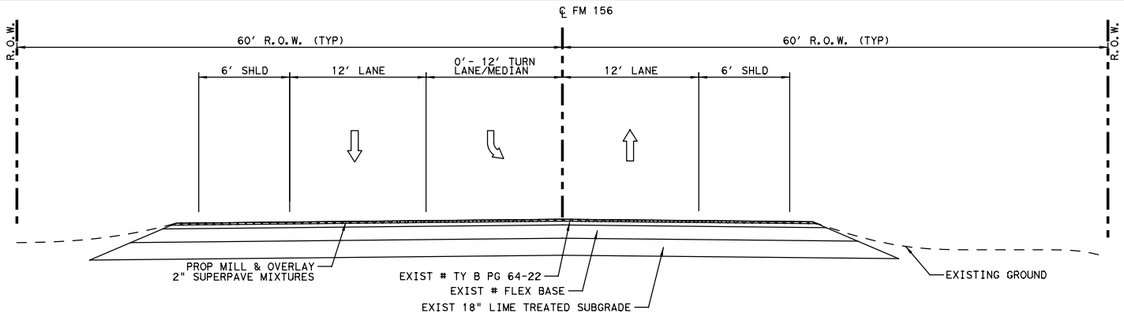
PROPOSED TYPICAL SECTION

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	21
CONTROL	SECTION	JOB	
0718	02	072	

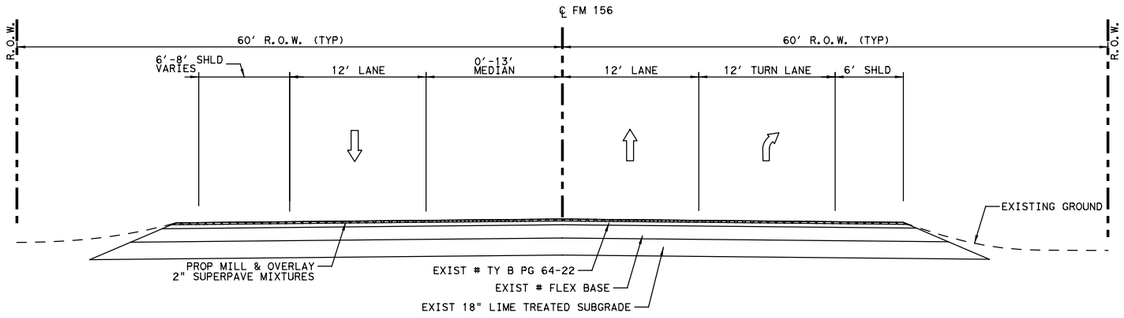
PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:45:59 PM SCALE: 1:10
FILE: FM156_TYP_PROP_1.dgn

100% PLANS SUBMITTAL



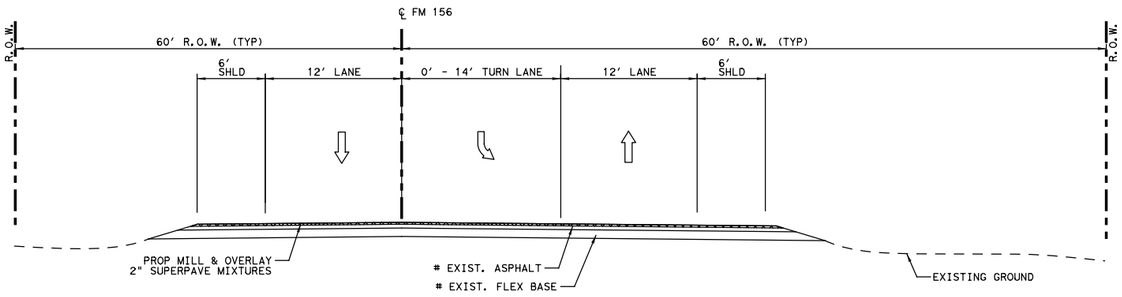
STA. 19+50.00 TO STA. 28+14.00

PROPOSED FM 156 SECTION



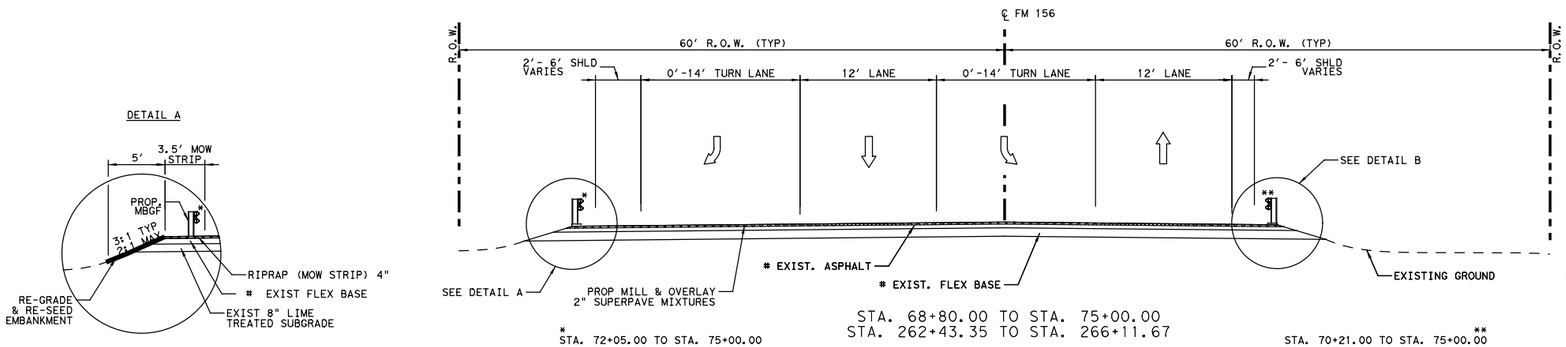
STA. 28+14.00 TO STA. 32+40.00

PROPOSED FM 156 SECTION



STA. 64+80.00 TO STA. 68+80.00

PROPOSED FM 156 SECTION



* STA. 72+05.00 TO STA. 75+00.00

STA. 68+80.00 TO STA. 75+00.00
STA. 262+43.35 TO STA. 266+11.67

** STA. 70+21.00 TO STA. 75+00.00

PROPOSED FM 156 SECTION

NOTES:

1. LEAVE A UNIFORM SURFACE OF PLANED PAVEMENT FREE OF LOOSE ASPHALT MATERIAL AND FABRIC UNDERSEAL.
2. REPAIR PAVEMENT FAILURES IN ACCORDANCE WITH FLEXIBLE PAVEMENT REPAIR DETAIL AND/OR AS DIRECTED BY THE ENGINEER.
3. REFERENCE ALL EXISTING PAVEMENT MARKINGS PRIOR TO PLANING OPERATIONS.
4. FOR DETAILS NOT SHOWN, SEE PM STANDARD SHEETS.
5. MATCH EXISTING PAVEMENT CROSS-SLOPE.
6. RAILROAD BRIDGE FROM
   STA. 39+29.51 TO STA. 50+72.25
   STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

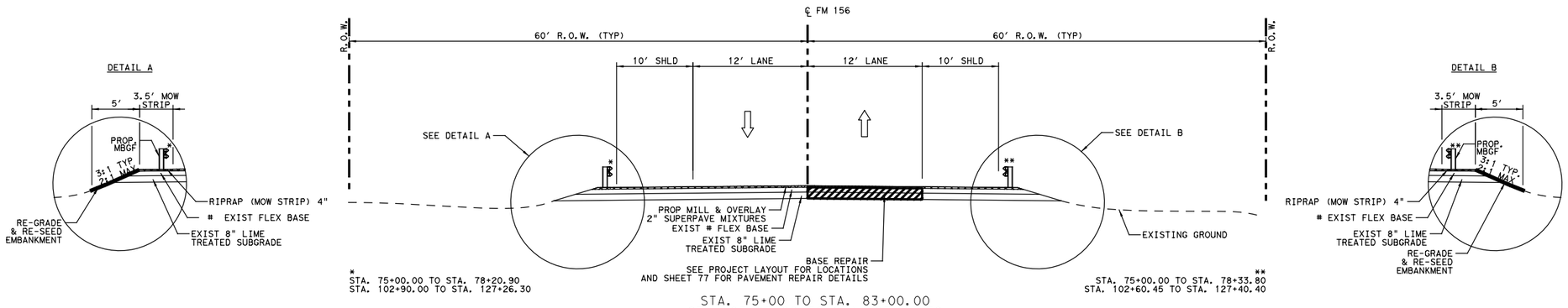
PROPOSED
TYPICAL SECTION

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	22
CONTROL	SECTION	JOB	
0718	02	072	

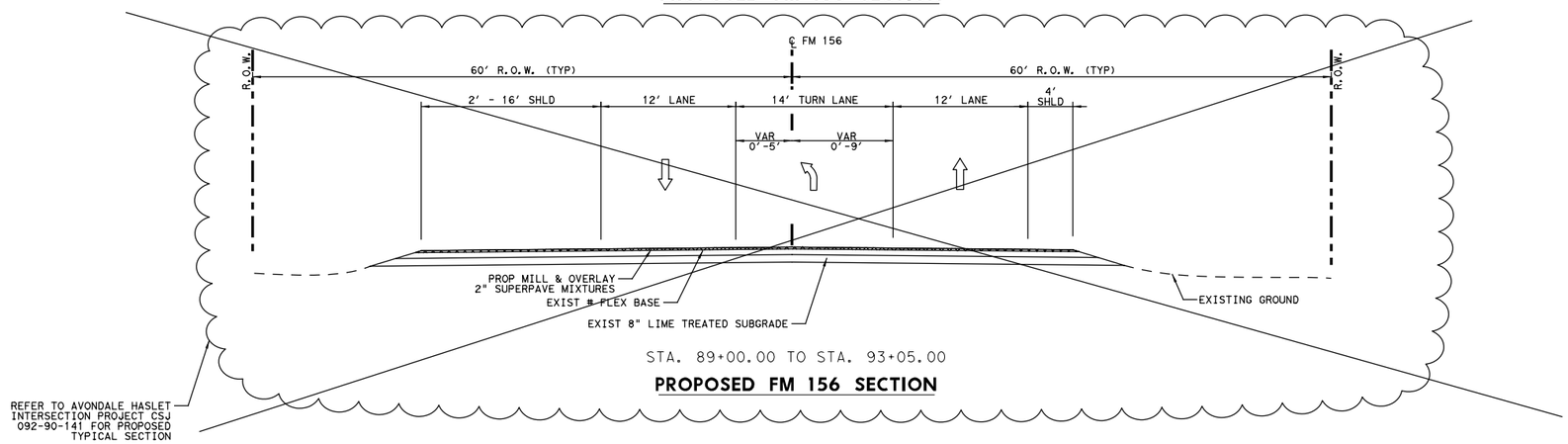
PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:46:02 PM SCALE: 1:1
FILE: FM156_TYP_PROP_2.dgn

100% PLANS SUBMITTAL



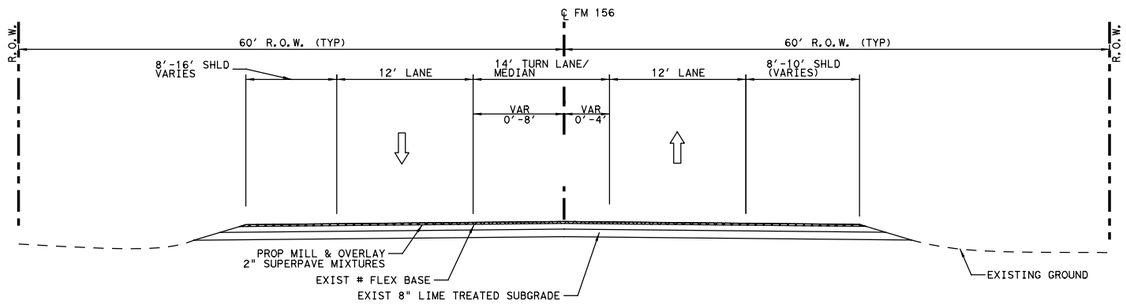
STA. 75+00 TO STA. 83+00.00
STA. 93+05.00 TO STA. 93+84.59
STA. 97+13.62 TO STA. 137+10.80

PROPOSED FM 156 SECTION



STA. 89+00.00 TO STA. 93+05.00

PROPOSED FM 156 SECTION



STA. 173+56.00 TO STA. 189+60.00

PROPOSED FM 156 SECTION

NOTES:

1. LEAVE A UNIFORM SURFACE OF PLANED PAVEMENT FREE OF LOOSE ASPHALT MATERIAL AND FABRIC UNDERSEAL.
2. REPAIR PAVEMENT FAILURES IN ACCORDANCE WITH FLEXIBLE PAVEMENT REPAIR DETAIL AND/OR AS DIRECTED BY THE ENGINEER.
3. REFERENCE ALL EXISTING PAVEMENT MARKINGS PRIOR TO PLANING OPERATIONS.
4. FOR DETAILS NOT SHOWN, SEE PM STANDARD SHEETS.
5. MATCH EXISTING PAVEMENT CROSS-SLOPE.
6. RAILROAD BRIDGE FROM STA. 39+29.51 TO STA. 50+72.25 STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

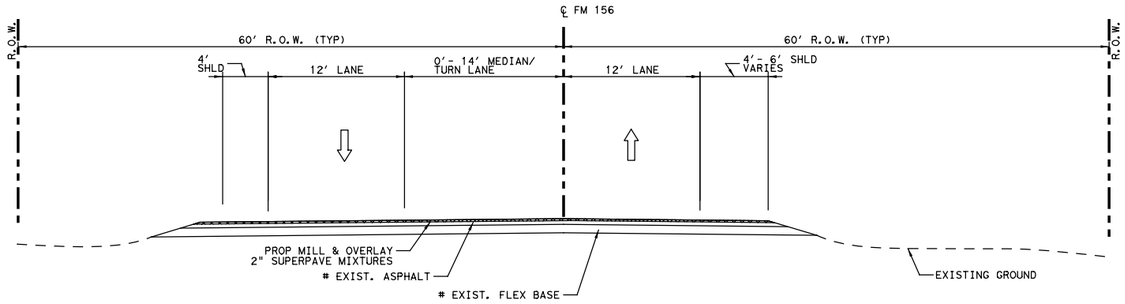
FM 156

PROPOSED
TYPICAL SECTION

SHEET 3 OF 4

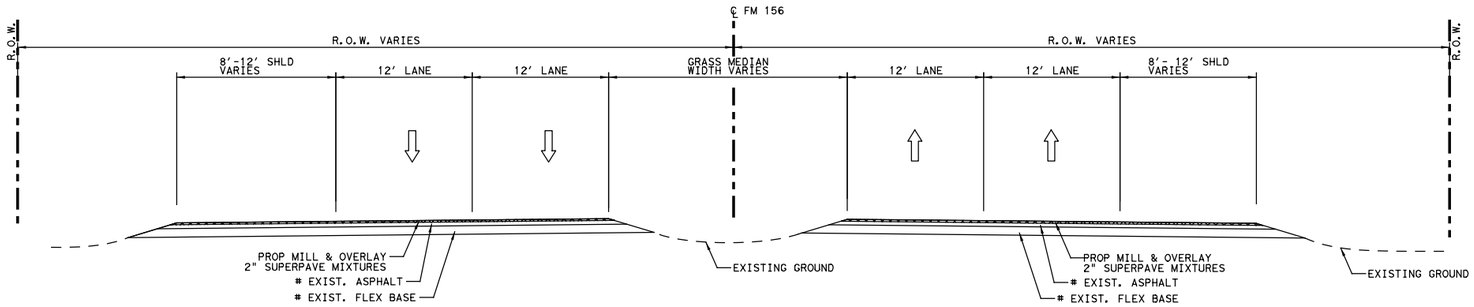
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	23
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM156_TYP_PROP_3.dgn
DATE: 2/9/2023
TIME: 2:46:05 PM
PENTABLE: I0246000.tbl
SCALE: H0



STA. 207+39.29 TO STA. 216+00.00

PROPOSED FM 156 SECTION



STA. 281+09.49 TO STA. 289+74.00

PROPOSED FM 156 SECTION

NOTES:

1. LEAVE A UNIFORM SURFACE OF PLANED PAVEMENT FREE OF LOOSE ASPHALT MATERIAL AND FABRIC UNDERSEAL.
2. REPAIR PAVEMENT FAILURES IN ACCORDANCE WITH FLEXIBLE PAVEMENT REPAIR DETAIL AND/OR AS DIRECTED BY THE ENGINEER.
3. REFERENCE ALL EXISTING PAVEMENT MARKINGS PRIOR TO PLANING OPERATIONS.
4. FOR DETAILS NOT SHOWN, SEE PM STANDARD SHEETS.
5. MATCH EXISTING PAVEMENT CROSS-SLOPE.
6. RAILROAD BRIDGE FROM STA. 39+29.51 TO STA. 50+72.25 STA. 112+14.03 TO STA. 116+25.50

EXISTING PAVEMENT DEPTHS

FM 156 STA. FROM	FM 156 STA. TO	EXIST ASPHALT THICKNESS	EXIST FLEXBASE THICKNESS
7+36.40	31+96.50	5.5	10.5
31+96.50	63+38.30	6	9
63+38.30	92+62.75	13	6
92+62.75	119+95.50	13	6
119+95.50	146+72.85	11.5	5.5
146+72.85	171+65.50	11.5	5.5
171+65.50	203+65.90	15	5
203+65.90	232+11.65	9	4
232+11.65	259+11.35	11	4.5
259+11.35	END OF PROJECT	14.5	5.5

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

PROPOSED
TYPICAL SECTION

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	24
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG DATE: 2/9/2023 TIME: 2:46:08 PM PENTABLE: I0246000.tbl
FILE: FM156_TYP_PROP_4.dgn SCALE: NO

Control: 0718-02-072

County: Tarrant

Highway: FM 156

168	Vegetative Watering	169.400 gal./acre	1.000 gal.
3077	Hot Mix (All Types)	115 lb./sq. yd.-in.	ton
3077	Tack Coat - Trackless Tack	0.15-0.22 gal./sq. yd.	gal.

Special Notes

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.

All files in the FTP site are subject to the License Agreement shown on the FTP site.

To obtain a copy of the project plans free of charge, submit a request from the following site: http://www.txdot.gov/business/letting-bids/plans-online.html

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

Area Engineer's Email: Minh.Tran@txdot.gov
Assistant Area Engineer's Email: Daniel.Poole@txdot.gov
Design Manager's Email: Sam.Yacoub@txdot.gov

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

For Q&A's on Proposals navigate to https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors. Use 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.

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All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

Peak Hours		Off-Peak Hours	
6 to 9 AM Monday through Friday	3 to 7 PM Monday through Friday	9 AM to 3 PM and 7 PM to 6 AM Monday through Friday	All day Saturday and Sunday

Work that requires closure of multiple travel lanes in the same direction, except as otherwise shown in the plans, are restricted to night hours between 9 PM and 6 AM.

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

Modifications to Lane Closure / Work Restrictions:

Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

When deemed necessary, the Engineer will modify the list of major events when new events develop, existing events are rescheduled, or when warranted.

Special Events/ Special Situations will be handled on a case-by-case basis. No work restricting lane closures is allowed from 3 PM a day before to 9 AM the day after the Special Event or Special Situation.

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

On superelevated curves the shoulders will have the same cross-slope as the pavement, unless otherwise indicated.

On superelevated curves where the grade line is in a sag or on a flat grade, overlay the shoulders to the extent necessary to prevent trapping of water on the high side.

All driveway openings will be determined by the Engineer and will conform with Texas Department of Transportation "Regulations for Access Driveways to State Highways" adopted September 1953, and revised June 2004.

Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines, and grades are to be established in the field.

Remove the grass from the crown of shoulders or pavement edges by blading or other approved methods. Payment for this work will not be made directly, but will be subsidiary to the various items of the contract.

Locations shown for drainage structures refer to the control points of structures as follows:

3) Headwalls—Locations are to the outside face of the headwall at the centerline of the pipe or box structure. For pipe headwalls with Type "P" or "C" safety end treatment, locations are on the centerline of the pipe structure at the limit of payment for pipe.

Plugging of pipes or culverts will not be paid for directly, but will be subsidiary to the various bid items, unless otherwise shown on the plans.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

Install all erosion control measures as shown on the plans or as directed, immediately following construction of channels to their required line, grade, and section.

The following standard detail sheets have been modified:

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T5/T501/T502 Transition Retrofit Guide (MOD)
Armor Joint Details (MOD)
Bridge Foam Expansion Joint Seal (MOD)

Item 6. Control of Materials

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

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

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

Item 7. Legal Relations and Responsibilities

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to haul roads, equipment staging areas, borrow and disposal sites. "Associated" as defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The contractor will be responsible for all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the Department with a copy of all consultations or approvals from the USACE prior to initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, prior to any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

(1) Restricted Use of Materials for Previously Evaluated Permit Areas. Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:

a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:

a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 0.75 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

When a bridge deck is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean and repair all of these features if they weren't properly protected at contractor's expense. This work is subsidiary work to applicable bid items.

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The contractor shall coordinate with the railroad for all overhead work on the bridges and provide the railroad with work schedules. Care shall be taken to prevent any debris or tools from falling on to the Railroad track(s) or the Railroad Right of Way below.

Prevention of Migratory Bird Nesting

It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, avoid nests containing migratory birds and perform no work in the nesting areas until the young birds have fledged.

Structures

Do not begin bridge and culvert construction operations until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

The following Holiday/Event lane closure restriction requirements apply to this project:

No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 29 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 21 through 9 AM December 27

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

When a holiday falls on a Monday, modify restrictions, if needed, to begin lane restrictions on the Friday preceding the holiday. This may affect projects with construction lasting several years. (Example: Independence Day falls on Monday so restrictions should begin on the Friday preceding this holiday.

Event Lane Closure Restrictions

3 PM the day before Event to 9 AM the day after the Event

NASCAR Races at Texas Motor Speedway (generally 3 events):	NASCAR Nationwide and Sprint Cup Series (Held in late March/early April)	NASCAR Nationwide and Sprint Cup Series (Held in Late October/early November)	Indy Series Racing and NASCAR Truck Series (Held in June)

Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)

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Blanket use of the Event schedule is not permitted. The following list of events is an example and is not all-inclusive. Contact the appropriate Area Office to develop the applicable list for the project.

Item 8. Prosecution and Progress

Working days will be computed and charged in accordance with Section 8.3.1.1, "Five-Day Workweek."

Only Nighttime and weekend work will be allowed unless written permission from the Engineer is provided for the following.

Metal beam guard fence replacement can be completed during the day time. Refer to applicable TxDOT traffic control standards.

Before starting night work on a construction project, prepare and submit a work zone light system design in accordance with NCHRP Report 476, Section 3 for approval by the Engineer. The engineer will review the work zone light system design and notify the contractor of its acceptability. Do not start work until the work zone light system design is accepted.

Prepare the progress schedule as a bar chart, include all planned work activities and sequences and show Contract completion within the number of working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

Item 100. Preparing Right of Way

Measurement for this item will be along the centerline of the project with the limits of measurements as shown on the plans.

Removal of existing concrete pavement will be in accordance with Item 104, "Removing Concrete" except that this work will not be paid for directly, but will be subsidiary to Item 100, "Preparing Right of Way."

Item 104. Removing Concrete

When associated with a structure to be removed, removal of riprap as required, approach slabs, and shoulder drains are to be included in the unit price bid for Item 496, "Removing Structures."

Items 110, 112, and 132. Excavation, Subgrade Widening, and Embankment

Sulfate-laden subgrade material that is to be treated with either lime or cement, including material up to one foot outside the proposed treatment limits, is susceptible to sulfate heave.

Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E.

Treat moderate sulfate or excavate high sulfate areas identified above and other subgrade areas that may be identified during construction as having moderate to high sulfate concentrations to a depth of one foot below and laterally to one foot outside the proposed treatment limits. Treatment of the moderate level material will be paid for under Item 260, "Lime Treatment (Road Mixed)" or Item 275, "Cement Treatment (Road Mixed)." Removal of the high level material will be measured and paid for in accordance with Item 110, "Excavation" and replacement with suitable material will be measured and paid for in accordance with Item 132, "Embankment."

Any excavated sulfate-laden material will be acceptable for use in fill areas. Do not place within previously specified section boundaries of subgrade to be treated with either lime or cement.

Off-Site Borrow Sources. In addition to meeting pertinent specification requirements, test off-site borrow sources for sulfate content. Test soils for soluble sulfates in accordance with Test Method Tex-145 and Tex-146-E and provide documentation that supports compliance with previously stated requirements. The Engineer will perform additional testing for sulfates of this material upon delivery to the project. Only material that is placed within one foot vertically or laterally of subgrade treatment will require testing for sulfates. Remove and replace failing material (sulfate concentrations >7,000 PPM by dry weight).

Item 132. Embankment

Do not provide Type B embankment material with a Plasticity Index (PI) higher than 35.

Furnish test results per Test Procedures Tex-104, 105, and 106-E (PIs), Tex-113 or 114-E (M-D Curves), and Tex-145 and/or Tex-146-E (Sulfates) for each material sample provided by the Engineer. Perform field density tests (Tex-115-E, Part I) at a frequency for each worked section to produce passing results prior to testing by the Engineer per Tex-115-E, Part I.

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When embankment is placed as a bridge header bank, test each lift for compliance with density requirements, near the center of each travel lane at the following locations:

1. At the "beginning of bridge" or "end of bridge" station (if abutment is on retaining wall, location may be adjusted by not more than 5 feet.)
2. At 25-foot intervals for a distance of 150 feet in advance of the "beginning of bridge" station.
3. At 25-foot intervals for a distance of 150 feet after the "end of bridge" station.

Density tests must be conducted by a department-certified independent testing laboratory. Results of tests will be furnished to TxDOT within 24 hours after testing; a final copy of all test reports must be signed and sealed by a Professional Engineer in the State of Texas and furnished within five (5) working days after testing. Areas which do not meet minimum density requirements will be removed, re-compacted, and re-tested for compliance at the contractor's entire expense. Testing and reporting of test results will not be paid for directly, but will be subsidiary to this item.

Construct embankments for bridge header banks to final subgrade elevation prior to excavation for abutment caps and placement of foundation course at approach slabs. Payment for structural excavation and/or excavation for placement of foundation course will not be paid for directly, but will be subsidiary to the pertinent bid items.

At all locations where guardrail is shown to flare, widen the embankment as necessary to accommodate the guardrail.

Item 164. Seeding for Erosion Control

Apply seeding required between December 1 and January 31 using seed types and mixtures as shown in Item 164.2.1, Table 3. If, in the opinion of the Engineer, this does not provide an effective vegetative cover, apply "straw or hay mulch" as specified in Article 164.3.2, "Straw or Hay Mulch Seeding" as soon as possible. After February 1, apply warm season seeding in order to establish a permanent protective vegetative cover.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly, but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on non-consecutive days, each at half the weekly application rate. For the remainder of the

establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

January—0.39"	April—0.86"	July—0.48"	October—0.68"
February—0.46"	May—1.00"	August—0.47"	November—0.46"
March—0.48"	June—0.63"	September—0.74"	December—0.37"

Item 301. Asphalt Antistripping Agent

Furnish a liquid antistripping agent unless otherwise directed.

Item 305. Salvaging, Hauling, and Stockpiling Reclaimed Asphalt Pavement (RAP)

Ensure that 95% of the reclaimed material passes a 2 in. sieve.

Contractor to dispose all RAP materials.

The existing pavement shall not be left exposed after milling operations. All milled surfaces must be overlay in in one operation.

The maximum allowable length of time per phase for milling surface operations shall be 2 days.

Vehicles shall not be allowed to drive on milled surfaces.

Remove dirt, raised pavement marking, and other debris, as directed.

Item 310. Prime Coat

Provide EC-30 for this Item.

Item 351. Flexible Pavement Structure Repair

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

(TY E, GR 4) Furnish aggregate conforming to the following requirements:

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Gradation:

Retained on Sieve Size	Percent (%) by Weight
1-3/4 in.	0–5
No. 4	30–75
No. 40	65–85

Plasticity Index (PI)	15 max.
Liquid Limit	45 max.
Wet Ball Mill	50 max.
Wet Ball Mill, % (Increase Passing the No. 40)	20 max.

Place material in two or more equal lifts unless otherwise directed.

Do not add field sand to modify the final material to meet the requirements.

Apply cement for subgrade treatment by the "slurry placement" method.

Treat base or subgrade material with a maximum 4% cement by weight. The 7-day compressive strength of treated material will be 250 psi.

Subgrade repair to be included when necessary.

Use EC-30 for the prime coat.

Item 432. Riprap

Provide weep holes as directed.

The quantities for riprap at the location indicated may be varied to the extent necessary to ensure proper functioning for the purpose intended.

All concrete riprap will be 4" (.33') in thickness, unless otherwise shown on the plans, and must be reinforced.

Item 454. Bridge Expansion Joints

For header-type expansion joints refer to the following TxDOT website for the approved systems:

http://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html

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Item 464. Reinforced Concrete Pipe

All bends and connections in pipe must be prefabricated.

Item 500. Mobilization

Lighting for nighttime operations are subsidiary to the bid item.

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 typically 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.

Maintenance of roadways, not paid as Item 508, "Constructing Detours," and designated in the traffic control plan to carry traffic, will be the responsibility of the Contractor.

Permanent signs may be installed when construction in an area is complete and they will not conflict with the traffic control plan for the remainder of the job.

Existing signs are to remain as long as they do not interfere with construction and they do not conflict with the traffic control plan.

Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

One-way Traffic Control will not be paid directly but will be subsidiary to pertinent items.

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Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

The SW3P for this project will consist of using the following items as directed:

- Construction exits
- Erosion control logs

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

Items 530 And 531. Intersections, Driveways and Turnouts

The furnishing and installation of the sand cushion in proposed sidewalks, sidewalk ramps, and driveways will not be paid for directly but will be subsidiary to this bid item.

Item 540. Metal Beam Guard Fence

The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

When connecting a Thrie-Beam to a concrete wingwall, bridge rail, etc., drill the holes for bolt placement using rotary or core type equipment. Use a core type drill when reinforcing steel is encountered. Do not use percussion or impact drilling. Repair damage to the concrete and spalls exceeding ½" from the edge of the hole.

A minimum of two metal beam guard fence rail element manufacturers must be provided.

Item 542. Removing Metal Beam Guard Fence

Remove existing metal beam guard fence only when authorized.

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Item 585. Ride Quality for Pavement Surfaces

Use Surface Test Type B pay adjustment schedule 3 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Item 644. Small Roadside Sign Assemblies

A minimum of two sign face manufacturers must be provided.

Item 662. Work Zone Pavement Markings

Paint and Beads may be used for Non-Removable Work Zone Pavement Markings, if TxDOT tested materials are used, paint and beads.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Item 3077. Superpave Mixtures

RAP aggregate must meet the requirements of Table 1.

Provide aggregate with a Surface Aggregate Classification (SAC) value of A for the travel lanes and shoulders.

Provide aggregate with a Surface Aggregate Classification (SAC) value of A for the surfaces other than the travel lanes.

No blending, of the material retained on the No. 4 sieve, to meet SAC A will be allowed for surface mixes.

Natural (field) sands are not allowed.

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Provide a PG 70-28 asphalt for the surface course and levelup course, if applicable.

A trackless tack coat is required for this project.

Warm Mix Asphalt (WMA) is not permitted in any mix type on this project.

RAP and RAS are not permitted in any surface and levelup mixes on this project.

Grade substitution per Table 5 is not allowed.

Provide a mix design with the gradation curve below the restricted zone.

Use the Boil Test, Test Procedure Tex-530-C, and provide only mixes that produce zero percent (0%) stripping for design verification and during production.

Include the approved mix design number on each delivery ticket.

Use a Material Transfer Device (MTD) unless otherwise directed.

Stop production after Lot 1. Review all test data and confirm any changes with the Engineer. Do not start production and placement on subsequent Lots until approved by the Engineer.

Shoulders, crossovers, and other areas listed on the Plan sheets or as directed are not subject to in-place air void determination for this project.

Use Surface Test Type B for this project.

Item 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

(15) electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead

2. Use Other Routes
3. Bridge Closed Ahead
4. FM 156 AT
5. Closed Ahead
6. Henrietta Creek
7. Detour Ahead
8. Johnson Creek
9. Prepare To Stop
10. Bishop Creek
11. Road Closed Ahead
12. Follow Detour
13. Signs
14. Merge Left
15. No Exit Next ** Miles

The following message portable changeable message sign messages are to be displayed:

Bridge Closed Ahead
FM 156 At
Henrietta Creek

Bridge Closed Ahead
FM 156 At
Johnson Creek

Bridge Closed Ahead
FM 156 at
Bishop Creek

Use Other Routes
Follow Detour
Signs

Item 6185. Truck Mounted Attenuator (TMA) and Trailer Attenuator (TA)

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 0 additional shadow vehicle(s) with TMA for TCP.

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Therefore, 2 total shadow vehicles with TMA will be required for this type of work. Determine if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0718-02-072 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY FM 156

				CONTROL SECTION JOB	0718-02-072		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00061435			
				COUNTY	Tarrant			
				HIGHWAY	FM 156			
ALT	BID CODE	DESCRIPTION	UNIT		EST.	FINAL		
	100-6002	PREPARING ROW	STA		280.000		280.000	
	104-6009	REMOVING CONC (RIPRAP)	SY		129.000		129.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY		1,108.000		1,108.000	
	134-6004	BACKFILL (TY A OR B)	STA		280.000		280.000	
	164-6003	BROADCAST SEED (PERM) (RURAL) (CLAY)	SY		2,276.000		2,276.000	
	168-6001	VEGETATIVE WATERING	MG		80.000		80.000	
	305-6002	SALV, HAUL & STKPL RCL APH PV (0 TO 2")	SY		128,132.000		128,132.000	
	351-6028	FLEX PAVE STRUCTURE REPAIR (8"-10")	SY		8,726.000		8,726.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY		293.000		293.000	
	438-6001	CLEANING AND SEALING EXISTING JOINTS	LF		264.000		264.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF		16.000		16.000	
	467-6358	SET (TY II) (18 IN) (RCP) (4: 1) (C)	EA		4.000		4.000	
	496-6006	REMOV STR (HEADWALL)	EA		2.000		2.000	
	500-6001	MOBILIZATION	LS		1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO		7.000		7.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY		467.000		467.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY		467.000		467.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF		900.000		900.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF		900.000		900.000	
	510-6001	ONE-WAY TRAF CONT (FLAGGER CONT)	HR		80.000		80.000	
	510-6002	ONE-WAY TRAF CONT (PILOT CAR)	HR		80.000		80.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF		42,111.000		42,111.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF		5,152.000		5,152.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA		12.000		12.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF		5,385.000		5,385.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA		12.000		12.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA		12.000		12.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA		84.000		84.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA		19.000		19.000	
	644-6033	IN SM RD SN SUP&AM TYS80(1)SA(U)	EA		3.000		3.000	
	644-6067	IN SM RD SN SUP&AM (INST SIGN ONLY)	EA		2.000		2.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA		9.000		9.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA		103.000		103.000	
	658-6014	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA		33.000		33.000	
	658-6047	INSTL OM ASSM (OM-2Y)(WC)GND	EA		4.000		4.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA		96.000		96.000	
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA		61.000		61.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0718-02-072 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY FM 156

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0718-02-072**			
		PROJECT ID		**A00061435**			
		COUNTY		**Tarrant**			
		HIGHWAY		**FM 156**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	449.000		449.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	53,495.000		53,495.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	4,593.000		4,593.000	
	662-6014	WK ZN PAV MRK NON-REMOV (W)12"(SLD)	LF	784.000		784.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	495.000		495.000	
	662-6017	WK ZN PAV MRK NON-REMOV (W)(ARROW)	EA	40.000		40.000	
	662-6018	WK ZN PAV MRK NON-REMOV (W)(DBL ARW)	EA	7.000		7.000	
	662-6029	WK ZN PAV MRK NON-REMOV(W)(WORD)	EA	40.000		40.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	61,078.000		61,078.000	
	662-6041	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)	LF	1,567.000		1,567.000	
	666-6027	REFL PAV MRK TY I (W)8"(BRK)(100MIL)	LF	40.000		40.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	4,593.000		4,593.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	993.000		993.000	
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	1,567.000		1,567.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	449.000		449.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	50,741.000		50,741.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	61,078.000		61,078.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	3,536.000		3,536.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	40.000		40.000	
	668-6078	PREFAB PAV MRK TY C (W) (DBL ARROW)	EA	7.000		7.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	40.000		40.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	16.000		16.000	
	672-6007	REFL PAV MRKR TY I-C	EA	247.000		247.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	2,027.000		2,027.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	30.000		30.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	114,573.000		114,573.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	4,633.000		4,633.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	784.000		784.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	1,702.000		1,702.000	
	677-6028	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)	LF	2,346.000		2,346.000	
	785-6004	BRIDGE JOINT REPAIR (ARMOR)	LF	90.000		90.000	
	785-6010	BRIDGE JOINT REPLACEMENT (ARMOR)	LF	419.000		419.000	
	3077-6027	SP MIXE5SP-CSAC-A PG70-28	TON	14,736.000		14,736.000	
	3077-6075	TACK COAT	GAL	25,627.000		25,627.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	100.000		100.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	100.000		100.000	

DISTRICT	COUNTY	CCSJ	SHEET
Fort Worth	Tarrant	0718-02-072	26A

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0718-02-072 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY FM 156

				CONTROL SECTION JOB	0718-02-072		TOTAL EST.	TOTAL FINAL
				PROJECT ID	A00061435			
				COUNTY	Tarrant			
				HIGHWAY	FM 156			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL			
	6185-6005	TMA (MOBILE OPERATION)	DAY	100.000		100.000		
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000		
		RAILROAD FLAGGING: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000		
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000		

100% PLANS SUBMITTAL

SHEET	0100	0104	0132	0134	164	168	0305	0351	0432	0540	0540	0542	0544	0544	3077	3077
	6002	6009	6003	6004	6003	6001	6002	6028	6045	6001	6006	6001	6001	6003	6027	6075
	0100 6002	0104 6009	0132 6003	0134 6004	164 6003	168 6001	0305 6002	0351 6028	0432 6045	0540 6001	0540 6006	0542 6001	0544 6001	0544 6003	3077 6027	3077 6075
	PREPARING ROW	REMOVING CONC (RIPRAP)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	BACKFILL (TY A OR B)	BROADCAST SEED (PERM) (RURAL) (CLAY)	VEGETATIVE WATERING	SALV, HAUL & STKPL RCL APH PV (0 TO 2")	FLEX PAVE STRUCTURE REPAIR (8"-10")	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	SP MIXES SP-C SAC-A PG70-28	TACK COAT
	STA	SY	CY	STA	SY	MG	SY	SY	CY	LF	EA	LF	EA	EA	TON	GAL
PROJECT LAYOUT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SHEET 1 OF 14	22	-	-	22	-	-	11,156	-	-	-	-	-	-	-	1,283	2,231
SHEET 2 OF 14	22	66	-	22	-	-	9,386	612	10	126	2	274	2	2	1,080	1,877
SHEET 3 OF 14	22	63	-	22	-	-	7,925	1,533	10	126	2	1,095	2	2	911	1,585
SHEET 4 OF 14	17	-	158	17	-	-	12,518	1,693	65	725	2	-	2	2	1,439	2,504
SHEET 5 OF 14	12	-	374	12	1,101	39	6,064	1,527	75	275	2	-	2	2	697	1,213
SHEET 6 OF 14	22	-	576	22	1,175	41	9,510	2,293	133	3,900	4	4,016	4	4	1,094	1,902
SHEET 7 OF 14	22	-	-	22	-	-	9,070	604	-	-	-	-	-	-	1,043	1,814
SHEET 8 OF 14	22	-	-	22	-	-	9,044	264	-	-	-	-	-	-	1,040	1,809
SHEET 9 OF 14	22	-	-	22	-	-	11,652	-	-	-	-	-	-	-	1,340	2,331
SHEET 10 OF 14	22	-	-	22	-	-	9,011	200	-	-	-	-	-	-	1,037	1,802
SHEET 11 OF 14	22	-	-	22	-	-	8,058	-	-	-	-	-	-	-	927	1,612
SHEET 12 OF 14	22	-	-	22	-	-	10,098	-	-	-	-	-	-	-	1,161	2,020
SHEET 13 OF 14	22	-	-	22	-	-	11,354	-	-	-	-	-	-	-	1,306	2,271
SHEET 14 OF 14	9	-	-	9	-	-	3,286	-	-	-	-	-	-	-	378	657
SUMMARY	280	129	1,108	280	2,276	80	128,132	8,726	293	5,152	12	5,385	12	12	14,736	25,627

SHEET	464	467	496
	6003	6358	6006
	464 6003	467 6358	496 6006
	RC PIPE (CL III) (18 IN)	SET (TY II) (18 IN) (RCP) (4: 1) (C)	REMOV STR (HEADWALL)
	LF	EA	EA
DRAINAGE	-	-	-
SHEET 1 OF 14	-	-	-
SHEET 2 OF 14	-	-	-
SHEET 3 OF 14	-	-	-
SHEET 4 OF 14	-	-	-
SHEET 5 OF 14	-	-	-
SHEET 6 OF 14	-	-	-
SHEET 7 OF 14	16	4	2
SHEET 8 OF 14	-	-	-
SHEET 9 OF 14	-	-	-
SHEET 10 OF 14	-	-	-
SHEET 11 OF 14	-	-	-
SHEET 12 OF 14	-	-	-
SHEET 13 OF 14	-	-	-
SHEET 14 OF 14	-	-	-
SUMMARY	16	4	2

SHEET	0506	0506	0506	0506
	6020	6024	6041	6043
	0506 6020	0506 6024	0506 6041	0506 6043
	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	LF	LF
CSJ: 0718-02-072 TOTAL	467	467	900	900
SUMMARY	467	467	900	900

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

ROADWAY, DRAINAGE & SW3P SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	27
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM_156_RDWY_SUMMARY.dgn
DATE: 2/9/2023
TIME: 2:46:10 PM
PENTABLE: 0246000.tbl
SCALE: 1:0

100% PLANS SUBMITTAL

SHEET	533	644	644	644	644	644	644	658	658	658	658	666	666	666	666	666	666
	6001	6001	6004	6033	6067	6068	6076	6014	6047	6060	6064	6027	6036	6048	6147	6306	6309
	533 6001	644 6001	644 6004	644 6033	644 6067	644 6068	644 6076	658 6014	658 6047	658 6060	658 6064	666 6027	666 6036	666 6048	666 6147	666 6306	666 6309
	RUMBLE STRIPS (SHOULDER)	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(U)	IN SM RD SN SUP&AM (INST SIGN ONLY)	RELOCATE SM RD SN SUP&AM TY 10BWG	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	INSTL OM ASSM (OM-2Y)(WC)GND	REMOVE DELIN & OBJECT MARKER ASSMS	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	REFL PAV MRK TY I (W)8"(BRK)(10 0MIL)	REFL PAV MRK TY I (W)8"(SLD)(10 0MIL)	REFL PAV MRK TY I (W)24"(SLD)(1 00MIL)	REFL PAV MRK TY I (Y)24"(SLD)(1 00MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(10 0MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(10 0MIL)
	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF	LF
SIGNING & PAVEMENT MARKING	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SHEET 1 OF 14	3,595	5	6	1	-	-	12	-	-	-	-	-	759	52	310	-	4,112
SHEET 2 OF 14	3,190	8	-	-	-	-	6	10	-	12	2	-	502	-	364	-	3,190
SHEET 3 OF 14	2,485	9	1	-	-	-	10	15	-	17	2	-	122	-	64	-	3,006
SHEET 4 OF 14	1,843	8	5	-	-	1	13	-	-	12	12	-	905	67	73	-	2,811
SHEET 5 OF 14	2,350	3	-	-	-	-	3	-	-	15	15	-	-	-	-	-	2,408
SHEET 6 OF 14	2,978	9	-	1	-	1	10	8	-	38	30	-	-	50	-	-	4,062
SHEET 7 OF 14	3,459	11	-	-	-	2	11	-	-	-	-	-	-		-	-	4,282
SHEET 8 OF 14	3,496	4	-	-	-	1	4	-	-	-	-	-	-	-	90	-	3,934
SHEET 9 OF 14	3,923	7	2	-	-	1	7	-	-	-	-	40	525	436	152	-	4,124
SHEET 10 OF 14	3,516	4	-	-	-	1	4	-	-	-	-	-	340	-	147	-	4,190
SHEET 11 OF 14	3,841	1	-	-	-	1	1	-	4	2	-	-	-	-	-	-	4,294
SHEET 12 OF 14	3,537	2	1	-	2	1	4	-	-	-	-	-	536	277	217	-	4,084
SHEET 13 OF 14	3,476	4	2	-	-	-	6	-	-	-	-	-	190	-	150	104	4,404
SHEET 14 OF 14	422	9	2	1	-	-	12	-	-	-	-	-	714	111	-	345	1,840
SUMMARY	42,111	84	19	3	2	9	103	33	4	96	61	40	4,593	993	1,567	449	50,741

SHEET	666	666	668	668	668	668	672	672	672	677	677	677	677	677
	6321	6343	6077	6078	6085	6092	6007	6009	6010	6001	6003	6005	6007	6028
	666 6321	666 6343	668 6077	668 6078	668 6085	668 6092	672 6007	672 6009	672 6010	677 6001	677 6003	677 6005	677 6007	677 6028
	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (DBL ARROW)	PREFAB PAV MRK TY C (W) (WORD)	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PV MRK & MRKS (RUMBLE STRIP)
	LF	LF	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF
SIGNING & PAVEMENT MARKING	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SHEET 1 OF 14	5,880	-	6	4	6	10	39	250	-	9,992	759	-	362	1,152
SHEET 2 OF 14	5,498	940	4	-	4	-	26	212	-	9,628	502	-	364	1,194
SHEET 3 OF 14	4,800	1,340	1	1	1	-	6	146	-	9,146	122	-	-	-
SHEET 4 OF 14	3,638	288	11	2	11	-	46	182	-	6,737	905	-	140	-
SHEET 5 OF 14	2,408	-	-	-	-	-	-	61	-	4,816	-	-	-	-
SHEET 6 OF 14	4,304	968	-	-	-	-	-	108	-	8,552	-	-	50	-
SHEET 7 OF 14	4,174	-	-	-	-	-	-	102	-	8,456	-	-	-	-
SHEET 8 OF 14	4,352	-	-	-	-	-	-	132	-	8,286	-	-	91	-
SHEET 9 OF 14	4,732	-	5	-	5	-	27	192	-	8,856	565	534	50	-
SHEET 10 OF 14	4,756	-	3	-	3	-	17	174	-	8,946	340	-	202	-
SHEET 11 OF 14	4,186	-	-	-	-	-	-	104	-	8,480	-	-	-	-
SHEET 12 OF 14	5,070	-	4	-	4	-	35	188	-	9,154	536	250	332	-
SHEET 13 OF 14	5,660	-	2	-	2	-	15	176	6	10,064	190	-	-	-
SHEET 14 OF 14	1,620	-	4	-	4	6	36	-	24	3,460	714	-	111	-
SUMMARY	61,078	3,536	40	7	40	16	247	2,027	30	114,573	4,633	784	1,702	2,346

SHEET	0502	0510	0510	0662	0662	0662	0662	0662	0662	0662	0662	0662	0662	6001	6001	6185	6185
	6001	6001	6002	6001	6004	6012	6014	6016	6017	6018	6029	6034	6041	6001	6002	6002	6005
	0502 6001	0510 6001	0510 6002	0662 6001	0662 6004	0662 6012	0662 6014	0662 6016	0662 6017	0662 6018	0662 6029	0662 6034	0662 6041	6001 6001	6001 6002	6185 6002	6185 6005
	BARRICADES, SIGNS AND TRAFFIC HANDLING	ONE-WAY TRAF CONT (FLAGGER CONT)	ONE-WAY TRAF CONT (PILOT CAR)	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	WK ZN PAV MRK NON-REMOV (W)12"(SLD)	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK NON-REMOV (W)(ARROW)	WK ZN PAV MRK NON-REMOV (W)(DBL ARW)	WK ZN PAV MRK NON-REMOV (W)(WORD)	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	WK ZN PAV MRK NON-REMOV (Y)24"(SLD)	PORTABLE CHANGEABLE MESSAGE SIGN	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	MO	HR	HR	LF	LF	LF	LF	LF	EA	EA	EA	LF	LF	DAY	EA	DAY	DAY
CSJ: 0718-02-072 TOTAL	7	80	80	449	53,495	4,593	784	495	40	7	40	61,078	1,567	100	2	100	100
SUMMARY	7	80	80	449	53,495	4,593	784	495	40	7	40	61,078	1,567	100	2	100	100

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156
PAVEMENT MARKING AND TRAFFIC CONTROL SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	28
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM_156_PMRK_SUMMARY.dgn
DATE: 2/9/2023
TIME: 2:46:12 PM
SCALE: 1:20
PENTABLE: 10246000.tbl

100% PLANS SUBMITTAL

SHEET	0438	0785	0785
	6001	6004	6010
	0438 6001	0785 6004	0785 6010
	CLEANING AND SEALING EXISTING JOINTS	BRIDGE JOINT REPAIR (ARMOR)	BRIDGE JOINT REPLACEMENT (ARMOR)
	LF	LF	LF
CSJ: 0718-02-072 TOTAL	264	90	419
SUMMARY	264	90	419

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE SUMMARY

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	29
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:46:14 PM SCALE: 1:1
FILE: FM_156_BRIDGE_SUMMARY.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
95												
			Denton COUNTY LINE									
	1	I-2dT		48x24	X		10BWG	1	SA	T		
					X							
			Tarrant COUNTY LINE									
	2	I-2dT		48x24	X		10BWG	1	SA	T		
	3	W3-3		36X36	X		10BWG	1	SA	P		
	4	R3-8 LK	ONLY	30x30	X		10BWG	1	SA	P		
	5	R1-2	YIELD	48x48x48	X		10BWG	1	SA	T		
		M3-1	NORTH SOUTH	24x12	X		S80	1	SA	U		
		M3-3	FARM 156 ROAD	24x12	X							
	6	M1-6F		24x24	X							
		M1-6F		24x24	X							
		M6-1		21x15	X							
		M6-1		21x15	X							
					X							
	7	R1-2	YIELD	48x48x48	X		10BWG	1	SA	T		
					X							
	8	R1-2	YIELD	48x48x48	X		10BWG	1	SA	T		
					X							
	9	R3-8 LK	ONLY	30x30	X		10BWG	1	SA	P		
					X							
	10	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES HERITAGE BAPTIST CHURCH VOLS	48x48	X		10BWG	1	SA	T		
					X							
	11	R1-1	STOP	36x36	X		10BWG	1	SA	P		

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STATE OF TEXAS
EN WANG
123262
LICENSED
PROFESSIONAL ENGINEER
02/09/23

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0718	02	072	FM156
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		30

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	1 2	R1-1		36x36	X		10BWG	1	SA	P		
		R3-2		36x36	X							
96	1	R1-1		36x36	X		10BWG	1	SA	P		
	2	R2-1		30x36	X		10BWG	1	SA	P		
	3	R1-1		36x36	X		10BWG	1	SA	P		
	4	R3-8 RT		30x30	X		10BWG	1	SA	P		
	5	R3-8 LT		30x30	X		10BWG	1	SA	P		
	6	R2-1		30x36	X		10BWG	1	SA	P		
	7	R4-1		24x30	X		10BWG	1	SA	P		
	8	W8-13aT		36x36	X		10BWG	1	SA	P		
97	1	R4-1		24x30	X		10BWG	1	SA	P		
	2	R2-1		30x36	X		10BWG	1	SA	P		

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02/09/23

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

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

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-16 8-16	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		31

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	3	R4-1	DO NOT PASS	24x30	X		10BWG	1	SA	P		
	4	R2-1	SPEED LIMIT 45	30x36	X		10BWG	1	SA	P		
	5	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36	X		10BWG	1	SA	P		
	6	W3-3	G G G	36x36	X		10BWG	1	SA	P		
	7	R4-1	DO NOT PASS	24x30	X		10BWG	1	SA	P		
	8	W1-2L		36x36	X		10BWG	1	SA	P		
	9	D3-1	KELLER HASLET RD ⇨	VARIES x 12	X		10BWG	1	SA	T		
	10	R3-8 LK	ONLY	30x30	X		10BWG	1	SA	P		
98	1	R3-8b	ONLY ONLY ONLY	48x30	X		10BWG	1	SA	T		
	2	R3-8b	ONLY ONLY ONLY	48x30	X		10BWG	1	SA	T		
	3	D12-4T	ADOPT A HIGHWAY NEXT 2 MILES HERITAGE BAPTIST CHURCH VOLS	48x48	X		10BWG	1	SA	T		
	4	R3-8 LK	ONLY	30x30	X		10BWG	1	SA	P		

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STATE OF TEXAS
EN WANG
123262
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02/09/23

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

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Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

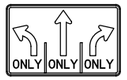
SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0718	02	072	FM156
4-16		DIST	COUNTY		SHEET NO.
8-16		FTW	TARRANT		32

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	5	W8-13aT		36x36	X		10BWG	1	SA	P		
	6	D14-4T		48x48	X		10BWG	1	SA	T		
	7	D3-1		VARIES x 12	X		10BWG	1	SA	P		
		R5-2		24x24	X							
		R5-2a		24x24	X							
	8	R1-1		36x36	X		10BWG	1	SA	P		
	9	W3-3		36X36	X		10BWG	1	SA	P		
	10	R3-8b		48x30	X		10BWG	1	SA	T		
		M3-3		24x12	X		10BWG	1	SA	P		
	11	M1-6F		24x24	X							
	12	W3-3		36X36	X		10BWG	1	SA	P		
	13	W8-13aT		36x36	X		10BWG	1	SA	P		
99												
	1	W3-3		36x36	X		10BWG	1	SA	P		

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STATE OF TEXAS
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02/09/23

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0718	02	072	FM156
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		33

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
	2	W1-2L		36x36	X		10BWG	1	SA	P		
	3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36	X		10BWG	1	SA	P		
100	1	W1-2R		36x36	X		10BWG	1	SA	P		
	2	D3-1	FM156	VARIES x 12								
		D3-1	SCHOOL HOUSE Rd	VARIES x 12								
		R1-1	STOP	36x36	X		10BWG	1	SA	P	BM	
	3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36x36	X		10BWG	1	SA	P		
	4	R7-1DBL	NO PARKING ANY TIME	12x18	X		10BWG	1	SA	P		
	5	D1-1	⇦ POST OFFICE	VARIES x 12	X		10BWG	1	SA	P	WC	
		D1-1	POST OFFICE ⇨	VARIES x 12	X							
	6	R1-1	STOP	36x36	X		10BWG	1	SA	P		
	7	D3-1	FM156	VARIES x 12								
		D3-1	ODESSA DR	VARIES x 12								
		R1-1	STOP	36x36	X		10BWG	1	SA	P	BM	

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STATE OF TEXAS
EN WANG
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02/09/23

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

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		34

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED: P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
		M3-1		24x12	X		S80	1	SA	U		
		M3-3		24x12	X							
	8	M1-6F		24x24	X							
		M1-6F		24x24	X							
		M6-1		21x15	X							
		M6-1		21x15	X							
	9	W1-2R		36x36	X		10BWG	1	SA	P		
	10	R7-1DBL		12x18	X		10BWG	1	SA	P		
101	1	R7-1DBL		12x18	X		10BWG	1	SA	P		
	2	R7-1DBL		12x18	X		10BWG	1	SA	P		
	3	W1-2L		36x36	X		10BWG	1	SA	P		
	4	R7-1DBL		12x18	X		10BWG	1	SA	P		
		D3-1		VARIES x 12								
	5	D3-1		VARIES x 12								
		R1-1		36x36	X		10BWG	1	SA	P	BM	
		D3-1		VARIES x 12								
	6	D3-1		VARIES x 12								
		R1-1		36x36	X		10BWG	1	SA	P	BM	

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
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7.5 to 15	0.100"
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STATE OF TEXAS EN WANG 123262 LICENSED PROFESSIONAL ENGINEER

02/09/23

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SHEET 6 OF 11

Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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REVISIONS 4-16 8-16	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		35

18

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE (FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80)	POSTS (1 or 2)	ANCHOR TYPE (UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic)	MOUNTING DESIGNATION: PREFABRICATED (P = "Plain", T = "T", U = "U")	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext (BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels)	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE (TY N, TY S)
	7	R7-1DBL	NO PARKING ANY TIME	12x18	X		10BWG	1	SA	P		
	8	R7-1DBL	NO PARKING ANY TIME	12x18	X		10BWG	1	SA	P		
	9	R7-1DBL	NO PARKING ANY TIME	12x18	X		10BWG	1	SA	P		
	10	R7-1DBL	NO PARKING ANY TIME	12x18	X		10BWG	1	SA	P		
	11	R7-1DBL	NO PARKING ANY TIME	12x18	X		10BWG	1	SA	P		
			FM156 BRENTWOOD LN 1100	VARIES x 12	X		10BWG	1	SA	P	BM	
102	1		STOP	VARIES x 12	X							
				36x36	X							
		W14-2	NO OUTLET	36x36	X		10BWG	1	SA	P		
	2											
		R2-1	SPEED LIMIT 30	30x36	X							
	3	W11-8		36x36	X		10BWG	1	SA	P		
	4	W3-3		36x36	X		10BWG	1	SA	P		
103	1	W11-8		36x36	X		10BWG	1	SA	P		

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STATE OF TEXAS
EN WANG
123262
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PROFESSIONAL ENGINEER

02/09/23

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080"
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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

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© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0718	02	072	FM156
4-16		DIST	COUNTY		SHEET NO.
8-16		FTW	TARRANT		36

18

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	2	R2-1	SPEED LIMIT 45	30x36	X		10BWG	1	SA	P		
	3	R3-8 LK	ONLY	30x30	X		10BWG	1	SA	P		
	4	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES LIFE COMMUNITY CHURCH	48x48	X		10BWG	1	SA	T		
	5	R2-1	SPEED LIMIT 45	30x36	X		10BWG	1	SA	P		
	6	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES DANIELLE SOTO	48x48	X		10BWG	1	SA	T		
	7	R3-8 LK	ONLY	30x30	X		10BWG	1	SA	P		
	8	W3-3	G O G	36X36	X		10BWG	1	SA	P		
	9	D3-1	FM156	VARIES x 12	X							
		D3-1	WHITE LN 2000	VARIES x 12	X							
		R1-1	STOP	36x36	X		10BWG	1	SA	P	BM	
104	1	D3-1	FM156	VARIES x 12	X							
		D3-1	WIMBERLY DR	VARIES x 12	X							
		R1-1	STOP	36x36	X		10BWG	1	SA	P	BM	

DATE: 2/9/2023
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STATE OF TEXAS
EN WANG
123262
LICENSED
PROFESSIONAL ENGINEER

02/09/23

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

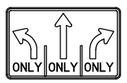
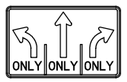
SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0718	02	072	FM156
4-16		DIST	COUNTY		SHEET NO.
8-16		FTW	TARRANT		37

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	2	R3-8 LK		30x30	X		10BWG	1	SA	P		
	3	D3-1 R1-1		VARIES x 12 36x36	X		10BWG	1	SA	P	BM	
	4											
105	1	D3-1 D3-1 R1-1		VARIES x 12 VARIES x 12 36x36	X X X		10BWG	1	SA	P	BM	
106	1	W3-3		36x36	X		10BWG	1	SA	P		
	2	R3-8 LK		30x30	X		10BWG	1	SA	P		
	3	D3-1		VARIES x 18	X		ON MAST ARM					
	4	D3-1		VARIES x 18	X		ON MAST ARM					
	5	R3-8b		36x36	X		10BWG	1	SA	T		
107	1	R3-8b		36x36	X		10BWG	1	SA	T		
	2	D1-1		VARIES x 12	X		10BWG	1	SA	T		
	3	W3-3		36x36	X		10BWG	1	SA	P		

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

DATE: 2/9/2023 2:46:48 PM
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02/09/23

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		38

18

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	4	R2-1	SPEED LIMIT 55	30x36	X		10BWG	1	SA	P		
	5	R4-7		24x30	X		10BWG	1	SA	P		
	6	W6-1		36x36	X		10BWG	1	SA	P		
		M3-3	NORTH	24x12	X		10BWG	1	SA	P		
108	1		FARM 156 ROAD									
		M1-6F		24x24	X							
	2	D14-4T	ADOPT A HIGHWAY NEXT 2 MILES DANIELLE SOTO	48x48	X		10BWG	1	SA	T		
	3	R8-1	NO PARKING ON R.O.W.	24x30	X		10BWG	1	SA	P		
		M3-1	SOUTH 81 287	24x12	X		S80	1	SA	U		
	4	M3-3	NORTH 81 287	24x12	X							
		M1-4		24x24	X							
		M1-4		24x24	X							
		M6-1		21x15	X							
		M6-3		21x15	X							
	5	R1-2	YIELD	48x48x48	X		10BWG	1	SA	T		
	6	R8-1	NO PARKING ON R.O.W.	24x30	X		10BWG	1	SA	P		
		M3-1	NORTH 81 287	24x12	X		10BWG	1	SA	P		
		M1-4		24x24	X							
	7	M1-4		24x24	X							
		M6-1		21x15	X							

STATE OF TEXAS
EN WANG
123262
LICENSED
PROFESSIONAL ENGINEER
02/09/23

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

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Texas Department of Transportation — Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		39

DATE: 2/9/2023 2:46:51 PM
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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
	8	R5-1	DO NOT ENTER	36x36	X		10BWG	1	SA	P		
	9	R6-1R	ONE WAY	36x12	X		10BWG	1	SA	P		
	10	R5-1	DO NOT ENTER	36x36	X		10BWG	1	SA	P		
	11	R5-1a	WRONG WAY	42x30	X		10BWG	1	SA	P		
	12	R5-1a	WRONG WAY	42x30	X		10BWG	1	SA	P		

STATE OF TEXAS
EN WANG
123262
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PROFESSIONAL ENGINEER

02/09/23

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

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NOTE:

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

DATE: 2/9/2023 2:46:55 PM
FILE: $FILE$

SHEET 11 OF 11

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		40

TB

100% PLANS SUBMITTAL

DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

1. GENERAL
    1. THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATIONS BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT ON OVERALL PROJECT TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED ENGINEER WITH THE STATE OF TEXAS FOR INCLUSION IN THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.
    2. MILL AND OVERLAY, STRIPING, AND BASE REPAIR OPERATIONS CAN TAKE PLACE AT NIGHT TIME WITH ENGINEER'S WRITTEN APPROVAL. METAL BEAM GUARD FENCE PLACEMENT CAN TAKE PLACE DURING THE DAYTIME.
    3. TRAFFIC SHALL NOT BE PERMITTED ON FAILED SUBGRADE.
    4. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC. DO NOT STORE EQUIPMENT OUTSIDE DESIGNATED RIGHT-OF-WAY WITHOUT PERMISSION GRANTED FIRST BY THE PROPERTY OWNER.
    5. CONTRACTOR IS TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES.
    6. ALL SEQUENCE OF WORK ON THIS PROJECT SHALL BE COORDINATED TO COINCIDE WITH ANY PROJECTS WITHIN OR ADJACENT TO THIS PROJECT.
    7. COORDINATE WITH TXDOT FOR SIGNAL TIMING REVISIONS, AS NECESSARY.
    8. WHEN A CULVERT EXTENSION, SAFETY END TREATMENT, AND OPEN EXCAVATION, ETC. IS WITHIN 10 FEET OF A TRAVEL LANE, DELINEATE THESE AREAS AS SHOWN ON THE BC STANDARD SHEETS.

2. LANE CLOSURES
    1. IN ADDITION TO THE PREVIOUSLY MENTIONED REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:
        i. ALL TRAFFIC SIGNAL WORK, DETOURS, HORIZONTAL TRAFFIC MOVEMENTS, LANE CLOSURES, ETC. ARE DIRECTLY RELATED TO THE SEQUENCE OF WORK.
3. TRAFFIC CONTROL NOTES
    1. FOLLOW TRAFFIC CONTROL PLAN TYPICAL SECTIONS AND STANDARD TCP SHEETS FOR LANE CLOSURES.
    2. FOLLOW TRAFFIC CONTROL PLAN DETOUR SHEETS FOR ROAD CLOSURES AND DETOURS.
    3. PLACE WORK ZONE PAVEMENT MARKINGS IN ACCORDANCE WITH WZ(STPM)-13.
    4. SIGN AND TREAT EDGE CONDITIONS IN ACCORDANCE WITH WZ(UL)-13 AND TXDOT STANDARDS, "WORKSHEET FOR EDGE CONDITION TREATMENT TYPES" (WECTT).
    5. PLACE REMOVABLE WORK ZONE PAVEMENT MARKINGS IN ACCORDANCE WITH BC(11)-21 & BC(12)-21 ON FINAL SURFACES.

FM 156 TRAFFIC CONTROL NARRATIVE

PRIOR TO PHASE 1

1. PLACE ADVANCE WARNING SIGNAGE FOR THE ENTIRE PROJECT.
2. PLACE STORM SEWER POLLUTION PREVENTION PLAN DEVICES FOR THE PROJECT PRIOR TO BEGINNING PHASE 1 CONSTRUCTION.
3. CULVERT AT STA. 149+25.00 SHALL BE EXTENDED PRIOR TO ANY ROADWAY CONSTRUCTION. UTILIZE ONE-LANE TWO WAY OPERATIONS PER TXDOT STANDARD TCP (1-2)-18. REFER TO STANDARDS AND TRAFFIC CONTROL PLAN FOR ADDITIONAL INFORMATION.

PHASE 1 – (NB & SB FM 156)

FROM: STA. 0+20.00 (BEGIN PROJECT – DENTON COUNTY LINE)
TO: RR BRIDGE APPROX. STA. 39+30.00

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 2 – (NB & SB FM 156)

RR BRIDGE APPROX. STA. 39+30.00 TO APPROX. STA. 50+72.00

1. THE RAILROAD BRIDGE REPAIR WILL REQUIRE A TEMPORARY CLOSURE OF FM 156. THE BRIDGE WILL BE CLOSED FOR REPAIRS ON FRIDAY FROM 10 PM TO MONDAY AT 5 AM. TRAFFIC WILL BE DETOURED IN ACCORDANCE WITH THE DETOUR LAYOUT.

PHASE 3 – (NB & SB FM 156)

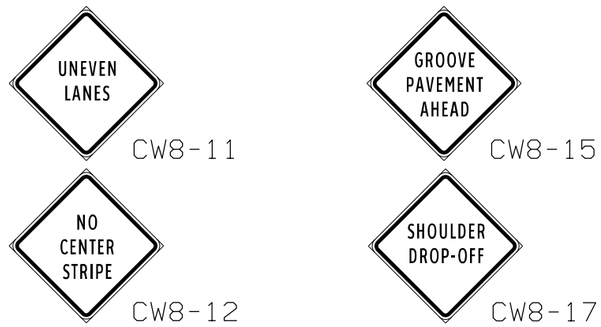
FROM: RR BRIDGE APPROX. STA. 50+72.00
TO: BRIDGE OVER CREEK APPROX. STA. 75+23.00

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 4 – (NB & SB FM 156)

BRIDGE OVER BISHOP CREEK APPROX. STA. 75+23.00 TO STA. 76+66.00, RR BRIDGE APPROX. STA. 112+48.40 TO 116+25.55 AND BRIDGE OVER JOHNSON CREEK APPROX. STA. 124+41.48.

1. THE REPAIRS FOR THE RAILROAD BRIDGE AND THE TWO BRIDGES OVER BISHOP AND JOHNSON CREEKS WILL REQUIRE A TEMPORARY CLOSURE OF FM 156. THE BRIDGES WILL BE CLOSED FOR REPAIRS ON FRIDAY FROM 10 PM TO MONDAY AT 5 AM. TRAFFIC WILL BE DETOURED IN ACCORDANCE WITH THE DETOUR LAYOUT.



PLACE IN ACCORDANCE WITH SHEETS WECTT,WZ(UL)-13,BC'S AN/OR AS DIRECTED.
UNLESS SHOWN OTHERWISE ALL CW SIGNS SHALL BE 48"X48".

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER
02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

SEQUENCE OF WORK

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	41
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 6:5:43 PM SCALE: 1:1
FILE: FM_156_TCP_SOW_1.dgn

PHASE 5 – (NB & SB FM 156)

FROM: BRIDGE OVER CREEK APPROX. STA. 76+66.00
TO: RR BRIDGE APPROX. STA. 112+48.40

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 6 - (NB & SB FM 156)

FROM: RR BRIDGE APPROX. STA. 116+11.60
TO: BRIDGE OVER CREEK APPROX. STA. 124+47.40

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 7 – (NB & SB FM 156)

FROM: BRIDGE OVER CREEK APPROX. STA. 125+84.90
TO: BLUE MOUND RD. STA. 182+50.00

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. REMOVE EXISTING HEADWALLS & INSTALL PROPOSED END TREATMENTS.
4. PERFORM BASE REPAIRS PER PLANS.
5. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 8 – (NB & SB FM 156)

FROM: BLUE MOUND RD. STA. 182+50.00
TO: BONDS RANCH RD. STA. 261+75.00

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 9 – (NB & SB FM 156)

FROM: BONDS RANCH RD. STA. 261+75.00
TO: FM 156 LANE DIVIDE STA. 282+57.60

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 10 – (NB FM 156)

FROM FM 156 LANE DIVIDE STA. 282+57.60
TO: END OF PROJECT

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

PHASE 11 – (SB FM 156)

FROM FM 156 LANE DIVIDE STA. 282+57.60
TO: END OF PROJECT

1. PLACE NECESSARY EROSION CONTROL DEVICES IF NEEDED.
2. FOLLOW THE FM 156 TCP TYPICAL SECTIONS AND APPLICABLE TCP STANDARD SHEETS FOR LANE CLOSURES.
3. PERFORM BASE REPAIRS PER PLANS.
4. MILL, OVERLAY AND PLACE PAVEMENT MARKINGS.

5. CONSTRUCTION NOTES

- THE CONTRACTOR WILL NOT BE ALLOWED TO ADVANCE TO THE NEXT PHASE OF WORK UNTIL COMPLETING WORK FOR THE CURRENT PHASE.
- THE CONTRACTOR SHALL MEASURE AND RECORD ALL PAVEMENT MARKING PRIOR TO CONSTRUCTION.
- THE CONTRACTOR SHALL MEASURE AND RECORD EXISTING CROSS SLOPES.
- THE CONTRACTOR SHALL MAINTAIN EXISTING GRADES AND SLOPES EXACTLY AS SHOWN OR AS DIRECTED AND PERFORM WORK IN A WAY TO ENSURE POSITIVE DRAINAGE.
- THE CONTRACTOR SHALL CREATE A TAPERED FEATHERED BUTT JOINTS TO PROVIDE A SMOOTH TRANSITION GRADE CHANGE AT THE END OF WORK SHIFTS AND PRIOR TO OPENING UP THE ROADWAY TO TRAFFIC.
- TEMPORARY STRIPING OPERATIONS TO BE COMPLETED DAILY.
- PLACE THE PAVEMENT MARKINGS AND MARKERS IN THE SAME MANNER TO MATCH PRE-CONSTRUCTION CONDITIONS. EXISTING STRIPING PATTERNS ARE PROVIDED ON "SIGNING AND PAVEMENT MARKING LAYOUT SHEETS 1-14" FOR REFERENCE.
- REMOVE TRAFFIC CONTROL DEVICES, CONSTRUCTION DEBRIS AND EROSION CONTROL DEVICES WHEN DIRECTED BY THE ENGINEER.

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

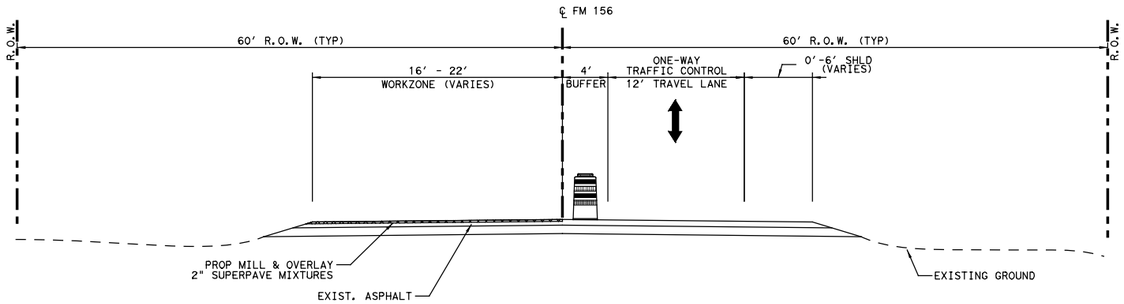
FM 156

SEQUENCE OF WORK

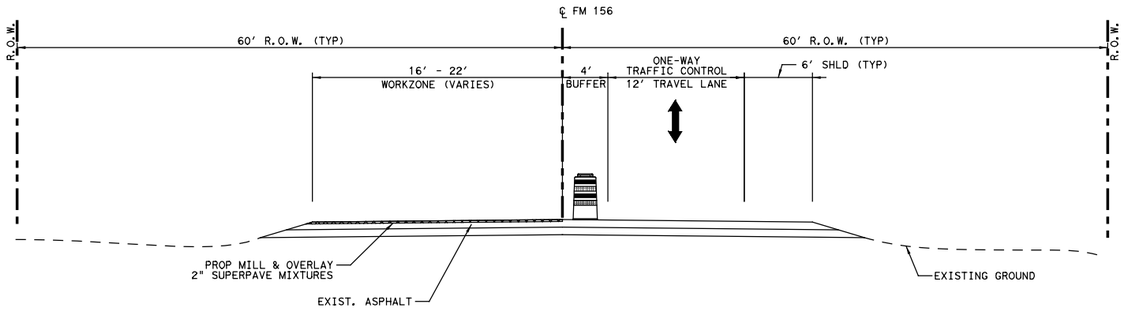
SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	42
CONTROL	SECTION	JOB	
0718	02	072	

100% PLANS SUBMITTAL



PHASES 1, 3, 7, 8, 9, 10 (TYPICAL)
STA. 0+20.00 TO STA. 39+30.00
STA. 50+72.00 TO STA. 75+23.00
STA. 125+84.90 TO STA. 182+50.00
STA. 182+50.00 TO STA. 261+75.00
STA. 261+75.00 TO STA. 282+57.60



PHASE 5, 6 (TYPICAL)
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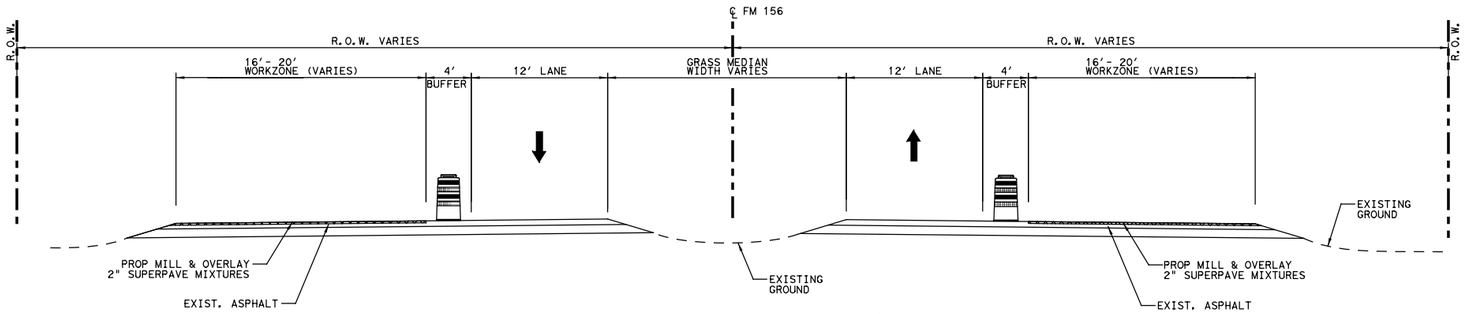
STA. 116+11.60 TO STA. 124+47.40



PHASE 11 (TYPICAL)
STA. 282+57.60 TO END OF PROJECT

LEGEND

- ROADWAY CONSTRUCTION THIS PHASE
- ROADWAY CONSTRUCTION PREVIOUS PHASE
- TRAFFIC ARROW

NOTES:

1. REFER TO THE SEQUENCE OF WORK SHEETS FOR THE FM 156 TRAFFIC CONTROL NARRATIVE ON SHEETS 41-42.
2. REFER TO THE TRAFFIC CONTROL STANDARDS FOR FLAGGING OPERATIONS, TRAFFIC CONTROL LAYOUT AND ADDITIONAL DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER
REGISTERED

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	43
CONTROL	SECTION	JOB	
0718	02	072	

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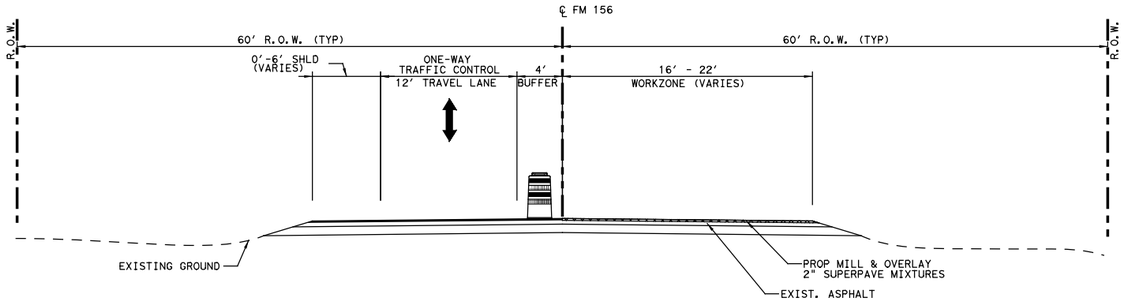
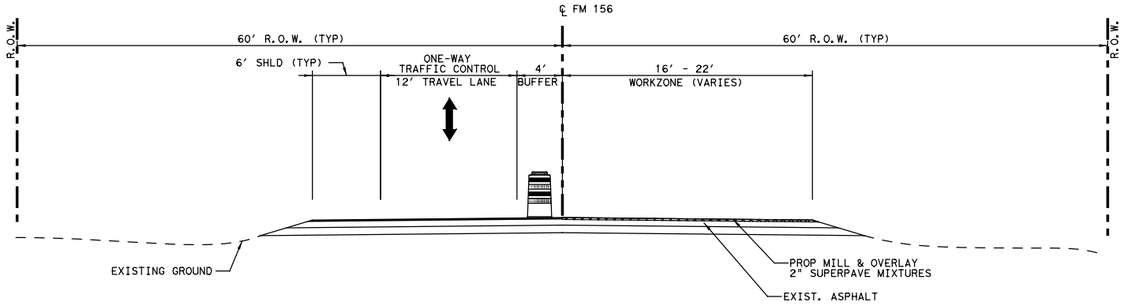
FILE: FM156_TYP_TCP_1.dgn

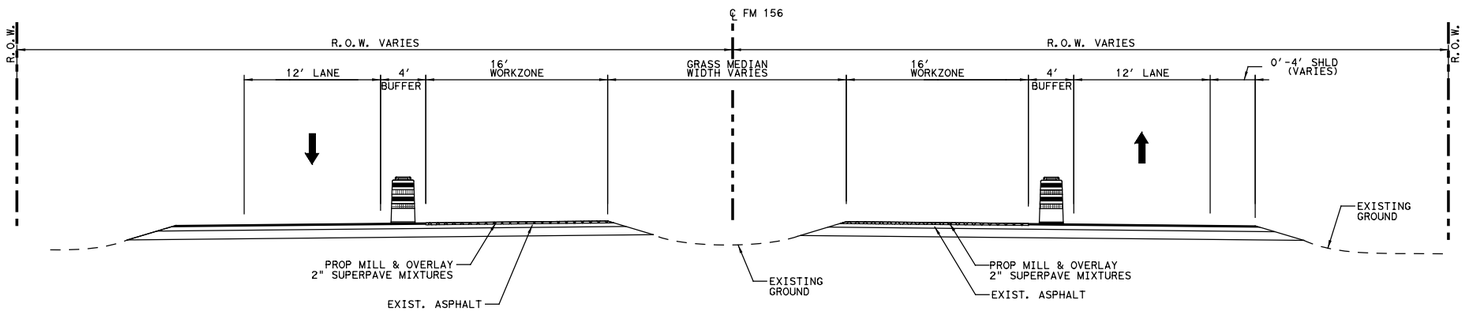
100% PLANS SUBMITTAL



PHASES 1B, 3B, 7B, 8B, 9B, 10B (TYPICAL)
STA. 0+20.00 TO STA. 39+30.00
STA. 50+72.00 TO STA. 75+23.00
STA. 125+84.90 TO STA. 182+50.00
STA. 182+50.00 TO STA. 261+75.00
STA. 261+75.00 TO STA. 282+57.60



PHASE 5B, 6B (TYPICAL)
STA. 76+66.00 TO STA. 112+48.40
STA. 116+11.60 TO STA. 124+47.40



PHASE 11B (TYPICAL)
STA. 282+57.60 TO END OF PROJECT

LEGEND

- ROADWAY CONSTRUCTION THIS PHASE
- ROADWAY CONSTRUCTION PREVIOUS PHASE
- TRAFFIC ARROW

NOTES:

1. REFER TO THE SEQUENCE OF WORK SHEETS FOR THE FM 156 TRAFFIC CONTROL NARRATIVE ON SHEETS 41-42.
2. REFER TO THE TRAFFIC CONTROL STANDARDS FOR FLAGGING OPERATIONS, TRAFFIC CONTROL LAYOUT AND ADDITIONAL DETAILS.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	44
CONTROL	SECTION	JOB	
0718	02	072	

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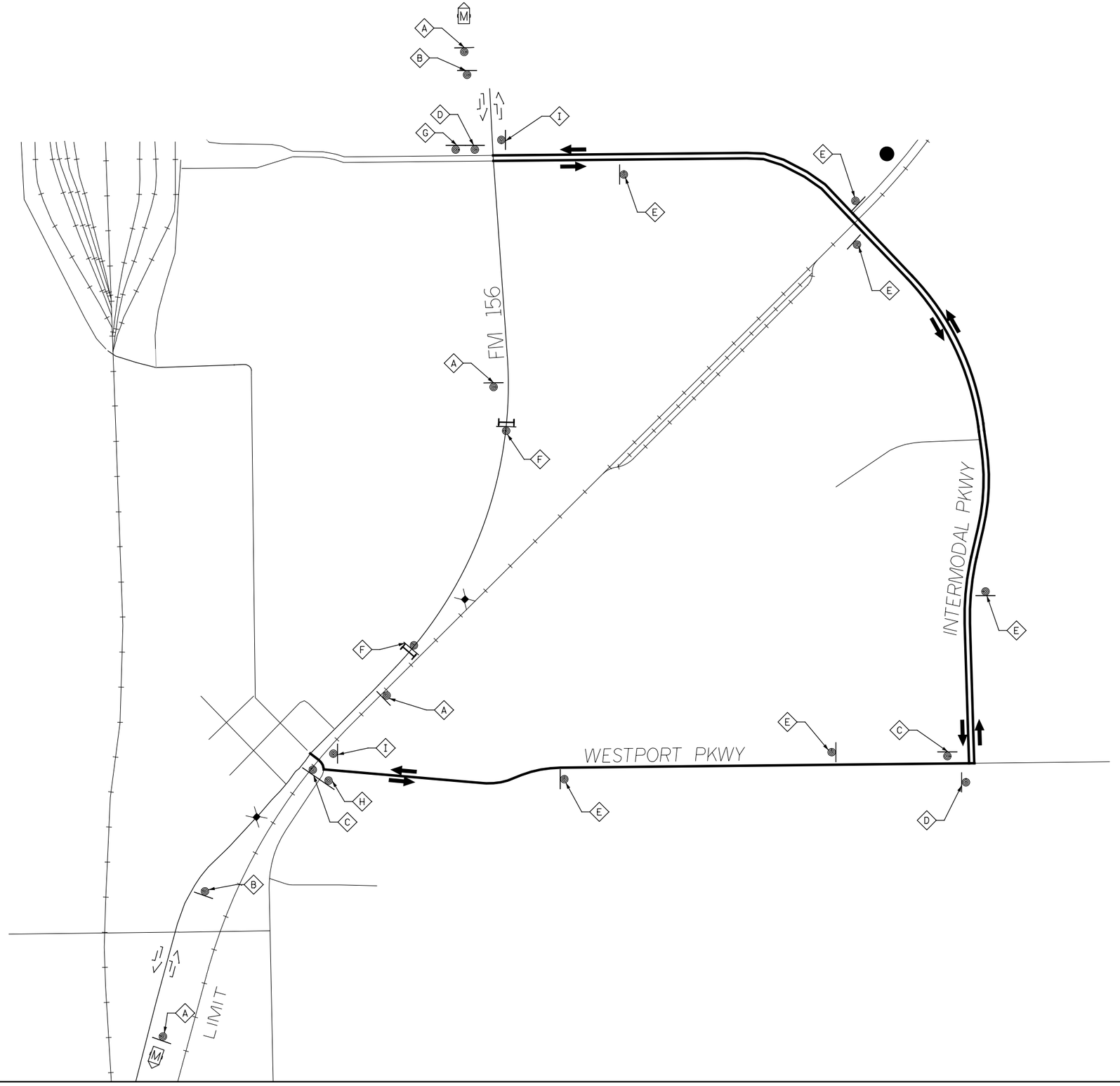
100% PLANS SUBMITTAL



N

A	ROAD CLOSED AHEAD	CW20-3D 48X48
B	DETOUR AHEAD	CW20-2D 48X48
C	DETOUR / FARM 156 ROAD	M4-8 24X12; M1-6F 24X24; M6-1R 21X15
D	DETOUR / FARM 156 ROAD	M4-8 24X12; M1-6F 24X24; M6-1L 21X15
E	DETOUR / FARM 156 ROAD	M4-8 24X12; M1-6F 24X24; M6-3 21X15
F	ROAD CLOSED	R11-2 48X30
G	ROAD CLOSED ½ MILES AHEAD LOCAL TRAFFIC ONLY	R11-3a 60X30; M4-10L 48X18
H	ROAD CLOSED ¼ MILES AHEAD LOCAL TRAFFIC ONLY	R11-3a 60X30; M4-10R 48X18
I	END DETOUR	M4-8 24X12

LEGEND

- SIGN
- TYPE 3 BARRICADE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- PROPOSED TRAFFIC
- EXISTING TRAFFIC

NOTES:

1. REFER TO THE SEQUENCE OF WORK SHEETS FOR THE FM 156 TRAFFIC CONTROL NARRATIVE ON SHEETS 41-42.
2. PCMS TO BE PLACED AT MAJOR INTERSECTION APPROACHES. REFER TO THE GENERAL NOTES FOR PCMS MESSAGES.
3. BRIDGES WILL BE CLOSED FOR REPAIRS ON FRIDAYS FROM 10 PM TO MONDAYS AT 5 AM. REFER TO THE SEQUENCE OF WORK FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.641.2800

Texas Department of Transportation

FM 156
TRAFFIC CONTROL PLAN
FM 156 DETOUR
HENRIETTA CREEK BRIDGE

N.T.S. SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	45
CONTROL	SECTION	JOB	
0718	02	072	

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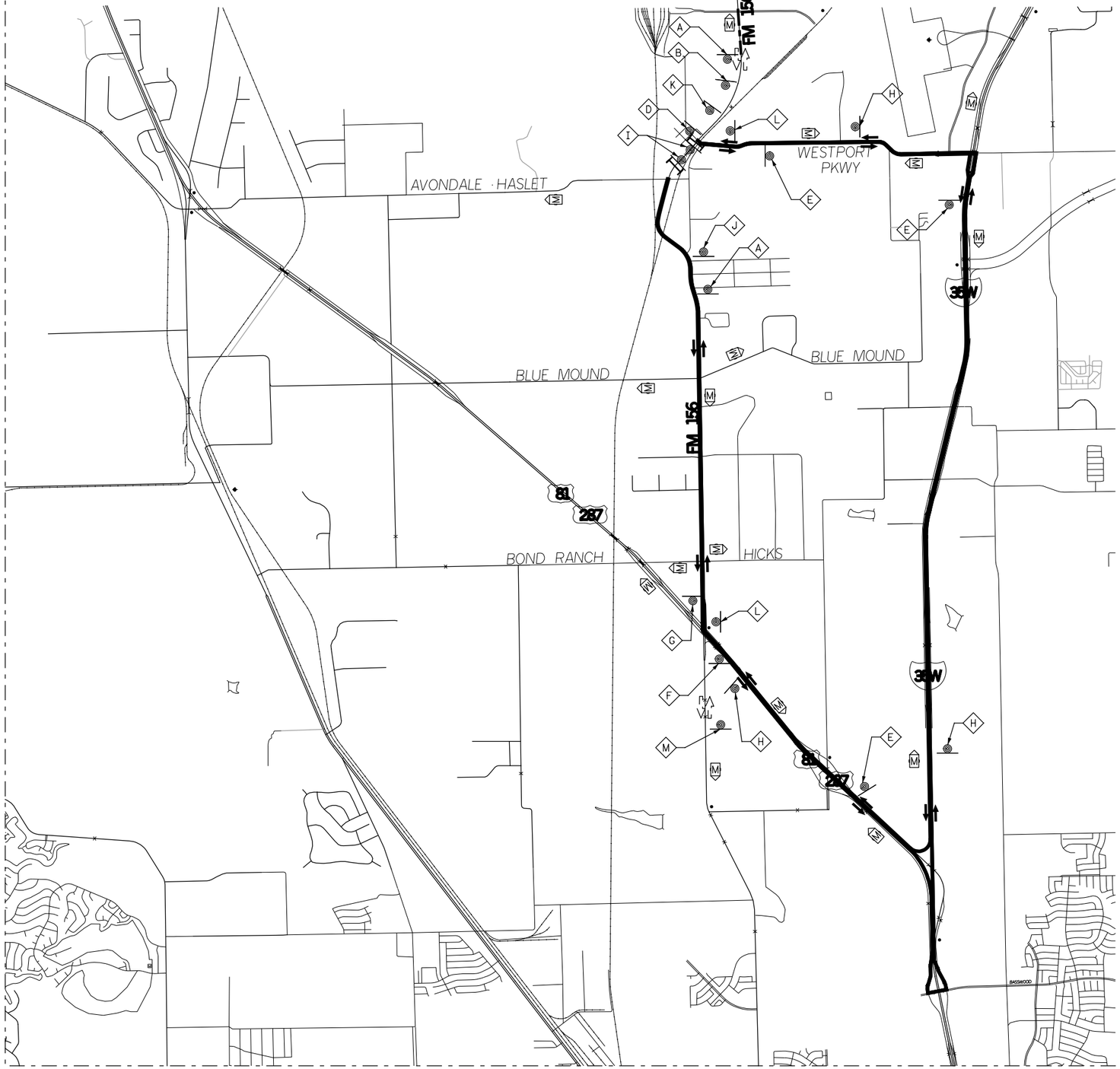
100% PLANS SUBMITTAL



N

A	ROAD CLOSED AHEAD	CW20-3D 48X48
B	DETOUR AHEAD	CW20-2D 48X48
C	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1R 21X15
D	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1L 21X15
E	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-3 21X15
F	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1R 21X15
G	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1L 21X15
H	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-3 21X15
I	ROAD CLOSED	R11-2 48X30
J	ROAD CLOSED 1 MILES AHEAD LOCAL TRAFFIC ONLY	R11-3a 60X30
K	ROAD CLOSED ¼ MILES AHEAD LOCAL TRAFFIC ONLY	R11-3a 60X30
		M4-10L 48X18
L	END DETOUR	M4-8 24X12

LEGEND

- SIGN
- TYPE 3 BARRICADE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- PROPOSED TRAFFIC
- EXISTING TRAFFIC

NOTES:

1. REFER TO THE SEQUENCE OF WORK SHEETS FOR THE FM 156 TRAFFIC CONTROL NARRATIVE ON SHEETS 41-42.
2. PCMS TO BE PLACED AT MAJOR INTERSECTION APPROACHES. REFER TO THE GENERAL NOTES FOR PCMS MESSAGES.
3. BRIDGES WILL BE CLOSED FOR REPAIRS ON FRIDAYS FROM 10 PM TO MONDAYS AT 5 AM. REFER TO THE SEQUENCE OF WORK FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156
TRAFFIC CONTROL PLAN
FM 156 DETOUR
JOHNSON CREEK BRIDGE

N. T. S. SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	46
CONTROL	SECTION	JOB	
0718	02	072	

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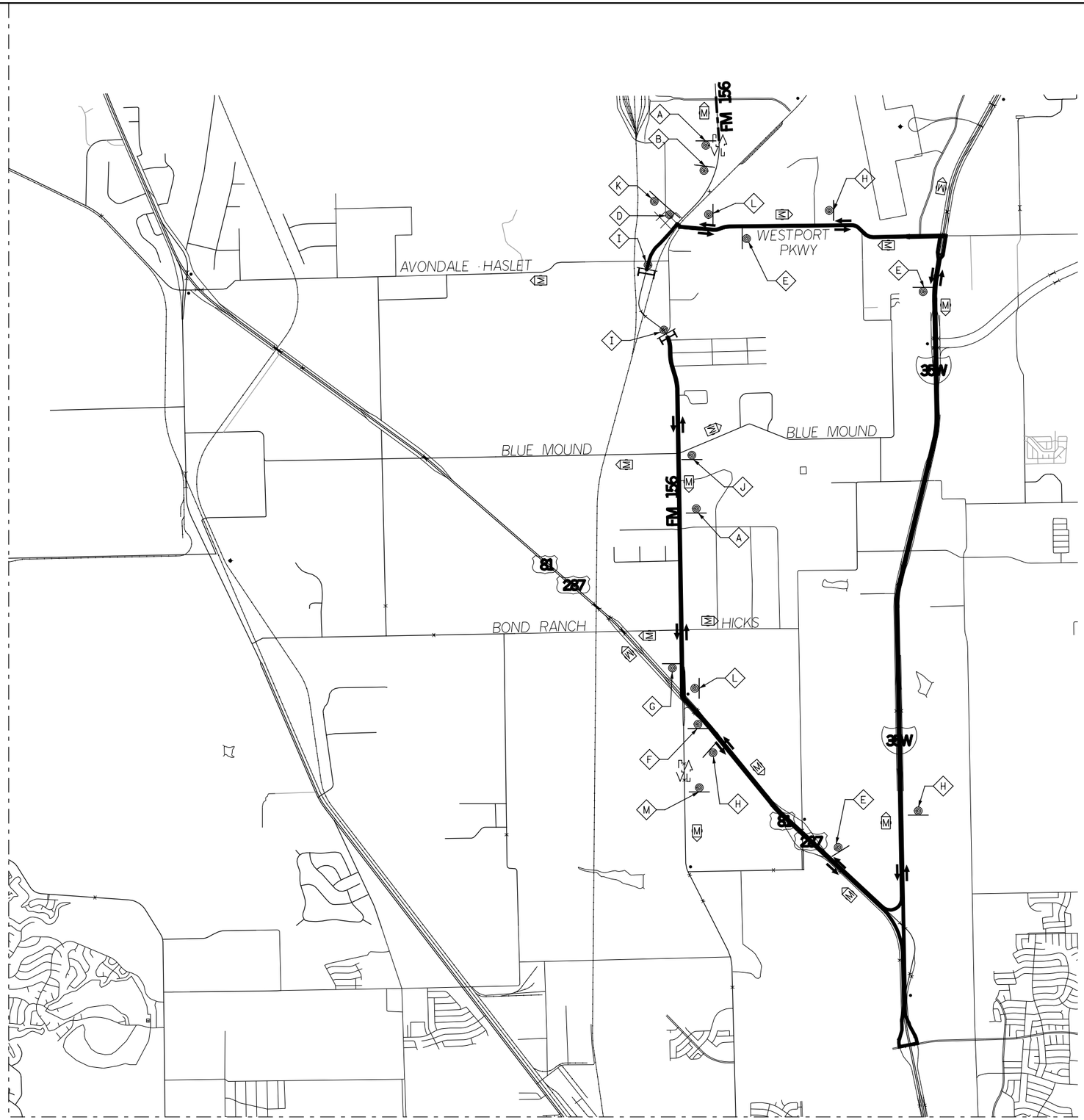
100% PLANS SUBMITTAL



A	ROAD CLOSED AHEAD	CW20-3D 48X48
B	DETOUR AHEAD	CW20-2D 48X48
C	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1R 21X15
D	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1L 21X15
E	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-3 21X15
F	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1R 21X15
G	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-1L 21X15
H	DETOUR	M4-8 24X12
		M4-8 24X12
	FARM 156 ROAD	M1-6F 24X24
		M6-3 21X15
I	ROAD CLOSED	R11-2 48X30
J	ROAD CLOSED 1 MILES AHEAD LOCAL TRAFFIC ONLY	R11-3a 60X30
K	ROAD CLOSED 1 MILES AHEAD LOCAL TRAFFIC ONLY	R11-3a 60X30
		M4-10L 48X18
L	END DETOUR	M4-8 24X12

N

LEGEND

- SIGN
- TYPE 3 BARRICADE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- PROPOSED TRAFFIC
- EXISTING TRAFFIC

NOTES:

1. REFER TO THE SEQUENCE OF WORK SHEETS FOR THE FM 156 TRAFFIC CONTROL NARRATIVE ON SHEETS 41-42.
2. PCMS TO BE PLACED AT MAJOR INTERSECTION APPROACHES. REFER TO THE GENERAL NOTES FOR PCMS MESSAGES.
3. BRIDGES WILL BE CLOSED FOR REPAIRS ON FRIDAYS FROM 10 PM TO MONDAYS AT 5 AM. REFER TO THE SEQUENCE OF WORK FOR ADDITIONAL INFORMATION.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156
TRAFFIC CONTROL PLAN
FM 156 DETOUR
BISHOP CREEK BRIDGE

N. T. S. SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	47
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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FILE: FM156-DETOUR-03.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

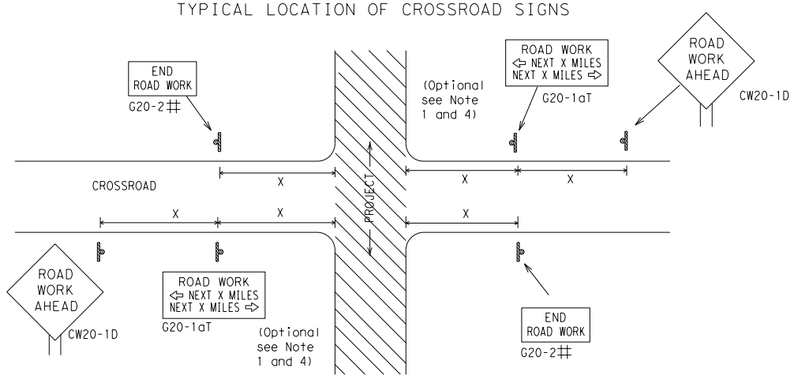
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	FTW	TARRANT		48
5-10 5-21				

DATE: 2/9/2023 2:47:28 PM
FILE: $FILE$

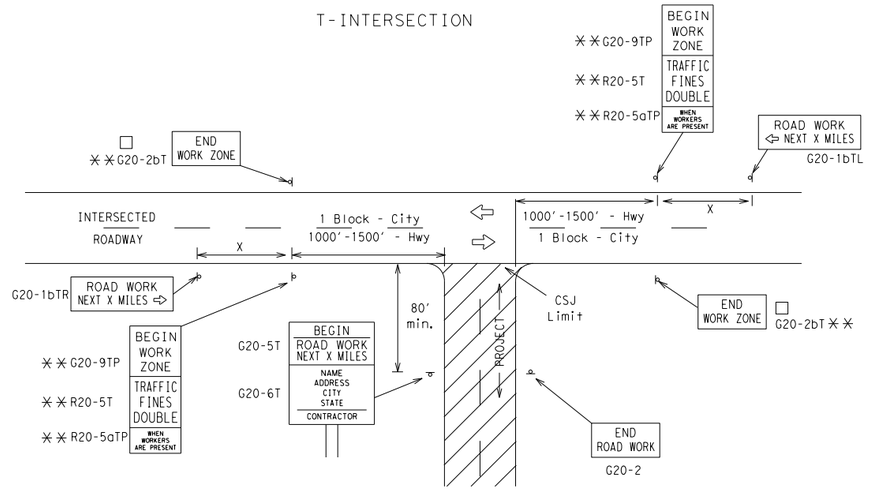
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

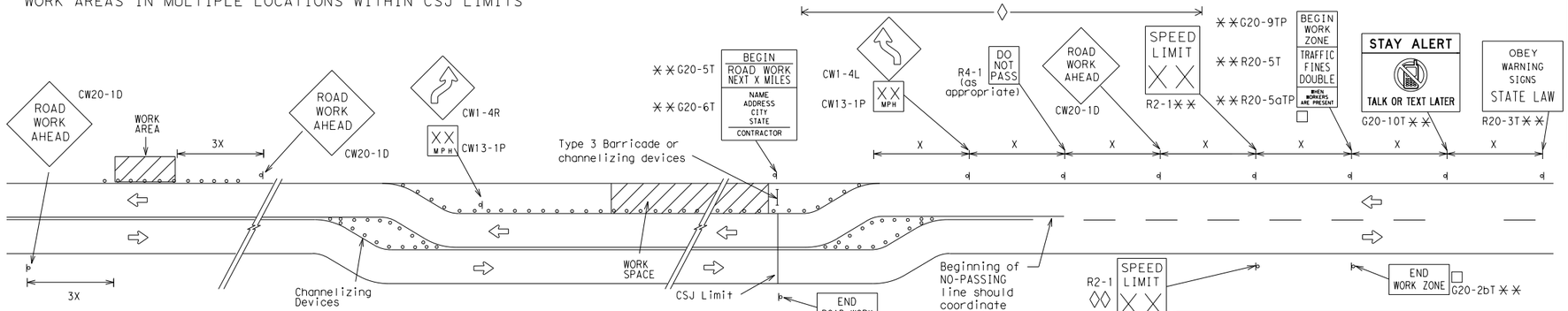
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

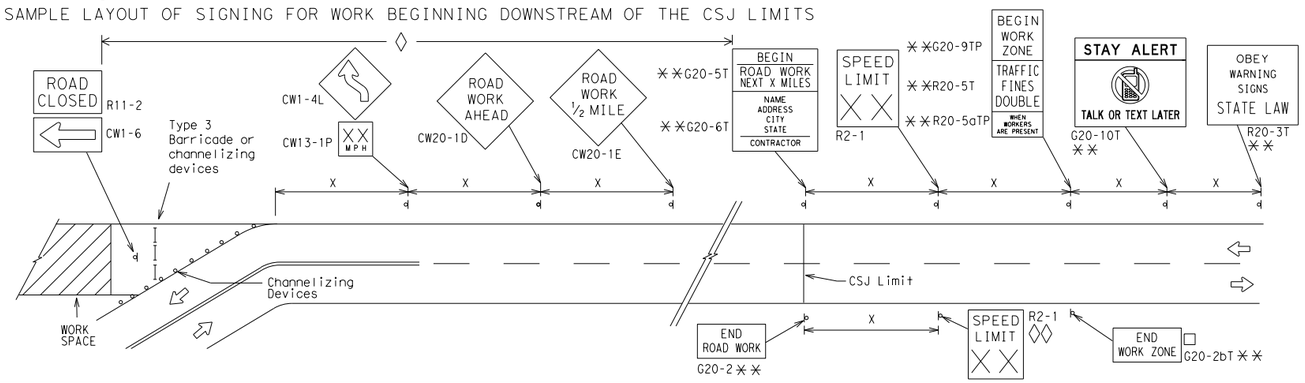
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE 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



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
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REVISIONS	0718	02	072	FM156
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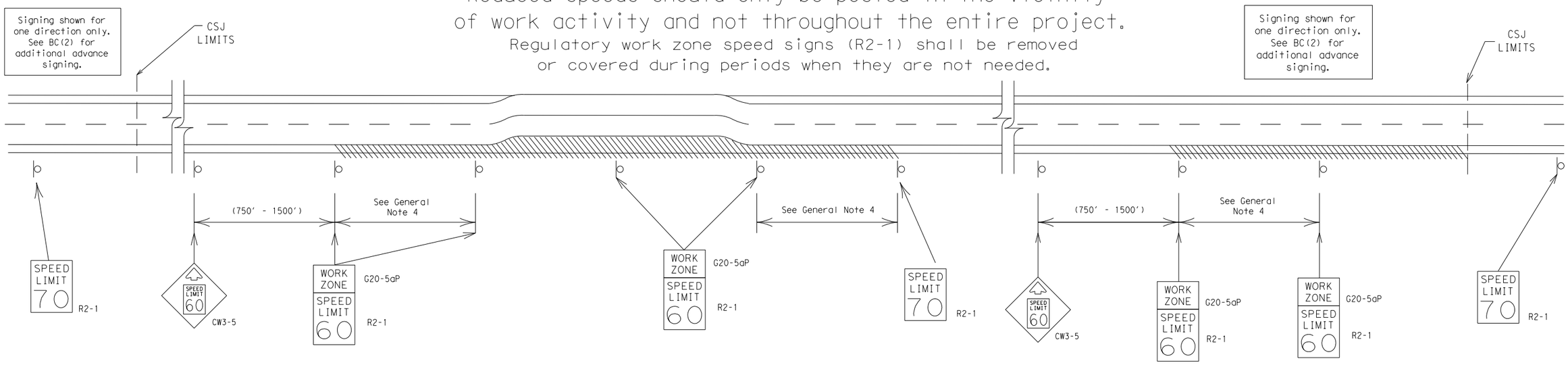
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the traveled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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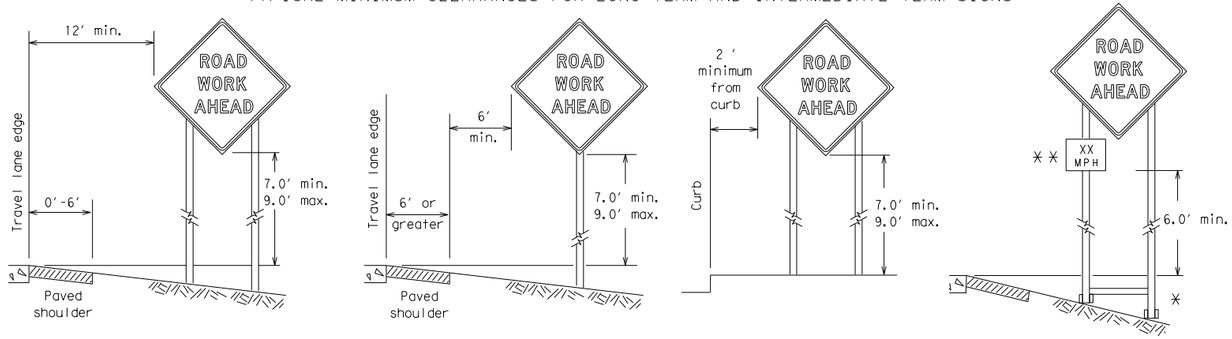
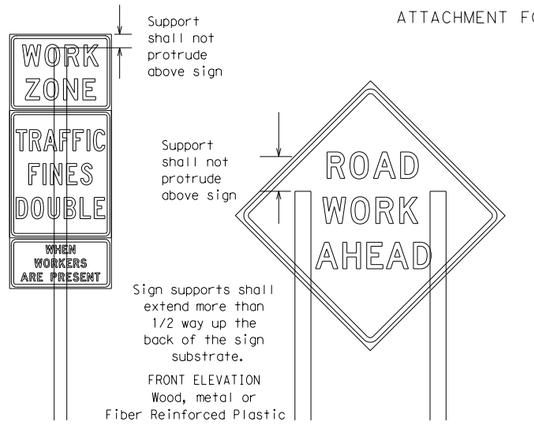
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

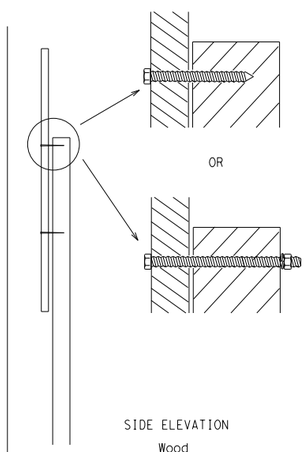


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





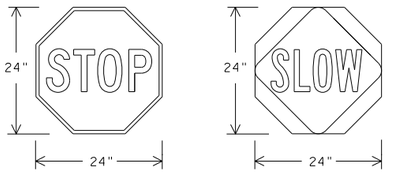
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, specific service (LOGO), or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition. For details for covering large guide signs see the TS-CD standard.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC standard sheets, TLRS standard sheets or the CWZTCD list. The signs shall meet the required mounting heights shown on the BC, or the SMD standard sheets during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) for small roadside signs. Supports for temporary large roadside signs shall meet the requirements detailed on the Temporary Large Roadside Signs (TLRS) standard sheets.The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height,the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used, the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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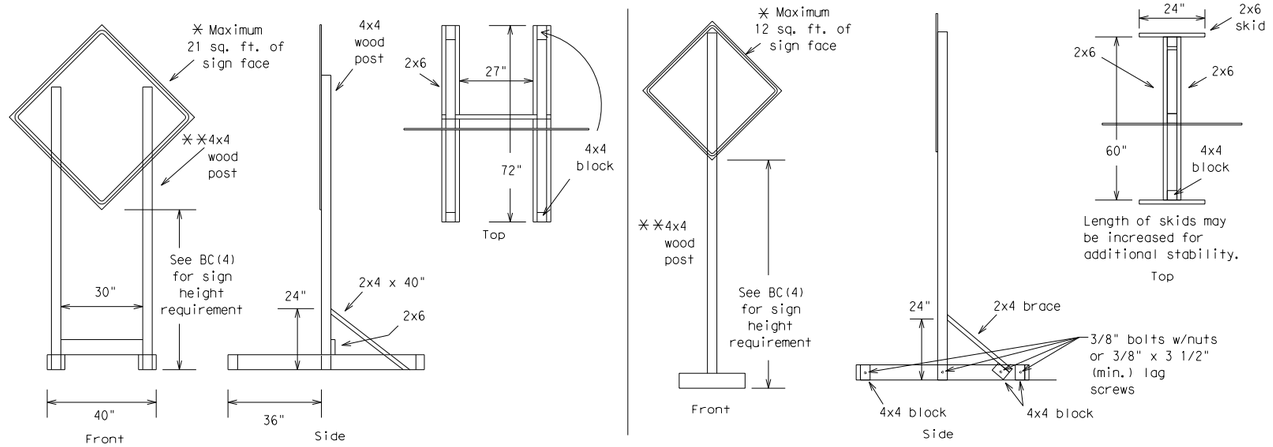
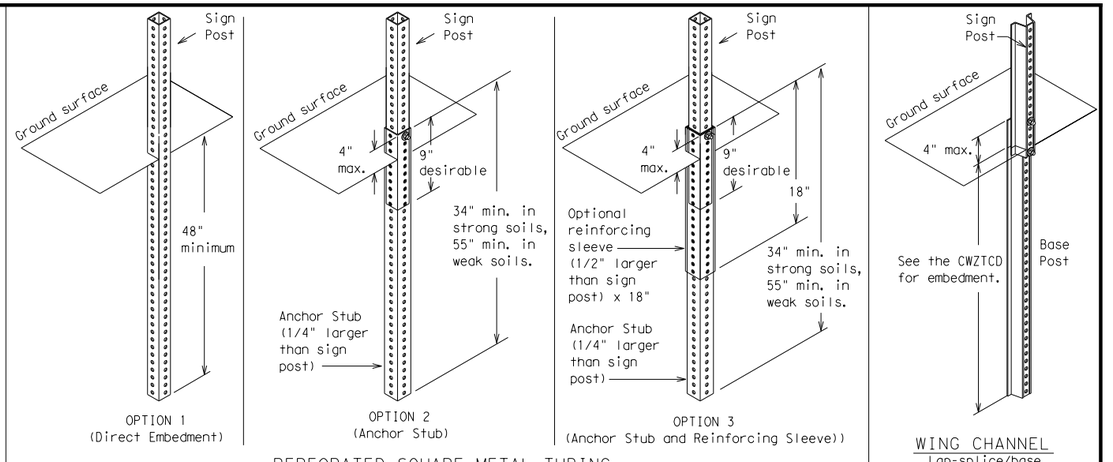


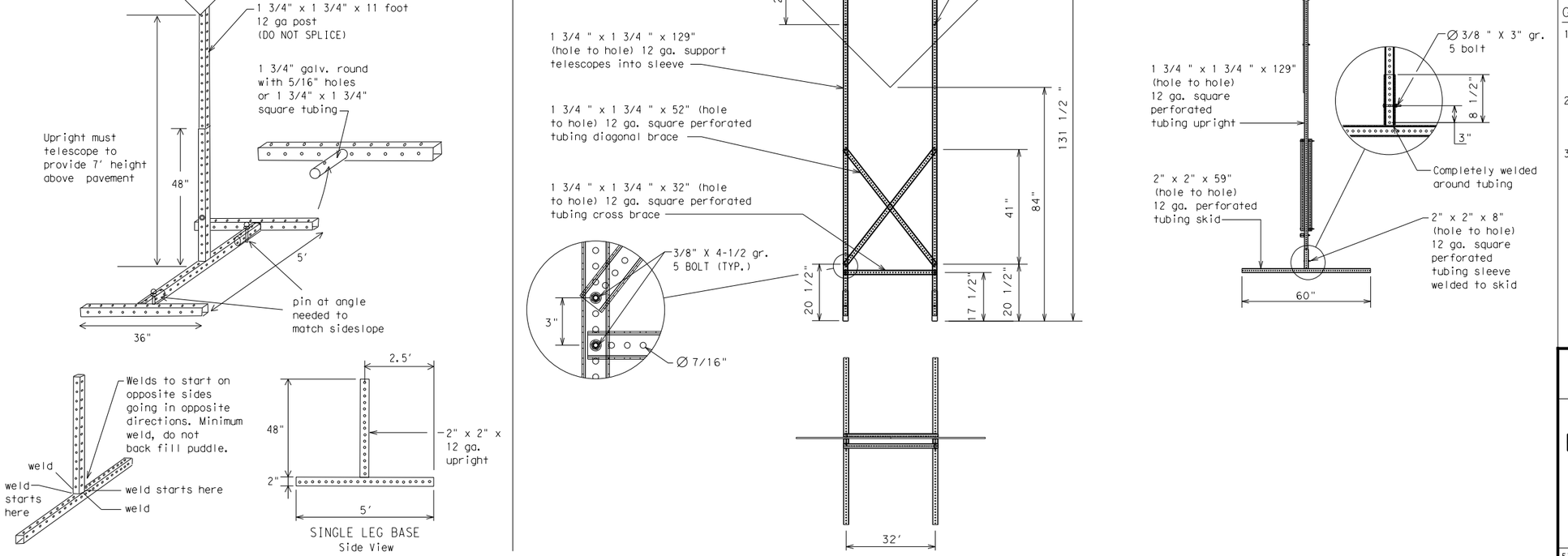
SKID MOUNTED WOOD SIGN SUPPORTS

* 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.

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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

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 ⁂

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	0718	02	072	FM156
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		53

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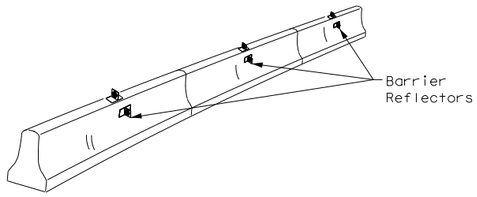
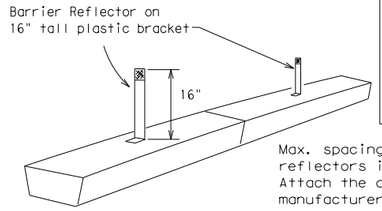
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

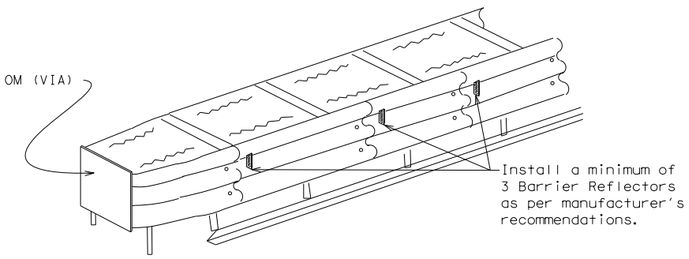


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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.

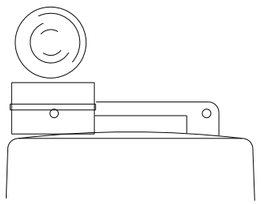


DELINEATION OF END TREATMENTS

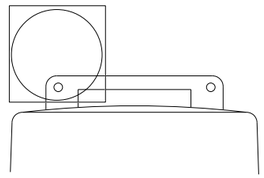
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

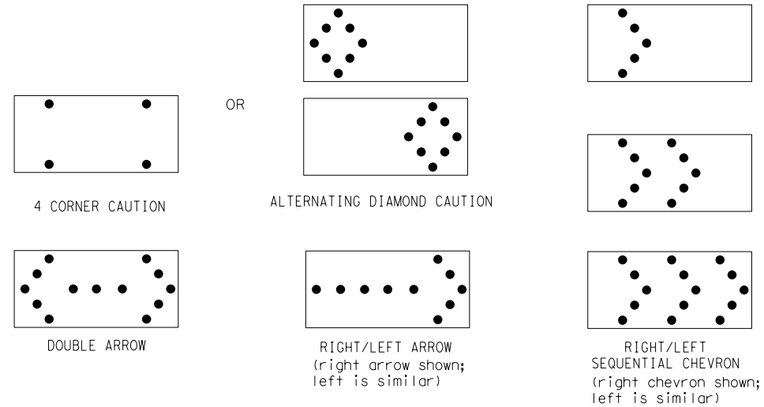
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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:



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

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	0718	02	072	FM156
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		54

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:

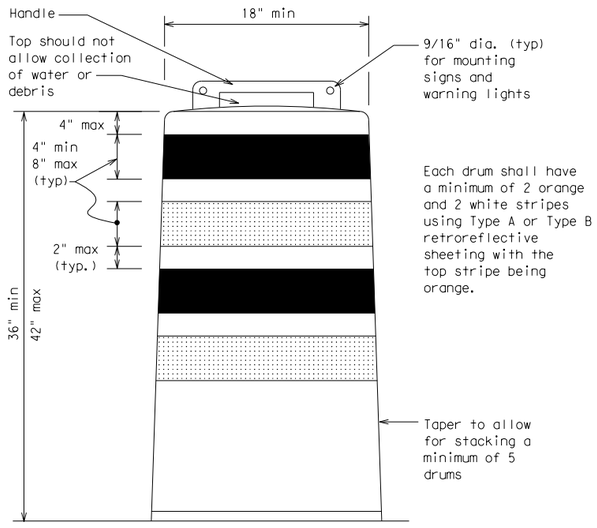
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

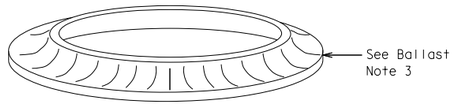
RETROREFLECTIVE SHEETING

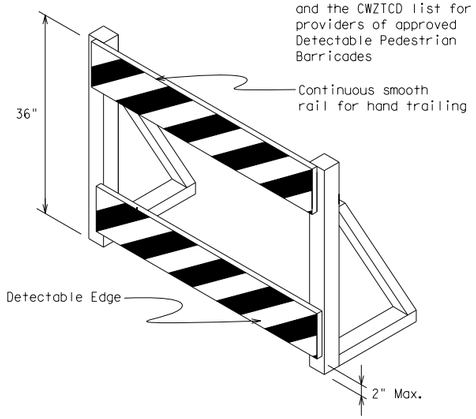
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

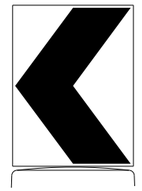




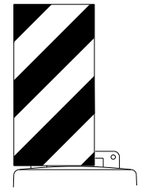


DETECTABLE PEDESTRIAN BARRICADES

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.

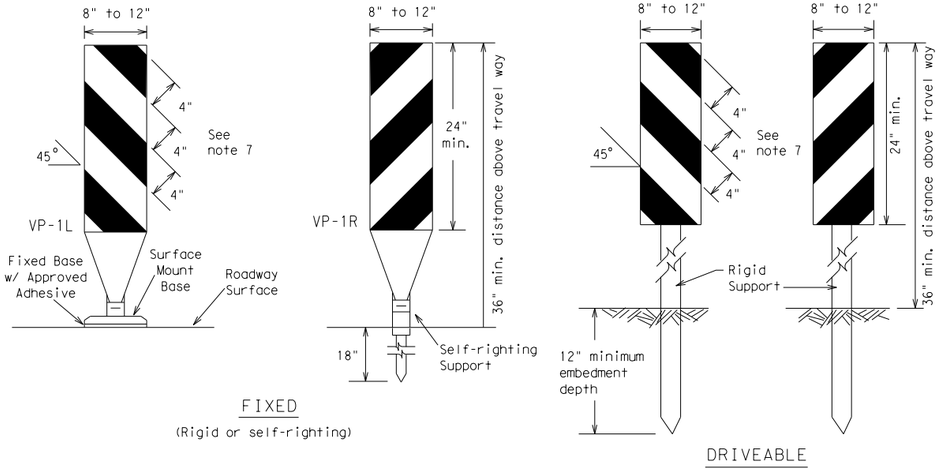
Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

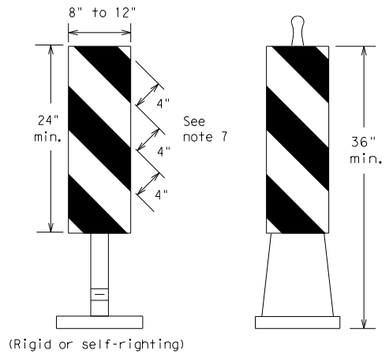
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	FTW	TARRANT		55
7-13				



FIXED

(Rigid or self-righting)

DRIVEABLE

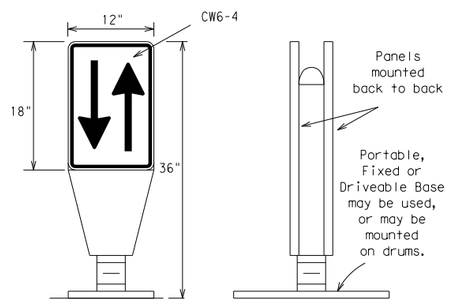


(Rigid or self-righting)

PORTABLE

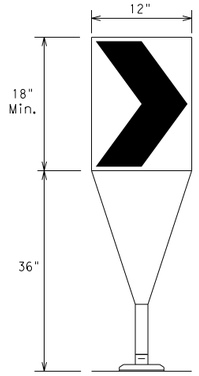
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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



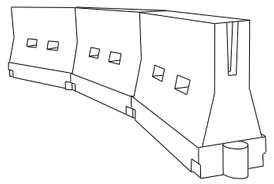
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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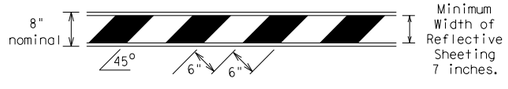
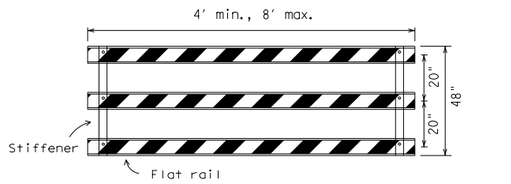
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



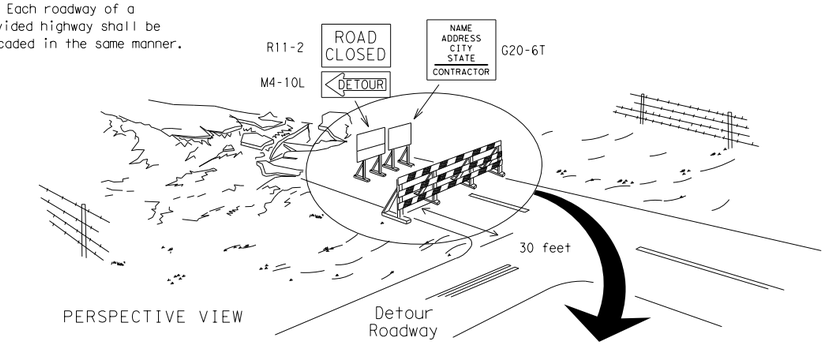
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

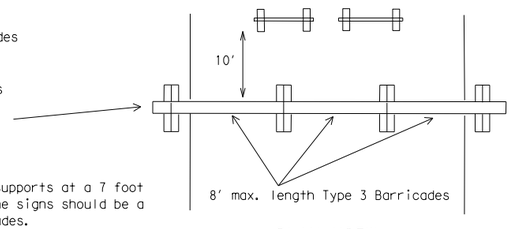
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

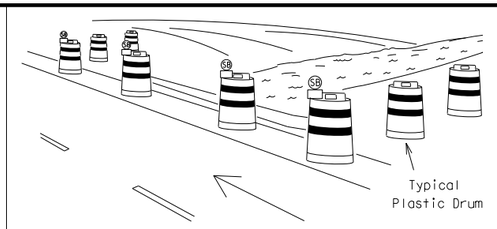
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

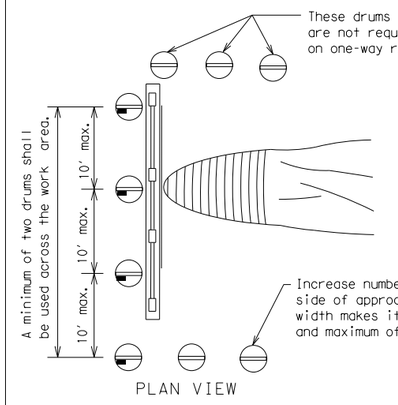
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

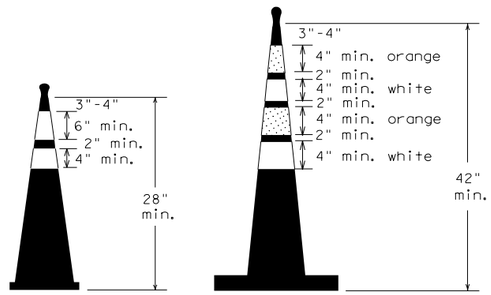
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

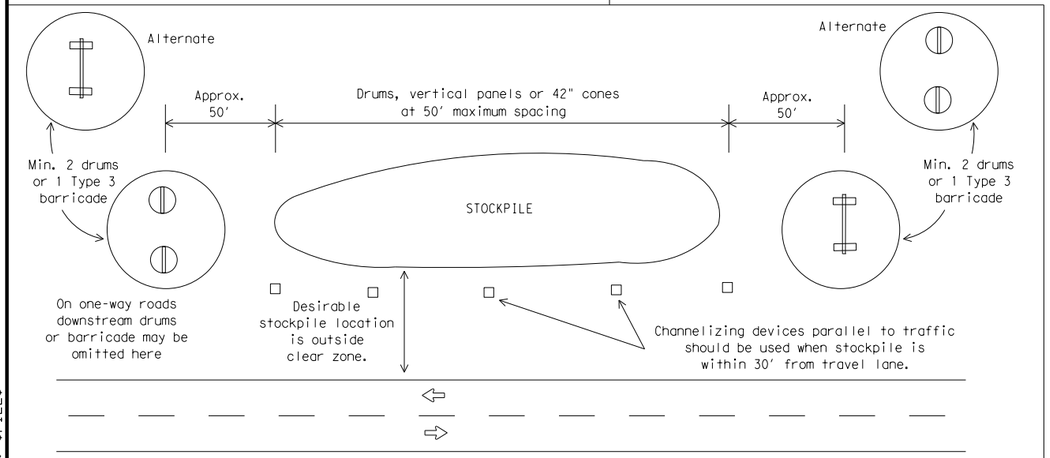
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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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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.

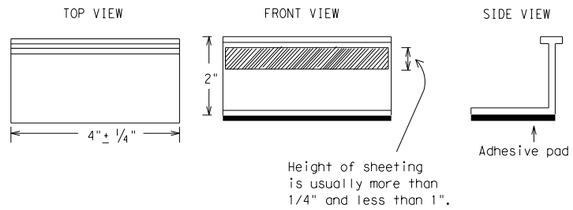
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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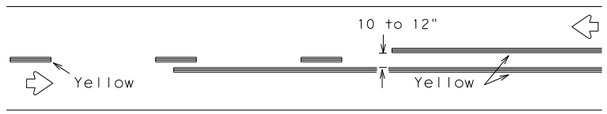
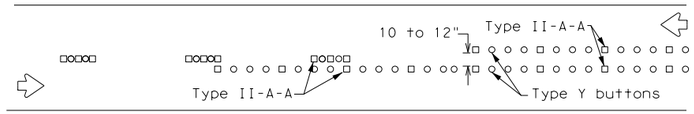
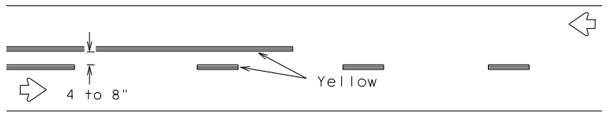
PAVEMENT MARKING PATTERNS



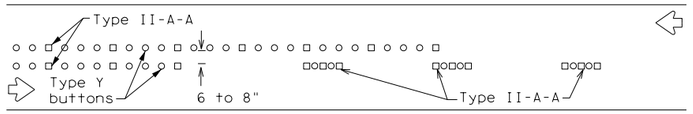
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



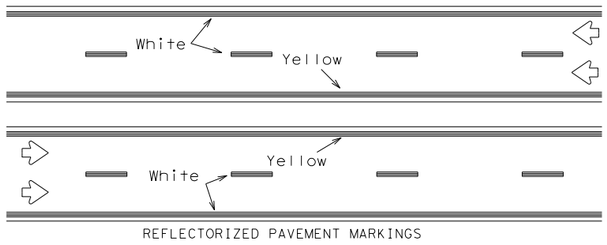
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



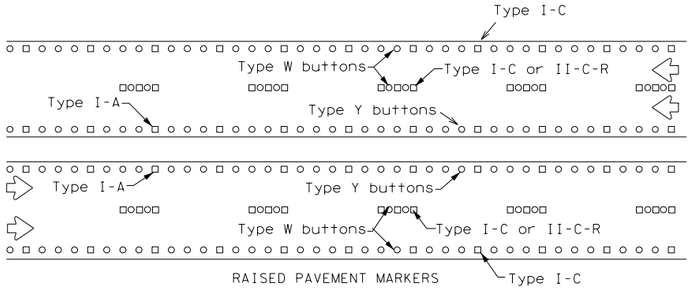
RAISED PAVEMENT MARKERS - PATTERN B

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



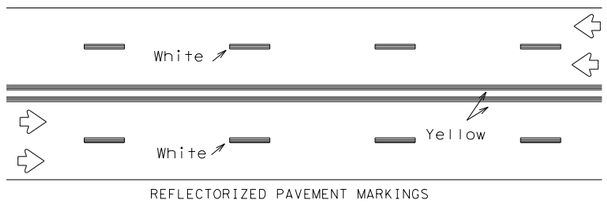
REFLECTORIZED PAVEMENT MARKINGS



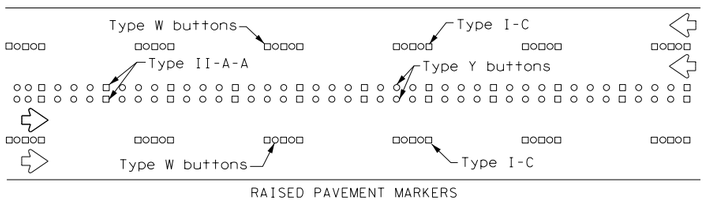
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



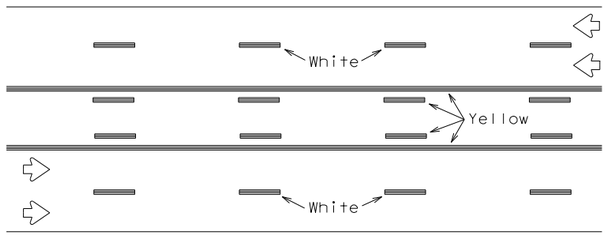
REFLECTORIZED PAVEMENT MARKINGS



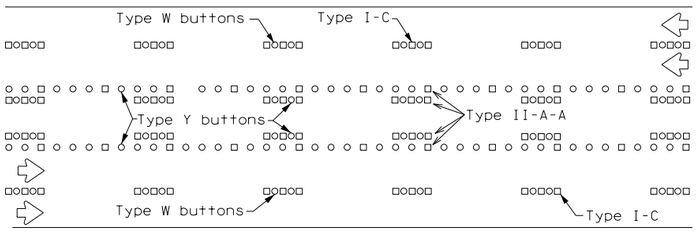
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

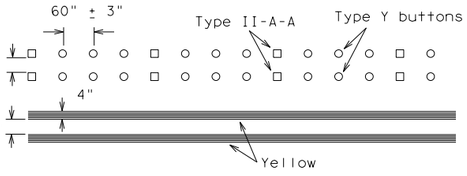
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

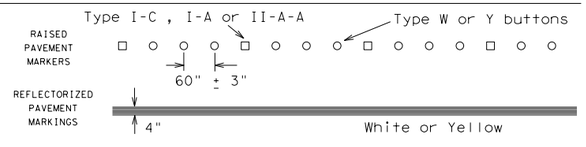
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

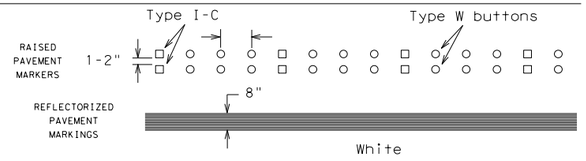


EDGE LINE OR SINGLE NO-PASSING LINE



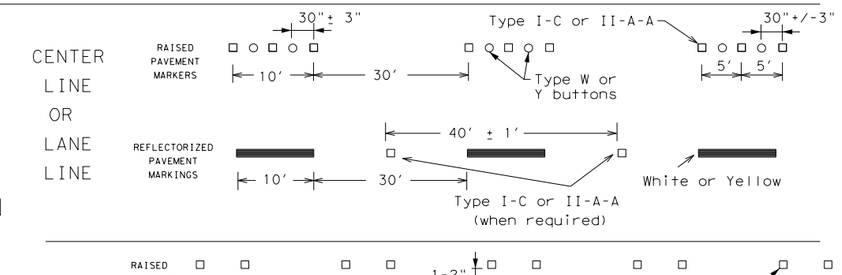
WIDE LINE

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

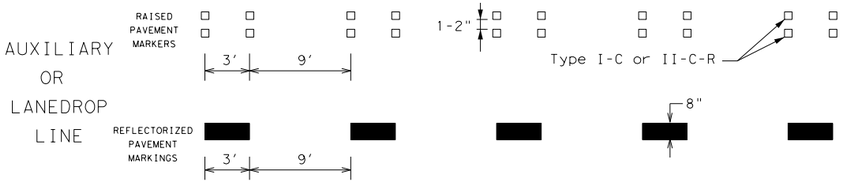


BROKEN LINES

CENTER LINE OR LANE LINE

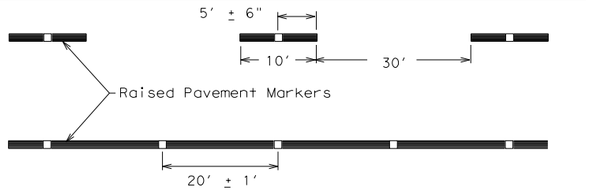


AUXILIARY OR LANEDROP LINE



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	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		59

106

DATE: 2/9/2023 2:47:42 PM
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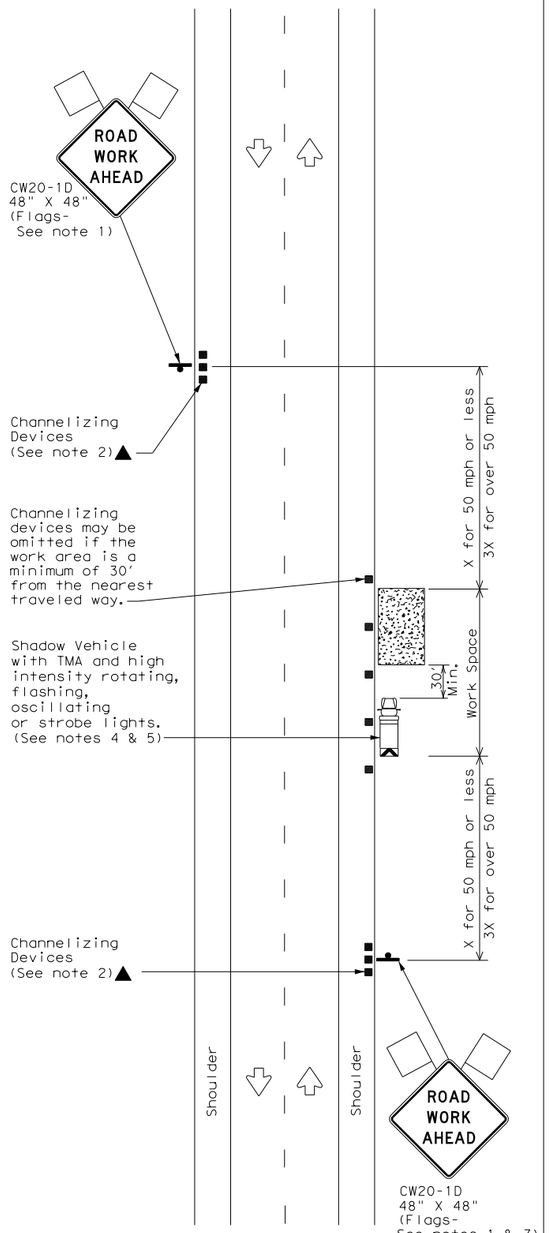
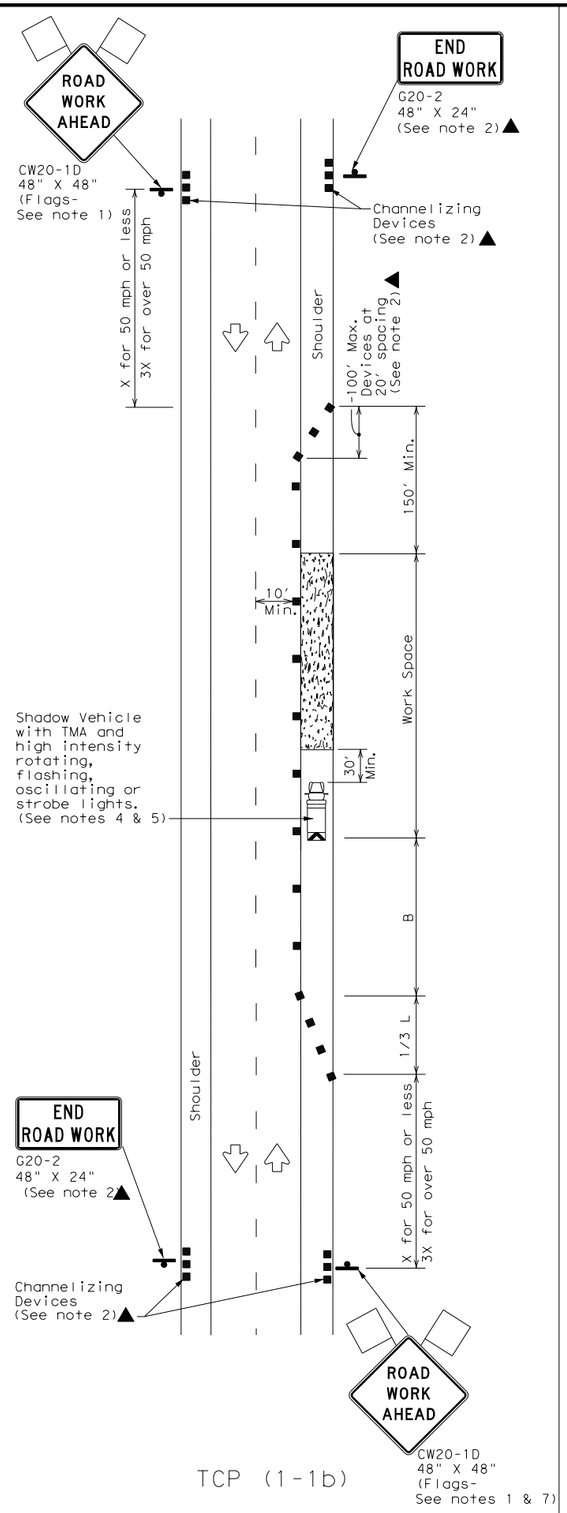


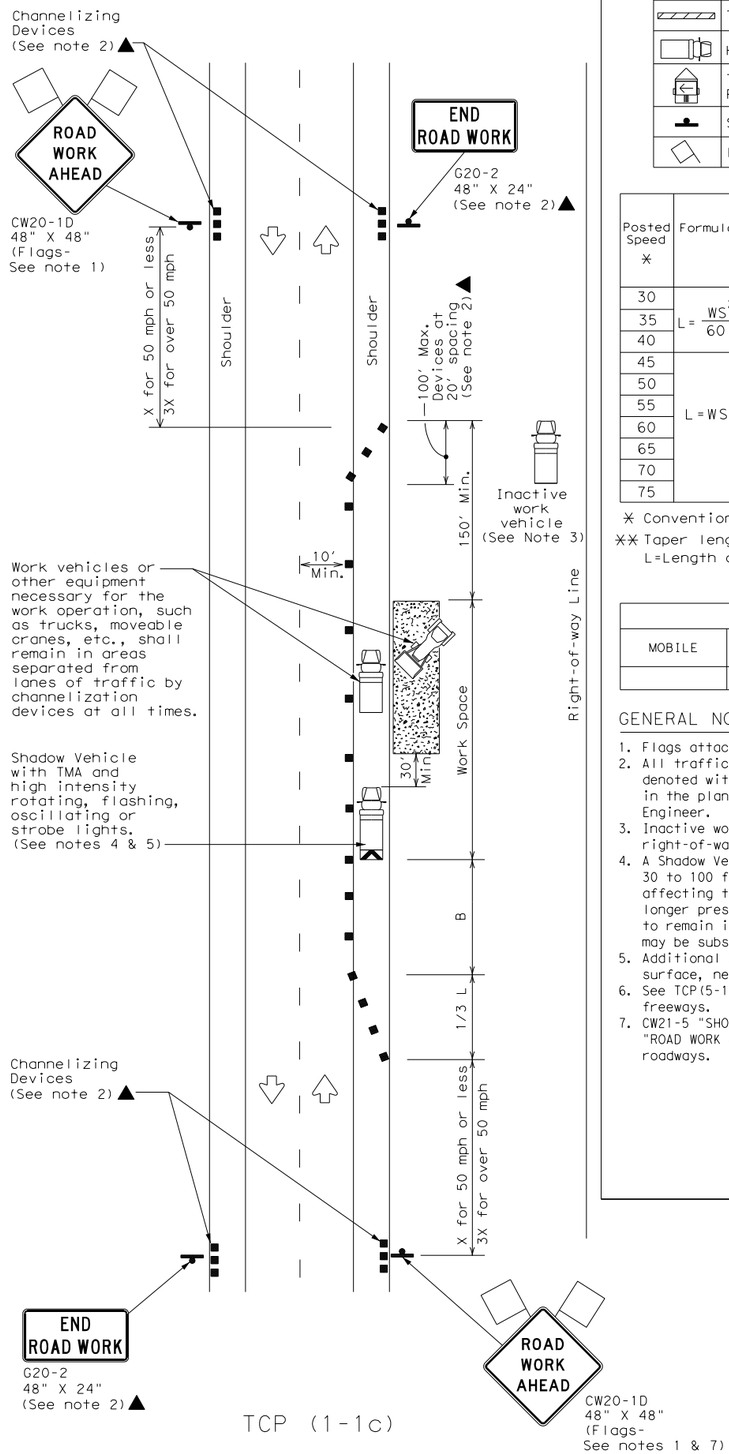
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	TARRANT		60
1-97 2-18				

151

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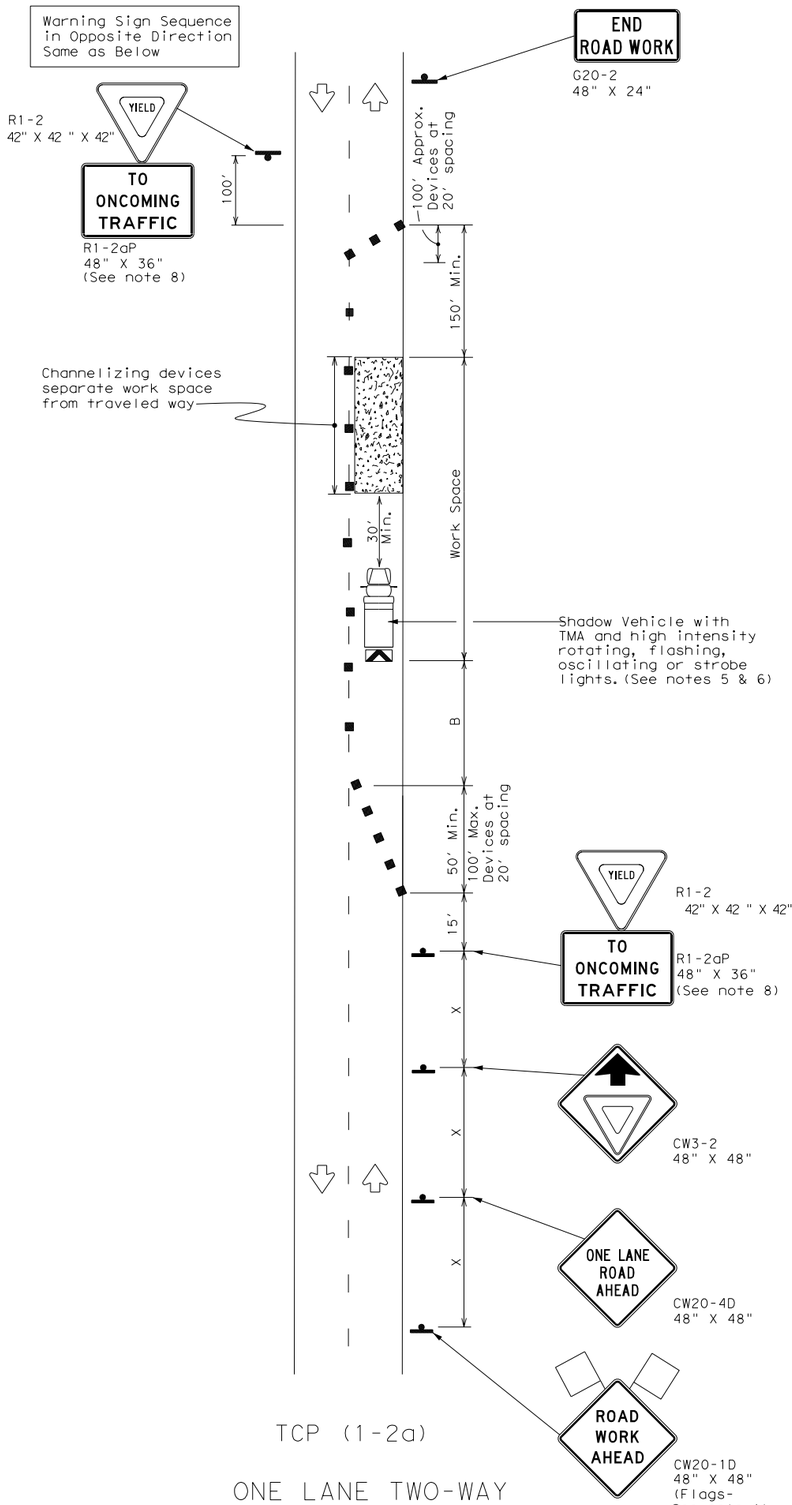
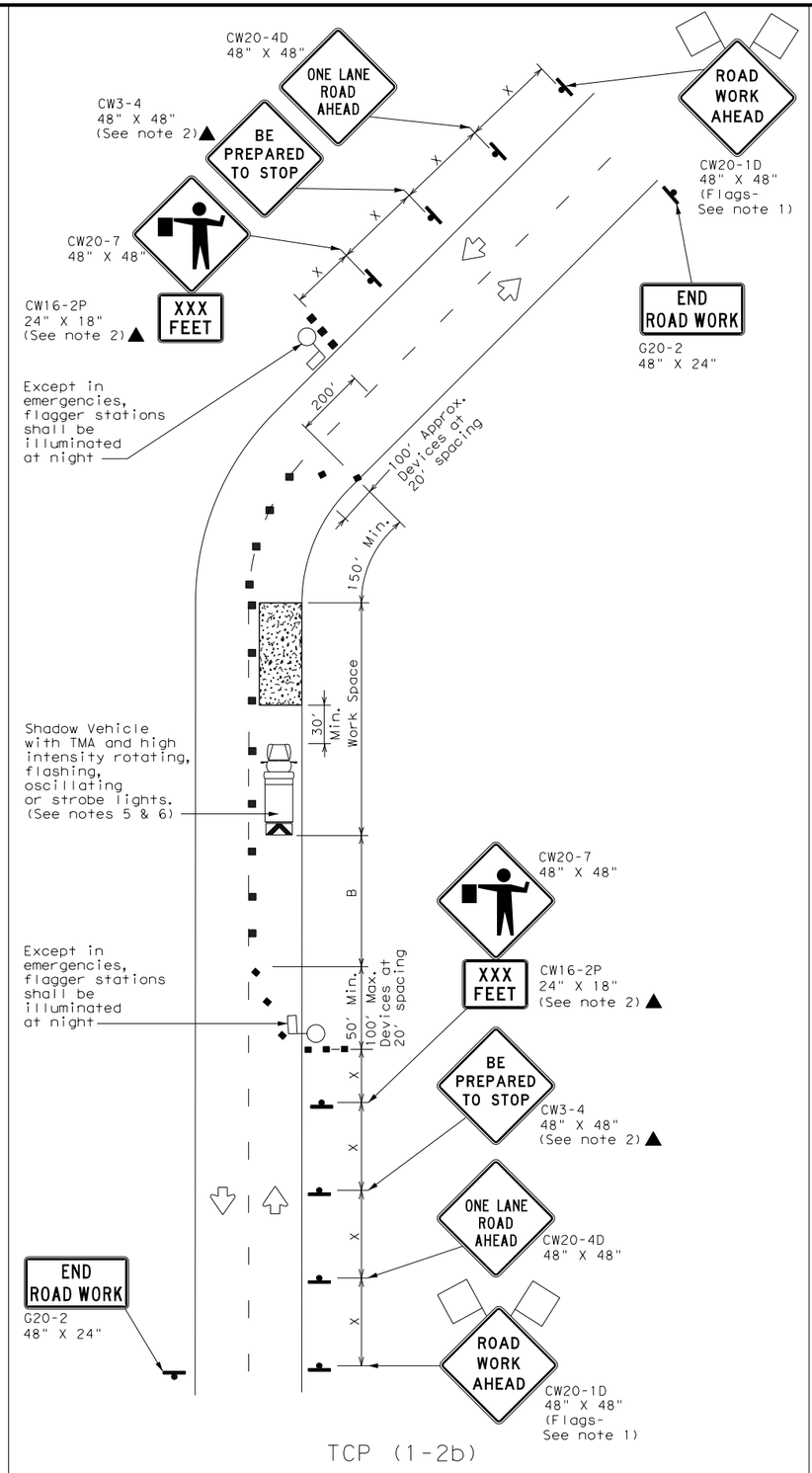


TCP (1-2a)

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		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	0718	02	072	FM156
2-94 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	FTW	TARRANT		61

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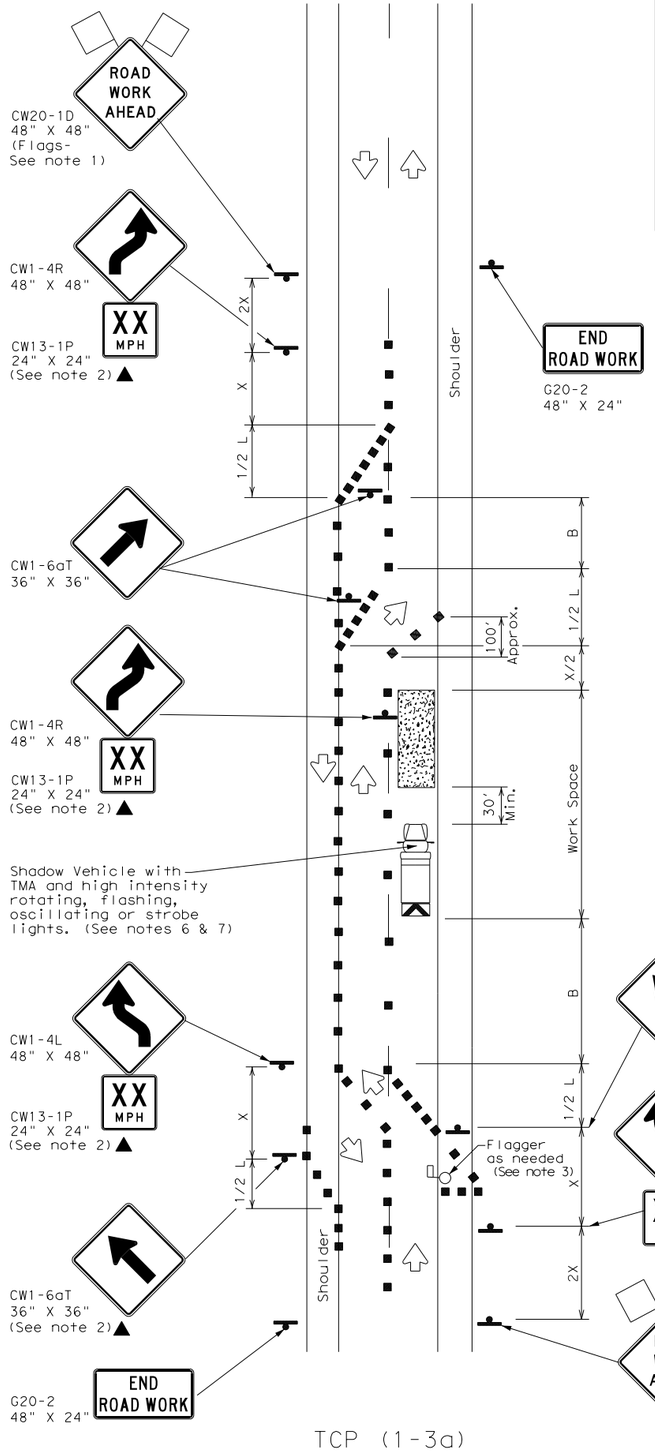
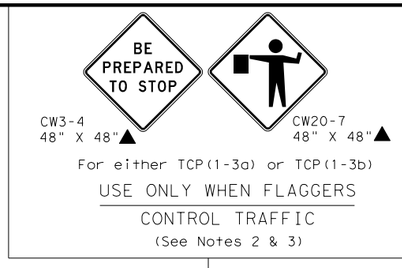


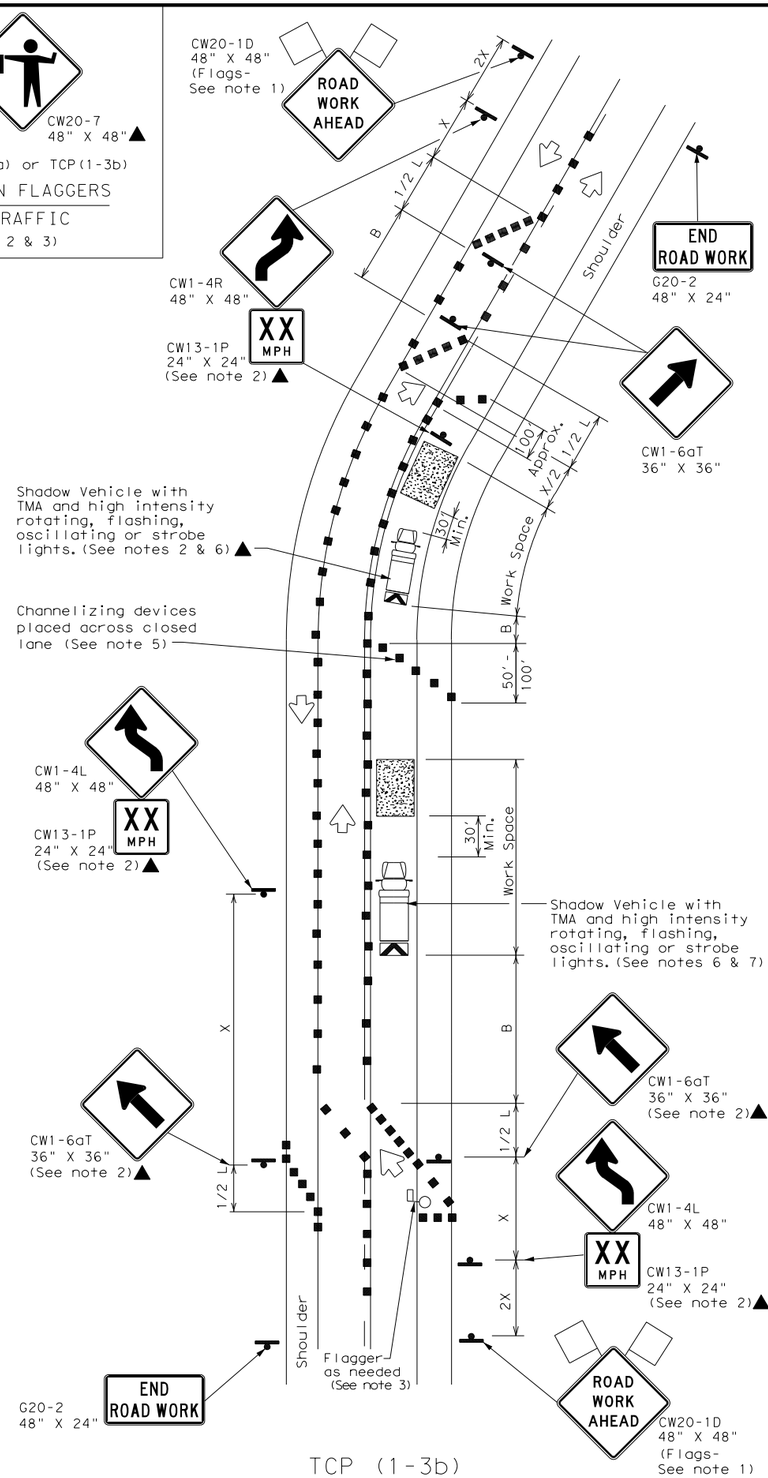
TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



For either TCP(1-3a) or TCP(1-3b)

USE ONLY WHEN FLAGGERS CONTROL TRAFFIC
(See Notes 2 & 3)



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. 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 speed 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 area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP (1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	TARRANT		62
1-97 2-18				

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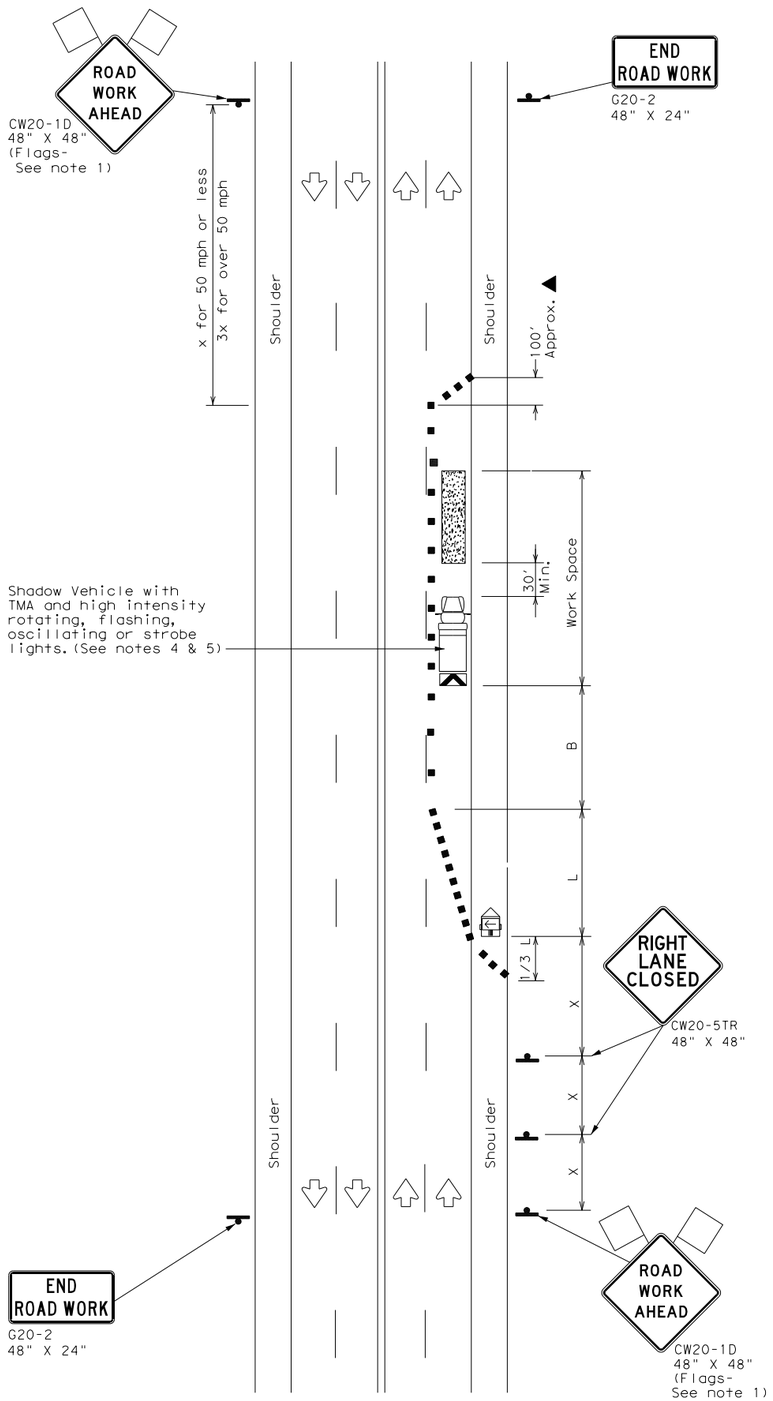
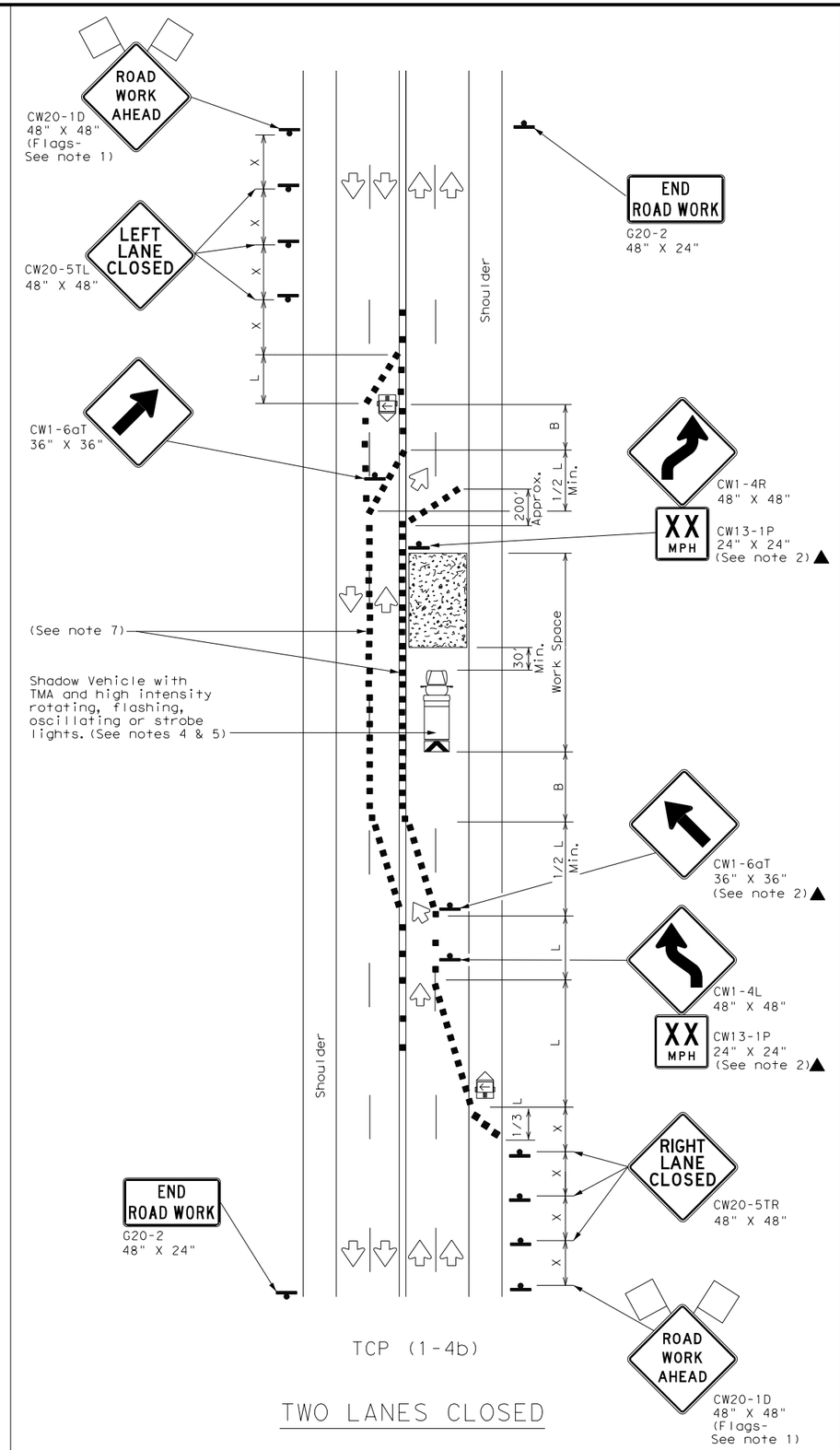


TCP (1-4a)

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	0718	02	072	FM156
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	TARRANT		63
1-97 2-18				

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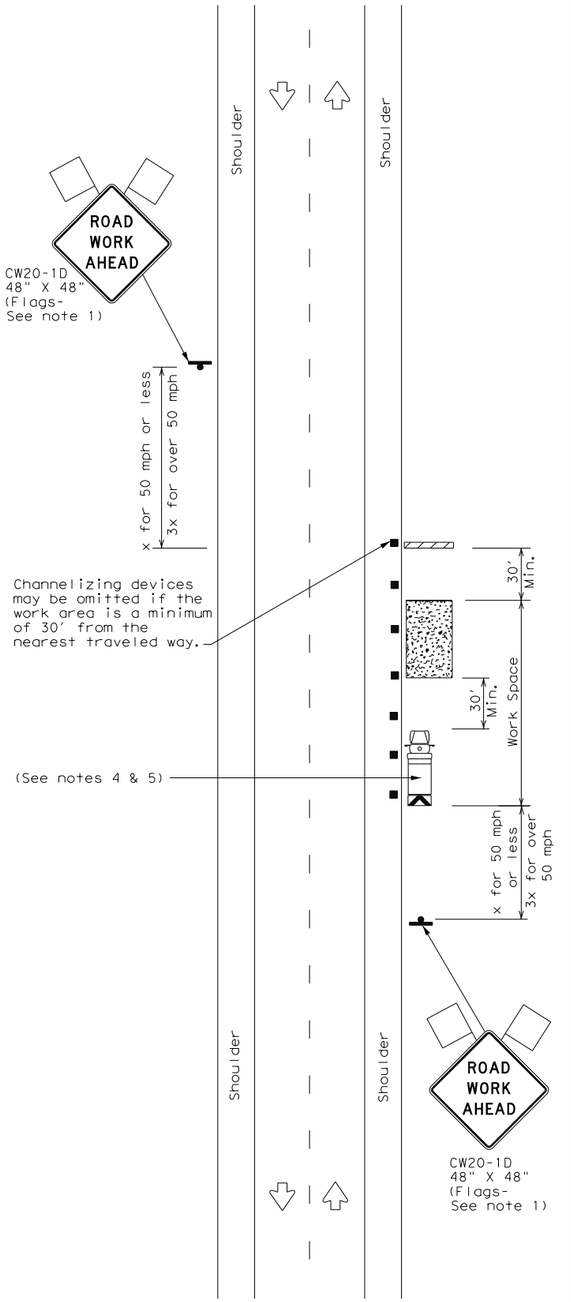
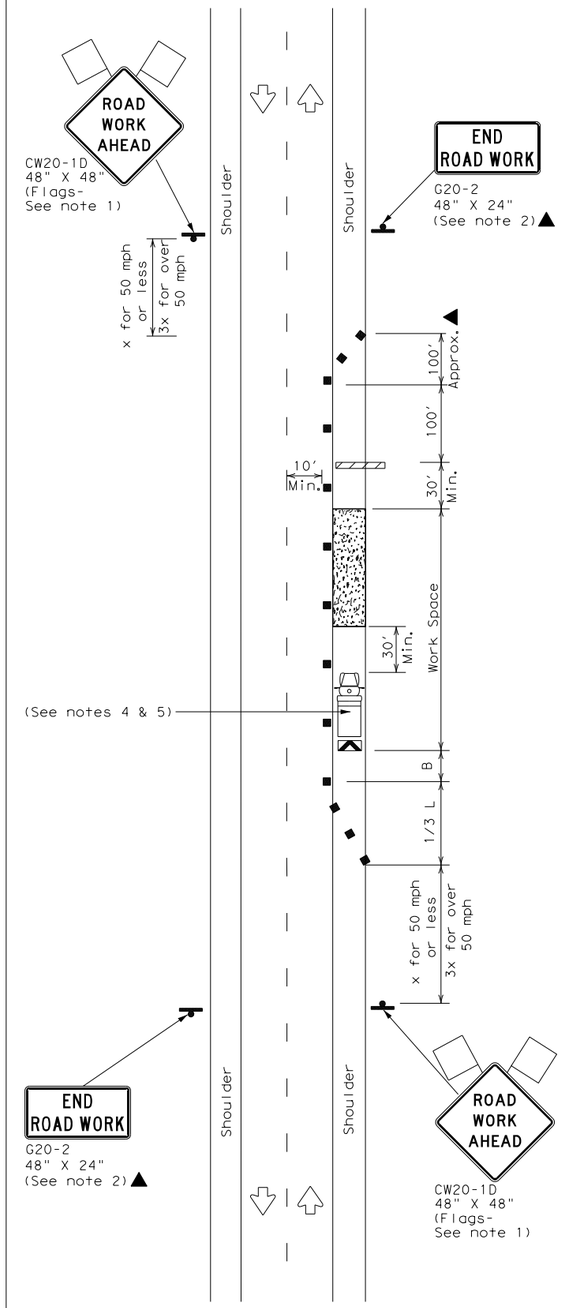


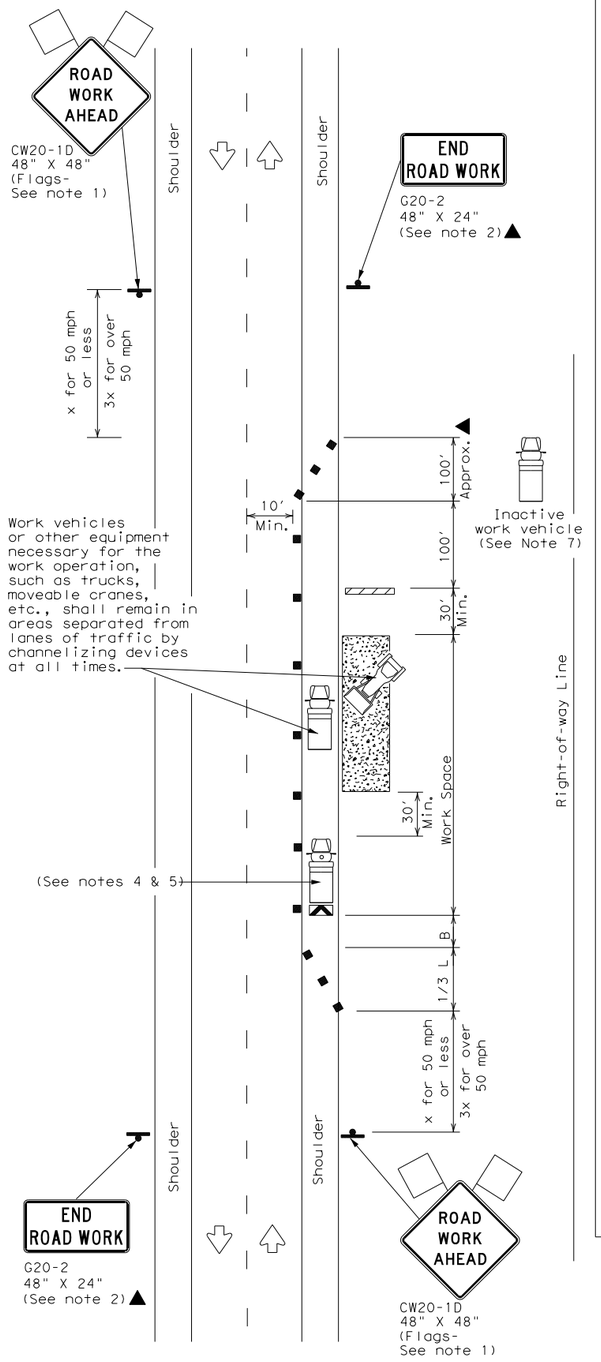
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

✳ Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP (2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	TARRANT		64
1-97 2-18				

161

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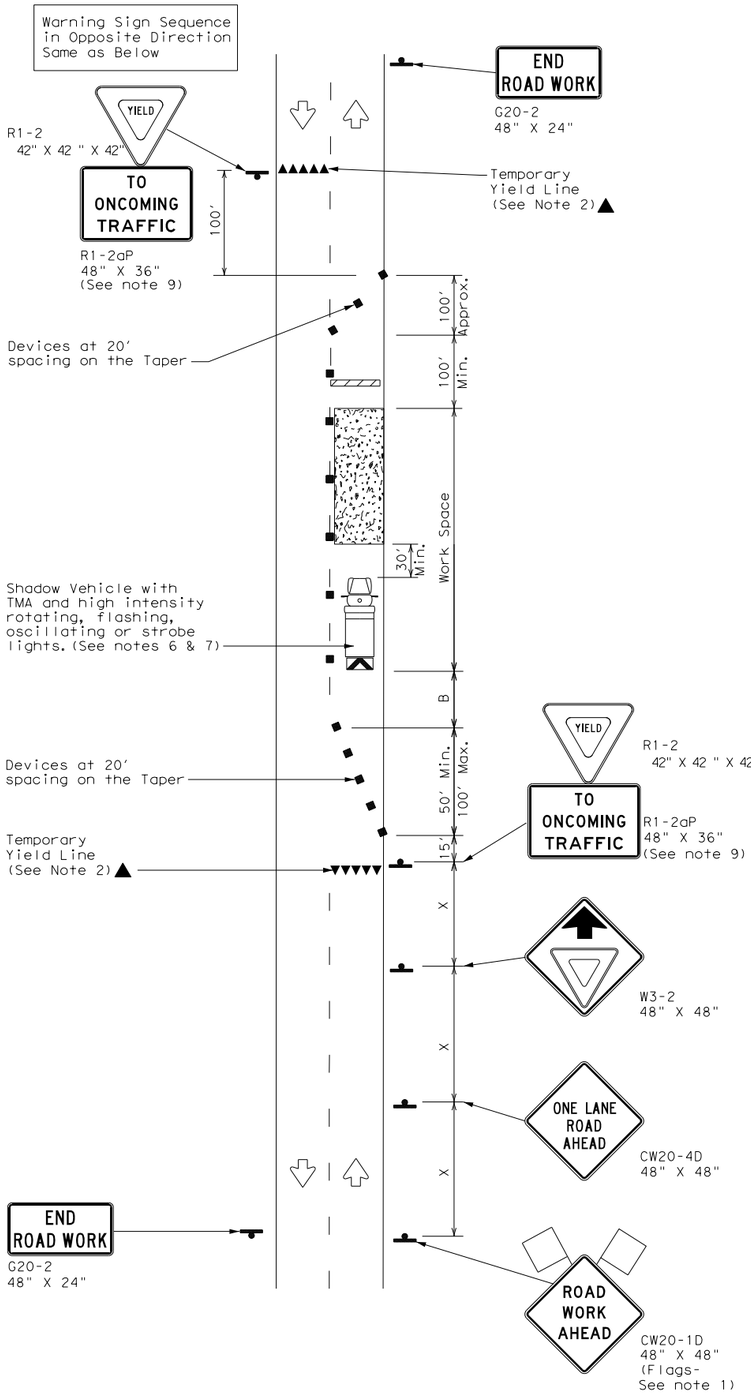
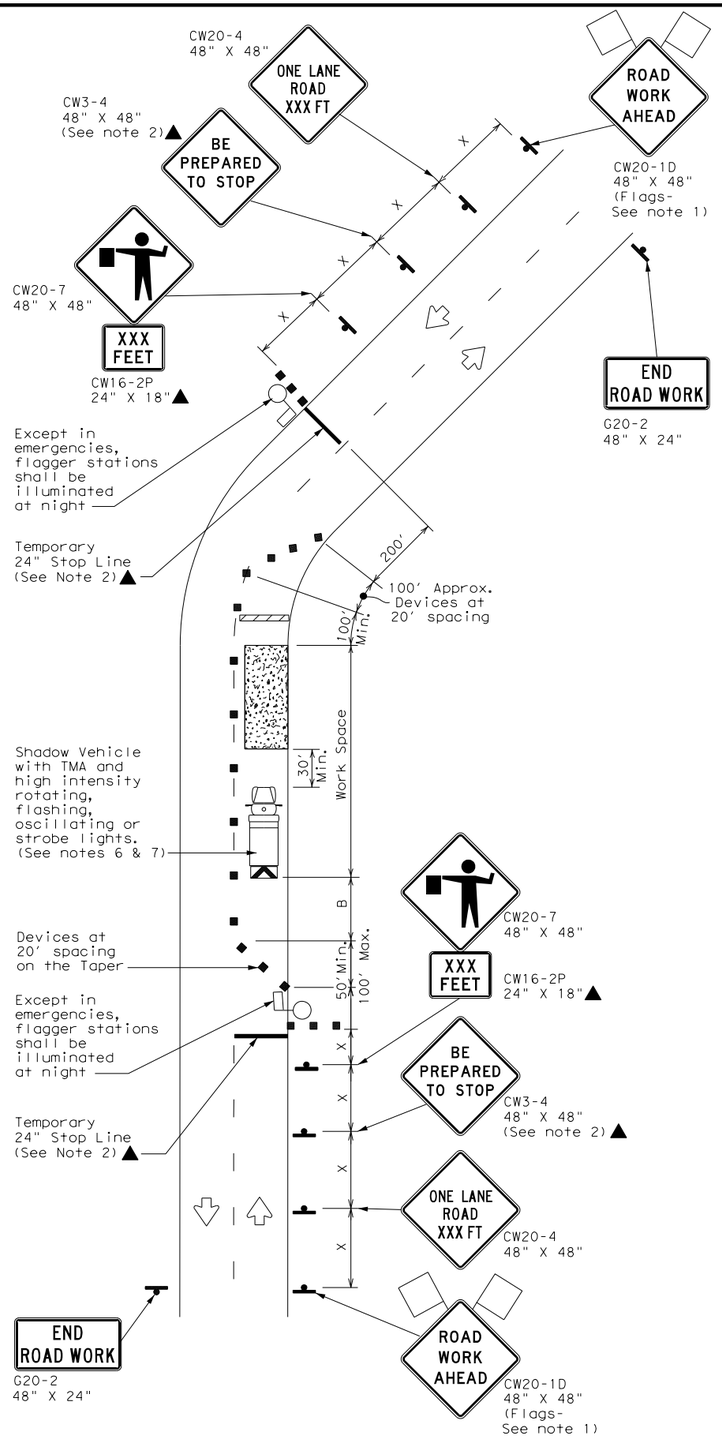


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP (2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		65

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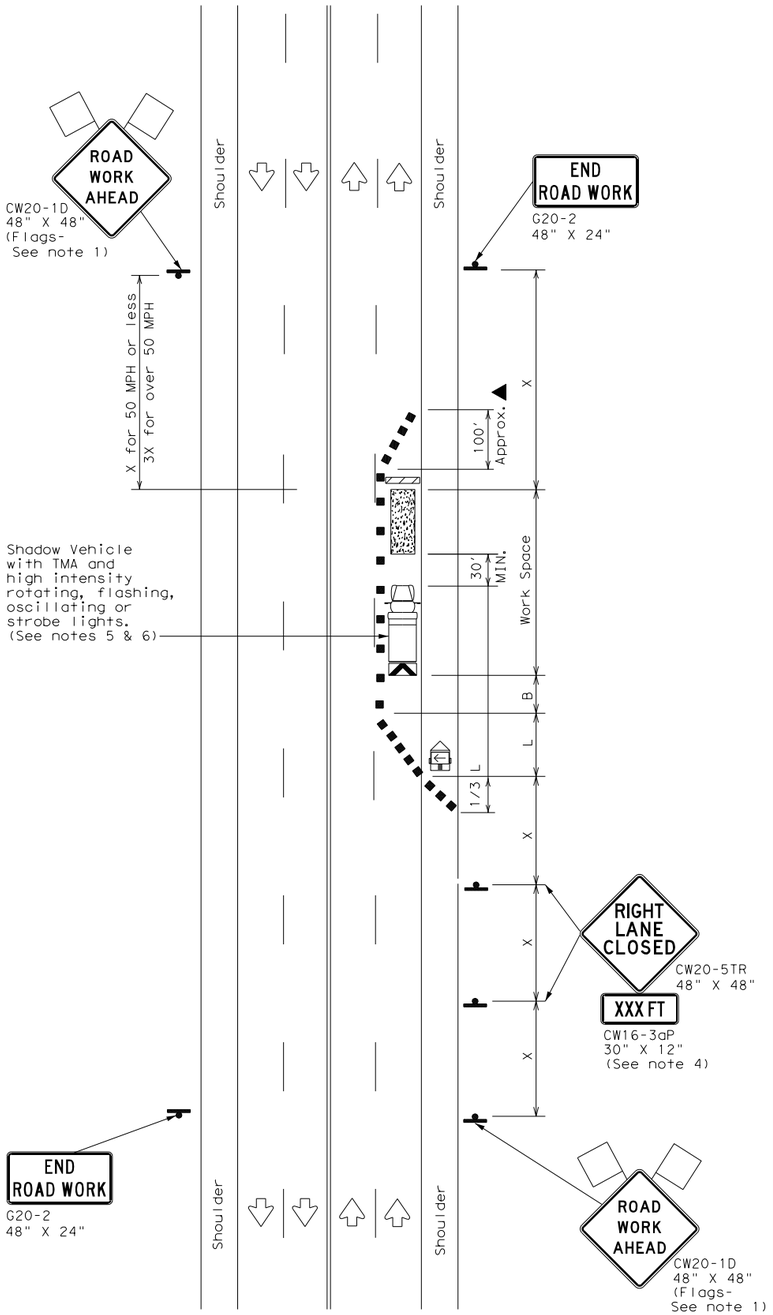
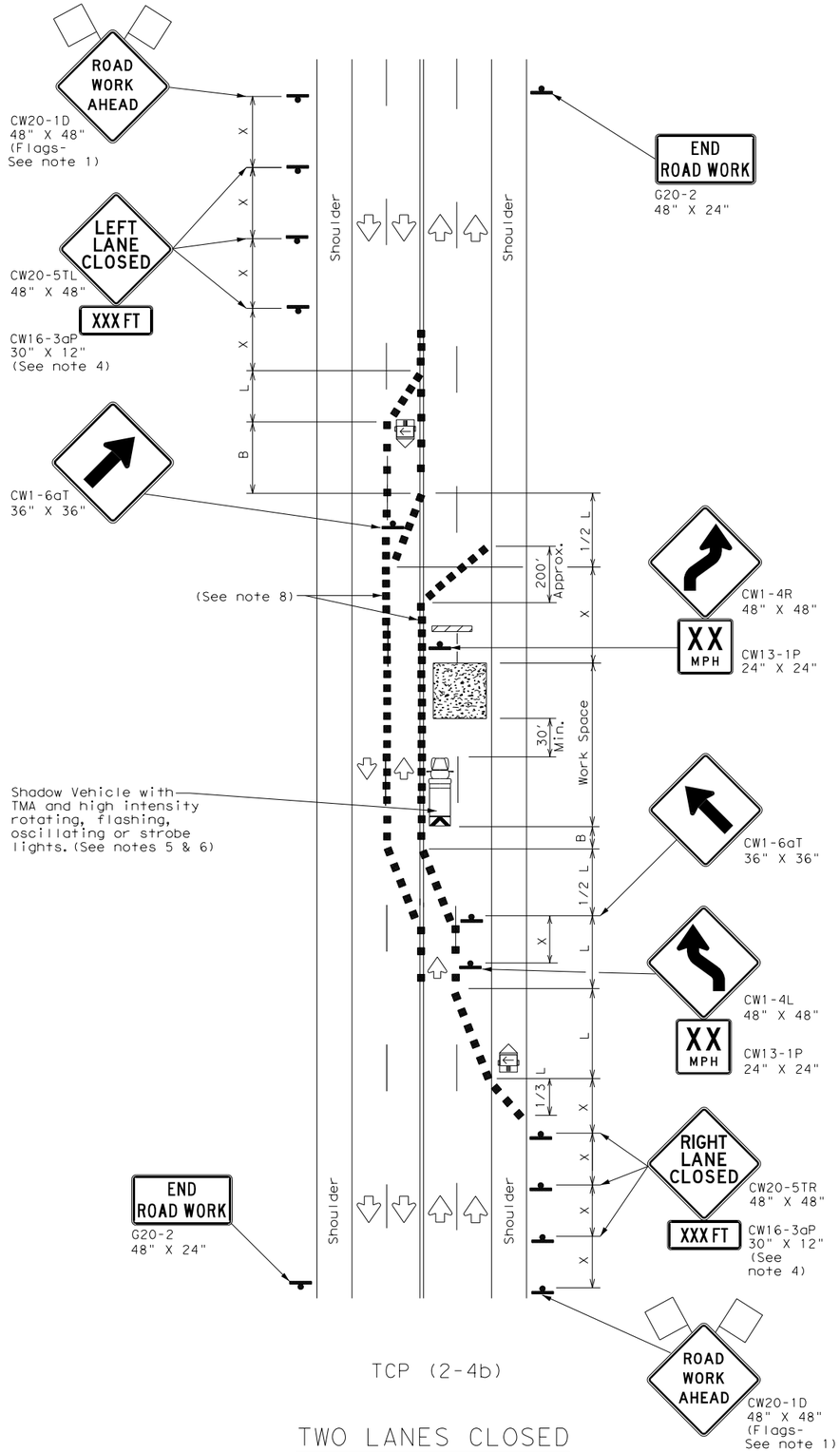


TCP (2-4a)

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

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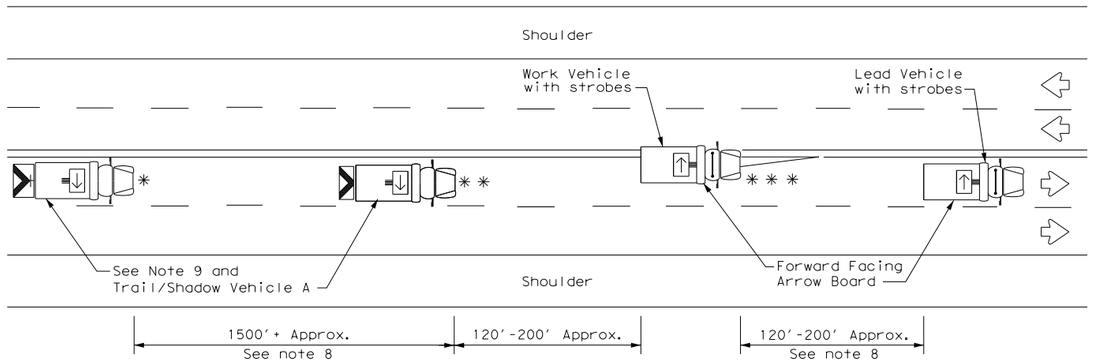
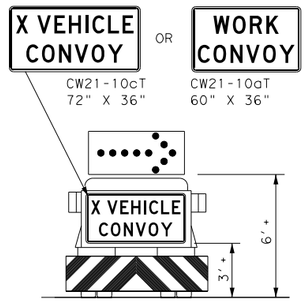
4-98 2-18	FTW	TARRANT		66



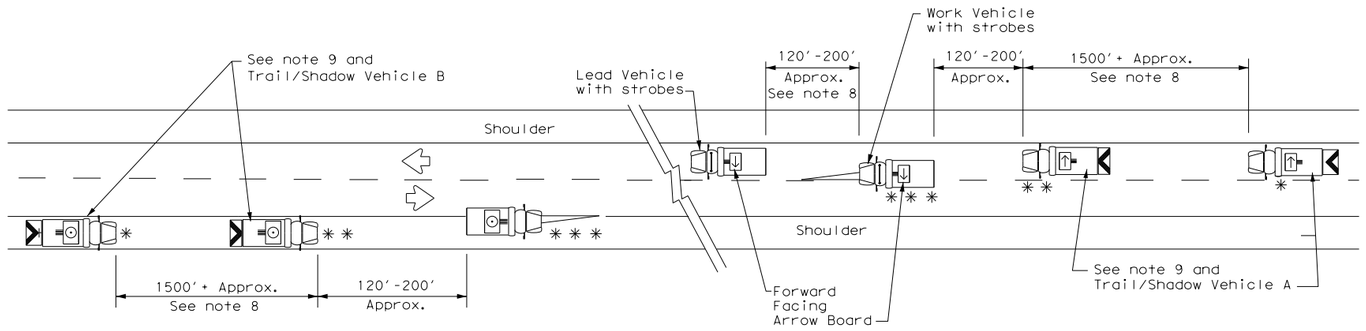
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

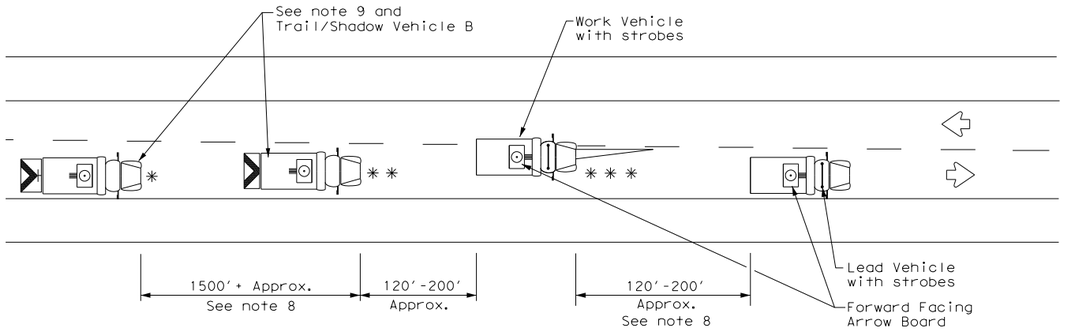


WORK ON SHOULDER

WORK ON TRAVEL LANE

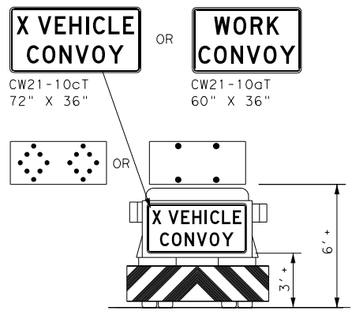
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

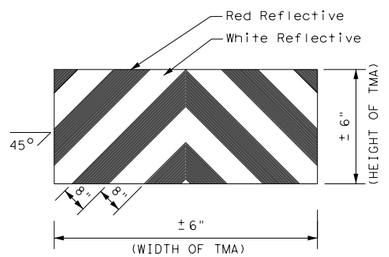
with Flashing Arrow Board in CAUTION display

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
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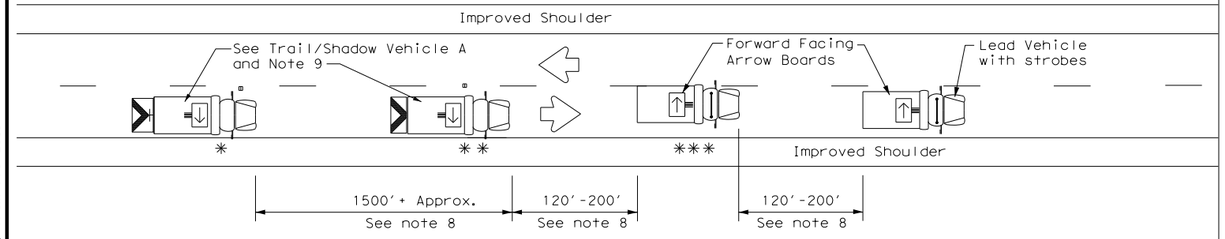
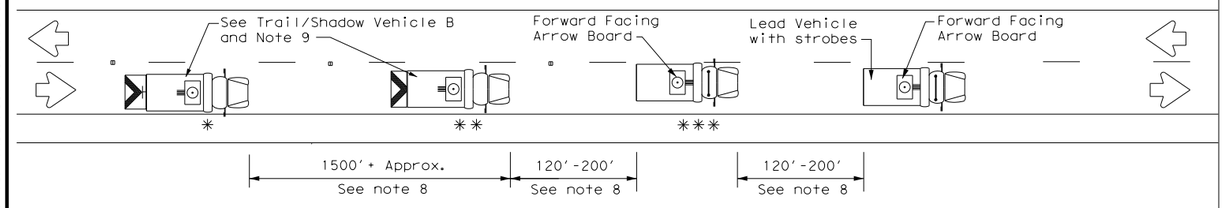


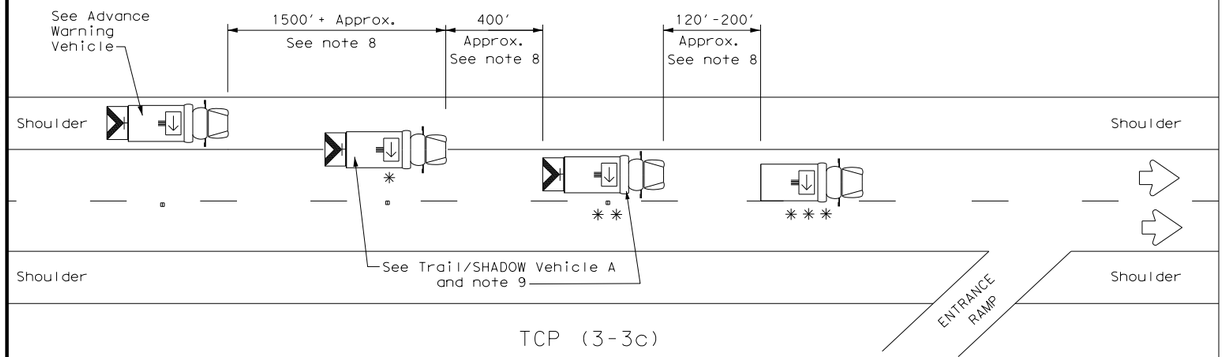
TCP (3-3a)

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



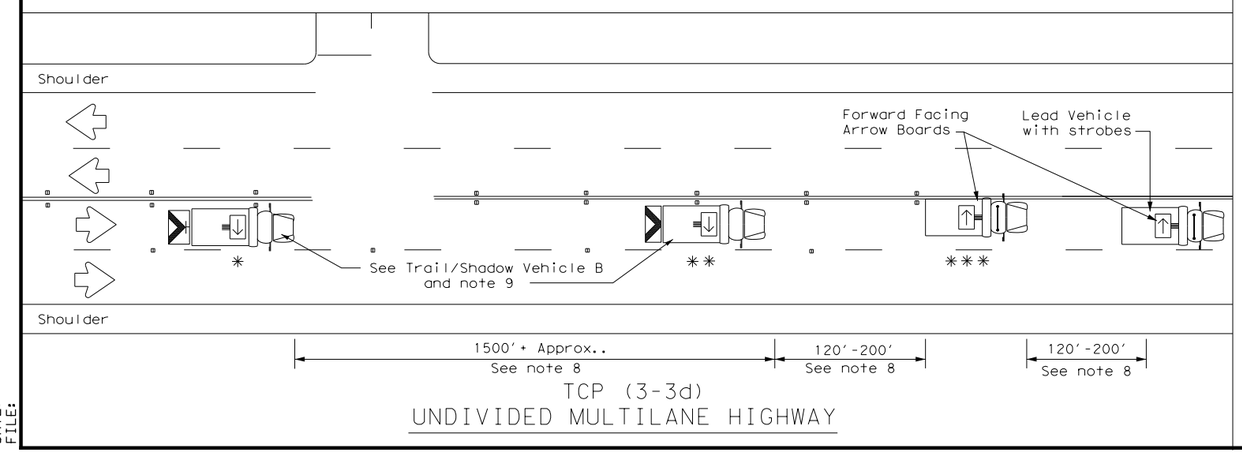
TCP (3-3b)

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



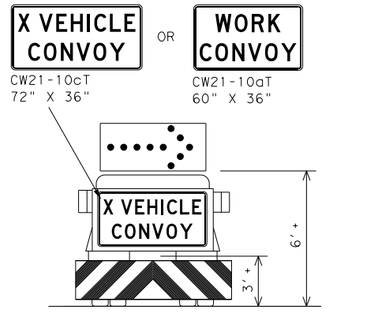
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



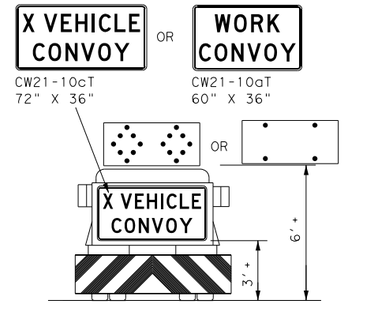
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



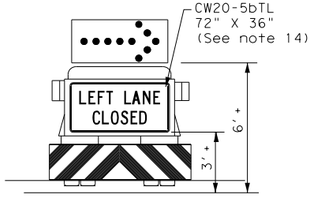
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

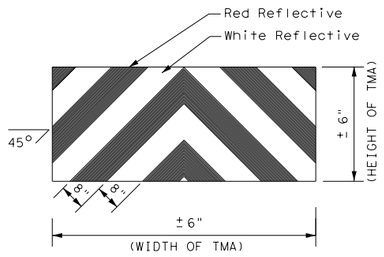


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

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©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
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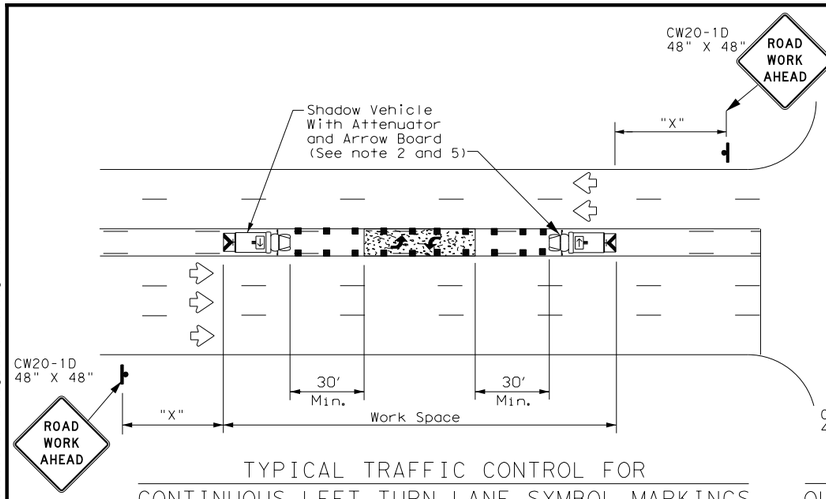
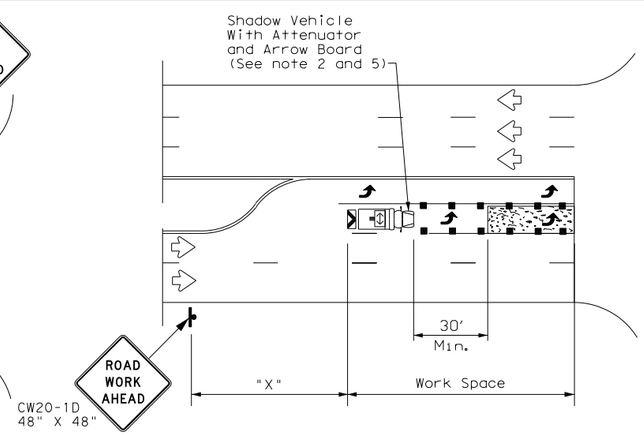
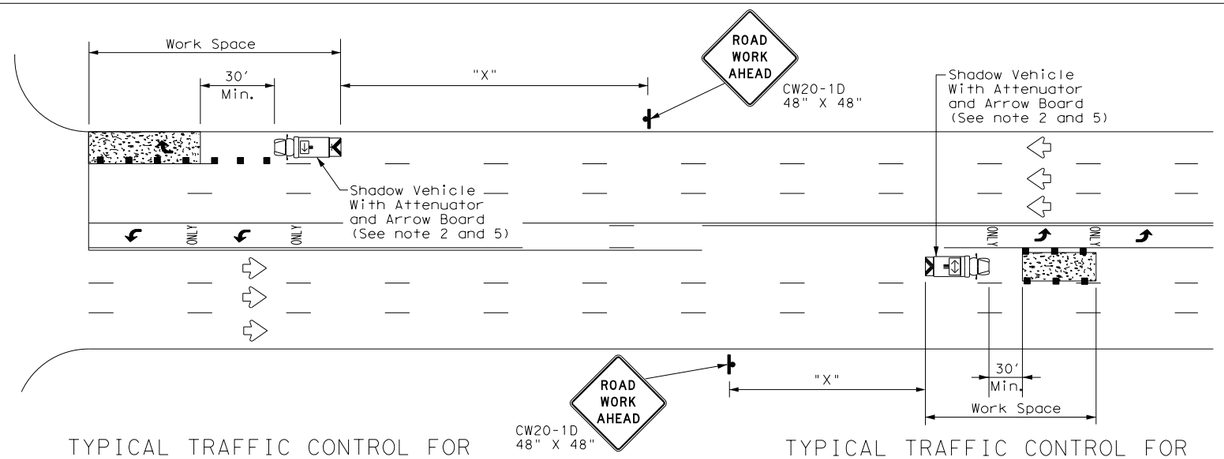


TYPICAL TRAFFIC CONTROL FOR
CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

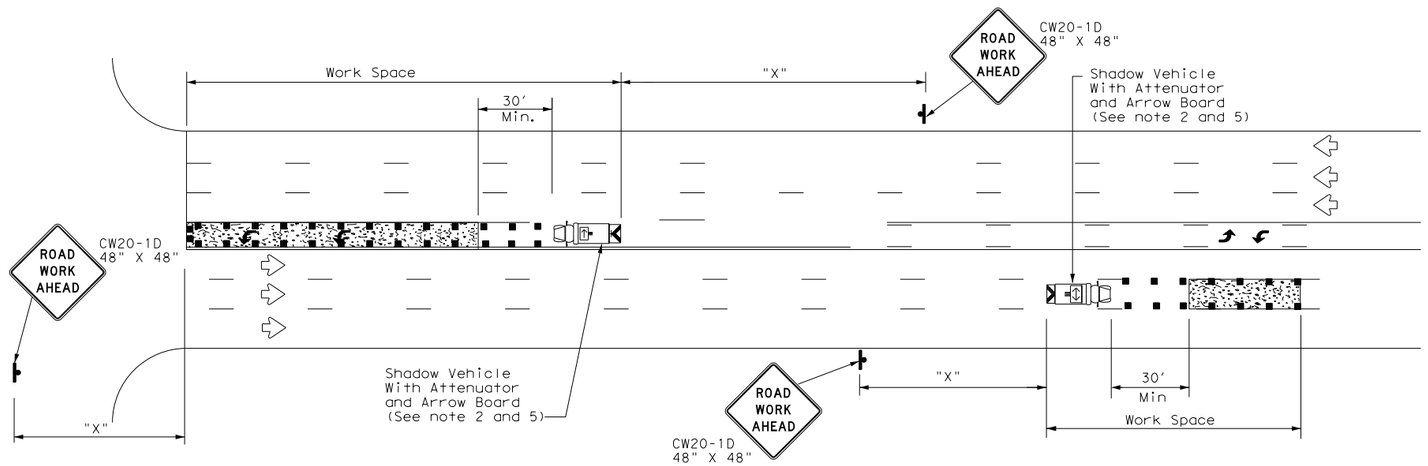


TYPICAL TRAFFIC CONTROL FOR
OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



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′

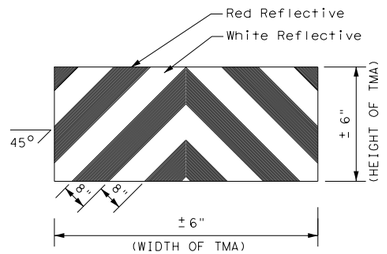
✳ Conventional Roads Only

✳✳ 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

FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT July, 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		69

DATE: 2/9/2023 2:48:09 PM
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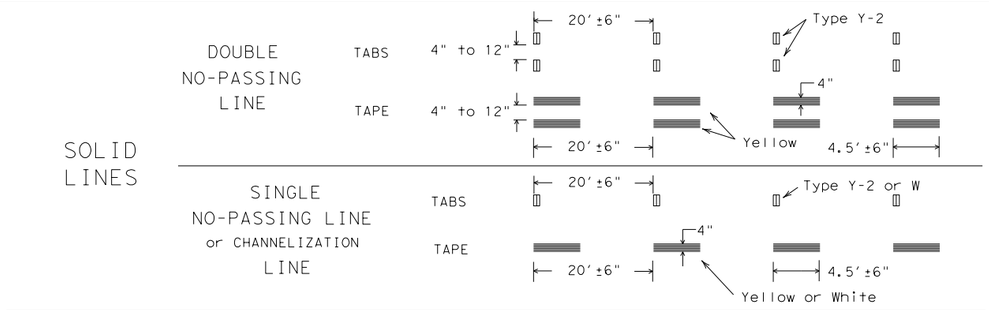
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



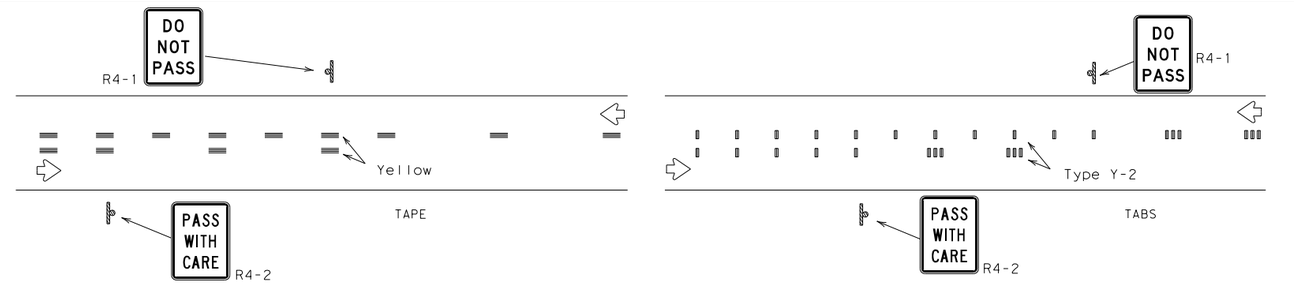
NOTES:

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.

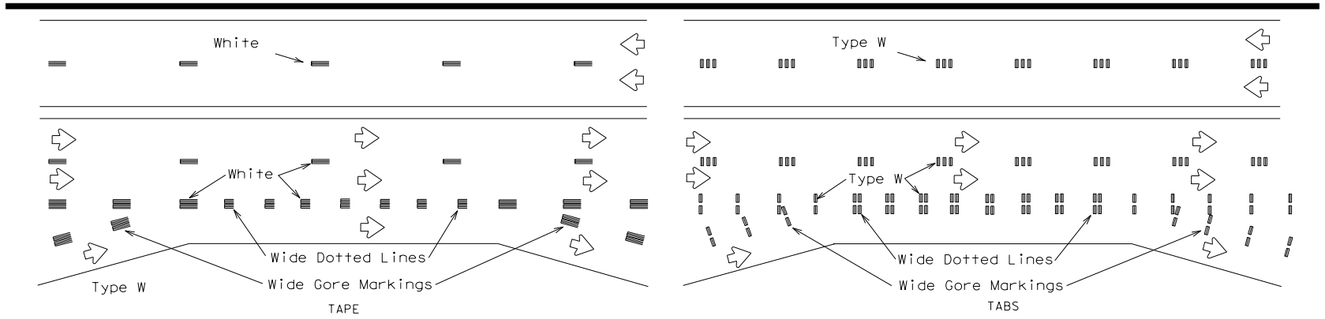
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

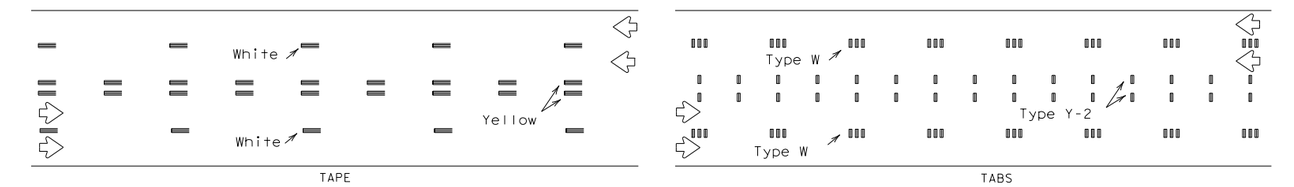
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



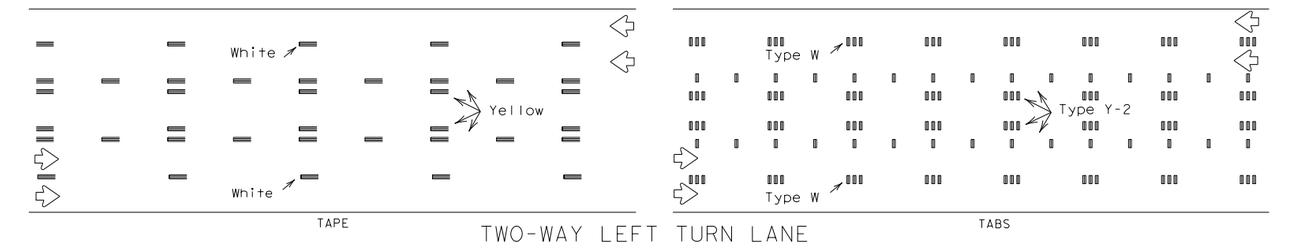
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



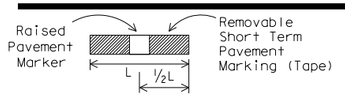
LANE LINES FOR DIVIDED HIGHWAY



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 Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
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1-97		DIST	COUNTY		SHEET NO.
3-03		FTW	TARRANT		70
7-13					

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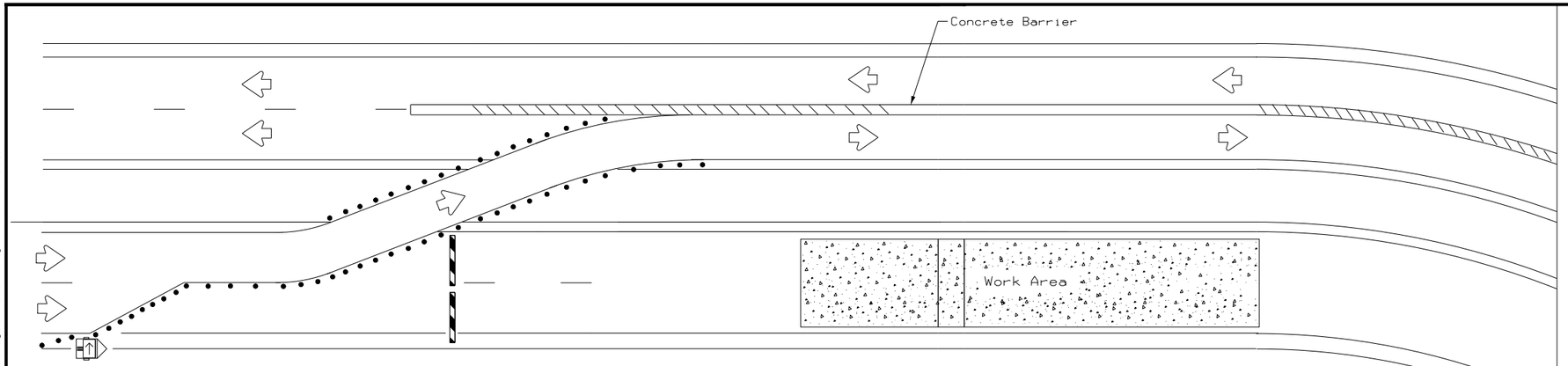


NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

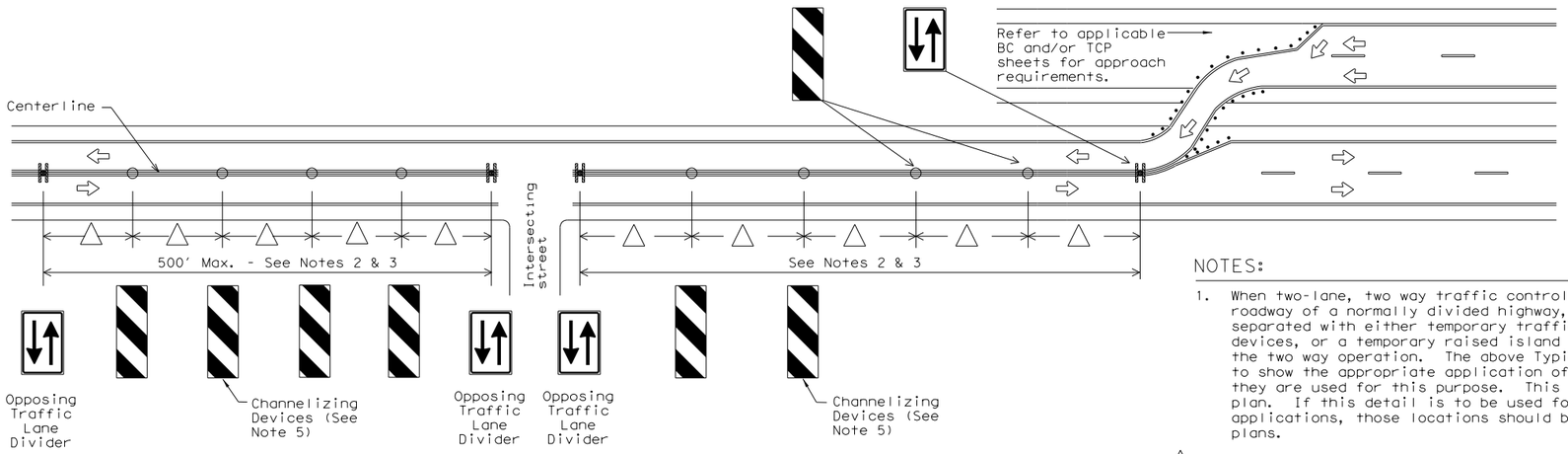
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100′.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 2-17 3-03 7-13	0718	02	072	FM156
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	FTW	TARRANT		71

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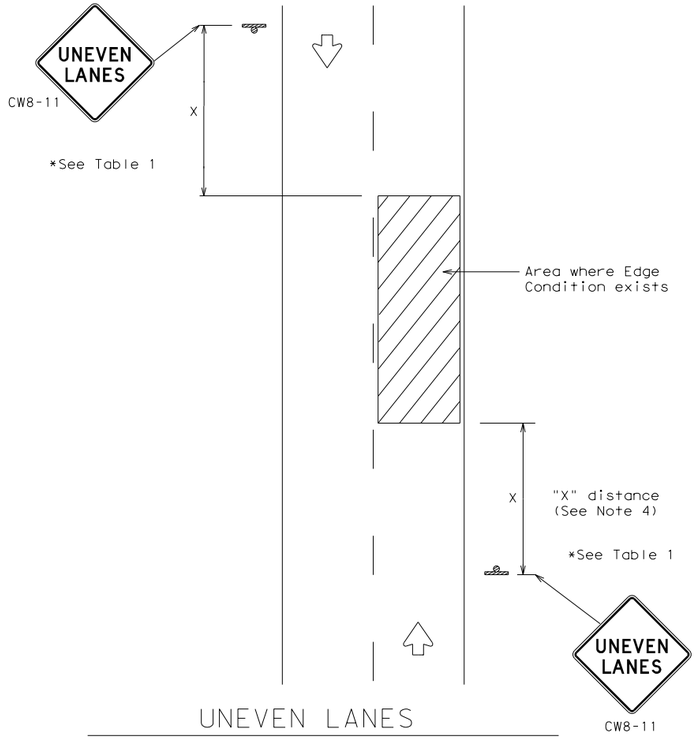
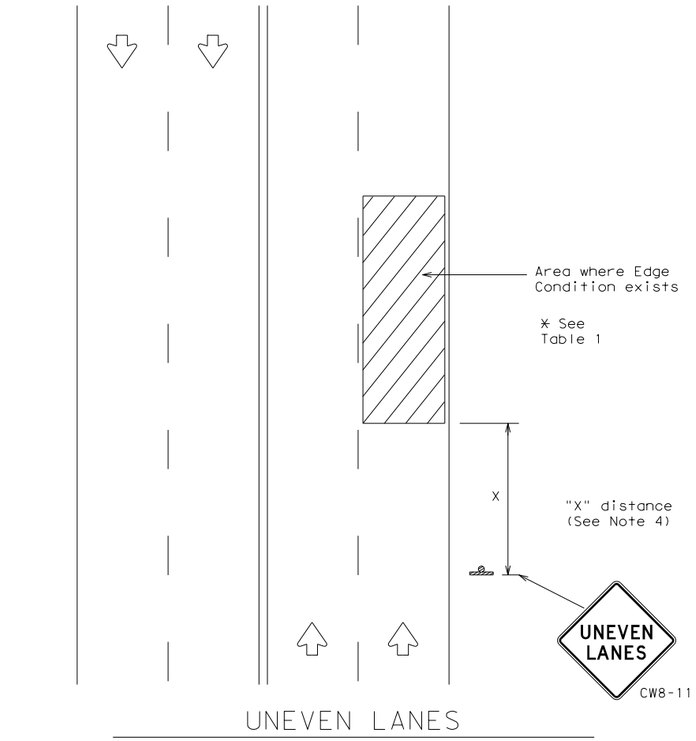
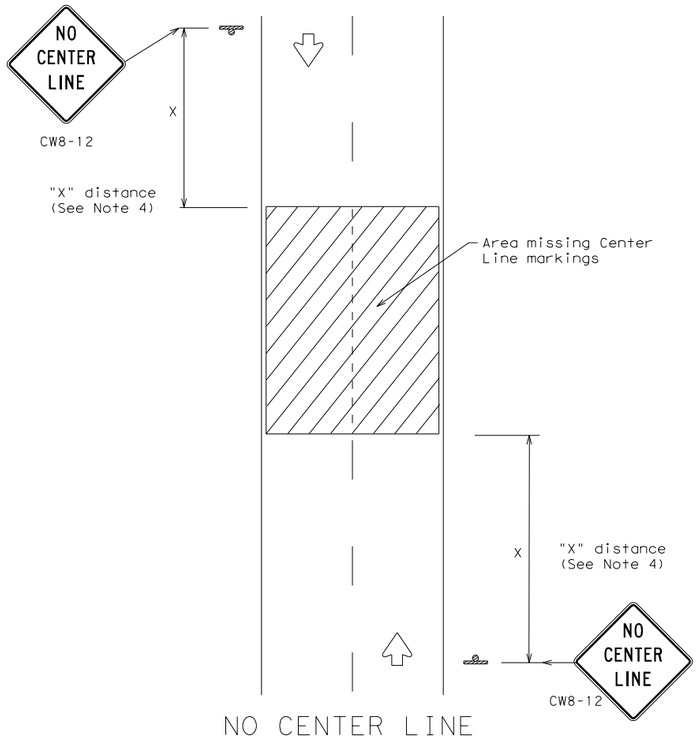


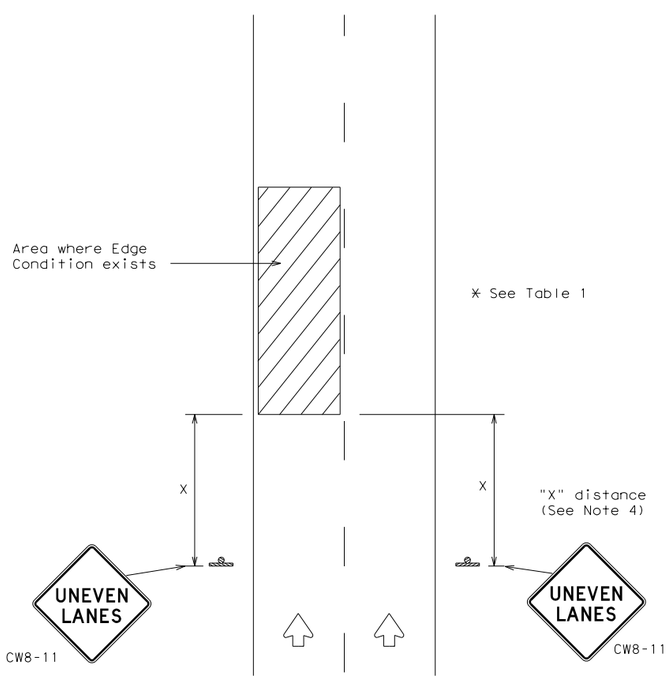
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

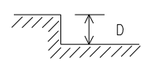
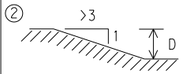
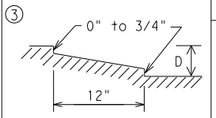
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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
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8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	FTW	TARRANT		72

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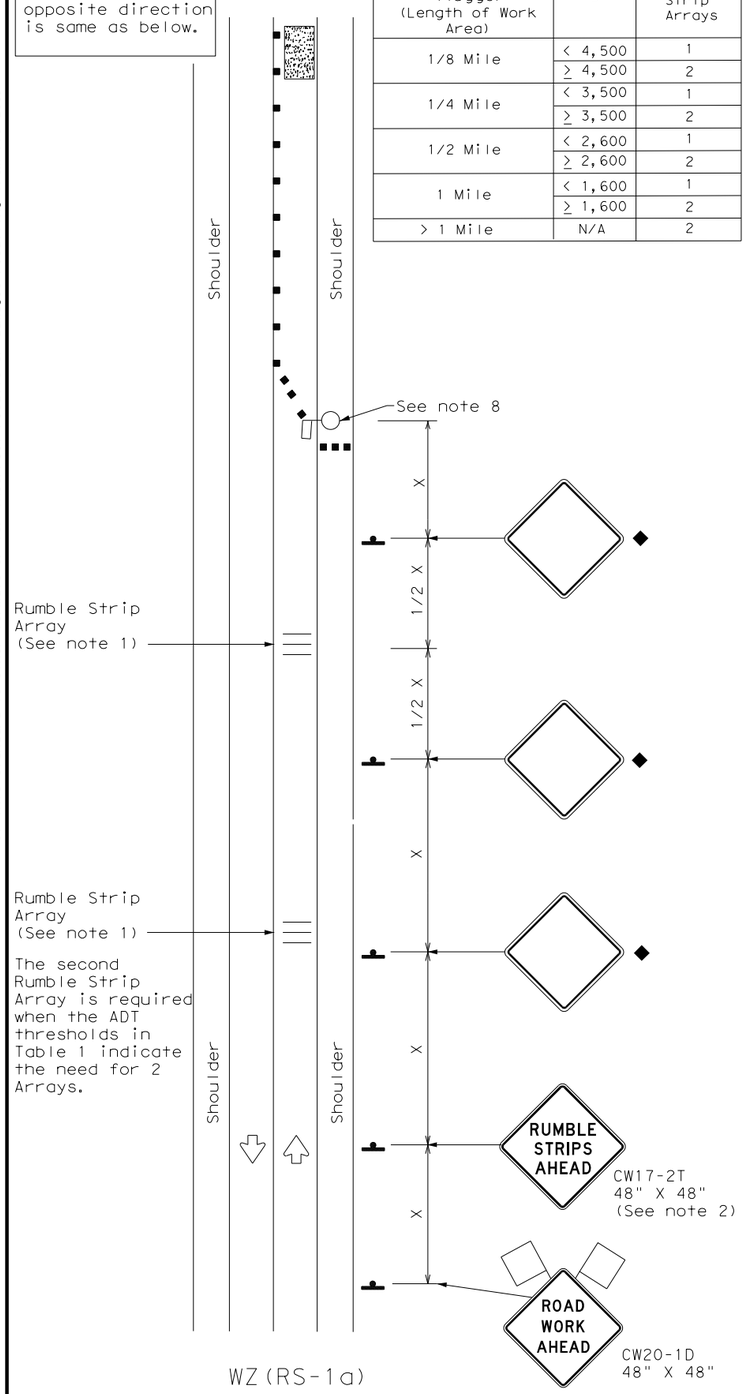
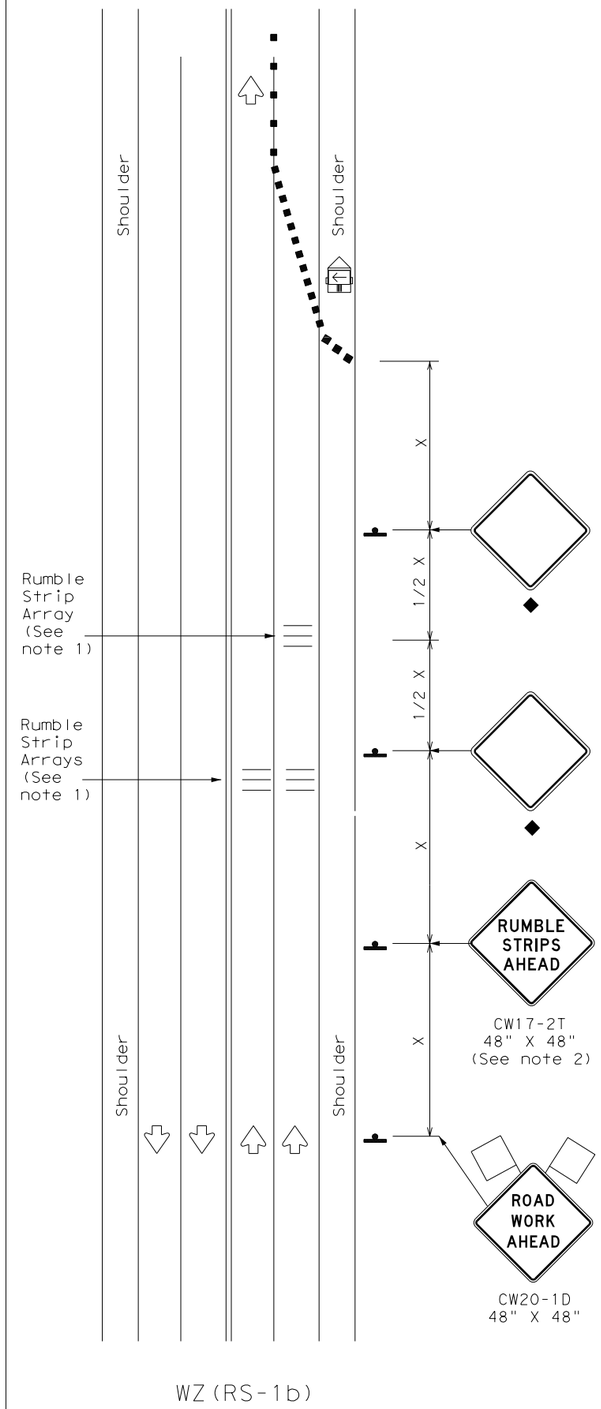
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE
TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE
ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

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

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		73

117

DATE:
FILE:

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 020659w
Crossing Type: ** BNSF underpass
RR Company Owning Track at Crossing: BNSF
Operating RR Company at Track: BNSF
RR MP: 362.10
RR Subdivision: Fort Worth Sub
City: Haslet
County: Tarrant
CSJ at this Crossing: 0718-02-072
Highway/Roadway name crossing the railroad: FM 156
# of regularly scheduled trains per day at this crossing: 5
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 0%

Scope of Work at this Crossing to Be Performed by State Contractor:
Mill and overlay FM 156 from Avondale Haslet Rd to International Parkway.

Scope of Work at this Crossing to Be Performed by Railroad Company:
None

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

None

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 3

On this project, night or weekend flagging is:

- ☐ Expected
- ☒ Not Expected

Flagging services will be provided by:

- ☐ Railroad Company: TxDOT will pay flagging invoices
- ☒ Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- ☐ UPRR - UP.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
  - UP.request@nrssinc.net
  Call Center 877-984-6777
- ☒ BNSF - BNSF.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
- ☐ KCS - KCS.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
  - Bottom Line On-Track Safety Services
  bottomline076@aol.com, 903-767-7630
- ☐ OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- ☒ Not Required
- ☐ Required: Contact Information for Construction Inspection: _____

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

- ☐ Required
- ☒ Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit

Railroad Protective Liability		
☐	Not Required	
☒	Non - Bridge Projects	$2,000,000 / $6,000,000
☐	Bridge Projects	$5,000,000 / $10,000,000
☐	Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

- ☐ Not Required
- ☐ Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
- ☐ Required: UPRR Maintenance Consent Letter. TxDOT CST to assist.
- ☒ Required: Contractor to obtain (see Item 5, Article 8.4)
  With the following railroad companies: BNSF

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- ☒ Not Required
- ☐ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call BNSF Railway
Railroad Emergency Line at 1-(800) 832-5452
Location: DOT # 020659w
RR Milepost 362.10
Subdivision Fort Worth Sub

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK
PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
© TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS 9/2021	0718	02	072	FM 156
	DIST	COUNTY		SHEET NO.
	2	Tarrant		73A

100% PLANS SUBMITTAL

Project Name: FM156
Description:
Horizontal Alignment Name: FM156-CL
Description: Created By Civil Geometry
Style: Default

		STATION	NORTHING	EASTING
Element: Linear				
POB	( )	R1 0+20.00	7046449.440	2323693.086
Eqn	( )	0+00.00	7046449.440	2323693.086
Eqn	( )	R1 0+20.00	7046449.440	2323693.086
PI	( )	R1 6+47.18	7045823.048	2323724.603
Tangent Direction:		272.9°		
Tangent Length:		627.1839		
Element: Linear				
PI	( )	R1 6+47.18	7045823.048	2323724.603
PC	( )	R1 25+33.36	7043941.635	2323858.599
Tangent Direction:		274.1°		
Tangent Length:		1886.1789		
Element: Circular				
PC	( )	R1 25+33.36	7043941.635	2323858.599
PI	( )	R1 42+32.38	7042246.913	2323979.298
CC	( )		7043668.128	2320018.326
PT	( )	R1 57+33.46	7041015.517	2322808.694
Radius:		3850.0000		
Delta:		47.6° Right		
Degree of Curvature(Arc):		1.5°		
Length:		3200.1014		
Tangent:		1699.0146		
Chord:		3108.7727		
Middle Ordinate:		327.7304		
External:		358.2242		
Tangent Direction:		274.1°		
Radial Direction:		184.1°		
Chord Direction:		250.3°		
Radial Direction:		136.4°		
Tangent Direction:		226.4°		
Element: Linear				
PT	( )	R1 57+33.46	7041015.517	2322808.694
PC	( )	R1 59+65.44	7040847.386	2322648.864
Tangent Direction:		226.4°		
Tangent Length:		231.9780		
Element: Circular				
PC	( )	R1 59+65.44	7040847.386	2322648.864
PI	( )	R1 60+30.57	7040800.181	2322603.989
CC	( )		7044292.335	2319025.009
PT	( )	R1 60+95.70	7040754.161	2322557.900
Radius:		5000.0000		
Delta:		1.5° Right		
Degree of Curvature(Arc):		1.1°		
Length:		130.2548		
Tangent:		65.1311		
Chord:		130.2511		
Middle Ordinate:		0.4242		
External:		0.4242		
Tangent Direction:		226.4°		
Radial Direction:		136.4°		
Chord Direction:		225.7°		
Radial Direction:		135.0°		
Tangent Direction:		225.0°		
Element: Linear				
PT	( )	R1 60+95.70	7040754.161	2322557.900
PC	( )	R1 67+26.76	7040308.267	2322111.340
Tangent Direction:		225.0°		
Tangent Length:		631.0601		
Element: Circular				
PC	( )	R1 67+26.76	7040308.267	2322111.340
PI	( )	R1 68+29.31	7040235.809	2322038.773
CC	( )		7039572.327	2322846.181
PT	( )	R1 69+31.19	7040150.573	2321981.756
Radius:		1040.0000		
Delta:		11.3° Left		
Degree of Curvature(Arc):		5.5°		
Length:		204.4360		
Tangent:		102.5484		
Chord:		204.1070		
Middle Ordinate:		5.0193		
External:		5.0436		
Tangent Direction:		225.0°		
Radial Direction:		135.0°		
Chord Direction:		230.6°		
Radial Direction:		146.2°		
Tangent Direction:		236.2°		
Element: Linear				
PT	( )	R1 69+31.19	7040150.573	2321981.756
PC	( )	R1 69+57.44	7040128.756	2321967.162
Tangent Direction:		236.2°		
Tangent Length:		26.2478		
Element: Circular				
PC	( )	R1 69+57.44	7040128.756	2321967.162
PI	( )	R1 70+03.86	7040090.170	2321941.350
CC	( )		7040707.002	2321102.736
PT	( )	R1 70+50.23	7040054.037	2321912.203
Radius:		1040.0000		
Delta:		5.1° Right		
Degree of Curvature(Arc):		5.5°		
Length:		92.7850		
Tangent:		46.4233		
Chord:		92.7542		
Middle Ordinate:		1.0346		
External:		1.0356		
Tangent Direction:		236.2°		
Radial Direction:		146.2°		
Chord Direction:		233.7°		
Radial Direction:		141.1°		
Tangent Direction:		231.1°		

Element: Linear				
PT	( )	R1 70+50.23	7040054.037	2321912.203
PC	( )	R1 71+84.30	7039949.682	2321828.024
Tangent Direction:		231.1°		
Tangent Length:		134.0754		
Element: Circular				
PC	( )	R1 71+84.30	7039949.682	2321828.024
PI	( )	R1 72+16.78	7039924.400	2321807.630
CC	( )		7040602.741	2321018.439
PT	( )	R1 72+49.24	7039900.440	2321785.698
Radius:		1040.1510		
Delta:		3.6° Right		
Degree of Curvature(Arc):		5.5°		
Length:		64.9427		
Tangent:		32.4819		
Chord:		64.9322		
Middle Ordinate:		0.5068		
External:		0.5070		
Tangent Direction:		231.1°		
Radial Direction:		141.1°		
Chord Direction:		229.3°		
Radial Direction:		137.5°		
Tangent Direction:		227.5°		
Element: Linear				
PT	( )	R1 72+49.24	7039900.440	2321785.698
PI	( )	R1 73+82.49	7039802.150	2321695.730
Tangent Direction:		227.5°		
Tangent Length:		133.2488		
Element: Linear				
PI	( )	R1 73+82.49	7039802.150	2321695.730
PC	( )	R1 74+89.15	7039724.485	2321622.622
Tangent Direction:		226.7°		
Tangent Length:		106.6611		
Element: Circular				
PC	( )	R1 74+89.15	7039724.485	2321622.622
PI	( )	R1 75+15.23	7039705.500	2321604.750
CC	( )		7045118.787	2315892.140
PT	( )	R1 75+41.30	7039686.633	2321586.753
Radius:		7870.0000		
Delta:		0.4° Right		
Degree of Curvature(Arc):		0.7°		
Length:		52.1475		
Tangent:		26.0739		
Chord:		52.1475		
Middle Ordinate:		0.0432		
External:		0.0432		
Tangent Direction:		226.7°		
Radial Direction:		136.7°		
Chord Direction:		226.5°		
Radial Direction:		136.4°		
Tangent Direction:		226.4°		
Element: Linear				
PT	( )	R1 75+41.30	7039686.633	2321586.753
PC	( )	R1 81+96.52	7039212.530	2321134.501
Tangent Direction:		226.4°		
Tangent Length:		655.2145		
Element: Circular				
PC	( )	R1 81+96.52	7039212.530	2321134.501
PI	( )	R1 82+25.22	7039191.759	2321114.686
CC	( )		7038494.685	2321887.029
PT	( )	R1 82+53.91	7039169.926	2321096.048
Radius:		1040.0000		
Delta:		3.2° Left		
Degree of Curvature(Arc):		5.5°		
Length:		57.3983		
Tangent:		28.7064		
Chord:		57.3910		
Middle Ordinate:		0.3960		
External:		0.3961		
Tangent Direction:		226.4°		
Radial Direction:		136.4°		
Chord Direction:		227.9°		
Radial Direction:		139.5°		
Tangent Direction:		229.5°		
Element: Linear				
PT	( )	R1 82+53.91	7039169.926	2321096.048
PC	( )	R1 82+92.36	7039140.683	2321071.084
Tangent Direction:		229.5°		
Tangent Length:		38.4492		
Element: Circular				
PC	( )	R1 82+92.36	7039140.683	2321071.084
PI	( )	R1 86+35.01	7038880.082	2320848.616
CC	( )		7038160.286	2322219.527
PT	( )	R1 89+66.24	7038548.984	2320760.413
Radius:		1510.0000		
Delta:		25.6° Left		
Degree of Curvature(Arc):		3.8°		
Length:		673.8775		
Tangent:		342.6445		
Chord:		668.2992		
Middle Ordinate:		37.4362		
External:		38.3880		
Tangent Direction:		229.5°		
Radial Direction:		139.5°		
Chord Direction:		242.3°		
Radial Direction:		165.1°		
Tangent Direction:		255.1°		
Element: Linear				
PT	( )	R1 89+66.24	7038548.984	2320760.413
PC	( )	R1 92+38.39	7038286.005	2320690.357
Tangent Direction:		255.1°		
Tangent Length:		272.1508		

Element: Circular				
PC	( )	R1 92+38.39	7038286.005	2320690.357
PI	( )	R1 92+64.07	7038261.196	2320683.748
CC	( )		7038018.292	2321695.310
PT	( )	R1 92+89.73	7038236.091	2320678.372
Radius:		1040.0000		
Delta:		2.8° Left		
Degree of Curvature(Arc):		5.5°		
Length:		51.3378		
Tangent:		25.6741		
Chord:		51.3326		
Middle Ordinate:		0.3168		
External:		0.3169		
Tangent Direction:		255.1°		
Radial Direction:		165.1°		
Chord Direction:		256.5°		
Radial Direction:		167.9°		
Tangent Direction:		257.9°		
Element: Linear				
PT	( )	R1 92+89.73	7038236.091	2320678.372
PC	( )	R1 93+12.05	7038214.263	2320673.697
Tangent Direction:		257.9°		
Tangent Length:		22.3224		
Element: Circular				
PC	( )	R1 93+12.05	7038214.263	2320673.697
PI	( )	R1 93+46.42	7038180.660	2320666.500
CC	( )		7038432.062	2319656.759
PT	( )	R1 93+80.76	7038147.605	2320657.100
Radius:		1040.0000		
Delta:		3.8° Right		
Degree of Curvature(Arc):		5.5°		
Length:		68.7059		
Tangent:		34.3654		
Chord:		68.6934		
Middle Ordinate:		0.5673		
External:		0.5676		
Tangent Direction:		257.9°		
Radial Direction:		167.9°		
Chord Direction:		256.0°		
Radial Direction:		164.1°		
Tangent Direction:		254.1°		
Element: Linear				
PT	( )	R1 93+80.76	7038147.605	2320657.100
PI	( )	R1 96+85.89	7037854.104	2320573.641
Tangent Direction:		254.1°		
Tangent Length:		305.1366		
Element: Linear				
PI	( )	R1 96+85.89	7037854.104	2320573.641
PC	( )	R1 105+99.08	7036975.154	2320325.925
Tangent Direction:		254.3°		
Tangent Length:		913.1903		
Element: Circular				
PC	( )	R1 105+99.08	7036975.154	2320325.925
PI	( )	R1 112+33.90	7036364.138	2320153.722
CC	( )		7036714.741	2321249.930
PT	( )	R1 117+20.86	7035966.457	2320648.539
Radius:		960.0000		
Delta:		67.0° Left		
Degree of Curvature(Arc):		6.0°		
Length:		1121.7723		
Tangent:		634.8182		
Chord:		1059.0323		
Middle Ordinate:		159.2424		
External:		190.9101		
Tangent Direction:		254.3°		
Radial Direction:		164.3°		
Chord Direction:		287.7°		
Radial Direction:		231.2°		
Tangent Direction:		321.2°		

NOTES:
1. HORIZONTAL ALIGNMENT SUPPLIED IS A BEST FIT ALIGNMENT TO THE EXISTING ROADWAY.
2. HORIZONTAL ALIGNMENT PROVIDED TO DETAIL LIMITS OF CONSTRUCTION ONLY. MODIFICATIONS TO EXISTING ALIGNMENT MAY ONLY BE MADE WITH ENGINEERS APPROVAL.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156

HORIZONTAL DATA

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	74
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:48:25 PM SCALE: 1:100
FILE: FM156_HADATA-01.dgn

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Element: Linear			
PT ( )	R1 117+20.86	7035966.457	2320648.539
PC ( )	R1 125+86.08	7035424.436	2321322.950
Tangent Direction:	321.2°		
Tangent Length:	865.2271		
Element: Circular			
PC ( )	R1 125+86.08	7035424.436	2321322.950
PI ( )	R1 130+42.45	7035138.547	2321678.669
CC ( )		7034676.152	2320721.559
PT ( )	R1 134+38.10	7034682.193	2321681.540
Radius:	960.0000		
Delta:	50.9° Right		
Degree of Curvature(Arc):	6.0°		
Length:	852.0141		
Tangent:	456.3636		
Chord:	824.3249		
Middle Ordinate:	92.9809		
External:	102.9524		
Tangent Direction:	321.2°		
Radial Direction:	231.2°		
Chord Direction:	295.8°		
Radial Direction:	180.4°		
Tangent Direction:	270.4°		
Element: Linear			
PT ( )	R1 134+38.10	7034682.193	2321681.540
PC ( )	R1 138+06.08	7034314.217	2321683.856
Tangent Direction:	270.4°		
Tangent Length:	367.9829		
Element: Circular			
PC ( )	R1 138+06.08	7034314.217	2321683.856
PI ( )	R1 141+23.46	7033996.845	2321685.853
CC ( )		7034331.993	2324508.800
PT ( )	R1 144+38.19	7033687.827	2321758.222
Radius:	2825.0000		
Delta:	12.8° Left		
Degree of Curvature(Arc):	2.0°		
Length:	632.1066		
Tangent:	317.3786		
Chord:	630.7888		
Middle Ordinate:	17.6612		
External:	17.7723		
Tangent Direction:	270.4°		
Radial Direction:	180.4°		
Chord Direction:	276.8°		
Radial Direction:	193.2°		
Tangent Direction:	283.2°		
Element: Linear			
PT ( )	R1 144+38.19	7033687.827	2321758.222
PC ( )	R1 149+27.92	7033210.999	2321869.892
Tangent Direction:	283.2°		
Tangent Length:	489.7300		
Element: Circular			
PC ( )	R1 149+27.92	7033210.999	2321869.892
PI ( )	R1 152+48.54	7032898.825	2321943.001
CC ( )		7032566.834	2319119.315
PT ( )	R1 155+66.43	7032578.208	2321944.292
Radius:	2825.0000		
Delta:	13.0° Right		
Degree of Curvature(Arc):	2.0°		
Length:	638.5083		
Tangent:	320.6202		
Chord:	637.1501		
Middle Ordinate:	18.0203		
External:	18.1360		
Tangent Direction:	283.2°		
Radial Direction:	193.2°		
Chord Direction:	276.7°		
Radial Direction:	180.2°		
Tangent Direction:	270.2°		
Element: Linear			
PT ( )	R1 155+66.43	7032578.208	2321944.292
PI ( )	R1 170+88.54	7031056.110	2321950.420
Tangent Direction:	270.2°		
Tangent Length:	1522.1099		
Element: Linear			
PI ( )	R1 170+88.54	7031056.110	2321950.420
PI ( )	R1 174+28.05	7030716.600	2321952.000
Tangent Direction:	270.3°		
Tangent Length:	339.5137		
Element: Linear			
PI ( )	R1 174+28.05	7030716.600	2321952.000
PI ( )	R1 184+22.11	7029722.550	2321956.310
Tangent Direction:	270.2°		
Tangent Length:	994.0593		
Element: Linear			
PI ( )	R1 184+22.11	7029722.550	2321956.310
PI ( )	R1 207+39.29	7027405.380	2321963.250
Tangent Direction:	270.2°		
Tangent Length:	2317.1804		
Element: Linear			
PI ( )	R1 207+39.29	7027405.380	2321963.250
PI ( )	R1 232+59.65	7024885.020	2321967.850
Tangent Direction:	270.1°		
Tangent Length:	2520.3642		
Element: Linear			
PI ( )	R1 232+59.65	7024885.020	2321967.850
PI ( )	R1 254+38.50	7022706.200	2321978.770
Tangent Direction:	270.3°		
Tangent Length:	2178.8474		

Element: Linear			
PI ( )	R1 254+38.50	7022706.200	2321978.770
PC ( )	R1 260+73.65	7022071.068	2321983.681
Tangent Direction:	270.4°		
Tangent Length:	635.1508		
Element: Circular			
PC ( )	R1 260+73.65	7022071.068	2321983.681
PI ( )	R1 261+34.29	7022010.430	2321984.150
CC ( )		7022148.390	2331983.382
PT ( )	R1 261+94.93	7021949.802	2321985.354
Radius:	10000.0000		
Delta:	0.7° Left		
Degree of Curvature(Arc):	0.6°		
Length:	121.2786		
Tangent:	60.6400		
Chord:	121.2778		
Middle Ordinate:	0.1839		
External:	0.1839		
Tangent Direction:	270.4°		
Radial Direction:	180.4°		
Chord Direction:	270.8°		
Radial Direction:	181.1°		
Tangent Direction:	271.1°		
Element: Linear			
PT ( )	R1 261+94.93	7021949.802	2321985.354
PC ( )	R1 265+01.58	7021643.212	2321991.444
Tangent Direction:	271.1°		
Tangent Length:	306.6506		
Element: Circular			
PC ( )	R1 265+01.58	7021643.212	2321991.444
PI ( )	R1 265+62.05	7021582.754	2321992.645
CC ( )		7021444.623	2311993.416
PT ( )	R1 266+22.52	7021522.286	2321993.114
Radius:	10000.0000		
Delta:	0.7° Right		
Degree of Curvature(Arc):	0.6°		
Length:	120.9384		
Tangent:	60.4699		
Chord:	120.9376		
Middle Ordinate:	0.1828		
External:	0.1828		
Tangent Direction:	271.1°		
Radial Direction:	181.1°		
Chord Direction:	270.8°		
Radial Direction:	180.4°		
Tangent Direction:	270.4°		
Element: Linear			
PT ( )	R1 266+22.52	7021522.286	2321993.114
PC ( )	R1 276+98.66	7020446.181	2322001.472
Tangent Direction:	270.4°		
Tangent Length:	1076.1368		
Element: Circular			
PC ( )	R1 276+98.66	7020446.181	2322001.472
PI ( )	R1 279+04.68	7020240.165	2322003.072
CC ( )		7020508.311	2330001.231
PT ( )	R1 281+10.61	7020034.504	2322015.274
Radius:	8000.0000		
Delta:	3.0° Left		
Degree of Curvature(Arc):	0.7°		
Length:	411.9537		
Tangent:	206.0224		
Chord:	411.9082		
Middle Ordinate:	2.6515		
External:	2.6524		
Tangent Direction:	270.4°		
Radial Direction:	180.4°		
Chord Direction:	271.9°		
Radial Direction:	183.4°		
Tangent Direction:	273.4°		
Element: Linear			
PT ( )	R1 281+10.61	7020034.504	2322015.274
PC ( )	R1 283+77.63	7019767.953	2322031.088
Tangent Direction:	273.4°		
Tangent Length:	267.0206		
Element: Circular			
PC ( )	R1 283+77.63	7019767.953	2322031.088
PI ( )	R1 285+38.30	7019607.568	2322040.604
CC ( )		7019412.598	2316041.621
PT ( )	R1 286+98.89	7019446.904	2322041.523
Radius:	6000.0000		
Delta:	3.1° Right		
Degree of Curvature(Arc):	1.0°		
Length:	321.2568		
Tangent:	160.6668		
Chord:	321.2184		
Middle Ordinate:	2.1500		
External:	2.1508		
Tangent Direction:	273.4°		
Radial Direction:	183.4°		
Chord Direction:	271.9°		
Radial Direction:	180.3°		
Tangent Direction:	270.3°		
Element: Linear			
PT ( )	R1 286+98.89	7019446.904	2322041.523
POE ( )	R1 294+53.64	7018692.164	2322045.838
Tangent Direction:	270.3°		
Tangent Length:	754.7519		

NOTES:
1. HORIZONTAL ALIGNNMENT SUPPLIED IS A BEST FIT ALIGNMENT TO THE EXISTING ROADWAY.
2. HORIZONTAL ALIGNMENT PROVIDED TO DETAIL LIMITS OF CONSTRUCTION ONLY. MODIFICATIONS TO EXISTING ALIGNMENT MAY ONLY BE MADE WITH ENGINEERS APPROVAL.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156

HORIZONTAL DATA

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	75
CONTROL	SECTION	JOB	
0718	02	072	

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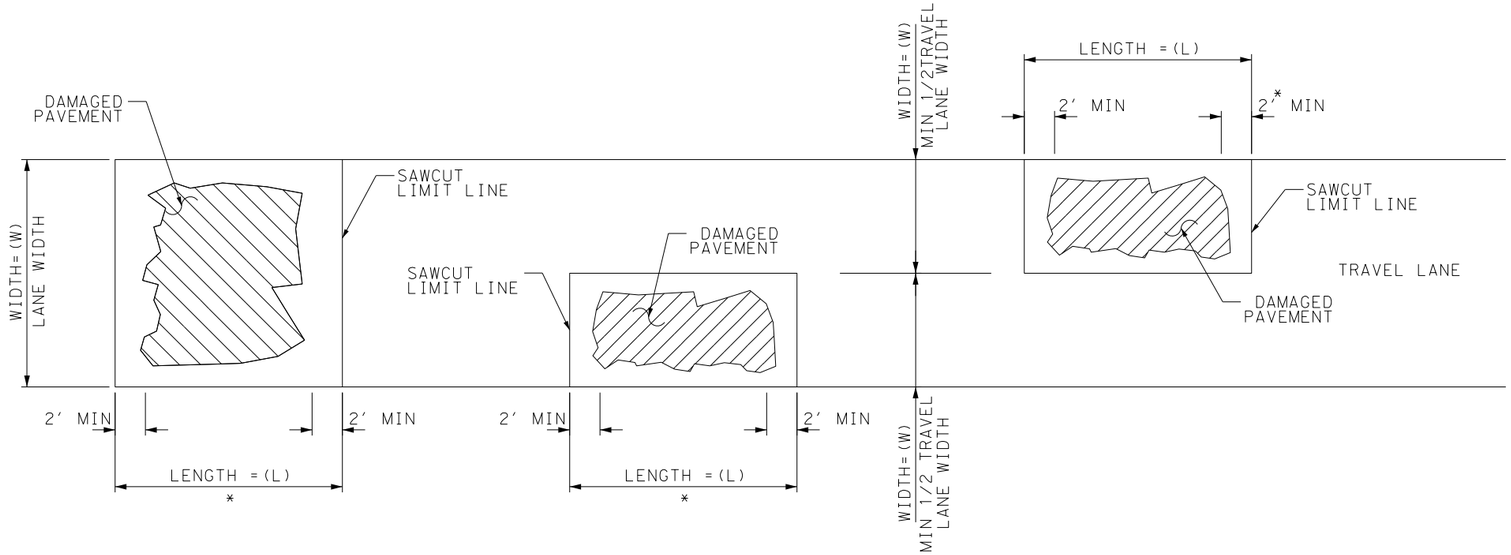
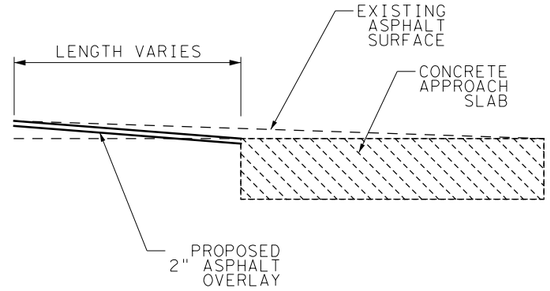
100% PLANS SUBMITTAL

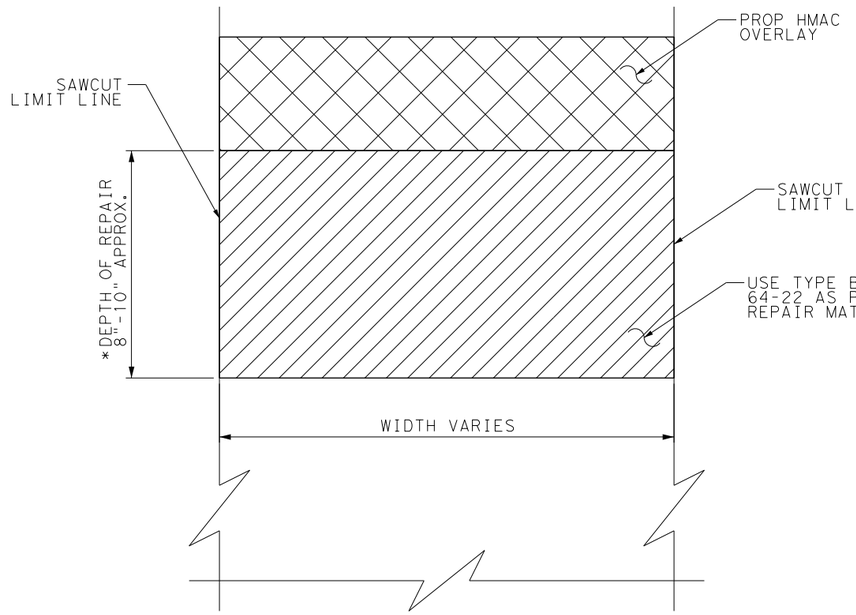


FLEXIBLE PAVEMENT REPAIR DETAIL

* ACTUAL DIMENSIONS AND LOCATIONS TO BE INITIALLY DETERMINED BY THE CONTRACTOR AND COORDINATED WITH THE ENGINEER IN THE FIELD.



MILLING DETAIL AT APPROACH SLAB



FLEXIBLE PAVEMENT REPAIR DETAIL PROFILE VIEW

NOTE:

1. DEPTH OF PVMT REPAIR WILL VARY DEPENDING ON LOCATION. FM 156 REPAIR WILL VARY FROM 8"-10" BASED ON CORES DONE FOR THE PROJECT.
2. DEPTH OF PVMT REPAIRS FOR SIDE STREETS IS ASSUMED TO VARY MORE THAN FM 156. IF THE DEPTH IS DEEPER THEN 8"-10" THEN USE ITEM 351 6039.
3. FULL DEPTH REPAIR FOR FM 156 AND THE SIDE STREETS IS TO MATCH THE EXISTING PAVEMENT DEPTH EXCEPT FOR 2" FOR THE PROPOSED OVERLAY.

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

MISCELLANEOUS ROADWAY DETAILS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	76
CONTROL	SECTION	JOB	
0718	02	072	

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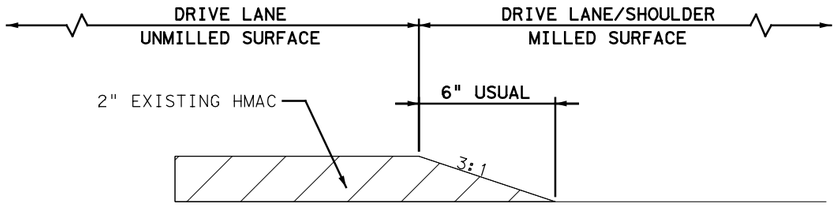
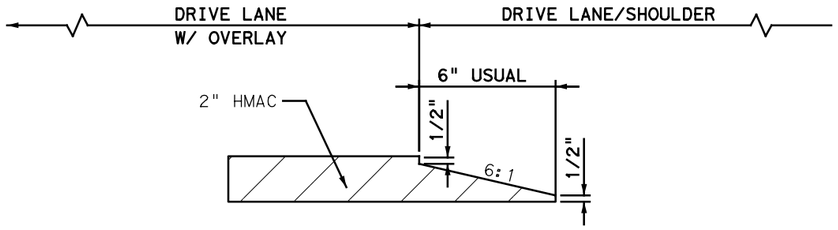


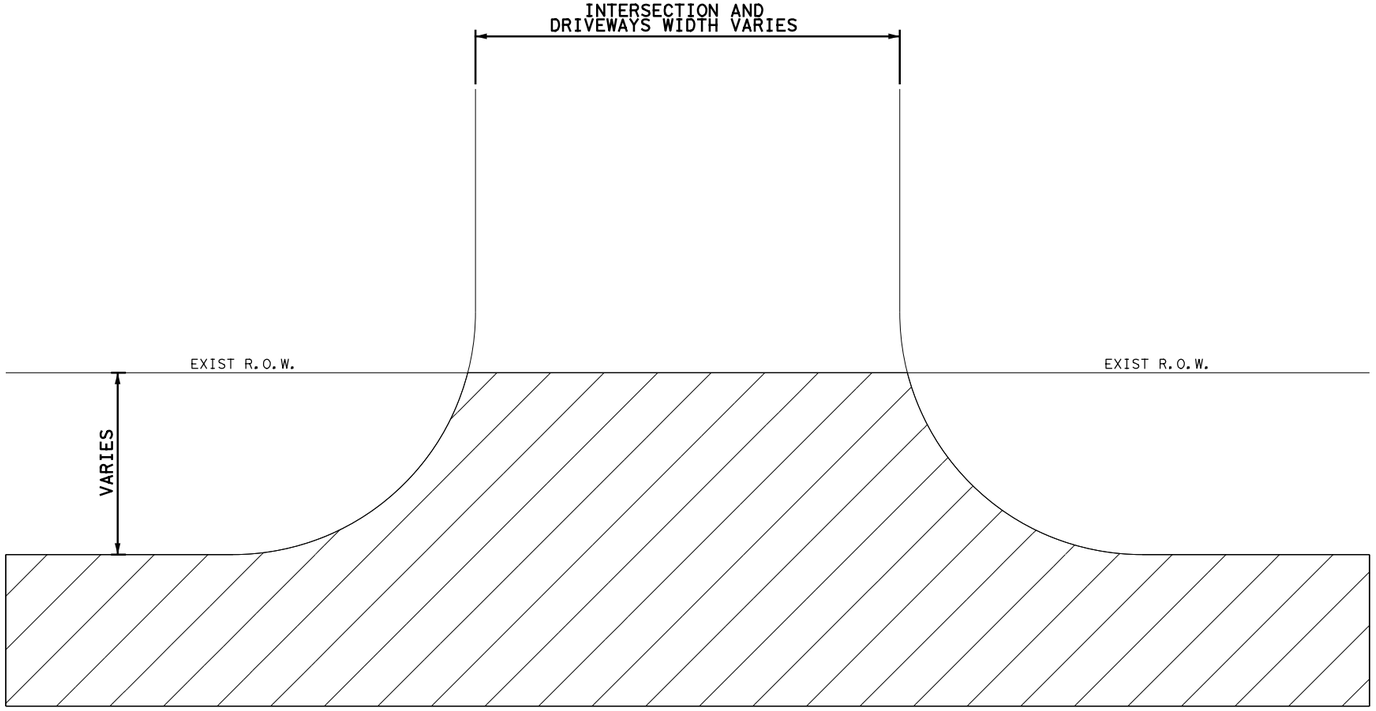
PLANED TAPERED LONGITUDINAL JOINT DETAIL

(N.T.S.)



EXTRUDED TAPERED LONGITUDINAL HOT MIX JOINT DETAIL

(N.T.S.)



HMAC INTERSECTION AND DRIVEWAY DETAIL

NOTE:

1. REFER TO THE PROJECT LAYOUT SHEETS FOR APPROXIMATE MILL AND OVERLAY LIMITS AT INTERSECTIONS AND DRIVEWAYS. ACTUAL LIMITS TO BE DETERMINED & COORDINATED WITH THE ENGINEER IN THE FIELD.
2. DO NOT MILL AND OVERLAY CONCRETE INTERSECTIONS AND DRIVEWAYS.
3. COMPACT TAPER WITH SMALL STATIC STEEL-WHEEL ROLLER OR PNEUMATIC ROLLER.
4. APPLY A UNIFORM AMOUNT OF TACK COAT TO ALL VERTICAL SURFACES PRIOR TO PAVING ADJACENT AREA.
5. APPLY TACK COAT TO WEDGE (TAPERED PORTION) WHEN CONSTRUCTED PAVEMENT HAS BEEN OPEN TO TRAFFIC FOR A SIGNIFICANT AMOUNT OF TIME.

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

MISCELLANEOUS
ROADWAY DETAILS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	77
CONTROL	SECTION	JOB	
0718	02	072	

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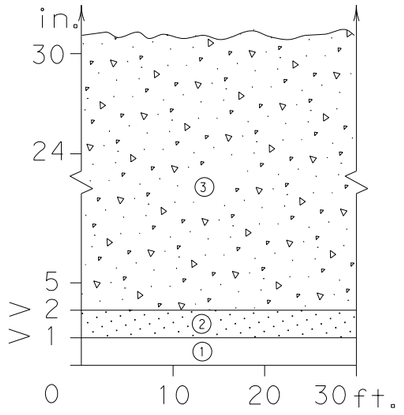
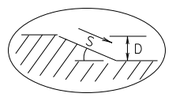
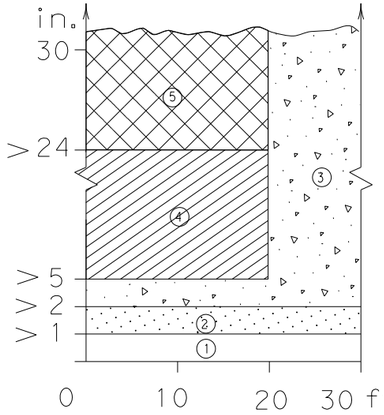
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

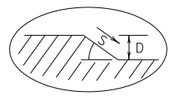


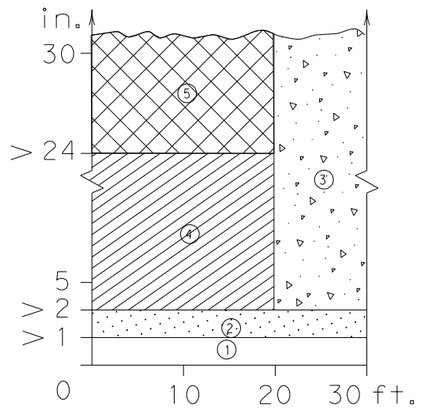
Edge Condition I
S = (3:1) (or flatter)



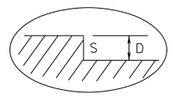


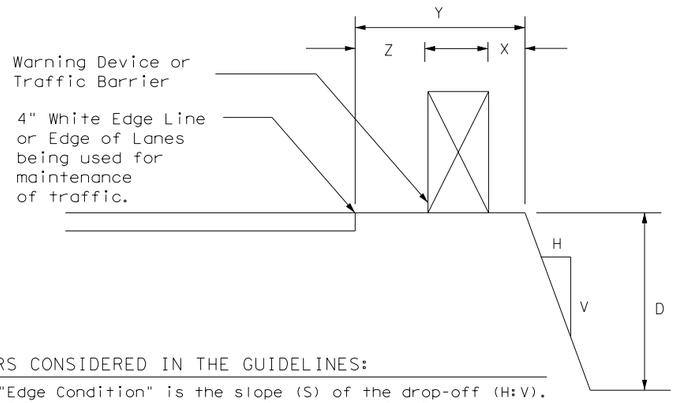
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

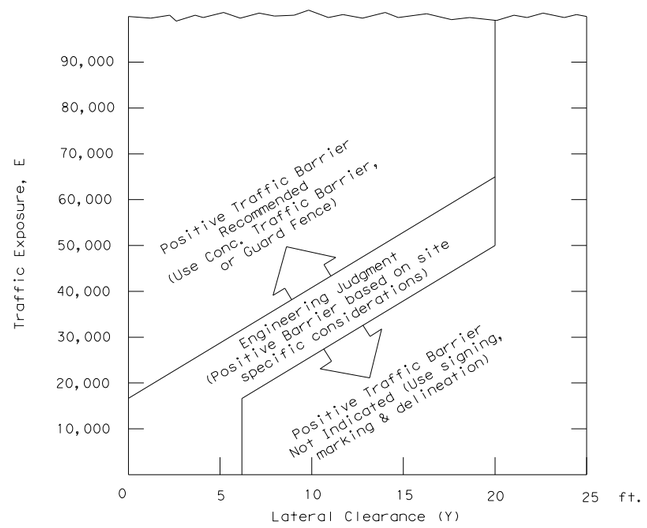
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

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

Engineer's Seal

STATE OF TEXAS
EN WANG
123262
LICENSED
PROFESSIONAL ENGINEER

Date 02/09/23

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		78

DATE: 2/9/2023 2:48:40 PM
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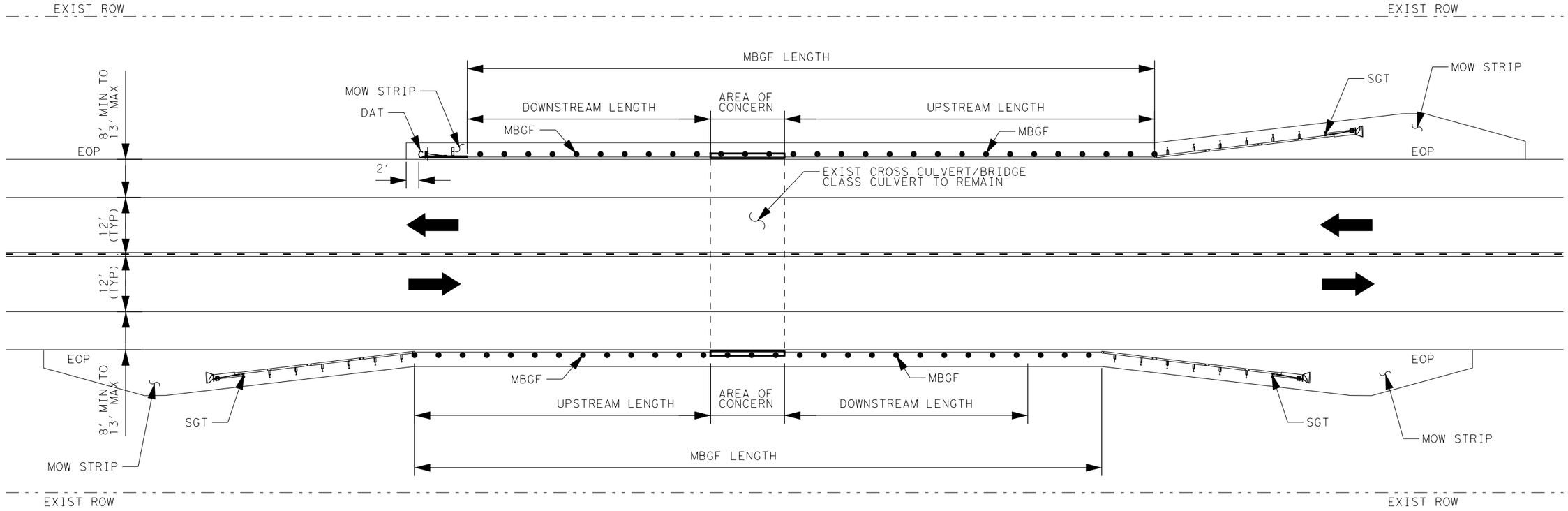
100% PLANS SUBMITTAL



STATION	TYPE	DIRECTION	MBGF TOTAL LENGTH	MBGF UPSTREAM LENGTH	AREA OF CONCERN	MBGF DOWNSTREAM LENGTH	SGT	DAT	THRIE BEAM TRANSITION	REMOVING MBGF	REMOVING TAS	REMOVING SGT	MOW STRIP (4 IN)	OBJECT MARKERS
			LF	LF	LF	LF	EA	EA	EA	LF	EA	EA	CY	EA
39+30 TO 50+70	BRIDGE	NB	112.5	62.5	0	62.5	2	0	2	138	0	2	10	2
39+30 TO 50+70	BRIDGE	SB	112.5	62.5	0	62.5	2	0	2	136	0	2	10	2
75+15 TO 76+60	BRIDGE	NB	625	150	0	475	2	0	2	670	0	2	41	7
75+30 TO 76+70	BRIDGE	SB	375	250	0	125	2	0	2	425	0	2	24	5
102+60 TO 127+45	BRIDGE	NB	2013	250	838	925	2	0	4	2050	0	2	106	24
102+90 TO 124+50	BRIDGE	SB	1963	975	838	150	2	0	4	1966	0	2	99	21

NOTE:

1. MBGF STATIONING PROVIDED IS APPROXIMATE. CONTRACTOR TO ADJUST LOCATIONS OF MBGF IN THE FIELD AS DIRECTED BY THE ENGINEER.

2. REMOVAL OF TRANSITIONS ARE QUANTIFIED AS MBGF REMOVAL.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

MBGF SUMMARY

N. T. S.

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	79
CONTROL	SECTION	JOB	
0718	02	072	

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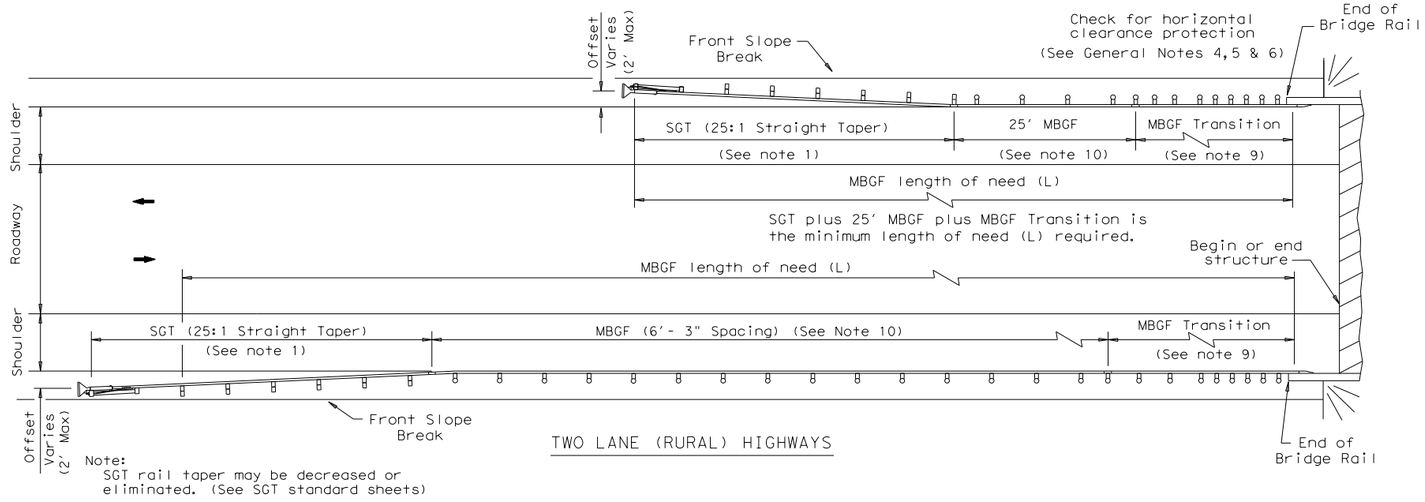
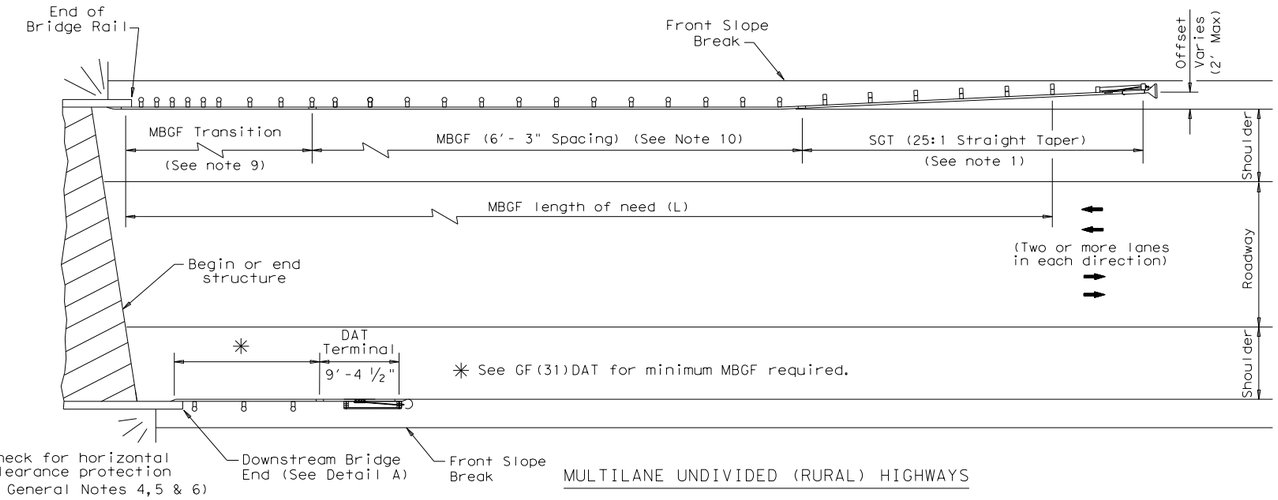
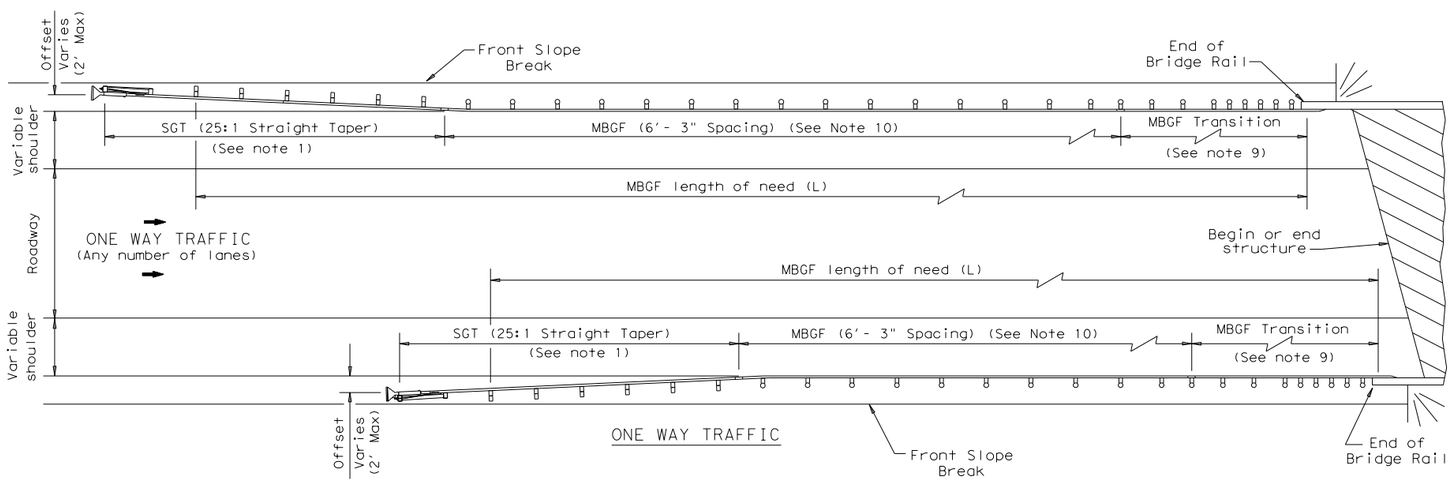


TWO LANE (RURAL) HIGHWAYS

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



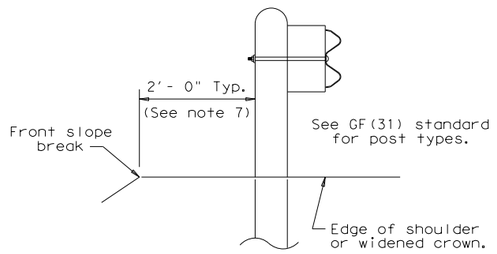
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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

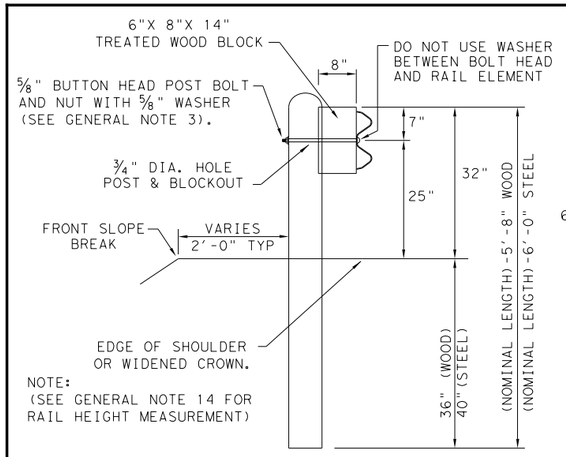
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

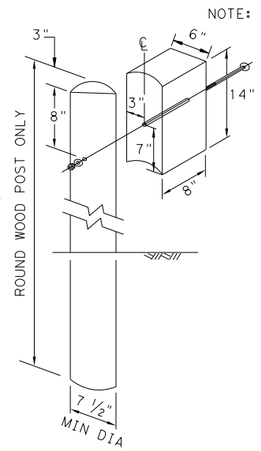
BED-14

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)	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		80

DATE: 1/16/2023
FILE: $FILE$

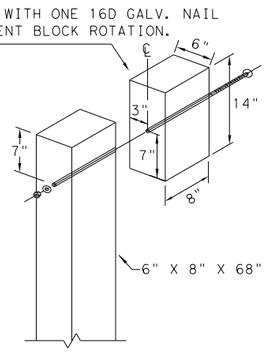


TYPICAL POST PLACEMENT

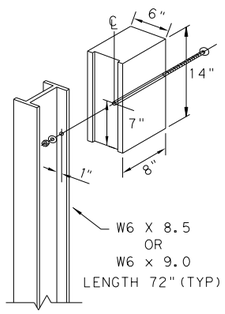


WOOD BLOCK TO ROUND WOOD POST

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

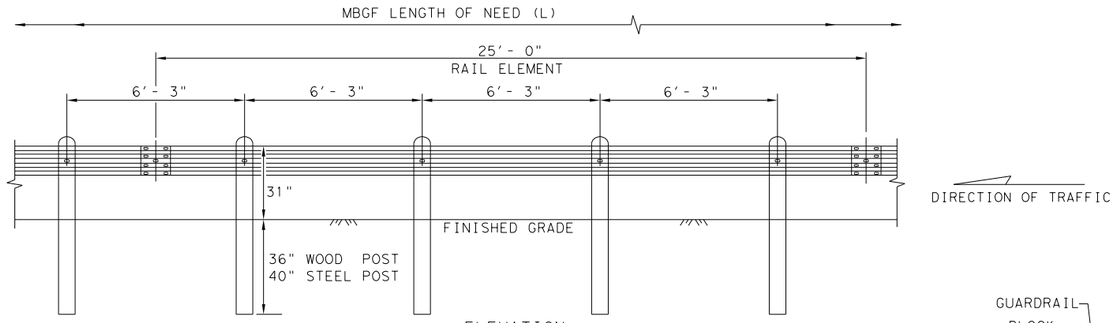


WOOD BLOCK TO RECTANGULAR WOOD POST



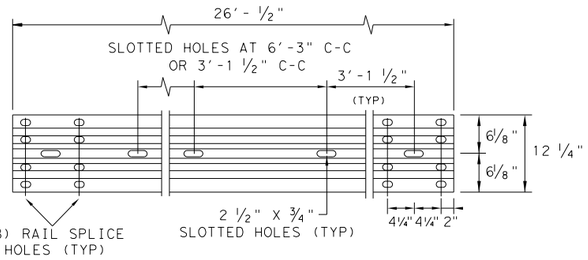
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



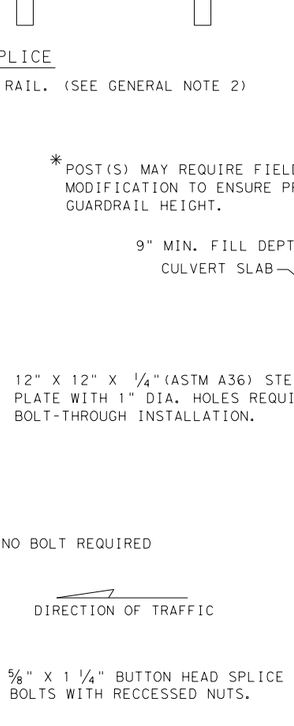
ELEVATION
MID-SPAN RAIL SPLICE

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



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

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



MID-SPAN RAIL SPLICE DETAIL

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

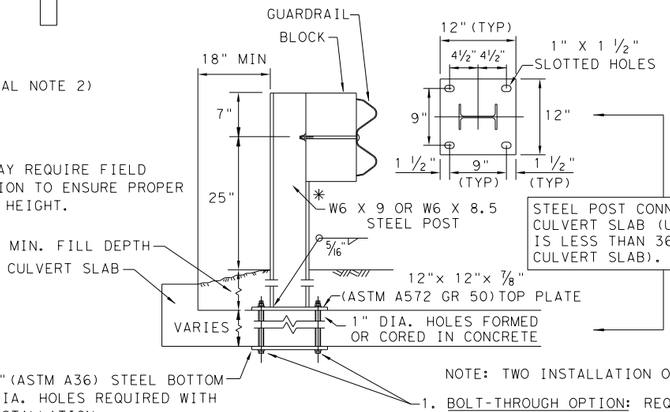
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

BUTTON HEAD BOLT

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



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.

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.

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.

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	0718	02	072	FM156	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		81	

DATE: 1/16/2023
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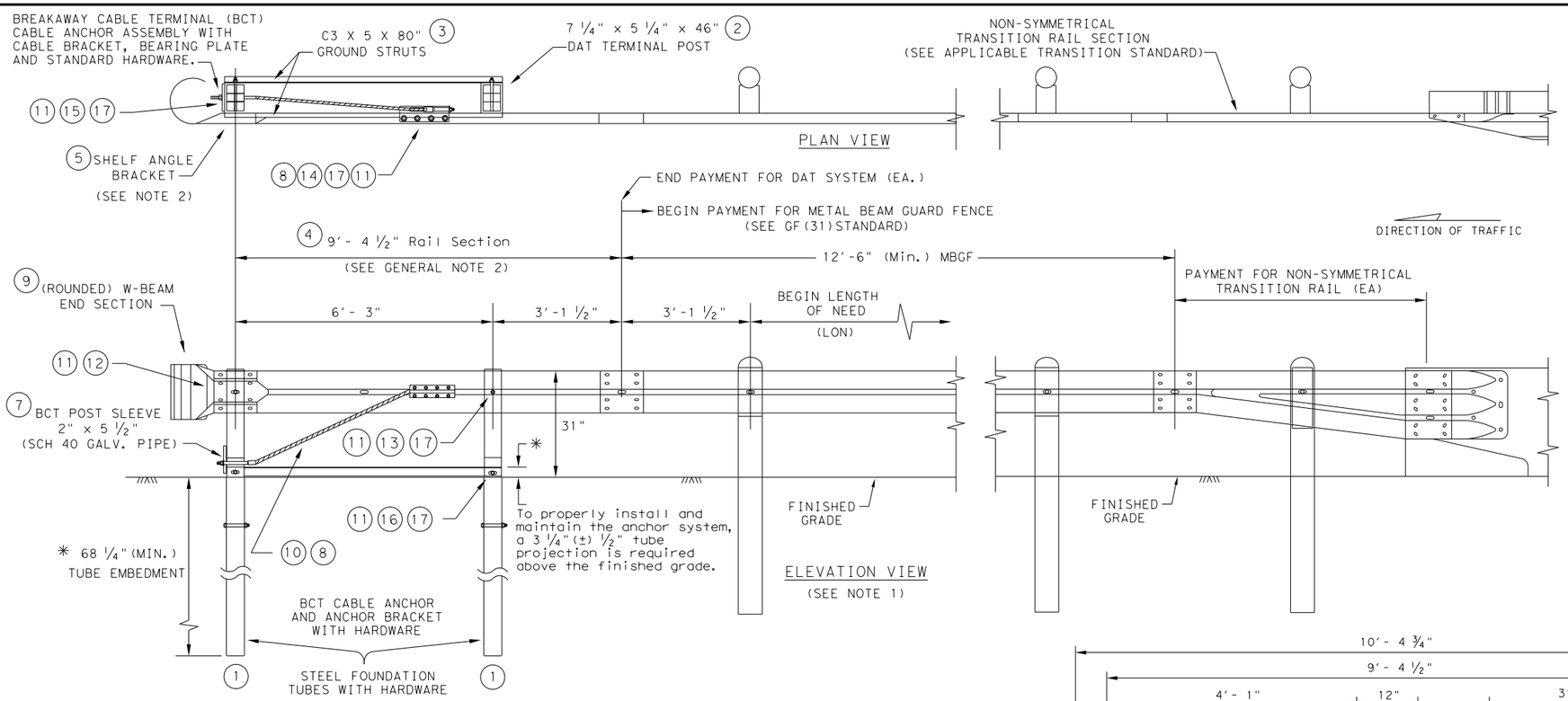


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

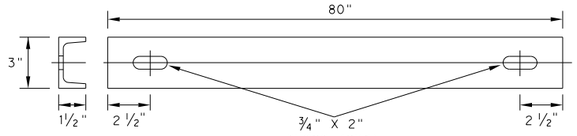
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

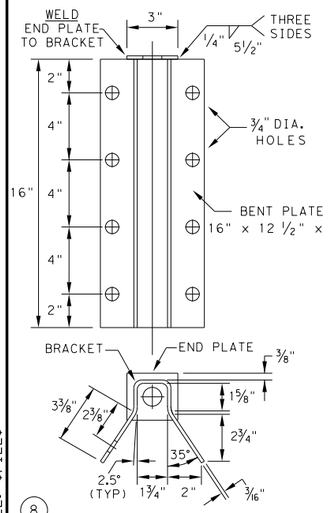
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

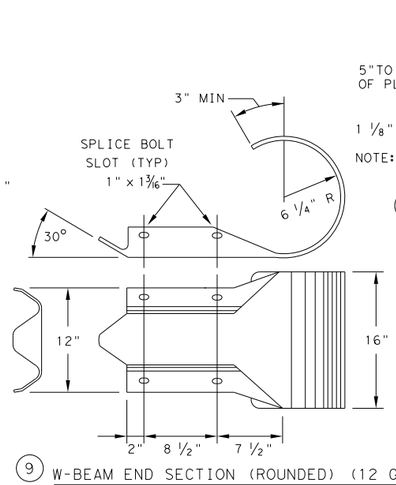
(4) TERMINAL RAIL ELEMENT FOR DAT



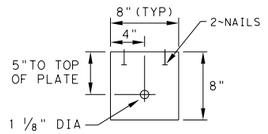
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

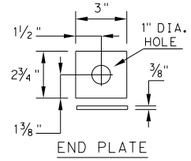


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

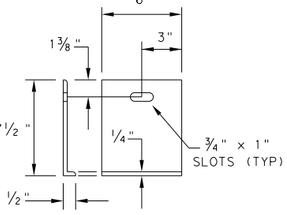


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

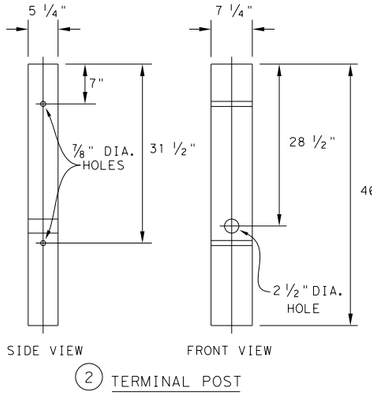
(6) BEARING PLATE
8"x 8"x 5/8" R



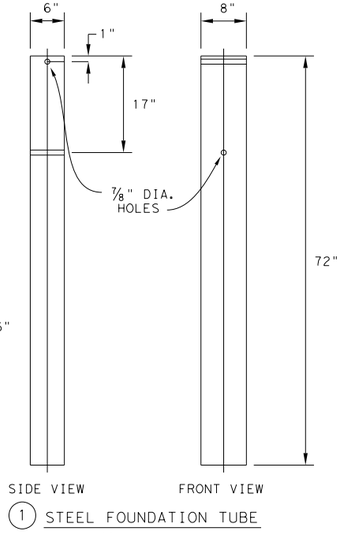
END PLATE



(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

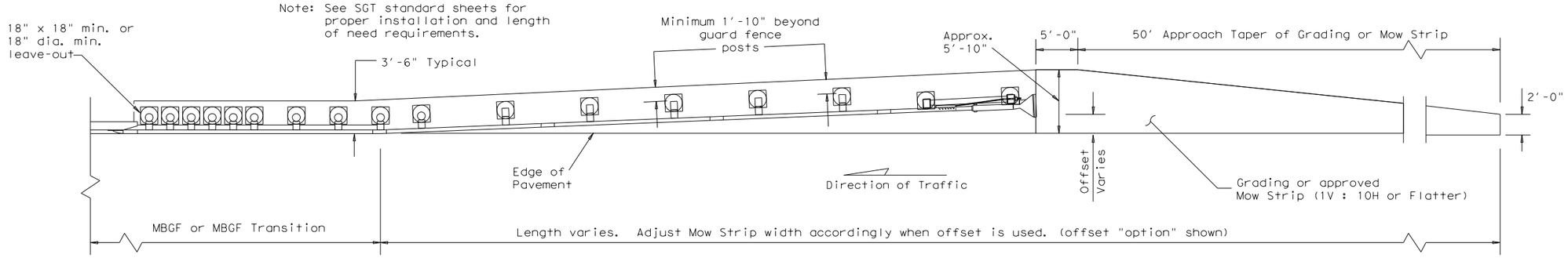
Texas Department of Transportation

Design Division Standard

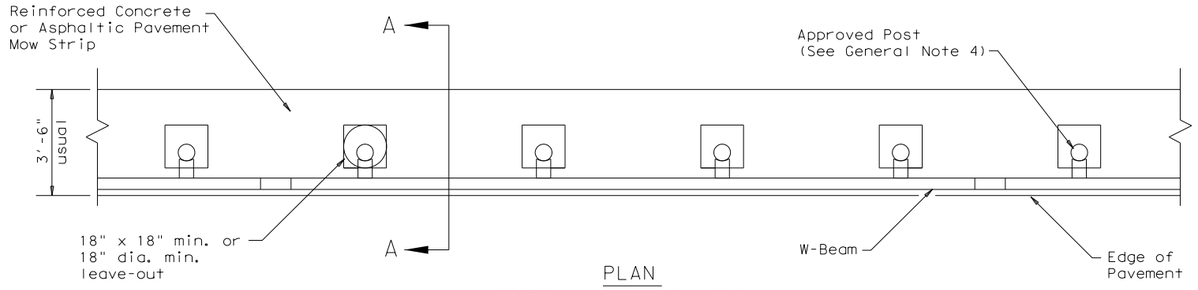
METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		82

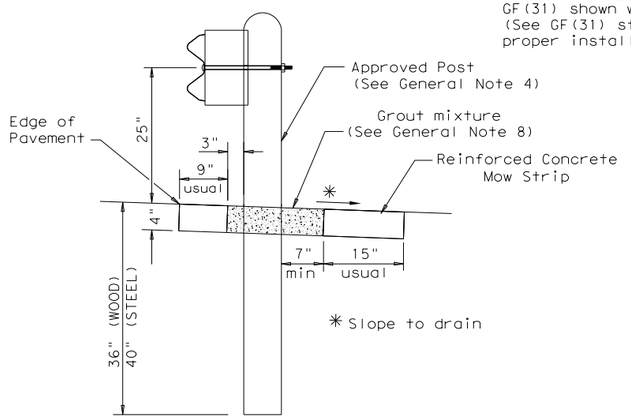


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



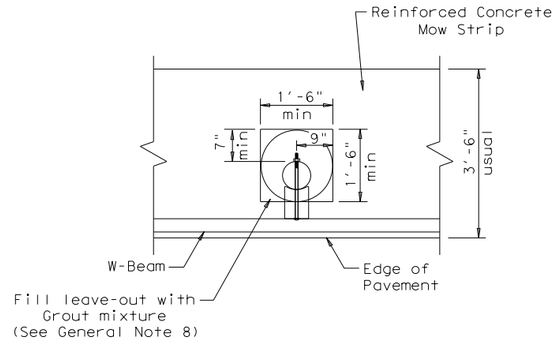
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

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

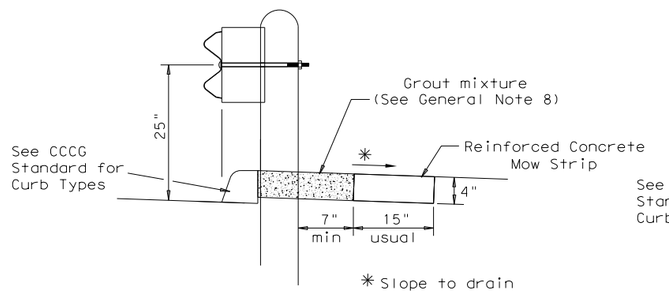
Note: Site Condition(s)

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

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

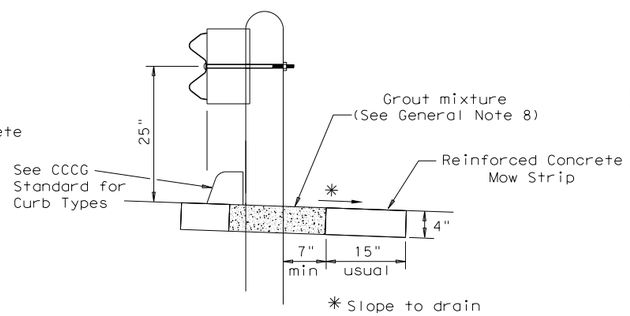
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 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.



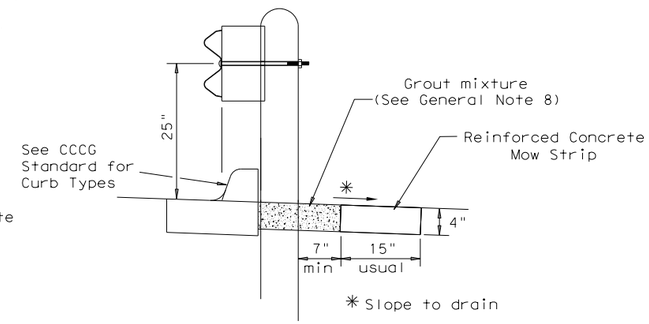
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		83

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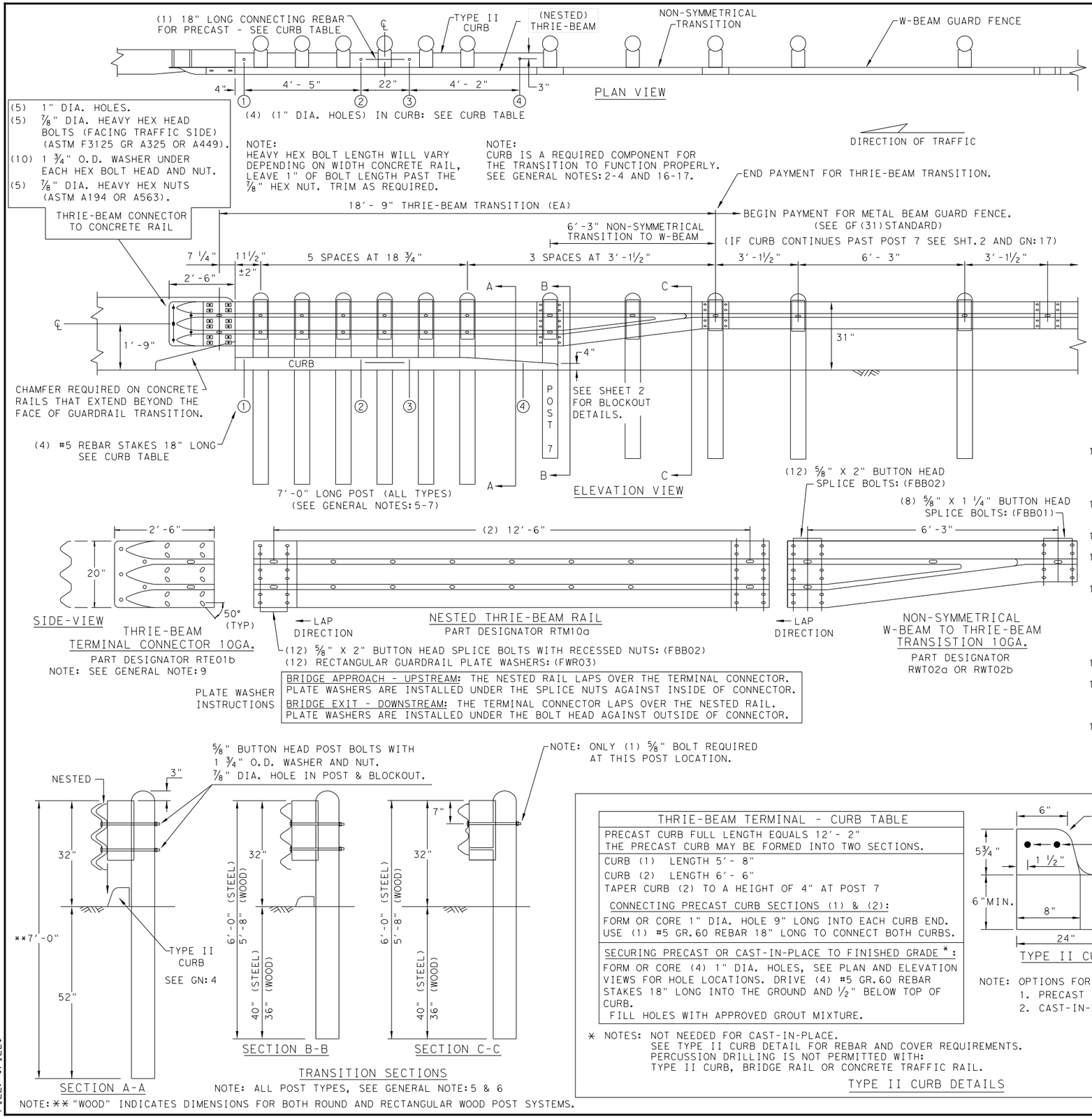


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 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

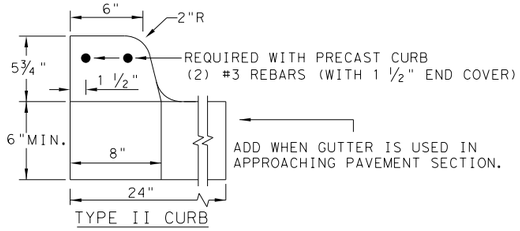
PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

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.

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



TYPE II CURB

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

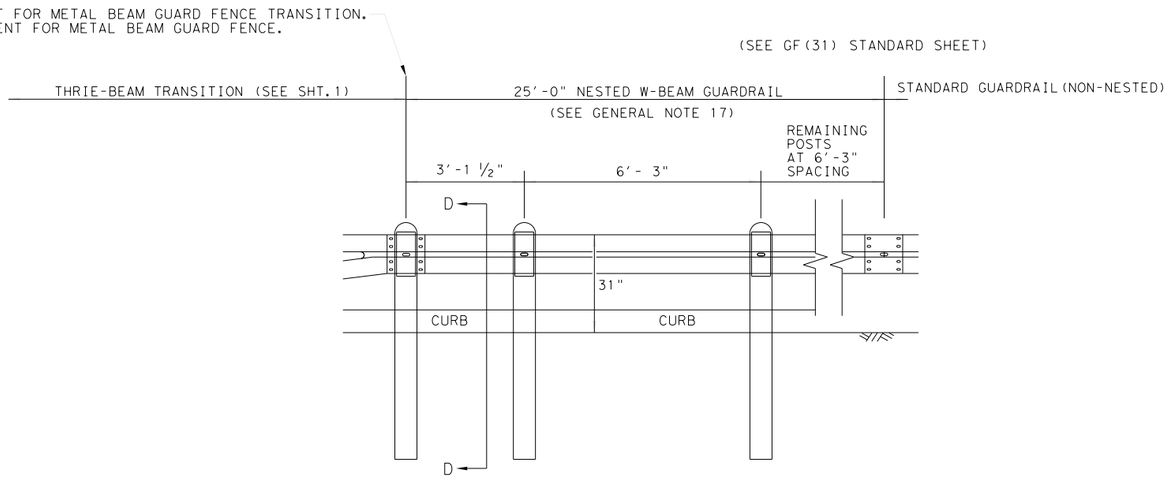
GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0718	02	072	FM156	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		84	

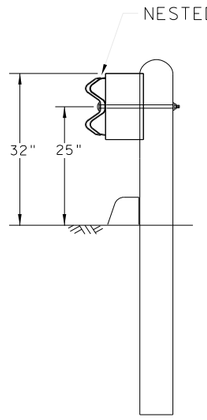
DATE: 1/16/2023
FILE: $FILE$

DATE: 1/16/2023
FILE: $FILE$

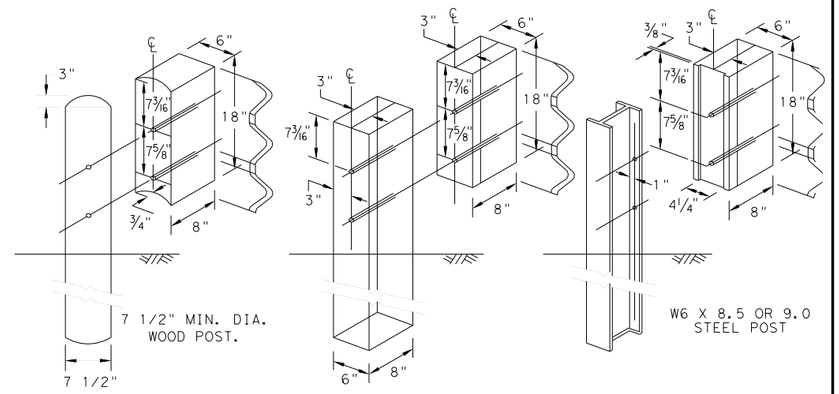
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

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	0718	02	072	FM156	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		85	

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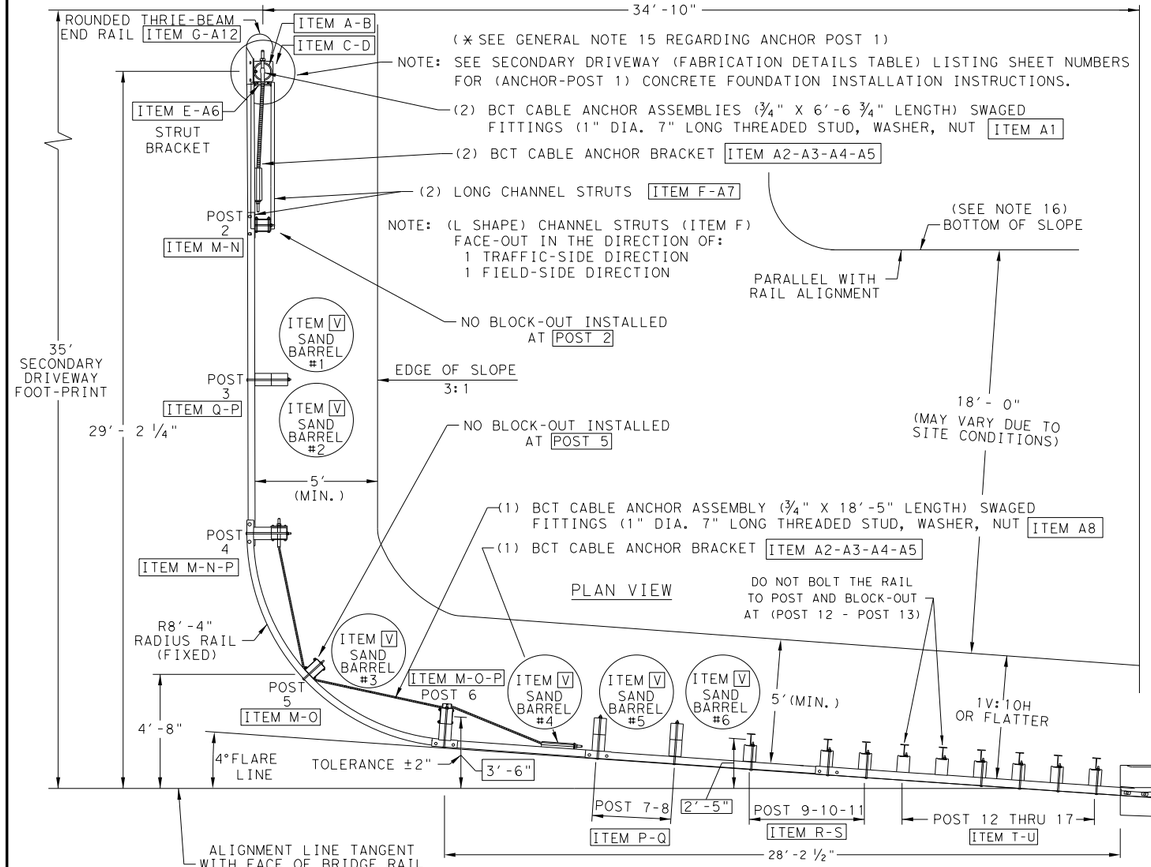
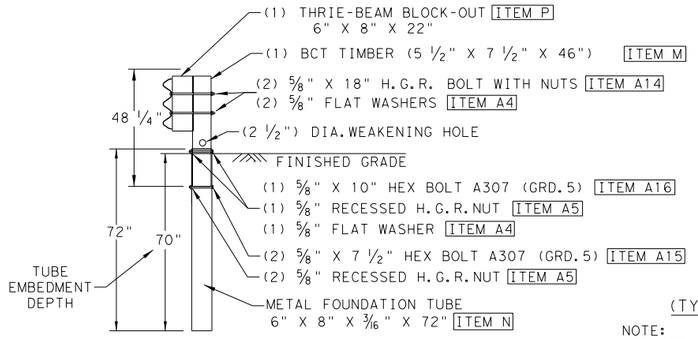
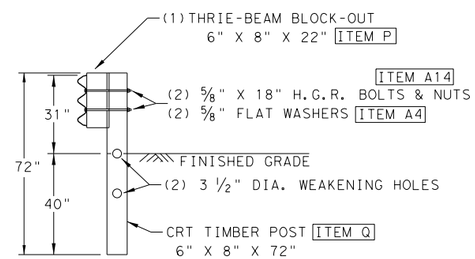
DATE:
FILE:





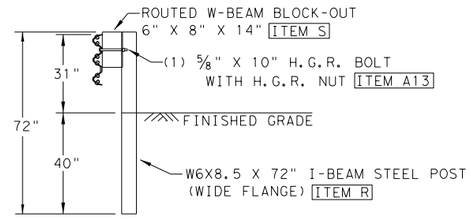
SECTION VIEW (A-A)
TIMBER POST WITH
METAL FOUNDATION TUBE
(TYP) BCT POSTS 2-4-5-6

NOTE:
NO BLOCK-OUTS INSTALLED AT BCT POST 2 - POST 5

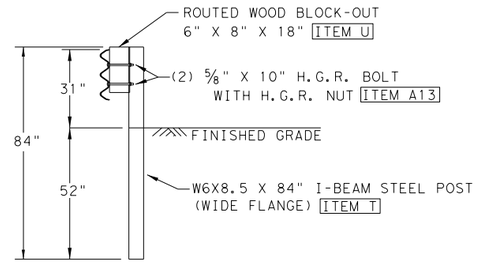


SECTION VIEW (B-B)
(TYP) CRT TIMBER POSTS 3-7-8

NOTE:
SEE SPECIAL APPLICATION NOTES ON SHEET 3 OF 3.
CRT POST WILL REQUIRE AN ADDITIONAL 3/4" HOLE TO ACCOMMODATE THE 22" LONG BLOCKOUT.



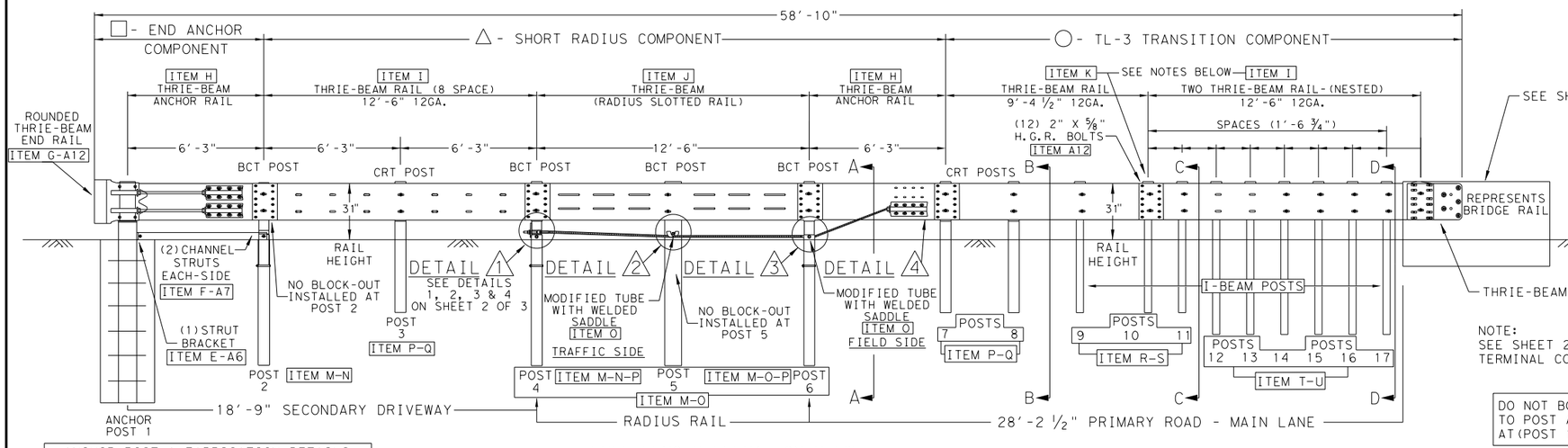
SECTION VIEW C-C
(TYP) AT POSTS 9-10-11



* SECTION VIEW D-D
(TYP) AT POSTS 12-13-14-15-16-17

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13



NOTE:
SEE SHEET 2 FOR THRIE-BEAM TERMINAL CONNECTION DETAILS.

DO NOT BOLT THE RAIL TO POST AND BLOCK-OUT AT (POST 12 & POST 13)

NOTE: FOR POST 12 & 13

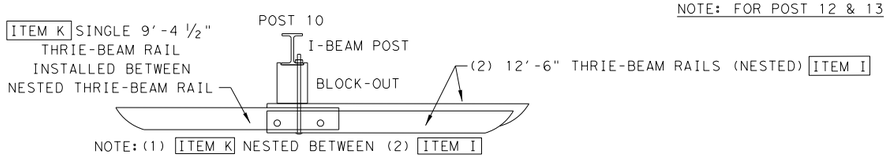
(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

ANCHOR POST 1 FABRICATION DETAILS	
SHEET DESCRIPTION	SHEET NUMBER
ANCHOR POST	SHEET 1 OF 8
ANCHOR SLEAVE	SHEET 2 OF 8
RADIUS RAIL	SHEET 3 OF 8
THRIE-BEAM RAILS	SHEET 4 OF 8
BCT TIMBER POST	SHEET 5 OF 8
STRUT RADIUS ANCHOR	SHEET 6 OF 8
FOUNDATION TUBE	SHEET 7 OF 8
ANCHOR CABLE	SHEET 8 OF 8

FULL-LENGTH ELEVATION VIEW

NOTE: ALL CABLE BRACKET ASSEMBLIES ARE LOCATED ON THE FIELD-SIDE. SHOWN HERE FOR CLARITY.

NOTE: FOR BCT POSTS 2-4-5-6 INSTALL (1) OR (2) ITEM A15-A4-A5 BOLT ASSEMBLIES TO PREVENT TIMBER POST SLIDING DOWN FOUNDATION TUBE.



NESTED-GUARDRAIL SPLICE AT POST 10

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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DATE:
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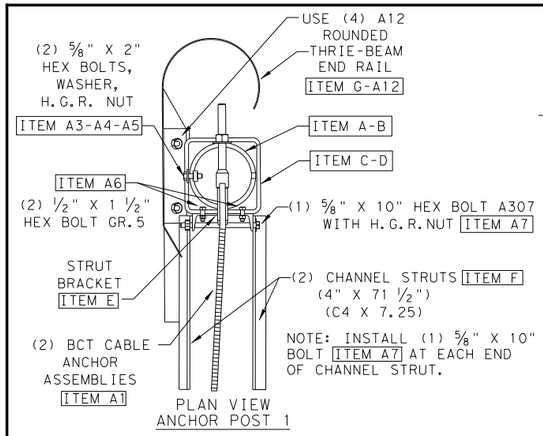
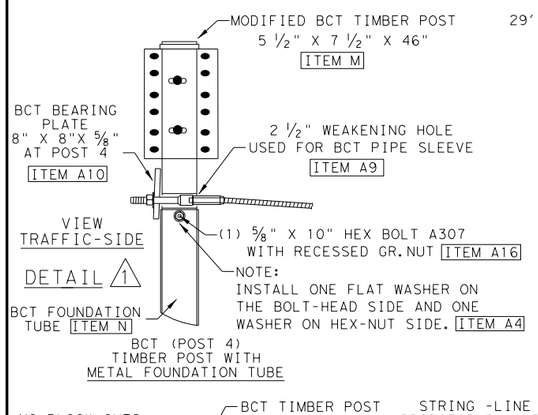
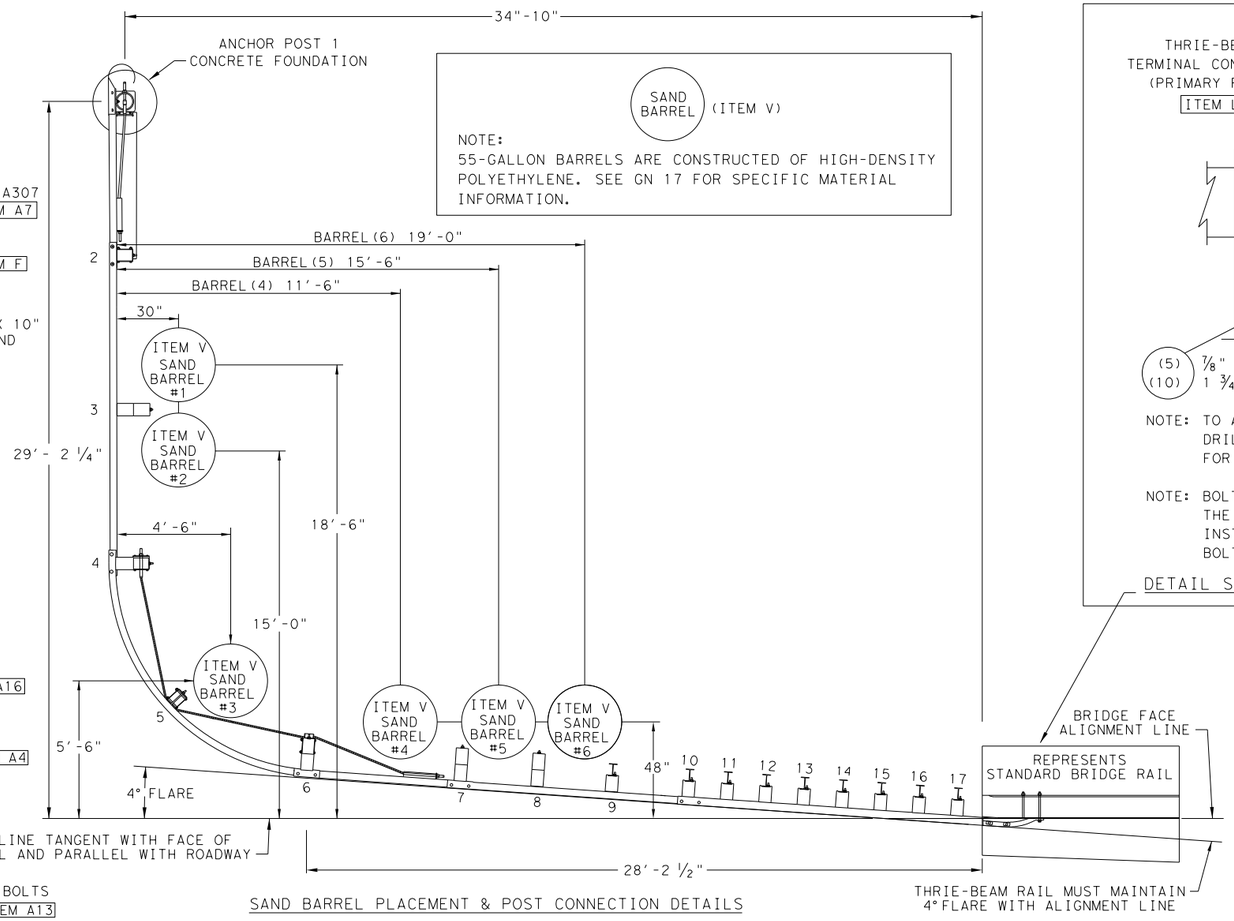


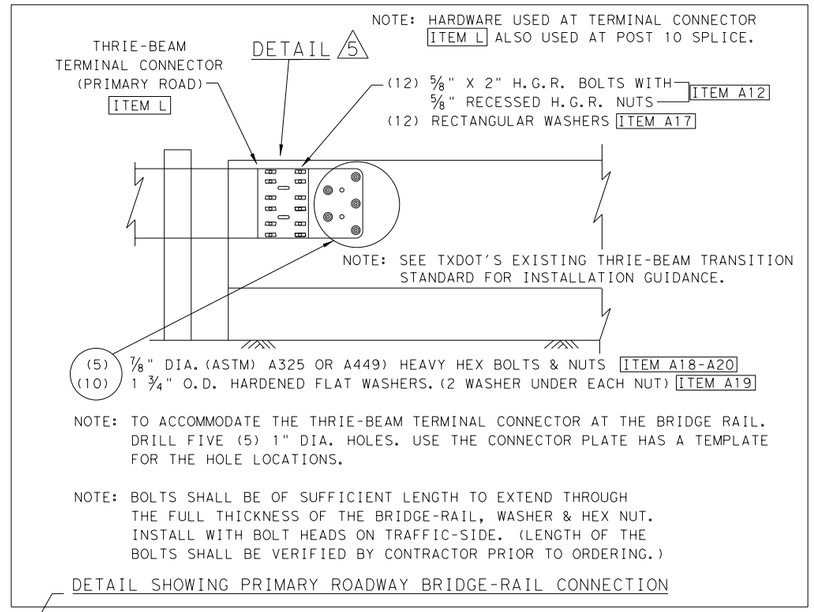
PLAN VIEW
ANCHOR POST 1



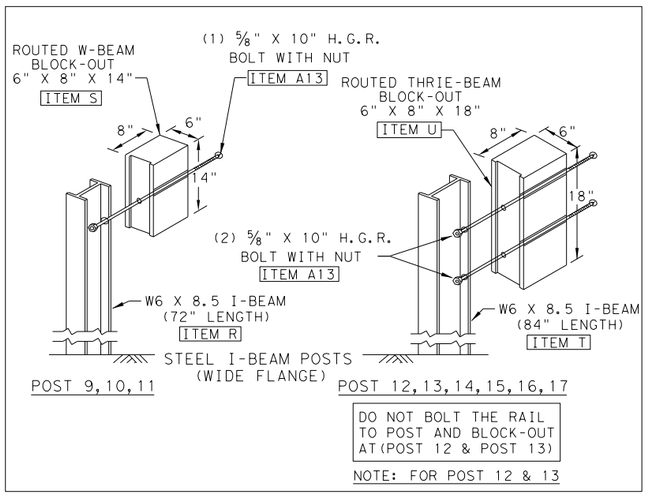
BCT (POST 4)
TIMBER POST WITH
METAL FOUNDATION TUBE

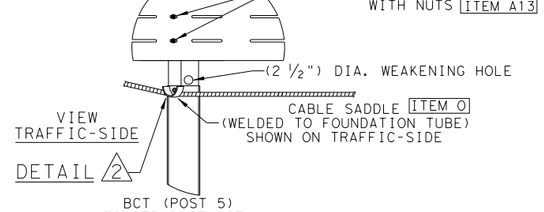


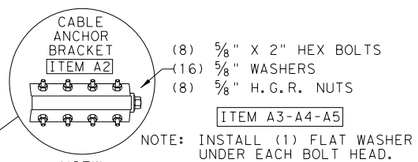
SAND BARREL PLACEMENT & POST CONNECTION DETAILS

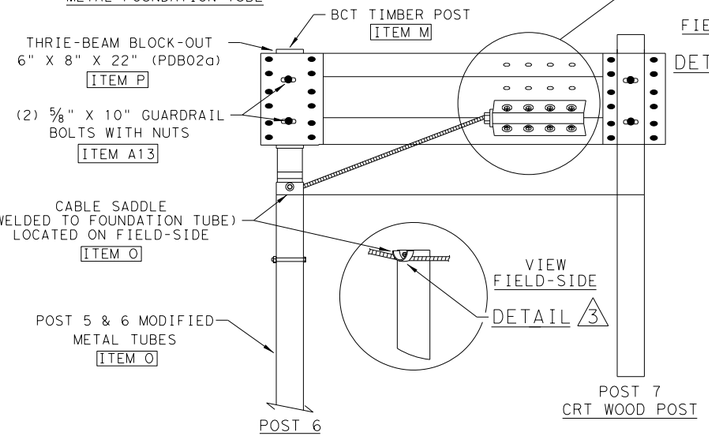


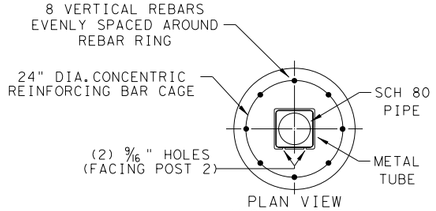
DETAIL SHOWING PRIMARY ROADWAY BRIDGE-RAIL CONNECTION





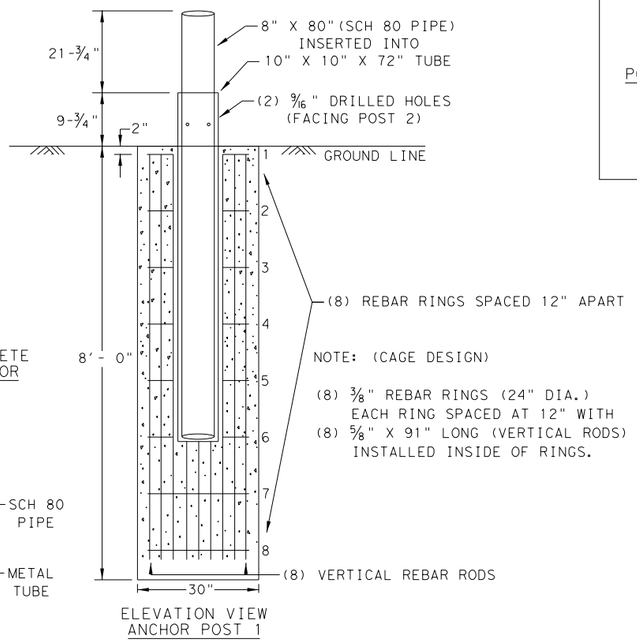






POST 1
REINFORCED CONCRETE
FOUNDATION ANCHOR

PLAN VIEW
ANCHOR POST 1



ELEVATION VIEW
ANCHOR POST 1

(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

Texas Department of Transportation

Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
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	FTW	TARRANT		87

DATE:
FILE:

ITEM	ALL LARGE & SMALL COMPONENT DESCRIPTIONS	END ANCHOR (POST 1 & POST 2) □		TL-3 SHORT RADIUS (POST 2 TO POST 7) △		TL-3 TRANSITION (POST 7 TO POST 17) ○		TL-3 SHORT RADIUS GUARDRAIL COMPLETE SYSTEM	
		ITEM	QTY	ITEM	QTY	ITEM	QTY	ITEM	TOTAL QTY
A	POST 1 TOP (SCH.80 PIPE) (8" X 80" LENGTH)	A	1					A	1
B	POST 1 TOP (WELDED SUPPORT COLLAR 10" X 10" X ½" ASTM A36)	B	1					B	1
C	POST 1 TUBE (HSS 10" X 10" X ½" X 72" LENGTH) A500 GR.B	C	1					C	1
D	POST 1 (WELDED PLATE 9 ¼" X 9 ¼" X ⅛") A36	D	1					D	1
E	POST 1 STRUT BRACKET (C8 X 11.50 A36)	E	1					E	1
F	(POST 1 & 2) CHANNEL STRUTS (4" X 71 ½")(C4 X 7.25)A36	F	2					F	2
G	THRIE-BEAM RAIL (END ANCHOR - ROUNDED TYPE) 12GA. (RTE02a)	G	1					G	1
H	THRIE-BEAM RAIL (ANCHOR) (6'-3" LENGTH) 12GA. (RWM14a)	H	1	H	1			H	2
I	THRIE-BEAM RAIL (8 SPACE) (12'-6" LENGTH) 12GA. (RTM08)			I	1	I	2	I	3
J	THRIE-BEAM RAIL (RADIUS 8'-4 ½") (SLOTTED) 12GA.			J	1			J	1
K	THRIE-BEAM RAIL (3 SPACE) (9'-4 ½" LENGTH) 12GA.					K	1	K	1
L	THRIE BEAM RAIL (TERMINAL CONNECTOR) (BRIDGE-RAIL) (RTE01b)					L	1	L	1
M	POST 2,4,5,6 BCT TIMBER (5 ½" X 7 ½" X 46") (PDF04)			M	4			M	4
N	POST 2,4, BCT TUBE (6" X 8" X 3/16" X 72" LENGTH) (PTE05)			N	2			N	2
O	POST 5,6 MODIFIED BCT TUBES (FOR WELDED CABLE SADDLES)			O	2			O	2
P	POST 3,4,6,7,8 THRIE-BEAM BLOCK-OUT (6" X 8" X 22")(PDB02a)			P	4	P	1	P	5
Q	POST 3,7,8 CRT TIMBER POSTS (6" X 8" X 72" LENGTH)(PDE09)			Q	2	Q	1	Q	3
R	POST 9,10,11 I-BEAM POSTS (W6X8.5 X 72" LENGTH) (PWE01)					R	3	R	3
S	POST 9,10,11 ROUTED W-BEAM BLOCK-OUT(6" X 8" X 14")(PDB01b)					S	3	S	3
T	POST 12 THRU 17 I-BEAM POSTS (W6X8.5 X 84" LENGTH) (PWE07)					T	6	T	6
U	POST 12 THRU 17 ROUTED BLOCK-OUT (6" X 8" X 18") (PDB??)					U	6	U	6
V	SAND BARRELS 700-715 LBS							V	6
A1	BCT CABLE ANCHOR ASSEMBLIES (¾" X 6'-6 ¾" LENGTH) (FCA01)	A1	2					A1	2
A2	BCT CABLE ANCHOR BRACKET (FPA01)	A2	2	A2	1			A2	3
A3	⅝" X 2" HEX BOLT A307 GRD.5 (FOR CABLE BRACKETS)	A3	18	A3	8			A3	26
A4	⅝" FLAT WASHER A307 GRD.5 (1 WASHER UNDER BOLT HEAD & 1 NUT)	A4	36	A4	40			A4	76
A5	⅝" RECESSED H.G.R NUT (NUTS FOR HEX BOLTS)	A5	22	A5	20			A5	42
A6	STRUT BRACKET HARDWARE (½" X 1 ½") HEX BOLT A307 GRD.5	A6	2					A6	2
A7	CHANNEL STRUT HARDWARE (⅝" X 10") HEX BOLT A307 GRD.5	A7	2					A7	2
A8	BCT CABLE ANCHOR ASSEMBLY (FCA02) (¾" X 18'-5" LENGTH)			A8	1			A8	1
A9	BCT POST SLEEVE (FMM02a) (POST 4 ONLY)			A9	1			A9	1
A10	BCT CABLE BEARING PLATE (⅝" X 8" X 8" (FPB01) (POST 4 ONLY)			A10	1			A10	1
A11	⅝" X 1 ¼" H.G.R. BOLTS (FBB01) (SPLICES AT POST 2,4,6,7)			A11	48			A11	48
A12	⅝" X 2" H.G.R. BOLTS (FBB02)(ROUND TERM-POST 10-END SPLICE)	A12	4			A12	24	A12	28
A13	⅝" X 10" H.G.R. BOLTS (FBB03) (I-BEAM POSTS RAIL & BLOCKOUT)					A13	18	A13	18
A14	⅝" X 18" H.G.R. BOLTS (FBB04) (POSTS 3,4,6,7,8)			A14	8	A14	2	A14	10
A15	⅝" X 7 ½" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A15	8			A15	8
A16	⅝" X 10" HEX BOLTS A307 GRD.5 (BCT POSTS 2,4,5,6)			A16	4			A16	4
A17	RECTANGULAR WASHERS (FWR03) (FOR TERMINAL CONNECTOR RTE01b)					A17	12	A17	12
A18	⅞" X (LENGTH VARIES) HEX BOLTS A325 OR A449 GR.5					A18	5	A18	5
A19	1 ¾" O.D. HARDENED FLAT WASHER A325					A19	10	A19	10
A20	⅞" HEX NUT GR.5 A325					A20	5	A20	5

GENERAL NOTES

1. FOR ADDITIONAL INSTALLATION INFORMATION AND GUIDANCE CONTACT: TEXAS DEPARTMENT OF TRANSPORTATION, (TXDOT'S DESIGN DIVISION). (512) 416-2678. THE EXACT POSITION OF MBGF SHALL BE SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER. THE SIGHT DISTANCE OF THE INSTALLATION WILL NEED TO BE VERIFIED WITH RESPECT TO THE SPECIFIC SITE PLACEMENT.
2. STEEL POSTS ARE NOT PERMITTED AT CRT OR BCT POST POSITIONS.
3. RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12 ½" OR 25 FOOT NOMINAL LENGTHS.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
7. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A SLOPE RATE OF NOT MORE THAN 1V:10H.
8. IT IS NOT RECOMMENDED THAT GUARD FENCE BE PLACED IN THE VICINITY OF CURBS.
9. GUARDRAIL POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
10. SPECIAL FABRICATION WILL BE REQUIRED FOR THRIE BEAM RAIL RADIUS (ITEM J).
11. ALL MATERIAL AND WORK INVOLVED IS SUBSIDIARY TO SHORT RADIUS BID ITEM, INCLUDING, BUT NOT LIMITED TO FOUNDATIONS, GRADING, THRIE BEAM RAIL, SAND BARRELS, AND OTHER PARTS.
12. ALL CABLE ASSEMBLIES SHOULD BE TAUT AFTER INSTALLATION. WHEN CABLES ARE MANIPULATED BY HAND THE CABLES SHOULD NOT MOVE MORE THAN 1" IN ANY DIRECTION PERPENDICULAR TO THE CABLE.
13. THE BCT BEARING PLATE INSTALLED AT POST 4 SHOULD BE ORIENTED SUCH THAT THE 3" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE BOTTOM AND 5" DIMENSION FROM PLATE EDGE TO CENTER OF BOLT HOLE IS ON THE TOP.
14. FOUNDATION AT POST 1 SHALL BE CLASS C CONCRETE.
*15. POST (1) IS NOT A CRASHWORTHY TERMINAL. THE DESIGN AND PLACEMENT OF POST (1) MUST BE OUTSIDE OF THE CLEAR ZONE OF THE SECONDARY ROADWAY USING THE RESPECTIVE CLEAR ZONE CRITERIA. PLEASE CONTACT THE DESIGN DIVISION (512) 416-2678 FOR ASSISTANCE IN DETERMINING THE APPROPRIATE USE AND/OR PLACEMENT OF THE SYSTEM IN CONSTRAINED LOCATIONS. THE PAYMENT OF THE COMPLETE SYSTEM WILL BE WITH BID ITEMS: 540 XXXX TL-3 31" SHORT RADIUS (COMPLETE).
16. TESTED TO MASH WITH A 3:1 SLOPE OR SHALLOWER IS PREFERABLE IN THE LIMITS OF THE TOP AND BOTTOM OF THE SLOPE AS SHOWN IN THE PLAN VIEW. IF FIELD CONDITIONS REQUIRE A STEEPER SLOPE, THIS MAY BE ALLOWABLE UP TO A 2:1 SLOPE. CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE.
17. THE BARRELS ARE ENERGY ABSORPTION ENERGITE III, MODEL 640 FILLED WITH 715 LB (+/-15) SAND; OR AN APPROVED EQUIVALENT. THE APPROXIMATE HEIGHT OF THE BARREL IS 41" (+/-).
18. ALTERNATE METHODS TO TERMINATE THE SRG ALONG THE PRIMARY ROADWAY ARE AVAILABLE WHEN SITE CONDITIONS DICTATE. CONTACT DESIGN DIVISION FOR DETAILS: 512 416-2678

NOTE: SEE SHEET 1 OF 3.

(MASH TL-3 COMPLIANT)
TESTED TO MASH TL-3 WITH A 3:1 SLOPE

SPECIAL APPLICATION NOTES.

1. THIS IS A MASH COMPLIANT TL-3 SHORT RADIUS GUARDRAIL SYSTEM WITH A TOP RAIL HEIGHT OF 31". AVAILABLE FOR USE ON ANY SPEED ROADWAY. THE SYSTEM REQUIRES A MINIMUM PLACEMENT FOOTPRINT OF 34'-10" ALONG THE PRIMARY ROAD AND A 35'-0" ALONG SECONDARY DRIVEWAY.
2. IT IS CRITICAL THAT THE PRIMARY GUARDRAIL MAINTAIN A (4 DEGREE FLARE) WITH THE SECONDARY DRIVEWAY.
3. THE SYSTEM REQUIRES A MINIMUM 5' WIDE (WORK ZONE) DIRECTLY BEHIND THE GUARDRAIL SYSTEM WITH A SLOPE AT 1V:10H OR FLATTER FROM THERE A MAXIMUM 3:1 SLOPE IS RECOMMENDED. SEE SHEET 1 OF 3 FOR FLARE AND SLOPE DETAILS.
4. NOTE FOR INSTALLER: THE THREE (3) CRT POSTS ITEM (Q), AT POST LOCATIONS, 3, 7, & 8.), REQUIRE THE FOLLOWING FIELD ADJUSTMENT. USING A ¾" X 10" LONG SPADE BIT DRILL ONE (1) ADDITIONAL HOLE 7-⅞" DIRECTLY BELOW THE EXISTING TOP HOLE TO ACCOMMODATE THE HARDWARE FOR THE 22" LONG BLOCKOUT.

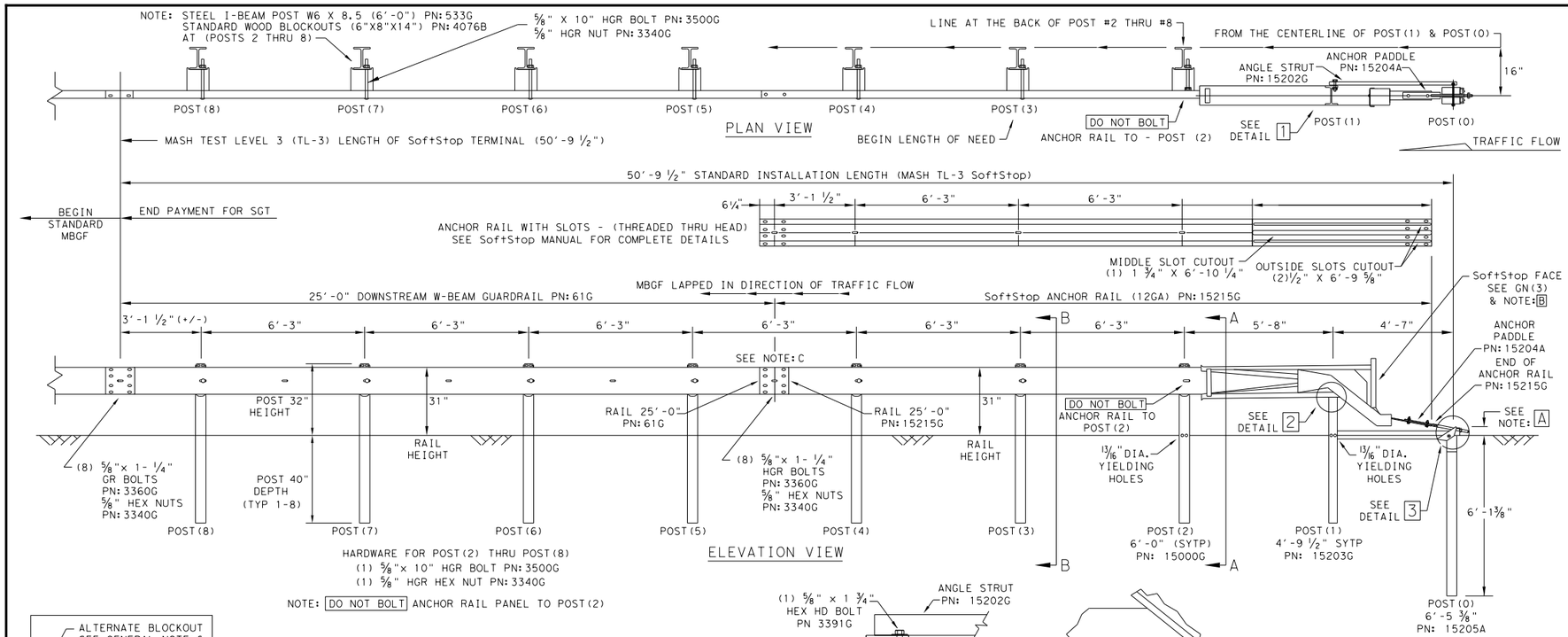
   OPTION FOR ADDITIONAL ¾" HOLE. THE 22" LONG BLOCKOUT (PDB01a) IS MANUFACTURED WITH TWO ¾" DRILLED HOLES FOR THE POST HARDWARE, THEREFORE THE BLOCKOUT CAN BE USED AS A TEMPLATE GUIDE FOR THE BOTTOM ¾" HOLE. AFTER INSTALLING THE CRT POST USE THE TOP HOLE TO MOUNT THE 22" LONG BLOCKOUT TO POST, USE THE BLOCKOUT'S PRE-DRILLED HOLE AS A GUIDE FOR THE BOTTOM ¾" HOLE.

Texas Department of Transportation — Design Division Standard

TL-3
SHORT RADIUS GUARDRAIL
MASH COMPLIANT

SRG(TL-3)-21

FILE: srgt1321	TxDOT	CK:KM	DN: VP	CK:CGL
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		88



GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN: 620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY		
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	FTW	TARRANT		89		

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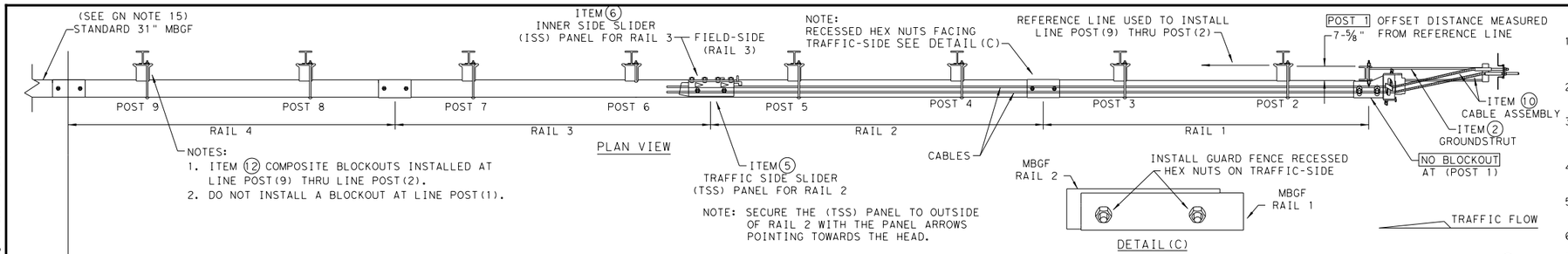
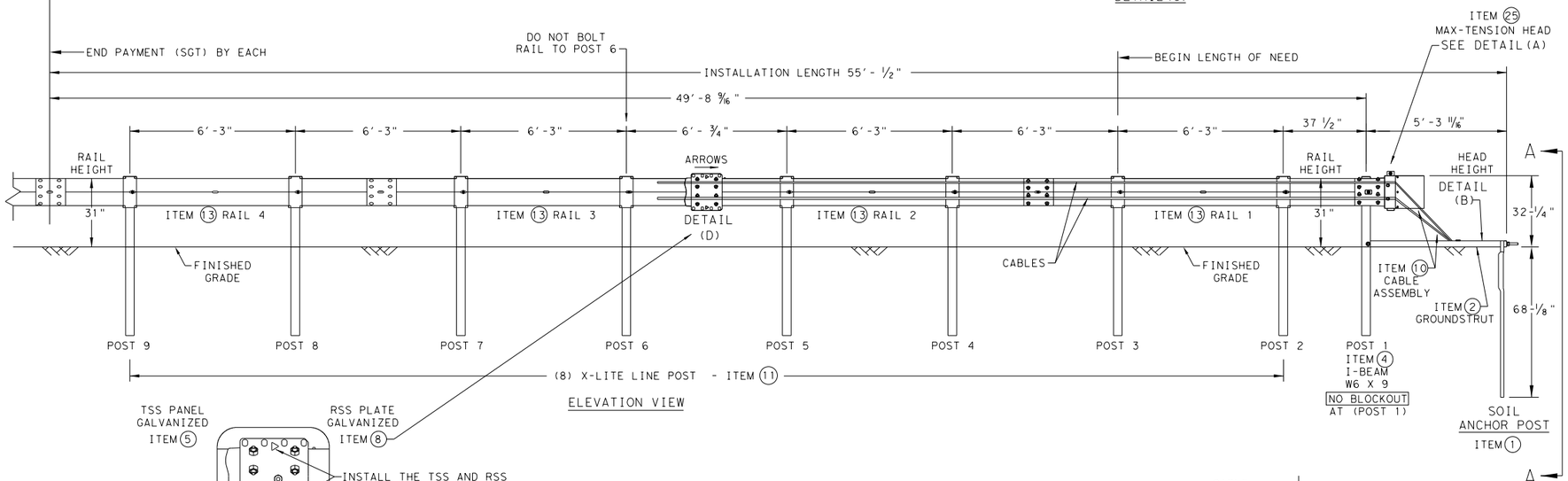
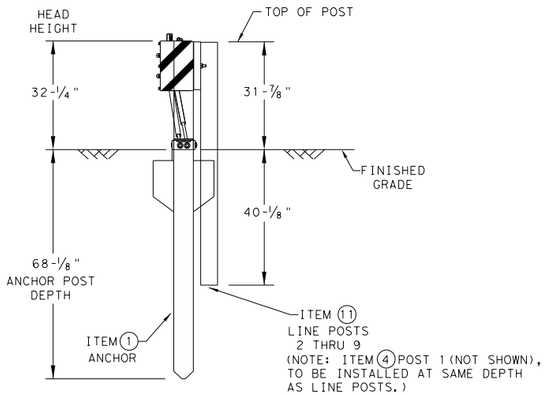
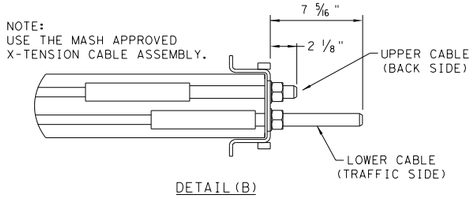
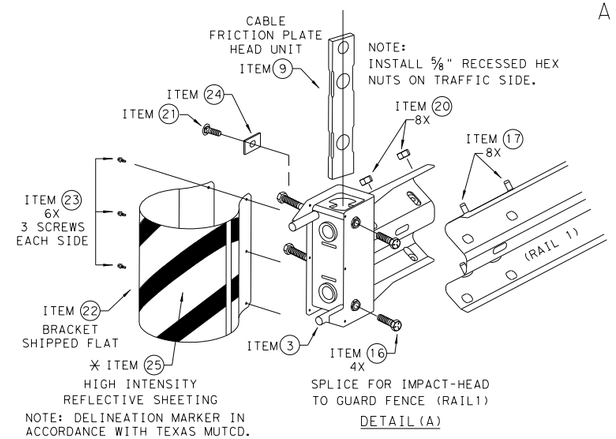










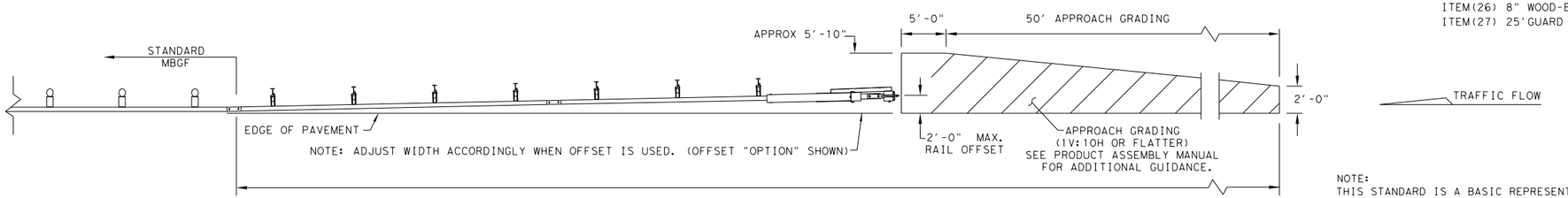
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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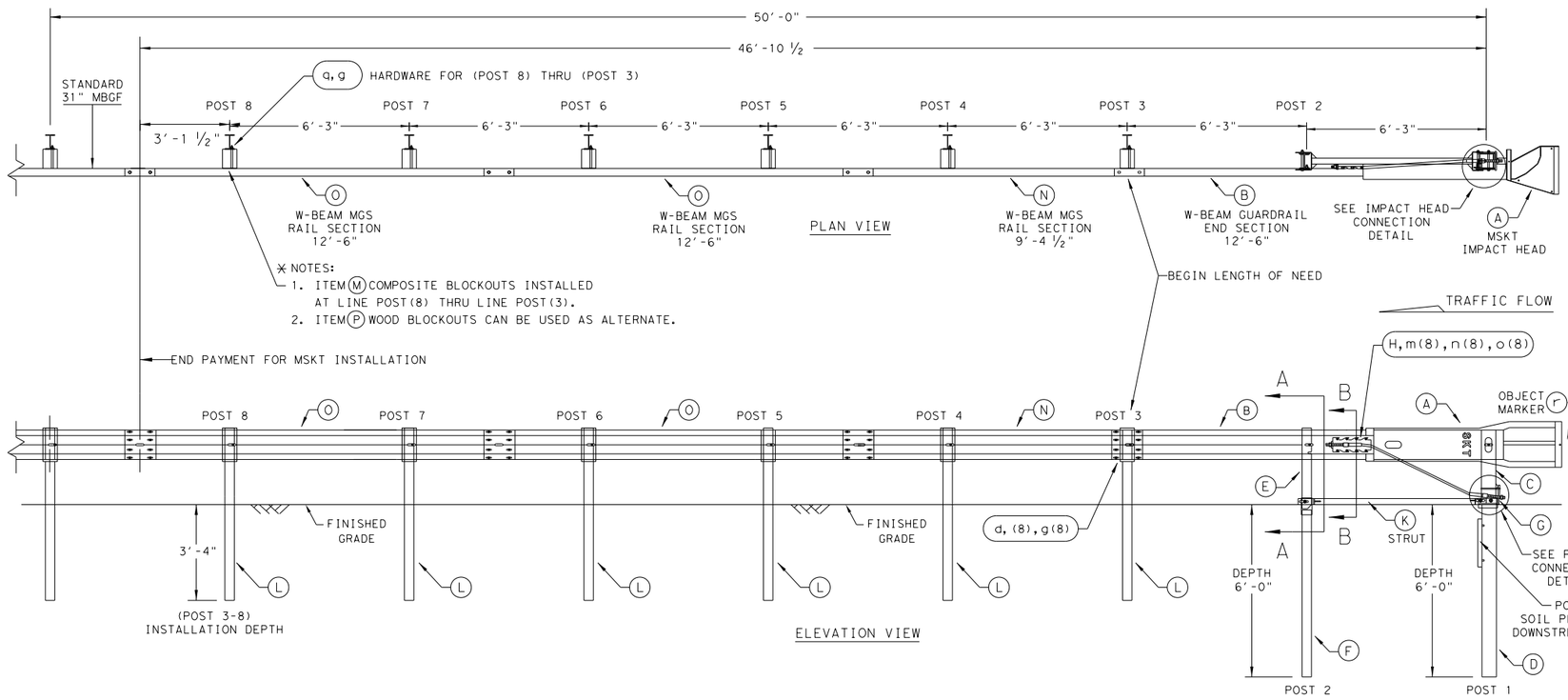
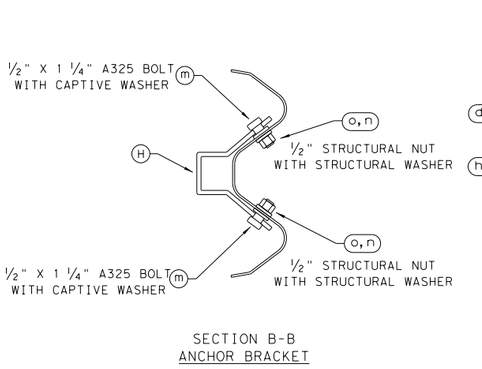
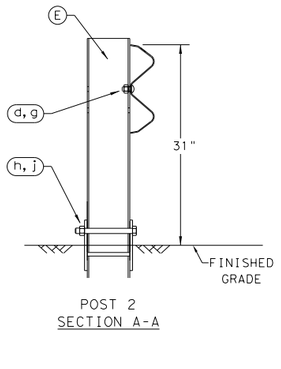
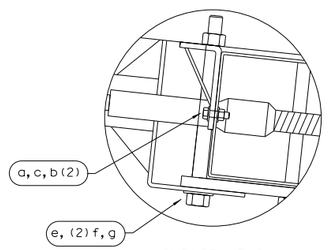
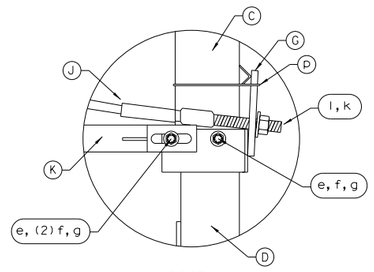


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

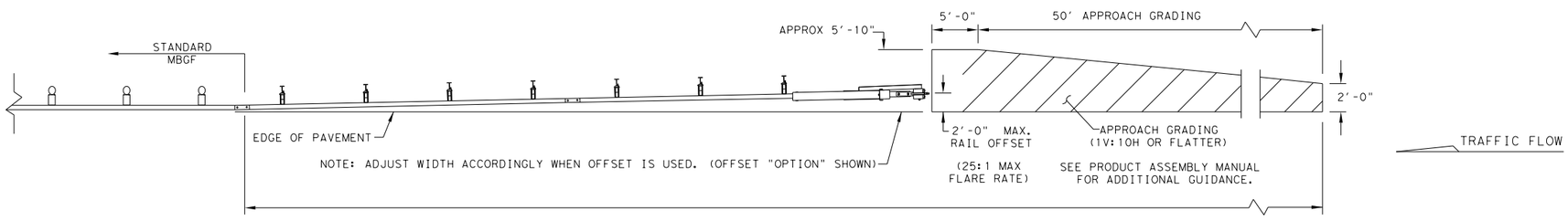








ALTERNATIVE ITEMS NOT SHOWN.
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

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 9/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: ✳

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
©TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
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	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		91	

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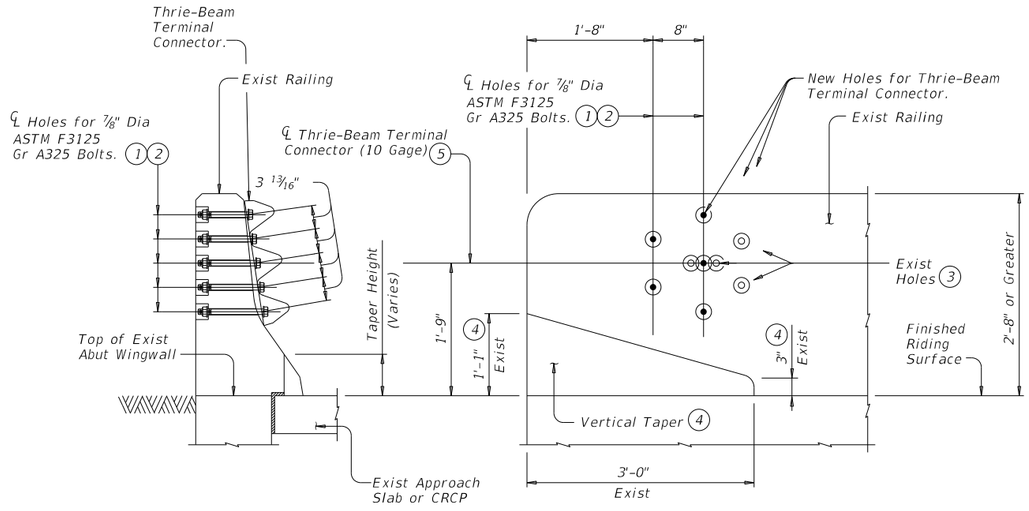
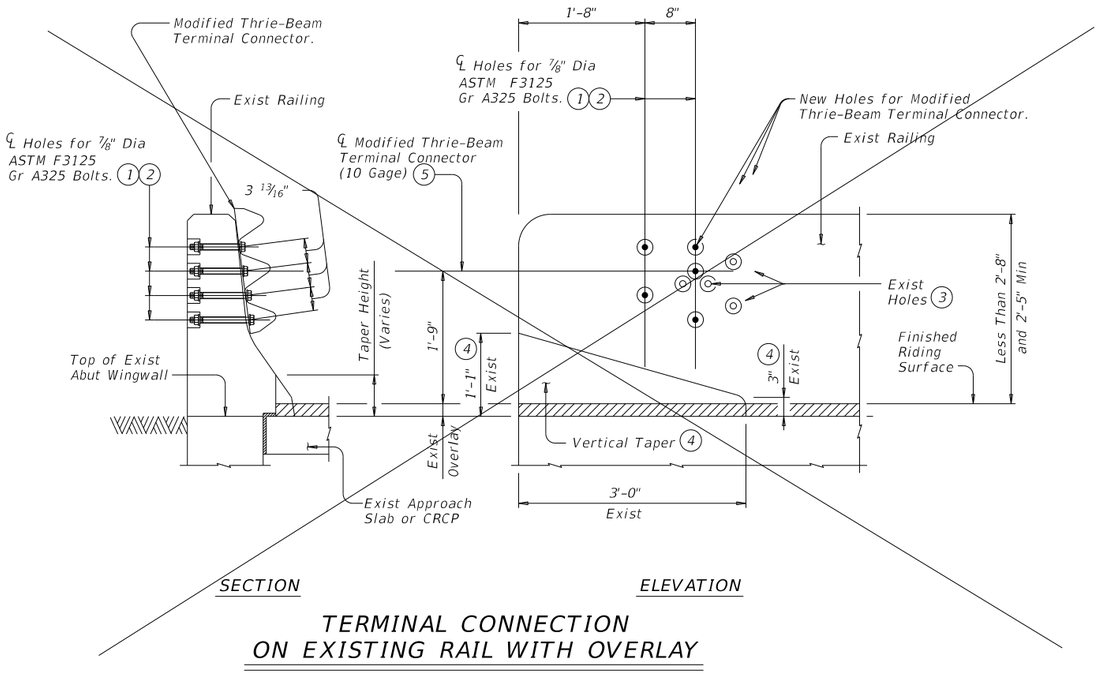


SECTION ELEVATION

TERMINAL CONNECTION ON EXISTING RAIL WITHOUT OVERLAY



SECTION ELEVATION

TERMINAL CONNECTION ON EXISTING RAIL WITH OVERLAY

(1) ℄ 5 ~ 1" Dia holes and 2 ½" Dia x 2" deep recesses. Holes and recesses must be core drilled. Percussion drilling is not permitted. Concrete spalls in rail exceeding ½" from edge of holes will be patched in accordance with Item 429, "Concrete Structure Repair" at the contractor's expense. Bolt recesses are only required when pedestrian sidewalks are adjacent to back of rail.

(2) ℄ 5 ~ ⅞" Dia F3125 Gr A325 Bolts with two 1 ¾" O.D. washers. Place washer under each head and nut. The 5 Terminal Connection Bolts must be tightened in a well distributed pattern so to prevent damage or distortion of the Thrie-Beam Connection and the MBGF Transition. Bolts must be cut off after installation so as to extend no more than ¾" beyond nut. End of cut-off bolt must be painted with two coats of zinc-rich paint conforming to the Item "Galvanizing".

(3) Existing anchor bolt holes in rail that can not be utilized and are within 3" of a new bolt hole must be filled with an epoxy grout prior to coring new holes.

(4) If vertical taper is not present, then a vertical taper must be field cut to limits shown when the existing rail measurement is 2'-8". Rail measurement should be taken from behind rail as to not include overlay if present. If existing rail measurement is 2'-10" and existing rail does not have vertical taper, then add 2" to vertical dimensions and field cut vertical taper. Any exposed reinforcing steel from field cut taper must be ground flush and painted with two coats of zinc-rich paint conforming to the Item "Galvanizing".

(5) 10 Gage Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Metal Beam Guard Fence Transitions must be attached to the bridge rail and extended along the embankment unless otherwise shown in the plans.

(6) ~~Terminal Connector must be modified for the Terminal Connection on Existing Rail with Overlay with two new 1" Dia holes as shown. Top new 1" Dia hole is used in lieu of existing top hole in terminal connector. All other existing holes in terminal connector must be used. Additional hole on bottom of terminal connector is used for other side for opposite hand. Damage to galvanization caused by this modification must be painted with two coats of zinc-rich paint conforming to the Item "Galvanizing".~~

This sheet is intended as a guide in preparing job-specific details to retrofit existing T5/T501/T502 rails with a Thrie-Beam terminal connector. This sheet may not be used without modification. The details shown may need to be amended if the exact existing conditions are not covered. In all cases, details and notes not required are to be removed or crossed out, "(MOD)" added, and the phrase "(Not to be used as a standard)" removed from the title block. This sheet must be signed, sealed, and dated by a registered Professional Engineer.

The effective height of the existing rail (at the terminal connector location) above the finished riding surface, as seen by an errant vehicle, must be between 2'-5" and 2'-10". Alternate methods of retrofit must be used for effective heights beyond these limits. Dimensions of existing rail height (traffic side) should be shown. Particular care should be taken in identifying existing rail conditions and providing for proper MBGF transition positioning.

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

Remove any MBGF (W-beam) and attachment hardware, from the face of rail if present, prior to installation of new MBGF Transition. Dispose of these materials as directed by the Engineer. Plugging of exposed existing bolt holes is not necessary except as stated herein or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.

If vertical taper is not present, then a vertical taper must be field cut to limits shown and debris removed.

Attach the MBGF Transition to the existing rail and extend along the embankment using the Thrie-Beam Terminal Connection unless shown otherwise on the plans. Splice the Approach Guard Rail and the Terminal Connection with the normal 12 connection bolts. Refer to Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:

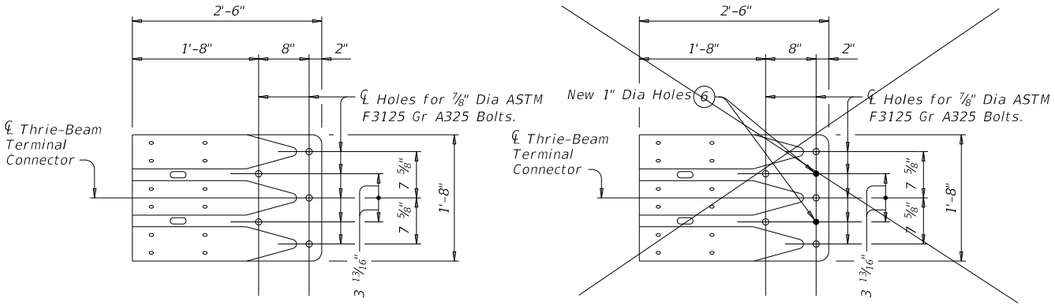
Galvanize all steel components unless otherwise noted.

GENERAL NOTES:

These details are shown for retrofitting MBGF transitions to existing rails only and not used for new construction.

Shop drawings are not required for this installation.

Materials, fabrication and installation of this assembly are to be included in the price bid for "Metal Beam Guard Fence."



THRIE-BEAM TERMINAL CONNECTORS (5)

CORY L. SHIPMAN
82762
REGISTERED PROFESSIONAL ENGINEER
STATE OF TEXAS
1/17/23

DATE:
FILE:

Texas Department of Transportation — Bridge Division Standard

T5/T501/T502 TRANSITION RETROFIT GUIDE

~~(NOT TO BE USED AS A STANDARD)~~

T5/T501/T502TR(MOD)

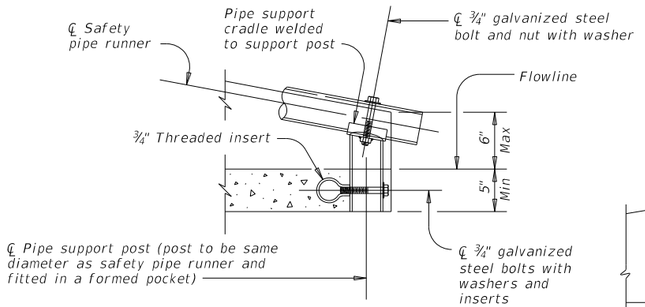
FILE: r1std039-19.dgn	DN: TxDOT	CK: APK	DW: JTR	CK: APK	
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0718	02	072	FM156	
	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		92	

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

DATE:
FILE:

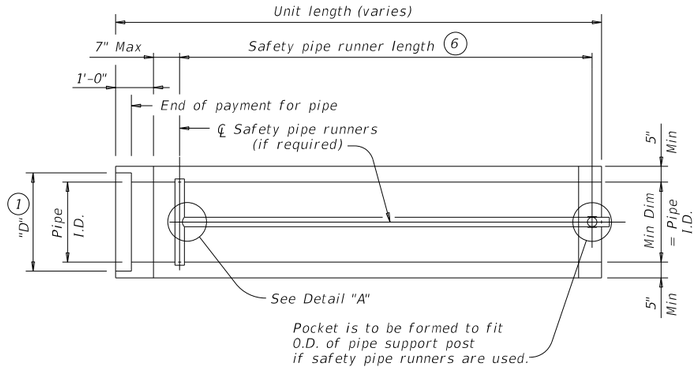
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe		Multiple Pipes	
						Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	2.7"	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



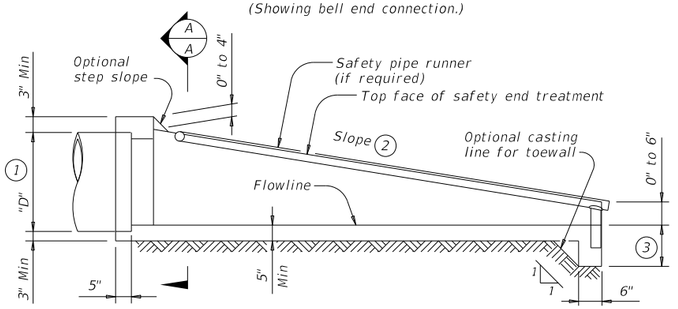
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



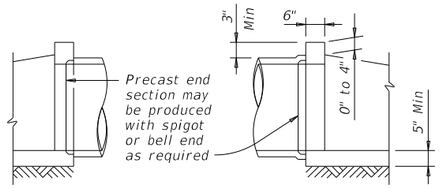
PLAN

(Showing bell end connection.)



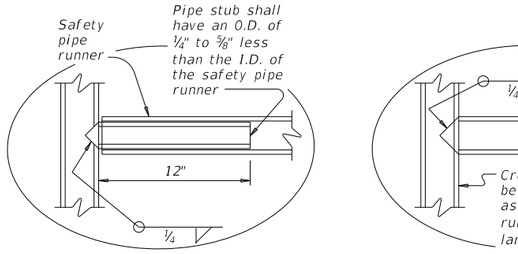
LONGITUDINAL ELEVATION

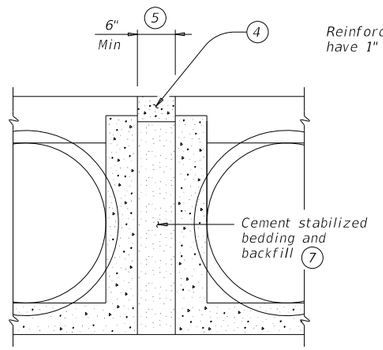
(Showing bell end connection.)



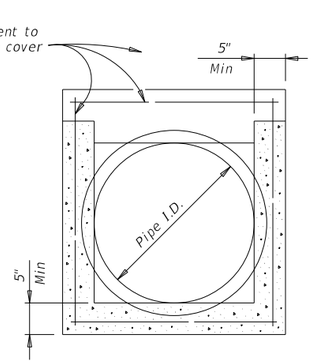
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)

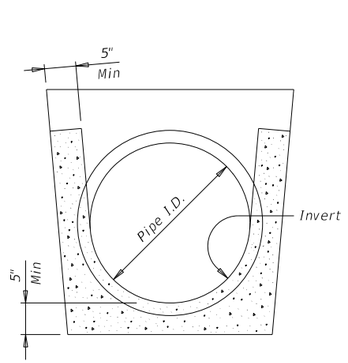




MULTIPLE PIPE INSTALLATION

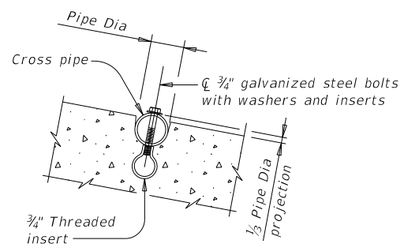


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

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

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

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

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

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

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See Pipe and Box Grouted Connections (PBGC) standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

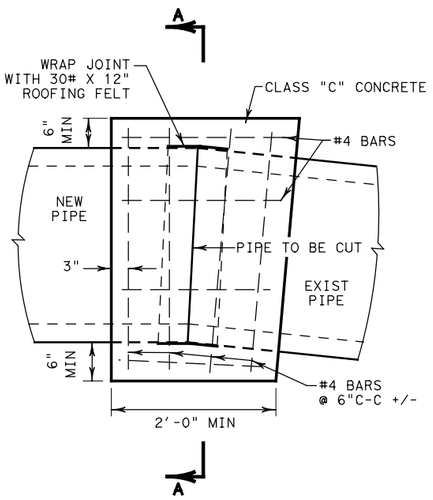
Bridge Division Standard

PRECAST SAFETY END TREATMENT

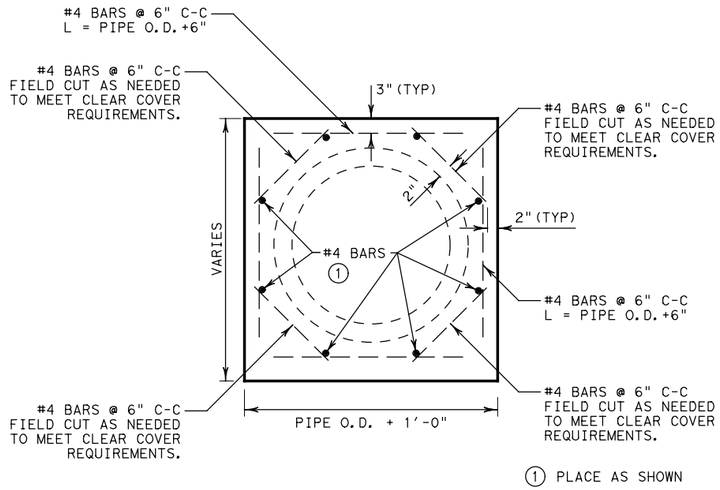
TYPE II ~ CROSS DRAINAGE

PSET-SC

FILE: psetscss-21.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-21: Added 42" TP	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		93



PLAN/ELEVATION



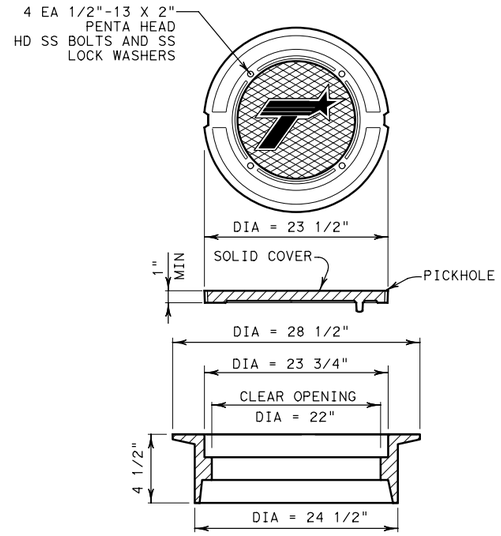
SECTION A-A

PIPE COLLAR GENERAL NOTES

1. THE CONTRACTOR SHALL TAKE STEPS TO ENSURE A SMOOTH JOINT ALONG THE INSIDE WALL OF PIPE.
2. ANY SPILLAGE OF CONCRETE THROUGH THE JOINT SHALL BE REMOVED AND THE INSIDE PIPE SURFACES SMOOTHED AS DIRECTED BY THE ENGINEER.
3. PIPE COLLARS WILL NOT BE PAID FOR DIRECTLY, BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 464.

PIPE COLLAR DETAIL

FOR HORIZONTAL OR VERTICAL PLACEMENT
N.T.S.



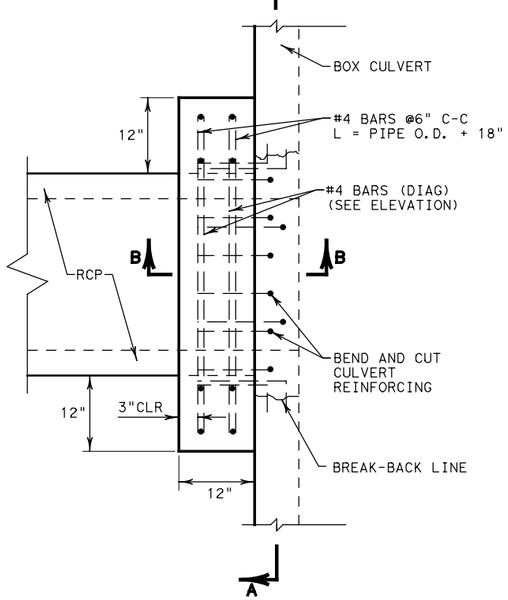
RING AND COVER DETAILS

MANHOLES AND CURB INLETS
N.T.S.

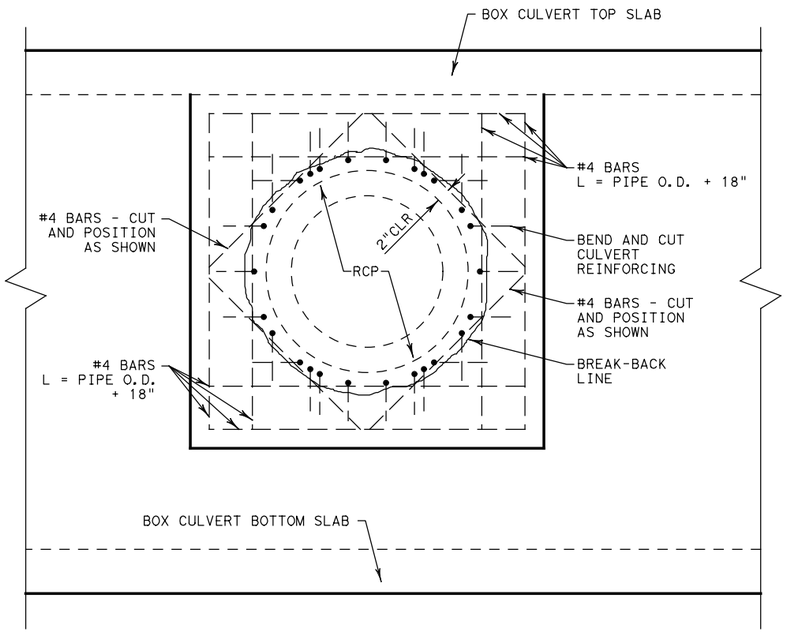
RING AND COVER SHALL CONFORM TO THE REQUIREMENTS OF ITEM 471 AND SHALL BE INCLUDED IN THE CURRENT TXDOT "APPROVED CAST IRON PRODUCTS SHEETS"

DIMENSIONS SHOWN ARE APPROXIMATE; ACTUAL DIMENSIONS PER MANUFACTURE/FABRICATOR.

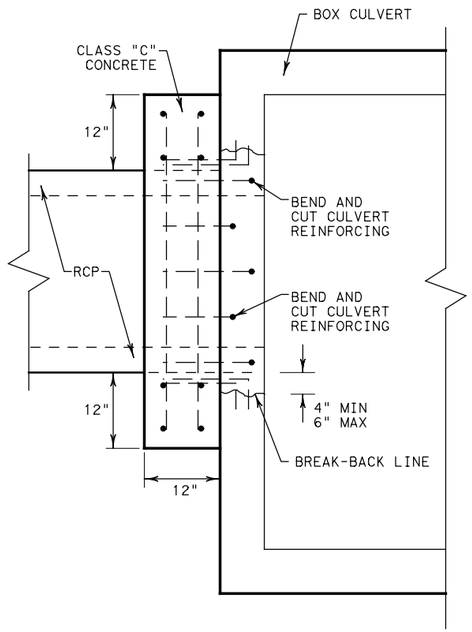
IF RING AND COVER ARE LOCATED IN PAVEMENT; SECURE COVER WITH BOLTS AS SHOWN.



PLAN VIEW



SECTION A-A



SECTION B-B

PIPE STUB-IN CONNECTION TO BOX CULVERT OR EXISTING DRAINAGE STRUCTURE

N.T.S.

PIPE STUB-IN GENERAL NOTES

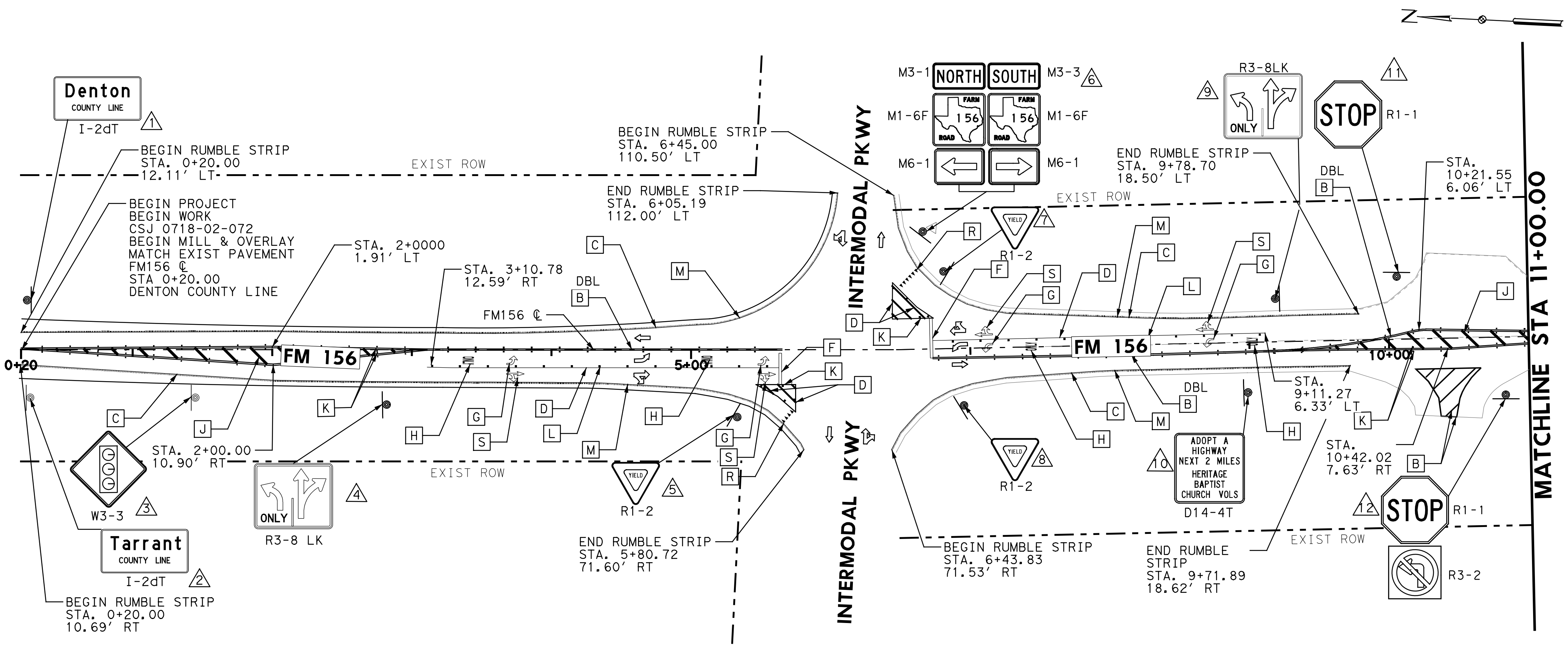
1. SAW CUT A MAXIMUM 1/2" DEPTH AT BREAK-BACK LINE. USE REMOVAL METHODS THAT WILL NOT DAMAGE REMAINING CONCRETE OR CULVERT REINFORCING.
2. EXPOSE AND CLEAN BOX CULVERT REINFORCING. BEND BARS INTO PROPOSED CONNECTION AND TIE TO CONNECTION REINFORCING.
3. ROUGHEN AND CLEAN EXISTING CONCRETE SURFACES THAT ARE IN CONTACT WITH NEW CONCRETE BEFORE PLACING FORMS.
4. MATERIAL & LABOR FOR PIPE/BOX CONNECTIONS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEMS 462 AND 464.

Texas Department of Transportation

Fort Worth District Standard

MISCELLANEOUS DRAINAGE DETAILS
MDD(FTW)

ORIGINAL DRAWING: 05/2019	mdd-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.			SHEET NO.
DATE	REVISIONS	6				94
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY		
07/2022	REVISE AND CORRECT RING AND COVER NOTES	TEXAS	FTW	TARRANT		
		CONT.	SECT.	JOB	HIGHWAY NO.	
		0718	02	072	FM156	

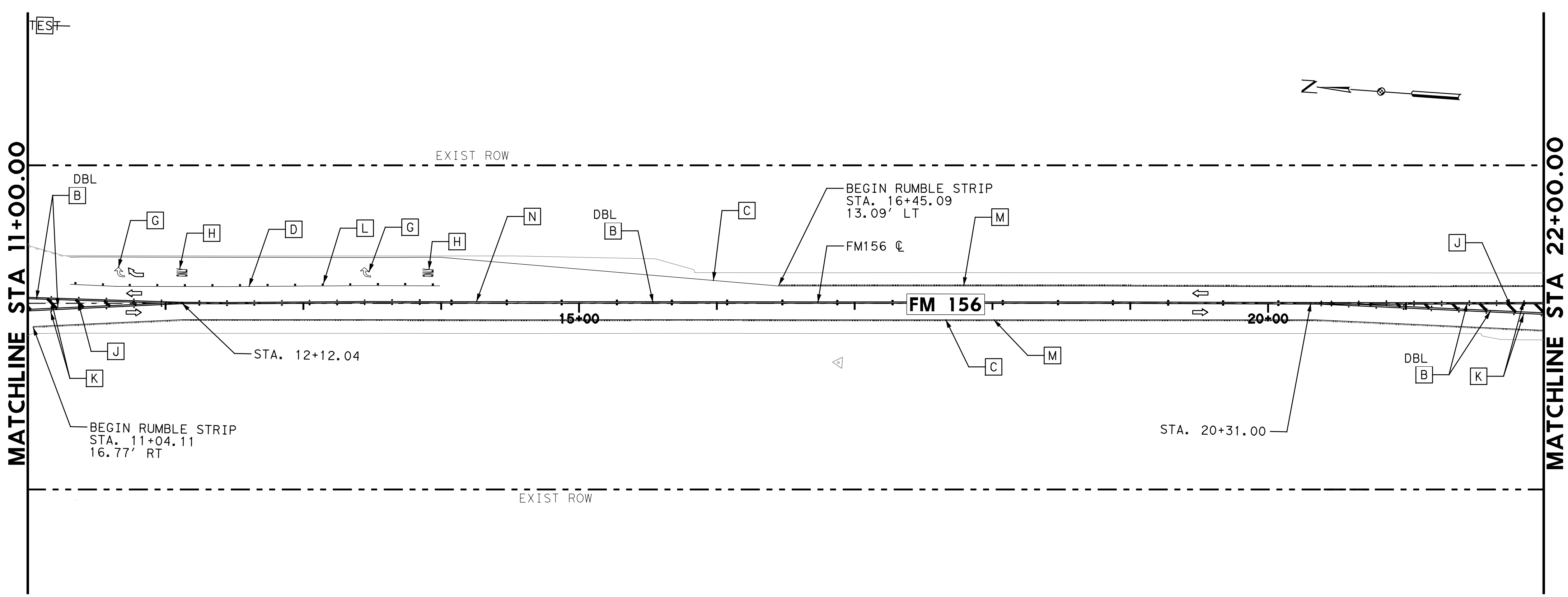


LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)
- # (triangle) EXISTING SIGN TO BE REMOVED AND REPLACED
- # (hexagon) EXISTING SIGN TO BE RELOCATED
- # (circle) EXISTING SIGN TO REMAIN IN PLACE
- EXISTING R.O.W.
- TRAFFIC FLOW
- OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.



STATE OF TEXAS
EN WANG
123262
REGISTERED PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation
© 2023

FM 156 SIGNING & PAVEMENT MARKING BEGIN TO STA 22+00

SCALE: 1"=100' SHEET 1 OF 14

FED. RD. DIV. NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	95
CONTROL	SECTION	JOB	
0718	02	072	

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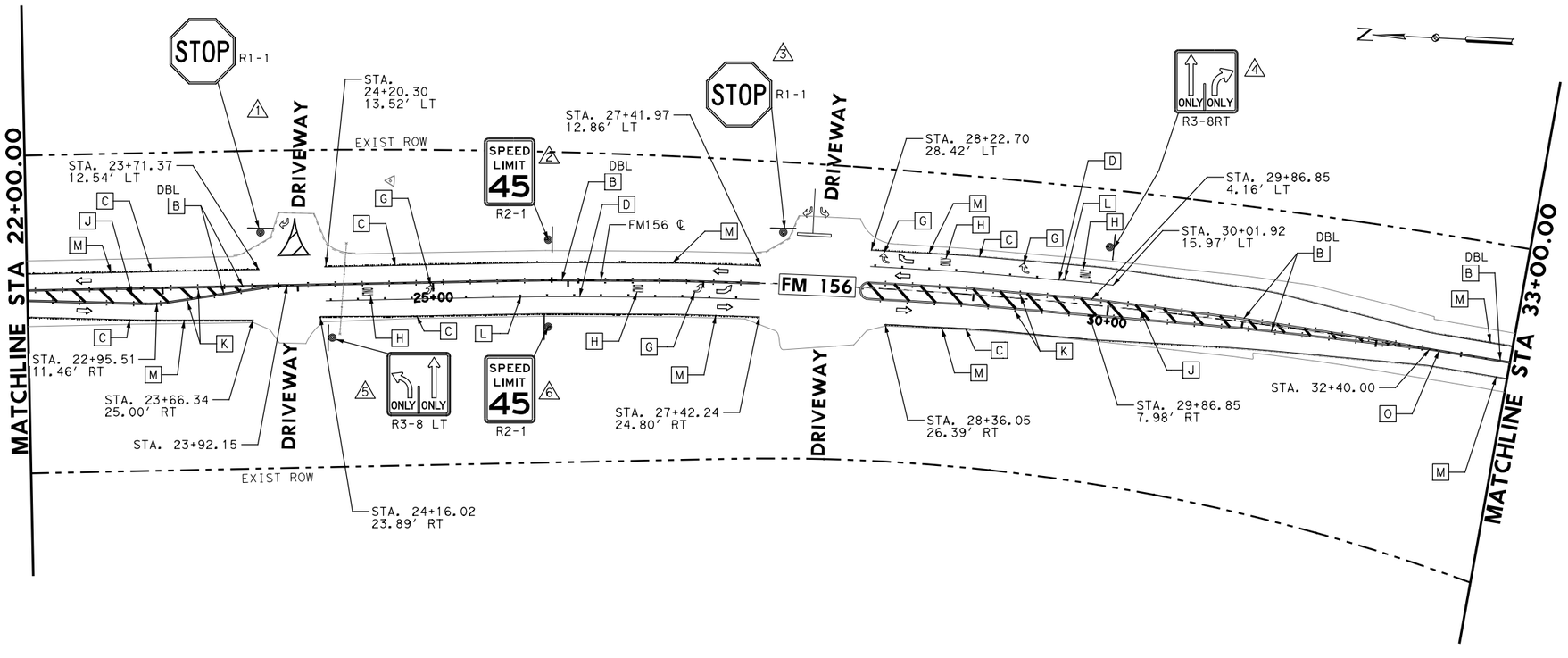
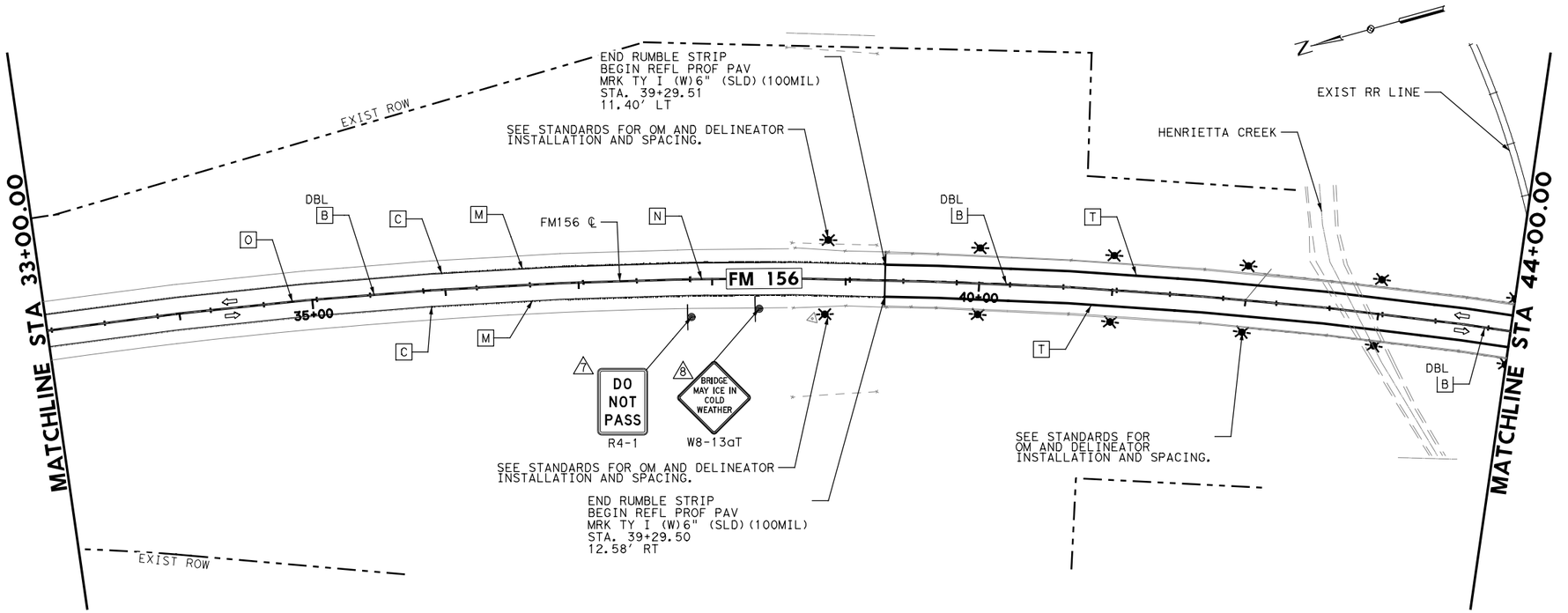
100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
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- O REFL PAV MRKR TY II-A-A AT 80'CC
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- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

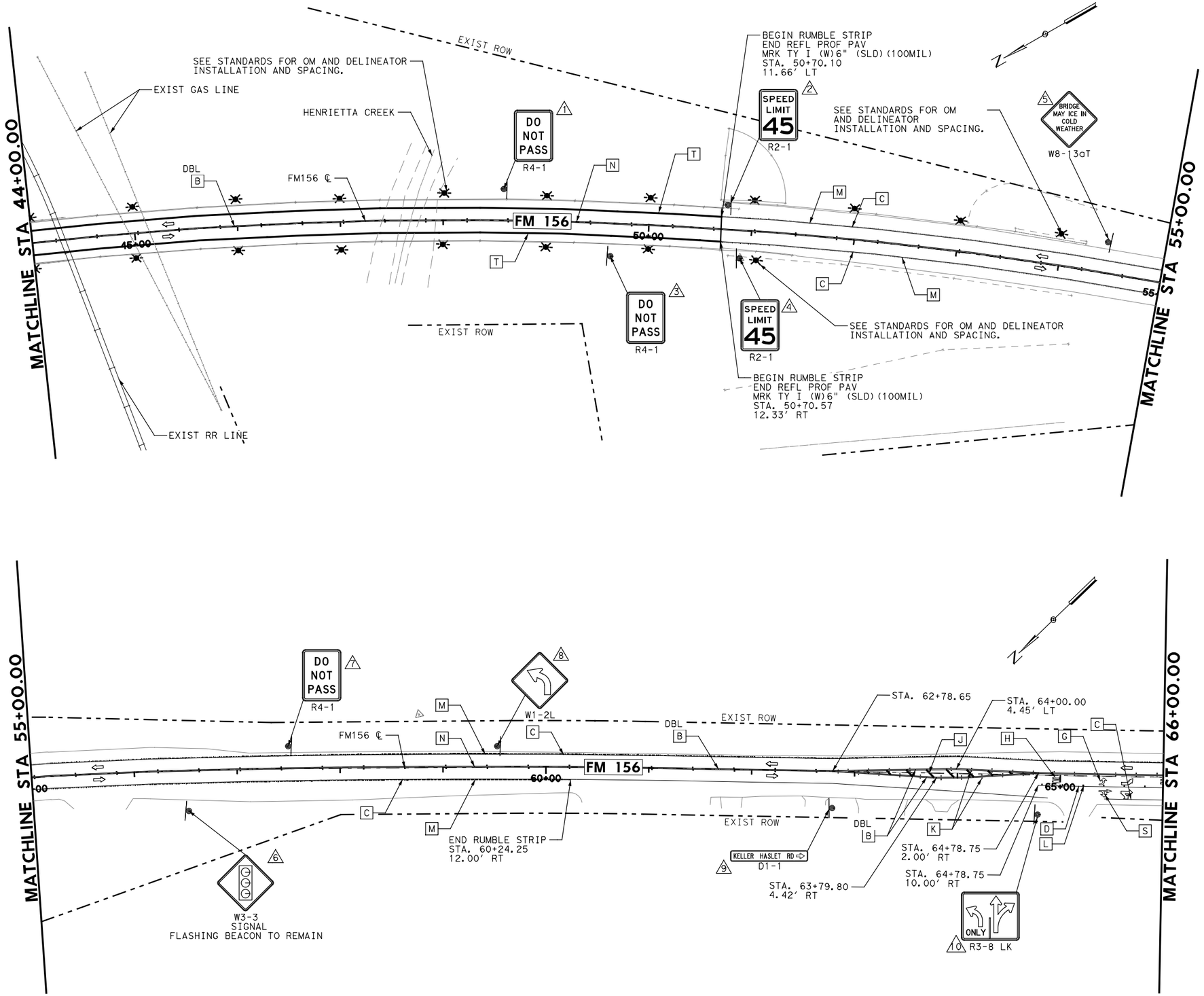
FM 156
SIGNING & PAVEMENT MARKING
STA 22+00 TO STA 44+00

SCALE: 1"=100' SHEET 2 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	96
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:49:44 PM SCALE: 1:00
FILE: FM156-PVMK-02.dgn

100% PLANS SUBMITTAL



LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER
REGISTERED
02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

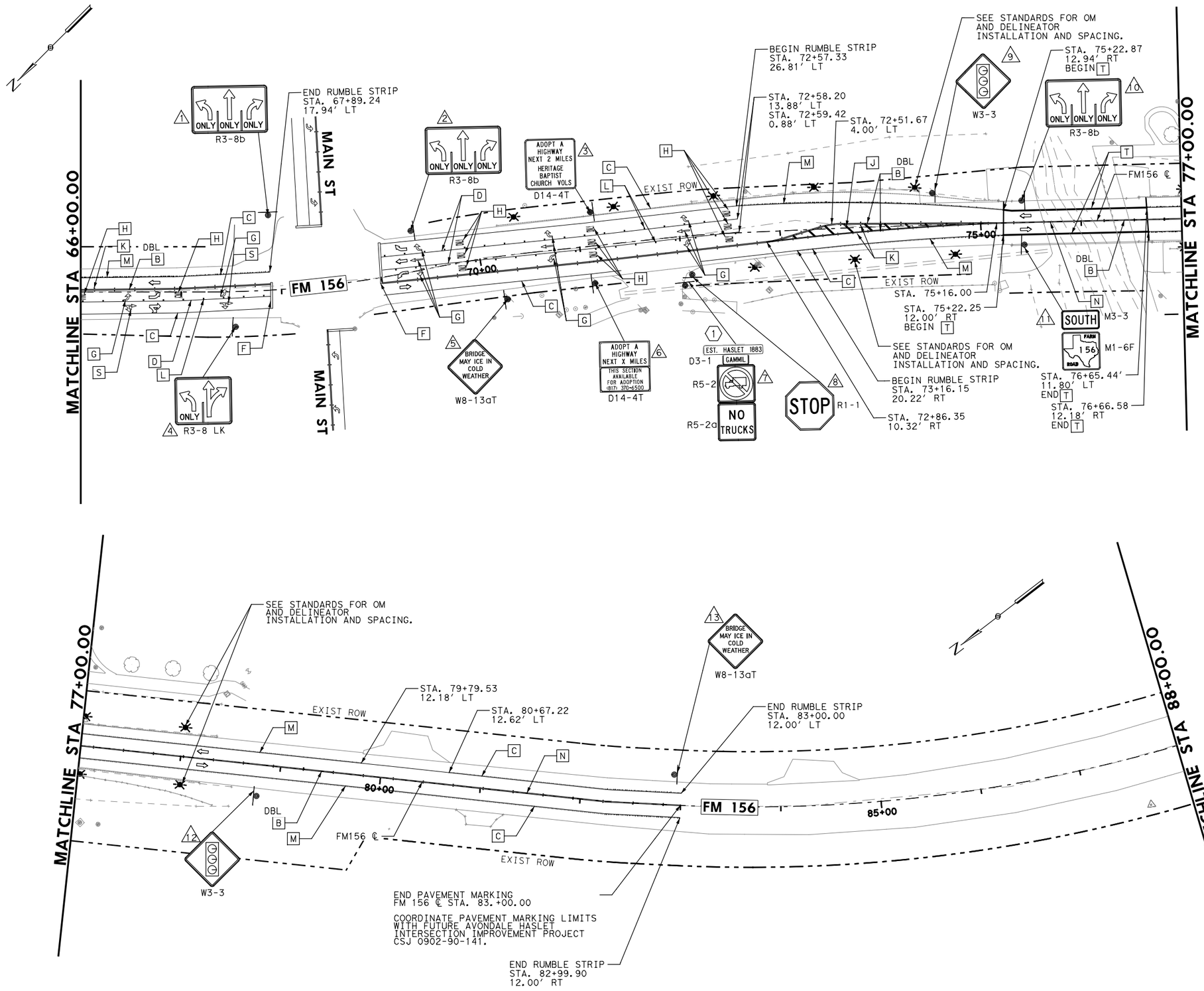
FM 156
SIGNING & PAVEMENT MARKING
STA 44+00 TO STA 66+00

SCALE: 1"=100' SHEET 3 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	97
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:49:52 PM SCALE: 1:00
FILE: FM156-PVMK-03.dgn

100% PLANS SUBMITTAL



LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
REGISTERED PROFESSIONAL ENGINEER
02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156
SIGNING & PAVEMENT MARKING
STA 66+00 TO STA 88+00

SCALE: 1"=100' SHEET 4 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	98
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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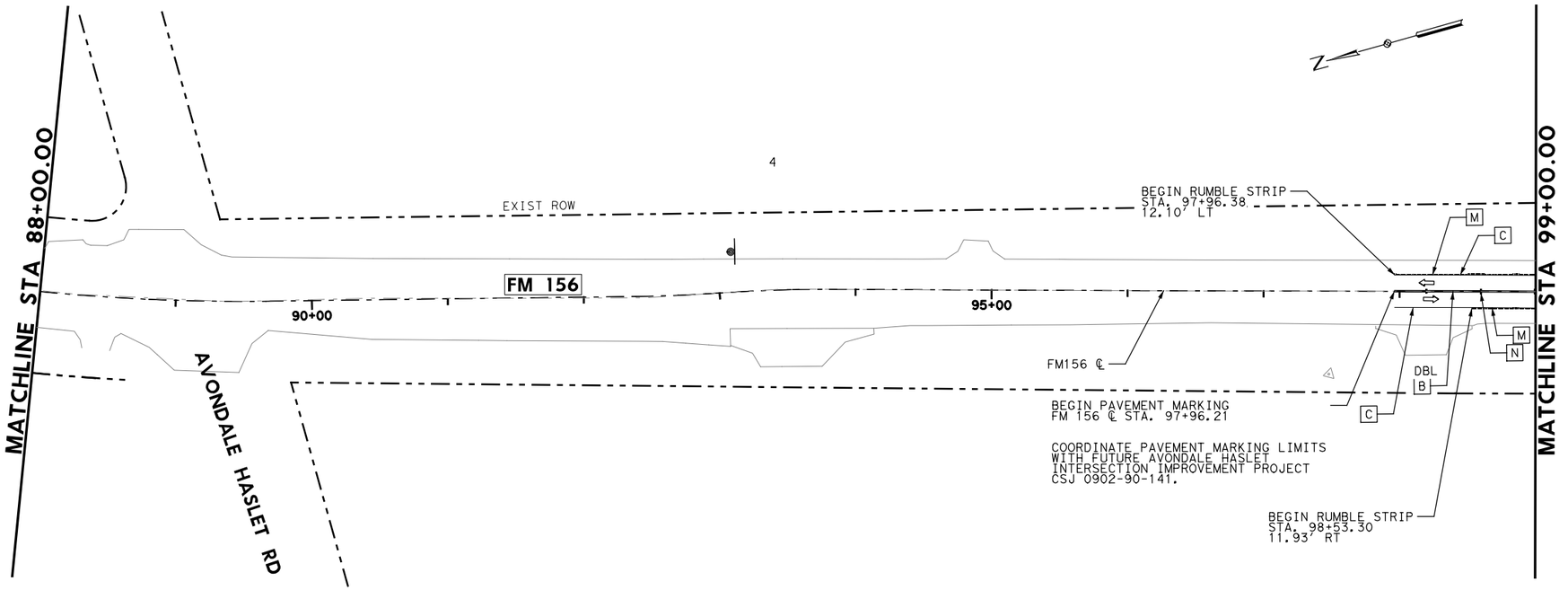
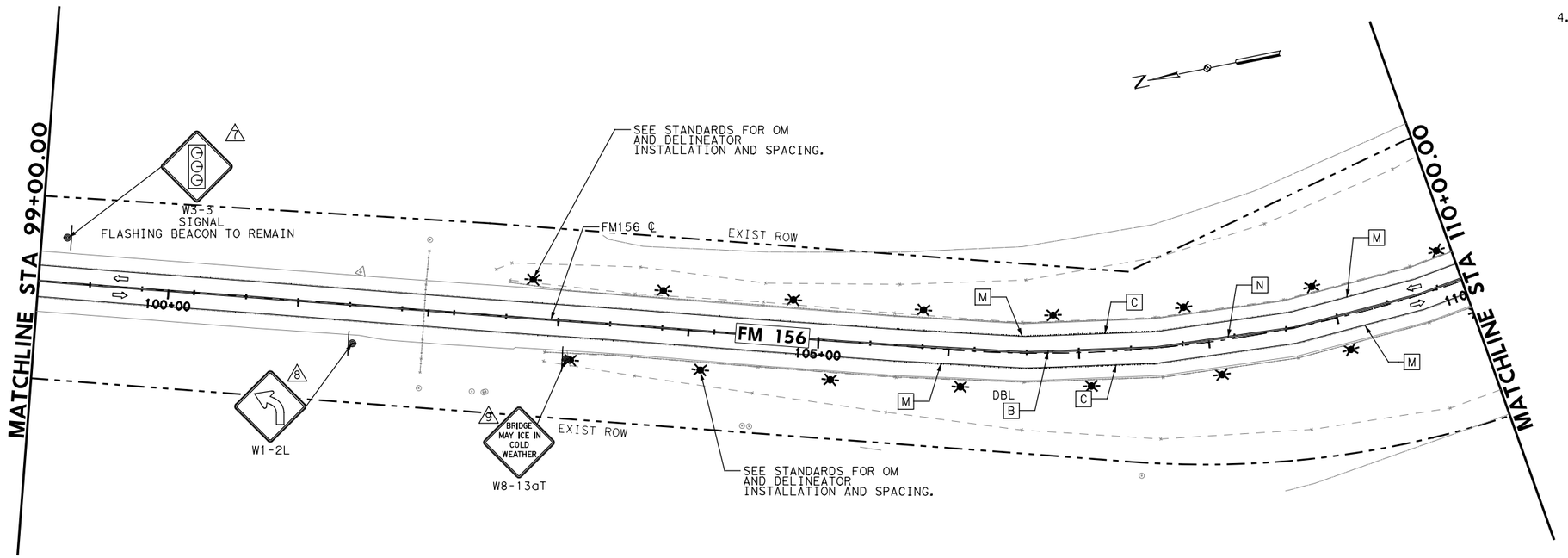
FILE: FM156-PVMK-04.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER
REGISTERED
THOMAS ENGINEERING

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

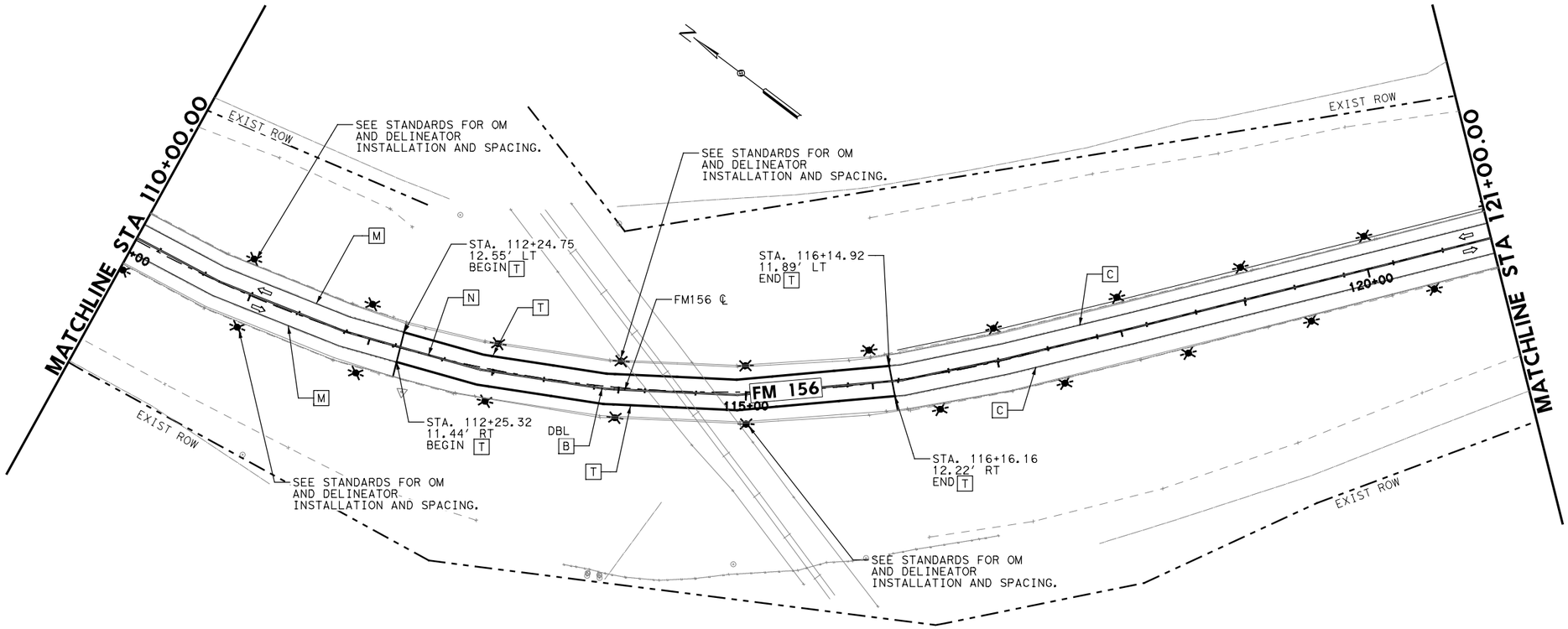
FM 156
SIGNING & PAVEMENT MARKING
STA 88+00 TO STA 110+00

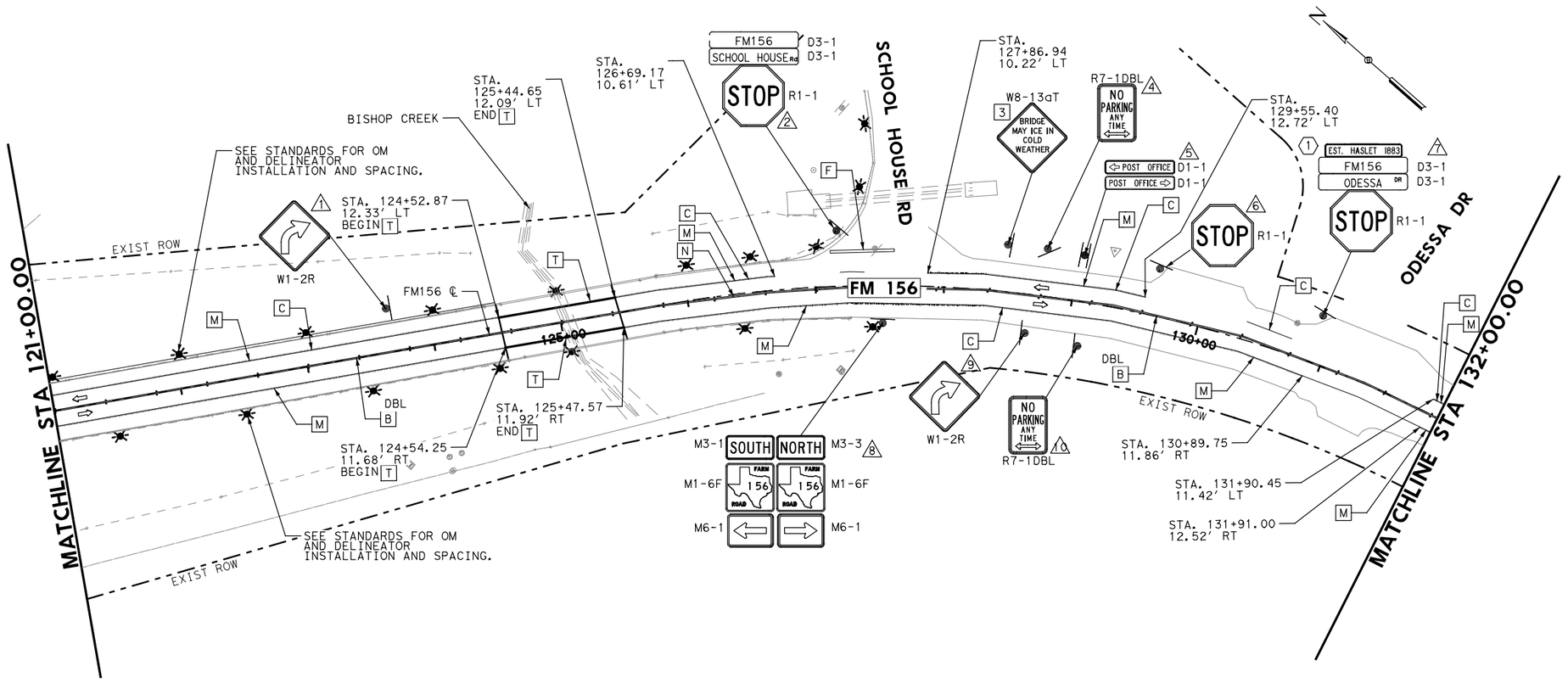
SCALE: 1"=100' SHEET 5 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	99
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:06 PM SCALE: 1:00
FILE: FM156-PVMK-05.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
REGISTERED PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

FM 156
SIGNING & PAVEMENT MARKING
STA 110+00 TO STA 132+00

SCALE: 1"=100' SHEET 6 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	100
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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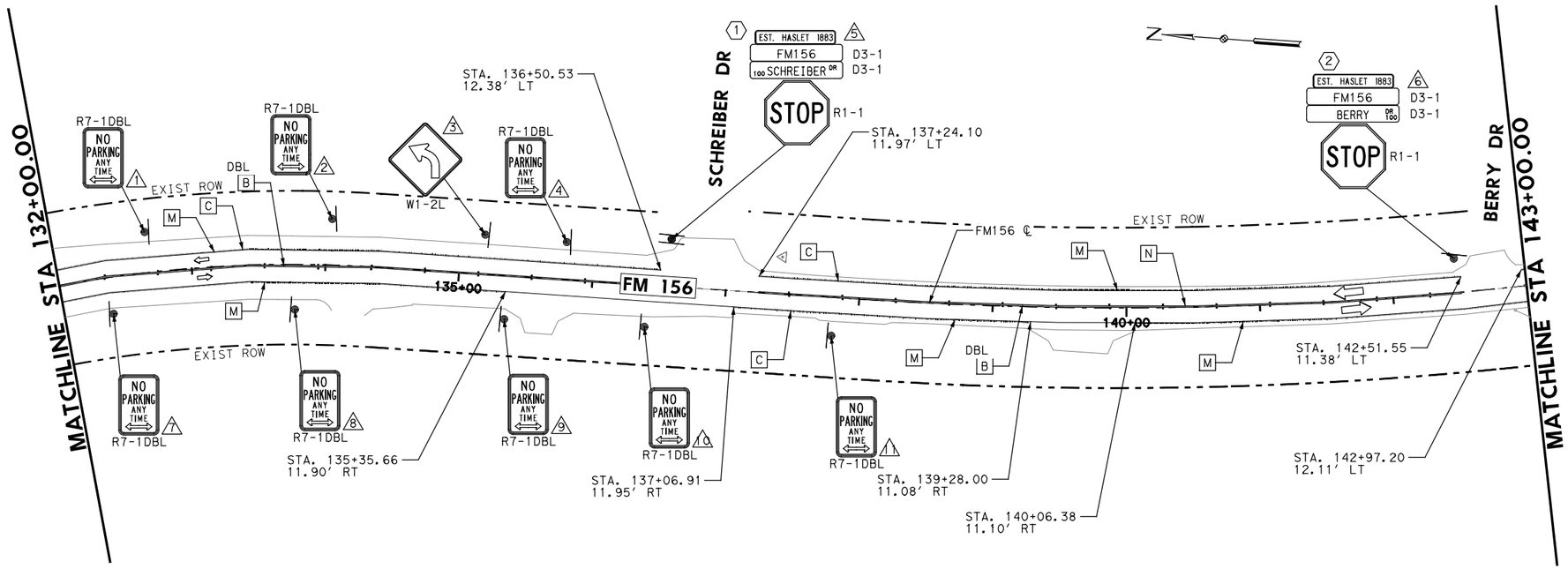
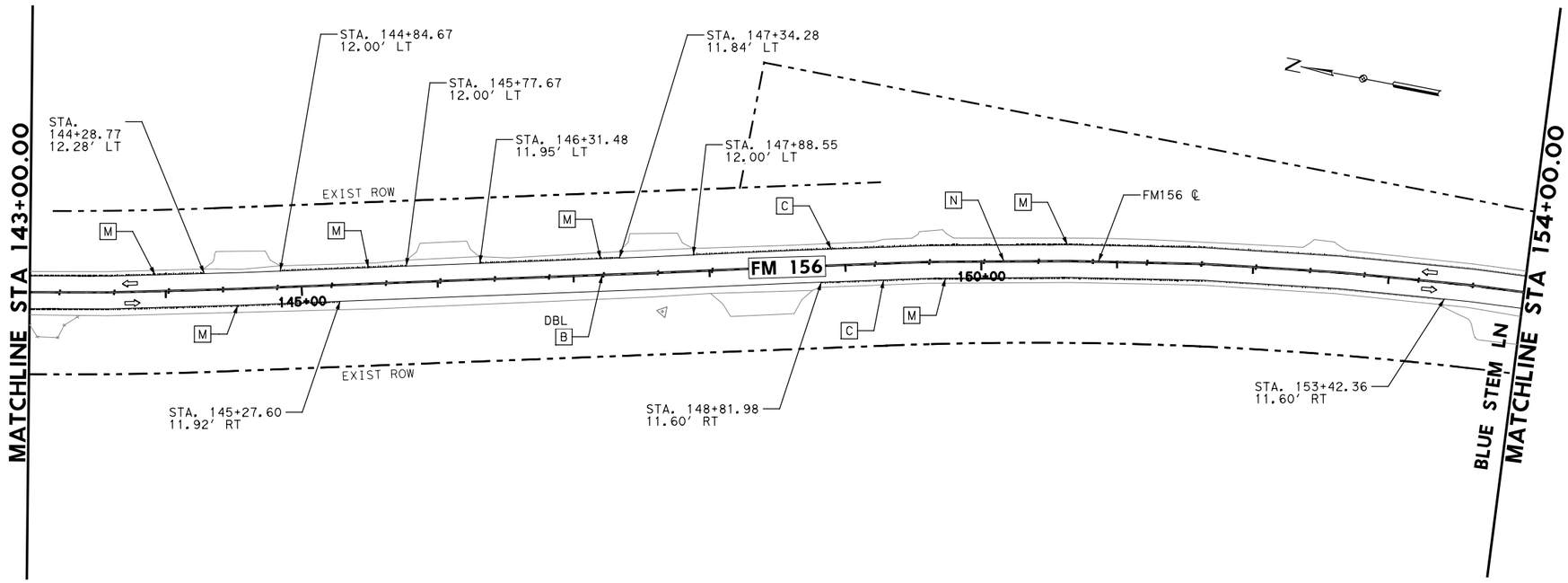
FILE: FM156-PVMK-06.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

— — — EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER
TO/AM/L ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

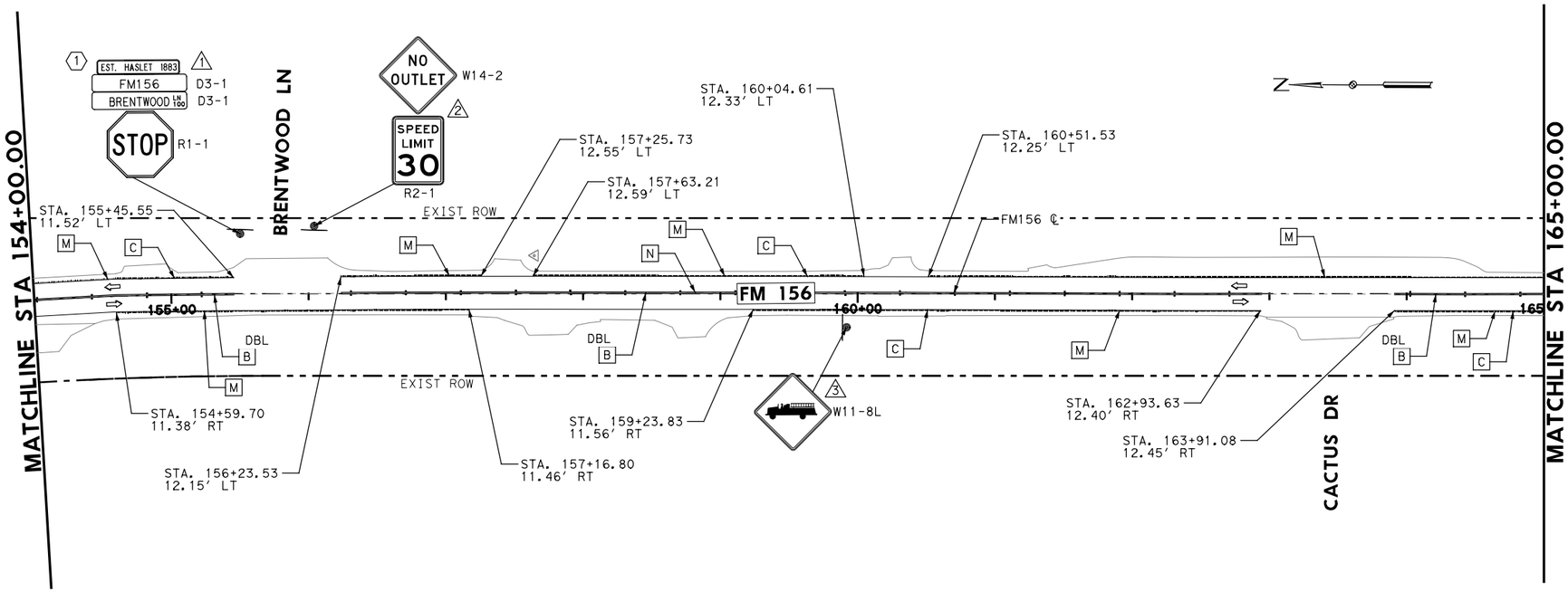
FM 156
SIGNING & PAVEMENT MARKING
STA 132+00 TO STA 154+00

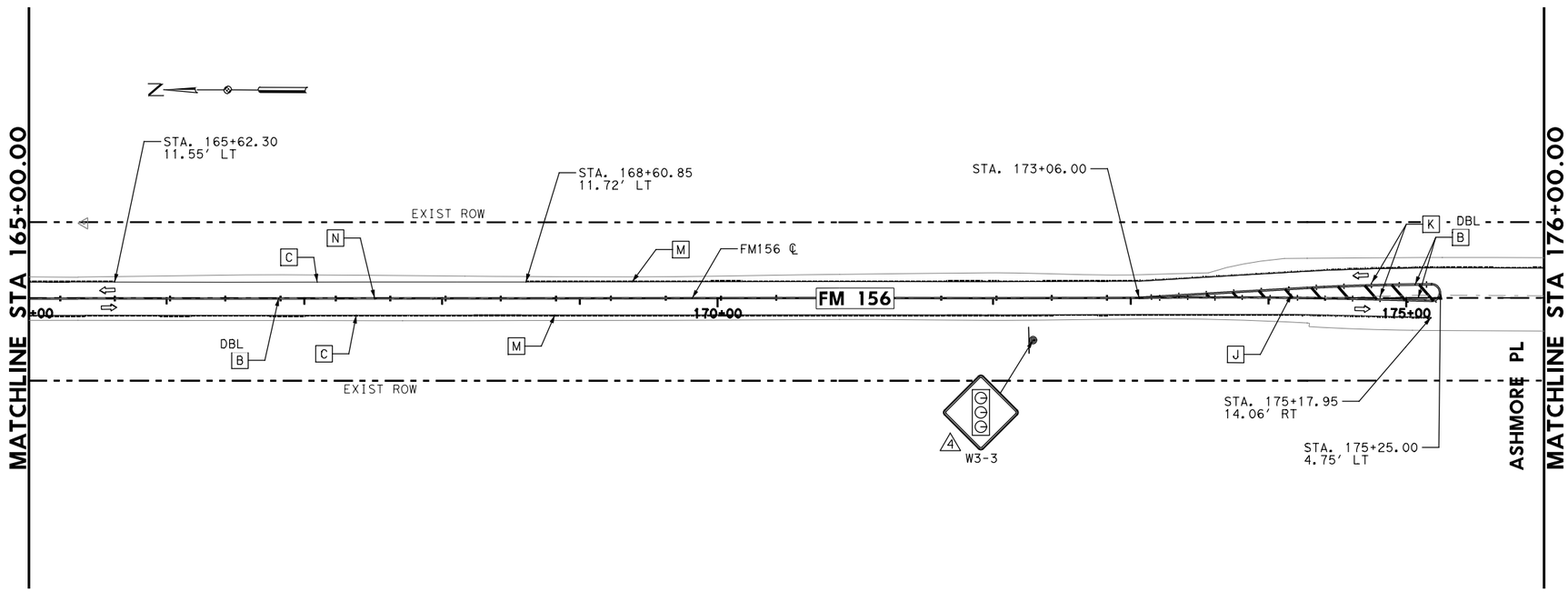
SCALE: 1"=100' SHEET 7 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	101
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:35 PM SCALE: 1:00
FILE: FM156-PVMK-07.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

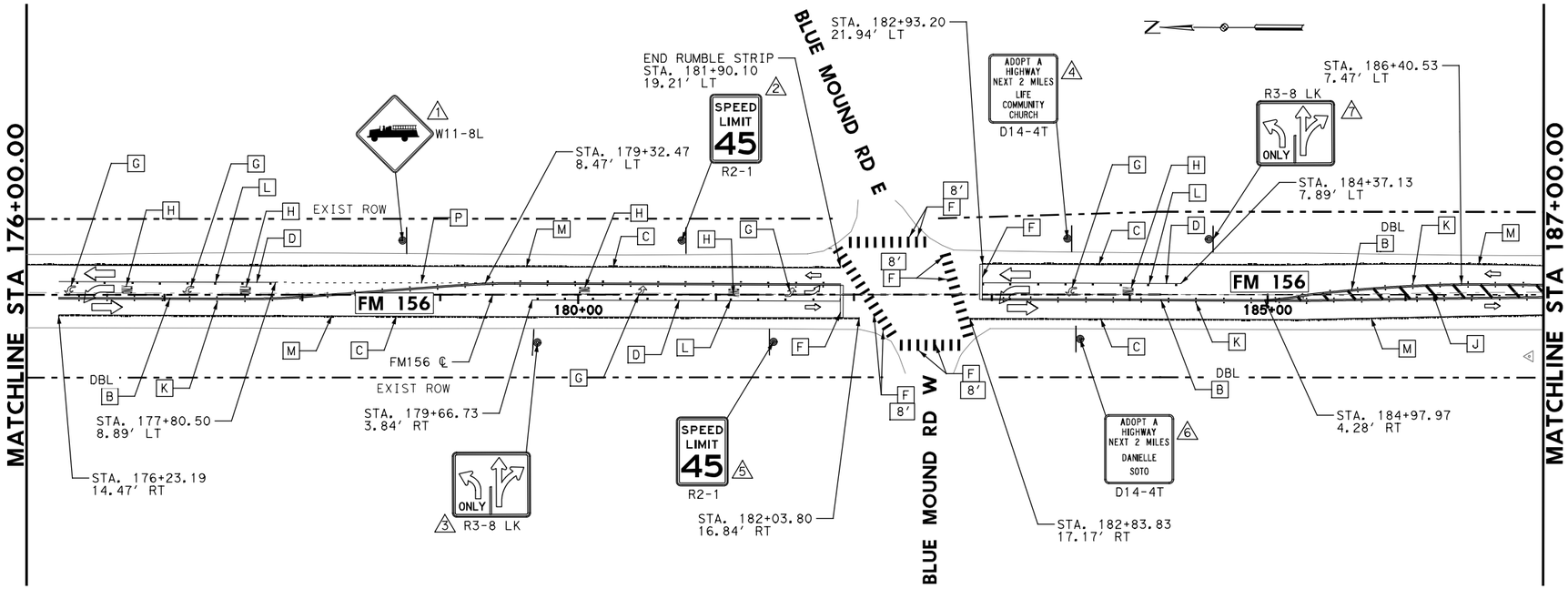
FM 156
SIGNING & PAVEMENT MARKING
STA 154+00 TO STA 176+00

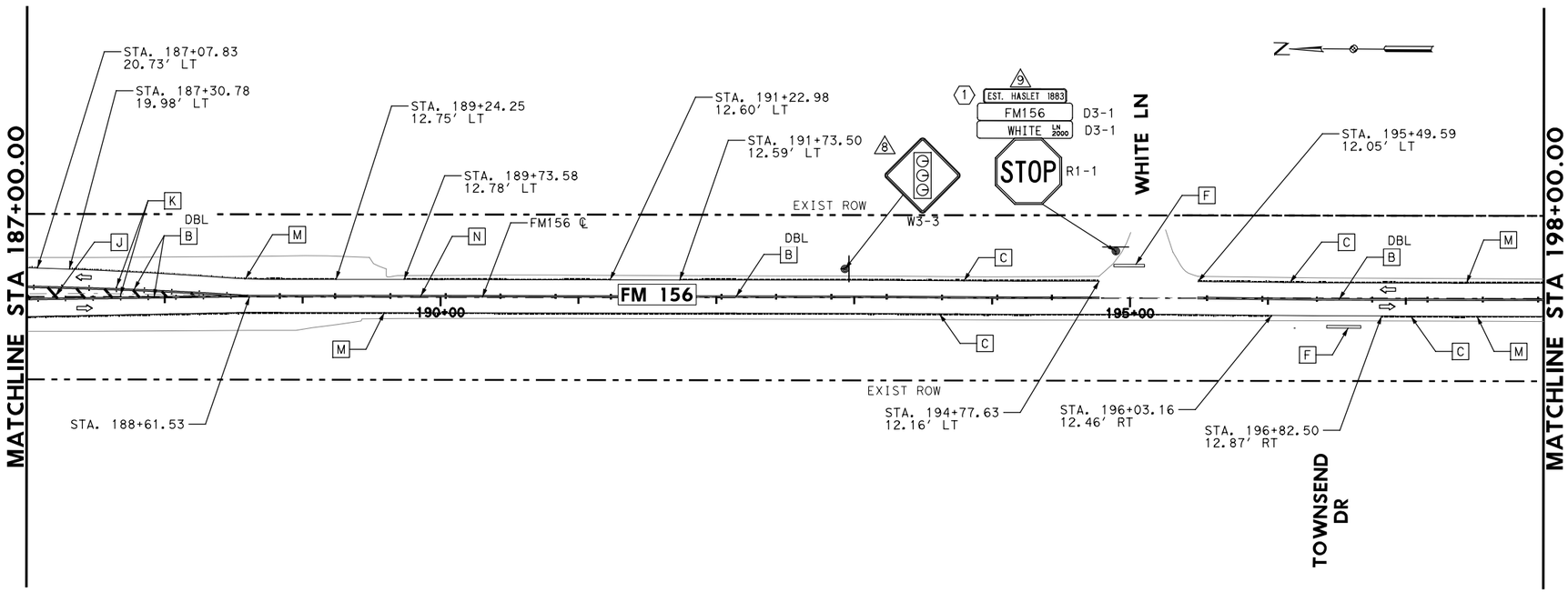
SCALE: 1"=100' SHEET 8 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	102
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:38 PM SCALE: 1:00
FILE: FM156-PVMK-08.dgn

100% PLANS SUBMITTAL





LEGEND:

A	REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
B	REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
C	REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
D	REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
E	REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
F	REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
G	PREFAB PAV MRK TY C (W) (ARROW)
H	PREFAB PAV MRK TY C (W) (WORD)
I	REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
J	REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
K	REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
L	REFL PAV MRKR TY I-C AT 20' C-C
M	RUMBLE STRIPS (SHOULDER)
N	REFL PAV MRKR TY II-A-A AT 40'CC
O	REFL PAV MRKR TY II-A-A AT 80'CC
P	REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
Q	REFL PAV MRKR TY II-C-R AT 80'CC
R	PREFAB PAV MRK TY C (W)(36")(YLD TRI)
S	PREFAB PAV MRK TY C (W) (DBL ARROW)
T	REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

— - - EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

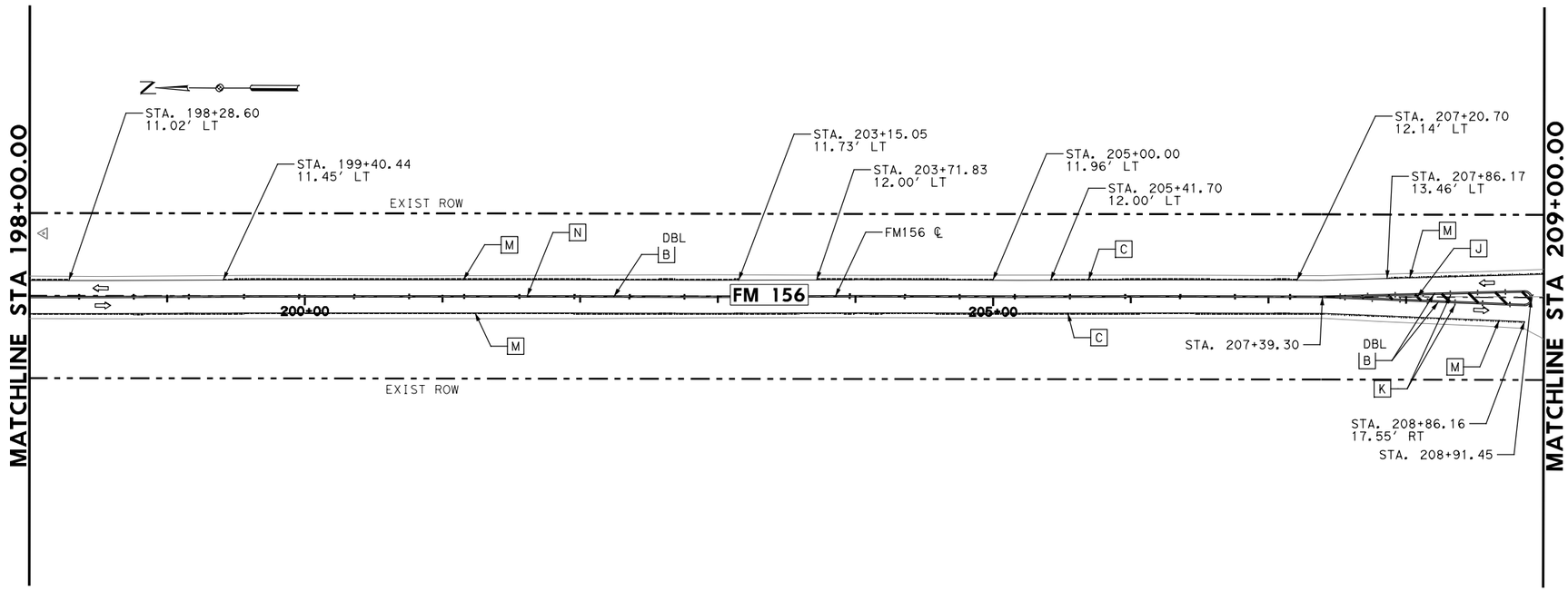
FM 156
SIGNING & PAVEMENT MARKING
STA 176+00 TO STA 198+00

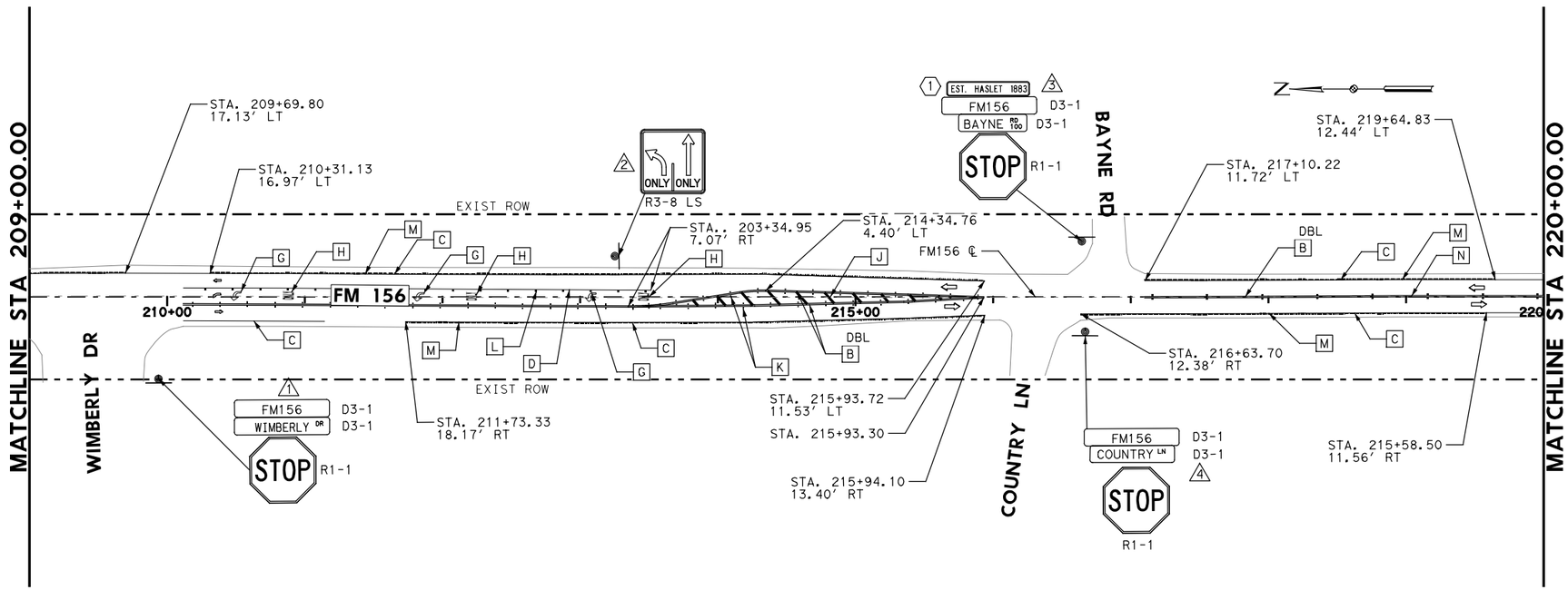
SCALE: 1"=100' SHEET 9 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	103
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:41 PM SCALE: 1:100
FILE: FM156-PVMK-09.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER
02/09/23

NO.	DATE	REVISION	APPROVED

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613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156
SIGNING & PAVEMENT MARKING
STA 198+00 TO STA 220+00

SCALE: 1"=100' SHEET 10 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	104
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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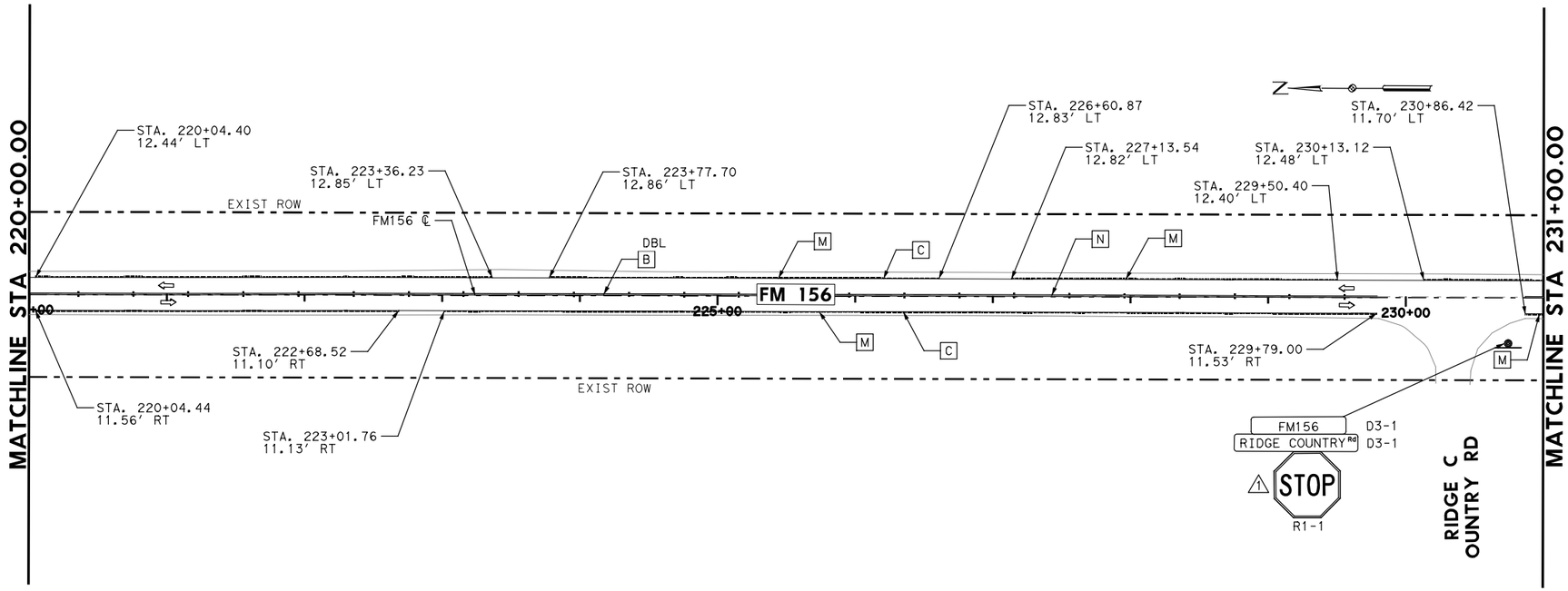
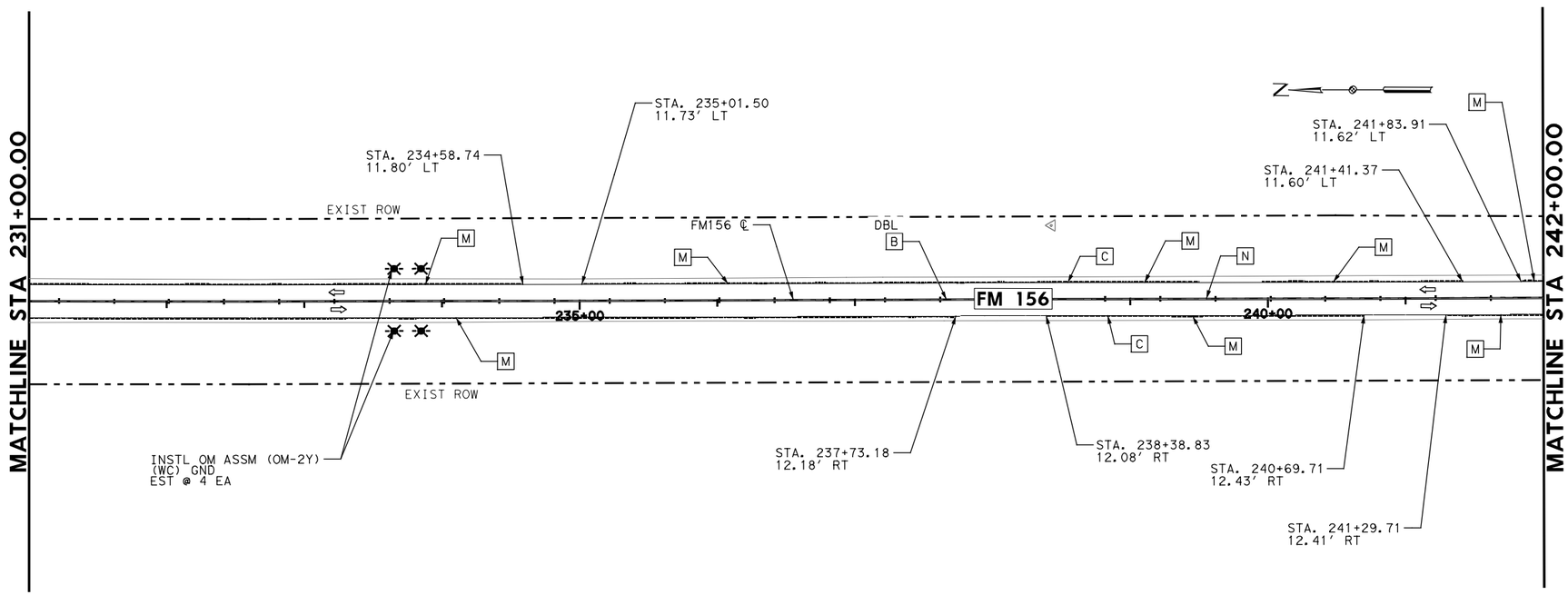
FILE: FM156-PVMK-10.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER
02/09/23

NO.	DATE	REVISION	APPROVED

HDR
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613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156
SIGNING & PAVEMENT MARKING
STA 220+00 TO STA 242+00

SCALE: 1"=100' SHEET 11 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	105
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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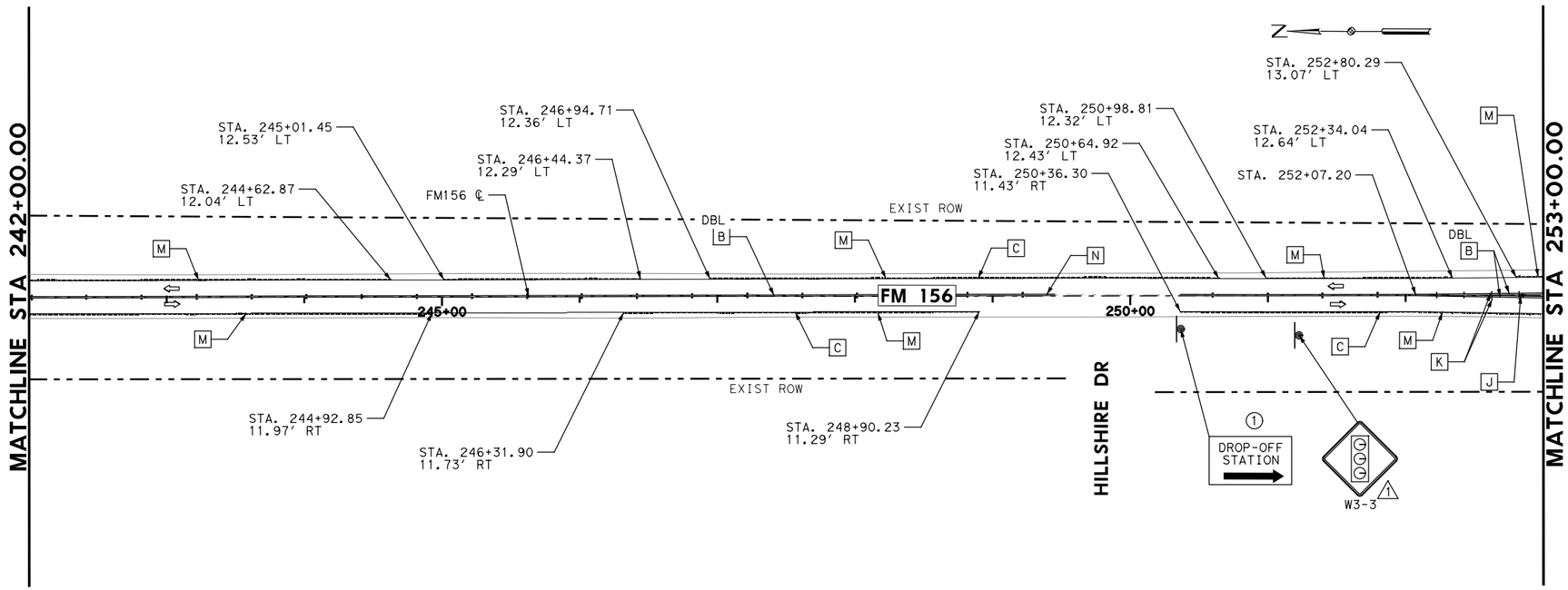
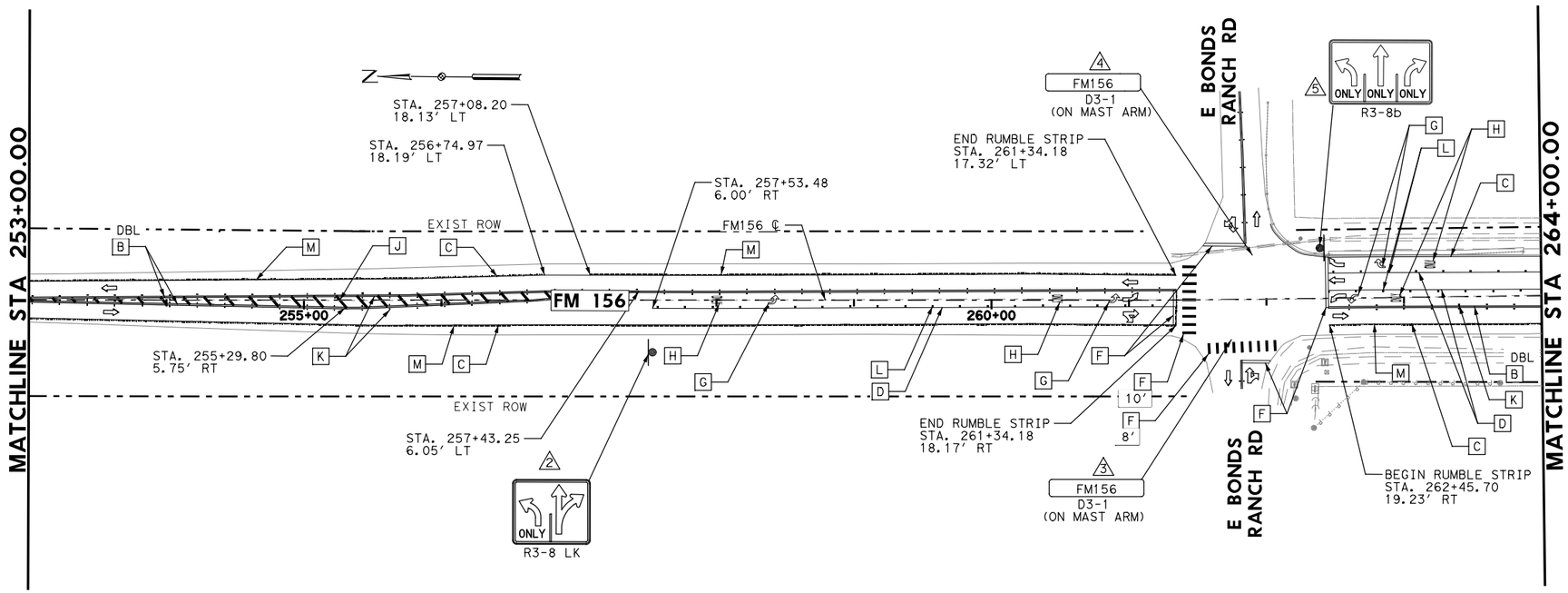
FILE: FM156-PVMK-11.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
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STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER
02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

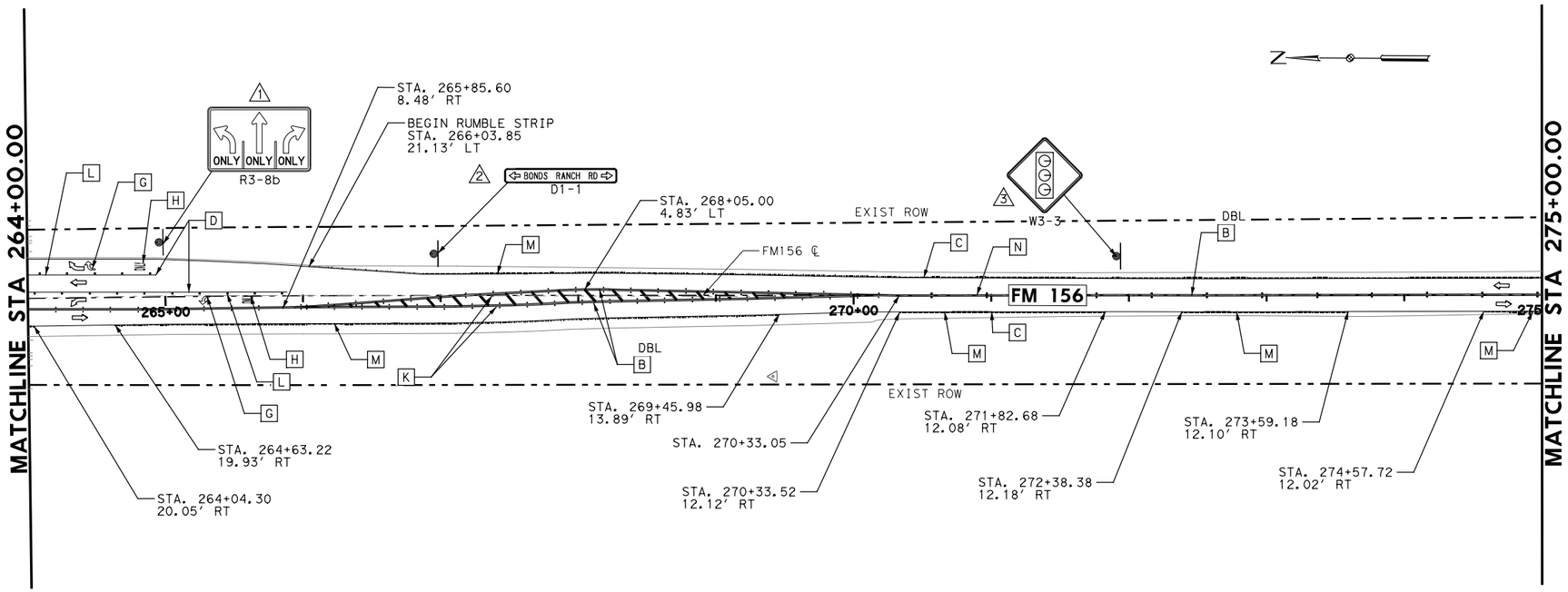
FM 156
SIGNING & PAVEMENT MARKING
STA 242+00 TO STA 264+00

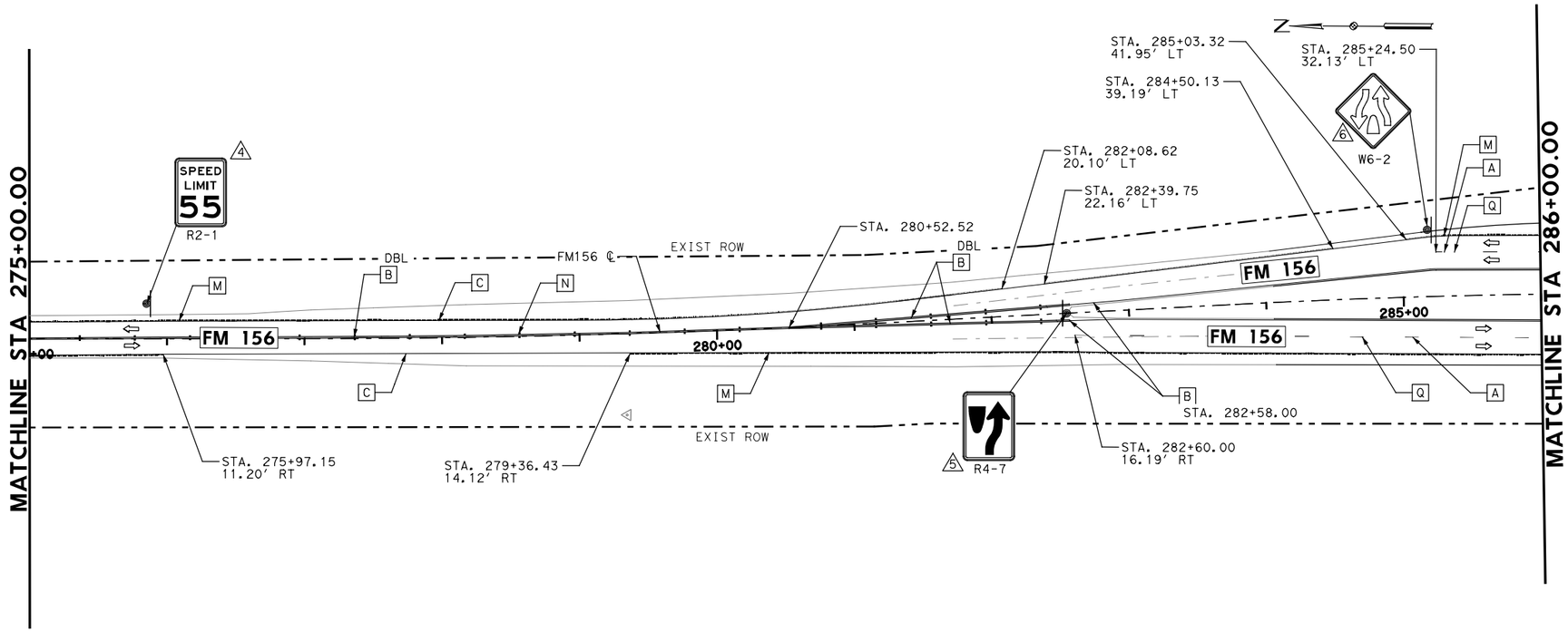
SCALE: 1"=100' SHEET 12 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	106
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:49 PM SCALE: 1:00
FILE: FM156-PVMK-12.dgn

100% PLANS SUBMITTAL





LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
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- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
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STATE OF TEXAS
EN WANG
123262
PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

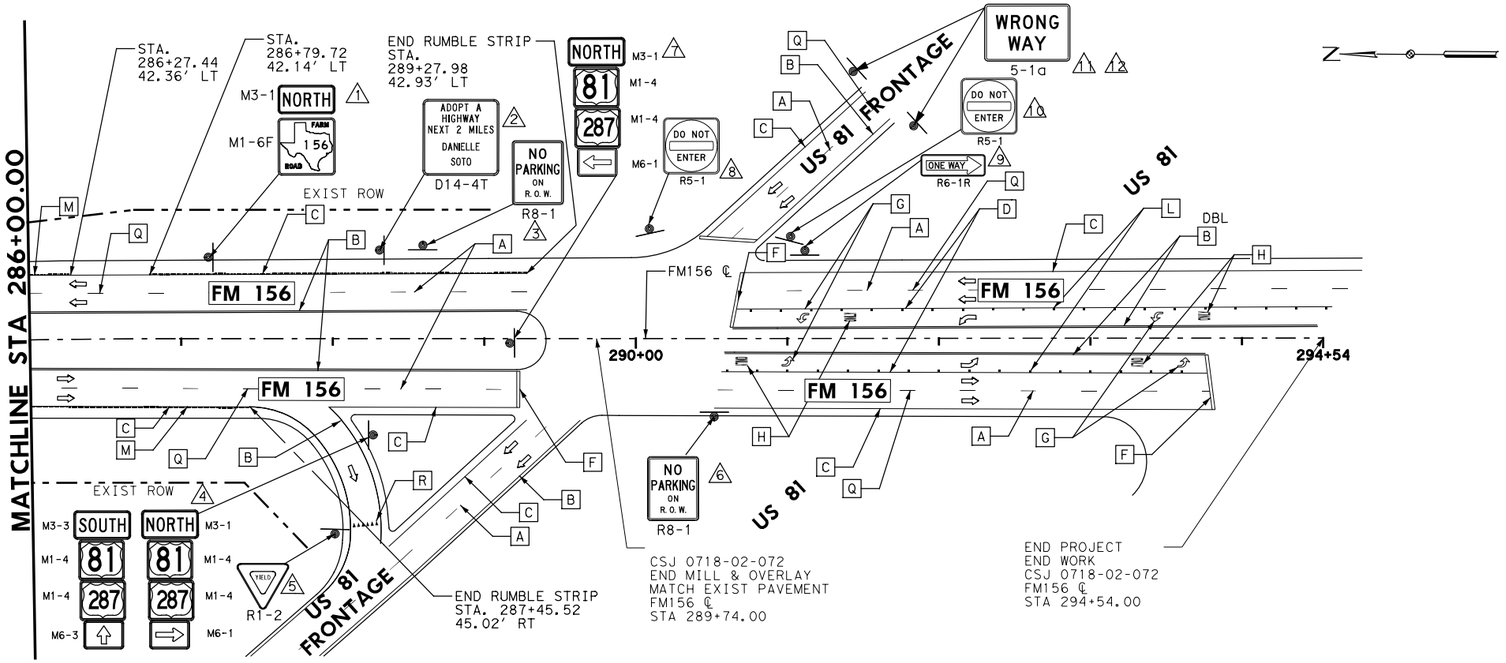
FM 156
SIGNING & PAVEMENT MARKING
STA 264+00 TO STA 286+00

SCALE: 1"=100' SHEET 13 OF 14

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	107
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:52 PM SCALE: 1:100
FILE: FM156-PVMK-13.dgn

100% PLANS SUBMITTAL



LEGEND:

- A REFL PAV MRK TY I (W)6"(BRK)(100 MIL)
- B REFL PAV MRK TY I (Y)6"(SLD)(100 MIL)
- C REFL PAV MRK TY I (W)6"(SLD)(100 MIL)
- D REFL PAV MRK TY I (W)8"(SLD)(100 MIL)
- E REFL PAV MRK TY I (W)12"(SLD)(100 MIL)
- F REFL PAV MRK TY I (W)24"(SLD)(100 MIL)
- G PREFAB PAV MRK TY C (W) (ARROW)
- H PREFAB PAV MRK TY C (W) (WORD)
- I REFL PAV MRK TY I (Y)6"(BRK)(100 MIL)
- J REFL PAV MRK TY I (Y)24"(SLD)(100 MIL)
- K REFL PAV MRKR TY II-A-A AT 20' C-C (TYP.)
- L REFL PAV MRKR TY I-C AT 20' C-C
- M RUMBLE STRIPS (SHOULDER)
- N REFL PAV MRKR TY II-A-A AT 40'CC
- O REFL PAV MRKR TY II-A-A AT 80'CC
- P REFL PAV MRKR TY I (W)8"(BRK)(100 MIL)
- Q REFL PAV MRKR TY II-C-R AT 80'CC
- R PREFAB PAV MRK TY C (W)(36")(YLD TRI)
- S PREFAB PAV MRK TY C (W) (DBL ARROW)
- T REFL PROF PAV MRK TY I(W)6"(SLD)(100MIL)

(#) EXISTING SIGN TO BE REMOVED AND REPLACED

(#) EXISTING SIGN TO BE RELOCATED

(#) EXISTING SIGN TO REMAIN IN PLACE

EXISTING R.O.W.

TRAFFIC FLOW

OBJECT MARKER / DELINEATOR

NOTES:

1. REFER TO TYPICAL SECTIONS FOR LANE WIDTH REQUIREMENTS.
2. ALL STATIONING REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
3. CONTRACTOR TO SURVEY EXISTING STRIPING PRIOR TO MILLING AND OVERLAY. CONTRACTOR TO MATCH EXISTING STRIPING UNLESS NOTED ON THE PLANS.
4. REFER TO TXDOT STANDARDS FOR OBJECT MARKER & DELINEATOR, PAVEMENT MARKING AND SIGN MOUNTING DETAILS.

STATE OF TEXAS
EN WANG
123262
REGISTERED PROFESSIONAL ENGINEER

02/09/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

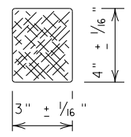
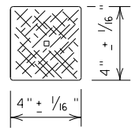
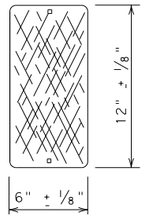
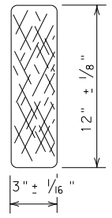
FM 156
SIGNING & PAVEMENT MARKING
STA 286+00 TO END

SCALE: 1"=100' SHEET 14 OF 14

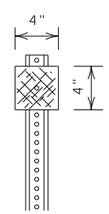
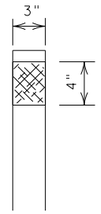
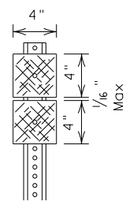
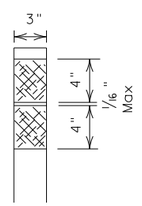
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	108
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: 10246000.tbl
USER: EWANG DATE: 2/9/2023 TIME: 2:50:55 PM SCALE: 1:00
FILE: FM156-PVMK-14.dgn

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

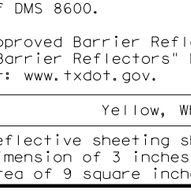
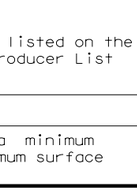
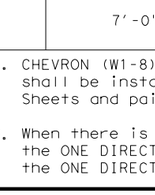
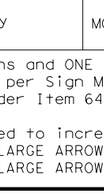
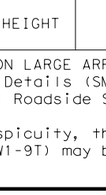
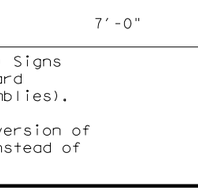
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker 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

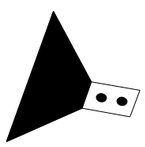
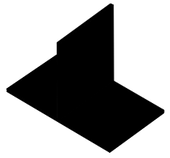
OBJECT MARKERS

	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

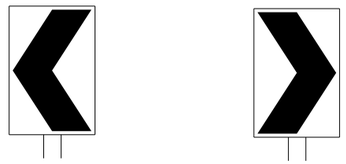
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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.

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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	0718	02	072	FM156
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	FTW	TARRANT		109

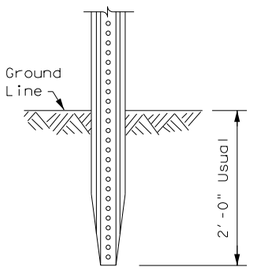
DATE:
FILE:

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

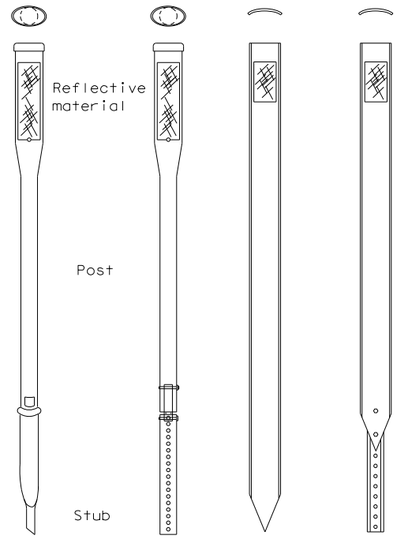


NOTES

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

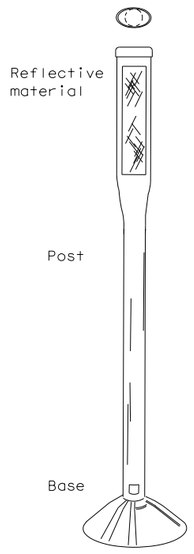
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



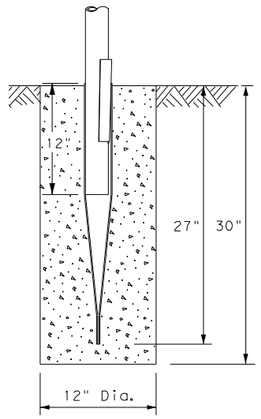
SURFACE MOUNT

NOTES

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

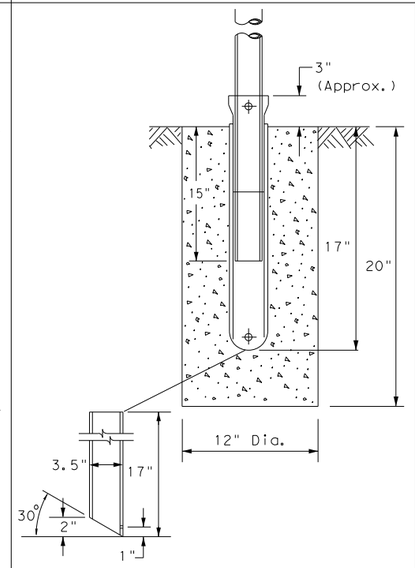
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

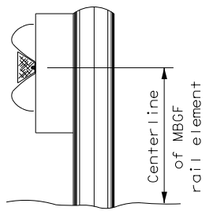
NOTE

1. Install per manufacturer's recommendations.

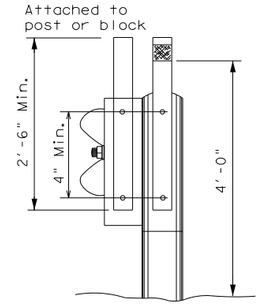
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

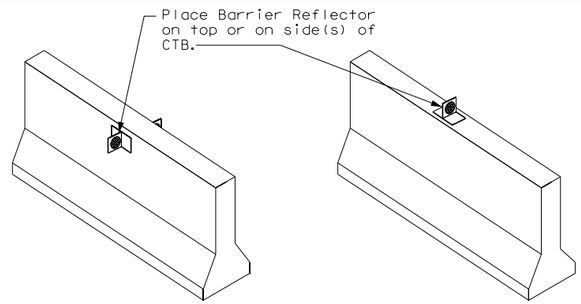
GF1



GF2



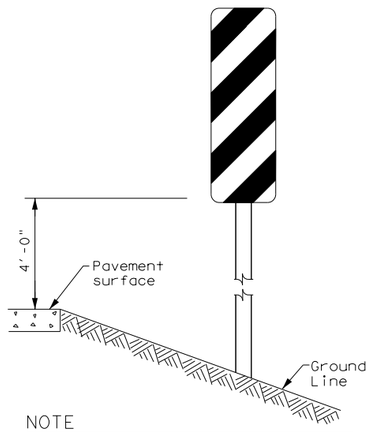
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

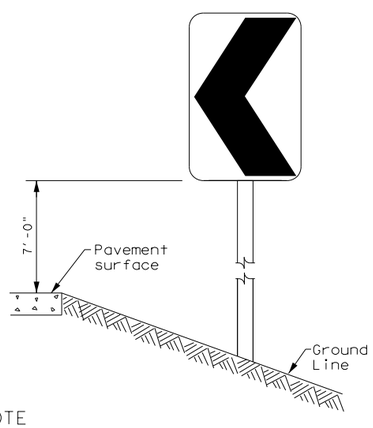
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

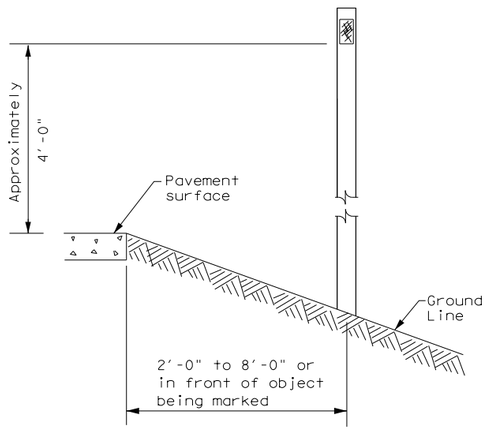
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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4-10 7-20	FTW	TARRANT		110

20B

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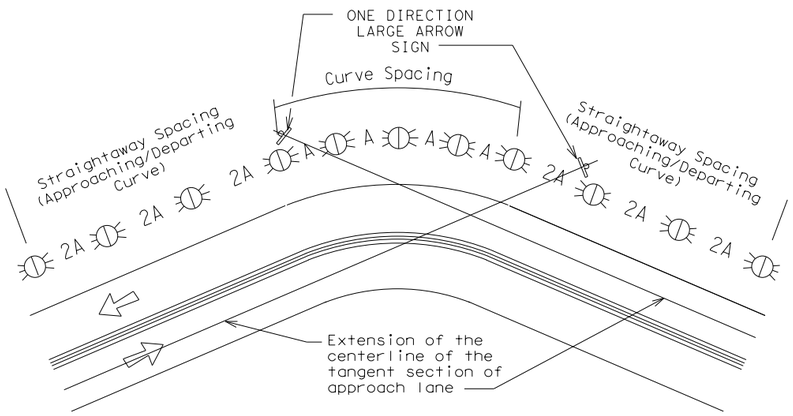
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

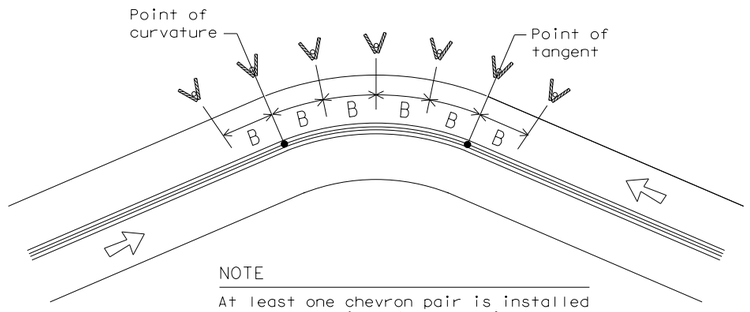
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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
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3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	FTW	TARRANT		111

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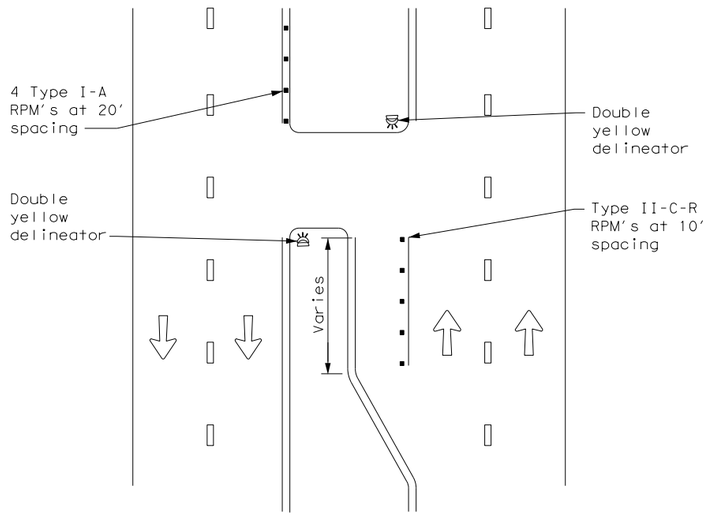
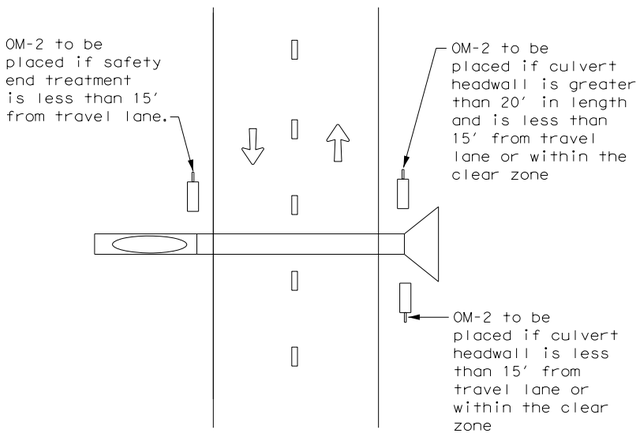
CROSSOVERS



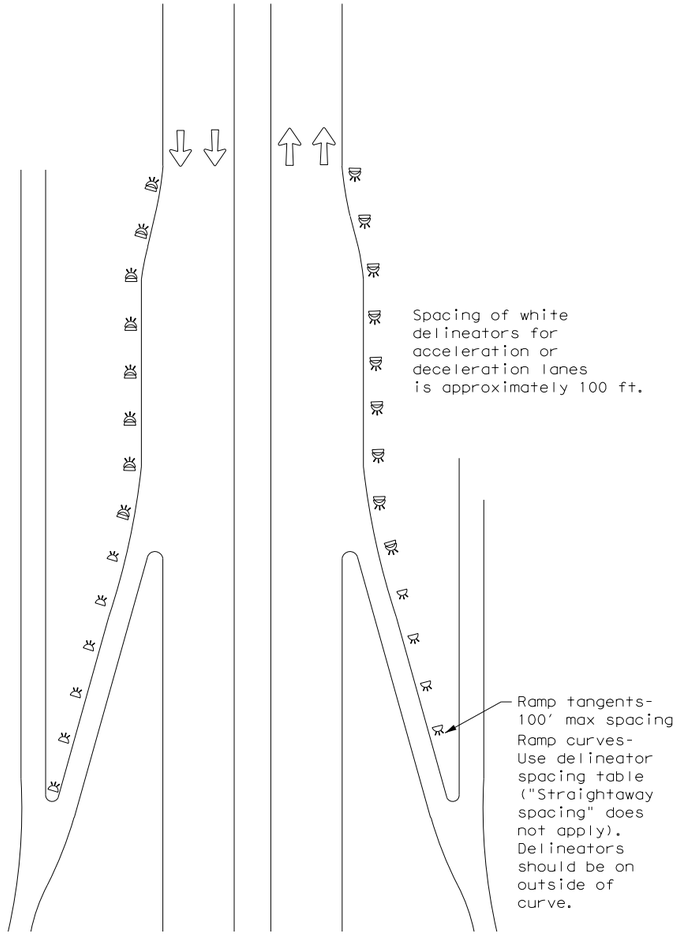
DETAIL 1

FOR CULVERTS WITHOUT MBGF



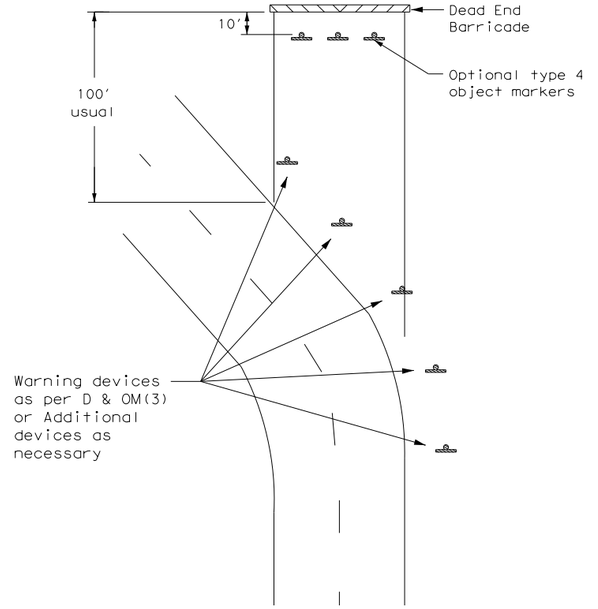
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



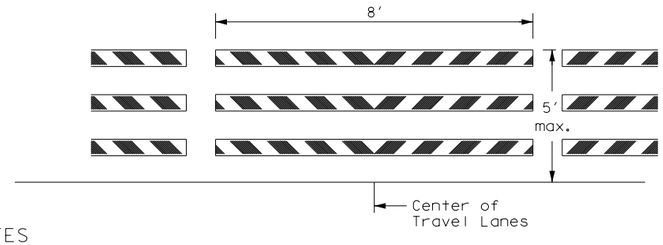
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

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

Texas Department of Transportation

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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
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REVISIONS	0718	02	072	FM156
3-15	DIST	COUNTY		SHEET NO.
7-20	FTW	TARRANT		111B

20D

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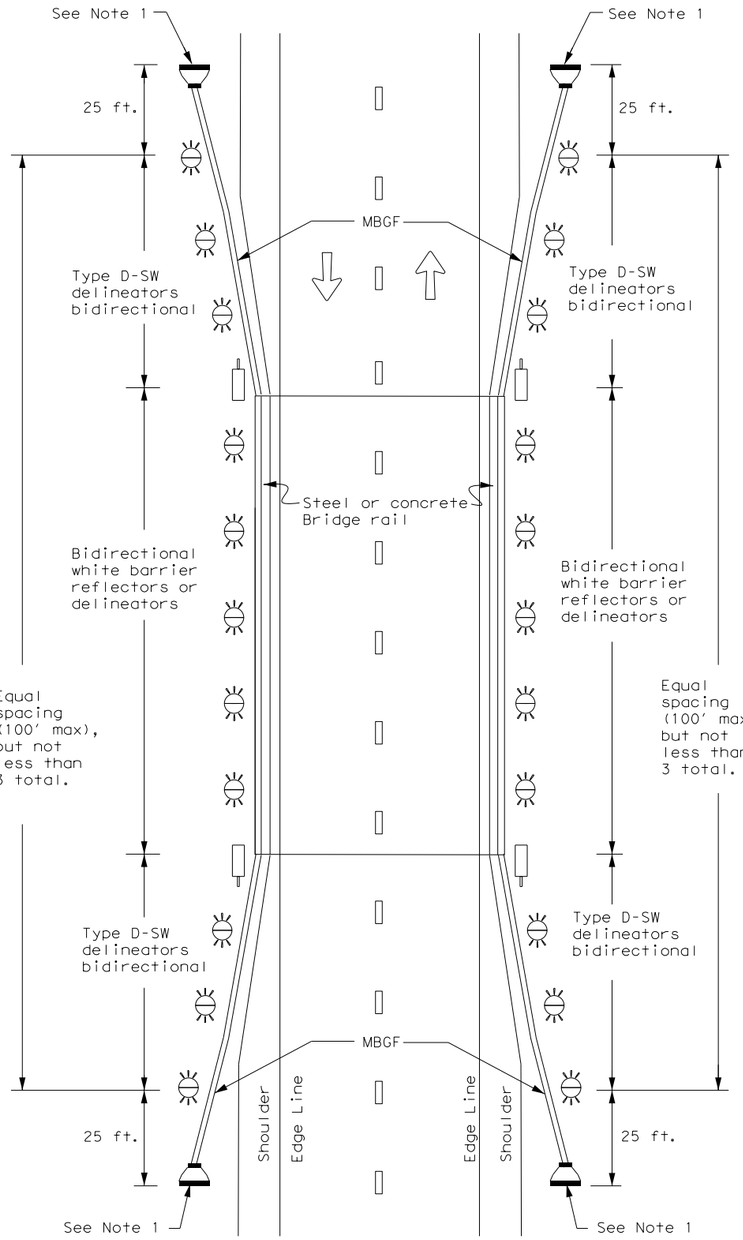
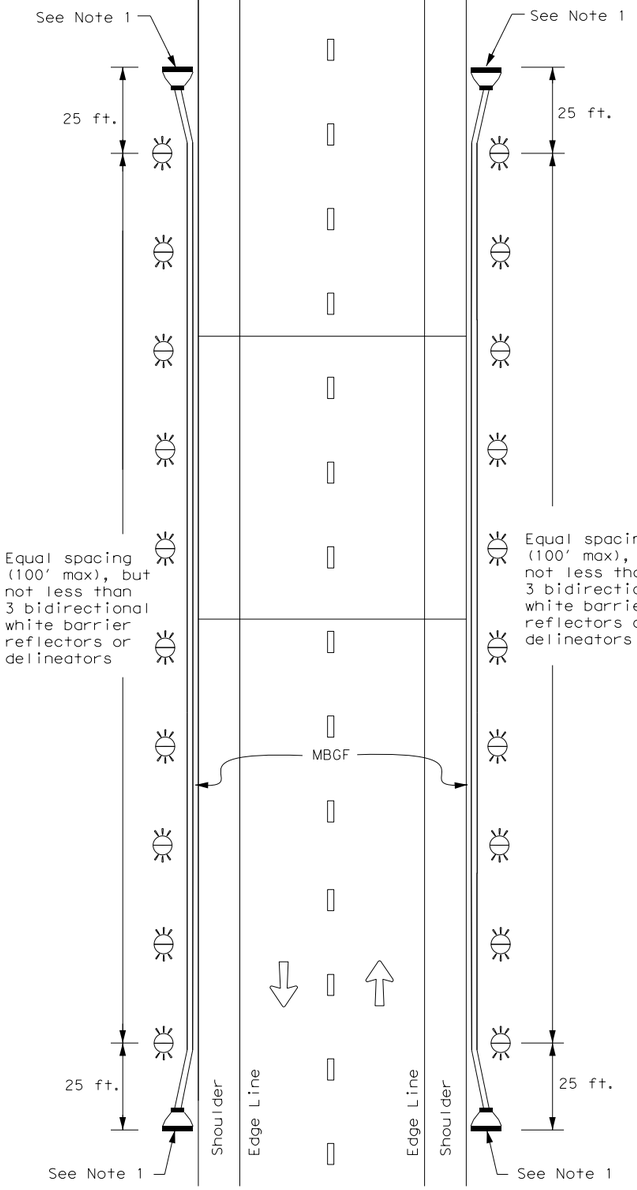
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

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

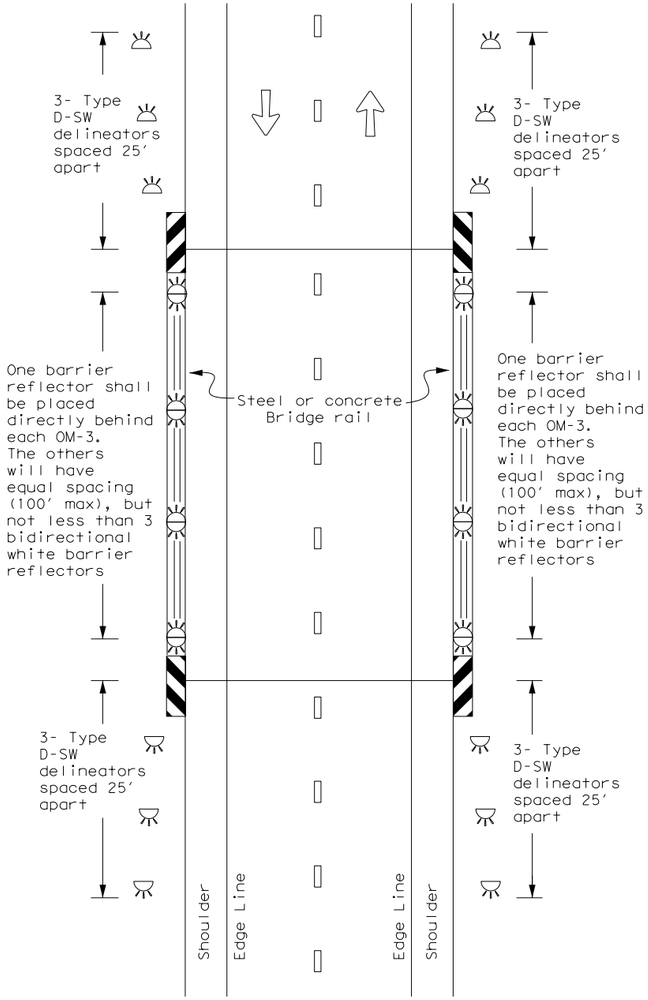
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

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

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



LEGEND

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

Texas Department of Transportation

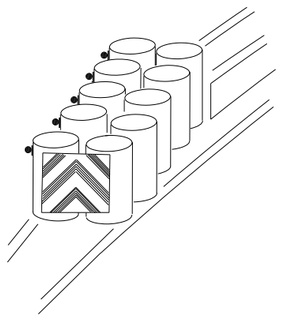
Traffic Safety Division Standard

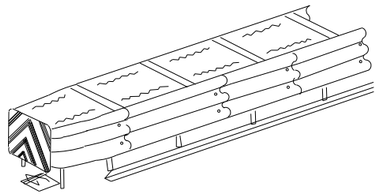
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

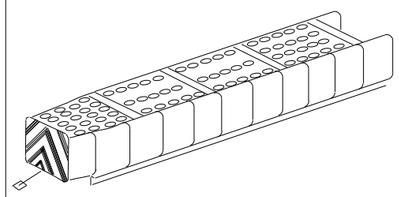
D & OM(5)-20

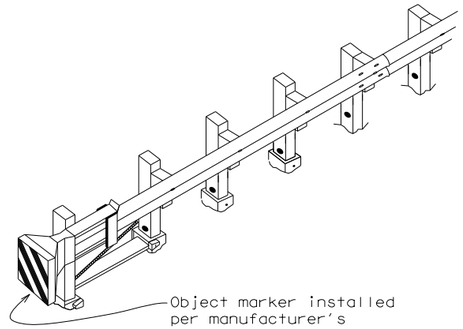
FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
7-20	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		112

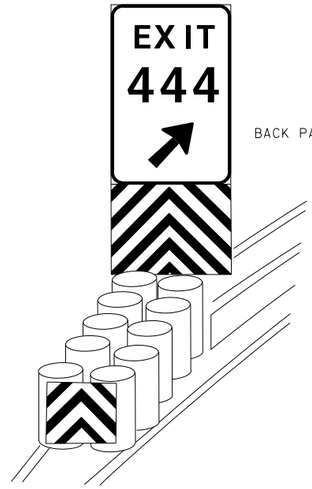
20E

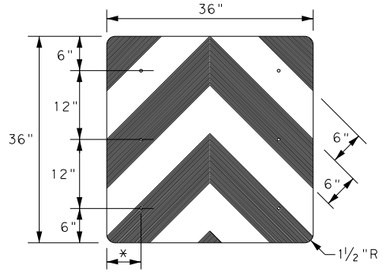


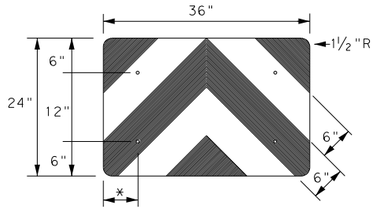




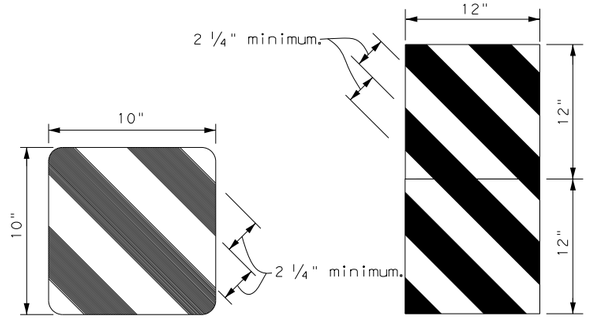




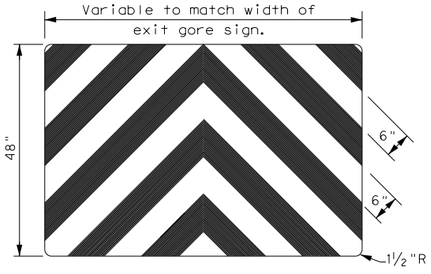


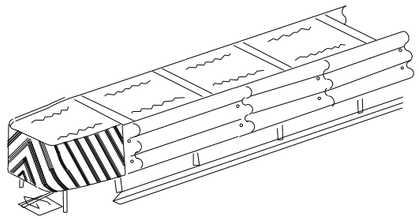


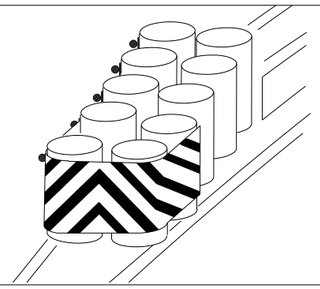
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

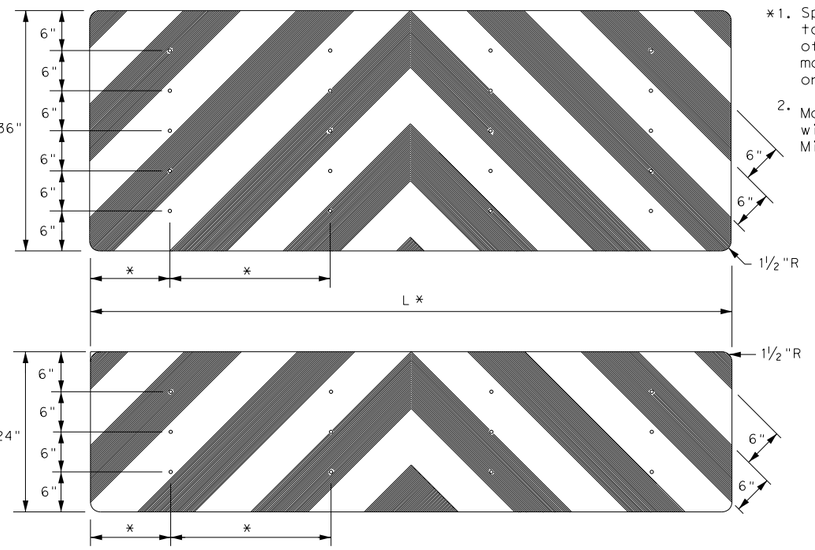


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
4-92 8-04	DIST	COUNTY		SHEET NO.
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4-98 7-20				
20G				

DATE: 1/16/2023 5:10:28 PM
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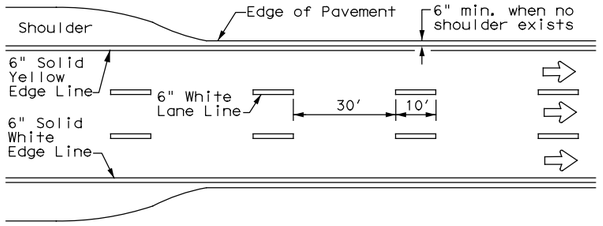
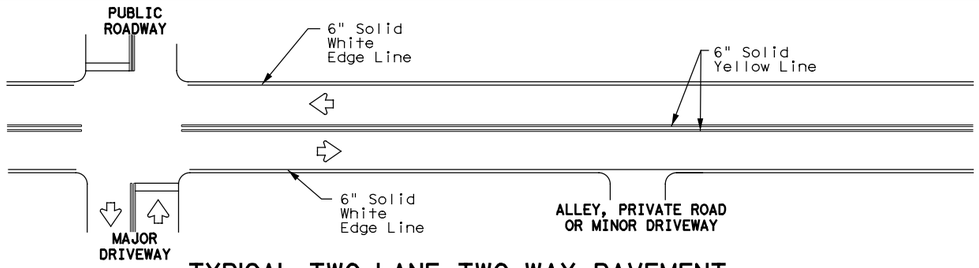
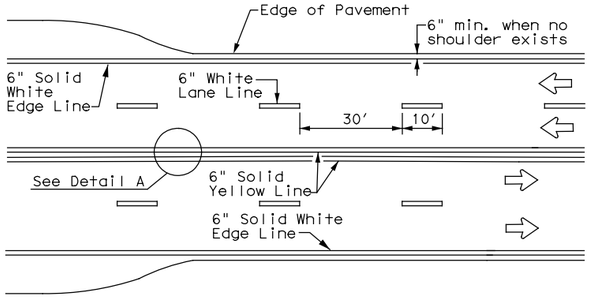
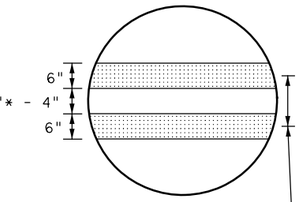


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





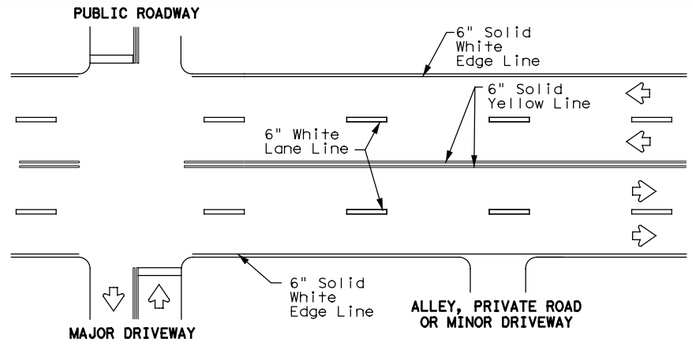
DETAIL "A"

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

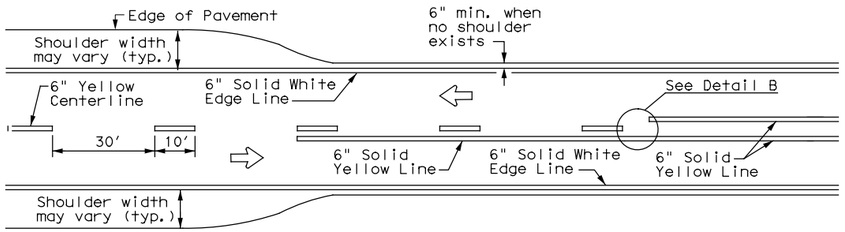
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

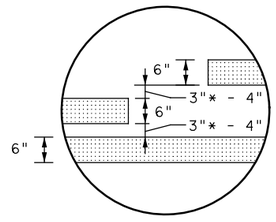
** 8" minimum for restripe projects when approved by the Engineer.



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



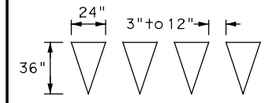
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

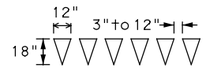
DETAIL "B"

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

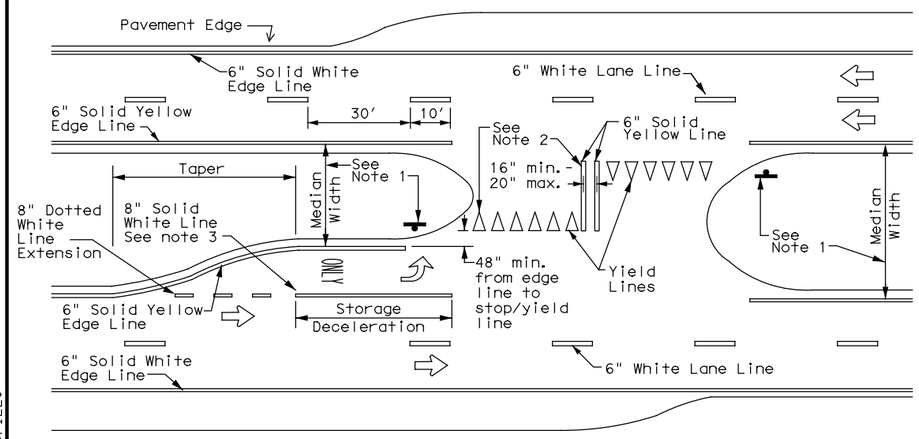


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

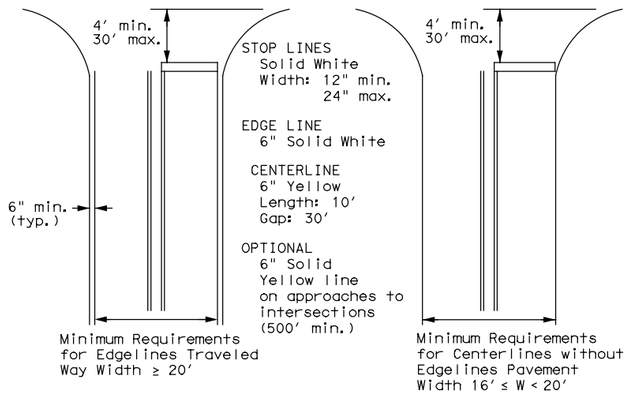
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

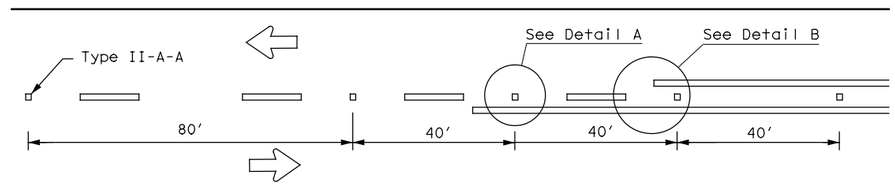
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		114

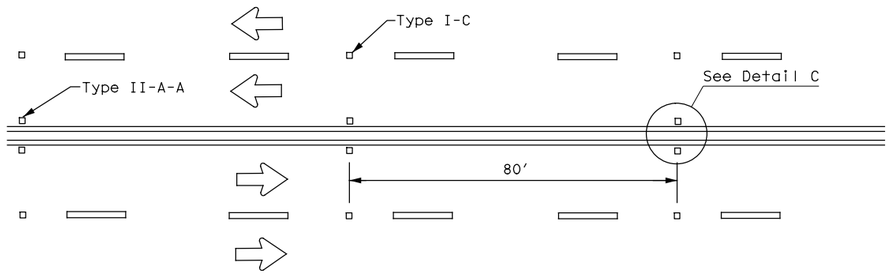
22A

DATE: 1/16/2023 5:10:30 PM
FILE: $FILE$

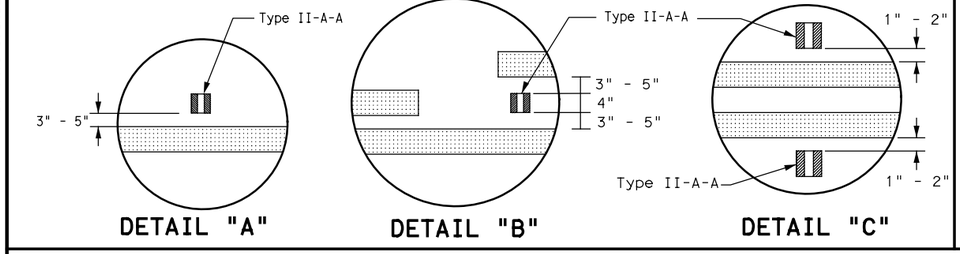
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

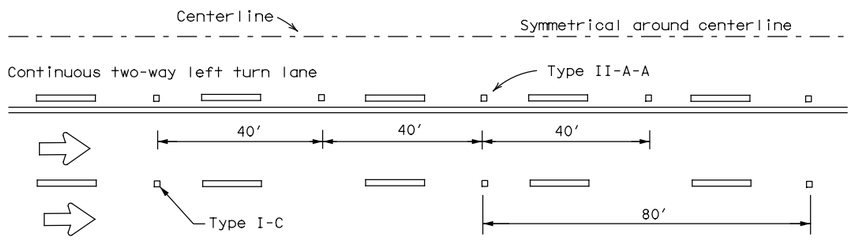


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

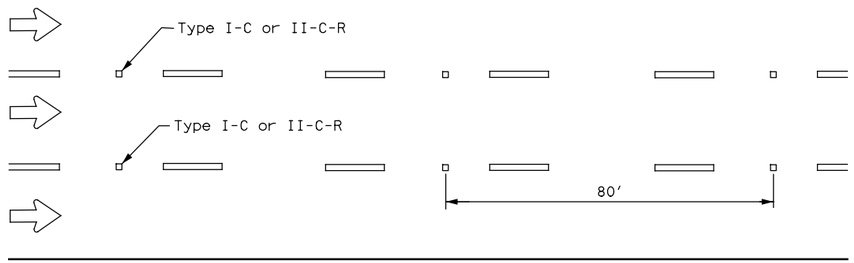


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



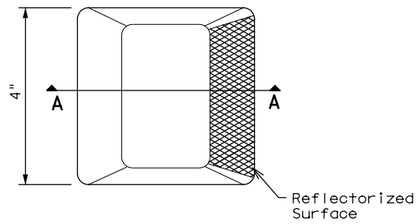
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

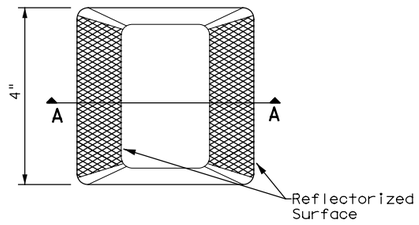
See Note 3.

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)



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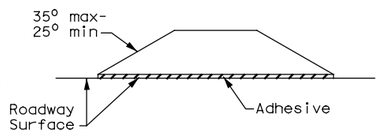
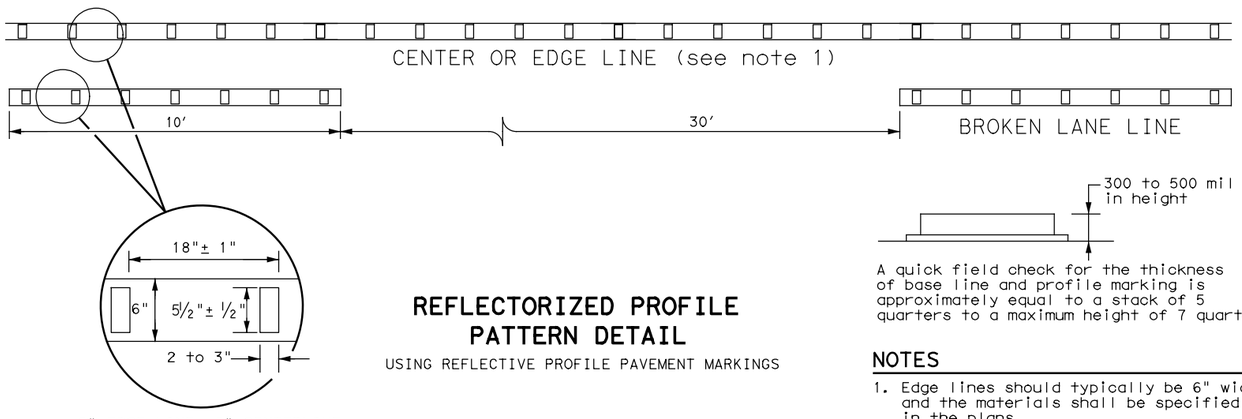


SECTION A

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	0718	02	072	FM156
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	FTW	TARRANT		115

22B

DATE: 1/16/2023 5:10:31 PM
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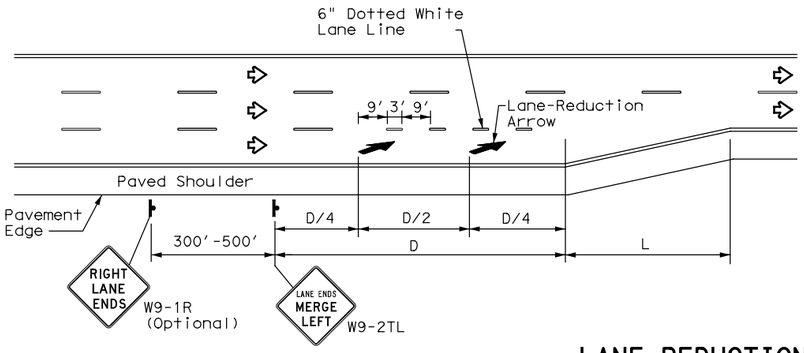
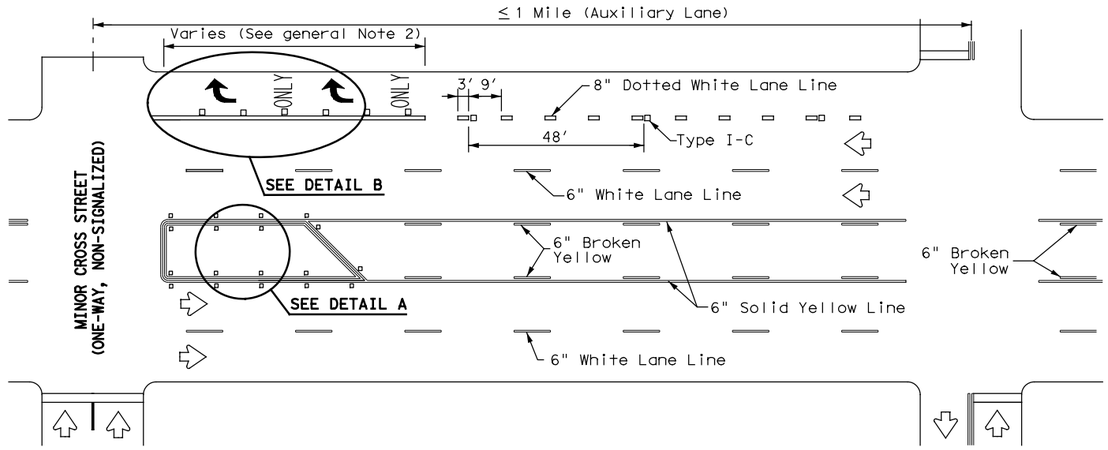


LANE REDUCTION

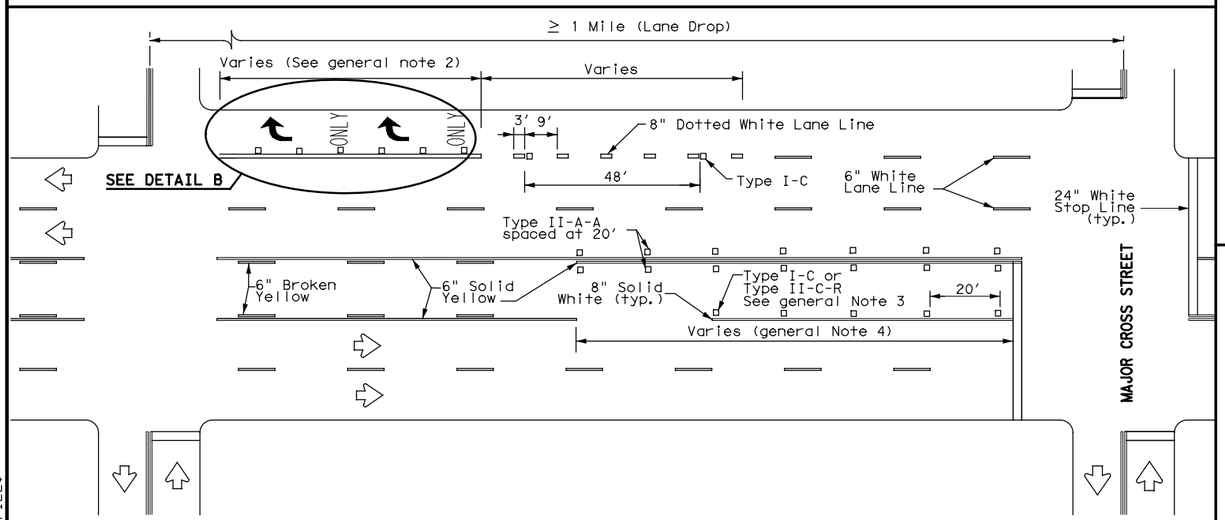
NOTES

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

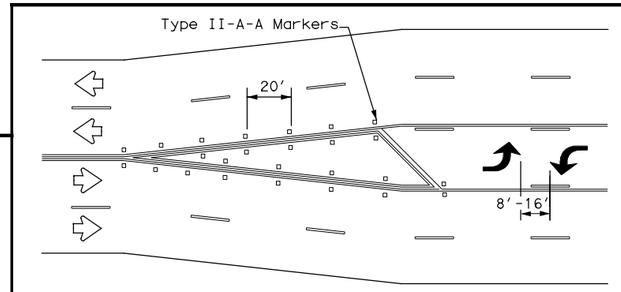
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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



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



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

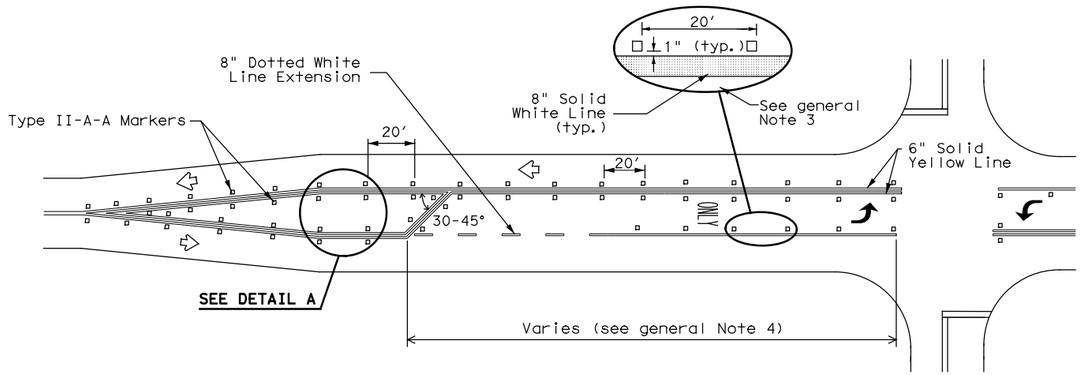
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

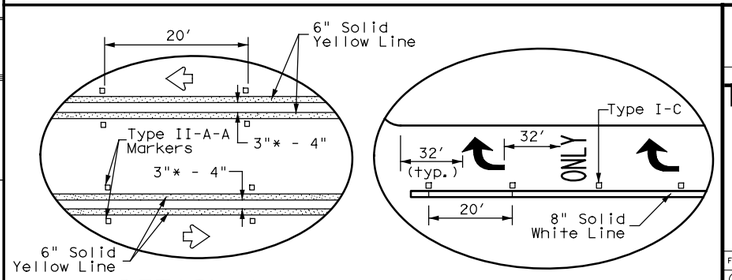
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

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

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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

Texas Department of Transportation

Traffic Safety Division Standard

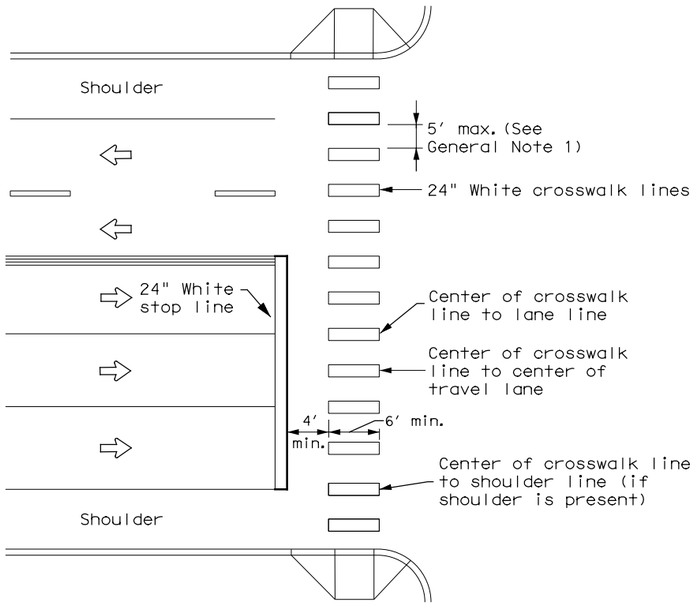
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		116A

22C

DATE: 1/16/2023 5:10:32 PM
FILE: $FILE$



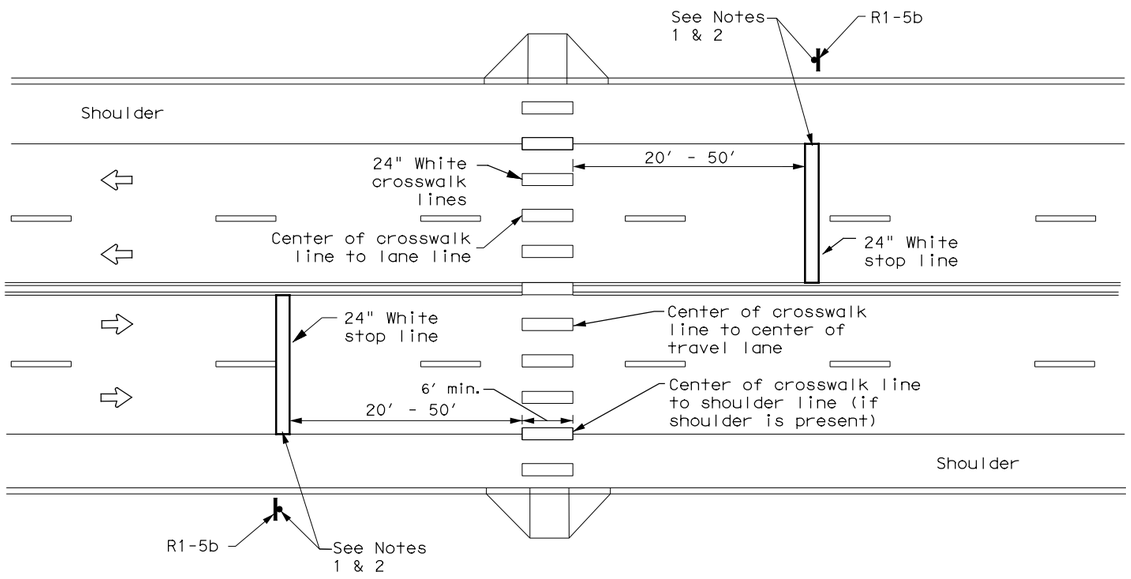
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

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
REVISIONS	0718	02	072	FM156
6-20	DIST	COUNTY		SHEET NO.
6-22	FTW	TARRANT		116B
12-22				
22D				

DATE: 1/16/2023 5:10:34 PM
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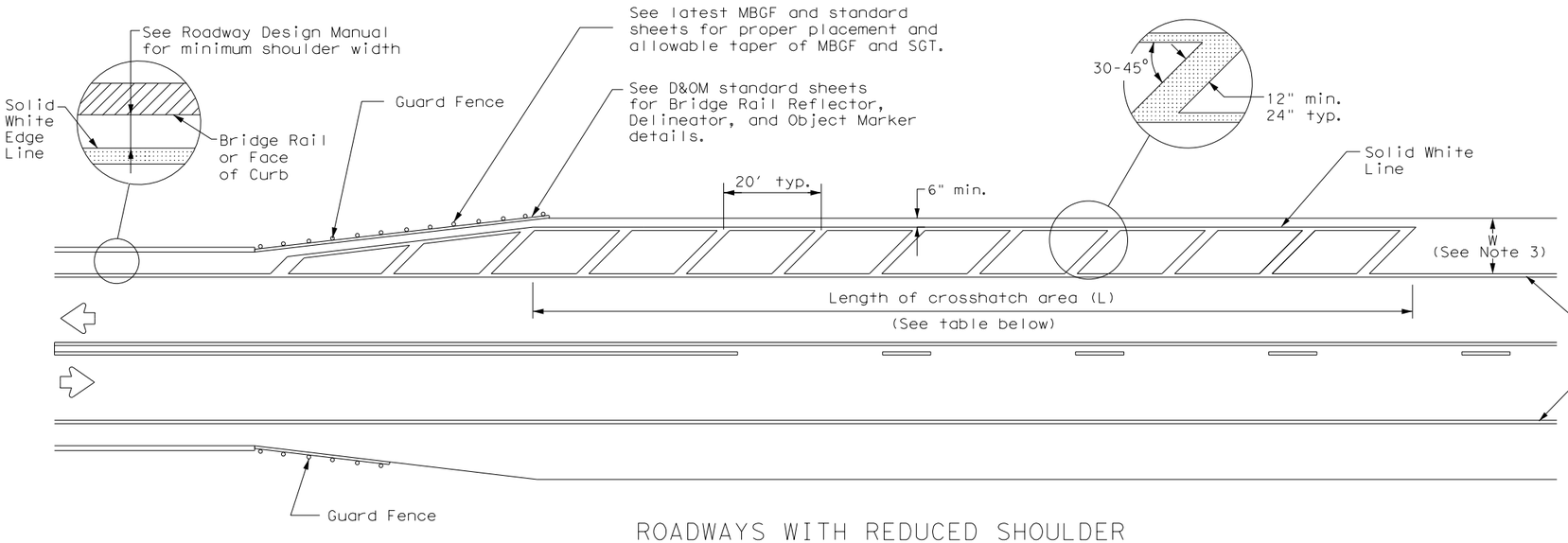
DATE:
FILE:



ROADWAYS WITH REDUCED SHOULDER
WIDTHS ACROSS BRIDGE OR CULVERT

CROSSHATCH LENGTH (L)	
Posted Speed (MPH)	L (ft)
30	300 ft
35	
40	
45	
50	500 ft
55	
60	
65	
70	
75	

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 4 inches from the bridge rail or face of curb or 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions.
2. No-passing zone on bridge approach is optional. If used, the no-passing zone shall be a minimum 500 feet long from the beginning of the bridge.
3. The crosshatching should be required if the shoulder width in advance of the bridge is 4 feet or wider and a reduction of at least 3 feet in shoulder width across the bridge occurs.
4. On divided highways, review both the right and left shoulder widths for the need for narrow bridge pavement markings.

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.

Texas Department of Transportation

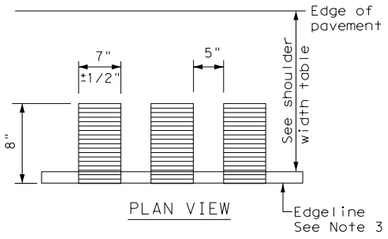
Traffic Safety Division Standard

PAVEMENT MARKINGS FOR ROADWAYS WITH REDUCED SHOULDER WIDTHS ACROSS BRIDGE OR CULVERT

PM(5)-22

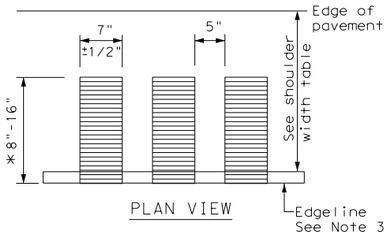
FILE: pm5-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		116C

DATE:
FILE:



PROFILE VIEW
OPTION 1

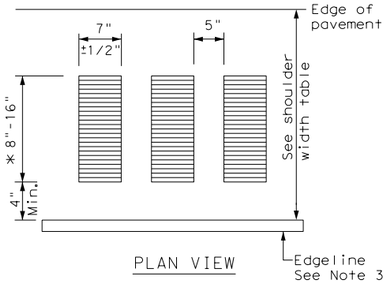
CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



* This distance may vary based on width of shoulder

PROFILE VIEW
OPTION 2

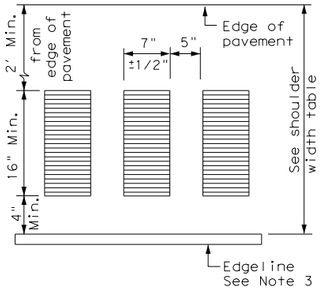
CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



* This distance may vary based on width of shoulder

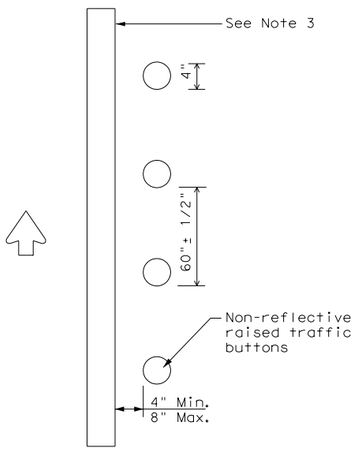
PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



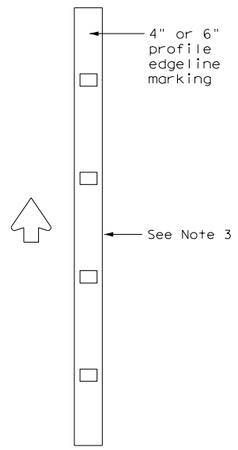
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

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 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

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) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE 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 edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline 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. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM 156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		116D

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

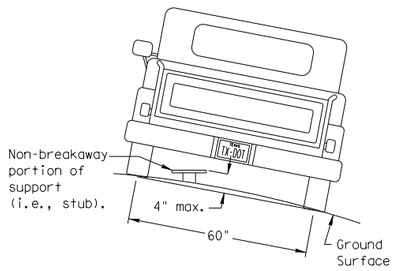
Anchor Type

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

Sign Mounting Designation

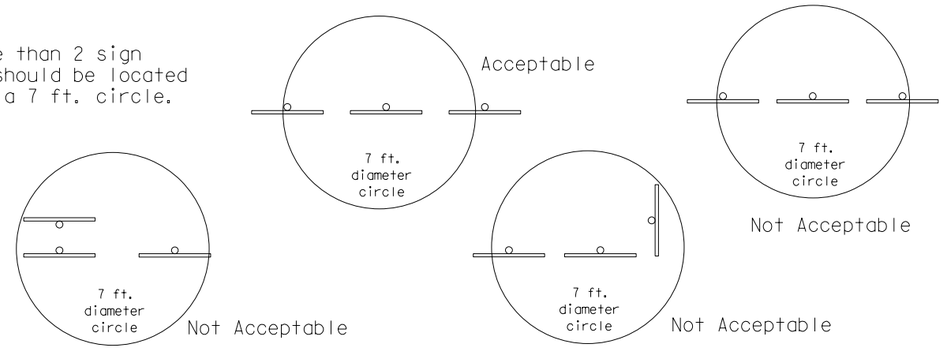
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))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

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



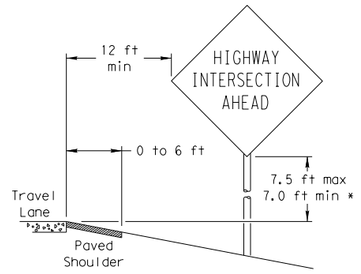
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



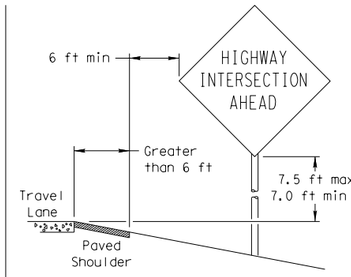
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

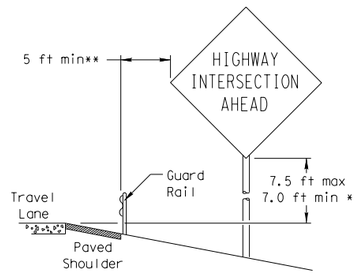
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



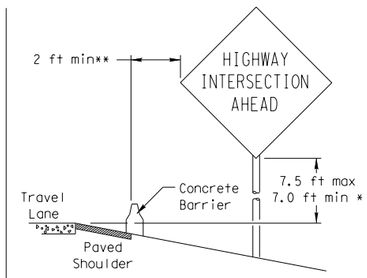
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



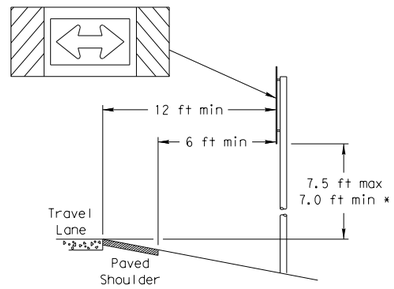
BEHIND GUARDRAIL



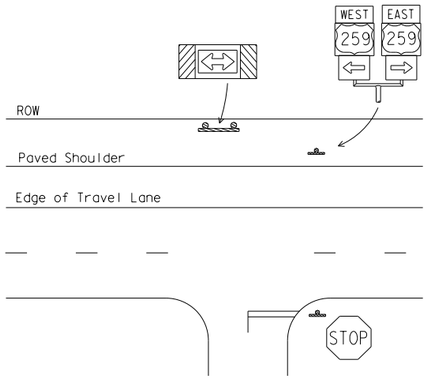
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

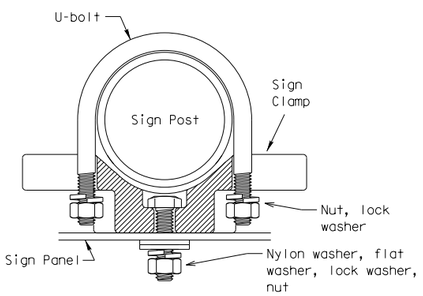
The maximum values may be increased when directed by the Engineer.

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

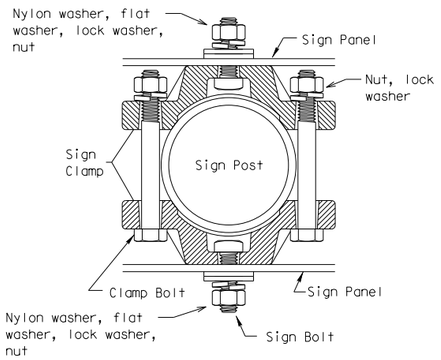
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



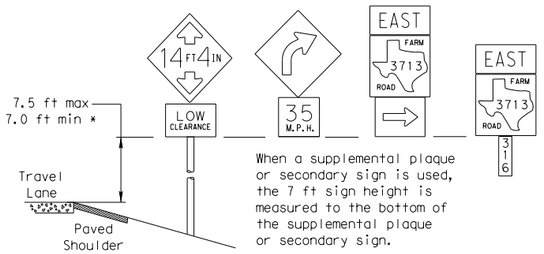
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

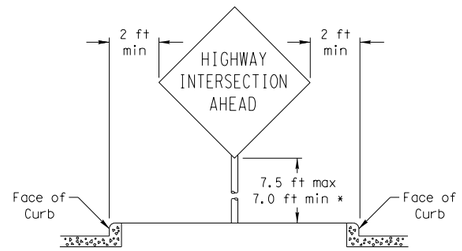
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



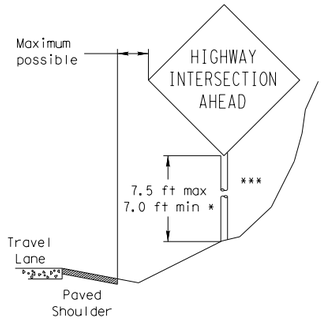
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

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

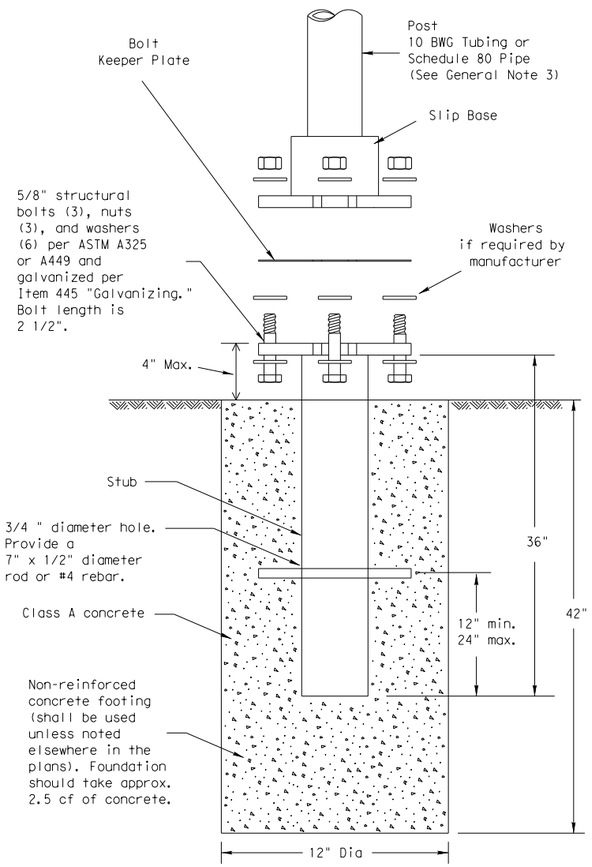
CONT	SECT	JOB	HIGHWAY
0718	02	072	FM156

DIST	COUNTY	SHEET NO.
FTW	TARRANT	117

26A

DATE: 1/16/2023 5:10:37 PM
FILE: $FILE$

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

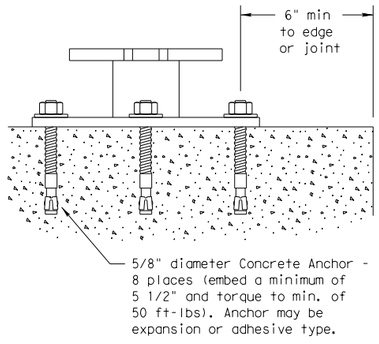
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

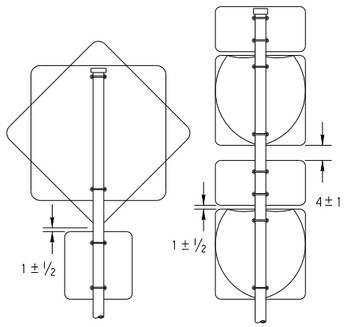
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0718	02	072	FM156

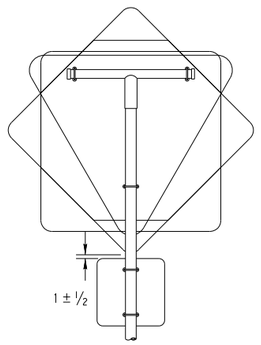
DIST	COUNTY	SHEET NO.
FTW	TARRANT	118

26B

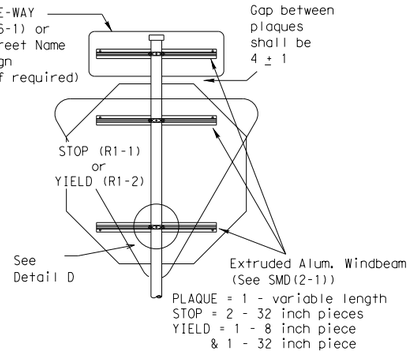
DATE: 1/16/2023 5:10:39 PM
FILE: $FILE$



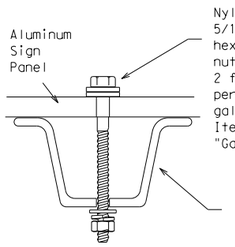
SM RD SGN ASSM TY XXXXX(1)XX(P)



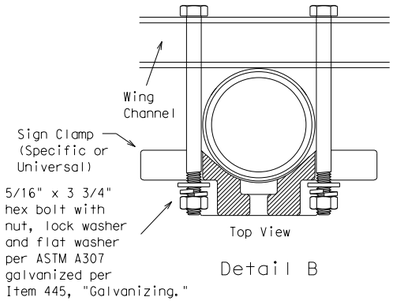
SM RD SGN ASSM TY XXXXX(1)XX(T)



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



Detail A



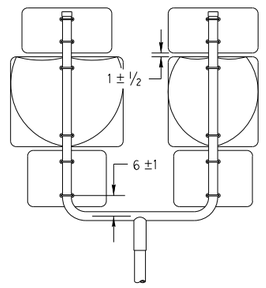
Detail B

GENERAL NOTES:

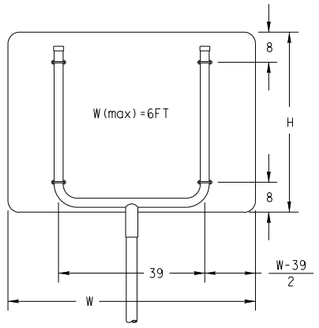
1.

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

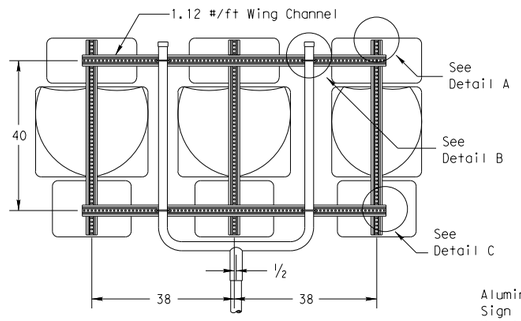
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material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



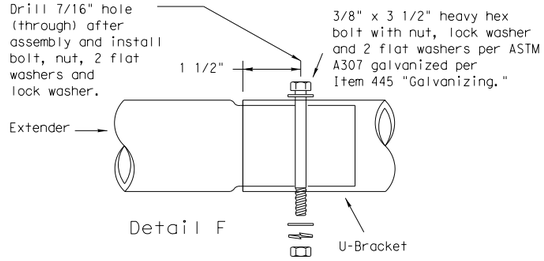
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

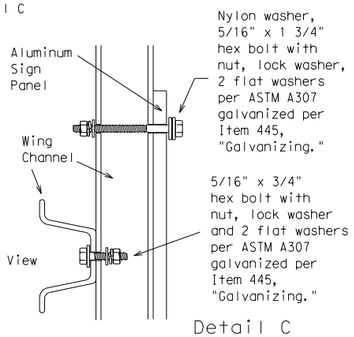


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

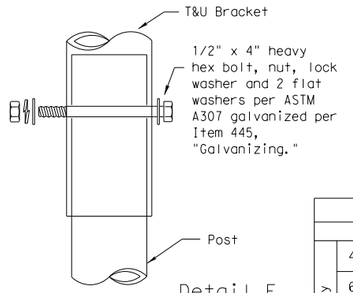


Detail F

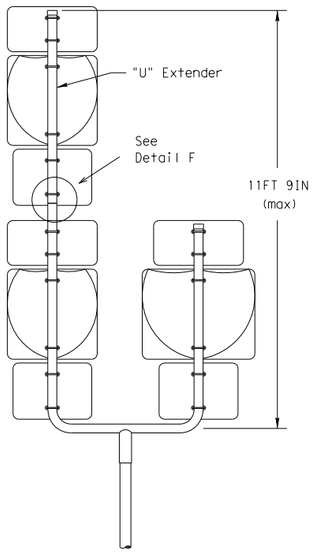
Splices shall only be allowed behind the sign substrate.



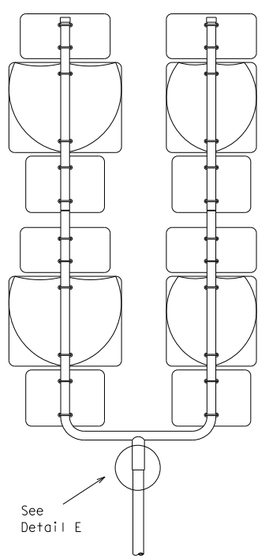
Detail C



Detail E



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



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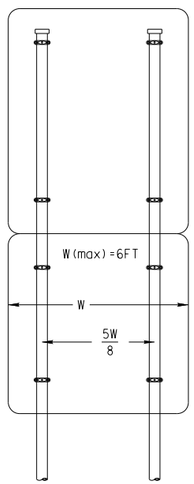
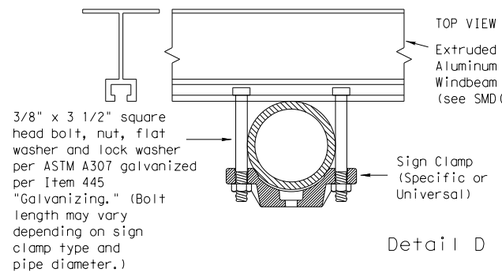
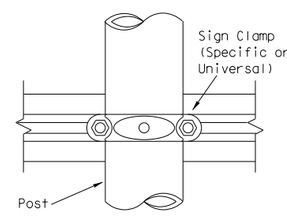


SM RD SGN ASSYM TY XXXXX(2)XX(P)

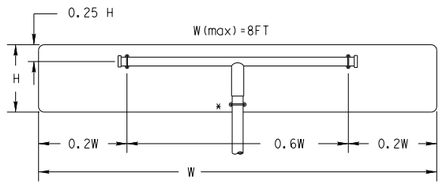
SIDE VIEW



Detail D



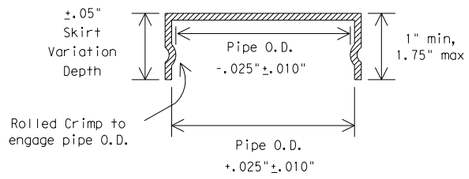
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		119

26C

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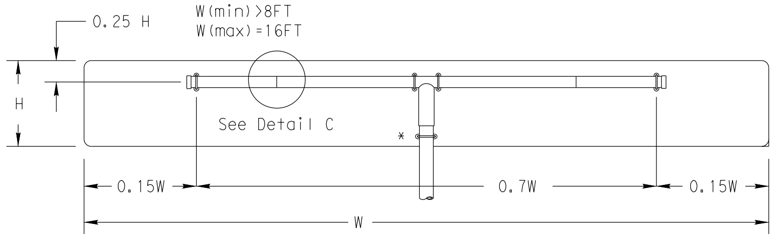
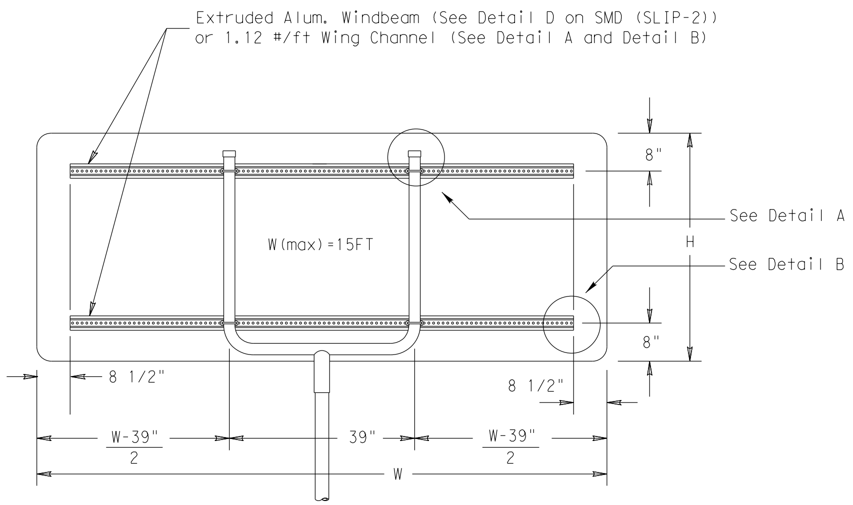
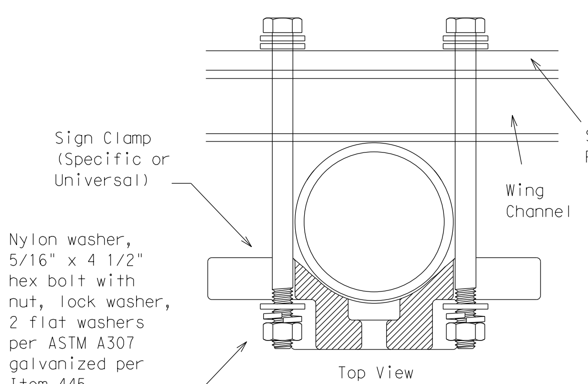


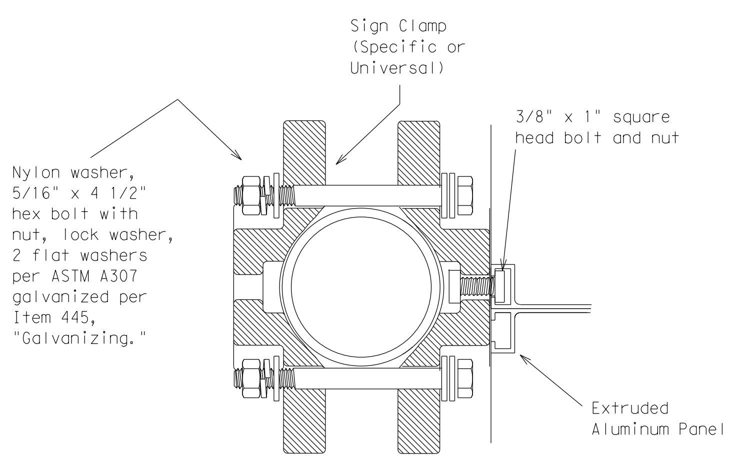
SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



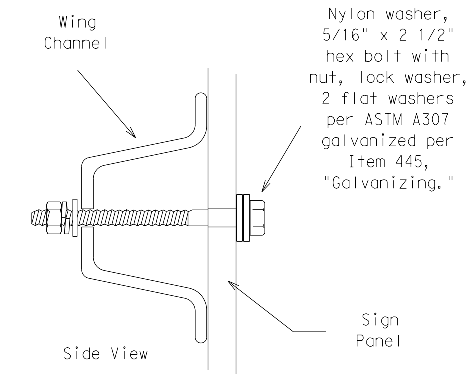
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



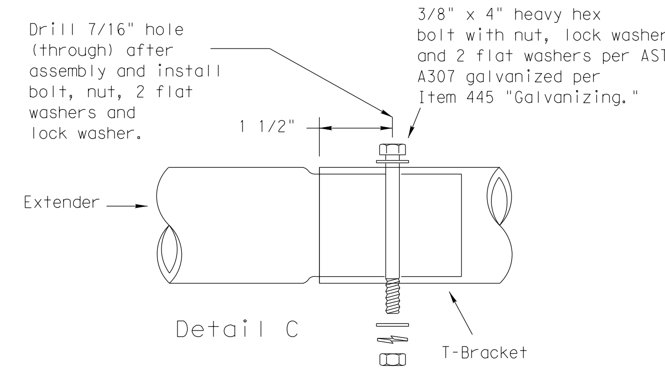
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

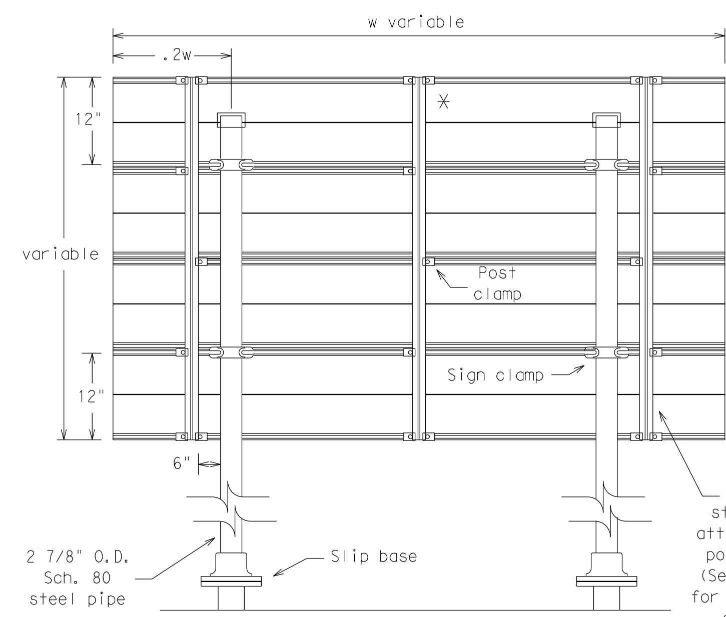


Detail B



Detail C

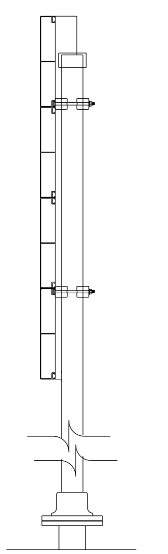
Splices shall only be allowed behind the sign substrate.



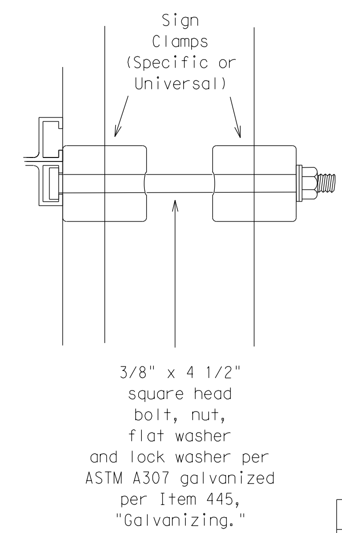
Typical Sign Mount

SM RD SGN ASSM TY S80(2)XX(P-EXAL)

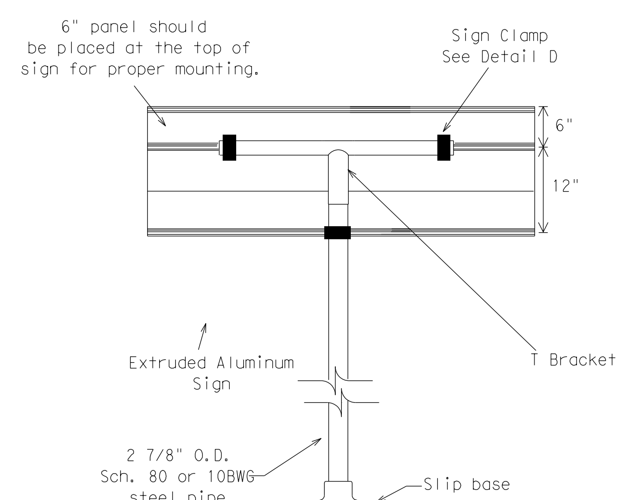
⚹ Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



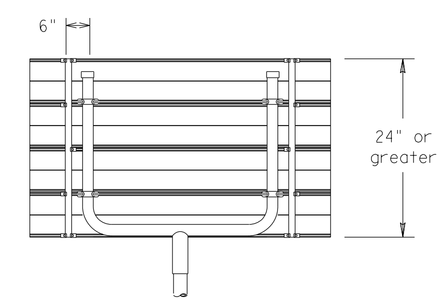
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

1.

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

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

REQUIRED SUPPORT

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

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

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0718	02	072	FM156
DIST	COUNTY		SHEET NO.
FTW	TARRANT		120

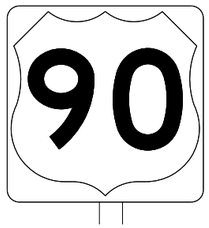
26D

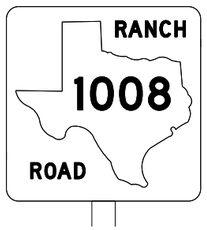
DATE: 1/16/2023 5:10:41 PM
FILE: $FILE$

DATE: 1/16/2023 5:10:44 PM
FILE: $FILE$

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

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

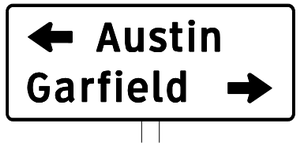




TYPICAL EXAMPLES

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

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



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

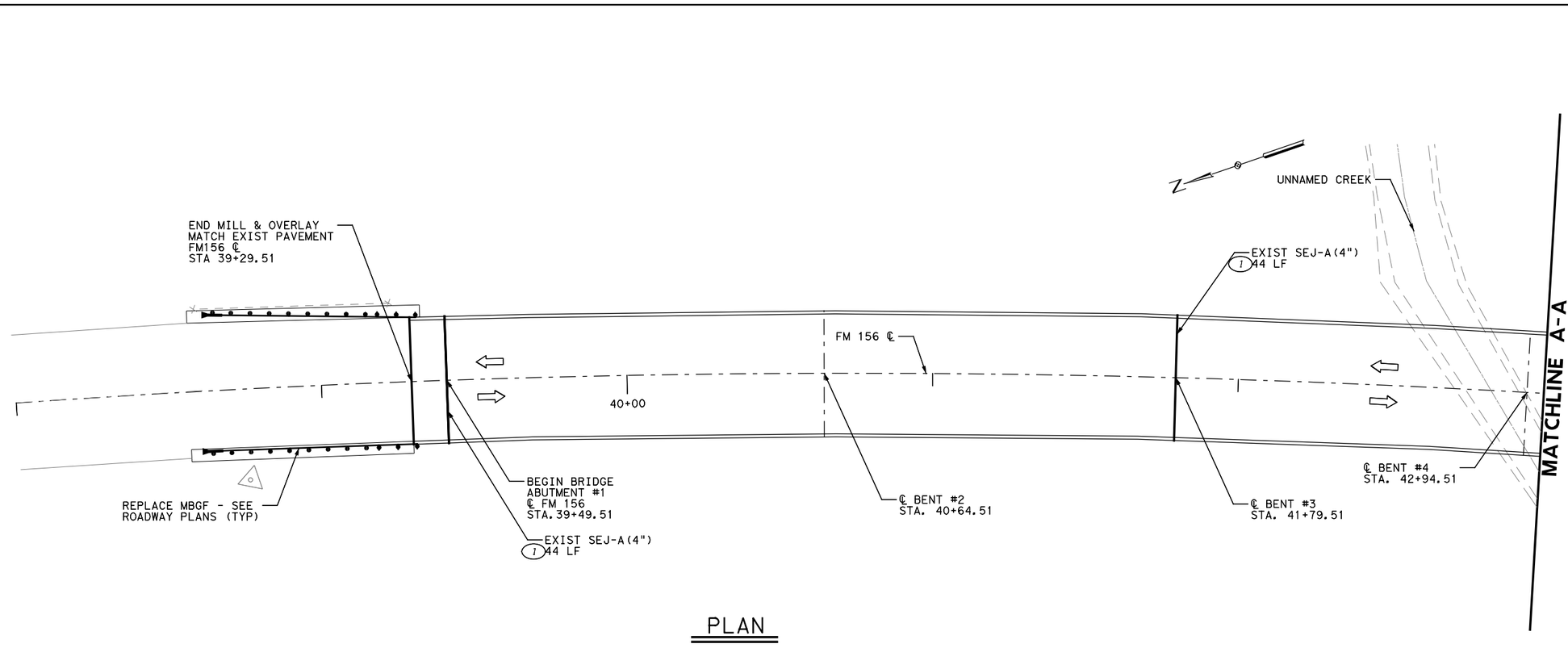
TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	FTW	TARRANT		121

3

100% PLANS SUBMITTAL



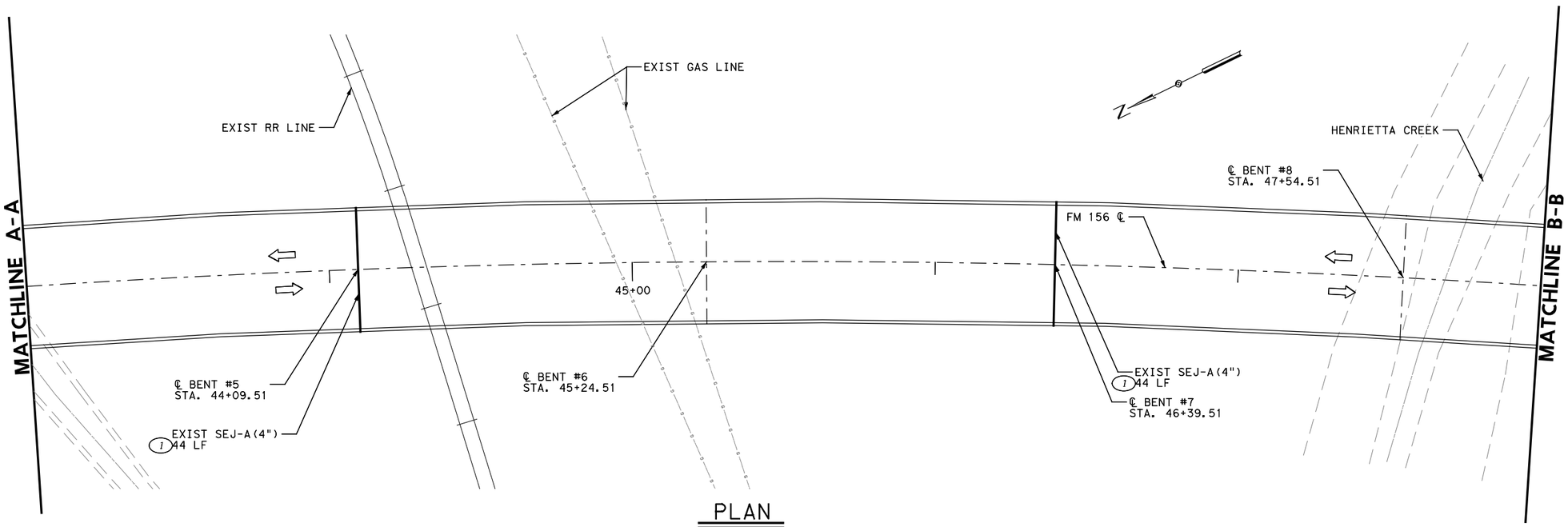
PLAN

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO "BRIDGE REPAIR TABLE" SHEET FOR INFORMATION NOT SHOWN.
3. REFER TO ROADWAY SHEETS FOR MILL & OVERLAY LIMITS.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS FOR ADDITIONAL INFORMATION.
5. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.

LEGEND:

(X) REPAIR DESIGNATION - SEE "BRIDGE REPAIR TABLE" SHEET



PLAN

Cory L. Shipman
STATE OF TEXAS
CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE LAYOUT
HENRIETTA CREEK AND BNSF RR

SCALE: 1"=40' SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	122
CONTROL	SECTION	JOB	
0718	02	072	

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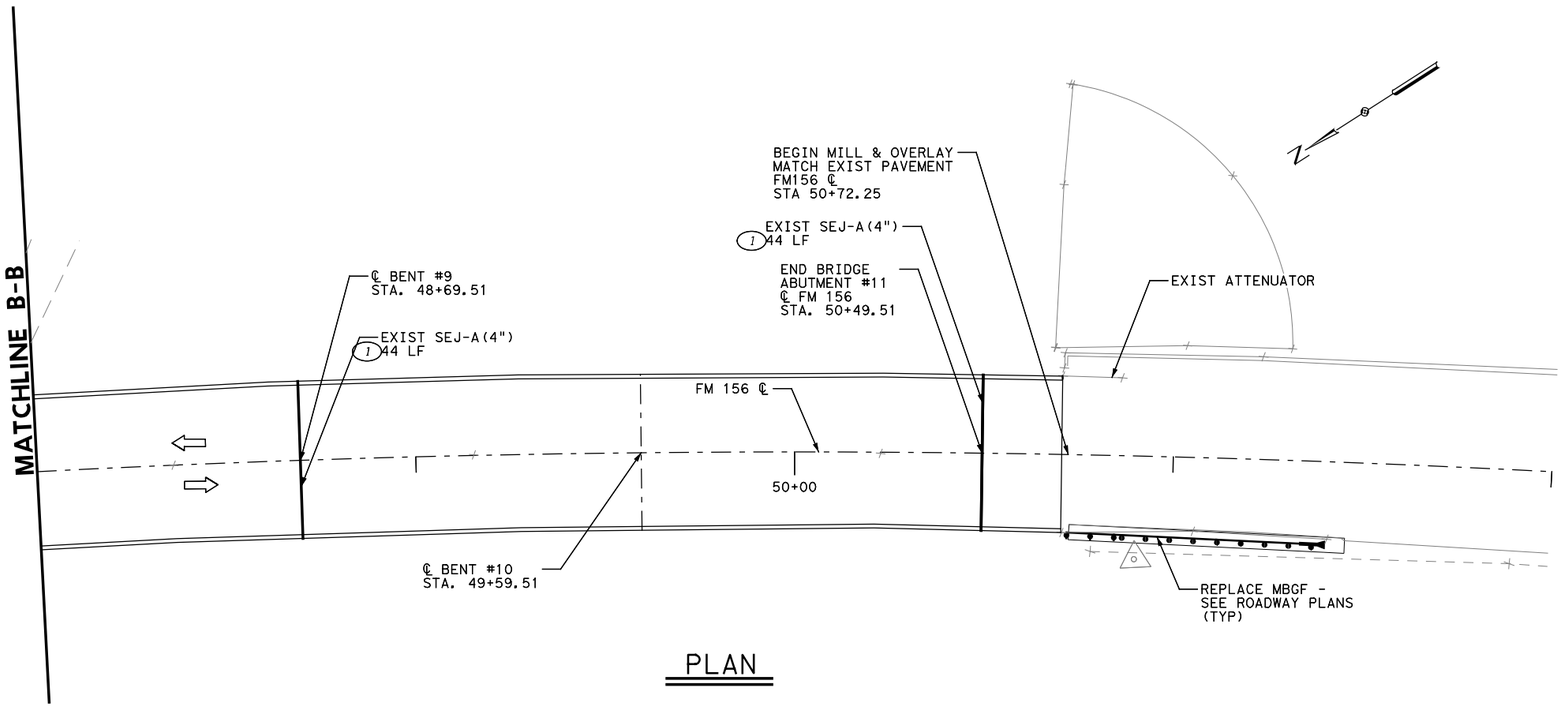
USER: EWANG DATE: 1/16/2023 TIME: 5:10:50 PM SCALE: 1:40
FILE: FM156-BRIDGE-01.dgn

100% PLANS SUBMITTAL



PLAN

0 20 40 60 80
SCALE IN FEET

NOTES:
1. SEE SHEET 1 OF 1 FOR NOTES.

LEGEND:

(X) REPAIR DESIGNATION - SEE "BRIDGE REPAIR TABLE" SHEET

STATE OF TEXAS
CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE LAYOUT
HENRIETTA CREEK AND BNSF RR

SCALE: 1"=40' SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	123
CONTROL	SECTION	JOB	
0718	02	072	

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USER: EWANG DATE: 1/16/2023 TIME: 5:10:58 PM PENTABLE: 0246000.tbl
FILE: FM156-BRIDGE-02.dgn SCALE: 1:40

100% PLANS SUBMITTAL

TABLE OF REPAIRS

CSJ NO. / NBI NO.	REPAIR NO.	REPAIR DESCRIPTION/LOCATION	BID CODE	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
CSJ 0718-02-048 NBI 02-220-0-0718-02-342	(1)	Remove existing seals. Clean joint full-depth and reseal SEJ-A expansion joints per manufacturer's requirements. Provide seals in the longest lengths and install in a single operation, if possible. See Bridge Layout for locations.	438 6001	CLEANING AND SEALING EXISTING JOINTS	264	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering joint materials. Refer to Bridge Foam Expansion Joint Seal (MOD) sheet for details.

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CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE REPAIR TABLE
HENRIETTA CREEK AND BNSF RR

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	124
CONTROL	SECTION	JOB	
0718	02	072	

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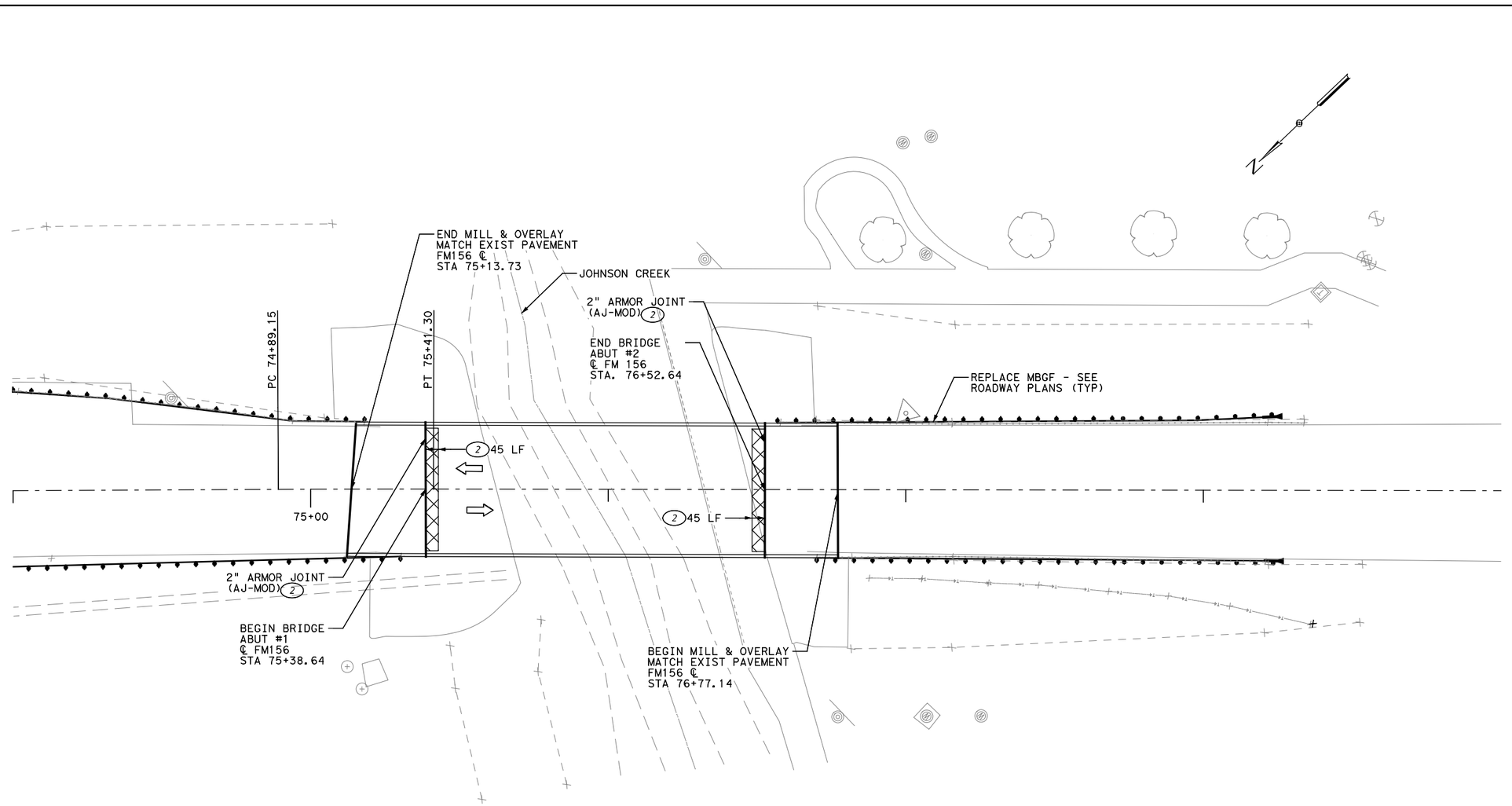
100% PLANS SUBMITTAL



PLAN

0 20 40 60 80
SCALE IN FEET

BRIDGE PLAN LEGEND

- ARMOR JOINT REPLACEMENT AND CLEAN AND SEAL JOINTS (FOAM) (BRIDGE SIDES ONLY)
- (X) REPAIR DESIGNATION - SEE "BRIDGE REPAIR TABLE" SHEET

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO "BRIDGE REPAIR TABLE" SHEET FOR INFORMATION NOT SHOWN.
3. REFER TO ROADWAY SHEETS FOR MILL & OVERLAY LIMITS.
4. REFER TO "MISCELLANEOUS ROADWAY DETAILS" SHEETS FOR ADDITIONAL INFORMATION.
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Cory L. Shipman
STATE OF TEXAS
CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE LAYOUT
TRIB OF HENRIETTA CREEK NO. 1

SCALE: 1"=40'

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	125
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG
FILE: FM156-BRIDGE-04.dgn
DATE: 1/16/2023
TIME: 5:11:10 PM
PENTABLE: 10246000.tbl
SCALE: 1:40

100% PLANS SUBMITTAL

TABLE OF REPAIRS

CSJ NO. / NBI NO.	REPAIR NO.	REPAIR DESCRIPTION/LOCATION	BID CODE	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
CSJ 0718-02-022 NBI 02-220-0-0718-02-038	(2)	Reconstruct Concrete Deck full-depth on the bridge side of the joint only. Replace the single armor joint plate on the bridge side of the joint only. Then, install foam compression seals after cleaning and preparing the joints. See Bridge Layout for locations.	785 6004	BRIDGE JOINT REPAIR (ARMOR)	90	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering plates. See Armor Joint Repair at Abutments on Bridge Repair Details sheet.
			* 438 6011	CLEANING AND SEALING JOINTS (FOAM)	90	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering joint materials. Refer to Bridge Foam Expansion Joint Seal (MOD) sheet for details.

* Not a separate pay item. Subsidiary to the Bid Item 785-6004 Bridge Joint Repair (Armor).

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CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

NO.	DATE	REVISION	APPROVED

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

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FM 156

BRIDGE REPAIR TABLE
TRIB OF HENRIETTA CREEK
NO. 1 SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	126
CONTROL	SECTION	JOB	
0718	02	072	

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FILE: FM156-BRIDGE-05.dgn

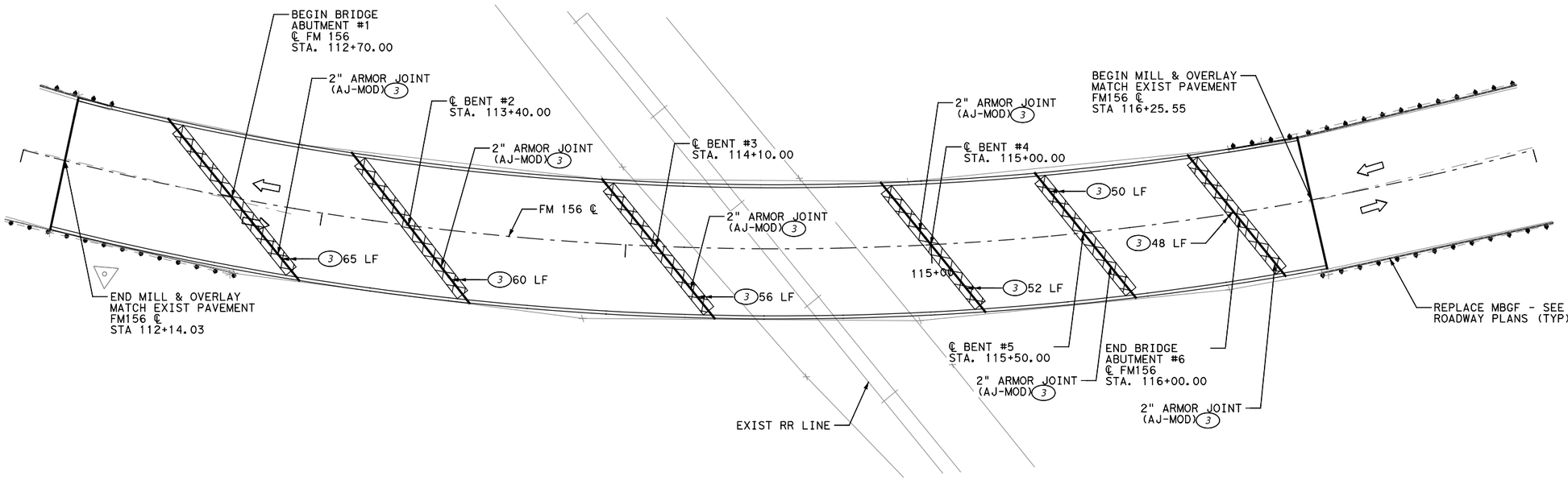
100% PLANS SUBMITTAL

0 20 40 60 80
SCALE IN FEET

BRIDGE PLAN LEGEND

ARMOR JOINT REPLACEMENT AND CLEAN AND SEAL JOINTS (FOAM)

(X) REPAIR DESIGNATION - SEE "BRIDGE REPAIR TABLE" SHEET



PLAN

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO FM156 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO "BRIDGE REPAIR TABLE" SHEET FOR INFORMATION NOT SHOWN.
3. REFER TO ROADWAY SHEETS FOR MILL & OVERLAY LIMITS.
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Cory L. Shipman
STATE OF TEXAS
CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

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HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

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FM 156

BRIDGE LAYOUT
BNSF RR

SCALE: 1"=40'

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	127
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
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PENTABLE: I0246000.tbl
TIME: 5:11:21 PM SCALE: 1:40

100% PLANS SUBMITTAL

TABLE OF REPAIRS

CSJ NO. / NBI NO.	REPAIR NO.	REPAIR DESCRIPTION/LOCATION	BID CODE	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
CSJ 0718-02-022 NBI 02-220-0-0718-02-039	(3)	Reconstruct concrete deck full-depth on both sides of the joints. Replace the joint with an Armor Joint. Then, install a foam compressible seal after cleaning and preparing the joints. See Bridge Layout for locations.	785 6010	BRIDGE JOINT REPLACEMENT (ARMOR)	331	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering plates. See Armor Joint Repair at Abutments on Bridge Repair Details sheet.
			* 438 6011	CLEANING AND SEALING JOINTS (FOAM)	331	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering joint materials. Refer to Bridge Foam Expansion Joint Seal (MOD) sheet for details.

* Not a separate pay item. Subsidiary to the Bid Item 785-6010 Bridge Joint Replacement (Armor).

CORY L. SHIPMAN
STATE OF TEXAS
82762
REGISTERED PROFESSIONAL ENGINEER
1/17/23

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Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

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FM 156

BRIDGE REPAIR TABLE
BNSF RR

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	128
CONTROL	SECTION	JOB	
0718	02	072	

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FILE: FM156-BRIDGE-07.dgn

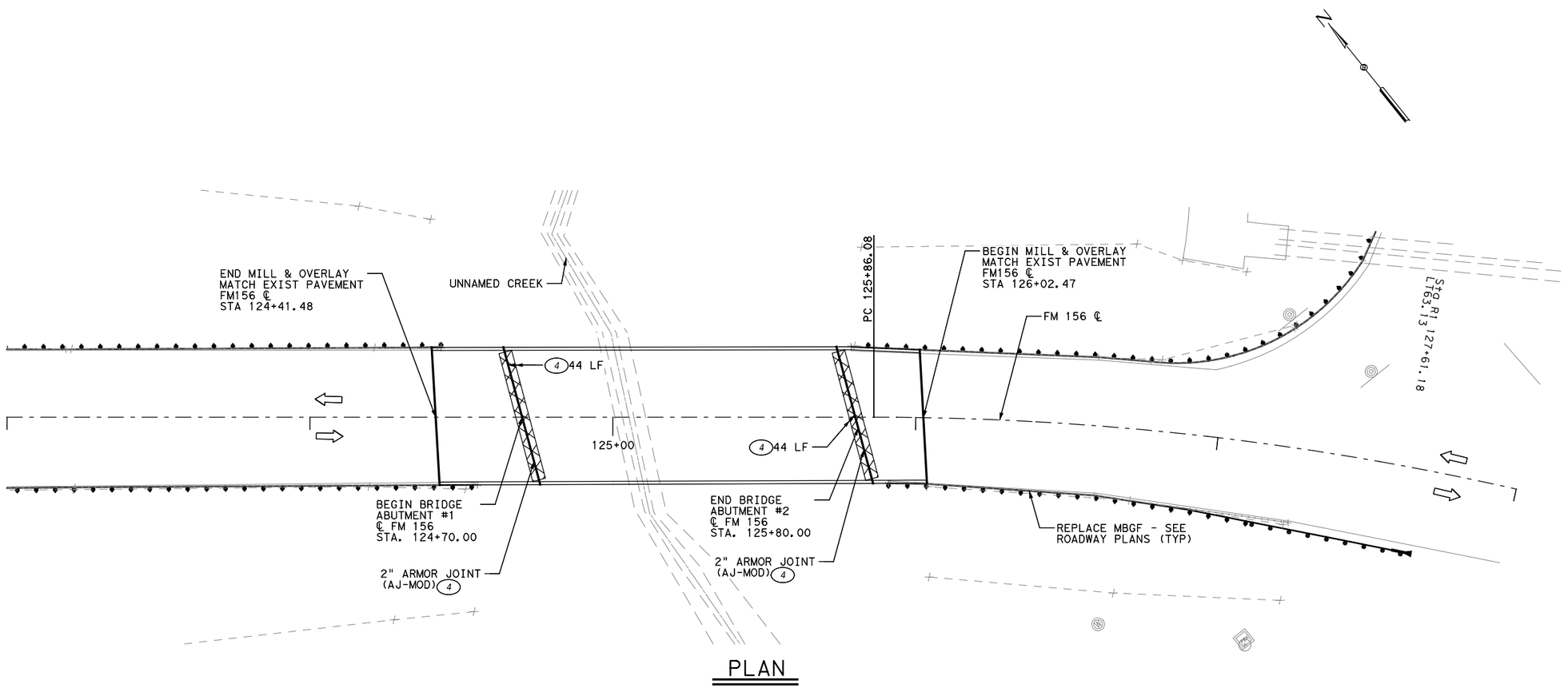
100% PLANS SUBMITTAL

0 20 40 60 80
SCALE IN FEET

BRIDGE PLAN LEGEND

ARMOR JOINT REPLACEMENT AND CLEAN AND SEAL JOINTS (FOAM)

(X) REPAIR DESIGNATION - SEE "BRIDGE REPAIR TABLE" SHEET



PLAN

NOTES:

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CORY L. SHIPMAN
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1/17/23

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Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE LAYOUT
TRIB OF HENRIETTA CREEK
NO. 2

SCALE: 1"=40'

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	129
CONTROL	SECTION	JOB	
0718	02	072	

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DATE: 1/16/2023
TIME: 5:11:32 PM
PENTABLE: 10246000.tbl
SCALE: 1:40

100% PLANS SUBMITTAL

TABLE OF REPAIRS

CSJ NO. / NBI NO.	REPAIR NO.	REPAIR DESCRIPTION/LOCATION	BID CODE	BID ITEM DESCRIPTION	QUANTITY	UNIT	DETAILS/NOTES
CSJ 0718-02-022 NBI 02-220-0-0718-02-040	(4)	Reconstruct concrete deck full-depth on both sides of the joints. Replace the joint with an Armor Joint. Then, install a foam compressible seal after cleaning and preparing the joints. See Bridge Layout for locations.	785 6010	BRIDGE JOINT REPLACEMENT (ARMOR)	88	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering plates. See Armor Joint Repair at Abutments on Bridge Repair Details sheet.
			* 438 6011	CLEANING AND SEALING JOINTS (FOAM)	88	LF	Lengths shown on Bridge Layout sheets are approximate; field verify prior to ordering joint materials. Refer to Bridge Foam Expansion Joint Seal (MOD) sheet for details.

* Not a separate pay item. Subsidiary to the Bid Item 785-6010 Bridge Joint Replacement (Armor).

Cory L Shipman

STATE OF TEXAS
CORY L. SHIPMAN
82762
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PROFESSIONAL ENGINEER

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Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

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FM 156

BRIDGE REPAIR TABLE
TRIB OF HENRIETTA CREEK
NO. 2 SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	130
CONTROL	SECTION	JOB	
0718	02	072	

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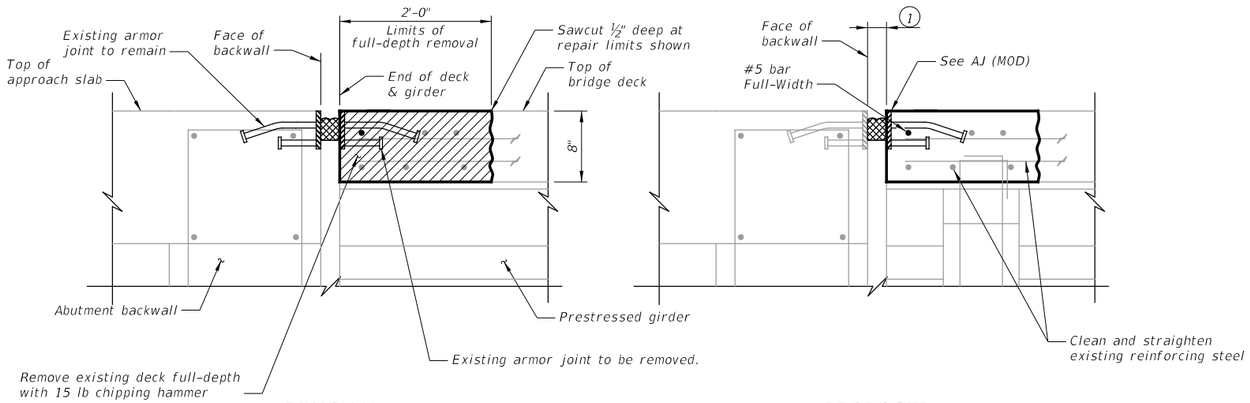
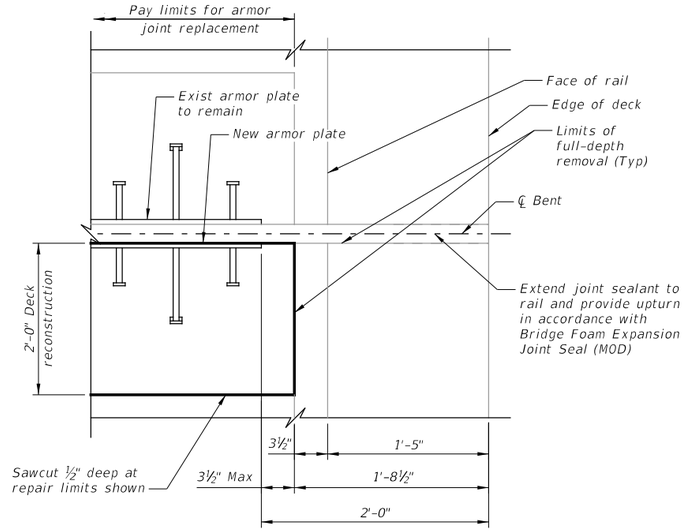


REMOVAL PROPOSED

ARMOR JOINT REPAIR AT ABUTMENTS



PLAN OF ARMOR PLATE AND JOINT RECONSTRUCTION

ARMOR JOINT REPAIR DETAILS - TRIB OF HENRIETTA CREEK NO. 1 BRIDGE

ARMOR JOINT REPAIR NOTES:

Identify and mark all repair locations prior to beginning work. Verify areas, repair type, and quantities with the Engineer. Contractor shall verify joint widths prior to ordering materials.

Deck concrete shall be Class K concrete (f'c = 4,000 psi). Class K concrete shall attain a minimum f'c of 4,000 psi within a maximum of 24 hours.

Reinforcing steel shall be Grade 60.

Avoid damage to existing concrete girders and diaphragms. Repair concrete damage per Item 429, "Concrete Structure Repair". Repair is incidental to Item 785, "Bridge Joint Replacement".

Payment is per Item 785, "Bridge Joint Replacement". Payment for sealing joints is per Item 438, "Cleaning and Sealing Joints".

(1) Set joint opening to width shown on AJ (MOD).

Cory L. Shipman

STATE OF TEXAS
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82762
REGISTERED PROFESSIONAL ENGINEER
1/17/23

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HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

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FM 156

BRIDGE REPAIR DETAILS

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	
CONTROL	SECTION	JOB	131
0718	02	072	

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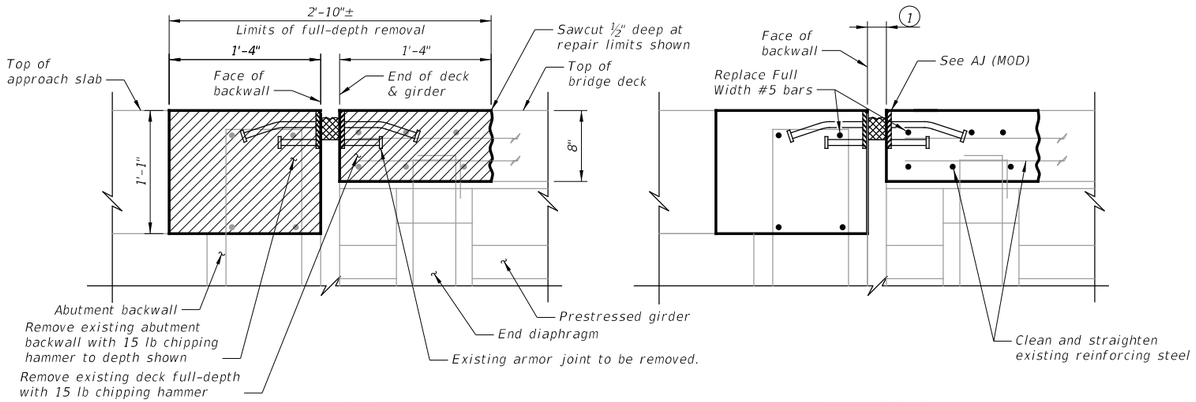
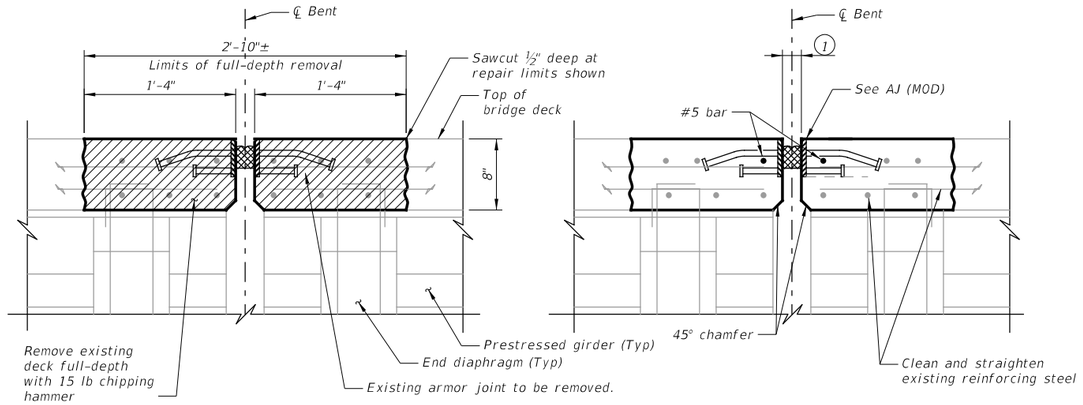


REMOVAL PROPOSED

ARMOR JOINT REPLACEMENT AT ABUTMENTS



REMOVAL PROPOSED

ARMOR JOINT REPLACEMENT AT INTERIOR BENTS

ARMOR JOINT REPAIR DETAILS - BNSF RR AND TRIB HENRIETTA CREEK NO. 2 BRIDGE

See Sheet 3 of 3 for Plan View

ARMOR JOINT REPLACEMENT NOTES:

Identify and mark all repair locations prior to beginning work. Verify areas, repair type, and quantities with the Engineer. Contractor shall verify joint widths prior to ordering materials.

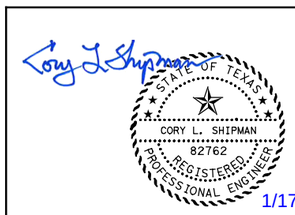
Deck concrete shall be Class K concrete (f'c = 4,000 psi). Class K concrete shall attain a minimum f'c of 4,000 psi within a maximum of 24 hours.

Reinforcing steel shall be Grade 60.

Avoid damage to existing concrete girders and diaphragms. Repair concrete damage per Item 429, "Concrete Structure Repair". Repair is incidental to Item 785, "Bridge Joint Replacement".

Payment is per Item 785, "Bridge Joint Replacement". Payment for sealing joints is per Item 438, "Cleaning and Sealing Joints".

(1) For armor joint replacements, set joint opening to width shown on AJ (MOD).



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Firm Registration No. F-754
613 NW Loop 410, Suite 700
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210.841.2800

Texas Department of Transportation

FM 156

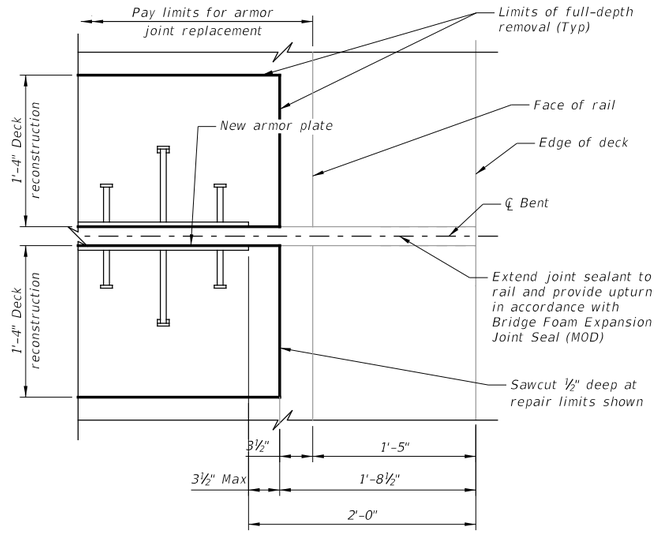
BRIDGE REPAIR DETAILS

SHEET 2 OF 3

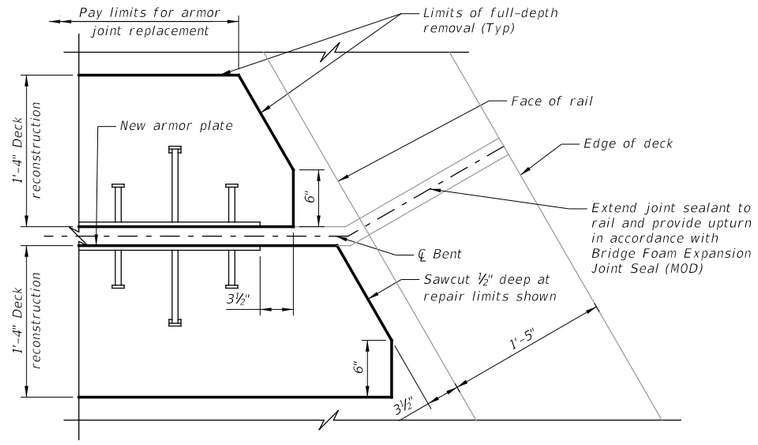
FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	132
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg
USER: EWANG DATE: 1/16/2023
FILE: FM156-BRIDGE-11.dgn
PENTABLE: 10246000.tbl
TIME: 5:11:40 PM SCALE: 1:1.33333

100% PLANS SUBMITTAL



PLAN OF ARMOR PLATE AND JOINT RECONSTRUCTION



PLAN OF ARMOR PLATE AND JOINT RECONSTRUCTION

NOTES:
1. See Sheet 2 of 3 for Notes.

ARMOR JOINT REPAIR DETAILS - BNSF RR AND TRIB HENRIETTA CREEK NO. 2 BRIDGE

CORY L. SHIPMAN
82762
REGISTERED PROFESSIONAL ENGINEER
STATE OF TEXAS
1/17/23

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HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Texas Department of Transportation

FM 156

BRIDGE REPAIR DETAILS

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		FM156
STATE	DISTRICT	COUNTY	SHEET NO.
TEXAS	FTW	TARRANT	133
CONTROL	SECTION	JOB	
0718	02	072	

PLOT DRIVER: TXDOT_PDF_BW.pltcfg PENTABLE: I0246000.tbl
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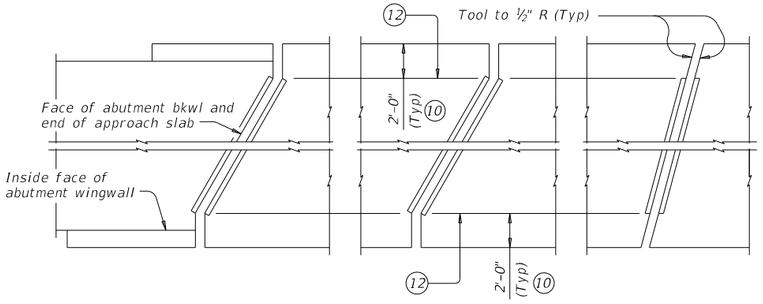
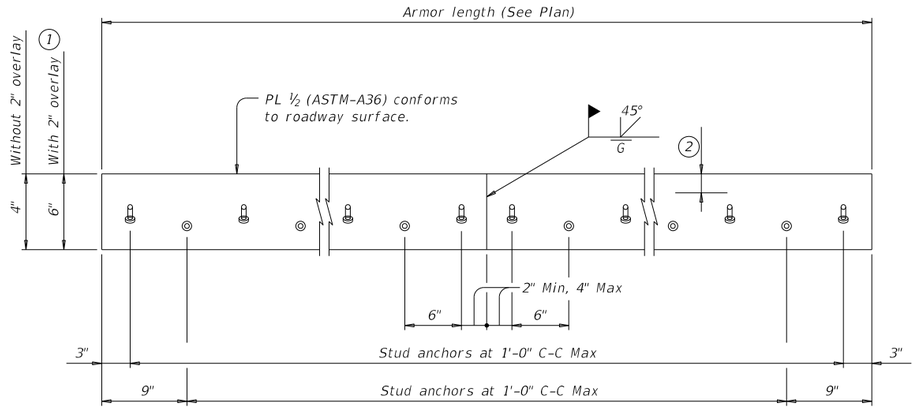
FILE: FM156-BRIDGE-12.dgn

DATE: 1/16/2023 5:11:44 PM
FILE: SFILES



JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES



ELEVATION OF BASIC ARMOR PLATE

(1) Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.

(2) Do not paint top 1 ½" of plate if using sealed armor joint.

(3) Not used.

(4) Blast clean entire contact area between seal and plate (SSPC-SP10) before installing seal. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint seal.

(5) See ~~Cleaning and Sealing Existing Joints on the Bridge Repair Details sheets for foam compression seal.~~ Bridge Foam Expansion Joint Seal (MOD).

(6) Not used.

(7) Not used.

(8) Armor joint (sealed) includes preformed joint seal sized for measured joint opening. Provide model "FS" foam compression seal by Watson Bowman Acme, BEJS seal by EMseal/Sika, or approved equal.

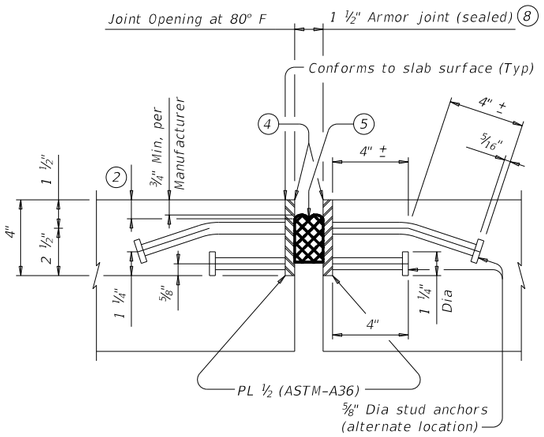
(9) Not used.

(10) Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

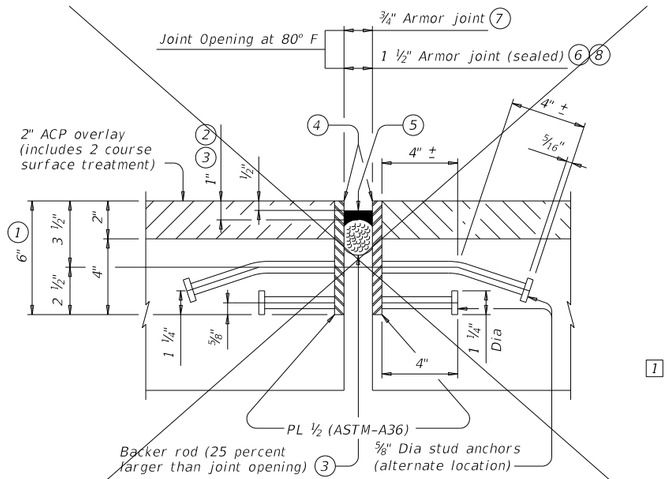
(11) Not used.

(12) At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.

(13) Align shipping angle perpendicular to joint.



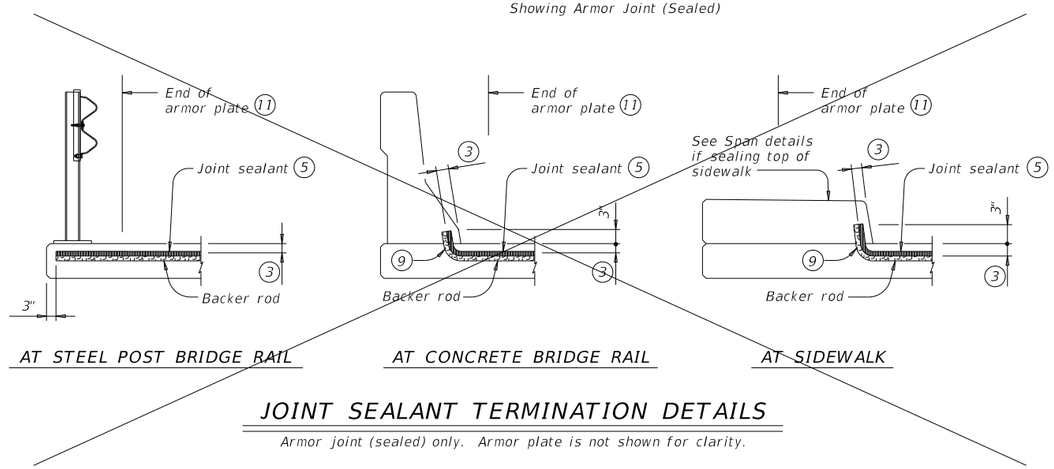
1 SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



SHOWN WITH 2" OVERLAY AT JOINT LOCATION (1)

ARMOR JOINT SECTIONS

Showing Armor Joint (Sealed)



AT STEEL POST BRIDGE RAIL | AT CONCRETE BRIDGE RAIL | AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor joint (sealed) only. Armor plate is not shown for clarity.

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.

Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section, except as stated in Note 2, with System II or IV primer in accordance with Item 446 "Field Cleaning and Painting Steel." Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Items 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

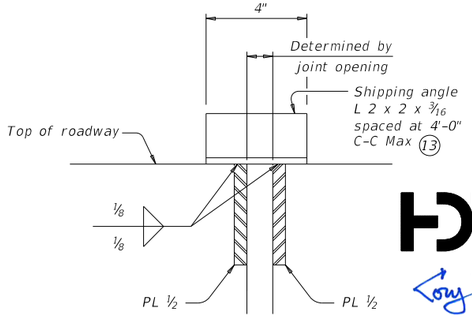
Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.

Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

1 GENERAL NOTES:

Provide armor joints at locations shown on the plans. ~~Provide the seal when "Armor Joint (Sealed) is noted on the plans. These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅝" closure movement). Payment for armor joint, with or without seal, is based on length of armor plate.~~

Provide foam compression seal at all locations. Foam compression seal is paid for separately under Item 438, "Cleaning and Sealing Joints".



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION
With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

WEIGHTS FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 plf
WITH 2" OVERLAY (1)	22.90 plf

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

STATE OF TEXAS
CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER
1/17/23

1 Updated notes and details for foam compression seal. Deleted payment note. Oct 2020.

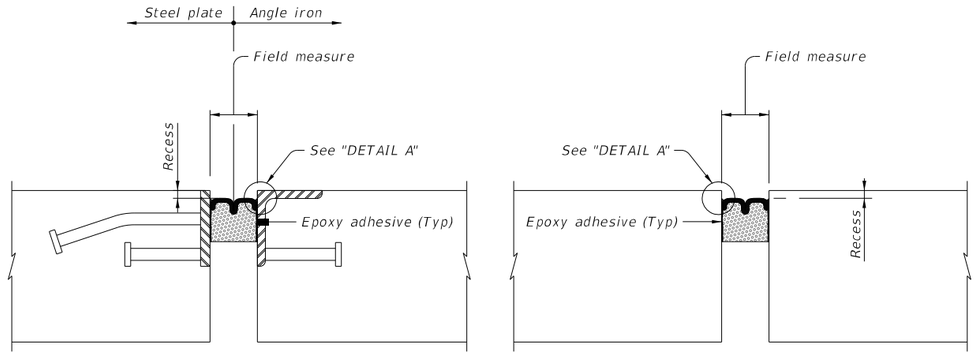
Texas Department of Transportation

Bridge Division Standard

ARMOR JOINT DETAILS

AJ (MOD)

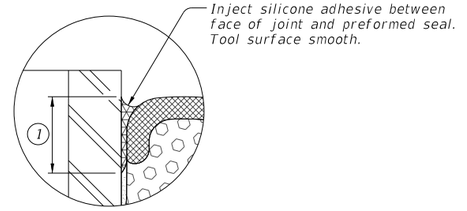
FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		134



SHOWING STEEL NOSING

SHOWING CONCRETE NOSING

JOINT SECTIONS



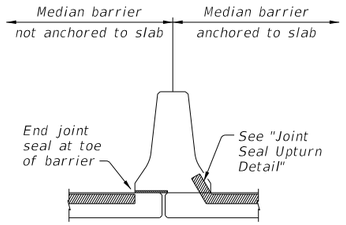
DETAIL A

APPROVED PRECOMPRESSED FOAM SEAL MANUFACTURERS

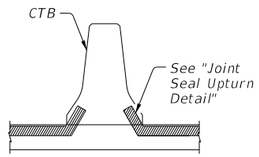
MANUFACTURER (2)	STEEL OR CONCRETE SECTION	SEAL TYPE
Watson Bowman Acme	As shown	Wabo FS
SSI	As shown	Silspec SES
Sealtite	As shown	Sealtite 50N
EMSEAL	As shown	BEJS

(1) Injection depth as recommended by Manufacturer.

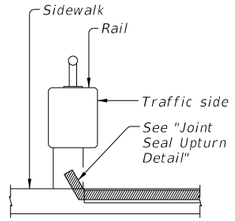
(2) Other manufacturers of bridge expansion joint foam seal may be listed on the plans.



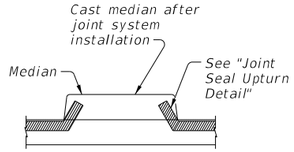
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



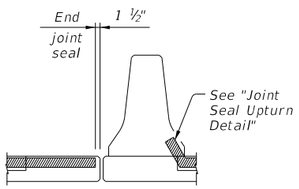
AT CONCRETE TRAFFIC BARRIER



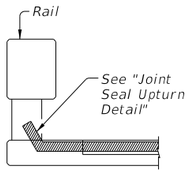
AT SIDEWALK BEHIND BRIDGE RAIL



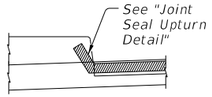
AT RAISED MEDIAN



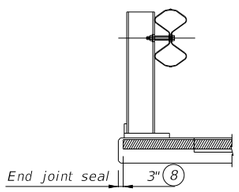
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

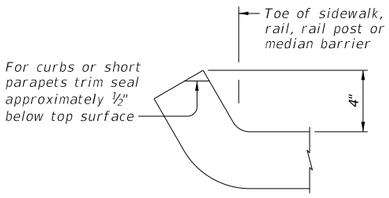


AT SIDEWALK



AT STEEL POST BRIDGE RAIL

JOINT SEALANT TERMINATION DETAILS



JOINT SEAL UPTURN DETAIL

PROCEDURES:

1) Correctly size joint seal based on field measurement and in accordance with Manufacturer's specifications. Multiple seal widths may be required. Ensure proper seal is selected for each joint.

2) Abrasive blast clean existing joint surfaces where seal is to be applied.

3) Wipe down joint surfaces to remove contaminants.

4) Mask areas adjacent to joint opening sufficiently to keep epoxy off deck surface.

5) Apply epoxy to joint opening side surfaces.

6) While epoxy is still tacky, remove shrink wrap from seal and install in joint opening.

7) Recess top of joint seal ½" in travel lanes and ¼" in shoulders.

8) Inject silicone adhesive along top interface of seal with joint side surface. Tool to spread adhesive as necessary.

CONSTRUCTION NOTES:

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

Splice and install seal in accordance with the Manufacturer's directions and with the adhesive provided by the Manufacturer.

Extend sealant up into rail or curb 4 inches on low side or sides of deck.

GENERAL NOTES:

Provide pre-compressed silicone and foam hybrid joint seal in the size and at locations shown on the plans.

Payment is based on the length of seal placed and in accordance with Item 438, "Cleaning and Sealing Joints."

HDR
Firm Registration No. F-754
613 NW Loop 410, Suite 700
San Antonio, Texas 78216
210.841.2800

Cory L Shipman

STATE OF TEXAS
CORY L. SHIPMAN
82762
REGISTERED
PROFESSIONAL ENGINEER

1/17/23

Texas Department of Transportation — Bridge Division

BRIDGE FOAM EXPANSION JOINT SEAL (MOD)

FILE: WD-PFEJ-22.dgn	DN:	CK:	DW:	CK:
©TxDOT August 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		135

DATE: 1/16/2023 5:11:45 PM
FILE: $FILE$

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

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

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0718-02-072

1.2 PROJECT LIMITS:

From: DENTON/TARRANT COUNTY LINE

To: US 287

1.3 PROJECT COORDINATES:

BEGIN: (Lat)32.991511, (Long)-97.342242

END: (Lat)32.916028,(Long)-97.348712

1.4 TOTAL PROJECT AREA (Acres): 27.27

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.75

1.6 NATURE OF CONSTRUCTION ACTIVITY:
MILL, OVERLAY, BASE REPAIR, AND BRIDGE REPAIR

1.7 MAJOR SOIL TYPES:

Soil Type	Description
PURVES CLAY, 1 TO 3% SLOPES	89% CLAY, WELL DRAINED, HIGH RATE OF RUNOFF, CLASS 1 EROSION
SANGER CLAY, 1 TO 3% SLOPES	90% CLAY, WELL DRAINED, VERY HIGH RATE OF RUNOFF, CLASS 1 EROSION
SANGER CLAY, 3 TO 5% SLOPES	90% CLAY, WELL DRAINED, VERY HIGH RATE OF RUNOFF, CLASS 1 EROSION
SLIDELL CLAY, 1 TO 3% SLOPES	85% CLAY, MODERATELY WELL DRAINED, VERY HIGH RATE OF RUNOFF, CLASS 1 EROSION

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☒ Mobilization
☒ Install sediment and erosion controls
☒ Blade existing topsoil into windrows, prep ROW, clear and grub
☒ Remove existing pavement
☒ Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☒ Remove existing culverts, safety end treatments (SETs)
☒ Remove existing metal beam guard fence (MBGF), bridge rail
☒ Install proposed pavement per plans
☒ Install culverts, culvert extensions, SETs
☒ Install mow strip, MBGF, bridge rail
☒ Place flex base
☒ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☐ Revegetation of unpaved areas
☒ Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☒ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☒ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☒ Long-term stockpiles of material and waste
☐ Other: _____
☐ Other: _____
☐ Other: _____

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

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

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

MS4 Entity

EN WANG 123262 LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
01/16/23

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			136
STATE	STATE DIST.	COUNTY	
TEXAS		TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0718	02	072	FM156

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ X Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ 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

- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- X ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

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

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

T / P

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

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

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

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

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

2.8 INSPECTIONS:

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

2.9 MAINTENANCE:

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

STATE OF TEXAS
EN WANG
123262
LICENSED
PROFESSIONAL ENGINEER

01/16/23

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			137
STATE	STATE DIST.	COUNTY	
TEXAS		TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0718	02	072	FM156

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.

☐ 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:

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.

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

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. Areas within the existing ROW, but outside the limits of construction, would not be disturbed. Every effort would be made to preserve trees where they would neither compromise safety nor substantially interfere with the proposed projects.
2. Apply hydromulching and/or hydroseeding in areas for soil stabilization and/or revegetation of disturbed areas where feasible. If hydromulching and/or hydroseeding are not feasible due to site conditions, utilize erosion control blankets or mats that contain no netting or contain loosely woven, natural fiber netting preferred. Plastic netting should be avoided to the extent practicable.
3. Avoid or minimize disturbing or removing downed trees, rotting stumps, and leaf litter where feasible.

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

☐ No Action Required ☒ Required Action

Action No.

1. Between October 1 and February 15, the contractor would remove all old migratory bird nests from any structure that would be affected by the proposed project, and complete any bridge work/demolition and /or vegetation clearing. In addition, the contractor would be prepared to prevent migratory birds from building nests by utilizing nest prevention methods, such as bird-deterrent netting and bird-repelling sprays and/or gels, between February 15 and October 1. In the event that migratory birds are encountered on-site during project construction, adverse impacts on protected birds, active nests, eggs, and/or young would be avoided.
2. The Eagle Protection Act prohibits the taking or possession of and commerce in eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Eagles may not be taken for any purpose unless a permit is issued prior to the taking.
3. Be advised of potential occurrence of the Western burrowing owl.The contractor would be prepared to take appropriate measures to avoid disturbing, destroying, or removing active nests, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests, as preactivable. As necessary, take appropriate measures to prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair.
4. Collecting, capturing, relocation, or transporting birds, eggs, young, or active nests without a permit is prohibited.
5. The contractor and/or TxDOT personnel would be advised of potential for Whooping Cranes to occur within the project limits. Construction personnel will be advised to avoid adverse impacts to this species and to report any sightings to TxDOT District Environmental staff. Drainage modifications will be limited to the extent practical to accommodate the additional paved surface needed to bring the roadway up to current TxDOT safety standards. The construction personnel will report all sightings to TxDOT Fort Worth District Environmental staff. Reports should include the time, date and location and any available photos.
6. Be advised of potential occurrence of the Timber rattlesnake, Texas garter snake and the Plains spotted skunk in the project area, and to avoid harming the species if encountered.
7. If reptiles are found on the project site, to allow the species to safely leave the project area.

V. (CONT.)

8. For open trenches and excavated pits, install escape ramps at an angle of less than 45 degrees (1:1) in areas left uncovered. Visually inspect excavation areas for trapped wildlife prior to backfilling.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

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

STATE OF TEXAS
EN WANG
123262
REGISTERED
PROFESSIONAL ENGINEER

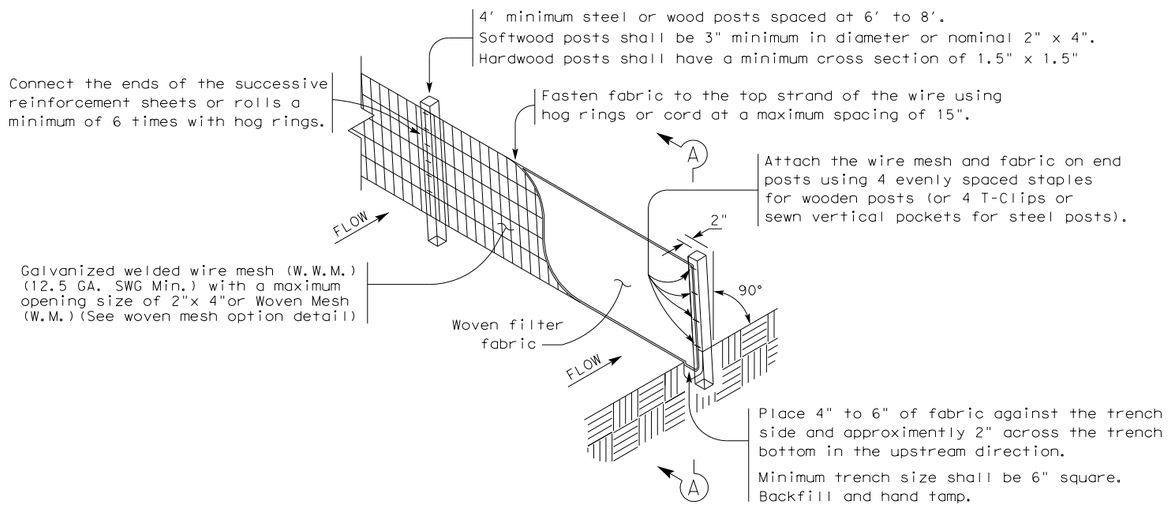
01/16/23

Texas Department of Transportation

Design Division Standard

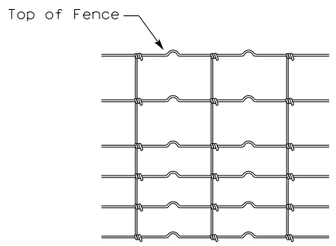
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC

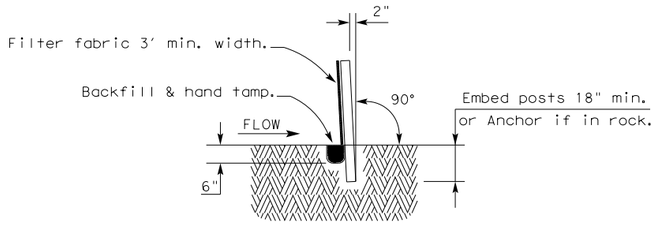
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0718	02	072	FM156	
	DIST		COUNTY	SHEET NO.	
	FTW		TARRANT	138	



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.

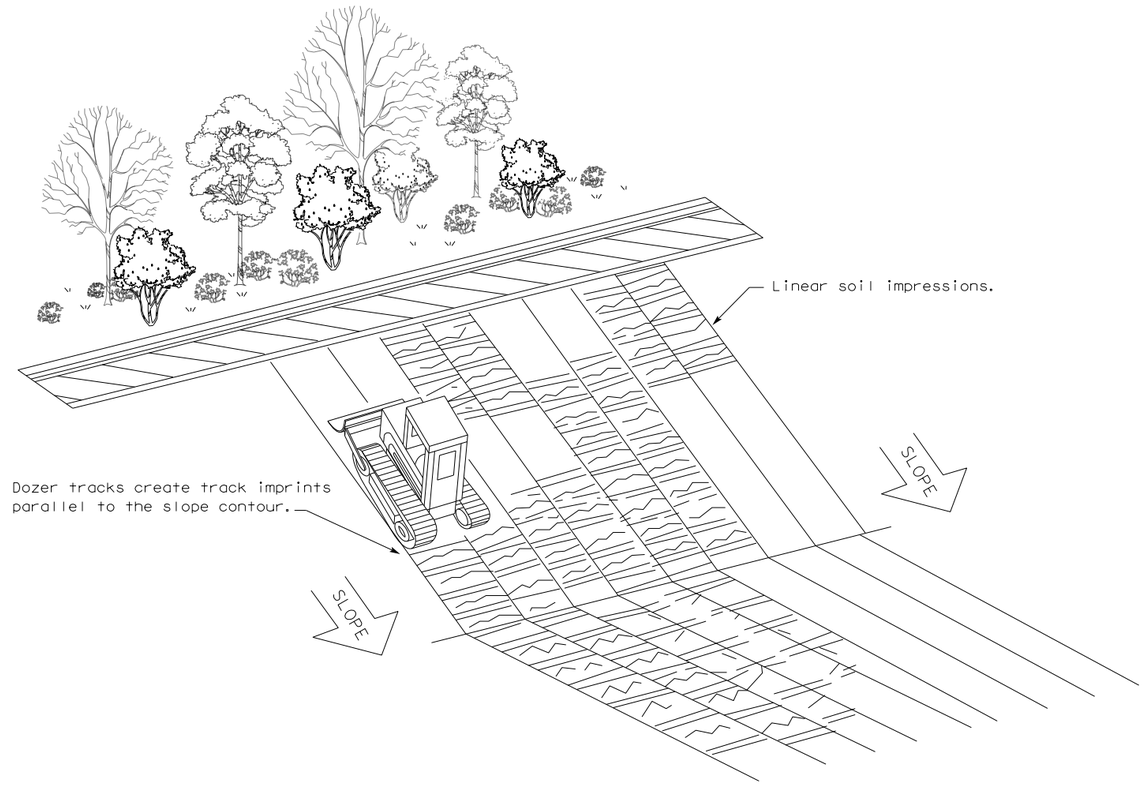
LEGEND

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
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0718	02	072		FM156	
	DIST	COUNTY			SHEET NO.	
	FTW	TARRANT			139	

10AUG2023
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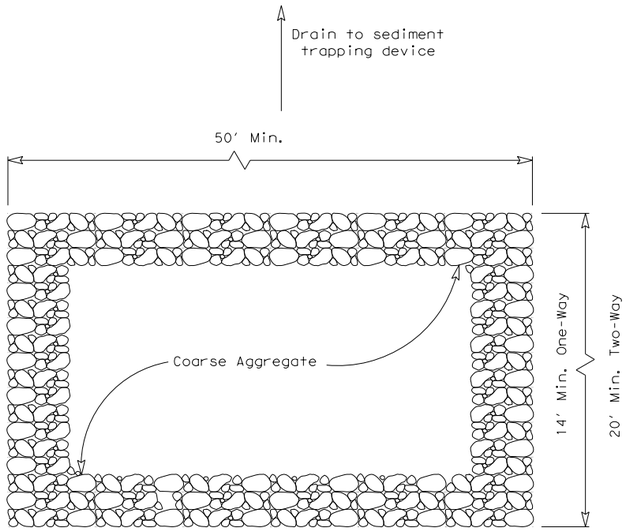
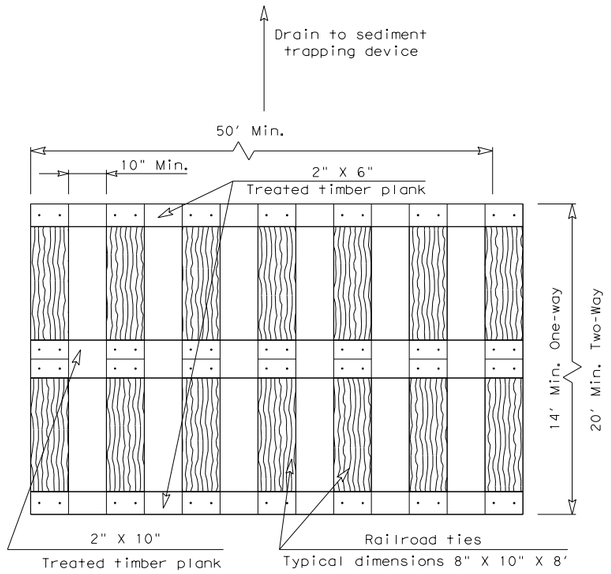


PLAN VIEW



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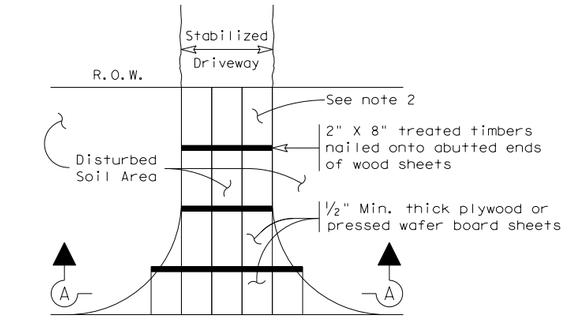

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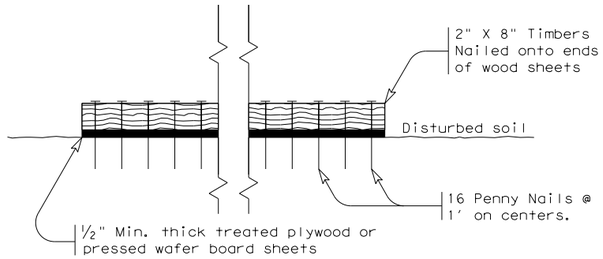
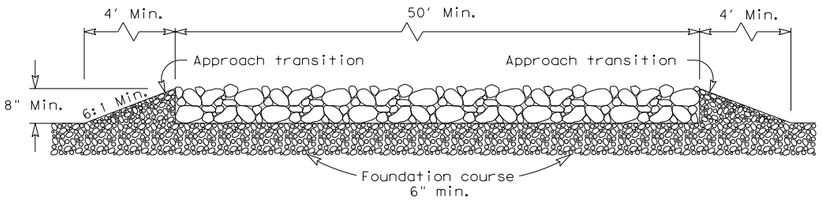


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

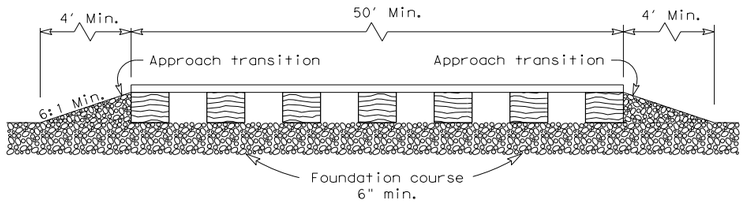
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0718	02	072	FM156
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	FTW	TARRANT		140

DATE: 1/16/2023
FILE: $FILE$

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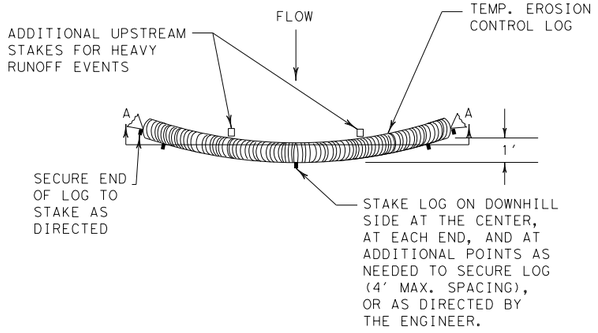
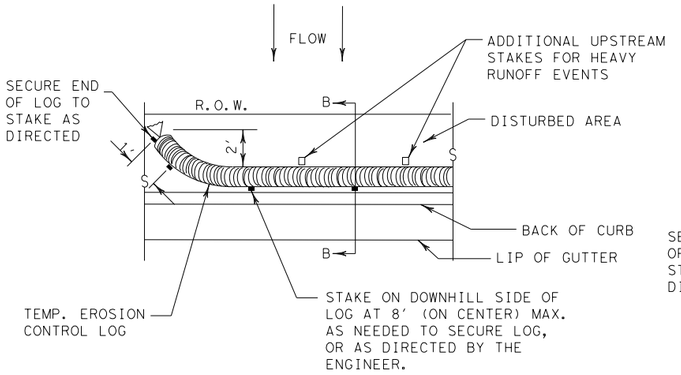


PLAN VIEW



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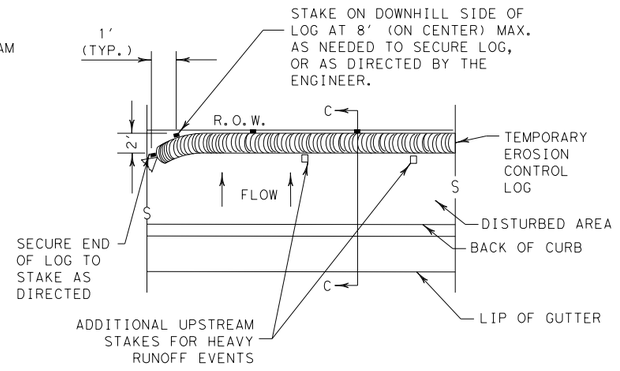
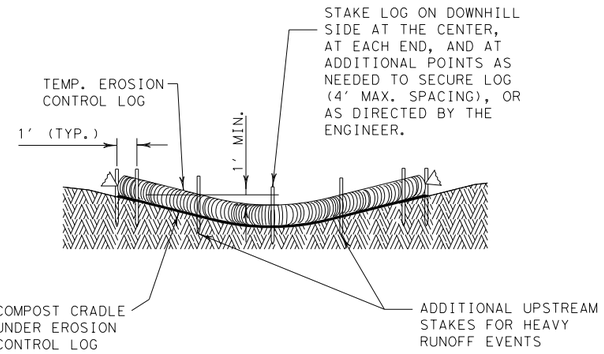


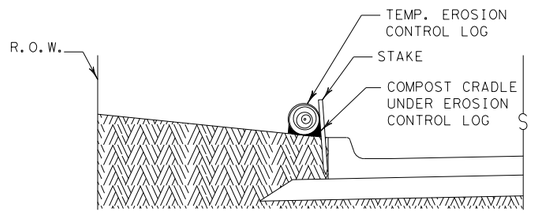
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

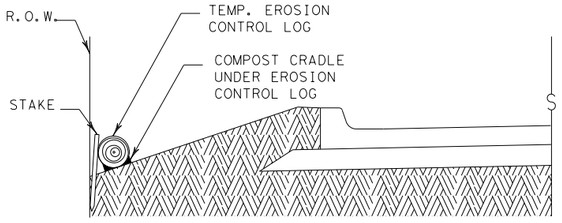
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



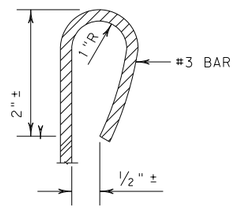
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

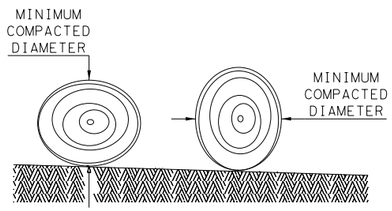
- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
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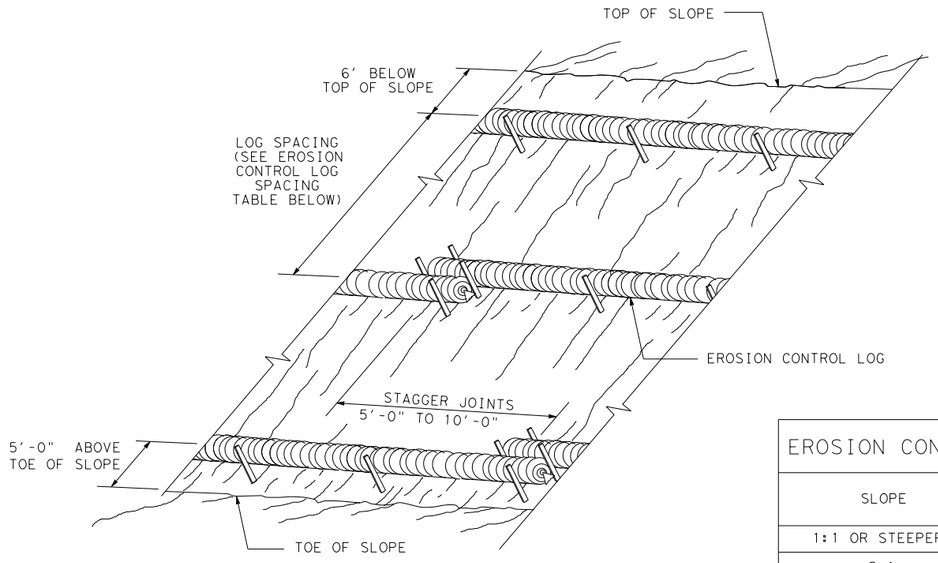
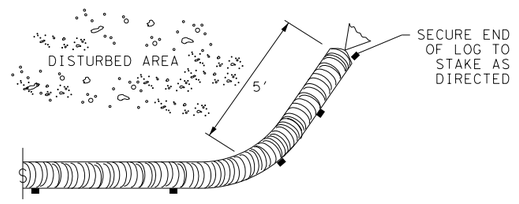
REVISIONS						
	DIST	COUNTY				SHEET NO.
						141

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

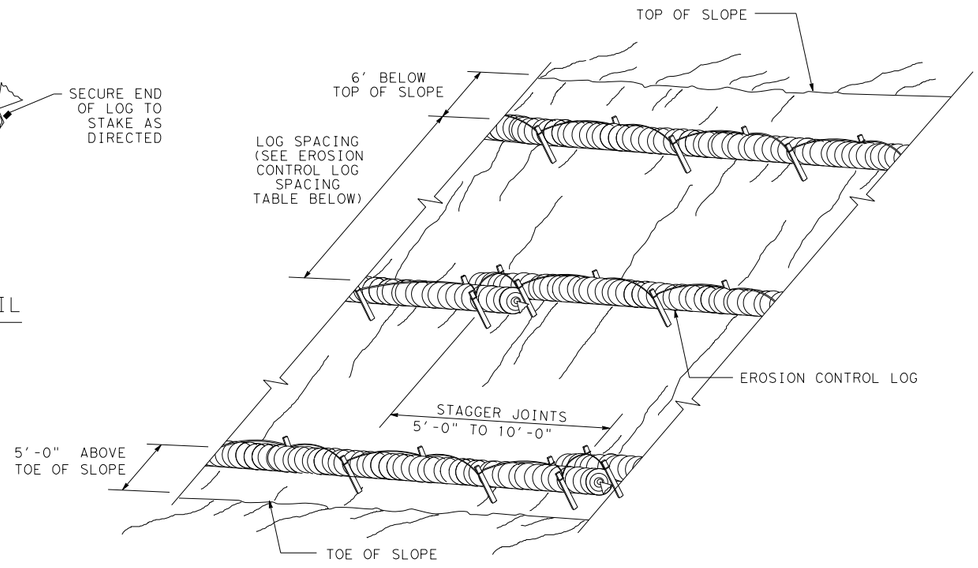
CL-SST



END SECTION RAP DETAIL

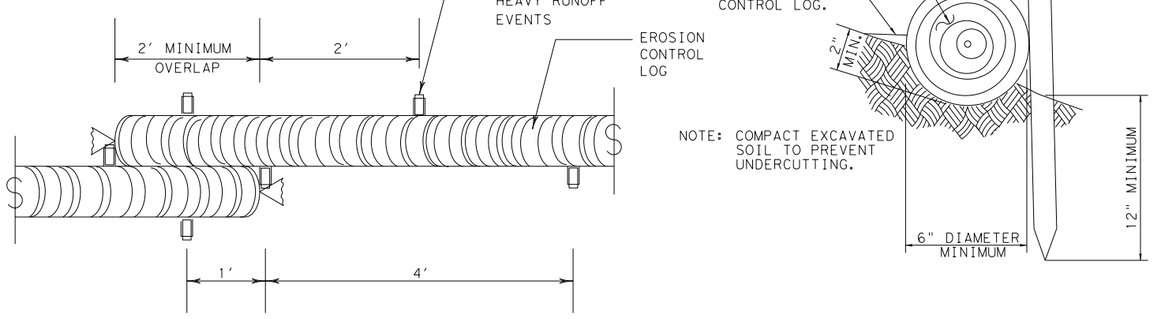
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

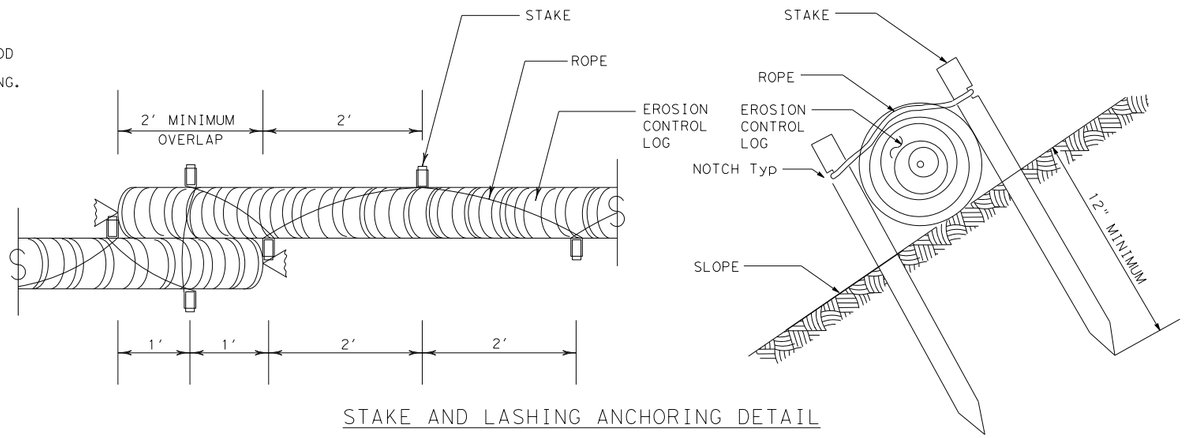
CL-SSL



STAKE AND TRENCHING ANCHORING DETAIL

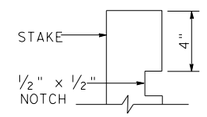
CL-SST

TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

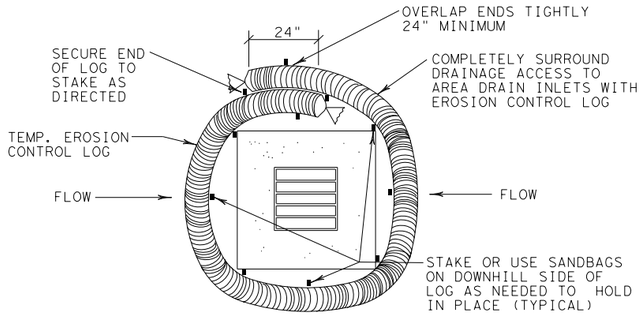
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

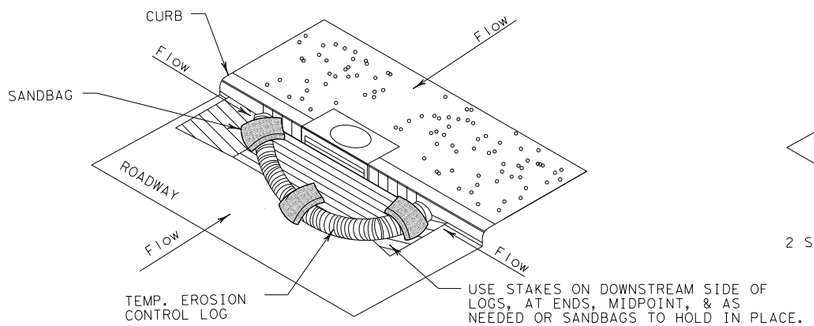
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
	DIST	COUNTY		SHEET NO.	
				142	

DATE:
FILE:



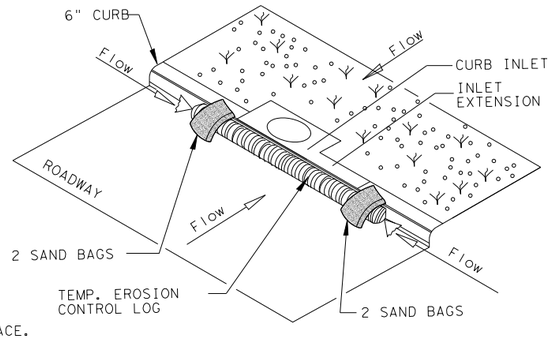
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

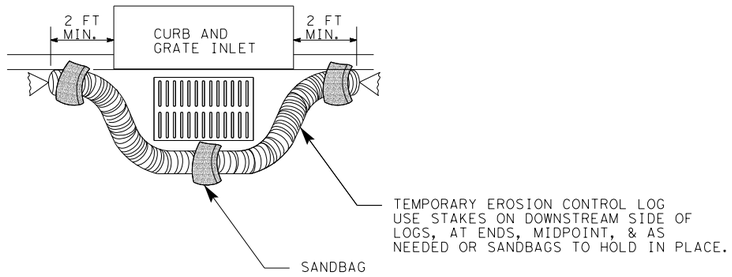
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

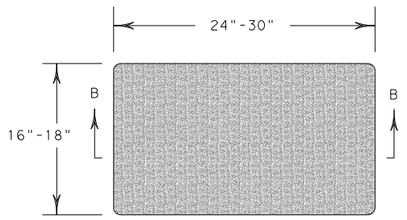
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
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REVISIONS					
	DIST	COUNTY		SHEET NO.	
				143	